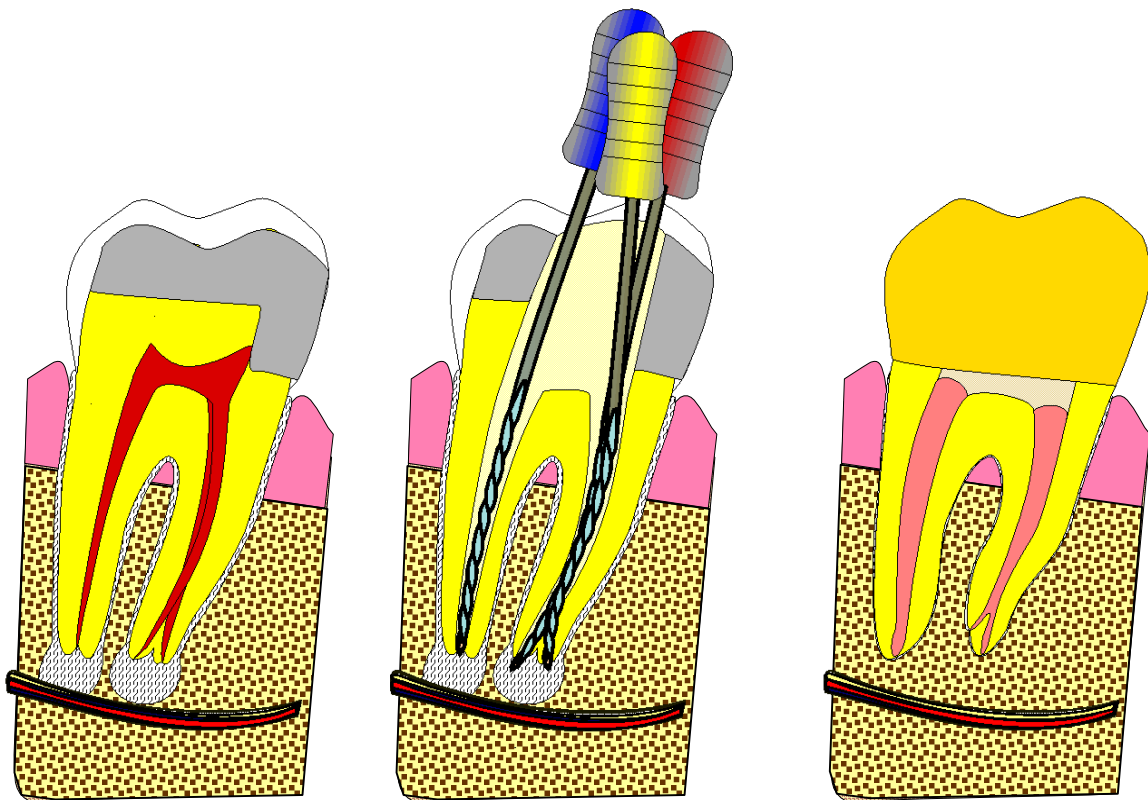


ENDODONTIC

CLINIC MANUAL
CLASS OF 2019



DR. ANDREW P. GOLDBECK, PROFESSOR

DR. DAVID CLEMENT, ASSOCIATE PROFESSOR

DR. SUHAIR JAMBI, ASSISTANT PROFESSOR

DEPARTMENT OF ENDODONTICS

COLLEGE OF DENTISTRY

UNIVERSITY OF OKLAHOMA HEALTH SCIENCES CENTER

ENDODONTIC CLINIC MANUAL

**The University of Oklahoma College of Dentistry
Department of Endodontics**

Class of 2019

Dr. Andrew P. Goldbeck
Professor

Dr. David Clement
Associate Professor

Dr. Suhair Jambi
Assistant Professor

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The University of Oklahoma Health Sciences Center
College of Dentistry
Department of Endodontics

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ADVANCED ORGANIZER

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ENDODONTIC CLINIC MANUAL

Description:

This clinic manual contains a brief review of treatment techniques along with a detailed description of departmental policies and procedural guidelines. All students should review the sections and complete the formative test of objectives for each section.

Rationale:

Providing patient treatment in a new clinical discipline is always an emotionally taxing endeavor. Although the stress associated with your first few experiences cannot be completely eliminated, it can be greatly reduced if you are familiar with the procedures which you will be expected to follow.

Departmental Goals:

The student will be able to complete the following tasks in their entirety.

- I. Initiate an Endodontic case by providing adequate information at the appropriate time to the department secretary.
- II. Complete an initial case work-up without error.
- III. Arrange instruments and materials in such a manner that efficient, aseptic Endodontic treatment can be provided.
- IV. Isolate any tooth that requires Endodontic treatment.
- V. Cut an access preparation which allows free passage of instruments to the apical 1/3 of the root canal.
- VI. Prepare the appropriate roots to the appropriate preparation sizes.
- VII. Obturate instrumented canals with three-dimensional fills, restore the completed root canal treated tooth, and document Endodontic treatment radiographically.
- VIII. Expose accurate, useful radiographs of completed cases, and write-up cases using standardized entries.
- IX. Provide acceptable radiographs and records and submit treatment plans for referral of complex cases.
- X. Complete necessary requirements, including clinical competencies, in the allotted time for graduation.

Reasonable Accommodation for Disabilities Policy

The University of Oklahoma complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Students with disabilities who require special accommodations related to work in a course are recommended to notify the course instructor in writing within the first week of the course. Students must also formally request reasonable accommodations for documented disabilities through Suzette Dyer at the OU Disability Resource Center (620 Elm Avenue, Suite 166, Goddard Health Center, Norman Campus). 405.325.3852 (Voice), 405.325.4173 (TDD), 405.325.4491 (FAX). The center will confirm the disability and work with the course instructor in making reasonable accommodations. Please go to <http://drc.ou.edu/content/view/164/120/> for additional information, policies, procedures and additional resources.

SECTION I

MINIMUM CLINICAL EXPERIENCES AND GRADING

Description:

This section describes the typical minimum endodontic clinical experiences expected for the third and fourth years of pre-doctoral endo education and clinical requirements for graduation.

Rationale:

The Endodontic requirements for graduation are provided so that the student may allot his/her time appropriately throughout the two years of providing clinical endodontic care to patients as a pre-doctoral student.

A. DS III Minimum Clinical Experiences for Promotion to the DS IV year

Pre-requisites for DS III Clinical Endodontic Course are:

**ENDO 7125 (Passing Endo Pre-clinical Laboratory and Didactic course)
2 Pre-clinical Competency Exams: Clinically Acceptable Laboratory
Treatment of a Single Rooted Tooth and Diagnosis Mock Patient Exercise**

**DS III Clinical Competency Examinations as well as a
Minimum of 4 treated and graded canals**

B. DS IV Minimum Clinical Experience Totals for Graduation:

**Pre-Requisites for enrolling in the DS IV Endo Clinical Courses are:
Successful Completion of ALL DS II and DS III Endodontic Requirements**

**2 DS IV Competency Examinations (Diagnostic and Clinical) as well as a total of 10 a
treated and graded canals**

8 Points (for miscellaneous endodontic procedures), of which

**2 Recall points / 2 Endodontic Recalls (one point each for an endodontic recall)
4 Core Build-up points / 2 Core build-ups (2 points for each core build-up)
2 Points from any of several possible miscellaneous endodontic procedures**

Each student is required to complete a required minimum of ten (10) endodontic canals, all of which are treated to a ‘clinically acceptable’ level and adhere to basic objectives of root canal therapy. Students are encouraged to treat more than the minimal number of cases required to meet and exceed the 10 canal minimum. A tooth or case initially assigned a given number of canals is not assured of that number of canals. Clinically canals must be treated to an acceptable level for full credit.

**C. SUMMARY OF SUGGESTED MINIMUM CLINICAL EXPERIENCES
TREATMENT MINIMUM CLINICAL EXPERIENCES BY SEMESTER**

Course	Clinical Periods.	# of Canals	Clinical Course Grade Based on	# of Recalls (suggested)
Endo 8291	DSIII yr	4	canals 1-4	1
Endo 9215	DSIV yr	6	canals 5-10	1
Accumulative Totals		10 canals		2 recalls

Teeth considered Ideal for the DS III year are:

Class I - Anteriors and premolars are preferred.

Class II - Anteriors and premolars. 1st Molars for a student's first case by faculty approval.

Teeth considered Ideal for the DS IV year are

Any tooth approved faculty - Class I, Class II, or selected Class III

the DS IV treatment competency requires a maxillary or mandibular molar

Note, accepted Class III Cases may be performed in SAC with faculty prior approval during any semester.

Minimum clinical experiences are periodically reviewed and limited care assignments are made accordingly.

D. Additional Endo Department Requirements for Graduation

Endodontic Clinical Competencies

There are seven endodontic competency evaluations which must be successfully completed:

Pre-clinical Competencies must be completed prior to and are Prerequisites for entering clinic during the DS III year.

(see SECTION II - Mock Patient Exercise).

1. Pre-clinical Treatment Competency
2. Pre-clinical Diagnosis Competency

DS III Clinical Competencies must be completed prior to promotion to DS IV year. Along with the minimum Canal Requirement, Successful Completion of all DS III Competencies are Clinical Pre-requisites for participation and enrollment in DS IV Endo Courses

3. Clinical Diagnostic Competency
4. Clinical WL Competency
5. Clinical Obturation Competency

DS IV Clinical Competencies must be completed prior to graduation.

3. Clinical Diagnosis Competency
(can attempt after 4 canals and completion of all DSIII competencies)
4. Clinical Treatment Competency
(first attempt is taken concurrently with the DS IV Diagnosis competency)

(see SECTION III - Clinical Competencies in Endodontics)

Determination of Canals Awarded

There are several reasons why that the assignment and accumulation of canals towards the minimum graduation clinical experiences MAY vary. All canal numbers are verified by acceptable student Clinical Treatment. No canal credit is given for canals not negotiated nor canals where a procedural mishap (i.e., broken file, blockage, perforation, etc.) prevented acceptable clinical treatment. No canal credit is given for canals deemed too difficult for a student to treat and are used for Faculty Clinical Demonstration. Canal credit may or may not be given for a canal linked to a failed clinical DS IV treatment competency, depending on the judgment of the attending faculty.

Endodontic ‘Points’ Required for Graduation

The Department of Endodontics recognizes that there are a number of clinical endodontic procedures performed by students that may not result in a completed case and hence awarding canals that are credited towards the minimum number of case clinical experiences. An Endodontic ‘Points’ System exists for procedures performed in Green Endodontic Clinic that accumulatively improve the overall clinical endodontic experience, yet cannot be counted as completed cases. Eight (8) accumulative points must be acquired for graduation. Two (2) points must be acquired by performing recalls. Preferably on teeth the student personally performed root canal treatment on. 4 points must be acquired by performing 2 core build-up procedures in **Green Endodontic Clinic**. The remaining two (2) points may come from any combination of the procedures listed in the following table. This includes additional recalls or additional core build-ups.

Procedure	Points Awarded per Procedure	Points Required for graduation from each procedure type
Endodontic Recall Recalls <u>do not</u> require direct Endo Faculty Supervision	1	2 points
Core build-up Core build-ups require direct Endo Faculty Supervision in Green Clinic	2	4 points (from 2 core build ups)
Internal Bleaching Per patient per tooth	2	
Incomplete RCT, pt dismissed by COD w/ Diag and Case Work up, Working Lengths & Completed Pulpectomy	2	
Endo Faculty Tx & Assisting of Class III Endodontic Case	1	
Endo Student Assisting available to DS3s or DS4s limit of 5	1	
Total Points required for Graduation		8

To receive credit for the endodontic ‘points’ appropriate procedures, the Endodontic Points Form (Fig 1a) must be filled out and turned in to the Endodontic Department Secretary.

Endodontic Points Form
Recall and Core Build-up Graduation Requirements
Miscellaneous Procedure Verification

Student:	DS III DS IV	Treatment Date:		
Patent:	DOB	COD Chart #	Endo Case Card	Tooth #
Procedure: <input type="checkbox"/> Recall – Record information on Endo Recall Card (2 required for graduation on RCTs you performed) <input type="checkbox"/> Core Buildup – include post-op x-ray (2 core buildups required for graduation) <input type="checkbox"/> Internal Bleaching (per patient) <input type="checkbox"/> Diag, WL x-ray & Pulpectomy (Partial Tx Cannot be awarded with a case completion) <input type="checkbox"/> Endo Faculty Assisting (Cannot be awarded in addition to canals treated) <input type="checkbox"/> Endo Student Assisting <input type="checkbox"/> Other	Points:	Remarks:		
	1			
	2			
	2			
	2			
	1			
	1			
Date:	Points Awarded:	Faculty Signature:		

Endo Dept 6-1-2017

Fig. 1a
 Endodontic Points Form/ Miscellaneous Procedure Verification

CORE BUILD-UP REQUIREMENT

A minimum of two core build-ups are required. For Endodontic core build-up credit, each core build-up must be completed in green endodontic clinic under the supervision of covering endodontic faculty.

All students must complete at least two (2) placements of a core in endodontically treated teeth. This preferably should be in a student's own cases, but may be in any tooth which root canal therapy was completed at the College of Dentistry. Special approval is required for the placement of a core build-up in teeth that have had root canal treatment completed outside of the College of Dentistry. An **Endodontic Points Form /Post and Core Placement Verification** (see Fig. 1a) must be completed for each procedure and turned in to the Endodontic department secretary for credit. The first two core build-ups will satisfy department minimum clinical experiences and core build-up requirements (4 points). Additional core build-ups can receive additional points for credit from the Department of Endodontics to satisfy the minimum point requirements. The tooth number, procedure code, type and length of post, cement used, and number of surfaces restored should be recorded in the progress notes of the patient's chart. The Points Form for the core build-up is turned for recording on the fifth floor Endodontic offices either separately or with the completed case envelop.

The Department of Operative Dentistry accepts the surfaces restored during a core placement for operative points. A maximum of four operative points can be received, for a 4 or 5 surface amalgam core. To receive operative credit, the covering endodontic faculty must complete an Operative Grade Slip. The Operative Grade Slip should indicate tooth number, procedure performed, material and number of surfaces restore, and the placement of any pins (if applicable). Only 'Clinically Acceptable' grades will be assigned by the covering endodontic faculty. The student will receive the pick copy of the faculty signed Operative Grade Slip which should be retained for his/her records. For recording of credit, faculty will return the other copies of the Operative Grade slip to the Operative Department secretary.

ENDODONTIC RECALL REQUIREMENT

Endodontic Recalls are discussed in SECTION VII. Each student is required to complete a minimum of two (2) recalls. Each recall must be six-months or longer from the date root canal therapy was completed or from the previous recall. Ideally the recall will be performed on a tooth the student has completed root canal therapy on.

Students should attempt to complete recalls on **all** of his/her own patients. Recalls of longer than six-months are to be encouraged; a more valid evaluation of the case result is then available. Recalls can also be performed on any Endodontic Case performed at the COD student clinic. These endodontic cases can be identified in the treatment notes of the chart record by procedure, tooth, and case number. Up to 5 additional endodontic recalls (7 recalls in total) can be performed and applied to the Endodontic Points Requirement for graduation.

In order to receive proper credit for recalls, both a recall card and an Endodontic Points Form should be properly completed and turned in to the Endodontic Department Secretary.

E. DS III MINIMUM CLINICAL EXPERIENCES

Course Director for DS III Clinical Courses: Andrew P. Goldbeck, DMD
Office: 544H Telephone: 405-271-5550

Course #8291 minimum clinical experiences is (4) canals. One (1) The "Mock Patient" exercise **must** be successfully completed with a passing grade of a 'C' before the student will be allowed to enter the clinic.

In addition, the student must complete all three (3) of the DS3 clinical competencies.

It is the Student's Responsibility to be continually aware of their canals completed and clinical competency status.

F. DS IV MINIMUM CLINICAL EXPERIENCES

Course Director for DS IV Clinical Courses: Andrew Goldbeck, DMD
Office: 544H Telephone: 405-271-5550

Course #9215 minimum clinical experiences are six (6) canals. Cases to fulfill these minimum clinical experiences may be any tooth of a Class I or Class II difficulty. In addition the student must complete the two (2) DSIV competencies.

Extra endodontic cases may be completed (and are encouraged). Extra canals completed beyond ten (10) canals will be figured into the average and consideration for improving the course grade will be made.

G. CASE DIFFICULTY GENERAL DESCRIPTIONS

A classification of each case is to be done before treatment starts. The classification is accomplished to establish the difficulty of the case. In general terms, the categories are:

Class I: The case is an anterior or premolar tooth that has no pathological or anatomical characteristics which are likely to result in compromised treatment or prognosis.

Class II: The case has pathological or anatomical characteristics, which require intermediate operator skills in Endodontics in order to avoid a compromised treatment or prognosis. Included are all molar teeth, any calcified tooth or one moderate canal curvatures, medically compromised patients, and most molar teeth.

Class III: The case has pathological and anatomical characteristics, which require specialist level operator skills and extensive clinical knowledge. These cases are beyond the experience level and capabilities of all but the most experienced general dentists and endodontic specialists. These cases will not be treated by dental students, but it may be possible to treat some cases at the COD under direct faculty supervision (Special Assistance Clinic) or by assisting the faculty (Faculty Special Care Clinic). Many will be referred.

H. CASE EVALUATION AND GRADES

Remember! In order to be considered complete, each case must be received in the Endodontic Department with:

1. A proper and acceptable self evaluation. (See SECTIONS V, B-E; VI, A-C)
2. Complete and acceptable treatment.
A completed case requires a pre-op diagnosis x-ray, a working length x-ray, a cone fit x-ray, and final x-ray showing the obturated canals, an intact temporary filling, and no rubber dam clamp on the tooth. Completed and acceptable treatment may be submitted after the cementation of the post and core build-up for any case requiring a post and core, in which case the obturation x-ray should be placed in the extra x-ray films in a coin envelope. If a cast post is required through the Fixed Prosthodontic Department, the space could be either left unprepared and the dowel core may be completed as a limited treatment with Fixed Prosthodontics.

The **Grade for an Endodontic Case** is the result of a composite evaluation of quality of radiographs, diagnostic work-up, case record write-up and quality of instrumentation and fill of the tooth involved. The primary covering Endodontic faculty member will evaluate each of these items. The instructor may also make comments or suggestions for improvement or change in each particular area. This section of the grade sheet is also used to indicate areas or steps completed with exceptionally good quality. This affords the student an opportunity to observe areas of needed improvement and provides information relating to how he or she may attempt to improve the quality of Endodontic treatments and diagnostic skills.

After the instructor has evaluated the items on the left side of the grade sheet, on the right side of the grade sheet is a space for the faculty to list comments concerning a particular item or portion of the case. A case grade, in part, is based on the total number of canals completed. Quality and self-reliance should increase with each case. Next, an overall numerical grade will be determined by the use of the above mentioned information. Please note that a student may perform an excellent clinical treatment, but if the quality of radiographs or case write-up is average to poor, a lower grade will be given. Once the grade has been determined, the student will receive a copy of his grade report for their personal records. The procedure for a Remediation Procedure following a procedure mishap and how it affects a case grade is discussed in SECTION I, I.

Final Clinic Course Grades are computed by averaging all clinic case grades (based on the required canals) recorded on the student grade sheet. A failing grade for a course may be given for failure to complete the specified work in a timely manner

I. COURSE REMEDIATION

Clinical Course grades of a 'D' or 'F' must be remediated to a 'C'. When an unacceptable clinical grade is due a quality deficiency, extra course work (additional canals to replace those canals contributing to a failing grade) and partial replacement of the minimal clinical experiences (canals) will be necessary. The course director will set a deadline upon which the remediation of minimal clinical experiences must be completed.

Course remediation may be required if an 'F' or 'D' is assigned to one of the final (DS III or DS IV) courses 8291 or 9215. Course remediation may occur when accumulative cases grades result in a grade of 'D' or 'F'. This could only occur as the result of a student's actions repeated iatrogenic mishaps and grievous treatment errors have occurred that have resulted in significant patient harm. Each situation will be addressed on a case by case basis with input from the PRC and Associate Dean of Academic affairs.

J. PROCEDURAL MISHAPS & CLINICAL CASE REMEDIATION

Procedural endodontic mishaps may periodically occur during patient treatment. These include (but are not limited to) separated instruments (such as files) and perforation of the tooth (during access, radicular access, or apical enlargement). Procedural mishaps usually have a significant adverse effect on the prognosis. They **must never be taken lightly**.

Cases are recorded sequentially for grading. It is expected the case will otherwise be completed in a timely manner, and always (preferably) completed within the same semester of the occurrence. Available canals cannot be awarded until a case is graded. If the case having an iatrogenic error purposely is not handed in for grading, a 0 (zero) 'F' grade will be assigned. A case of a severe iatrogenic error (these that so adversely compromise the prognosis to cause the tooth to be unsuitable for the its intended restorative purpose) is not handed in a timely manner a 0 (zero) 'F' grade will be automatically assigned. Because of the deleterious effects of these events, the following **grade limits** will also be applied. The final case grade however is at the discretion of the covering faculty.

1. Separation of a file fragment in a canal: Grade no higher than 'C' for the case.
2. Perforation above or below the crest of bone-either during coronal or root access: Grade no higher than a C for the case.
3. If a procedural error occurs that results in extraction of the tooth, no grade higher than an 'F' is possible, no canal credit will be awarded, and the case will be included in the semester grade.
4. Gross iatrogenic mishaps that demonstrate the student lacks the most basic knowledge and skill and/or results in such a diminished tooth prognosis that it can no longer be used for the intended purpose in the restorative treatment plan will result in a Grade no higher than 'F' for the case. The COD 'Deficiency in Professional Conduct or Performance' will be completed and forwarded to the administrative offices of Student Affairs.

Cases involving a procedural mishap may be followed by a **clinical remediation process**. Remediation is not meant to be a punishment. It is meant to identify and improve upon clinical skills that have been inadequately developed or demonstrated during the delivery of patient care. Options and consequences of this remediation are at the discretion of the faculty, and may include any or all of the following:

1. A self evaluation and an analysis of the case. The self evaluation form for a procedural mishap is depicted in Figure 1b.
2. Partial or complete loss of canal credit for the case. For example, a broken instrument prevents the cleaning, shaping and obturation of one canal in a three canal molar. A reduced canal credit to two canals may be awarded, and so noted on the grade sheet. A Perforation results in extraction, no canals are awarded.

Lacking sufficient number of Endo Faculty, this portion of the remediation process is no longer a regularly implemented teaching tool. It is, however, encouraged that students learn to not repeat the same mistakes and elect to complete several pre-clinical (stimulated) RC procedures.

3. A preclinical exercise requiring treatment of a similar case(s) on extracted teeth in a typodont simulating clinical treatment. For example; 1) after an access perforation the student may be required to demonstrate appropriate acceptable endodontic access on several teeth or 2) after a gates glidden perforation the student may be required to demonstrate appropriate radicular access on a particular tooth type or 3) after an instrument separation the student may be required to demonstrate adequate cleaning, shaping and obturation in a similar tooth type.
4. **All case remediation steps concerning endodontic procedural mishaps must be completed prior to awarding any canal credit for the particular case.** No new endodontic case initiations will be allowed until the clinical cases remediation is completed. No new endodontic patients will be assigned from shared care or limited care until the remediation is completed. **All remediation steps concerning procedural mishaps must be completed to meet the endodontic requirements for graduation.**

If clinical remediation projects are assigned because of the occurrence of a procedural mishap, all remediation procedures must be completed prior the end of each Academic year.

Case Card Quality, Radiographic Interpretation, Diagnosis, Reasons for Tx, etc.

--	--	--

Sequence, Positioning, Quality of Required x-rays, Processing Errors, etc.

due

Coronal Outline, Gouges, Inclusion of pulp horns, perforation

--	--	--

File size, accuracy, maintenance during Cleaning & Shaping

--	--	--

mass

over or under flared, too deep

Blend, irregular shape, bottleneck, taper, ledges

Short, long, taper, apical blockages, lost patency

GP Extension, adaptation/condensation, extruded sealer

Condensation, Density, cone adaptation, voids, sealer

--	--	--

the Procedural Mishap(s) have on Prognosis?

the Prognosis is affected &/or unaffected.

has been prevented the Procedural Mishap?

		Overall Evaluation (circle your expected final grade)												
Excellent A	Good A-	Above Average B	Average C	Marginal D	Failed F									
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Fig. 1b
Self Evaluation of a Case after a Procedural Mishap

Performance Objectives:

The student will complete the following tasks without access to the text or printed materials.

1. State the number of canals required for successful completion of each clinical Endodontics course.
2. Discuss the canal minimum clinical experiences required for graduation.
3. Discuss the Endodontic 'Points' System and the post and core and endodontic recall requirements for graduation
4. State the penalties for failure to complete the required minimum clinical experienced within the allotted semester time.
5. Write the criteria for a completed case.

Understand the consequences of the occurrence of clinical procedural mishap and how the clinical remediation process associated with a procedural mishap is assessed.

SECTION II

PRE-CLINICAL COMPETENCIES IN ENDODONTICS

“TECHNIQUE” FINAL PRACTICAL / MAXILLARY CENTRAL INCISOR “MOCK PATIENT” EXERCISE / DIAGNOSIS

Required Reading: 7125 Endodontics I Lecture and Laboratory Manuals
Endodontic Clinic Manual

Description:

Students must be able to demonstrate the minimal technical expertise to render root canal treatment to a Class I uncomplicated case prior to treating patients in Green Endodontic Clinic at the College of Dentistry. The Technique Final Practical is the final practical examination of the laboratory portion of Course 7125 and is the Pre-clinical Treatment Competency Examination. In order to receive a grade in that course, clinically acceptable treatment of a maxillary incisor tooth must be demonstrated. Failure to receive a passing grade on the final practical examination requires a remediation process. Minimally this remediation process requires repeating the practical exam treatment of a maxillary incisor until treatment is performed to a clinically acceptable standard.

Students must be able to demonstrate the ability to arrive at a pulpal and periapical diagnosis when presented a case history containing a set of clinically relevant diagnostic information prior to their treating patients in Green Endodontic Clinic at the College of Dentistry. The “Mock Patient” Exercise is the Pre-clinical Diagnosis Competency Examination. The “Mock Patient” Exercise is in two phases. The first phase (case write-up and diagnosis) will familiarize the student with the procedural requirements necessary to review a medical history, interpret radiographs, interpret the clinical test results, accurately record the clinical information on a case envelope, and establish a pulpal and periapical diagnosis. The second phase (clinical) will familiarize the student with clinical procedures: including reviewing the case envelope, the clinical set-up, using an apex locator, and procedures for treatment of an Endodontic patient in Green Endodontic Clinic.

Rationale:

The transition from the laboratory to the clinic can be intimidating. To help in this transition two Pre-clinical Competencies must be successfully completed. The Pre-clinical Treatment Competency is the final practical examination project performed in the pre-clinical laboratory course 7125. Unaided treatment of a maxillary central incisor is performed under conditions which simulated clinical treatment. The Pre-Clinical Diagnosis Competency is the "Mock Patient" exercise. The student will perform diagnostic procedures without a patient present. The "Mock Patient" exercise will allow the student to become familiar with the signs

and symptoms endodontic pathosis and apply the Clinical Diagnostic Classification used by the OU COD in 'Green' Endodontic Clinic. In addition the student will become familiar the Department of Endodontic requirements, the necessary forms to be completed before an actual patient is treated, and the set-up and treatment procedures used during patient treatment.

A. CASE WRITE-UP AND DIAGNOSIS, PHASE I OF THE MOCK PATIENT

The diagnostic phase of the mock patient is a graded simulated computer exercise in which the student will demonstrate a minimum clinical competency to record pertinent information on the case envelope, to interpret an x-ray and the results of clinical tests, and to establish a Pulpal and Periapical diagnosis. As soon as the relevant lectures covering diagnosis, radiographic interpretation and clinical policies have been presented in Endo Course 8191 in the Summer of the DSIII year, a student may sign up for the Mock Patient. In order to continue on to Phase II of the Mock Patient and to be able to start seeing patients in the Endodontic 'Green' clinic, the diagnostic Phase I of the Mock Patient must be completed with a passing grade of 'C'.

