E. Surgical Endodontics

1. Incision and Drainage/Trephination

Indications for Treatment
Incision and drainage of soft tissues is indicated if any of the following clinical conditions exist:

- If a pathway is needed in soft tissue with localized fluctuant swelling that can reasonably be expected to provide necessary drainage.
- When pain is caused by accumulation of exudate within soft tissues.
- When necessary to collect samples for bacteriologic analysis.

Trephination of hard tissues is indicated in any of the following clinical situations:

- If a pathway is needed from hard tissue that can reasonably be expected to provide necessary drainage.
- When pain is caused by accumulation of exudate within the alveolar bone.
- When necessary to collect samples for bacteriologic analysis.

Procedure
Incision and drainage is a surgical opening created in soft tissue for the purpose of releasing exudate or decompressing the area of swelling.

Trephination is the surgical perforation of the alveolar cortical bone to release accumulated tissue exudate.

These procedures may include the placement and subsequent timely removal of a drain.

Antibiotics may be indicated if there is diffuse swelling (cellulitis), systemic symptoms or in patients who are immunocompromised.

Objectives

- To alleviate present and prevent future adverse clinical signs or symptoms.
- To reduce localized soft tissue swellings.
- To promote acceptable repair of hard and soft tissues.
- To prevent damage to teeth or anatomical structures.

2. Periradicular Curettage

Indications for Treatment
Periradicular curettage is indicated if any of the following clinical conditions exist:

- Persistent periradicular pathosis following endodontic treatment.
- A periradicular lesion that enlarges after endodontic treatment, as noted on follow-up radiographs or digital radiographic images.
- A marked overextension of obturating materials interfering with healing.
- Access for periradicular curettage, biopsy or to an additional root is necessary.

Procedure
Periradicular curettage is a surgical procedure to remove diseased or reactive tissue and/or foreign material from the alveolar bone in the apical or lateral region surrounding an endodontically treated tooth. By definition, the root is not resected.

A mucoperiosteal flap is surgically elevated and, when necessary, bone is removed to allow direct visualization of and access to the affected area. Thorough removal of all targeted tissue and/or foreign material is performed. Guided tissue regeneration techniques and/or bone replacement may be used if, at the time of surgery, the clinical condition warrants their use. Primary closure of the surgical site is desired.

Objectives

- To alleviate present and prevent future adverse clinical signs or symptoms.
- To promote repair of hard and soft tissues.
- To minimize damage to adjacent teeth or anatomical structures.

3. Root-end Resection (Apicoectomy)

Indications for Treatment
A root-end resection (apicoectomy) in conjunction with periradicular curettage is indicated if any of the following clinical conditions exist:

- Persistent periradicular pathosis following endodontic treatment.
- A periradicular lesion that enlarges after endodontic treatment, as noted on follow-up radiographs or digital radiographic images.
- A marked overextension of obturating materials interfering with healing.
- Access for periradicular curettage, biopsy or to an additional root is necessary.
- Access for root-end preparation and root-end filling is necessary.
- When the apical portion of the root canal system of a tooth with periradicular pathosis cannot be cleaned, shaped and obturated.

Procedure
Root-end resection (apicoectomy) is the preparation of a flat surface by the excision of the apical portion of the root and any subsequent removal of attached soft tissues.

A mucoperiosteal flap is surgically elevated and, when necessary, bone is removed to allow direct visualization of and access to the affected area. Thorough removal of all targeted tissue and/or foreign material is performed. Guided tissue regeneration techniques and/or bone replacement may be used if, at the time of surgery, the clinical condition warrants their use. Primary closure of the surgical site is desired.
Objectives
a. To alleviate present and prevent future adverse clinical signs or symptoms.
b. To promote repair of hard and soft tissues.
c. To minimize damage to adjacent teeth or anatomical structures.
d. To preserve as much root length as possible.

4. Root-end Filling (Retrofilling)/Root Repair

Indications for Treatment
Root-end filling (retrofilling) and root repair, when anatomically feasible, are indicated if any of the following clinical conditions exist:

a. Persistent periapical pathosis resulting from an inadequate apical seal that cannot be corrected nonsurgically.
b. Periapical pathosis and a blockage of the root canal system that could not be obturated by nonsurgical root canal treatment.
c. Root perforations.
d. Resorptive defects.

