

Clinical Features

ROOT AMPUTATION AND HEMISECTION

INDICATIONS, TECHNIQUE AND RESTORATION

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Root amputation requires an interrelated multi-disciplinary approach towards treatment, encompassing the realms of endodontics, periodontics and prosthodontics. Since the treatment often becomes complicated, the clinician should be very critical towards case selection in order to ensure successful therapy. A synopsis of the major areas of concern is provided as a guideline.

Indications:

- 1) Severe vertical bone loss*
 - 2) advanced furcation invasion*
 - 3) unfavourable root proximity
 - 4) root fracture subsequent to endodontic or restorative procedures
 - 5) endodontic limitations (localized calcified canals or root perforations).
- (* not amenable to osteoplasty or bone grafting procedures).

Contra-Indications:

- 1) Decreased bone support – all roots
- 2) fused roots
- 3) endodontically inoperable canals
- 4) poor root form
- 5) limited prosthodontic possibilities (number and distribution of remaining teeth)
- 6) economics and oral hygiene limitations.

Timing

considerations:

Since radiographic and clinical interpretations of osseous defects are often inconclusive, the final decision for root removal may have to await surgical exposure.^{1,2,3,4} With vital root amputations

most teeth remain asymptomatic for at least 6 months⁵, however, endodontic therapy is recommended before root amputation to circumvent the complication of intrapulpal dystrophic calcification and post-operative tooth sensitivity. Pulpal extirpation alone would fulfill this treatment requirement.

Technique:

- 1) A cross-cut fissure bur or long tapering diamond bur in high speed handpiece is used to separate the root segment (figures 1a, 2a).
- 2) The furcation region must be blended smooth to avoid shelf or residual ledge formation (figure 1b). If left alone, these areas become sites of future inflammation and trap food debris.
- 3) Occlusal modification is performed to balance the forces of occlusion on the remaining roots (figure 1b). (reference 6 was helpful in the preparation of the figures)

Restorative concerns:

- 1) Soft tissues are stable after 6-8 weeks⁷
- 2) crowns are advisable to decrease risk of tooth fracture⁸ (Figures 3, 4)
- 3) splinting is not always necessary for single tooth treatments where adjacent teeth are present
- 4) crowns should receive an undercontoured embrasure space and narrowed occlusal table (buccal of maxillary molars and lingual of mandibular molars) as demonstrated in figures 1c and 2c^{1,2,8,9,11}. The crown margins must encompass the furcation area.

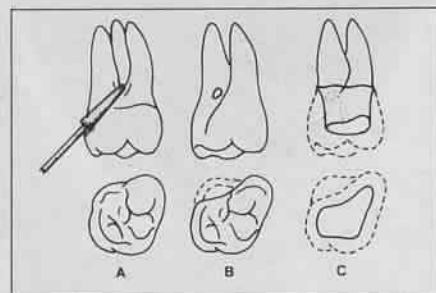


Figure 1 Disto-buccal root amputation of the maxillary molar

- a initial approach
- b occlusal table modification, and blending-smoothing of the furcation region
- c prosthetic reduction of tooth structure with occlusal table modification in mind. Crown margins extend into, and encompass the furcation areas.

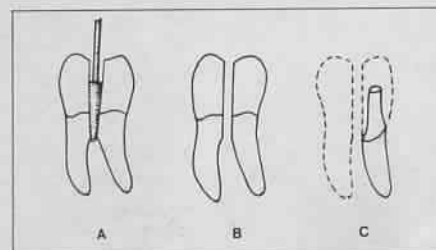


Figure 2 Hemisection of the mandibular molar

- a initial approach
- b the tooth preparation should be made precisely through the furcation region in order to avoid shelf creation and residual ledge formation
- c prosthetic reduction of tooth structure simulating that of a bicuspid tooth, crown margins must encompass the furcation region

Discussion

Figures 3 and 4 depict two different applications of root amputation and hemisection therapy. Case selection and successful management depends on an appreciation for the limitations and applications of this treatment modality. Of interest, most failures of root amputated teeth occur within five years for reasons other than inflammatory periodontal disease^{10,11}. Root fracture appears to be the main cause of failure, primarily affecting hemisected mandibular molar teeth following extensive multi-unit prosthetic reconstruction¹⁰. The most successful results are achieved when only one of the buccal roots of maxillary molars are amputated¹⁰, or hemisected mandibular molars are used as abutments for small bridges¹¹. In any case, maintenance of a high standard of plaque control and restoration of a stable occlusion are most important in order to achieve any degree of success with root amputation therapy.

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Figure 3 Mandibular molar distal root hemisection due to root fracture subsequent to endodontic and prosthodontic treatment a) before b) 6 months after distal root removal and subsequent splinted crowns on the second bicuspid & mesial molar root. The root in area 47 was also extracted.

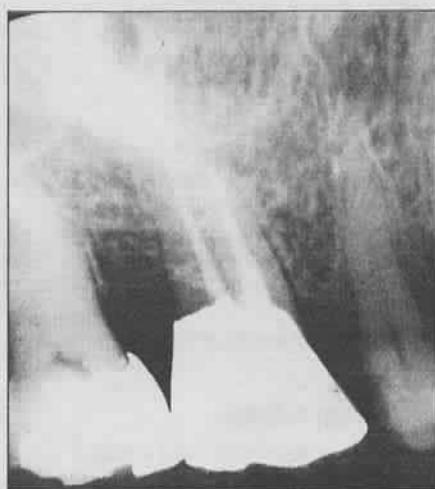


Figure 4 Maxillary molar disto-buccal root amputation due to a root proximity problem and furcation involvement a) before treatment b) 6 years later following endodontic and prosthetic therapy.