The Case Write-up and Diagnosis Phase I of the mock patient will include:

1. Assessment of a Case History with radiographs and results of clinical testing
2. Preparation of a Case Envelope
3. Establishing a Pulpal and Periapical Diagnosis from the simulated case materials
4. Answering quiz questions related to the case and to the endodontic technique

A minimum passing grade of 'C;' will be required to pass the exercise. A correct pulpal and periradicular diagnosis that is justified by the appropriate reason is necessary. An inaccurate pulpal and/or periradicular diagnosis will immediately result in failure of Phase I of the Mock Patient, requiring repeating the diagnostic phase.

A grade of a 'D' or 'F' on the Diagnostic, Phase 1 of the Mock Patient will require remediation by repeating the exercise and evaluating a different simulated case. A minimum passing grade of 'C;' will be required to pass the exercise and will be recorded as the final grade. When remediation of the mock patient exercise is necessary, the student will receive a maximum grade of 'C'.

Those students receiving a grade of a 'D' or 'F' on the Diagnostic, Phase 1 of the Mock Patient, should schedule an appointment with the course director of ENDO 8191 to review the case envelope and discuss the reasons the case was graded as deficient.

B. CLINICAL, PHASE II OF THE MOCK PATIENT

The clinical phase II of the mock patient will include:

1. Assisting once in endo clinic
2. Having your endo cassette checked off and turned in to Central Sterilization

C. SEQUENCE OF PROCEDURES FOR THE MOCK PATIENT EXERCISE

Phase I - Case Write-up and Diagnosis

1. Plan on two to three (2-3) hours of time to complete the Phase I of the mock patient. Filling out the case envelope, establishing a pulpal and periapical diagnosis, and answering the quiz questions are open book, therefore the 7125 Preclinical Lecture and Laboratory Manuals, this Endodontic Clinical Manual, the 8191 Lecture Manual and any other material can be available.
2. See the departmental secretary for the case number and card for the Mock Patient
3. Access the case history on D2L
4. Complete the case write-up from the information (medical history, dental history, examination, narrative, x-rays, and results of clinical testing).
7. Answer the test questions
8. Turn in the completed case envelope and answer sheet for grading.

Phase II - Clinic

1. Assist at least once in Endo Clinic
2. Have your Endo Cassette checked off and the turned in to Central Sterilization

D. CASE ENVELOPE:

1. Provides biographical data and relevant information necessary to establish reasons for treatment, a receptacle for radiographs and treatment records and is also a procedure check sheet.
2. Envelope front. This is the case write-up. It includes (see discussion in Clinic Manual, SECTION V, C-E):
 - a. Biographical data from the case initiation form
 - b. Patients chief complaint

- c. History of the tooth and clinical findings
 - d. Radiologic findings
 - e. Clinical tests
 - f. Reasons for treatment
 - g. Pulp and periapical diagnosis
 - h. Pertinent medical information
 - i. Treatment problems
3. Envelope back includes:
 - a. Permission to begin
 - b. Case work-up
 - c. Treatment checks
 - d. Comments by faculty
 - e. Asepsis technique
 - f. Radiation safety

E. SET-UP FOR TREATMENT (SEE CLINIC MANUAL, SECTION IX):

1. Student's Endodontic Instrument Cassette (SECTION IX, B)
2. Assistants cart. This is the primary work surface. **It must remain sterile.**
3. Over-the-Patient Tray. This secondary work area should also remain sterile and uncluttered during patient treatment.
4. Counter, non-treatment areas.

Performance Objectives

After completing this exercise the student will be able to complete the following tasks without reference to notes or printed materials.

1. Identify and Describe the two Pre-Clinical Competency Examinations that must be successfully completed before being able to see patients in Green Endodontic Clinic.
2. Indicate the sequence steps and the procedures for the "Mock Patient."
3. State the purpose of the case envelope and list its contents.
4. List the items contained on the front of the case envelope.
5. List the items that are on the back of the case envelope.
6. Set-up an assistant's cart and indicate the degree of "sterility" desired for this set-up.
7. Indicate the items that are to be placed on the operators cart and which items are not sterile.
8. List the necessary items and steps that are included in the completion of the "Mock Patient" case.
9. Describe the grading of the "Mock Patient" case and the credit received.

SECTION III

CLINICAL COMPETENCIES IN ENDODONTICS

Description:

This section will acquaint the student with the procedures necessary to complete the endodontic clinical competencies. The Endodontic Competency Exams are designed to be a series of progressively more difficult procedures, which a student must be able to complete with minimal faculty intervention or without any faculty assistance. It should be realized, however, that when a case is being performed without close faculty supervision, there is greater risk to the patient. **Appropriate judgment** during the competency examinations is an important portion of the examination. Therefore, *while the procedures during a competency examination are meant to be accomplished with minimal assistance, there are times when students can (and should) ask the faculty for direction.*

Rationale:

Definitions: "A competency is a complex behavior or ability essential for the general dentist to begin independent and unsupervised dental practice. Competency includes knowledge, experience, critical thinking, problem-solving, professionalism, ethical values and procedural skills. These components of competency become an integrated whole during the delivery of patient care." (ADEA; Competencies for the New General Dentist, 2008). "Professional competence is the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values and reflection in daily practice for the benefit of the individuals and communities being served by the practitioner." (Epstein, 2002)

Competency-based education is the designated model for the dental school curriculum as specified by the standards of the Commission on Dental Accreditation. Accordingly, assessment of students' competence, or readiness, to begin unsupervised practice is a primary function of the dental school. There are six domains of competency in the 2008 ADEA "Competencies for the New General Dentist". These domains collectively define the knowledge, skills and values necessary for entry into the profession as a beginning general dentist. The domains are:

1. Critical Thinking (and problem solving)
2. Professionalism
3. Communication and Interpersonal Skills
4. Health Promotion
5. Practice Management and Informatics
6. Patient Care including:
 - a) Assessment, diagnosis and treatment planning
 - b) Establishing and maintaining oral health

For the Department of Endodontics, a series of progressively more complex, yet integrated Competency Examinations have been set up. Competency examinations are required in your DSII, DS III and DS IV years. The DS II Competency Exams assess entry level pre-clinical skills and the application of didactic information to diagnosis, both in simulated situations. Endodontic Clinical Competencies during the DS III and DS IV years include those for Clinical Diagnosis (2), WL determination (1), Obturation (1) and Clinical Treatment (of one canal) of a Molar (1). The DS III Competency Exams assess individual components required for providing endodontic care in the clinical situation. In order to be recommended to advancement from the DS III year to the DS IV year, three basic competency exams and a minimum number of cases or canal experiences are required. The DS IV Competency Exams assess the ability of students to perform the Series of Procedures (diagnosis, access through obturation) for molar root canal therapy. Every student must ultimately be able to perform a non-complex diagnosis and treatment of an endodontic case prior to graduation to show competency in these skills. In order to be recommended for graduation, these two additional clinical competencies in Endodontics are required along with an additional minimum number cases and canals.

A. DS III COMPETENCY EXAMINATIONS DESCRIPTIONS

The clinical competency examinations must be performed with minimal faculty assistance or intervention. Both interpretation (radiographic assessment) and critical thinking (corrective measures) are being assessed, therefore encouraging faculty interaction. The competency exams consist of:

Endo Competency 1 – Clinical Diagnosis

1. Your 1st Endodontic Case envelop can be your first attempt at the Clinical Diagnosis Competency.
2. Pre-Treatment x-ray
(that meets the criteria of a diagnostic pre-operative diagnostic x-ray taken with an XCP or similar alignment device).
3. Radiographic Interpretation of the pre-treatment x-ray.
4. Accurate and thorough recording of clinical diagnostic information and test results of clinical testing.
5. Completion of the Case Envelop, including the medical history.
6. An Accurate Endodontic Diagnosis
 - Pulpal Diagnosis
 - Periradicular Diagnosis
7. Correct Identification of the Reasons for Treatment (diagnosis justification)

Endo Competency 2 – Working Length Determination (of one canal)

It should be noted that the skills required to acquire ‘full’ canal negotiation to apical patency are not a requirement of this competency exam.

1. Your 1st Clinical Experience may be your first attempt at the Working Length Competency.
2. Establish a Trial Length (via x-ray) or Patency length (via EAL)

3. Demonstrate appropriate Radiographic Techniques for taking a WL x-ray with a rubber dam in place.
4. Demonstrate appropriate Infection Control Procedures for exposing and developing a WL x-ray.
5. Correctly Interpret the Working Length x-ray and Suggest any necessary WL file adjustments (NOTE: the WL x-ray is typically taken with #25p files, generally exposed after #6 and #5 orifice or cervical level canal modification).
6. Discuss alternative (adjunctive) methods of Working Length Determination.
7. Discuss ‘measures’ required to correct a clinically unacceptable working length.

Endo Competency 3 – Cone Fit and Obturation (of one canal)

Unassisted obturation of one canal of the Instructor’s choosing. The selection of the canal will be determined at the time of the Control Zone verification and check.

1. The first attempt taking the Cone fit and Obturation Competency Exam may be during your 1st Clinical Experience, concurrent after the Working Length Competency Exam. While often taken during the same case, the results of the two competency exam are assessed separately.
2. Demonstrate the ability to accurately fit a GP cone to a Control Zone.
3. Demonstrate appropriate Radiographic Techniques for taking a Cone Fit x-ray with a rubber dam in place.
4. Demonstrate appropriate Infection Control Procedures for exposing a cone fit x-ray.
5. Discuss the attributes of a correctly adapted GP cone and properly mixed sealer.
6. Recognize radiographically and Discuss ‘measures’ required to correct a clinically unacceptable cone fit.
7. Once a Cone Fit is accepted by an Endo Faculty/Instructor, demonstrate the skills required to seat the GP cone with sealer applied, perform the Downpack with a System B and complete the Backfill obturation.
8. Recognize, interpret and discuss the quality of obturation (and corrective measures if necessary) seen on the condensation or final obturation film.

B. DS IV COMPETENCY EXAMINATIONS DESCRIPTIONS

The clinical competency examinations must be performed without faculty assistance or intervention. Both skills (performance) and critical thinking (corrective measures) are being assessed, therefore encouraging faculty interaction. An understanding of accumulative knowledge, application of principles, and results of root canal therapy are essential components of the DS IV competency examinations.

DS III and DS IV endodontic competency exams cannot be taken concurrently. Prior to performing either DS IV clinical competency examination, the student must have successfully passed the DS III Competency Examinations and completed a minimum of **4 canals**.

Endo Competency 4 – Clinical Diagnosis

1. Appropriate Case Selection
2. Pre-Treatment x-ray
(that meets the criteria of a diagnostic pre-operative diagnostic x-ray)
3. Case Work-up (accurate and thorough recording of clinical diagnostic information and completing the case envelope). The work up must be based on how the patient first presents for treatment to Green Endodontic Clinic.
4. An Accurate Endodontic Diagnosis:
 - Pulpal Diagnosis
 - Periradicular Diagnosis
5. Correct Identification of the Reasons for Treatment (diagnosis justification)

Endo Competency 5 – Clinical Treatment

1. Appropriate Case Selection
which includes ability to identify and discuss factors affecting case difficulty.
2. Pre-Treatment x-ray
3. Demonstrate the ability to deliver local anesthetic and achieve profound anesthesia (or discuss adjunctive techniques) that insure a patient will be comfortable during the endodontic procedure.
4. Endodontic Rubber Dam Isolation
5. Demonstrate appropriate sterile technique and infection control procedures
6. Perform Endodontic Access on a molar tooth (including caries removal)
7. Demonstrate the ability and all skills required to establish Working Length on the pre-selected canal of a molar tooth with a WL x-ray
(unaided canal negotiation, exposing the WL x-ray, correctly interpreting the results of the WL x-ray, and implementing corrective measures to present a clinically accept WL requiring file adjustments no more than ± 0.5 mm)
8. Clinical treatment of the ‘selected’ canal of a molar tooth
 - Initial Apical Patency and Radicular Access
 - Preparation of the Control Zone
 - Adaptation of the GP Fitted gutta-percha
 - Completion of obturation
9. Patient management

The DS IV Diagnosis and the Clinical Treatment Competency will be first attempted simultaneously on the same molar tooth. In this situation the tooth selected for diagnosis and treatment must be a molar tooth with multiple canals. A failure of the Diagnostic Clinical Competency does not disqualify the student from attempting the Clinical Treatment Competency on the same tooth.

The Diagnosis Clinical Competency alone may be re taken, if the Clinical Treatment Competency was previously successfully completed. When only the Diagnosis Clinical Competency is being attempted, the DS IV student can any tooth for repeating the diagnostic competency.

The DS IV Clinical Treatment Competency must be performed on a molar tooth with multiple canals. The student will select one of the canals in advance to be designated the Competency Canal. If the canal initially chosen is in a root with two canals that have a common apical canal segment or apical foramen, both canals must be treated and completed for the Clinical Treatment Competency. **ANTERIOR AND PREMOLAR TEETH ARE NOT PERMITTED FOR THE DS IV CLINICAL TREATMENT COMPETENCY Unless a total of 7 canals have been completed and graded prior to the start of the DS IV clinical treatment competency.**

No Clinical Treatment Competency Exam (DS III or IV) can be repeated while working on the same case, after a subsequent failure. Repeated failures will result in remediation requiring successful complete treatment of a mounted extracted molar tooth. This remediation requires treatment simulating the WREB, but treating of all canals.

C. PROCEDURE FOR INITIATING ENDODONTIC COMPETENCIES

THE CLEAR INTENT THAT THE STUDENT IS ATTEMPTING ANY COMPETENCY EXAMINATION MUST BE MADE AT THE TIME OF THE ‘PERMISSION TO PROCEED’ (PTP) SIGNATURE IN THE CLINICAL CHART. Under no circumstances will permission to proceed with any endodontic clinical competency (diagnosis or treatment) be granted after the case history and endodontic case card has been reviewed. The student must declare the canal for the DS IV Clinical Treatment Competency at the time of PTP. The student shall have the appropriate Endodontic Competency Form available. If the Endodontic Competency Form is not available, the student will be directed to the endodontic department secretary.

Competency Examinations during the DS III year are automatically determined based on the case initiated. It is therefore essential, that the student keep track of open case cards, and endodontic treatments that are unlikely to be completed (due to patient non-compliance). It is the student’s responsibility to insure that the three DS III competency exams are completed and correctly recorded after case envelopes are turned in for grading. Every attempt (PASS or Fail) is recorded. The DS III Endodontic Diagnostic and ‘Clinical’ Competency Forms (Fig. 3a, 3b) are available only from the department secretary.

The ideal time to plan for a competency is at the time the case initiation form is submitted. In this way both the Case Envelope and the Endodontic Competency Form will be returned to you in the usual manner (see SECTION IV, F) and both will be available to you at the time of the patient’s first appointment. This early identification of a competency case also encourages adequate outside student preparation. The DS IV Endodontic ‘Clinical’ Competency Form (Fig. 3c) is available only from the endodontic department secretary. **Each form is sequentially identified and must be accounted for, whether the attempted endodontic competency was successfully completed (PASS), was aborted, or was failed (FAIL).**

The student may choose any molar case during the DS IV year after 4 canals to be their first attempt at the DS IV Clinical Competency Examinations. It is suggested that a

student attempt the DS IV Competency Exam on any available molar case of the DS IV year, as long as the above stated minimum 4 canal requirement has been completed.

D. PROCEDURES DURING DS IV COMPETENCY EXAMINATIONS

Clinical Diagnosis Competency

A recent pre-operative diagnostic x-ray should be available or taken. All historical information, radiographic interpretation, diagnostic information, reasons for treatment, accurate diagnosis, and medical history should reflect the patient's presentation to Green Clinic on the initial appointment day. The complete case work-up, with all areas of the case envelope being completed, is then presented to the faculty for evaluation. At no time should clinical information involving the interpretation of the Pre-Treatment Diagnostic x-ray be filled into/on the case envelop before receiving a PTP from an instructor.

Common reasons for failure of the Clinical Diagnosis Competency include submitting an unacceptable pre-op diagnostic x-ray, submitting information of incorrect or incomplete radiographic interpretation, submitting an incorrect Pulpal or Periapical (periradicular) diagnosis, and inaccurate or incomplete documentation of the medical history.

Clinical Treatment Competency

A preoperative film and diagnostic work-up on the case envelope must be provided. After approval by a faculty member on the competency exam form (Fig. 3c), the student may initiate treatment. The student must provide documentation during treatment of the competency canal to include **a working length film with a file in place, a fitted gutta-percha film, condensed fill film, and a final obturation film of the competency canal**. Corrections during treatment are permitted, but the faculty should not be prompted for direction. A question such as "How should I do that?" is sufficient for failure. The attending faculty member must sign the case envelope and Endodontic Competency Form at each check step to attest to successful completion during treatment of the competency canal. If the student requires faculty intervention to assure successful treatment of the selected canal, then the student must abandon the attempt and re-attempt a new Clinical Treatment Competency to successfully satisfy this clinical experience.

Common reasons for failure of the Clinical Treatment Competency include inability to achieve profound pulpal anesthesia, inability to expose the necessary working x-rays, incorrect radiographic interpretation of WL, and over extension of the gutta percha obturation.

It is encouraged that the cleaning, shaping and obturation be taken to completion (with a condensed fill x-ray) on the selected canal of the molar tooth. In this way, if assistance and intervention is needed by the faculty on the non-competency canals, there will be no penalty.

E. COMPETENCY CREDIT AND GRADING

The completed endodontic competency exam form must be included in the case envelope when turned in for grading. Your performance (pass /fail) is then recorded with every attempted competency examination. All endodontic competency forms must be accounted for and turned in.

Successful completion of a competency examination only implies that the faculty has found your performance was clinically acceptable. No grade is specifically implied. The grade for a competency examination (Clinical Diagnosis and Clinical treatment) case(s) is a composite evaluation of the overall case taking into account the quality of the radiographs, diagnostic work-up, case record write-up, and quality of instrumentation and fill of all of the canals involved with treatment of the case (see SECTION I, I).

The Clinical Diagnosis Competency is a stand alone examination:

Failure of a Clinical Competency involving obturation of a canal (Endo Competency 3 and 5), will result in loss of canal credit for the individual canal used for competency testing. If a case is a single rooted tooth, no canals will be awarded. Case credit is awarded, but the recorded case grade will reflect that faculty assistance was needed to complete the case. However since the Clinical Treatment Competency often requires treatment of a multi-rooted posterior molar tooth, the grade for this canal will become part of a total overall grade for the case. Inadequate documentation on the case card, an inaccurate diagnosis, and misadventures (e.g., broken instruments, perforation, etc.) in the other canals of the molar being treated (where faculty assistance is permitted) will adversely affect the grade. **If the final grade for the case is a failing level grade (D or F) because of adverse treatment results in a non-competency canal, the Clinical Treatment Competency exam may or may not have to be repeated.**

F. ENDODONTIC CLINICAL COMPETENCY FORMS

DS III Endodontic Diagnosis Treatment Competency Form

DS III DIAGNOSISCOMPETENCY FORM

Tracking # _____

Student Name: _____

Date: _____

Patient Name _____ COD Chart # _____

Endo Case # _____

Tooth # _____ Canal _____

Diagnosis - Competency 1	Signature	
PTP (Pre-op Discussion)	(Suggestions Permitted)	
Pretreatment X-ray (w/ XCP)		
Radiographic Techniques & Procedures		
Chief Complaint		
History		
Radiographic Interpretation		
Discussion	(Suggestions Permitted)	
Clinical Testing		
Reasons for Treatment		
Discussion	(Suggestions Permitted)	
Medical History		
Case Work-up Completed		Acceptable Fail*
*Reason for Failure		
Diagnosis (Pulpal & Periapical)		Correct Incorrect*
Diagnosis Evaluation Completed		Pass Fail*
*Reason for Failure		

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Fig. 3a - DS III Endodontic 'Diagnosis' Competency Form

Note: The DS III Diagnosis Competency Exam tests the ability to identify and record the necessary information (history, radiographic, and clinical testing) to establish and justify an endodontic diagnosis and the need for root canal therapy.

DS III Diagnosis and Clinical Treatment Competency Form (pink)

DS III ENDODONTIC COMPETENCY FORM

Tracking # _____

Student Name: _____

Date: _____

Patient Name _____

COD Chart # _____

Endo Case # _____

Tooth # _____

Canal _____

Working Length- Competency 2	Signature	
Trial Length &/or Patency EAL		(Estimated Length)
Radiographic Technique & Procedures		
WL x-ray (Interpretation &/or Correction)		Time – 1 hour limit, max 3 x-rays
Discussion		
WL Evaluation Completed		Pass Fail*
*Reason for Failure		

Obturation - Competency 3		
Control Zone Check		(Master GP Cone required)
Radiographic Technique & Procedures		
GP Cone Fit (Interpretation & Attributes)		Time – 1 hour limit
Discussion (corrective measures)		
RC Sealer, Final GP Apical Position		
Condensed Fill x-ray		Time – 1 hour limit
Discussion (quality, corrective measures)		
Obturation Evaluation Completed		Pass Fail*
*Reason for Failure: (failure results in loss of canal credit)		

rev 04-04-08

Fig. 3b - DS III Endodontic ‘Clinical’ Competency Form

Signatures are required for each check step during the Clinic Competency being attempted irrespective of the number of canals you have completed or the check steps indicated on the your case card. Skipping a check step may disqualify the attempted competency and result in failure.

Note: DS III Clinical Competency Exams test Basic Knowledge and Recognition Skills

A completed DS III Endodontic Competency Form (Fig. 3c) requires

1. Completed student and patient information
2. Tooth and canal designation
3. Faculty check step signatures
No check step can be skipped. If special instructions during a discussion are given to a student by an instructor those instructions must be adhered to.
4. Pass / Fail clearly marked for one or both of the Clinical Competencies
5. If necessary, a reason for failure of the Clinical Competency identified

DS IV Diagnosis & Clinical Treatment Competency Form (yellow)

DS IV ENDODONTIC COMPETENCY FORM

Tracking # _____

Student Name: _____

Date: _____

Patient Name _____ COD Chart # _____ Endo Case # _____

Tooth # _____ Canal _____

Diagnosis - Competency 4	Signature
Pretreatment X-ray	(Suggestions Permitted)
Case Work-up	
Diagnosis (Pulpal & Periapical)	
Diagnostic Evaluation Completed	Pass Fail*
*Reason for Failure	

Clinical Treatment - Competency 5	
Molar Case Selection	(Discuss Case Difficulty)
RD Isolation	
Initial Access Outline Form (3mm depth)	(Suggestions Permitted)
Final Access (orifices Identified)	
WL X-ray & Interpretation	
CZ Prep and Fitted Gutta-Percha	Time – 1 hour limit for Cone Fit
Condensed Fill X-ray	
Case Completed and Final X-ray	
Clinical TX Evaluation Completed	Pass Fail*
*Reason for Failure (failure results in loss of canal credit)	

rev 04-04-08

Fig. 3c - DS IV Endodontic ‘Clinical’ Competency Form

Signatures are required for each check step during the Clinic Competency being attempted irrespective of the number of canals you have completed or the check steps indicated on the case card. Skipping a check step may disqualify the attempted competency and result in failure.

Note: DS IV Competency Exams test accumulative Knowledge, Recognition and Skills.

A completed DS IV Endodontic Competency Form (Fig. 3c) requires:

1. Endodontic department assigned tracking number
2. Completed student and patient information
3. Tooth and canal designation
4. Faculty check step signatures
No check step can be skipped. If special instructions are given to a student by an instructor (i.e., concerning coronal access development, faculty assistance with a difficult canal other than the competency canal, discussions of corrective measures), those instructions must be adhered to.
5. Pass / Fail clearly marked for one or both of the Clinical Competencies
6. Faculty signature on the Evaluation Completed line(s)
7. If necessary, a reason for failure of the Clinical Competency identified

**G. ENDODONTIC COMPETENCY EXAMINATIONS (continued)
DETAILED DESCRIPTIONS. CRITERIA FOR PASS & FAILURE**

DS III COMPETENCY EXAMINATION DESCRIPTIONS

The clinical competency examinations taken during the DS III year evaluates the recognition of set standards (observation and interpretation), critical thinking (corrective measures), and skills (performance). Faculty assistance and guidance is encouraged during this process. Faculty intervention is permitted during the treatment phases for clinical treatment of a case when technical problems are encountered which may be beyond a student's skill level. The three DS III competency exams consist of:

Endo Competency 1 – Clinical Diagnosis

Purpose: Every student must be able to take the necessary pre-operative x-ray(s) to evaluate a tooth requiring a 'problem focused exam' which may potentially need root canal therapy. Pre-operative x-rays must be of diagnostic value and should be an accurate representation of the tooth in question. Each student must then be able to interpret the pre-operative x-ray for anatomic factors that affect case difficulty and selection, and for evidence of pulpal and periapical pathology. Assessment of subjective information and gathered objective data through clinical tests must be correlated to establish Pulpal and Periradicular Diagnosis that is consistent with a tooth requiring root canal therapy.

Description:

1. *Your 1st Endodontic Case envelop may be your first attempt at the Clinical Diagnosis Competency.*
2. Expose a Pre-Treatment x-ray
3. Accurate and thorough radiographic interpretation of the pre-treatment diagnostic x-ray(s).
4. Accurate and thorough recording of clinical diagnostic information and test results of clinical testing.
5. Completion of the Case Envelop, including the medical history.
6. Establish an Accurate Endodontic Diagnosis
Pulpal Diagnosis
Periradicular Diagnosis
7. Correct Identification of the Reasons for Treatment, which justify the diagnosis and need for root canal therapy.

Criteria for Successful Completion (Pass):

1. Take a pre-operative x-ray using an alignment device such as an XCP (or equivalent). The x-ray should contain all vital information necessary to satisfy the criteria of an acceptable pre-op diagnostic x-ray (i.e., film size, adjacent teeth, root apex and lesion, etc).

2. Accurately interpret and describe the coronal and radicular portions of the radiographic interpretation.
3. Accurately interpret and describe the radiographic depiction of periradicular anatomy (PDL, lamina dura, and surrounding bone) of the tooth in question.
4. If a radiographic periradicular lesion is present, accurately describe the lesion in terms of position, size and borders.
5. Accurately establish a Pulpal and Periradicular diagnosis that is consistent with the subjective, objective, clinical, and radiographic information recorded on the case card.
6. Discuss the attributes and qualities of an acceptable endodontic pre-operative diagnostic x-ray
7. Discuss the specific information requested in the individual sections for radiographic interpretation.
8. Discuss the importance, relevance, types of clinical patient responses and recording of the clinical tests used to establish a pulpal and periradicular diagnosis.
9. Identify and discuss possible inconsistencies in the recorded diagnostic data and information. When conflicting diagnostic information exists, the student should be able to recommend strategies that would be useful to resolve inconsistencies and establish an accurate endodontic diagnosis.

Criteria Representing Severe Deficiencies (Failure):

1. Inabilities to take, to recognize the deficiencies of, and/or to relate the attributes of an ideal pre-operative diagnostic x-ray.
2. Inabilities to relate or identify the criteria which should be interpreted and recorded under each section of the radiographic interpretation.
3. Using the phrase ‘within normal limits (WNL)’ in any section of the radiographic interpretation or medical history.
4. Recording an inaccurate Pulpal and/or Periradicular Diagnosis and/or endodontic diagnosis that is not consistent with the subjective, objective, clinical, and radiographic information recorded.

Endo Competency 2 – Working Length Determination (of one canal)

Purpose: Every student must understand the concept and series of steps involved in determining an accurate canal or working length, and be able to establish an accurate working length for a given canal. This includes taking an acceptable working length x-ray with a file(s) in place, using an aseptic technique, insuring that isolation is maintained with a rubber dam in place during the procedure. Each student must then be able to interpret the working length x-ray and identify the corrective measures (file adjustments) required to accurately record the working length for future reference. The examination is timed. The student has 1 hour to take, interpret, and present a diagnostic quality working length x-ray to the covering instructor.