Procedure
Root-end filling (retrofilling) is an additional procedure following root-end resection (apicoectomy). A biologically acceptable restorative material is placed into a root-end preparation. Root resorptive defects and perforations are repaired with a biologically acceptable filling material.

Following root-end resection, a preparation is made and a biologically acceptable repair material is placed. Guided tissue regeneration techniques and/or bone replacement may be used if, at the time of surgery, the clinical condition warrants their use. Primary closure of the surgical site is desired.

Objectives
a. To alleviate present and prevent future adverse clinical signs or symptoms.
b. To promote acceptable repair of hard and soft tissues.
c. To minimize damage to adjacent teeth or anatomical structures.
d. To preserve maximum root length possible.
e. To limit root-end filling and root repair materials to the confines of the preparation.
f. To seal the root canal system or defect.

5. Biopsy

Indications for Treatment
A biopsy is indicated if any of the following clinical conditions exist:

a. When an adequate amount of tissue or foreign material can be removed from the periradicular surgical site for histopathologic examination.
b. Persistent pathosis or pathosis inconsistent with endodontic disease is noted on clinical or radiographic examination.
c. Medical history indicates the merits of biopsy.

Procedure
A biopsy is the surgical removal of a soft and/or hard tissue specimen for histopathologic examination.

Objective
To establish a diagnosis by histopathologic examination.

6. Hemisection

Indications for Treatment
Hemisection is indicated if any of the following clinical conditions exist:

a. Class III or Class IV periodontal furcation defect.
b. Infraorbital defect of one root of a multi-rooted tooth that cannot be successfully treated periodontally.
c. Coronal fracture extending into the furcation.
d. Vertical root fracture confined to the root to be separated and removed.
e. Carious, resorptive root or perforation defects that are inoperable or cannot be corrected without root removal.
f. Persistent periapical pathosis where nonsurgical treatment or periradicular surgery is not possible and the problem is confined to one root.

Procedure
Hemisection is the surgical separation of a multi-rooted tooth through the furcation in such a way that a root and the associated portion of the crown may be removed. Occasionally, this procedure is performed on maxillary molars or premolars. Hemisection requires root canal treatment on all retained root segments. When possible, it is preferable to complete the root canal procedure and place a permanent restoration that extends into the canal orifices prior to the hemisection procedure.

Objectives
a. To alleviate present and prevent future adverse clinical signs or symptoms.
b. To eliminate or reduce significant periodontal defects.
c. To perform acceptable root canal obturation(s) in the remaining root segment(s).
d. To perform proper contouring of remaining tooth structure.
e. To seal all external openings into the pulp chamber.
f. To provide a portion(s) of the tooth that is/are restorable and that can be maintained by the patient.

7. Root Resection (Root Amputation)

Indications for Treatment
A root resection procedure is indicated if any of the following clinical conditions exist:

a. Class III or Class IV periodontal furcation defect.
b. Infraorbital defect of one root of a multi-rooted tooth that cannot be successfully treated periodontally.
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Indications for Treatment

- An existing fixed prosthesis that will be seriously compromised by a hemisection.
- Vertical root fracture confined to the root to be separated and removed.
- Carious, resorptive root or perforation defects that are inoperable or cannot be corrected without root removal.
- Persistent periradicular pathosis where nonsurgical root canal treatment or periradicular surgery is not possible.
- At least one root is structurally sound.

Procedure

Root resection (root amputation) is the surgical removal of an entire root(s) leaving the crown of the tooth intact. Root resection requires root canal treatment on all retained root segments. When possible, it is preferable to complete the root canal procedure and place a permanent restoration that extends into the canal orifices prior to the root resection procedure.

Objectives

- To alleviate present or prevent future adverse clinical signs or symptoms.
- To eliminate or reduce significant periodontal defect(s).
- To perform acceptable root canal obturation(s) in the remaining root segment(s).
- To perform proper contouring of remaining tooth structure.
- To seal all external openings into the pulp chamber.
- To provide a portion(s) of the tooth that is/are restorable and that can be maintained by the patient.
- To preserve an existing prosthesis where one root of an abutment requires removal.