Description:

Note: Although a critical portion of establishing working length, the skills required to achieve ‘full’ canal negotiation to apical patency are not a requirement of this competency exam. Faculty can assist with initial canal negotiation.

1. ***Your 1st Clinical Experience may be your first attempt at the Working Length Competency.***
2. Determine a Trial Length (via a pre-operative x-ray) or Patency Length (via electronic apex locator).
3. Demonstrate appropriate Radiographic Techniques for taking a Working Length x-ray with a rubber dam in place using any suitable technique or method.
4. Demonstrate appropriate Infection Control Procedures for exposing and developing a Working Length x-ray.
5. Establish a Working Length. Correctly Interpret the Working Length x-ray and Suggest any necessary WL file adjustments (NOTE: a second or final WL verification x-ray taken with #25p files, generally exposed after #6 and #5 orifice or cervical level canal modification may be used to evaluate this skill).
6. Recognize radiographically and Discuss measures required to correct an unacceptable attempt at (short or long) working length determination.
7. WL also relates to ‘ideal’ obturation length. Discuss alternative methods of or adjusts for Working Length when one may encounter variations in apical patency (apical blockages, stops, or excessively large patency).
8. Discuss the acceptable range of file adjustments advised for working length determination during root canal techniques used at the OU COD.

Criteria for Successful Completion (Pass):

1. Perform a working length procedure that identifies the appropriate canal length (reference to foramen or reference to anatomic apex) and place an appropriately sized file to the estimated working length. Within the allotted time: Take a working length x-ray using an aseptic technique. Interpret the working length x-ray and identify deficiencies (short or long file appearance) needed to establish a minimally acceptable and/or ideal working length determination. Note: a perfect working length on a student’s first attempt is not a requirement of this competency examination.
2. Discuss the most appropriate file selection (size) that should be used to insure a working length is determined as accurately as possible.
3. Discuss the ideal clinical and radiographic appearance of a file length that is considered minimally acceptable.
4. Discuss the use of and identify ideal coronal reference(s) used in working length determination.
5. Discuss steps of the cleaning and shaping the root canal system that are dependent on establishing an accurate working length determination.

6. Discuss ‘measures’ taken during creation of a control zone when a clinical working length is accepted in a canal with atypical apical anatomy (either not patent or excessively large patency) exists.
7. Discuss common cleaning and shaping errors that occur from an inaccurate working length.

Criteria Representing Severe Deficiencies (Failure):

1. Inability to take a working length x-ray of acceptable quality; the apex is not visible on the film and an angulation does not allow interpretation.
2. Inability to take a minimally acceptable working length x-ray in a reasonable allotment of time and/or multiple radiographic retakes (generally limited to 3 attempts) which show repetitive or uncorrected errors in radiographic technique.
3. Inability to recognize a working length x-ray which does not meet the minimum criteria of an x-ray that can be interpreted.
4. Inability to identify a file length adjustment, from a working length x-ray, that is needed to establish and record an accurate working length.
5. Inabilities to establish a coronal reference, adjust the rubber stop to an appropriate reference, remove a radiographically acceptable file from the canal, and/or record the working length.
6. Inability to discuss the importance of and/or identify an appropriate coronal reference(s) for commonly treated teeth.
7. Disregarding or negligence to follow proper infection control procedures necessary during the taking and developing of a working length x-ray.

Endo Competency 3 – Cone Fit and Obturation (of one canal)

Purpose: Every student must be able to seal and adapt gutta percha to the root canal system, from apex to orifice, during root canal obturation. This starts with the adaptation of a master gutta percha cone to the apical extent of the canal preparation (control zone or working length), and subsequent evaluation of the cone fit. This includes the skills to take a cone fit x-ray using an aseptic technique, insuring that isolation is maintained with a rubber dam in place during the procedure, developing the x-ray, interpreting the cone fit x-ray and identifying the corrective measures (cone fit adjustments) required to improve the cone fit (if necessary). Finally, root canal obturation according to the OU COD technique requires the mixing and placement of endodontic sealer, the correct use of a System B (for the down pack), and Calamus (for the back fill).

Description

Note: This competency exam is designed to evaluate a student’s ability to obturate a single (one) canal. The selection of the canal will be determined at the time of the control zone verification and check. The examination is timed. The student has 1 hour to perform the cone fit, take, interpret, and present a diagnostic quality cone fit x-ray to the covering instructor. At that time, the student is asked to make recommendations concerning the immediate progress of the obturation (i.e., proceed with obturation, measures required to

correct the cone fit, etc.). Upon completion of the root canal obturation, a condensation x-ray is taken and interpreted. At that time, the student is asked to make recommendations concerning quality of or deficiencies in the root canal obturation and suggest corrective measure (if necessary).

1. ***The first attempt taking the Cone fit and Obturation Competency Exam may be your 1st Clinical Experience, concurrent or after the Working Length Competency Exam.*** While often taken during the same case, the results of the two competency exams are assessed separately.
2. Demonstrate the ability to accurately fit a GP cone to a Control Zone.
3. Demonstrate appropriate Radiographic Techniques for taking a Cone Fit x-ray with a rubber dam in place.
4. Demonstrate appropriate Infection Control Procedures for exposing and developing a cone fit x-ray.
5. Discuss the attributes of a correctly adapted GP cone. Common cone fit adjustments of adapted cone tip shape, cone length, and cone adaptation to the apical third of the canal are issues of primary concern.
6. Recognize radiographically and Discuss ‘measures’ required to correct a clinically unacceptable cone fit.
7. Properly mix endodontic sealer and place sealer in the canal.
8. Once a Cone Fit is accepted by an Endo Faculty/Instructor, demonstrate the skills required to seat the GP cone with sealer applied, perform the Downpack with a System B and complete the Backfill obturation with the Calamus injectable gutta percha unit.
9. Recognize, interpret and discuss the quality of obturation (and corrective measures if necessary) seen on the condensation or final obturation film.

Criteria for Successful Completion (Pass):

1. Within the allotted time: Perform a master cone fit procedure that adapts the appropriate size gutta percha cone to an established control zone. Take a cone fit x-ray using an aseptic technique. Interpret the cone fit x-ray and identify deficiencies (or corrective measures) needed for minimally acceptable and/or ideal master gutta percha cone fit. Note: a perfect cone on a student’s first attempt is not a requirement of this examination.
2. Correctly identify and/or discuss common cone fit errors.
3. Correctly mix ZOE root canal sealer.
4. Remove an adapte gutta percha cone, apply sealer and correctly reposition the cone into the canal in proper orientation.
5. Perform the Warm Vertical Condensation technique of root canal obturation with a System B (down pack) and Calamus (back fill)
6. Discuss the ideal clinical and radiographic appearance of an ideally adapted master gutta percha cone.
7. Discuss the properties of gutta percha and endodontic sealer.

8. Discuss the correct settings and steps to use the System B and Calamus.
9. Discuss the cause, significance and correction of commonly encountered deficiencies in obturation as evaluated on the condensation film.

Criteria Representing Severe Deficiencies (Failure):

1. Inabilities to perform a master cone fit on the single canal, take an acceptable cone fit x-ray, and present the cone fit x-ray to the covering faculty in a reasonable allotment of time.
2. Inability to take a cone fit x-ray of acceptable quality (the entire apex is visible on the film and an angulation that allows interpretation).
3. Inability to recognize a cone fit x-ray which does not meet the minimum criteria of an x-ray that can be interpreted.
4. Inabilities to identify and/or discuss common cone fit errors. Most important are those involved with cone tip shape, cone length, and cone adaptation to the apical third of the canal.
5. Inability to demonstrate and/or discuss how endodontic sealer is mixed to the proper consistency or use the proper liquid: powder ratio.
6. Inability to identify a severe deficiency in the quality of root canal obturation (either apically or within the body of the canal) as interpreted from the condensation x-ray.
7. Inability to recognize a condensation x-ray which does not meet the minimum criteria of an x-ray that can be interpreted.
8. Inability to discuss and/or make suggestions for correction of a severe deficiency in obturation determined on the condensation x-ray.
9. Disregarding or negligence to follow proper infection control procedures necessary during the taking and developing of a cone fit x-ray.

NOTE: A DS III student may request to take one or more of the competency examinations during any (every) clinical case treated during the DS III year. The requirement to take a competency is automatically determined by case initiation, yet an intent to take a competency must be noted at the time of PTP. Competency Exams must be taken consecutively.

Multiple failures of the Diagnostic Competency Exam will require didactic remediation.

Untimely completion of or 2 failures of Competency 2 or 3 will result in the student required to demonstrate competency in root canal obturation during the treatment of multiple canals while working on an extracted molar tooth.

DS IV COMPETENCY EXAMINATION DESCRIPTIONS

The clinical competency examinations during the DS IV year must be performed without faculty assistance or intervention. Both skills (performance) and critical thinking (corrective measures) are being assessed, therefore encouraging faculty interaction. Skills of Cleaning Shaping and Obturation are primarily assessed by results, as evaluated radiographically or as seen at the required check steps. If/As difficulties arise during the course of treatment, the DS IV student is expected to have the technical skills to manage and correct those deficiencies. Uncorrected, the mechanical objectives of root canal therapy are not achieved and would compromise the result and prognosis of the case. Skills and knowledge are secondarily assessed by student-faculty interaction, which accumulatively provide evidence that a student has retained the information taught and understands the essential concepts of providing endodontic care and root canal therapy.

DS III and DS IV endodontic competency exams cannot be taken concurrently. Prior to performing either DS IV clinical competency examination, the student must have successfully passed the DS III Competency Examinations and completed a minimum of 4 canals. The two DS IV competency examinations consist of:

Endo Competency 4 – Clinical Diagnosis

Purpose: A student must be able to continually improve their skills to identify and diagnosis teeth which require a ‘problem focused exam’ and which may potentially need root canal therapy. A student must then be able to take and interpret the pre-operative x-ray for evidence of pulpal and periapical pathology, for anatomic factors that affect case difficulty and selection, and be able to discuss how these factors may affect prognosis. Assessment of subjective information and gathering objective data through clinical tests must be correlated to establish an accurate pulpal and periapical diagnosis consistent with the subjective, radiographic and clinical evidence which the patient has on initial presentation.

Description:

1. Appropriate Case Selection
2. Expose and develop a Pre-Treatment x-ray
3. Case Work-up (accurate and thorough recording of clinical diagnostic information and completing the case envelope). The work up must be based on how the patient first presents for treatment to Green Endodontic Clinic.
4. Establish an Accurate Endodontic Diagnosis:
 - Pulpal Diagnosis
 - Periradicular Diagnosis
5. Correctly Identify the Reasons for Treatment: justification(s) for the endodontic diagnosis and the need to perform RCT (or alternative treatment).

Criteria for Successful Completion (Pass):

1. Accurately complete all sections of the endodontic case envelop used to record information requested during the endodontic evaluation. The information recorded must be based on a patient's initial presentation.
2. Take a pre-operative x-ray using an alignment device such as an XCP (or equivalent). The x-ray must contain all vital information necessary to satisfy the criteria of an acceptable pre-op diagnostic x-ray.
3. Accurately interpret and describe the radiographic depiction of coronal, radicular and periradicular/osseous anatomy) of the tooth in question. The periradicular/osseous anatomy must be specifically referenced by a description of the PDL space, lamina dura and/or the size of a periapical lesion if present.
4. Accurately establish a Pulpal and Periradicular diagnosis that is consistent with the subjective, objective, clinical, and radiographic information recorded on the case card.

Criteria Representing Severe Deficiencies (Failure):

1. Inabilities to take, to recognize the deficiencies of, and/or to relate the attributes of an ideal pre-operative diagnostic x-ray.
2. Recording inaccurate information (on the endodontic case envelop) or information that is not consistent with a patient's initial presentation and diagnostic work-up appt in Green Clinic.
3. Inabilities to relate or identify the criteria which should be interpreted and recorded under each section of the radiographic interpretation.
4. Using the phrase 'within normal limits (WNL)' in any section of the radiographic interpretation or medical history.
5. Recording an inaccurate Pulpal and/or Periradicular Diagnosis and/or endodontic diagnosis that is not consistent with the subjective, objective, clinical, and radiographic information recorded.

Endo Competency 5 – Clinical Treatment

Purpose: Every student must be able to provide unassisted root canal therapy that is consistent with a minimal satisfactory quality of care and standards set for cleaning, shaping and obturation of the root canal system, as taught for the OU COD technique. This treatment competency examination closely mirrors the conditions of Western Region Examination Board that requires complete treatment a single (one) canal of a multi-rooted posterior tooth.

Description:

1. Appropriate Case Selection
identify and discuss factors which affect case difficulty & selection.
2. Expose a Pre-Treatment x-ray.
3. Provide an informed consent for root canal therapy consistent with the pre-operative diagnosis and evaluation of case difficulty.
4. Deliver and achieve profound local anesthetic.

5. Accomplish endodontic rubber dam isolation
6. Demonstrate appropriate sterile technique and infection control procedures during the delivery of root canal therapy
7. Perform Endodontic Access on a molar tooth (including caries removal).
8. Determine Working Length on the pre-selected canal of a molar tooth. This includes unaided canal negotiation, exposing the WL x-ray, correctly interpreting the results of the WL x-ray, and implementing corrective measures to ultimately present a clinically accept WL x-ray requiring file adjustments of no more than ± 0.5 mm.
9. Clinical unassisted treatment of the 'selected' canal of a multi-rooted molar tooth: Cleaning and Shaping the body of the canal, Creation of the apical Control Zone, proper use of canal conditioners and irrigation, adaptation of master gutta percha cone, and obturation via warm vertical condensation.
10. Patient management

Criteria for Successful Completion (Pass):

1. Demonstrate the ability to deliver local anesthetic and achieve profound anesthesia (or discuss adjunctive techniques) that will insure a patient is comfortable during the entire endodontic procedure.
2. Achieve and maintain an aseptic field using rubber dam isolation during all phases of the root canal procedure.
3. Perform coronal access (having the correct shape and position for the tooth being treated) and identify all major orifices of a multi-canal molar tooth. If information is presented during the course of treatment that suggests a missed canal, the student must be able to recognize and discuss the pertinent information when directed by the covering faculty.
4. Accurately determine canal working length and/or be able to identify, discuss, and perform measures needed to correct an initially unacceptable working length, if needed.
5. Accurately clean and shape the body of the canal.
6. Accurately create an acceptable apical control cone that is consistent with the anatomical requirements of the tooth and root.
7. Accurately perform a gutta percha master cone fit and/or be able to identify, discuss and perform measures need to correct an initially unacceptable cone fit, if needed.
8. Provide an acceptable gutta percha canal obturation that satisfies the minimal standards for canal obturation at the OU COD. The length of obturation must be within 0-1 mm of the radiographic apex. The obturation must be generally dense and without significant voids along the length of the canal obturation. The student can institute corrective measures as required to correct an initially unacceptable obturation.

Criteria Representing Severe Deficiencies (Failure):

1. Not strictly adhering to the check steps requested by an instructor during the treatment competency examination.
2. Inability to achieve profound local anesthesia in order to perform root canal therapy with complete patient comfort and/or not being able to discuss measures to provide additional, corrective, or adjunctive local anesthesia.
3. Not requesting faculty assistance or direction in a timely manner during the procedure when questions arise. The result of not seeking appropriate advice in a timely manner may lead to an iatrogenic mishap or preventable treatment error that may significantly alter the treatment and prognosis of the case.
4. Inability to achieve rubber dam isolation and/or maintain an aseptic technique during the entire length of the root canal procedure.
5. Inability to identify the major orifices of a multi-root posterior tooth during coronal access or recognize factors during the procedure that are consistent with a missed canal.
6. Inabilities to completely negotiate the selected canal and accurately determine working length for the selected canal. This includes file selection and placement, taking a working length x-ray, interpreting the working length x-ray, and correctly identifying the measures needed for a working length adjustment (short or long files), and if required perform the adjustment required to correct the working length.
7. Performing root canal cleaning and shaping of the root canal system in a sequence of steps that is not consistent with the technique for root canal therapy taught at the OU COD.
8. The occurrence of a perforation of any type (coronal, radicular or apical) during the course of molar RCT (competency canal or otherwise).
9. Inability to establish a cone fit in a timely manner in the selected canal. This includes correct adaptation of a master gutta percha cone, taking the cone fit x-ray, interpreting the cone fit x-ray, and correctly identifying the measures needed for cone fit adjustment (if required).
10. Inabilities to suggest, discuss and/or correct a master cone fit that does not meet the criteria of minimally acceptable cone fit.
11. Over extension of the gutta percha cone noted on the condensation or final obturation x-ray. The gutta percha over extension includes those resulting from a previous cone fit which had extruded gutta percha obturation material beyond the apex and which could not subsequently be retrieved from the periapical tissues.
12. A significant error in obturation (e.g., unacceptable short fill or apical third void) that cannot be corrected by the student and requires faculty assistance to retreatment of the canal (total removal of the gutta percha obturation) in order to correct the obturation deficiency.

Note: **An accurate diagnosis is required of each clinical competency examination taken during the DS IV year. First failure of the diagnosis competency requires diagnosis and treatment of another molar tooth. Multiple failures of the Diagnostic Competency Exam will require didactic remediation.**

2 or more failures of Competency 5 (unassisted treatment of a single canal or a multi-rooted molar tooth) will result in the student required to demonstrate competency in root canal obturation during the treatment of multiple canals while working on an extracted molar tooth.

Performance Objectives:

1. Identify and describe the five Clinical Competency Examinations in Endodontics.
2. Describe in detail the Pass and Failure requirements for each of the five Clinical Competency Examinations taken during the two year of pre-doctoral training.
3. Describe the procedure for initiating the DS III endodontic clinical competency examinations.
4. Describe the procedures during the DS III endodontic clinical competency examinations.

After having reviewed this section, and after having completed a minimum of ten (10) canals, (or the competency case includes the 10th canal) the DS IV student will be able to:

5. Describe the procedure for initiating the DS IV endodontic clinical competency examinations.
6. Describe the procedures during the DS IV endodontic clinical competency examinations.
7. Correctly and completely record a diagnostic work-up for the case in which the canal to be treated is involved.
8. Select an uncomplicated molar tooth to diagnose, perform access, and determine working lengths on the primary canals.
9. Treat to completion and without intervention by a faculty member a selected canal of a molar tooth.
10. Treat to completion, the canal selected, to a level deemed clinically acceptable, by the attending faculty member in the student clinic.

SECTION IV

SOURCES OF ENDODONTIC PATIENTS ENDODONTIC TREATMENT PLAN AND INITIATION OF A CASE

Description:

This section outlines the correct procedure for Endodontic Treatment Planning and initiating an Endodontic Case.

Rationale:

Without proper case initiation, patients may not be treated in the endodontic clinic. An endodontic case initiation is required for all patients seen in Green Endodontic Clinic. This includes:

1. Case from the treatment plan where root canal therapy is required
2. Cases from the treatment plan where root canal therapy is anticipated
3. Cases which require and E & E (Excavation and Evaluation) to complete the endodontic assessment and treatment plan
4. Cases that are referred mid-treatment from another clinic (e.g., after a pulp exposure, progressive symptoms after restoration)

A. SOURCES OF ENDODONTIC PATIENTS

It is the student's responsibility to secure the necessary patients and cases to complete their minimum clinical experiences.

1. Primary Source of Endodontic Patients -

The primary source of endodontic patients should be your patient family. When your patient family does not provide endodontic patients to meet your needs, you should request an appropriate patient from your GPD. The Endodontic Department is constantly aware of your endo progress and needs

2 Secondary Sources of Endodontic Patients -

Secondary sources of patients should not be depended upon routinely as a means to secure patients to complete your minimum clinical experiences. Secondary sources may include Shared Care assigned by your GPD and Limited Care assigned by Dean Miller from Emergency Clinic. It is also possible to receive a patient from an outside referral source. These are assigned by Dean Mullasseril It is your responsibility to let your GPD and /or Dean Mullasseril of your endodontic needs. In either case, the final approval for case assignment requires a signature from the endodontic faculty.

B. SHARED CARE OF ENDODONTIC PATIENTS

Shared Care is typically done within the student's Group Practice and co-ordinated by their GPD. Patients being shared outside of the Group Practice must be approved by both the GPDs involved with the shared care or the Director of Comprehensive Care. If endodontic therapy is required after a procedural restorative mishap (i.e., endodontic perforation, separated instrument, or pulp exposure in operative or fixed), the student is required to perform all necessary follow-up care and Shared Care **is not** an option.

C. LIMITED CARE ENDODONTIC PATIENTS

Root canal therapy may be performed on limited care patients. It is imperative you understand that this is a secondary source of patients to help fulfill your endodontic minimum clinical experiences, outside of your patient family. You must not depend upon this as a primary source of endodontic patients. Limited treatment cases coming from emergency clinic are first approved by Dr. Goldbeck and then assigned through Dean Miller's office in co-ordination with the Endo Department. Outside referral patients are assigned by Dr. Mullasseril in co-ordination with Dr. Goldbeck.

D. PROCEDURAL ERRORS ON EMERGENCY PATIENTS

On occasion a student will begin endodontic treatment in Comprehensive Care or another restorative clinic on an emergency basis. Should a procedural accident occur, such as a broken instrument, perforation, etc., it will be that student's responsibility for the follow-up care of that tooth. Such follow-up care includes completion of the root canal, perforation repair, or extraction, should it be indicated. Whatever treatment is deemed necessary, it becomes the student's responsibility to see that it is accomplished.

E. TREATMENT PLANNING

Endodontic treatment planning is performed on many patients once assigned to a student's family. Oral Diagnosis or a Group Practice Director will indicate when an endodontic treatment plan is required. You may have questions during the treatment planning work-up process where endodontic input may be beneficial. In these cases an endodontic consult is suggested and encouraged. In most cases the patient is not required to be present for this. You may see the Endodontic Department Chair and discuss the case.

F. CASE INITIATION

ALL PATIENTS SEEN IN GREEN CLINIC REQUIRE CASE INITIATION AND A CASE CARD. If the case card is not available at the time of PTP, you will be asked to submit the case initiation form and receive a case card before performing any diagnostic or treatment procedures on the patient.

CASE INITIATION CANNOT BE GIVEN WITHOUT AN APPROVED MASTER TREATMENT PLAN. The master treatment plan must identify the tooth and the

endodontic procedure (by code). The master treatment plan should also show the intended final restoration for the tooth planned for root canal therapy. If a patient is symptomatic prior to establishing a mater treatment plan, speak to the endodontic faculty so that special arrangements can be made for you to initiate the case.

The Case Initiation Form is submitted for case the creation of a Case Card. Figure 4e is an example of a Case Initiation Form. The information regarding the student and the patient is self-explanatory. The information must be accurate and complete for the department's records. When a student is ready to initiate a case, the Case Initiation Form is presented to the Endodontic Department Chair for approval. **The Case Initiation Form is then returned to the Endodontic Department Secretary in order that the requested information can be typed on the case envelope record.** The department secretary will provide the case number. The department secretary will type a case envelope, based on the information provided on the Case Initiation Form. If you provide incomplete information, your case envelope will not be typed and your treatment of that patient may be delayed.

Once a case number has been assigned a case envelope is generated, **the department secretary must account for all case envelopes.** It is the student's responsibility to turn in **all** case envelopes assigned to them whether endodontic treatment was accomplished on that case or not. This includes all patients (i.e., no shows, E&E's not resulting in root canal therapy, difficulty contacting the patient, etc.). **In order to be signed out by the Endodontic Department prior to graduation, all case envelopes with assigned cases numbers must be accounted for.**

Endodontic Treatment Plan

Class of			Date		
Student: Last		First		MI	
Patient: Last		First		MI	
Address			City	State	Zip
Race	Age	Sex	Home Phone		Work Phone
Birth Date			Parent or Spouse or Employer		

Case Initiation Form

Tooth #	Canals	Estimated Difficulty I II III	Date Completed	Case #	Initiation Approval CDT #
Indication for treatment					

Tooth #	Canals	Estimated Difficulty I II III	Date Completed	Case #	Initiation Approval CDT #
Indication for treatment					

Tooth #	Canals	Estimated Difficulty I II III	Date Completed	Case #	Initiation Approval CDT #
Indication for treatment					

Tooth #	Canals	Estimated Difficulty I II III	Date Completed	Case #	Initiation Approval CDT #
Indication for treatment					

Tooth #	Canals	Estimated Difficulty I II III	Date Completed	Case #	Initiation Approval CDT #
Indication for treatment					

Tooth #	Canals	Estimated Difficulty I II III	Date Completed	Case #	Initiation Approval CDT #
Indication for treatment					

Treatment Plan Approval
Faculty Signature _____

rev.06-04-06

Fig. 4e, Orange Treatment Planning / Case Initiation Form

G. DEADLINES

Case Initiation Forms

Case Initiation Forms for cases to be treated in a morning session must be turned into the department secretary no later than 4:00 p.m. **the day before** a case is to be started. For cases being treated during the afternoon clinic period, the forms **must be turned in by 8:00 a.m.** the day the patient is to be seen.

Completed Cases and Case Envelopes

Completed cases must be turned in within 48 hours after obturation. Weekends and holidays are not included in this computation. Completed cases turned in late may be denied credit or may result in grade reduction.

AAE Endodontic Case Difficulty Assessment Form

CRITERIA AND SUBCRITERIA	MINIMAL DIFFICULTY	MODERATE DIFFICULTY	HIGH DIFFICULTY
A. PATIENT CONSIDERATIONS			
MEDICAL HISTORY	<input type="checkbox"/> No medical problem (ASA Class 1*)	<input type="checkbox"/> One or more medical problems (ASA Class 2*)	<input type="checkbox"/> Complex medical history/serious illness/disability (ASA Classes 3-5*)
ANESTHESIA	<input type="checkbox"/> No history of anesthesia problems	<input type="checkbox"/> Vasoconstrictor intolerance	<input type="checkbox"/> Difficulty achieving anesthesia
PATIENT DISPOSITION	<input type="checkbox"/> Cooperative and compliant	<input type="checkbox"/> Anxious but cooperative	<input type="checkbox"/> Uncooperative
ABILITY TO OPEN MOUTH	<input type="checkbox"/> No limitation	<input type="checkbox"/> Slight limitation in opening	<input type="checkbox"/> Significant limitation in opening
GAG REFLEX	<input type="checkbox"/> None	<input type="checkbox"/> Gags occasionally with radiographs/treatment	<input type="checkbox"/> Extreme gag reflex which has compromised past dental care
EMERGENCY CONDITION	<input type="checkbox"/> Minimum pain or swelling	<input type="checkbox"/> Moderate pain or swelling	<input type="checkbox"/> Severe pain or swelling
B. DIAGNOSTIC AND TREATMENT CONSIDERATIONS			
DIAGNOSIS	<input type="checkbox"/> Signs and symptoms consistent with recognized pulpal and periapical conditions	<input type="checkbox"/> Extensive differential diagnosis of usual signs and symptoms required	<input type="checkbox"/> Confusing and complex signs and symptoms: difficult diagnosis <input type="checkbox"/> History of chronic oral/facial pain
RADIOGRAPHIC DIFFICULTIES	<input type="checkbox"/> Minimal difficulty obtaining/interpreting radiographs	<input type="checkbox"/> Moderate difficulty obtaining/interpreting radiographs (e.g., high floor of mouth, narrow or low palatal vault, presence of tori)	<input type="checkbox"/> Extreme difficulty obtaining/interpreting radiographs (e.g., superimposed anatomical structures)
POSITION IN THE ARCH	<input type="checkbox"/> Anterior/premolar <input type="checkbox"/> Slight inclination (<10°) <input type="checkbox"/> Slight rotation (<10°)	<input type="checkbox"/> 1st molar <input type="checkbox"/> Moderate inclination (10-30°) <input type="checkbox"/> Moderate rotation (10-30°)	<input type="checkbox"/> 2nd or 3rd molar <input type="checkbox"/> Extreme inclination (>30°) <input type="checkbox"/> Extreme rotation (>30°)
TOOTH ISOLATION	<input type="checkbox"/> Routine rubber dam placement	<input type="checkbox"/> Simple pretreatment modification required for rubber dam isolation	<input type="checkbox"/> Extensive pretreatment modification required for rubber dam isolation
MORPHOLOGIC ABERRATIONS OF CROWN	<input type="checkbox"/> Normal original crown morphology	<input type="checkbox"/> Full coverage restoration <input type="checkbox"/> Porcelain restoration <input type="checkbox"/> Bridge abutment <input type="checkbox"/> Moderate deviation from normal tooth/root form (e.g., taurodontism, microdens) <input type="checkbox"/> Teeth with extensive coronal destruction	<input type="checkbox"/> Restoration does not reflect original anatomy/alignment <input type="checkbox"/> Significant deviation from normal tooth/root form (e.g., fusion, dens in dente)
CANAL AND ROOT MORPHOLOGY	<input type="checkbox"/> Slight or no curvature (<10°) <input type="checkbox"/> Closed apex (<1 mm in diameter)	<input type="checkbox"/> Moderate curvature (10-30°) <input type="checkbox"/> Crown axis differs moderately from root axis. Apical opening 1-1.5 mm in diameter	<input type="checkbox"/> Extreme curvature (>30°) or S-shaped curve <input type="checkbox"/> Mandibular premolar or anterior with 2 roots <input type="checkbox"/> Maxillary premolar with 3 roots <input type="checkbox"/> Canal divides in the middle or apical third <input type="checkbox"/> Very long tooth (>25 mm) <input type="checkbox"/> Open apex (>1.5 mm in diameter)
RADIOGRAPHIC APPEARANCE OF CANAL(S)	<input type="checkbox"/> Canal(s) visible and not reduced in size	<input type="checkbox"/> Canal(s) and chamber visible but reduced in size <input type="checkbox"/> Pulp stones	<input type="checkbox"/> Indistinct canal path <input type="checkbox"/> Canal(s) not visible
RESORPTION	<input type="checkbox"/> No resorption evident	<input type="checkbox"/> Minimal apical resorption	<input type="checkbox"/> Extensive apical resorption <input type="checkbox"/> Internal resorption <input type="checkbox"/> External resorption
C. ADDITIONAL CONSIDERATIONS			
TRAUMA HISTORY	<input type="checkbox"/> Uncomplicated crown fracture of mature or immature teeth	<input type="checkbox"/> Complicated crown fracture of mature teeth <input type="checkbox"/> Subluxation	<input type="checkbox"/> Complicated crown fracture of immature teeth <input type="checkbox"/> Horizontal root fracture <input type="checkbox"/> Alveolar fracture <input type="checkbox"/> Intrusive, extrusive or lateral luxation <input type="checkbox"/> Avulsion
ENDODONTIC TREATMENT HISTORY	<input type="checkbox"/> No previous treatment	<input type="checkbox"/> Previous access without complications	<input type="checkbox"/> Previous access with complications (e.g., perforation, non-negotiated canal, ledge, separated instrument) <input type="checkbox"/> Previous surgical or nonsurgical endodontic treatment completed
PERIODONTAL-ENDODONTIC CONDITION	<input type="checkbox"/> None or mild periodontal disease	<input type="checkbox"/> Concurrent moderate periodontal disease	<input type="checkbox"/> Concurrent severe periodontal disease <input type="checkbox"/> Cracked teeth with periodontal complications <input type="checkbox"/> Combined endodontic/periodontic lesion <input type="checkbox"/> Root amputation prior to endodontic treatment

*American Society of Anesthesiologists (ASA) Classification System

Class 1: No systemic illness. Patient healthy.
 Class 2: Patient with mild degree of systemic illness, but without functional restrictions, e.g., well-controlled hypertension.
 Class 3: Patient with severe degree of systemic illness which limits activities, but does not immobilize the patient.

Class 4: Patient with severe systemic illness that immobilizes and is sometimes life threatening.
 Class 5: Patient will not survive more than 24 hours whether or not surgical intervention takes place.

www.asahq.org/clinical/physicalstatus.htm

Fig. 4e, AAE Case Difficulty Assessment Form
High Difficulty is Similar to OU Class III Endodontic Case

G. CASE DIFFICULTY ASSESSMENT (AAE Form Fig. 4e)

A classification of each case should be done at the time of treatment planning, case initiation, and before treatment starts. The classification is accomplished to establish the difficulty of the case. In general terms, the categories are:

Class I: The case has no pathological or anatomical characteristics, which are likely to result in compromised treatment or prognosis. This category is similar to the AAE Minimal Difficulty case assessment. The AAE defines this level of difficulty as: “Preoperative condition indicates routine complexity (uncomplicated). These types of cases would exhibit only those factors in the MINIMAL DIFFICULTY category. Achieving a predictable treatment outcome should be attainable by a competent practitioner with limited experience”.

Class II: The case has pathological or anatomical characteristics, which require intermediate operator skills in Endodontics in order to avoid a compromised treatment or prognosis. Included are moderate curvatures, medically compromised patients, and most molar teeth. This category is similar to the AAE Moderate Difficulty case assessment. The AAE defines this level of difficulty as: “Preoperative condition is complicated, exhibiting one or more patient or treatment factors listed in the MODERATE DIFFICULTY category. Achieving a predictable treatment outcome will be challenging for a competent, experienced practitioner”. It is reasoned that with sufficient endodontic faculty assistance and timely intervention pre-doctoral students can treat most of these cases in Green Endodontic Clinic. DS IV students will be more experienced and therefore require less assistance in clinic than DS III students.

Class III: The case has pathological and anatomical characteristics, which require specialist level operator skills and extensive clinical knowledge. These cases are beyond the experience level and capabilities of a general dentist and will be referred. This category is similar to the AAE High Difficulty case assessment. The AAE defines this level of difficulty as: “Pre-operative condition is exceptionally complicated, exhibiting several factors listed in the MODERATE DIFFICULTY category or at least one in the HIGH DIFFICULTY category. Achieving a predictable treatment outcome will be challenging for even the most experienced practitioner with an extensive history of favorable outcomes”. The amount of direct endodontic faculty intervention and intensity of advanced specialty care needed precludes these cases from being treated in Green Endodontic Clinic: where several students must be overseen/supervised at one time or where there is NO reasonable expectation the pre-doctoral student can provide any degree of the endodontic treatment expected.

I. MANAGEMENT OF CLASS III ENDODONTIC CASES

1. Class III Case Defined - Teeth that are classified Class III are deemed beyond the experience level and capabilities of the pre-doctoral student. If an endodontic post graduate program was available in the OUCOD, the Endodontic Class III cases would be treated by those students.

2. Class III Cases include:

- A. Selected anterior, premolar and molar cases that show significant calcification and/or canal curvatures or cases where isolation and/or access difficulties are determined beyond the student's level of expertise.
- B. All Non-Surgical Retreatment Cases (anterior, premolar, molar)
- C. All Surgical Endodontic Cases

3. Student Responsibility for Class III Cases

Just as in private practice it is the student's (Practitioner's) responsibility to provide the best treatment possible for the patient. If a case is beyond the student's capabilities then he/she must discuss the treatment options for the tooth (pursue endodontic therapy, do nothing or elect extraction) with the patient. If an endodontic and restorative treatment plan has been accepted, then the student should assist with and arrange for the referral. Referrals outside of the Green Endodontic Clinic are the student's responsibility. The student should explain to the patient the need for the referral and as a courtesy discuss possible options with them, including the approximate fees. The referral must include a restorative treatment plan. Follow-up with the restorative treatment plan should proceed as soon as is practical after the requested treatment is rendered. Most often, treatment requiring referral will be deferred until the restorative treatment for the tooth can be performed by the student in an uninterrupted timely manner.

4. How is the Class III Case handled at the COD?

The OU College of Dentistry, the Department of Endodontics, and other Restorative Division Departments have no mechanism for the routine treatment of Class III endodontic cases. Presently, the Class III case is handled by:

- A. referring the patient to a Private Practice Endodontist in the community.
- B. making special arrangements to have an endodontic faculty assist the student in providing care in Endodontic Special Assistance Clinic (SAC).

Referral to Private Practice Endodontists

Referral to an Endodontist in the community is always an available option when Class III difficulty cases are identified. When Endodontic Pathosis is identified radiographically or is confirmed by continued endodontic signs and symptoms clinically, the endodontic faculty will suggest the appropriate treatment. NO Class III molar cases can be treated at the College of Dentistry by pre-doctoral students or as an emergency. When No Endodontic Pathosis is identified, but the tooth in question is seen to have a radiographically deficient root canal therapy, the decision to refer or do nothing lies with the particular Department in the Division of Restorative Dentistry who has established the restorative treatment plan. Referral forms for patients to a private practice endodontist (Fig. 4f) are available from department secretaries.

ALL Endodontic Retreatments that may be accepted as suitable at the COD MUST have a Consultation Appoint dedicated to diagnosis, prognosis, informed consent, and referral.

ALL PAPER WORK FOR THE REFERRAL MUST BE FILLED IN AFTER A CURRENT PATIENT ASSESSMENT THERE ARE NO EXCEPTIONS. All information pertinent to the tooth in question must be updated. Previous x-rays, a treatment plan older than 6 months, and even a previous TPC appointment are not accepted as a consultation.

Endodontic Special Assistance Clinic (SAC)

By the determination of the faculty, selected Class III anterior and premolar teeth may be approved for student treatment with faculty assistance. The Endodontic 'Faculty' Special Assistance Clinic (SAC) is available to students by special arrangement with a specific faculty member. Only uncomplicated anterior and premolar retreatments will be approved for treatment in this manner. The First Appointment required for potential SAC cases requires a case initiation, diagnostic work-up, and consultation in Green Clinic. Knowing the faculty member you will be working with, this is appointment and chair is reserved through the normal clinic scheduling system. At that time the suitability to see the patient as a SAC patient will be determined, and the paper work completed. An Endodontic Specialty Case referral must be completed (Figure 4g). **Final treatment approval lies with the billing office.**

Appointments can then be reserved for treatment only after approval by the covering faculty. A date of available coverage is usually discussed.

ENDODONTIC SPECIALTY CARE REFERRAL
CONSULTATION REQUIRED (list only one tooth on each referral form)

PATIENT'S NAME: _____

PT PHONE NUMBERS: _____

Referred By (Student): _____

Referral (Date): _____ **Completed (Date):** _____

Tooth #: _____ **Chart #:** _____ **Case #:** _____

TREATMENT REQUESTED:

(present a PA x-ray taken within 6 months of referral date) _____

REASON FOR REFERRAL: (if referral includes a Pros treatment plan, a faculty member must be consulted prior to a referral to insure continuity of care) _____

COMMENTS: (special treatment and fee arrangements to be discussed with patient.)

Pertinent Pt Medical Information: _____

Treatment required before Endo appointment: _____

Treatment is to be provided by: **Student in SAC** **Faculty in FSCC**

CDT codes & fees: _____

Pros. Faculty Signature _____

Treating Endo Faculty _____

Financial Approval _____

I have been informed of possible treatment alternatives including extraction and no treatment at all. I have been informed (by my student) of the risks and benefits of the above endodontic procedure. A diagnosis and consultation with COD faculty generally precedes the informed consent. Most of the time, both restorative and endodontic faculty have reviewed your case. It has been explained to me and I understand that a perfect result cannot be guaranteed or warranted. The supervising or treating endodontic faculty will be available to answer any additional questions at the time of your appointment.

PATIENT SIGNATURE _____

(inform consent) _____

Fig. 4f - Referral Form to Endodontic Faculty Special Care Clinic

Performance Objectives:

1. The student will understand the three sources of endodontic patients at the College of Dentistry
2. The student will understand how Limited Care and Shared Care endodontic patients can be assigned.
3. The student will be able to discuss the handling of a procedural accident that occurs in Oral Diagnosis.
4. The student will understand the endodontic treatment planning process.
5. The student will be able to identify and specify the use of each of the two forms (Green and Orange) used during endodontic treatment planning.
6. Describe the data on the case initiation form.
7. Recognize the number of teeth that can be listed on the case initiation form and what part of the form the faculty fills in.
8. The student will explain which color of case initiation form is used for each source of patient and where a case initiation form may be obtained.
9. The student will identify the functions and procedures associated with each block on a Case Initiation form.
10. The student will describe the procedures required in the handling of the case envelopes for cases completed, as well as for cases initiated but not treated endodontically.
11. The student will write the times at which Case Initiation forms are due for treating patients in the morning and the afternoon sessions.
12. The student will become familiar with the AAE Endodontic Case Difficulty Assessment Form.
13. The student will describe the qualities of Class I (Minimal), Class II (Moderate) and Class III (High) difficulty cases.
14. Define the Class III case and indicate how Class III difficulty cases are handled at the COD.

SECTION V

INITIAL CASE WORK-UP

CLINICAL EVALUATION AND PATIENT INSTRUCTIONS

Description:

This section contains instructions for completing an initial case work-up correctly. The mechanism for evaluation is explained. The correct method for setting up and handling instruments is discussed. Radiographs, clinical examination, case history write-up, and appropriate checkpoints are discussed.

Rationale:

Selectively collecting and organizing a database upon which procedural decisions may be made is an important part of dental practice. Over 1/3 of each clinical case grade will be determined by the accuracy and thoroughness with which the initial case work-up is conducted.

Obtaining good clinical outcomes and good clinical evaluations depend, to a large degree, on the ability of the operator to correctly identify, organize, and use the appropriate instruments.

A. PERMISSION TO PROCEED WITH TREATMENT

The student will obtain a permission to proceed (PTP) signature from the faculty at the beginning of each and every clinic appointment. At the time of PTP the following items must be available to the covering endodontic faculty.

1. Endodontic Case Envelope
2. A Pre-treatment periapical (PA) x-ray(s)
(either from the patient's full mouth set of x-rays or as a separate x-ray film)
3. Patient's Chart with Master Treatment Plan
or Limited Care Approval from Clinic Operations
or permission signature from Clinic Operations in treatment notes
4. Clinical Competencies Form (if applicable)
5. Final obturation x-ray (if a core is intended)

The PTP statement, will give the student permission to take a pre-op x-ray if needed and begin the write-up. The student will then present a proper preoperative radiograph and completed case card to an instructor before initiating any definite treatment (including administration of local anesthesia). The instructor will check the diagnostic value of the pre-op x-ray, review the case history clinical exam, diagnosis, medical history, etc., for completeness, accuracy, and acceptability. If these items are acceptable, the instructor will sign the reverse side of the treatment envelope to initiate your treatment (see Fig. 6d).

Check-steps will be evaluated when completed and comments by the faculty relating to performance will be given. Notice that aseptic technique and radiographic protocol will also be

evaluated. The information thus recorded will be later used to determine a case grade, which is based on more than clinical treatment alone (see Section I, Grading System). Students working beyond specified checks without signature/initial are in risk of being dismissed from the Endodontic Clinic and may be subject to additional required work.

NOTE: It is the student's responsibility to insure that all required faculty signatures are obtained. No credit will be given for cases, which have been inadequately evaluated or improperly initiated.

B. TRADITIONAL RADIOGRAPHS

Acceptable Radiographs:

1. The apex and crown of the tooth in question and the two adjacent periapical areas (mesial and distal) should be clearly defined. The tooth to be treated should be centered on the film.
2. Both Pre-op and Final x-rays should be taken with the XCP to insure consistent positioning and angulations.
3. The Pre-op / Diagnostic x-ray should be taken the day treatment is initiated. On special occasions and with faculty approval, a recent x-ray (i.e., taken in OD) may be acceptable, but **only if** NO treatment on the tooth was performed after the x-ray was taken.
4. If a periapical lesion is associated with the tooth requiring root canal therapy, the entire outline of the periapical lesion should be defined on the film. **The entire periapical lesion must be defined** on the initial diagnostic x-ray, the final treatment x-rays, and all recall films.
5. Working x-rays that are taken with the rubber dam clamp and rubber dam in place (e.g., working length, cone fit, and condensation films, etc.)

The Exposure Settings on the x-ray units have been calibrated, however each exposure setting is different depending upon the periapical x-ray being taken. After turning on the machine you are going to use, the exposure will need to be changed. The left side of the control pad indicates the periapical region anterior, premolar, and molar from top to bottom. Press the appropriate button once for the maxillary arch and a second time (twice) for the mandibular arch. The selected exposure setting will light up. Check the exposure each time before you take an x-ray. The student sharing the x-ray machine with you is likely working on a different tooth than you are and will require a different setting for the proper exposure. If an ERROR message occurs during the exposure, you did not hold the exposure button in through the entire exposure. To re-set, push the select button on the control touch pad once. When this occurs, the sensor was never exposed. You may expose the sensor without removing it from the patient's mouth.

Pre-op images All anterior teeth are to be positioned so as to have their long axis parallel to the longer side of the sensor (Fig. 5a). Canine to canine in both the maxilla and mandible will be considered anteriors. **All other teeth should be exposed in** such a fashion as to have their long axis perpendicular to the longer side of the sensor (Fig. 5b). These positions are standard for all full-mouth sets.

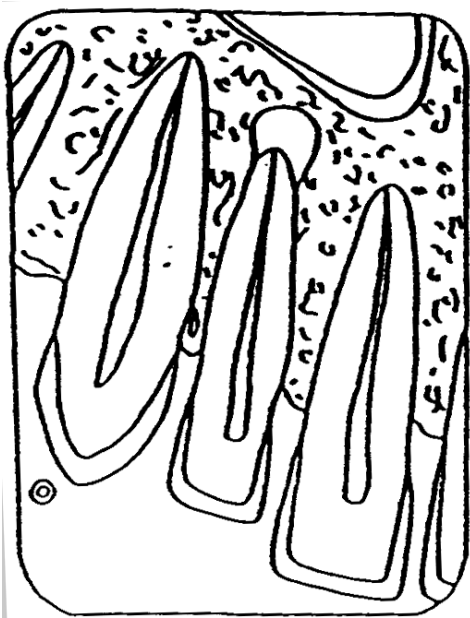


Fig. 5a
Anterior Radiograph
(canine to canine)

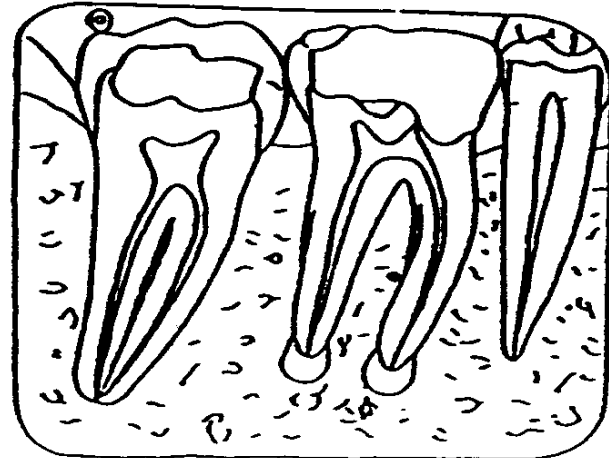


Fig. 5b
Posterior Radiograph
(premolars and molars)

C. CLINICAL EXAM

The clinical exam will consist of several steps. It starts with an extra-oral exam and proceeds to specific tests, which determine possible Endodontic origin of a specific problem. Initially, the patient's face should be inspected for signs of asymmetry due to swelling. The lymph nodes associated with drainage from the oral cavity should be palpated and enlarged or tender nodes. This should be noted on the case history card. Intra-orally, the area in question should be observed for vestibular, palatal, and/or lingual swelling. Presence of swelling, as well as the presence of a sinus tract, is to be noted in the appropriate section of the case card. Percussion and palpation tests will be done for all teeth in question. The depth of the gingival sulcus on the mesial, facial, distal, and lingual/palatal aspects of the tooth is to be measured and recorded, as well as the degree of tooth mobility. When appropriate, an electric pulp test and thermal test are done and their results noted on the case card envelope. The tooth should be examined for coloration and transmission of light. A discoloration or darkness to transmitted light should be noted on the case envelope in the discoloration section.

D. CASE HISTORY WRITE-UP

When you pick up your Endodontic case envelope (see Fig. 5c), the information you provided on the Case Initiation Form will be typed by the department secretary. The row beginning with "case number" will have to be completed by you. (The departmental secretary will assign the case number.) Tooth number, number of canals, visits, difficulty classification, and treatment are the student's responsibility. If the number of canals after treatment is different than the number estimated before the treatment, be sure to have a faculty member note that change. The number of visits should be entered when treatment is completed. The type of treatment is indicated by circling the appropriate letter: RC for conventional endodontic cases; RETx for retreatments, APEX for apexification, and BLEACH for bleaching treatment. Be sure

this part of the case envelope is completed before the case is submitted for grading along with numbers (1) through (7) listed below.

(1) Chief Complaint (c/c):

The first item to complete is the chief complaint. This should be a statement of clinical symptoms and or signs related to the specific tooth in question. It may include factors, which may aggravate that pain. When there are no signs or symptoms associated with a tooth but a treatment is requested as preparation for specialized treatment in another department, then simply state the c/c as a referral from the referring department. Give the reason for referral, i.e., post-space, root amputation, over denture, etc. List which tooth you feel is requiring treatment. Cases diagnosed from FMX or clinical exam without symptoms would be noted as an incidental finding on FMX or clinical examination (For example: asymptomatic apical lesion noted on radiograph). **The chief complaint, for our purposes , is a simple statement of the reason the patient is in the Endodontic Clinic!**

(2) History and Clinical Findings:

The history should include any pertinent information related to the tooth that might indicate why root canal treatment may be necessary. The clinical findings are those items that you visually see such as: swelling (diffuse or localized), sinus tracts, etc. Any previous restorations should be listed. This includes: crowns, amalgams, bridges, RCT, composites, and temporaries. If an exposure, pulp cap, pulpotomy or pulpectomy has been accomplished, it should be noted. Include data on the treatment of the tooth's line previous history of pain, including duration, intensity, spontaneous or provoked, and when it occurred. Any history of trauma and the approximate date of occurrence should be noted. If the tooth is discolored, indicate and describe the discoloration and possible cause. These findings should be described briefly yet thoroughly. The line labeled "other" provides room to complete the tooth's history.

(3) Radiologic Findings:

Include a brief descriptive statement(s) on your interpretation of the pre-op radiograph.

The Coronal description should describe existing caries, restorations, fractures, pulp chamber status, visible pulpotomy, sclerotic tracts, deep bases, etc. A pulp exposure is usually not visible on a radiograph, but if suspected, list as deep caries with possible pulp exposure.

The Radicular description should give your interpretation of the status of the canals. Straight, visible canals; sclerotic, moderately curved, severely curved in apical third; visible canals half way to apex; and, canals not visible in apical half are examples of possible findings.

The Periradicular (osseous) findings will include apical lesions with a brief description. Examples are: apical thickening of PDL; 1 x 1.5 cm distinct circular apical lesion; or a 2 x 2 cm diffuse apical lesion. Changes in the osseous structure, other than apically, should also be noted. This may include periodontal bone loss, lateral lesions associated with lateral canals, changes around root fractures, etc. The radiologic findings describe what you see and interpret from the pre-op film.

(4) Clinical Tests:

See SECTION V, C, Clinical Examination. If a tooth has had a pulpotomy or pulpectomy, then indicate "no" for EPT and thermal tests not performed. Cotton roll isolation and drying of the teeth is necessary for EPT. At least one other tooth, (preferably the same type), should be tested as a control tooth. Readings are recorded as a numerical value over the maximum number of the tester scale (i.e., 2/10, 30/80, etc.). Teeth not responding to EPT are

labeled as NR/10 or NR/80. The recorded reading should specify tooth number and response, example #24 (20/80). Variable responses are recorded as #24 20-25/80; this indicates that the tooth responded initially at 20/80 and on a second attempt at 25/80. **Remember to challenge multi-rooted teeth in more than one location.** When that is done, indicate the responses thus: #14 F's 20/80 P 40/80, etc., the location of reading F or L (P) are important, so unless specified, the reading is to be facial. Lingual or palatal readings are generally higher.

(5) Diagnosis:

The sections relating to diagnosis are self-explanatory. In **arriving at a pulpal diagnosis** remember:

- ∞ Reversible pulpitis implies that the pulp tissue will heal and that RCT will not be necessary.
- ∞ Irreversible pulpitis means that the pulp is vital but is damaged to the extent that it will not heal.
- ∞ Necrosis means that only necrotic tissue will be found throughout most of the root canal system.
- ∞ Devitalization implies a normal pulp that is being extirpated for restorative reasons.
- ∞ Previous treatment means that a pulpal diagnosis cannot be achieved because the pulp has been treated or removed.

In arriving at a **diagnosis for the periapical region**, remember:

- ∞ Percussion sensitivity relates to apical periodontitis, even when there is an absence of radiographic apical changes.
- ∞ An apical abscess has acute symptoms associated with it and swelling appears clinically.
- ∞ A draining fistula or sinus tract is pathognomonic for chronic apical abscess

(6) Reason for Root Canal Treatment:

This will usually require two reasons for treatment. Using diagnostic terms such as “irreversible pulpitis” or “apical periodontitis” are **NOT** acceptable. This may range from obvious abnormal signs or symptoms associated with the tooth to devitalization in conjunction with FPD, RPD, PERIO, etc. **Any statement in this area must be backed by other diagnostic (radiographic and/or clinical) entries.** This is simply a compiling of all the findings and your evaluation of relative importance. Hence, if the tooth has an apical radiolucency the record would verify that, within reason, it is related to pulpal injury. This may be accomplished via percussion, palpation, radiographic evidence of a probable route for pulpal damage, pulp testing and so forth. Generally, at least two mutually condemning findings are required for an acceptable diagnosis, i.e., apical radiolucency and percussion tenderness or non-vital EPT, etc. Devitalization would be supported via c/c and the reason for devitalization. Examples of **Acceptable reasons for treatment** would be:

- ∞ Previous pulp treatment
- ∞ Spontaneous pain
- ∞ Apical radiolucency
- ∞ Percussion tenderness
- ∞ Non-responsive to pulp testing (EPT and thermal)
- ∞ Lingering sensitivity to cold liquids
- ∞ Gray discoloration of virgin tooth

- ∞ Elective RCT for restorative reasons
- ∞ E&E resulted in a carious pulp exposure

(7) Medical History:

The medical history is brief, but very important. Any or all systemic diseases present must be noted. Any allergies must be noted, and medications taken must be listed with dosage and frequency. Is premedication with antibiotics required? If so, state the reason. If there is no history of allergies or diseases or if the patient is not on current medications, state **“no systemic diseases, no known allergies (NKDA), no current meds, no indication for antibiotic pre-medication.”** Leaving this space blank or writing something like **within normal limits (WNL) or unremarkable is not acceptable.**

(8) Therapeutic mishaps may periodically occur. These include separating instruments (such as files) and perforation of the tooth, and usually have significant effects on prognosis. Because of these deleterious or adverse effects, the following consequences will be incurred according to the following:

1. Separation of a file fragment in a canal: Grade will be no higher than C for the case.
2. Perforation above to below the crest of bone-either during coronal or root access: Grade no higher than C for the case.