8. Intentional Replantation (Extraction/Replantation)

Indications for Treatment

Intentional replantation is indicated when all of the following clinical conditions exist:
- Persistent periradicular pathosis following endodontic treatment.
- Nonsurgical retreatment is not possible or has an unfavorable prognosis.
- Periradicular surgery is not possible or involves a high degree of risk to adjacent anatomical structures.
- The tooth presents a reasonable opportunity for removal without fracture.
- The tooth has an acceptable periodontal status prior to the replantation procedure.

Procedure

Intentional replantation is the insertion of a tooth into its alveolus after the tooth has been extracted for the purpose of accomplishing a root-end filling or root repair. Stabilization of the replanted tooth may or may not be necessary. When possible, root canal treatment is performed prior to intentional replantation.

Objectives

- To alleviate present and prevent future adverse clinical signs or symptoms.
- To properly orient the tooth in the socket.
- To eliminate periradicular pathosis.
- To minimize periodontal pathosis.
- To preserve the maximum root length possible.
- To place root-end filling(s) or root repair material(s).
- To maintain the tooth as a functional member of the dentition.

9. Surgical Removal of the Apical Segment of a Fractured Root

Indications for Treatment

When a root fracture occurs in the apical portion and pulpal necrosis results, the fractured segment may be removed surgically following or in conjunction with nonsurgical root canal treatment. Surgical removal of the apical segment of a fractured root is indicated when all of the following clinical conditions exist:
- Root fracture in the apical portion of the root.
- Pulpal necrosis in the apical segment as indicated by a periradicular lesion or clinical signs or symptoms.
- Coronal tooth segment is restorable and functional.

Procedure

A mucoperiosteal flap is surgically elevated and, when necessary, bone is removed to allow direct visualization of and access to the affected site. The apical portion of the affected root and all of the targeted tissue are removed. A root-end resection and/or root-end filling may be necessary. Guided tissue regeneration techniques and/or bone replacement may be used if, at the time of surgery, the clinical condition warrants their use. Primary closure of the surgical site is desired.

Objectives

- To alleviate present and prevent future adverse clinical signs or symptoms.
- To remove the fractured root segment.
- To promote acceptable repair of hard and soft tissues.
- To maintain a favorable crown-to-root ratio.
- To prevent damage to adjacent teeth or anatomical structures.
- To maintain the tooth as a functional member of the dentition.
SELECTED REFERENCES:

Surgical Endodontics


F. Management of Traumatic Dental Injuries

1. Enamel Fracture (Uncomplicated Crown Fracture)

Indications for Treatment
Treatment of enamel fracture is indicated if any of the following clinical conditions exist:
- Enamel fracture.
- Chipped enamel not involving underlying dentin.

Procedure
Enamel fractures usually require minimal treatment; chipped enamel can either be smoothed or repaired with bonded resin.

Objectives
- To alleviate present and prevent future adverse clinical signs or symptoms.
- To establish an acceptable esthetic and functional tooth.

2. Crown Fracture Without Pulp Exposure (Uncomplicated Crown Fracture)

Indications for Treatment
Treatment of crown fracture involving enamel and dentin, but without direct exposure of the pulp, is indicated when both of the following clinical conditions exist:
- The crown fracture involves enamel and dentin with no pulp exposure.
- The pulp tests reveal no indication for endodontic treatment.

Procedure
In addition to restoring the esthetic aspect of the tooth, procedures for treating crown fractures without pulpal exposure are intended to protect the dentin and the underlying vital pulp. In immature teeth, continued root development may take place.

Objectives
- To alleviate present and prevent future adverse clinical signs or symptoms.
- To establish an acceptable esthetic and functional tooth.
- To determine radiographic evidence of continued/complete root development in immature teeth.

3. Crown Fracture With Pulp Exposure (Complicated Crown Fracture)

Indications for Treatment
Treatment of crown fracture is indicated when both of the following clinical conditions exist:
- Crown fracture involves enamel, dentin and exposure of the pulp.
- The pulp is vital.