E. CASE ENVELOPE

Case #	Tooth #	Canals	PTP SIGNATURE	COMPLETED SIGNATURE	GRADE
Student Name			Patent Name	Chart #	START DATE
FINISHING DATE					
CHIEF COMPLAINT					
HISTORY OF TOOTH AND CLINICAL FINDINGS					
PREVIOUS RESTORATIONS:		SINUS TRACT: YES NO		SWELLING: YES NO	
DISCOLORED: YES NO		PULP CAP: <input type="checkbox"/>		PULPOTOMY: <input type="checkbox"/>	
PREVIOUS TREATMENT: YES NO		PULPECTOMY: <input type="checkbox"/>			
OTHER HISTORY OF TOOTH:					
RADIOLOGIC FINDINGS:					
CORONAL					
RADICULAR					
PERIRADICULAR					
CLINICAL TESTS					
PERCUSSION TENDER: YES NO		MOBILITY: <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3			
PALPATION TENDER: YES NO		PROBING DEPTHS M D F L			
EPT: SUSPECTED TOOTH _____		CONTROLS _____			
THERMAL: PATIENT HISTORY: SENSITIVE: YES NO		RESULTS: _____			
THERMAL TEST: NONE HOT COLD					
REASONS FOR TREATMENT (2)					
Diagnosis:	Pulp:	NO APPARENT PATHOSIS <input type="checkbox"/>	REVERSIBLE PULPITIS <input type="checkbox"/>	PREVIOUS TREATMENT <input type="checkbox"/>	
		IRREVERSIBLE PULPITIS <input type="checkbox"/>	NECROSIS <input type="checkbox"/>		
	Periapical:	NO APPARENT PATHOSIS <input type="checkbox"/>	APICAL PERIODONTITIS <input type="checkbox"/>	CHRONIC APICAL ABCESS <input type="checkbox"/>	
		ACUTE APICAL ABCESS <input type="checkbox"/>	CONDENSING OSTEITIS <input type="checkbox"/>		
MEDICAL INFORMATION, ALLERGIES, CHRONIC DISEASES, MEDICAITONS, NEED FOR PROPHY ANTIOTBIOTIC COVERAGE. _____					
POST TREATMENT PROBLEMS: PERFORATION ACCESS FURCATION APICAL REPAIR: IMMEDIATE YES NO GP AMAL OTHER SEPARATED INST BEYOND APEX AT APEX SHORT OF APEX SIZE					

Fig. 5c
Endodontic Case Envelope
(Clinical Evaluation Side)

1-155514

Case No.	Tooth #	Canals	Difficulty	Date	Patient Chart #	Case Grade		
Student Name				Patient Name				
Acceptable / Unacceptable								
1. X. Rays		<input type="checkbox"/>	<input type="checkbox"/>	_____				
2. Case Envelope & Write-up		<input type="checkbox"/>	<input type="checkbox"/>	_____				
Chief Complaint				_____				
Case History				_____				
Radiographic Interpretation				_____				
Clinical Testing				_____				
Reasons for Treatment				_____				
Diagnosis				_____				
Recorded Entries				_____				
3. Access		<input type="checkbox"/>	<input type="checkbox"/>	_____				
4. Preparation	Radicular Access	<input type="checkbox"/>	<input type="checkbox"/>	_____				
	Control Zone			_____				
5. Obturation		<input type="checkbox"/>	<input type="checkbox"/>	_____				
6. Student Preparation		<input type="checkbox"/>	<input type="checkbox"/>	_____				
7. Aseptic Tech & Radiation Safety		<input type="checkbox"/>	<input type="checkbox"/>	_____				
LETTER GRADE AND POINTS EQUIVALENTS				A	B	C	D	F
				15 14 13	12 11 10	9 8 7	6 5 4	3 2 1
<small>HSC-6235-5-A Rev 1-16</small>				STUDENT COPY				

Fig. 5d
Endodontic Case Student Self Evaluation

F. CASE PRESENTATION (to covering endodontic faculty)

Once your case clinical examination and work-up are complete and the Endodontic Case Envelope has been filled in to the best of your ability, the case should be presented to the covering endodontic faculty. Any errors or omissions will be corrected at that time. Often there will be a discussion of case difficulty and precautions that should be taken while treating the case. Depending on the student's level of experience the next treatment check step will also be discussed. **Once the final diagnosis is accepted the student should record the Pulpal and Periapical Diagnosis in the treatment notes of the patient's record.**

G. PATIENT INFORMED CONSENT

One of the most important things you can do to help manage your endodontic patients is to provide them the information necessary for them to 'elect' to have root canal therapy to save a particular tooth. It is the student's responsibility to be able to discuss every aspect of treatment with a patient, and to answer questions that patients may freely ask. For this reason, ALL patients receiving root canal therapy at the COD are required to sign an Informed Consent Form. Informed consent can include several different aspects of treatment, some of which are:

1. Prognosis for immediate resolution of symptoms
2. Ability to provide root canal therapy with adequate local anesthesia and to be comfortable during the procedure.
3. Realistic expectations about the discomfort that is to be expected after the treatment appointment and the subsequent days or weeks.

4. Prognosis for long term retention of the tooth when root canal therapy is delivered to an acceptable standard
5. Information about pre-existing conditions which may adversely affect the prognosis for root canal therapy.
6. Information about pre-existing anatomy or case difficulty which may increase the likelihood of a procedural mishap occurring, which in turn could diminish the prognosis of root canal therapy.
7. The necessity that (generally speaking) every posterior tooth having had root canal therapy should have a cuspal coverage restoration placed ASAP in order to protect the investment/ tooth they are making in the root canal (e.i., to prevent further decay or tooth fracture).
8. Options for treatment if the patient elects not to have the advised root canal treatment.

H. PATIENT APPOINTMENT INSTRUCTIONS

To assist patients in understanding the realistic expectation of root canal therapy, two sets of written patient instruction are available for students to give them. Written instruction should be thought of as a means of re-forcing verbal instructions. Therefore, it is important that students become completely familiar with the inter-appointment and post treatment instructions patient should be given. The two sets of written instruction are

1. RCT has been started, but has not been completed (inter-appointment instructions) (Fig. 5f)
2. RCT has been complete, but there are concerns about the restorative phase of treatment (Fig. 5g). Either a durable interim restoration (i.e., access closure, post & core) and/or permanent restoration (i.e., crown) is necessary.

COD Endodontic Clinic

Student _____

Contact Number _____

After Today's Treatment

Your endodontic (root canal) treatment has been started, but HAS NOT been completed. Additional appointment(s) are necessary to continue (and ultimately complete) your Root Canal Treatment. A temporary filling has been placed in the entry made into your tooth. The temporary filling protects the work already accomplished. An unusual taste can be expected. It is normal for the temporary filling to wear away slightly between appointments. Should all of the temporary filling come out (or you are in doubt), please contact your student.

Please do not chew or attempt to eat on the affected side while you are still numb. Taking an analgesic before the numbness wears away may help you maintain an acceptable comfort level.

Discomfort and aching in the area is normal for a several days (or even weeks). This occurs because of conditions which existed before treatment was started and because of the manipulation of the tooth during treatment. The gums may be sore, for which warm salt water rinses will help. The tooth is often tender to biting or chewing, and **you should avoid chewing on that side of your mouth until all tenderness is gone.** Discomfort in the area in no way affects the successful outcome of treatment, but some emergency situations do take longer than others before symptoms completely resolve.

Non-prescription pain medications are useful for pain relief when taken on a regular schedule for the next several days. Anti-inflammatory analgesics (i.e., ibuprofen, naproxyn, or ketoprofen) are most beneficial, if not contraindicated by your medical history. Other similar strength analgesics (aspirin, Excedrin, Tylenol) can also be used to relieve most of the discomfort. If you were given a prescription for pain, it is meant to help you with more serious discomfort only for a couple of days. The prescription pain medicine should be used to adjunct (not replace) the use of over the counter analgesics. Please take prescribed medications (antibiotics and/or pain medications) as directed.

Your discomfort should improve gradually over several days. If pain and/or swelling becomes unmanageable or if the tooth becomes intolerant to biting pressures contact your student ASAP. At times the best service we can provide is only possible by seeing you for an unscheduled appointment.

If you have any questions, or difficulties as a consequence of your endodontic treatment, please do not hesitate to call your student.

Fig. 5f

Patient Instructions

Root Canal Therapy has been started, but is incomplete

COD Endodontic Clinic

Student _____ Contact Number _____

After Today's Treatment

Your endodontic (root canal) treatment has been completed. However , an additional appointment(s) is necessary to continue the restorative phase of the treatment. In the mean time a temporary filling has been placed in the entry made in your tooth. The temporary filling protects the work already accomplished. Should the temporary filling come out please contact your student ASAP.

Discomfort and aching in the area are normal for several days (or even weeks). The gums may be sore, for which warm salt water rinses will help. The tooth is often tender to biting or chewing, and **you should avoid chewing on that side of your mouth until all tenderness is gone.** Discomfort in the area in no way affects the successful outcome of treatment, but some emergency situations do take longer than others before symptoms completely resolve.

Non-prescription pain medications are useful for pain relief when taken on a regular schedule for the next several days. Anti-inflammatory analgesics (i.e., ibuprofen, naproxyn, or ketoprofen) are most beneficial, if not contraindicated by your medical history. Other similar strength analgesics (aspirin, Excedrin, Tylenol) can also be used to relieve most of the discomfort. If you were given a prescription for pain, it is meant to help you with more serious discomfort only for a couple of days. The prescription pain medicine should be used to adjunct (not replace) the use of over the counter analgesics. Please take prescribed medications (antibiotics and/or pain medications) as directed.

Your discomfort should improve gradually over several days. If pain and/or swelling becomes unmanageable or if the tooth becomes intolerant to biting pressures contact your student ASAP. At times the best service we can provide is only possible by seeing you for an unscheduled appointment.

Your next appointment will involve placement of a Core Restoration. These restorations are not meant to be permanent like a crown, but are meant to keep the tooth serviceable until a crown can be made. Generally the core in a back tooth also requires the placement of a post when the tooth is badly broken down. The post is needed when insufficient tooth structure remains to hold in a new filling. If you are a Limited Care Patient you should contact your general dentist to arrange for the placement of a crown ASAP.

If you have any questions or difficulties as a consequence of your endodontic treatment, please do not hesitate to call your student

Fig. 5g
Patient Instructions
Root Canal Therapy has been completed,
but the tooth requires an interim or permanent restoration

Performance Objectives

1. The student will describe the correct procedures for obtaining permission to proceed and the manner in which evaluation is to be carried out.
2. The student will be able to describe the correct method of exposing, processing, and mounting diagnostic and working films.
3. The student will be able to describe the appropriate method for conducting a clinical examination.
4. The student will discuss the essential features of the other sections.
5. The student will discuss the essential features of a "**Chief Complaint.**"
6. The student will discuss the essential features of the "**History and Clinical Findings.**"
7. The student will discuss the essential features of an adequate "**Radiologic Findings**" write-up.
8. The student will discuss the essential features of the "**Clinical Tests**" section.
9. The student will discuss the essential features of the "**Reason for Treatment**" section of the case history.
10. The student will explain the meanings of the diagnostic terms contained in the "**Diagnosis**" section of the case history.
11. The student will be able to discuss the essential features of the "**Medical History**" section of the case history.
12. The student will correctly match the number of canals completed with the number of evaluation steps required.
13. The student will be able to understand how the case is presented to the covering endodontic faculty and transfer the Pulpal and Periapical Diagnosis to the patient's chart.
14. The student will understand the importance and procedure to obtaining a patient's informed consent for root canal therapy
15. The student be able to discuss the patient appointment instructions, and enforce to the patient the necessity to understand and follow the directions given.

SECTION VI

FINAL RADIOGRAPH - CASE COMPLETION

Description:

This section includes a description of the type of x-ray images required for final radiographs, and the dispensation of these images. Examples of case write-ups including standardized abbreviations are provided and explanations of the correct procedures for obtaining record signatures, collecting fees, and completing six-month recalls are provided.

Rationale:

No credit will be given for cases, which are improperly documented. Records of Endodontic treatments are the property of the Department of Endodontics and must be maintained according to department standards and guidelines.

A. FINAL RADIOGRAPH and COMPLETING THE CHART RECORD

The final x-ray is taken when the patient is ready to be dismissed from the clinic, after a temporary filling or permanent core restoration and the rubber dam has been removed. An XCP is used for this procedure.

Before the patient leaves the clinic:

1. An instructor must approve completion of treatment (approve the radiographs and visually inspect the tooth treated, if warranted).
2. The procedure code should be moved to complete
3. The Endodontic Case Envelope should receive all of the required faculty signatures

B. CASE COMPLETION

The Endodontic Case card must be turned in within 48 hours after obturation. Grading of the case cannot occur until the card has been turned in to the Endo Department.

1. All radiographs should be approved and there should be a signed note in the electronic record.
2. Check to be sure the diagnostic information on the front side of the endodontic case envelope is completely filled in.
3. Check to be sure the faculty signatures are complete on the back side of the endodontic case envelope.

Performance Objectives:

The student will perform the following tasks without reference to the text or to other printed materials.

1. Discuss the essential features of the final x-ray films and their dispensation.
2. Write a standardized case history, giving the essential information relating to the case.
3. Explain the correct procedures for obtaining faculty signatures on the endodontic case envelope.
4. State department policies concerning fees for endodontic services.

SECTION VII

ENDODONTIC RECALLS

Description:

This section is intended to describe the proper procedures involved in obtaining a clinical and radiographic follow-up assessment of a previous endodontic therapy. It describes the process and completion of the written form utilized in this assessment.

Rationale:

Follow-up (recall) examination of previously treated endodontic cases will give the student an insight into the types of responses to endodontic therapy and allows him or her to make a personal assessment of the status of that treatment at a given time period.

A. ENDODONTIC RECALL REQUIREMENT

As part of the Endodontic ‘points’ requirement for graduation, **students are required to perform 2 recalls, preferably on cases they performed root canal therapy on.** Therefore at least 2 of the 8 points needed for graduation are acquired by a recalling and performing an assessment on endodontic therapy performed while working on student cases. Additional recalls can be performed (up to a maximum of 7 recalls), which can be applied towards the endodontic points requirement.

B. PROCEDURE for DOCUMENTING AN ENDODONTIC RECALL

Recalls can be performed on any case that was completed at the OU COD. Generally, teeth treated at the COD can be identified in the chart record by date and case number. Recalls with intervals of six months or greater are preferred.

Recalls can be performed in any clinic in the COD, and do not necessarily need to be performed in Green Endodontic Clinic. The student must:

1. Receive PTP (permission to proceed) from the covering faculty for an endodontic recall and have a note placed in the electronic record.(e.g., Endo Recall #?)
2. Take a new x-ray of the endodontically treated tooth. At the time of the recall. The x-ray must be of diagnostic quality and show the entire tooth and periapical region.
3. Perform a visual examination
4. Perform a clinical examination
5. Perform a radiographic interpretation of the PA x-ray

6. Chart the appointment and recall findings in the patient's chart. The endodontic recall must be counter-signed by the covering faculty.
7. Record your findings on the recall card. Recall cards are available across from the Endodontic Department Secretary.
8. Turn in the recall card (Fig 7a) in a timely manner. Recalls turned in longer than 1 month, from the date recorded on the periapical x-ray, will likely initiate an investigation for procedural inconsistencies and abuse of the honor system in place for endodontic recalls.

It is encouraged that you attempt to recall each patient you performed root canal therapy on. In order to properly fill out the portion of the recall card marked "Status at Time of Treatment", the original Endodontic Case envelope is often needed. Original Endodontic Case envelopes can be checked out from the department secretary. In order to track a specific case envelope, the case number (as written in the patient's chart) should be available along with the student's name that originally treated the case.

The student who performed root canal therapy is also responsible for providing an appropriate permanent restoration for the tooth. This is true for all patients; those patients within their patient family, those patients seen for limited care and those patients seen for share care. It is understandable that crowns (the most desirable permanent restoration) often cannot be placed in a timely manner at the COD. However, **recalls should show that a durable interim or permanent restoration has been placed** in the tooth being evaluated for an endodontic recall. If temporary filling material is seen with evidence of an empty space in the chamber containing a cotton pellet, this is an inadequate long term restoration. If there is radiographic evidence of a deficient or inadequate restoration on the recall x-ray, the endodontic faculty will request an explanation for this apparent deviation from ideal standard of care. Several options are possible if the recall x-ray shows a temporary filling or deficient restoration:

1. There may be a request that evidence of placement of an appropriate restoration (i.e., pre-fab post and core, amalgam core with no cotton pellet in the chamber) be presented to the endodontic faculty. This may occur if a recall x-ray is taken prior to a restorative appointment for the tooth in question.
2. The endodontic faculty may discuss the situation with the student and subsequently require the student to schedule the patient in Green Endodontic Clinic for placement of a durable interim restoration.
3. The endodontic faculty may inform the Comprehensive Care Director of the restorative requirement the patient needs.

B. RECALL CARD

Case No	Tooth #	Canals	Visits	Difficulty	Treatment			Perforation		ReRCTr	Lesion	Fistula	Student	# Cases	Recall	Race	Age	Sex
					A	R	S	Am	GP									
Student Name					Student I.D.					Case Grade				Patient Phone	Home ()			
Patient Name					Patient I.D. No			Patient Birthdate		Patient SSN			Work ()					
Address (Street, City, State, Zip)											Patient Employer or Parent/Spouse							
Date of Original Treatment					Date of Recall					No. of Months Since Treatment Completed								
6 MONTH RECALL - MINIMUM ACCEPTABLE																		
STATUS AT TIME OF TREATMENT	PULPAL	VITAL <input type="checkbox"/> ; NON-VITAL <input type="checkbox"/>																
	PERIAPICAL	NO LESION <input type="checkbox"/> ; LESION-TPDL <input type="checkbox"/> < 5mm <input type="checkbox"/> > 5mm <input type="checkbox"/> ; FISTULA <input type="checkbox"/>																
	SOFT TISSUE	NOT INVOLVED <input type="checkbox"/> ; SWELLING & TENDERNESS – VESTIBULE <input type="checkbox"/> ; FACIAL TISSUES <input type="checkbox"/>																
	SYMPTOMS	ASYMPTOMATIC <input type="checkbox"/> ; INTERMITTENT <input type="checkbox"/> ; CONTINUOUS <input type="checkbox"/> ; BITING <input type="checkbox"/>																
RECALL CLINICAL EXAM	PERCUSSION	NO TENDERNESS <input type="checkbox"/> ; TENDERNESS <input type="checkbox"/> ; ANTAGONIST ALSO TENDER <input type="checkbox"/>																
	PALPATION	NEGATIVE <input type="checkbox"/> ; TENDERNESS AT APEX <input type="checkbox"/> ; SWELLING <input type="checkbox"/> – F <input type="checkbox"/> L <input type="checkbox"/> ; APEX <input type="checkbox"/> ; OTHER <input type="checkbox"/> ; FISTULA – F <input type="checkbox"/> L <input type="checkbox"/>																
	SYMPTOMS	NONE <input type="checkbox"/> ; THERMAL <input type="checkbox"/> ; OCCASIONAL ACHE <input type="checkbox"/> ; BITING PAIN <input type="checkbox"/> ; PERIODIC DRAINAGE <input type="checkbox"/> ; PERIODIC SWELLING <input type="checkbox"/>																
RECALL RADIOGRAPHIC EXAM	APICAL	NO LESION <input type="checkbox"/> ; LESION - TPDL <input type="checkbox"/> < 5mm <input type="checkbox"/> > 5mm <input type="checkbox"/>																
	COMPARISON TO ORIG. LESION	DECREASED SIZE <input type="checkbox"/> ; SAME SIZE <input type="checkbox"/> – MORE DENSITY <input type="checkbox"/> ; SAME DENSITY <input type="checkbox"/> ; LARGER IN SIZE <input type="checkbox"/>																
	OBTURATION	FLUSH <input type="checkbox"/> ; OVER 0-2mm <input type="checkbox"/> > 2mm <input type="checkbox"/> ; UNDER 0.5-2mm <input type="checkbox"/> > 2mm <input type="checkbox"/>																
RESTORATION	TYPE	NONE <input type="checkbox"/> ; TEMP CR <input type="checkbox"/> ; CR <input type="checkbox"/> ; POST & CORE <input type="checkbox"/> ; BR <input type="checkbox"/> ; ONLAY – AM <input type="checkbox"/> GOLD <input type="checkbox"/> ; OTHER <input type="checkbox"/>																
EVALUATION	STUDENT	SUCCESSFUL <input type="checkbox"/> ACCEPTABLE <input type="checkbox"/> QUESTIONABLE <input type="checkbox"/> FAILURE <input type="checkbox"/>																
	FACULTY	SUCCESSFUL <input type="checkbox"/> ACCEPTABLE <input type="checkbox"/> QUESTIONABLE <input type="checkbox"/> FAILURE <input type="checkbox"/>																

HSC-6476 Recall Card

Figure 7a. Six-Month Recall Card

Two recalls on teeth/patients where root canal therapy was performed at the College of Dentistry are required to meet the recall points requirements for graduation. Additional recalls can be performed (up to seven total) on any endodontic treatment previously performed at the College of Dentistry. It is preferred that the recalls are done on teeth that the student performed the root canal therapy.

Performance Objectives:

The student will perform the following tasks without reference to the text or to other printed materials.

1. Discuss the endodontic recall requirements as it pertains to the points system
2. Identify what patient recalls can be used to apply towards the minimum requirement of three recalls
3. Discuss the essential features of the six-month recall.
4. Understand the procedure for correctly documenting an endodontic
5. Discuss what actions will be taken by the endodontic faculty when an endodontic recall is submitted on a tooth that does not have a durable interim or permanent restoration (i.e., still has a temporary filling at least 6 months after RCT was completed).

SECTION VIII

CORE PLACEMENT

Rationale:

This section will familiarize the student with the procedural requirements necessary to place a core build-up following the completion of root canal therapy. Many of the core build-ups will require the placement of a prefabricated post for retention of the core.

A POST AND CORE REQUIREMENT

As part of the Endodontic ‘points’ requirement for graduation, **students are required to perform a minimum of 2 (two) core build ups. Pre-fabricated post and cores, procedure code 2954 or Cores without a post use a code of 2950.** Two points are received for each core placed, for a total of four points. Therefore, at least 4 of the 10 points needed for graduation are acquired by providing a pre-fabricated post and amalgam core procedure or core without a post procedure on a posterior endodontically treated tooth. Additional cores can be performed (up to a maximum of 4 post cores worth 8 points), and applied towards the points requirement for graduation.

B. POST AND CORE PLACEMENT

Posterior endodontically treated teeth requiring post placement for core retention generally receive this procedure in the Green Endodontic Clinic. Depending on the amount of coronal structure missing, one or more posts may be placed to ensure or supplement retention. A minimum of two core procedures are required for graduation. Many will require the use of a prefabricated post. Both of the required cores must be completed under Endodontic Faculty Supervision. No Core Credit can be given for cores placed in clinics other than Green Endodontic Clinic.

A pre-operative or condensation x-ray should be available to the faculty at the time of PTP, so that the adequacy of the root canal therapy can be determined. A faculty member should be consulted in the clinic to verify whether post placement is necessary and, if so, how many posts should be placed. Undermined tooth structure may require removal or cuspal-onlaying with the amalgam core material. The supervising faculty member can also be consulted as to what diameter post(s) is/are appropriate for the tooth. At times pins may be recommended along with post placement. A post-op x-ray is required after the restorative procedures; gingival seats areas are evaluated for possible overhangs and restoration is assessed for condensation voids. The Endodontic Points Form / Post & Core Verification Form must be turned in to the Endodontic Department Secretary.

Operative Credit can be received for the number of surfaces restored when a core is placed in Endodontic Clinic during the DS3 year.

**Endodontic Points Form
Recall and Post & Core Graduation Requirements
Miscellaneous Procedure Verification**

Student:	DS III	DS IV	Treatment Date:		
Patient:	DOB	COD Chart #	Endo Case Card	Tooth #	
Procedure:		Points:	Remarks:		
Recall – Record information on Endo Recall Card (3 required for graduation on RCTs you performed)		1	_____		
Pre-Fab Post & Core – include post-op x-ray (2 post & cores required for graduation)		2	_____		
Internal Bleaching (per patient)		2	_____		
Diag, WL x-ray & Pulpectomy (Partial Tx Cannot be awarded with a case completion)		2	_____		
Endo Faculty Assisting (Cannot be awarded in addition to canals treated)		1	_____		
Endo Student Assisting Available to DS3s only, limit of 2		1	_____		
Other			_____		
Date:	Points Awarded:		Faculty Signature:		

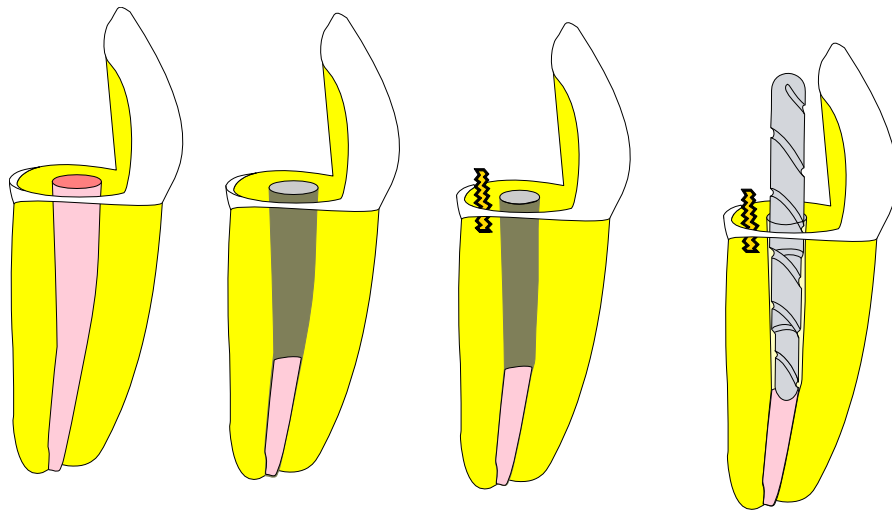
Endo Dept 8/1/2006

**Figure 8a
Post & Core Completion Form**

Generally speaking, the number two (yellow) Tri-R post is used for small root diameters, the number three (red) Tri-R post is used for roots of medium diameter, and in some few select cases, a number four (blue) Tri-R post may be used.

To determine whether all three Gates Glidden drills in a post kit will be used to make the space, the working length of the intended canal must be at least 21 mm from reference point to apex. If it is less than 21 mm, the smallest diameter drill (which is inserted the deepest) should **not** be used. This will prevent post space placement from becoming too close to the apex and the compromise/elimination of the gutta-percha seal.

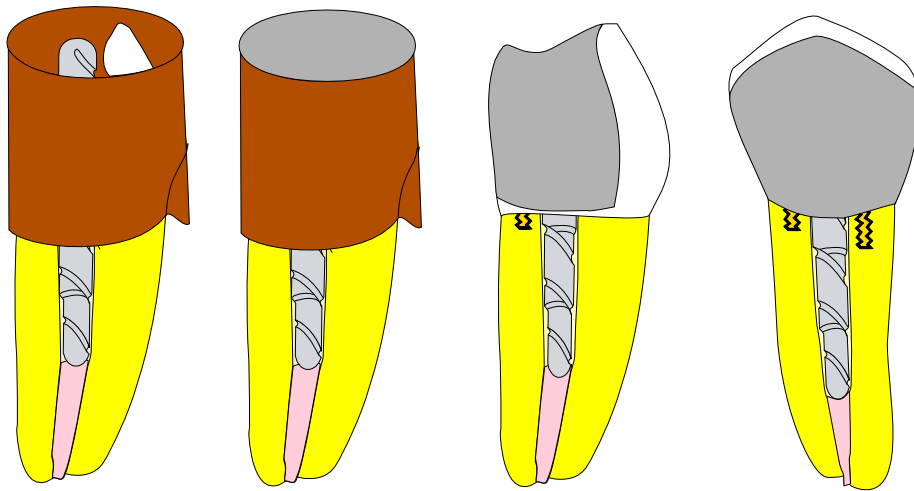
Once the appropriate diameter post is selected, the largest diameter drill is advanced into the canal obturation until the calculated depth (or when the rubber sleeve marker is flush with the canal orifice or CEJ level if a single canal). Express air from the syringe to the canal space to remove loose GP debris. Next, change to the next smaller drill and extend the depth to its calculated depth (or rubber sleeve marker). Express air into the space once again to remove debris. Complete the post space preparation in the same manner if a third step is required. The excess apical length can be removed by holding the post in a hemostat and cutting the apical step off with wire cutters (supplied by the Green Clinic), then rounding the end with a diamond.



Place each post into the canal to full depth. It should advance passively to its depth. If not, be sure to check for loose debris in the canal again. If the canal is curved, the post may be grasped by hemostats to hold it while cotton pliers are used to bend the post slightly at each step. Expose a film of the fitted post(s) and obtain a signature from the supervising faculty. Discuss reducing the coronal length with the covering faculty. A post, which does not pass through the full core height, may not provide sufficient retention. The fitting handle should remain in place until the cement has hardened, unless the occlusal height of the post is shortened prior to cementation. Excess coronal length may be ground off after the core is in place.

Each post is cemented into the canal with polycarboxylate cement (Durelon). Be sure to mix the cement to the proper thickness to avoid too thick of a mix. This will avoid cement setting too rapidly while placing the post(s). Use a lentulo spiral in a slow speed handpiece to fill each canal prior to post placement. The post(s) are inserted into the canal with cotton pliers. Seat each post and hold it in position for a few seconds. Allow the cement to set completely, then remove any unnecessary cement and finalize the cavity form for an amalgam core. In a root with a single canal, one or more pins may be needed. See illustration and consult a faculty concerning the necessity of placing pins. Place the matrix band or copper band and obtain an instructor's signature.

Mix amalgam and use G. P. condensers for the initial condensation around each post and pin if present. The Woodson #2 or amalgam condensers may be used to complete the condensation. Carve the amalgam appropriately and have an instructor check it. A final radiograph should be exposed for all completed post and cores. This film can be used for the final film for the case record and is required to insure an overhand does not exist. Obtain the necessary faculty member's signatures. Turn in the completed and signed Endodontic Points Form / Post & Core Verification with the endodontic case envelope.



C. CHECK STEPS FOR POST & CORE PLACEMENT (summary)

** indicate required checked steps

1. ** PTP with covering Endodontic Faculty
a condensation or final obturation x-ray must be available
2. Appropriate Local Anesthesia
3. ** Appropriate Rubber Dam
Often requires clamping a more posterior tooth and a splint dam to in order to be able to place a matrix on the tooth requiring the post and core.
4. ** Removal of all old filling materials and decay
although thin and unsupported tooth structure may need to be removed, working length references should be maintained until after the post space preparation
5. Identify of all canal orifices on the chamber floor
Separate canal orifices should be seen; add chamber/orifice retention if needed.
6. ** Tri-R Post Selection (size, maximum depth, length/steps)
7. Prepare post space with appropriate size (and measured) Gates Glidden Drills
8. Alter the post if the apical step was removed for a two step post
9. ** Fit the post and take a post fit x-ray (evaluate the post fit radiographically)
10. Final post adjustments prior to cementation (bend the post into the middle of the prep and adjust the occlusal clearance to 2 mm below the occlusal surface)
11. Cement post with Duralon (polycarboxylate cement)
The rubber dam must NEVER be removed prior to post cementation.
12. Clean excessive cement from post and from the tooth margins
13. Final tooth preparations (i.e., reducing cups to be onlayed, pin placement)
14. **Fit a Tofflemier Matrix or copper band. Wedge the proximal gingival seat margins.
15. Condense and Carve Amalgam. Removal band only after the core material is sufficiently set. Check occlusion
16. ** Expose a final x-ray image.

Performance Objectives:

After completing this exercise the student will be able to complete the following tasks without reference to notes or printed materials.

1. Determine the appropriate size (diameter) of part(s) needed for the restoration by root bulk.
2. Correctly prepare a post space using the Tri-R post system.
3. Correctly fit each post (passively) placed in its prepared post space and verify the post fit with an x-ray.
4. Cement the post(s) to place after correct fit and removed excess post length.
5. The student should understand and be completely familiar with the procedure and check steps of placing a posterior pre-fabricated post & core.

SECTION IX

CLINIC SET-UP

Description:

The section will acquaint the student with the proper set-up of instruments and materials for perform clinical endodontic treatment.

Rationale:

Organization of instruments and materials and promotion of an aseptic technique during their utilization will ensure a more aseptic environment and treatment procedure. It will also promote more efficiency of each endodontic procedure.

A. GENERAL OPERATORY SET-UP AND CLEAN-UP

At the beginning of each clinic session:

1. The chair should be wrapped as per COD Clinic Policy concerning universal infection control procedures.
2. The high and low suction valves should be checked to be in good working order
3. The water bottle, which is located on the delivery arm, should be checked. The bottle should be rinsed, and filled to the mark (about half full) prior to the start of clinic. The bottle should be empty at the beginning of each clinic period.
4. The dental operating light should be checked and verified in good working order.
5. The x-ray machine for your area should be turned on and set for the proper exposure. You should check the chair alignment to be sure the x-ray arm will reach when the patient is seated and in a supine position, and check that the lead apron is available. Chairs in Green Clinic are aligned to the spaces differently than any in other clinic at the COD because of the need to take x-rays during patient treatment.
Chair bases SHOULD NOT be moved.

Report any malfunctioning equipment to the dispensary personal immediately.

The clinic set-up must be neat, clean and orderly. There are three work surfaces to be set up when you prepare to see a patient in clinic: Assistant's Cart, Over-the-Patient Tray, and the Counters. The sterile working surfaces are to be covered with a sterile towel and the instruments laid out as described and shown in the following figures. The non-sterile working surface is to be covered with paper patient bibs.

At the end of each clinic session:

1. The chair should be unwrapped and placed in an up and forward position.
2. The chair should be cleaned, which requires the use on two different materials depending on the portion of the chair being cleaned.
 - a. The cushion portions of the operatory chair are wiped with pink soft soap using a damp paper towel.
 - b. The metal instrument tray and equipment arms of the chair, the counter tops and the assistant's cart top are wiped with a disinfectant wiped.
3. The water lines should be purged.
4. The x-ray arm should be return to the front storage position.
5. Instruments should be cleaned of visible debris and replaced into the instrument cassette in their proper position
6. Used clinic supplies should be placed into the clinic tubs and returned to the dispensary stainless steel mobile cart
7. All endodontic files should be examined. Those files that are damaged, distorted, or at your discretion should not be used again (even after sterilization) should be discarded into the sharps container. All remaining endodontic files (used or unused) should be removed from the file stand and placed into a plastic cup
8. Burs, gates glidden drills, and post kit drills and posts should be separated and placed into the medicine cup or into separate plastic cups on the dispensary cart.

B. STUDENT'S PERSONAL ENDODONTIC INSTRUMENT CASSETTE

The Endodontic Instrument Cassette, in order to be complete, must contain one of each of the following items. The instruments were either delivered to you in your pre-clinical lab kit (in the spring) or should have been delivered to you along with the cassette before the beginning of the fall semester. **The instruments should be arranged as shown in Fig 9b.**

1. Mouth mirror and ruler handle
2. DG 16 endodontic explorer
3. Periodontal probe
4. Endodontic pliers grooved and serrated
5. Cotton pliers
6. 33L excavator, long shank "spoon,"
7. 31 excavator, long shank "spoon,"
8. Double ended size 45 (white) and size 60 (yellow) Roane condenser
9. Double ended size 80 (red) and size 100 (blue) Roane condenser
10. Double ended size 120 (green) and size 140 (black) Roane condenser
11. #22 Cement spatula
12. Woodson #2 plastic instrument
13. Glass mixing slab - 1/8 x 2.5 x 2 inch,
14. Iris scissors (straight 4 1/2")
15. Hemostat (straight 5 3/4")

16. Amalgam Well (Thompson X9#AW)
17. T ruler - finger ruler
18. System B Tip (M)
19. Plastic rubber dam frame (Young, Nylon radiolucent, 4 5/8" X 3 7/8")
20. Rubber Dam Clamps
 - Ivory 9
 - Ivory 2A
 - Ivory 7
 - Ivory 4
21. Anesthetic Syringe
22. Electronic Apex Locator lip clip
23. Toffelmier Retainer

The instrument cassette is the student's personal property. It is the student's responsibility to be sure the instrument cassette is complete before each clinic appointment. When instruments become non-useable because of damage or abuse, the faculty may tag instruments for replacement. It is the student's responsibility to replace damaged or broken instruments by purchasing new replacement instruments from the College of Dentistry Store. The single exception to this is that replacement mouth mirrors can be replaced by requesting a new mirror from the dispensary.

The students also should bring the following instrument items to clinic from their pre-clinical kit. These items are not used in direct patient contact and should be disinfected after use and repackaged for the next clinic period.

C. ENDODONTIC CLINIC TUBS AND CLINIC CABINET

Clinic tubs are picked up from the Green Clinic dispensary prior to each clinic period. It contains most of the clinic supplies generally needed for an endodontic treatment appointment. Items in the clinic tubs include:

1. 3 sterile cloth towels
2. 3 patients bibs
3. 27 ga long Anesthetic Needle
4. 1 carpule lidocaine 1:50000
5. 1 carpule lidocaine 1:100000
6. x-ray film (F speed)
7. Over Gloves
8. Plastic Petri dish
9. Rubber Dam
10. Rubber Dam Forceps
11. Rubber Dam Punch (available at the dispensary)
12. Floss
13. 25 mm Endodontic Flex-R Files in sterile file stand
14. Gates Glidden Drills (#2- #6)
15. Endo Burs (RA #8, RA Surgical length #4, 157, 383 Diamond)
16. Luer-Lok 6cc irrigation syringe

17. Irrigation needle
18. Disposable air/water tips
19. Saliva ejector
20. High Volume Suction tip
21. Sterile cotton pellets
22. 2 X 2's, cotton rolls
23. ESPE mixing pad
24. IRM (temporary material)
25. Cavit
26. Kerr Pulp Canal Sealer EWT (powder and liquid)
27. XCP film positioning device
28. Articulating ribbon

There are several supply items located in the endodontic clinic cabinet that are available without having to request them from the dispensary. Items available from the clinic cabinet include:

1. Universal Precaution Supplies (chair and head rest covers, wrap. etc.)
2. Red Biohazard Bags
3. Sterilization bags
4. Gloves
5. Face Masks
6. Cotton tip Applicators
7. Cotton pellets
8. Sodium Hypochlorite
9. Absorbent points
10. Gutta-Percha points
11. Chloroform

D. MATERIALS AND EQUIPMENT FROM THE DISPENSARY

The list of clinic supplies available from the Green Clinic dispensary CANNOT be all inclusive. **Materials and Supplies commonly needed and available for the asking at the dispensary include:**

1. Additional Anesthetic Carpules (no faculty signature required)
2. Additional Anesthetic Needles (27 and 30 ga)
3. Intra-Osseous Anesthesia Supplies (cortical perforator and needle)
4. Extra Rubber Dams
5. 2 X 2's, 4 X 4's, cotton rolls
6. 21 mm and 31 mm Endodontic Flex-R Files
7. Short and Long Gates Glidden Drills
8. Ora Seal
9. RC Prep
10. Adhesive Kit
11. Additional Amalgam Capsules
12. Toffelmier matrix and bands
13. Duralon Polycarboxylate Cement (powder and liquid)

14. Post kits (red and yellow)
15. Post cutting pliers
16. Assorted RD clamps (by faculty request)
17. Calcium Hydroxide (syringe and needles or powder)
18. Cut-Trol (ferric sulfate hemostasis)

Equipment and Supplies that require a sign-out slip from the dispensary include:

1. Electric Pulp tester (EPT)
2. Electronic Apex Locator
3. System B
4. Calamus (backfill obturation system and cartridges)
5. Endo-ray Film Positioning Device
6. Copper Band Kit (assorted)
7. Amalgamator and Curing Light (quantities limited)
8. MTA
9. Messing Gun Kit

Equipment and instruments Available Only from the Endo Faculty

- 1.

E. ASSISTANT'S CART (Fig. 95c) - The assistant's cart is a work surface that contains two work areas; defined by the instrument cassette and the instrument cassette cover.

Instrument Cassette - Items in the instrument cassette will generally not become contaminated by contact with oral tissues or fluids. This should be considered the most sterile work area during endodontic treatment.

Instrument Cassette Cover - This area is a less sterile area because it will contain items that will become contaminated by contact with the oral tissues. It is an area where certain items are placed after their initial use or between uses. These items include the rubber dam forceps, the anesthetic syringe with attached needle, and the hemostat used to take radiographs.

F. OVER-THE-PATIENT TRAY (Fig. 9a) -

The over-the-patient tray is a secondary sterile work surface. Instruments and items on the over-the-patient tray include the mouth mirror, endodontic explorer, a cotton pliers, irrigation syringe, finger rule, opened endodontic files holder, dispensed Gates Glidden drills, and dispensed endodontic burs. Disposable sterile items such as cotton pellets and 2X2 gauze would be placed on this tray.

If used during diagnosis or root canal treatment the Electric Pulp Tester, Electronic Apex Locator, torch, and System B should not be placed directly on the sterile towel used to cover the tray. These small equipment items may be placed on the handpiece delivery top if the over-the-patient tray is momentarily sung aside or these small equipment items should be placed on the counter. When not in use these items should be moved to the counter to avoid excessive clutter of the work surface.

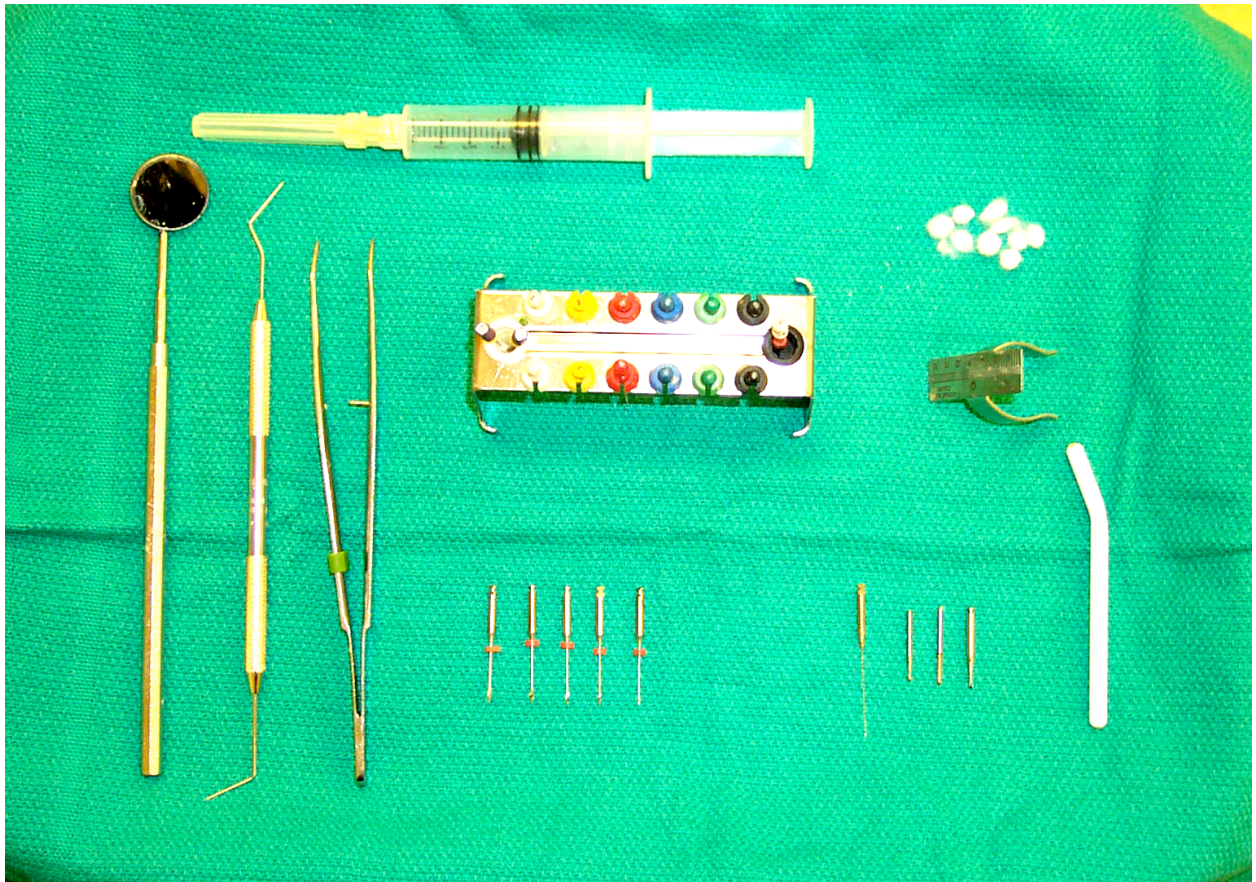


Fig. 9a
Instruments on the Over-the-Patient Tray

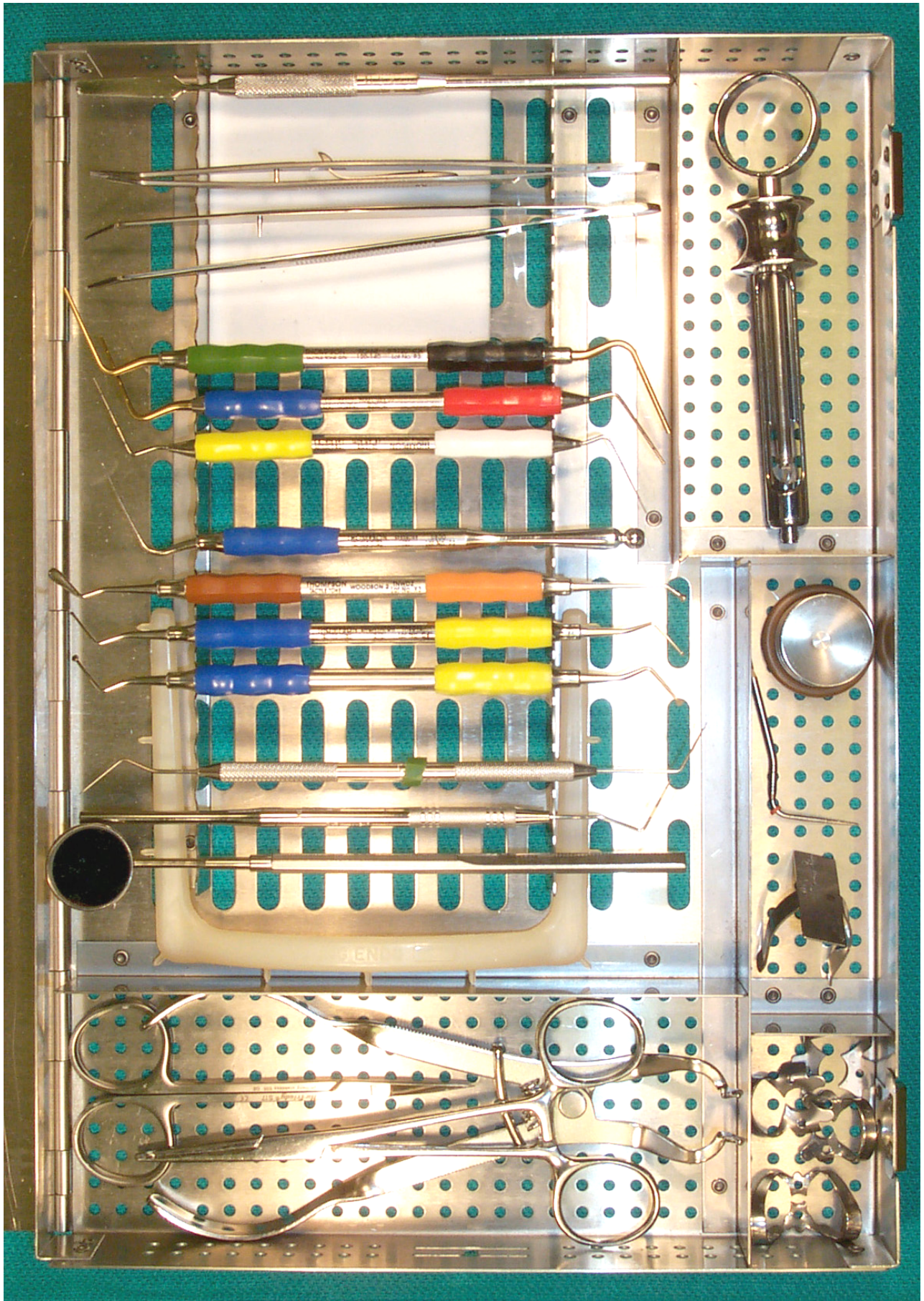


Fig. 9b
Complete Student's Personal Endodontic Instrument Cassette

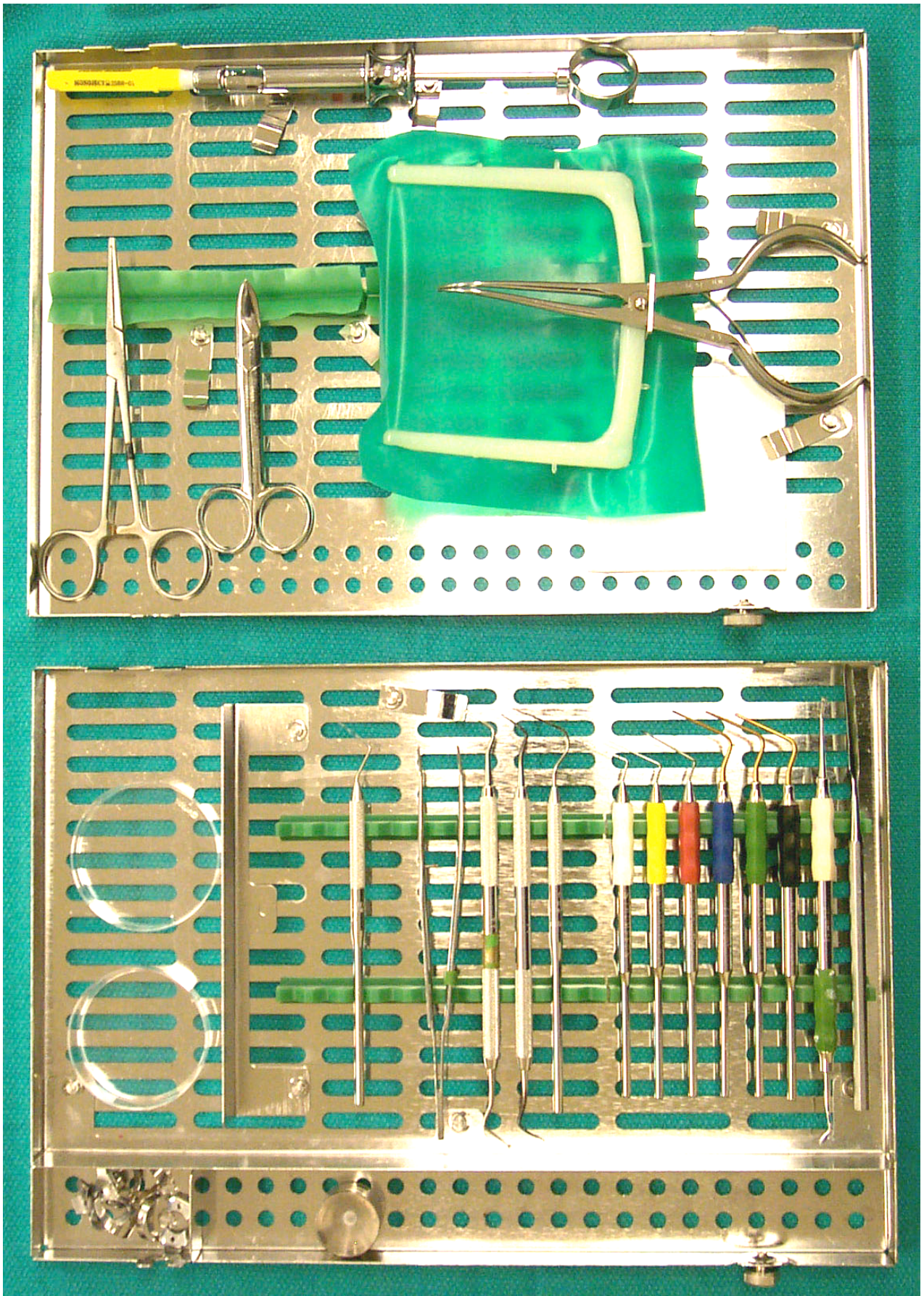


Fig. 9c
Organization of Instruments to be Maintained on the Assistant's Cart

G. COUNTERS (Fig. 9d) – The counters are considered a non-sterile work surfaces.

Both of the counter areas on each side of the operatory are needed when setting-up for an endodontic clinic appointment.

One counter space (generally the one closest to the operator) is set up with supplies and materials typically needed during the treatment procedure (Fig. 9d).

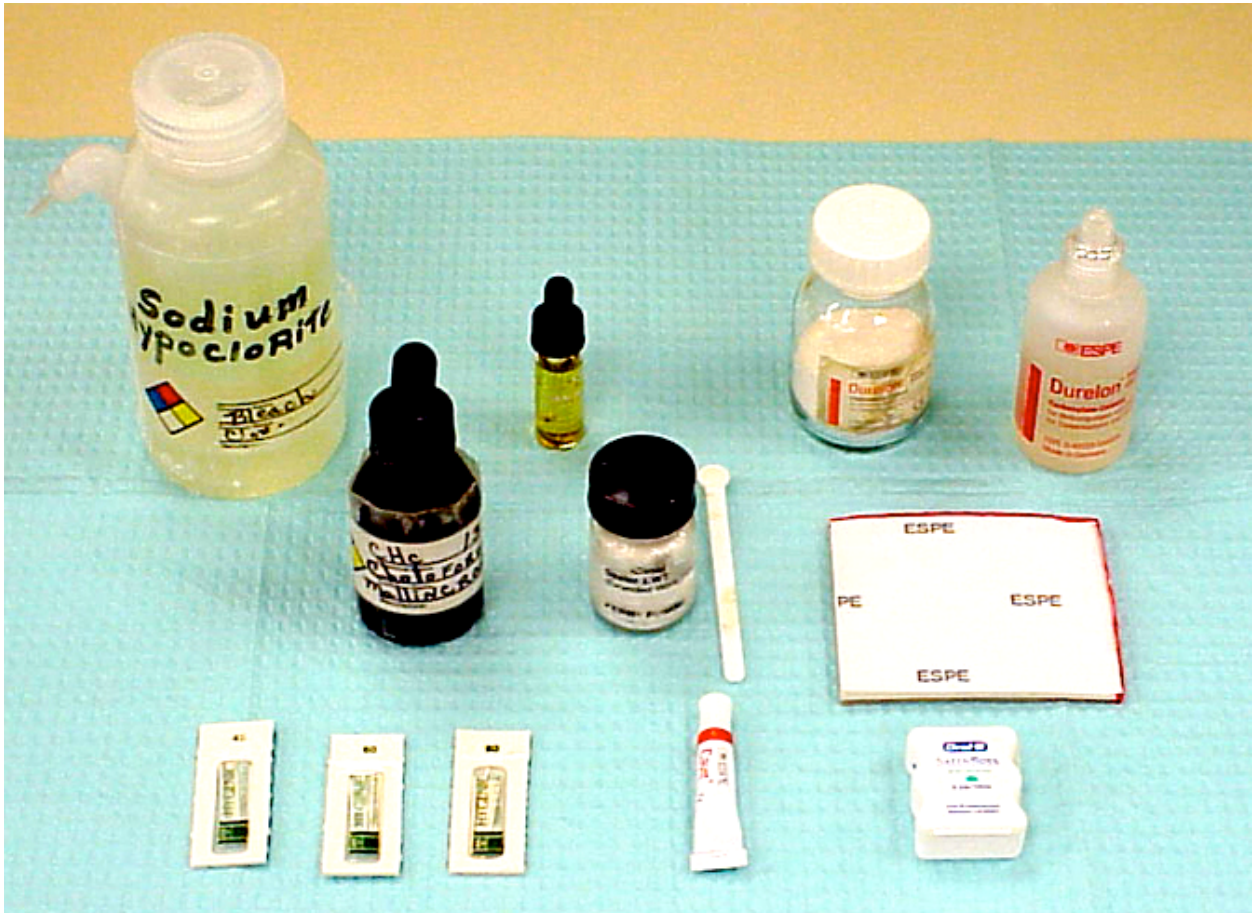


Fig. 9d
Counter (Non-treatment Area)

These items are not sterile and should not be placed in the treatment area. Only the contents of these items should be introduced into the therapeutic area.

At no point should non-sterilized materials be laid onto the sterile work surface/areas. All cements, rubber dam material, x-rays, irrigant bottles, etc. are to be kept on the counter or other non-treatment areas (see Fig. 9d). The mounted retreatment x-ray and working length x-ray, once available, must be displayed on the x-ray viewer during treatment. All other x-rays should remain in the chart unless required by a faculty member. The case envelope, write up sheets and clinic record should be on the clinic counter easily available for faculty signatures, etc. Your unit and area must be clean and orderly throughout each treatment appointment. Organization and cleanliness are very important factors in successful, efficient, and enjoyable Endodontic procedures. All non-required and unnecessary items should remain in the clinic tubs or on the clinic counter. **Do not clutter or contaminate the working areas.**

Performance Objectives

- 1 The student will be able to discuss the essential features of the clinic set-up and how the instruments are to be handled.
- 2 The student will be able to set up and maintain the student's endodontic cassette.
- 3 The student will be aware of the basic clinical supplies available in the dispensed clinical tubs and clinic cabinets.
- 4 The student will be aware of the material and equipment (needed during the step of performing root canal therapy) that is available to be checked out from the dispensary.
- 5 The student will be able to set-up for operatory before and clean-up the operatory after an endodontic appointment.
- 6 The student will understand in importance of and value of sterility in the three different work areas (assistant's cart, over-the-patient tray, and counters) in the operatory in Green Endodontic Clinic

SECTION X

RUBBER DAM ISOLATION METHODS

Description:

This section contains a review of Endodontic isolation methods. The clamps used in endodontic isolation are pictured below. The proper positions for holes for maxillary and mandibular teeth are described and diagrammed. Special isolation problems and solutions are discussed.

Rationale:

All Endodontic procedures must be completed using adequate isolation methods in order to provide aseptic treatment and prevent leakage of NaOCl into the patient's mouth.

A. STANDARD CLAMPS

ALL RUBBER DAM CLAMPS SHOULD BE LIGATED WITH FLOSS PRIOR TO PLACING IN THE MOUTH The following examples of clamps will be used to effect isolation for Endodontic cases, unless circumstances dictate otherwise:

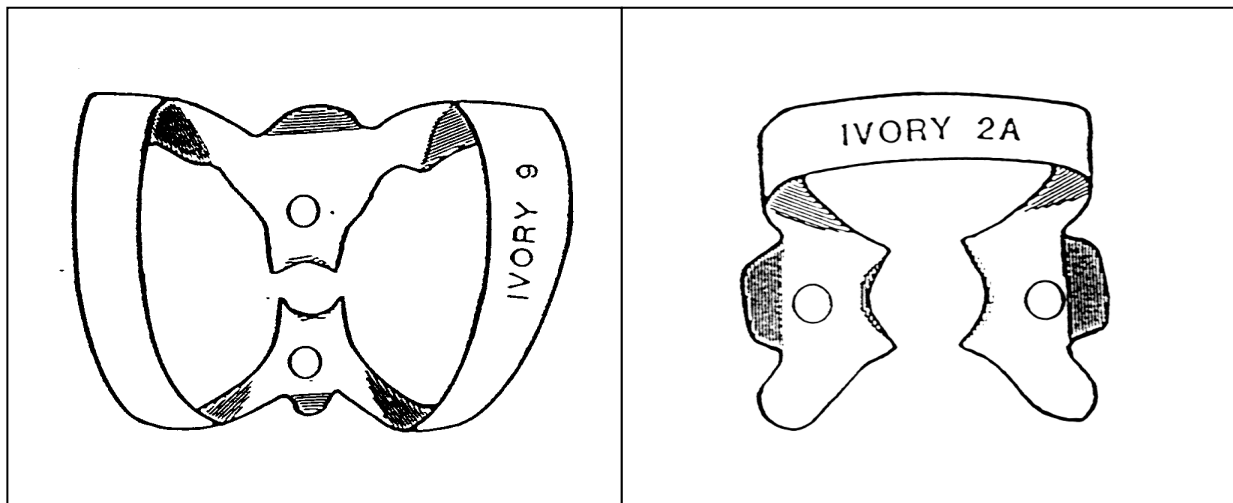


Fig. 10a
Ivory #9

All anterior teeth (canine to canine)

Fig. 10b
Ivory #2A

All premolar teeth

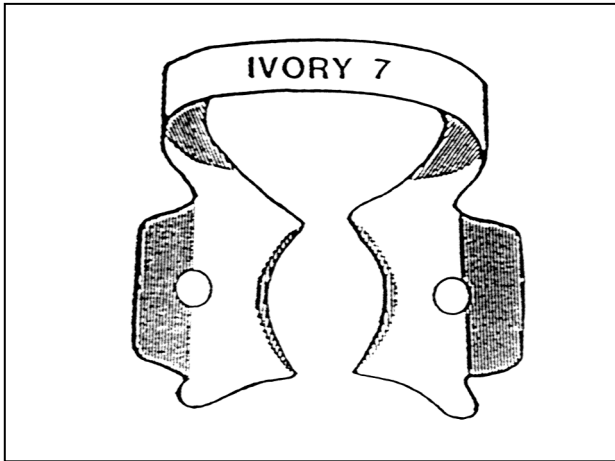


Fig. 10c
Ivory #7
Molar teeth

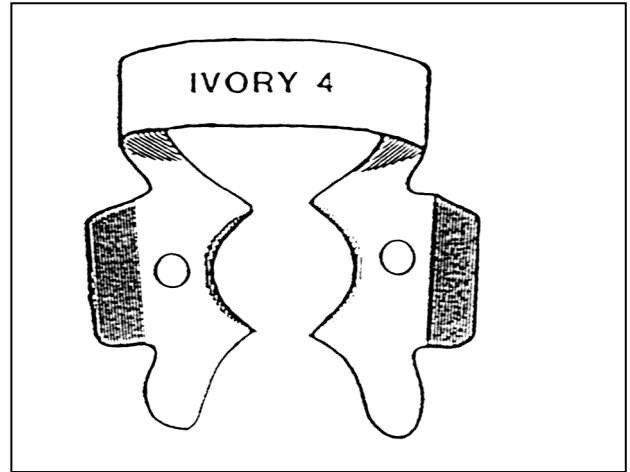


Fig. 10d
Ivory #4
Small Molar

B. PUNCHING AND PLACING THE RUBBER DAM

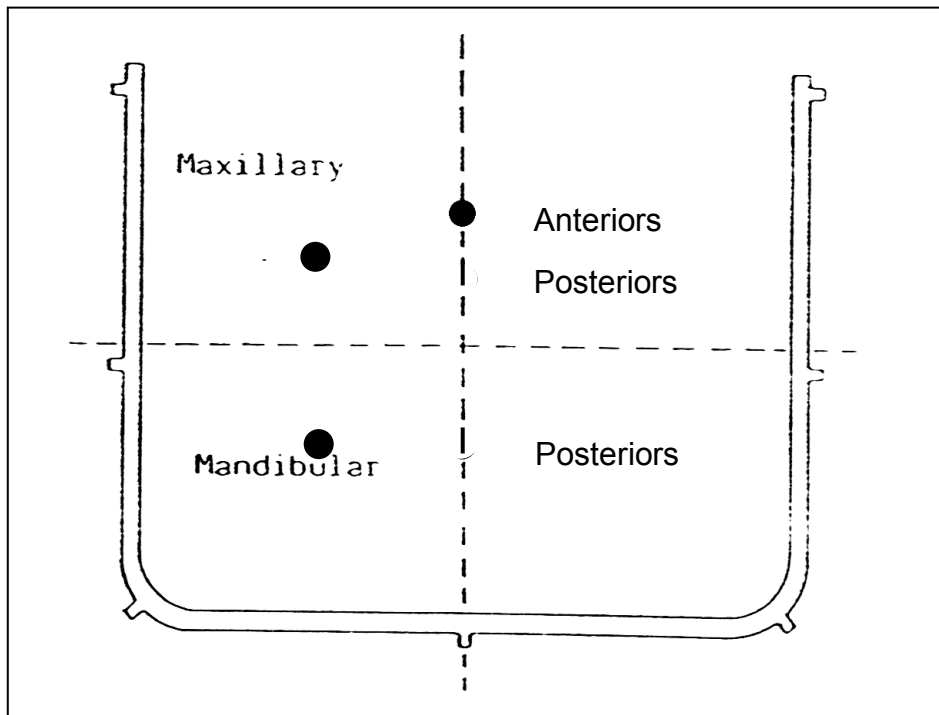


Fig. 10e
Suggested Hole Locations for Endodontic Use

Position a sheet of rubber dam material on the frame, then punch a hole in the required position determined by the tooth being treated. Use the largest hole on the punch for molars, a medium size hole for premolars and a small one for anteriors. Place the rubber dam over the tooth to be isolated, and then pull it through the contacts. Place the clamp with one hand while retracting the dam with the other. Alternate methods are: placing the clamp through the punched hole, retaining the dam with the clamp wings, then positioning the clamp, frame and dam all at one time, or placing the clamp over the proper tooth and stretching the dam and frame over the clamp (this always requires the largest punch hole).

The centerline positioning of the hole with the dam already on the frame limits the number of hole positions to only **three**. Placement of the dam on the tooth after mounting prevents rotation of the dam and later undesirable problems from rotation or ridges and obstruction of the field by improperly stretched dam material. Proper dam placement is crucial to a good isolation and proper visibility for Endodontic treatment. Also important to maintaining proper visibility are the winged clamps, which further retract the dam and allow full visibility of the facial surface of the treatment tooth. Facial visibility is imperative as the facial surface guides the access preparation and subsequent file placement.

C. SPECIAL RUBBER DAM ISOLATION SITUATIONS

Split Dam Technique

Multiple tooth isolation can be accomplished for certain Endodontic situations, i.e., adjacent teeth, overdenture devitalization of single rooted teeth, etc. When a situation calls for adjacent tooth isolation, the only alteration required is a second hole centered over the second tooth and punched with a smaller diameter than the hole for the clamped tooth. If several teeth separate the treatment areas, then the dam must be positioned and marked over the center of each tooth. Both teeth require a clamp in this situation, therefore, the hole size for each should allow for clamping (i.e., one size larger than normal). If two teeth are separated by only one tooth, all three should be isolated and generally just one clamp will be required.

The important things to remember when doing multiple tooth isolations are:

1. The dam must seal tightly so as not to leak any NaOC1 solution.
2. A sufficient number of clamps must be used to securely hold the dam in place throughout the procedure.
3. The clamps must be selected and placed so that they will not interfere with access, instrumentation, filling, or visualization during treatment.

In order to accomplish this, ligatures may, on occasion, be substituted for clamps. Clamps may be reversed and teeth may be surrounded by compound or cement (cavit) to hold the dam in proper position without a clamp.

Multiple tooth isolation lends itself primarily to a single quadrant. However, the anterior teeth may be considered as a quadrant by themselves or in conjunction with one posterior segment. Isolation of maxillary and mandibular quadrants on the same side is feasible. Considerable interference will be encountered during instrumentation, however, as the teeth in one quadrant tend to obstruct to some degree access to the other. Especially troublesome in this situation is the bow of isolation clamps, as they tend to block access and/or visibility in the opposite arch.

Broken Crown:

Use the largest size hole and punch the dam location required for the tooth receiving treatment, i.e., anterior, premolar, or molar area. Place the dam through the "D" contact of the tooth distal to the tooth in question. Place the clamp, then stretch the dam through the "M" contact one tooth mesial to the involved tooth and floss the dam into place (Fig. 10f). Cover all exposed gingiva and any open spaces between the rubber dam and tissue with cavit or ora-seal. Pack and form the cavit or ora-seal with a wet cotton pellet or cotton-tipped applicator.

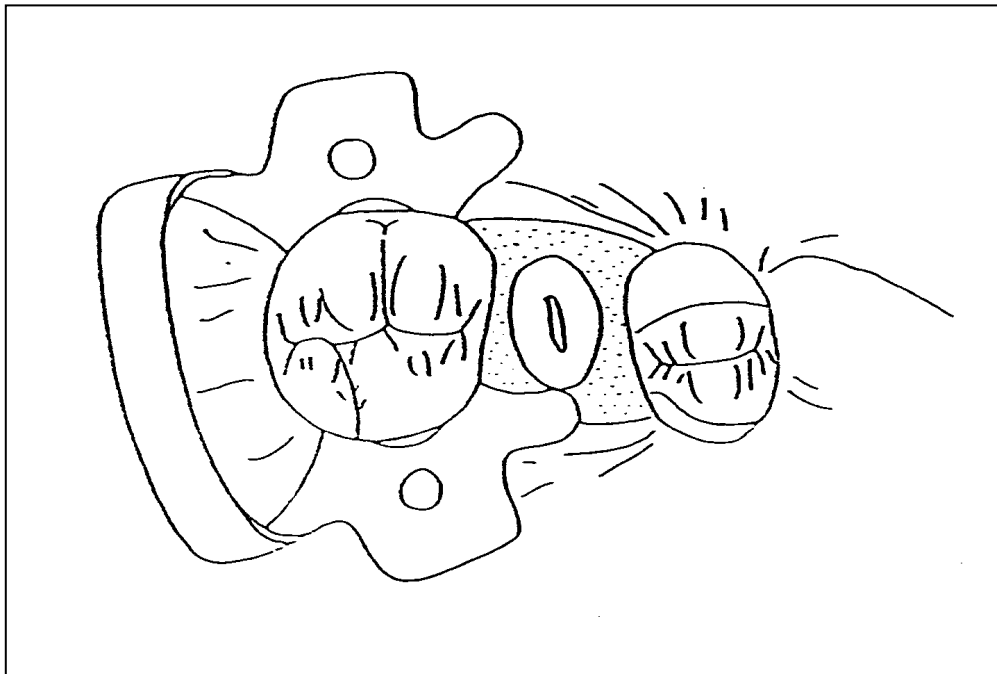


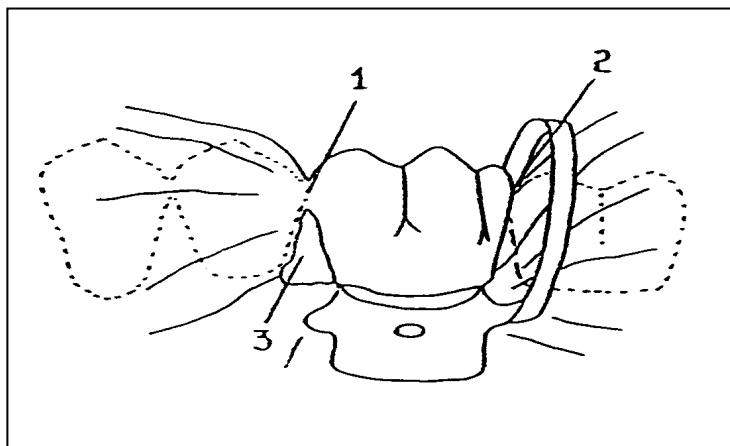
Fig. 10f
Suggested method of Isolating a Tooth Missing its Coronal Structure
Place Cavit or Ora-seal Over Soft Tissue

Small Molars:

A molar tooth of small diameter may require the use of an Ivory #4 clamp instead of a #7 to accomplish a stable retention of the dam. For molars with extremely small diameters, the Ivory #2A may be used as this situation approaches the anatomical configuration of a premolar.

Fixed Bridges:

Use the largest size hole punched in the required location for the involved tooth. Work the dam through the unsoldered contact (see Fig. 10g, (2)). Then stretch it over the tooth and solder joint (1), holding it in place with one hand, while placing the clamp with the other. When the clamp is in place, add cavit or ora-seal (3) in the F and L embrasure to close any openings. Form and adapt the cavit or ora-seal with a wet cotton-tipped applicator.



1. Mesial solder joint

2. Distal contact area

3. Cavit/Ora-seal placed in the F&L embrasure below the solder joint to seal the opening created by stretching the rubber dam over the joint.

Fig. 10g
Suggested Isolations for Endodontic Use

Orthodontic Bands:

Isolation of a tooth involved by orthodontic therapy need not be a difficult situation. The arch wires, brackets and other attachments between teeth may simply be treated as solder joints of a bridge (Fig. 10h). In other words, both the mesial and distal contacts are obstructed by the appliance, so a large hole is punched in the dam at the proper position with the dam mounted on the frame. The rubber dam is placed over the endodontically involved tooth then stretched until the gingival tissue is visible both facially and lingually.

The dam material is maintained in this position with one hand while the clamp is positioned below the infra-bulge of the crown with the other hand. When the clamp is securely in place, release the dam material and check to ensure its stability and proper location. If the dam material

creeps up on the lingual or into an area where it would interfere with the access preparation, the isolation must be attempted again. When the dam placement is proper, the mesial and distal embrasures are packed both facially and lingually with cavite or ora-seal. A wet cotton-tipped applicator can be used for packing and adaptation. All holes should be obstructed with cavite or ora-seal and the isolation examined for possible leaks before proceeding with treatment.

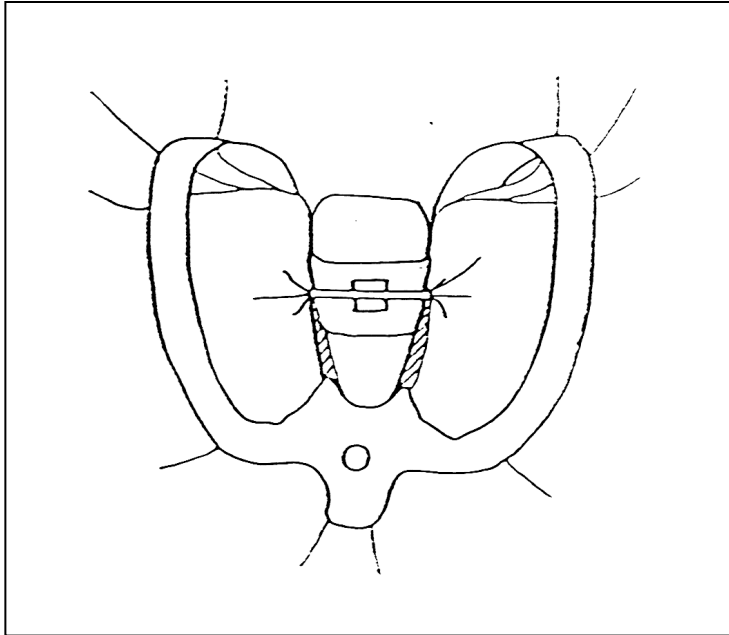


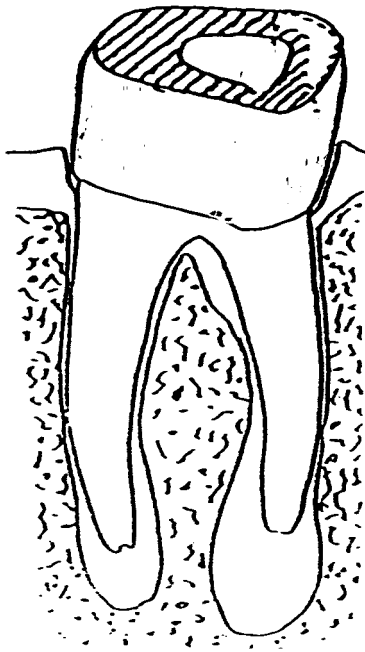
Figure 10h.

Suggested method of isolation for a tooth with an orthodontic bracket and arch wire.

Embrasure area held open by the arch wire. This area must be closed with cavite or ora-seal on both the F and L sides.

Banding Teeth:

Placing an ortho band on a posterior tooth prior to performing endodontic therapy is generally used to one of two reasons. Bands are placed on posterior teeth with coronal cracks, either symptomatic with 'Cracked Tooth Syndrome' or with cracks that have lead to Irreversible Pulpitis or Pulp Necrosis. In these cases stabilization of the crack is essential to the prognosis for the tooth. Without the band, the tooth could fracture or split during the course of treatment and before the permanent core restoration and crown. Once split the teeth are non-restorable.



 **Cement or Amalgam**

Fig. 10i

Suggested Method of Banding a Badly Damaged Distal Molar or Isolated Tooth

On rare occasions, a severely damaged tooth cannot be isolated by any of the previous routines and banding must be considered. An instructor should be consulted prior to attempting this, as they may be able to accomplish what you could not. If the instructor agrees, banding or a pin retained amalgam build-up should be employed. Teeth, which may require such treatment, are usually single standing or distal molar teeth for which few alternate isolation methods are available.

The first thing to accomplish is to complete caries removal and flap reflection if required. When this has been completed a band (either a copper tube or an orthodontic band) is adapted to fit the root stump.

With the band positioned, the situation is evaluated to see if sufficient structure is available to retain the band onto the tooth, i.e., a cusp tip or multiple projecting undercut tooth segment, etc. If adequate structure is available to retain the band onto the tooth, place it with polycarboxylate or zinc phosphate cement. After the cement has hardened, the clamp and dam are placed and treatment commenced.

When insufficient tooth structure remains to retain the cemented band, a pin-retained amalgam should be used. After the amalgam has hardened in this case, the band can be removed. A pin retained amalgam core is a dependable build up for isolation but it is often more than is necessary for treatment (see Fig. 10i).

Performance Objectives:

The student will perform the following tasks without reference to the text or to other printed materials.

1. Identify the standard clamps used to isolate the appropriate teeth for endodontic treatment.
2. Write the proper hole size and location of the hole for single tooth isolation of endodontically involved teeth.
3. Describe the isolation modifications necessary to isolate multiple teeth and the usefulness of a split dam technique when single tooth rubber dam isolation is impractical..
4. Describe the appropriate method for isolating a tooth with a broken crown.
5. Explain clamp selection modifications, which may be necessary to isolate small molars.
6. Describe the method for isolating an abutment in a fixed bridge.
7. Describe the appropriate method for isolating a tooth, which is part of a fixed orthodontic appliance.
8. Describe the indications and methods for placing a copper band on a tooth to aid in isolation.

SECTION XI

ACCESS PREPARATION

Description:

This section provides a review of the principles of access preparation. Illustrations of correct access preparations are provided for each anatomical grouping of teeth.

Rationale:

Access preparation is the "Key to Endodontics." Errors in access preparation will result in errors in preparation and obturation.

A. PURPOSE OF ACCESS PREPARATION

An 'appropriate, adequate and sufficient' Endodontic Access is the "Key to Endodontics." **The goal should be to provide unimpeded entry to the canal orifice(s) with minimum required removal of tooth structure. The access must remove all remnants of the pulp tissue in the pulp horn area to prevent staining of dentin.** Attention should be given to the diagrams of access for the various teeth (Fig. 11a-11h). **All caries and stained dentin must be removed** for a proper access. The devitalized dentin should not be left in contact with softened or contaminated (stained) material; it lacks the vital and potentially reparative capabilities of the odontoblastic processes. Additionally, softened areas provide routes of entry under temporary closure which can permit recontamination of the internal spaces between visits, should a multiple visit approach be required due to time availability. Your access preparations should allow easy visualization of the chamber walls, floor and canal orifices. Anterior teeth, after the final preparation, should allow visibility of the canal to near the apex. This is checked using light reflected into the canal by a mirror.

REMEMBER - Access Consists of three stages:

1. **Initial Access** - opening for initial hand instrumentation.
2. **Radicular Access** - gates glidden preparation which provides deep coronal flare to the canal and thereby provides access for approximately 2/3 the root length.
3. **Fill Access** - aligns the coronal and canal segments and thereby provides light passage and freedom for the condenser to access the canal circumference.

B. MAXILLARY ACCESS DIAGRAMS

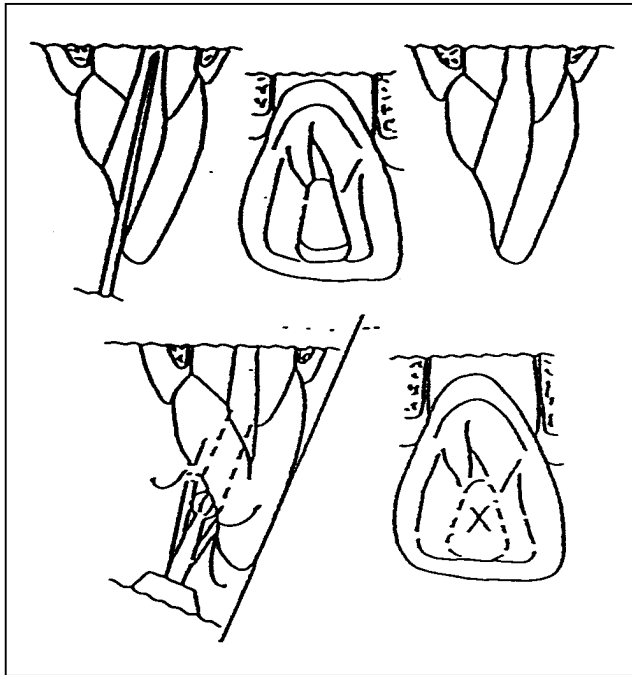


Fig. 11a
Maxillary Incisor Access

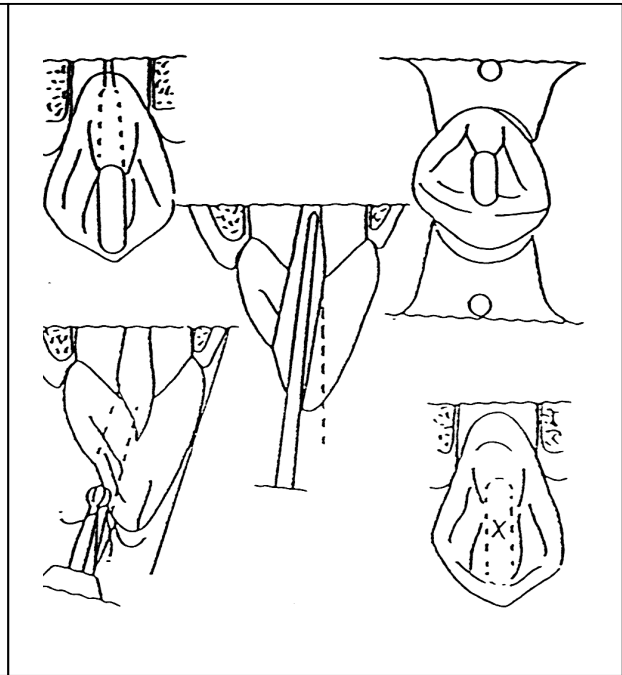


Fig. 11b
Maxillary Canine Access

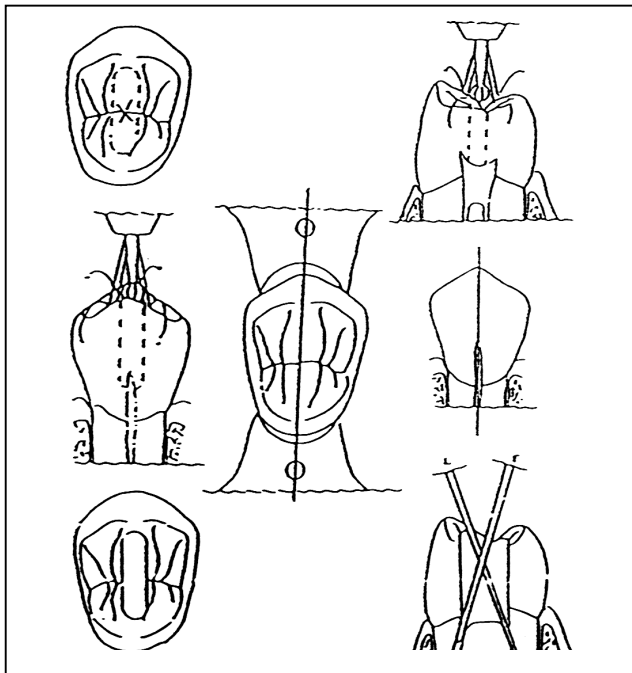


Fig. 11c
Maxillary Premolar Access

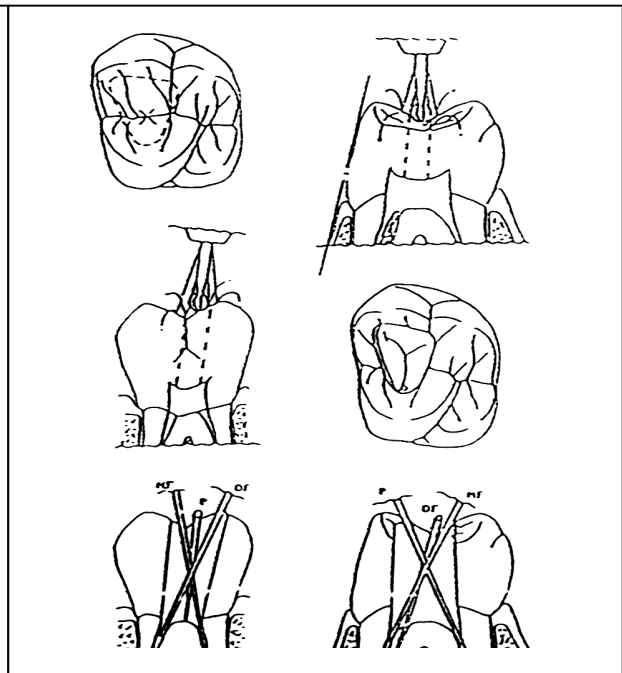


Fig. 11d
Maxillary Molar Access

C. MANDIBULAR ACCESS DIAGRAMS

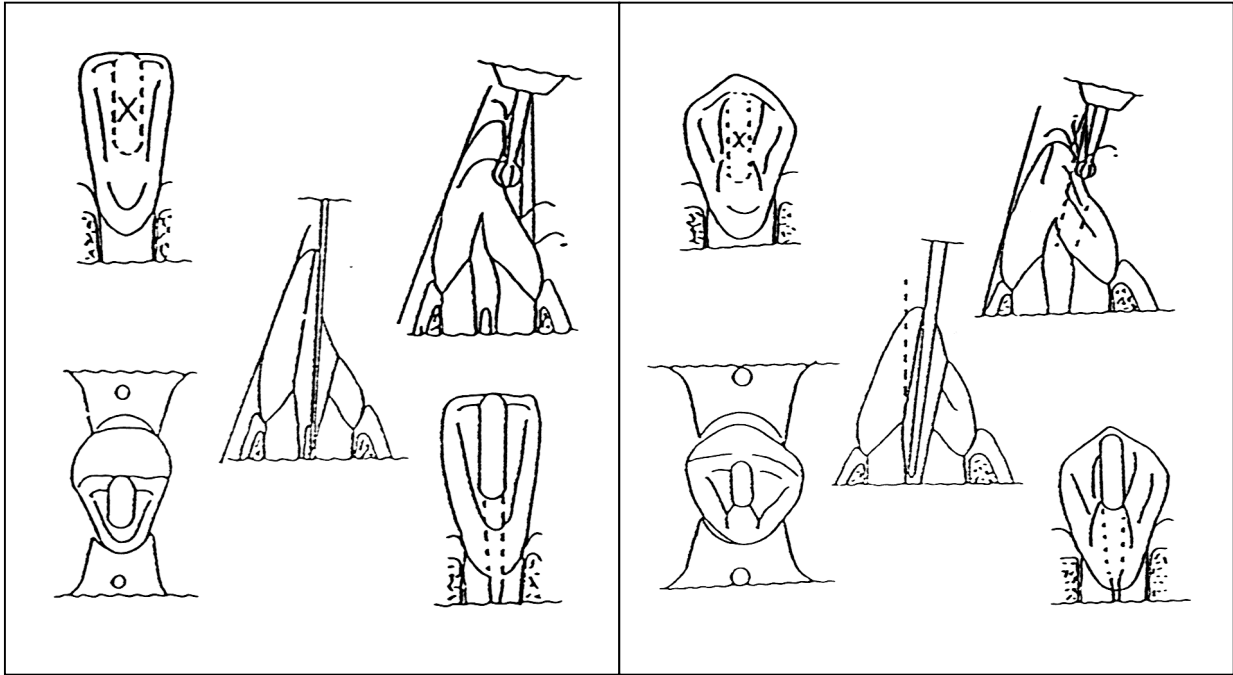


Fig. 11e
Mandibular Incisor Access

Fig. 11f
Mandibular Canine Access

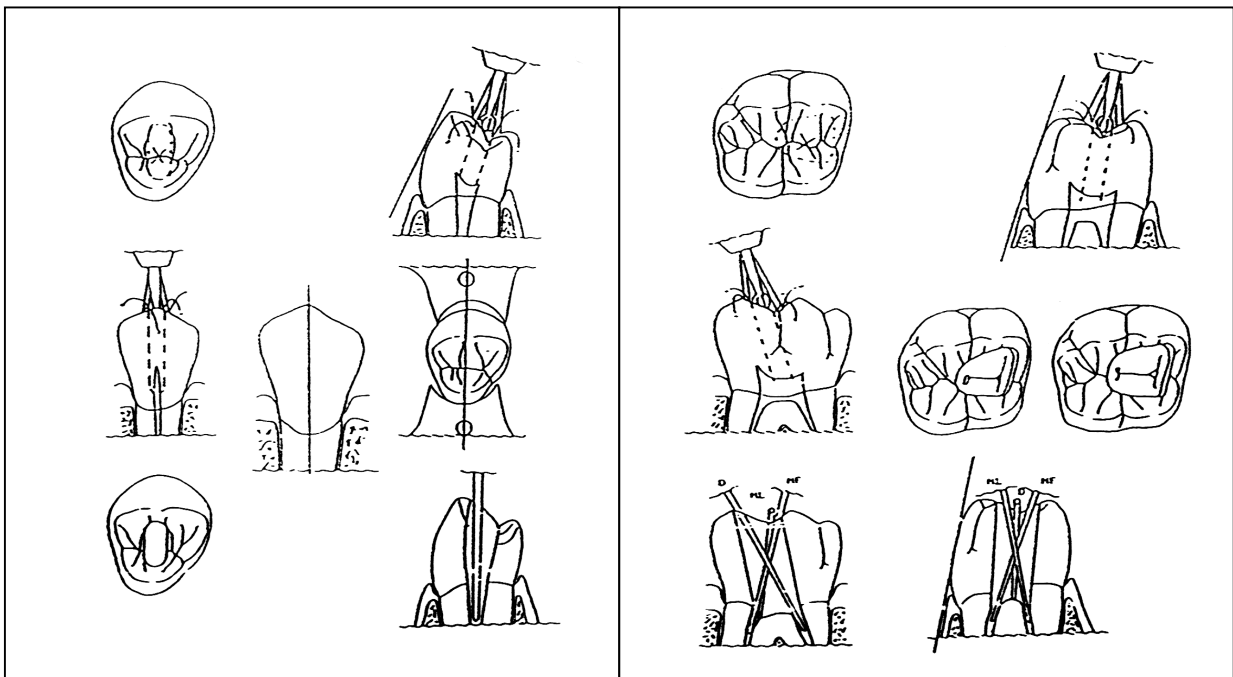


Fig. 11g
Mandibular Premolar Access

Fig. 11h
Mandibular Molar Access

Performance Objectives:

The student will be able to perform each of the following tasks in its entirety without access to the text or to other printed materials.

1. State the goal of access preparation.
2. Write and define the three stages of access preparation for endodontic therapy.
3. The student should be able to visualize the appropriate access shape and position for all maxillary teeth.
4. The student should be able to visualize the appropriate access shape and position for all mandibular teeth.

SECTION XII

CONTROL ZONE PREPARATIONS

Description:

This section contains a review of the three standard preparation sizes (45, 60, 80). The correct method for establishing a working length is discussed, as well as accurate radiographic techniques, and appropriate preparation diameters for the anatomical divisions of roots.

Rationale:

Two thirds of case grades will be determined by examining radiographs, and determining how thoroughly the preparation objectives have been achieved. Standard preparation sizes **must** be appropriately utilized, or cases **will not** be considered as acceptable.

A. OVERVIEW OF THE OU TECHNIQUE FOR ROOT CANAL THERAPY

Root canal therapy is a series of steps, each meticulously carried out. The steps of root canal therapy as taught at OU and the order they are to be accomplished are:

1. Pre-op X-ray (**x-ray required**)
2. Evaluation and Diagnosis
3. Achieving Profound Anesthesia
4. Rubber Dam Isolation
5. Endodontic Access
6. Working Length Determination (**x-ray required**)
7. Establish initial Apical Patency consistent with the final anticipated Control Zone dimensions
8. Radicular Access with Gates Glidden drills used in a Crown Down manner
9. Preparation of the Apical Control Zone
10. MCV check
11. Fitting Gutta Percha (**x-ray required**)
12. Mixing Sealer
13. Obturation of the root canal system by Warm Vertical Condensation
14. Condensation check (**x-ray required**)
15. Occlusal Seal with an adequate temporary &/or permanent restoration
16. Final Post-treatment x-ray with the RD clamp removed (**x-ray required**)

B. WORKING LENGTH DETERMINATION (WL)

The working length determination is the most critical step in endodontic therapy, as it establishes the affects all subsequent treatment within the canal. An accurate WL determination affects the accuracy of the location and the quality of the final seal. Proper care in establishing an accurate, reliable working length is rewarded by the quality of the end product. Working length should be interpreted as the length of the file from your established coronal reference point to when the file tip contacts the periodontal ligament space at the radiographic apex (root end).

When establishing a working length, it is important to utilize **right angle x-ray technology**. Remembering that the x-ray tube is a "light" source and the image is a shadow, one can easily relate the typical fringe and loss of marginal detail observed when shadow images are elongated. Due to this phenomenon, it is extremely important to project an accurate and true shadow created by the central beam (parallel light source) in order to obtain the best-defined and most accurate measurement of each tooth. The right angle projection has two effects:

1. It concentrates the film beam impact into the smallest undistorted area which results in a maximum density exposure.
2. It reduces the marginal fringe.

The end result is a clear and sharply defined image. Remember, the right angle is in multiple planes, but is controlled primarily by the M to D (horizontal) plane and the incisal to apical (vertical) plane. The clearest detail will result usually when the contact areas are opened and the apices of premolars are overlapped. Separation of F and L apices should be kept to a minimum, as this distorts the M to D right angle and produces fuzzing of the apical image. When separation is used, the accuracy should be confirmed by a superimposed view (F & L root overlapped), which will give greater apical clarity. Remember, generally the F & L canals will measure the same length if the F cusp tip is used as the reference point. Because of this, apical separation is not critical in the majority of treatments.

The working length determination must be verified by an instructor on all cases. Working lengths established with a electronic apex locator must be verified radiographically. The maximum acceptable adjustment of a file is plus 0.5mm; the file tip on the x-rays appears to be 0.5mm sort of the radiographic root end or PDL. A new working length film should be taken for all overextended file lengths and when a file adjustment of more than 0.5mm longer is required. Failure to obtain faculty approval of the WL determination can result in dismissal from clinic for remedial training. This may be made by the request of any Endodontic Clinical Faculty.

**THIS IS A "MUST HAVE" X-RAY.
NO CASE IS ACCEPTABLE WITHOUT THE WORKING LENGTH X-RAY!**

Rubber Dam. Management for the WL X-ray: All working length and other working x-rays are to be exposed with the rubber dam in place. This is done to protect the isolation and to preserve time. **Under NO Circumstance Should the Dam Be Removed for Working Films. If the rubber dam frame is removed, it should be replaced immediately after the film is exposed.**

C. BASIC PREPARATIONS

The minimum preparations consist of three basic preparation sizes. The 45, 60, and 80 preparations. All standard preparations are adaptations of these three primary preparations. Illustrations of the standard apical control zone and each standardized minimum preparation size are included (Fig. 12c and 12d).

Suggested application of the standardized 45, 60 and 80 preparations are made in the following chart (Fig. 12e). These are generally minimum sizes and will occasionally require larger openings for immature canals and retreatments.

NOTE: There is no replacement for good judgment and these sizes should not be considered absolute but rather as guides to help develop clinical judgment. Larger sizes must be employed for immature teeth and smaller sizes for teeth with extreme curvatures, which prohibit enlargement to a desired size.

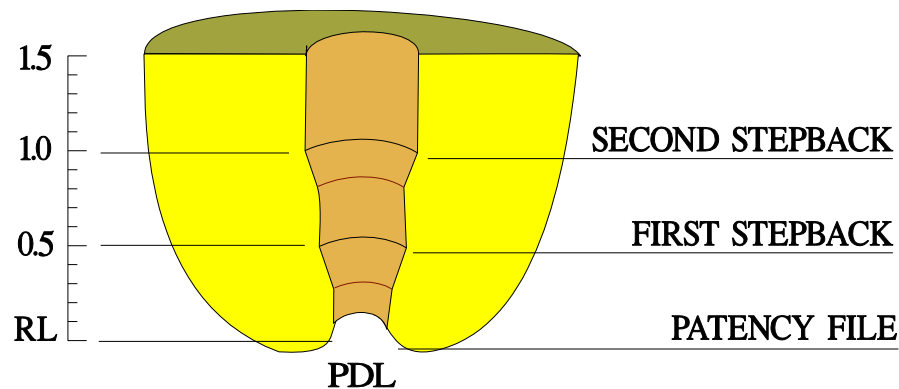


Fig. 12c
Control Zone Elements

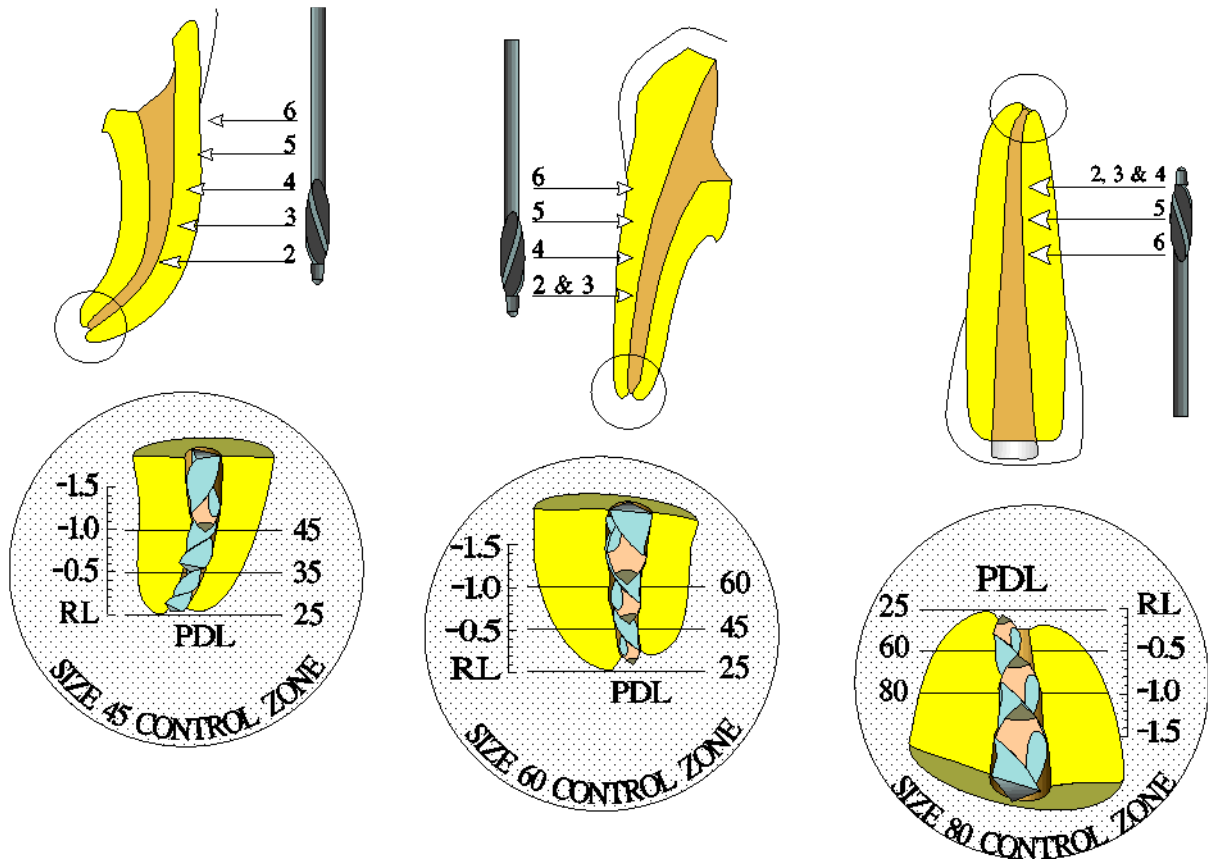


Fig. 12d
Preparations by control zone size

Maxillary Teeth			Mandibular Teeth		
INCISORS	Central	60-80CZ	INCISORS	Central (1 - 2 canals)	60 CZ
	Lateral	45 -60 CZ *		Lateral (1 - 2 canals)	60CZ
CANINE		60-80 CZ	CANINE		60-80 CZ
PREMOLARS	Two root, 2 canals	45 CZ	PREMOLARS	One root, 2 = canals	60 CZ
	One root, 2 canals	60 CZ		One root, 1 large - 1 small	60 CZ 45 CZ
	One root, 1 canal	60 CZ		One root, one canal	60CZ
MOLARS	Facial canals	45 CZ	MOLARS	Mesial root (2 canals)	45 CZ
	Fourth canal	45 CZ		Distal root (1 - 2 canals)	60CZ
	Palatal canal	60 CZ		One root & 1 canal	60-80 CZ

Fig. 12e
Suggested Minimum Control Zone Preparations

*Most times a small diameter (#60 Control Zone) is required on the maxillary lateral incisor, due to root curvature in the apical third of the root. Control Zones either larger or smaller could be attempted, but only after consultation with the endodontic faculty and after a thorough assessment of the apical curvature or delicate apical structure has been performed.

With the introduction of the COD Ni-Ti rotary preparation (Radicular Access Orifice Movement, the Vertical Extension Cervically, Vertical Extension to the Apex, and Step Down Apical Prep) there can be much greater appreciation of the root curvature in post teeth. With greater curvature it is accepted that the risks of apical transportation (ledge, zip, and perforation) are also greater which will decrease the overall prognosis for the case. **With discretion, a rotary #35/.04 or #30/.06 apical preparation canal flare are acceptable obturation sizes in posterior canals when there is clear evidence (radiographically or tactilely) that a severe curvature exists. Radiographically this may appear as a root dilaceration. Tactilely this is felt when the step down prep does not progress normally.**

The 80 Control Zone is no longer a 'standard' preparation. All 80 CZ are established as needed in large canals after the verification step of the developing the control zone and apical sizing justifies the size.

Performance Objectives:

The student will be able to complete the following tasks without access to the text or to other printed materials.

1. Discuss the steps needed to accomplish root canal therapy.
2. Discuss the importance of projecting film images with the central x-ray beam.
3. Discuss the importance of placing the x-ray beam at right angles to the film.
4. Explain the management of isolation while working films are exposed.
5. Describe film positioning for anterior and posterior teeth.
6. Describe the elements of a Control Zone.
7. Describe the preparation size of the three standard control zones (#45, #60 and #80).
8. Discuss the basic preparation sizes for any root of any tooth.

SECTION XIII

OBTURATION, OBTURATION MODIFICATIONS, PERFORATION REPAIR

Description:

This section provides a review of the obturation technique and enumerates the x-ray documentation necessary for turning in a completed case. Obturation modifications for overdenture abutments, furcation perforations, and teeth scheduled for root amputations are discussed. The proper method for treating teeth for placement of cast posts is also described.

Rationale:

Adequate obturation is necessary to prevent reinfection of the root canal system after the "cleanse and shape" procedure is accomplished. Modifications of the obturation system are introduced to facilitate the treatment of unusual cases.

A. STANDARD OBTURATION

For conventional root canal fills, a **radiograph should be taken of the gutta-percha point(s) fitted in the canal(s) before obturation.** (See working length determination section for requirements of x-ray detail.) **This is a required step for all canals** and must be approved by an instructor. This film is to be part of the radiographic series used for grading.

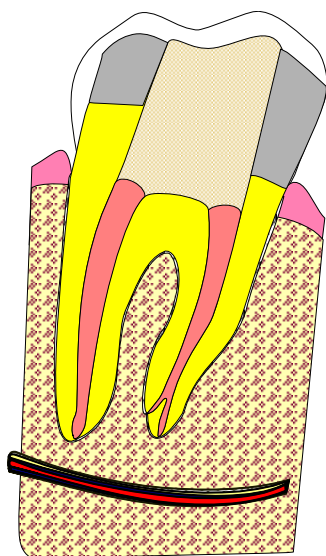


Fig. 13a
Standard Obturation

When obturation is complete, another radiograph should be taken to verify the apical position, presence or absence of voids, and extent of gates glidden flare. If this is acceptable, a polycarboxylate base temporary filling is placed. **A final x-ray is then exposed** (see SECTION VI A). **Remember, the final x-ray never has a clamp in place.**

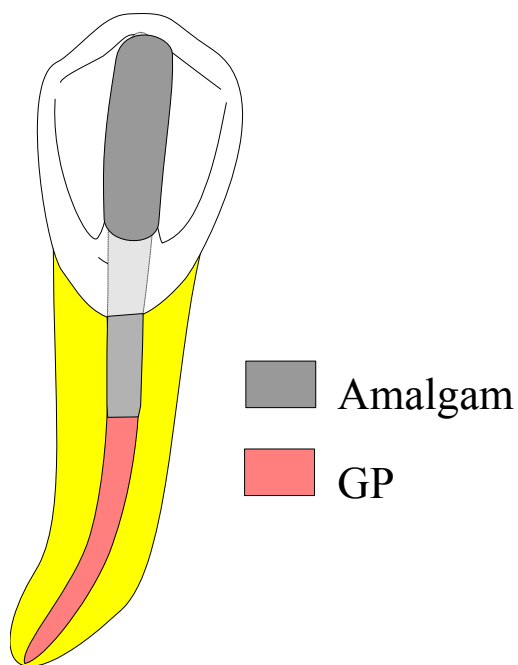


Fig. 13b
Over Denture Obturation

B. OVERDENTURE OBTURATION

If the tooth being treated has been selected as an overdenture abutment, the obturation is accomplished as outlined above, **up to and including** the radiograph of the complete obturation. Then a post space is made to a depth of at least three millimeters **below the crest** of the alveolar bone.

The remaining gutta-percha is reheated and recondensed to insure maintenance of the seal. The amalgam is placed and condensed from the coronal extent of the gutta-percha fill to the occlusal surface of the access preparation (use the Endodontic plugger/condenser for amalgam condensation).

C. ROOT AMPUTATION OBTURATION

If a root amputation is planned, only the apical down-pack (condensation) of gutta-percha is done in the root to be amputated. This should allow a canal space to exist, which ends about 3-4 mm below (apical to) the furcation or floor of the chamber. This remaining space is then filled to the orifice of that canal with amalgam, using the Endodontic pluggers/condensers. The chamber and access should then be filled with polycarboxylate cement. After the clamp and frame are removed, a final x-ray is taken (see SECTION VI A).

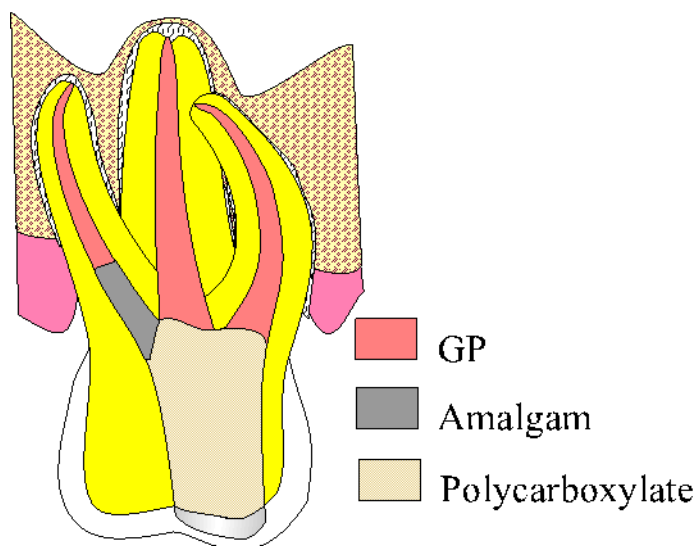


Figure 9c.
Root Amputation Obturation

D. POST SPACE

If a post and core are required, the general rule is that the post space is accomplished **the same day that the obturation is completed.** Proceed to completion of condensation and verify with a radiograph. If the fill is acceptable, the post space is opened with the appropriate gates glidden drill(s) to a **point no closer than 5 mm** of the apex or radiographic length. The remaining gutta-percha is reheated and recondensed. A radiograph of the post space is recommended at this point, to insure the space has been prepared to a proper depth and that no debris remains in the post space. Once the post space is acceptable, a cotton pellet is placed in the pulp chamber area of the access preparation and a durable temporary of IRM is placed. Afterwards, the rubber dam is removed, and the final x-ray exposed (see SECTION VI A).

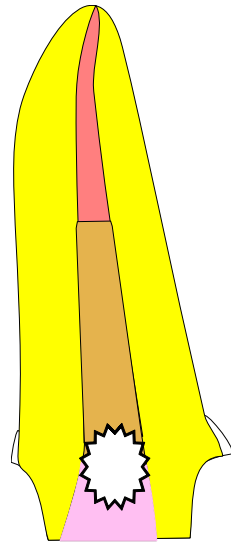


Fig. 13d
Post Space

If fixed prosthodontics requires less than 5 mm's of apical seal in order to obtain an adequate post length, then the preparation and cementation are to be completed as an Endodontic procedure, i.e., using isolation, canal disinfection, and sterile technique.

E. FURCATION PERFORATION TREATMENT

Should any perforation occur, faculty assistance must be obtained immediately. Furcation perforations occur most frequently in the M root of mandibular first molars and next most frequently in the MB root of maxillary first molars. A common cause is excessive depth with the large gates-glidden drills (#5 and #6) causing a lacerating the root and stripping into the furcation. Using a crown-down progression of GG, i.e. large to small is the best prevention. **The repair is to be completed by a Faculty only.** Shaping of the perforated canal will be completed and the apical obturated in most situations before the repair is made. MTA (mineral trioxide aggregate) or alloy is placed in the perforation site and carefully condensed. The remaining canal space may be filled to the orifice. The repair is covered with a wet mix of polycarboxylate cement. The best chance for healing is if the perforation is repaired immediately. This is a critical procedure and faculty assistance is imperative, as improper management will favor case failure.

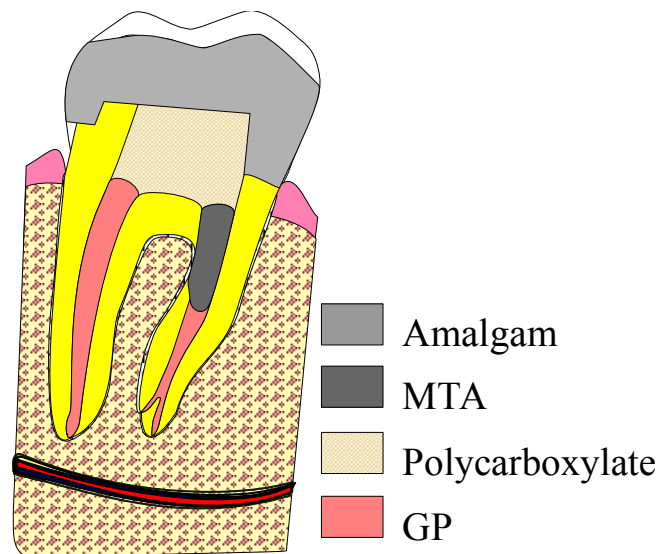


Fig. 13e
Furcation Perforation Treatment

Because of the profound adverse effect an iatrogenic perforation has on prognosis, cases with an iatrogenic perforation can will receive an automatic grade reduction. A grade no higher than a "C" will be given, which at the discretion of the covering instructor may be lower.

Performance Objectives:

The student will perform the following tasks without reference to the text or other printed materials.

1. Explain the nature of the radiographs, which are required on canals 1-9 after instrumentation has been completed and evaluated.
2. Differentiate a working film from a final film on the basis of the essential features of each.
3. Discuss the essential features of the overdenture modification.
4. Discuss the essential features of the root amputation modification.
5. Discuss the essential features of post space modification.
6. Discuss the essential features of the furcation perforation repair modification.