

Preventive durapatite ridge augmentation for esthetic fixed prosthodontics

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Maintaining or surgically recreating full contour of the gingival and mucosal tissues over and adjacent to extraction sites improves the esthetics of fixed partial dentures.¹⁻⁵ Poor esthetics results in patients with fixed partial dentures where teeth have been extracted and the residual ridge has been permitted to collapse. Residual ridge resorption follows tooth extraction.⁶

A variety of tooth replacement materials have been used in an effort to maintain the edentulous residual ridge for support of complete dentures.⁷ In addition, vital tooth root retention methods have been used to maintain the alveolar ridge.⁸ When treatment plans can be developed before extraction, a form of preventive ridge augmentation can be used to maintain the position of the gingival and mucosal tissues to be associated with

the pontic area. Careful planning and a step-by-step treatment sequence is necessary to ensure optimum results.

DIAGNOSIS AND TREATMENT PLAN

An accurate clinical and radiographic evaluation is performed (Fig. 1). The effect of root removal on the residual ridge relative to its collapse and subsequent esthetic complications are determined.

LABORATORY PREPARATION

With the use of a diagnostic cast, the stone abutment teeth are prepared and the teeth to be removed are eliminated from the cast to a level 2 mm subgingivally. Socket preparation to a depth 2 mm below the crest of

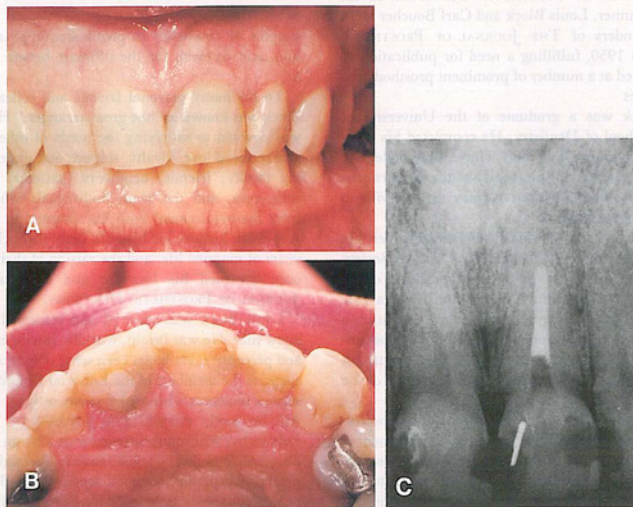


Fig. 1. A, Subosseous root fracture of maxillary left central incisor is not visible. B, Note discoloration and multiple restorations in maxillary left central incisor. C, Radiograph shows no subosseous horizontal fracture line on maxillary left central incisor.

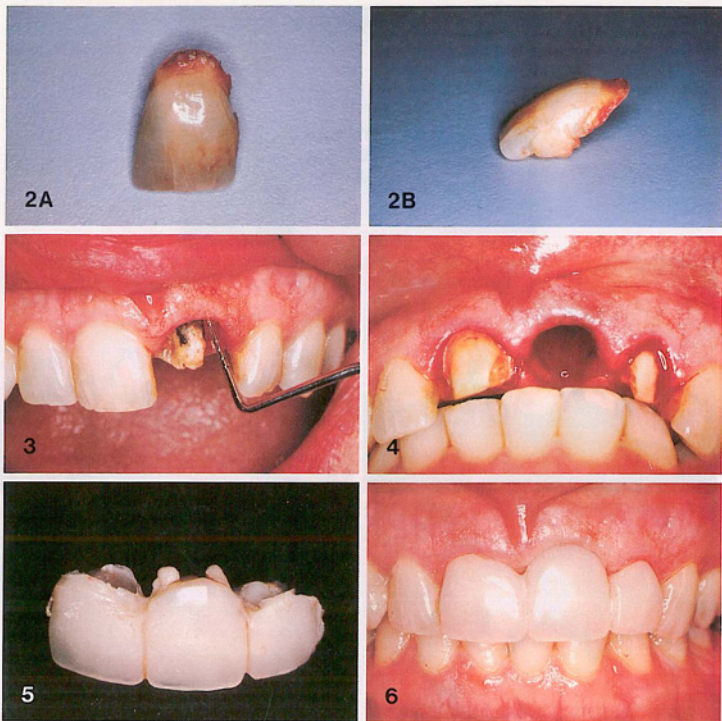


Fig. 2. A, Labial view; B, proximal view of fractured crown with approximately 4 mm of subgingival tooth structure remaining.

Fig. 3. Horizontal fracture line is approximately 4.5 mm subgingival.

Fig. 4. Abutment teeth prepared before extraction of retained root. Careful extraction of marginal gingival tissues.

Fig. 5. Relined high-impact prefabricated provisional restoration. Excess acrylic resin on pontic must be removed.

Fig. 6. Try-in of finished provisional restoration to determine socket seal.

the gingiva will permit the provisional restoration to later form a mechanical seal over the opening of the extraction site.

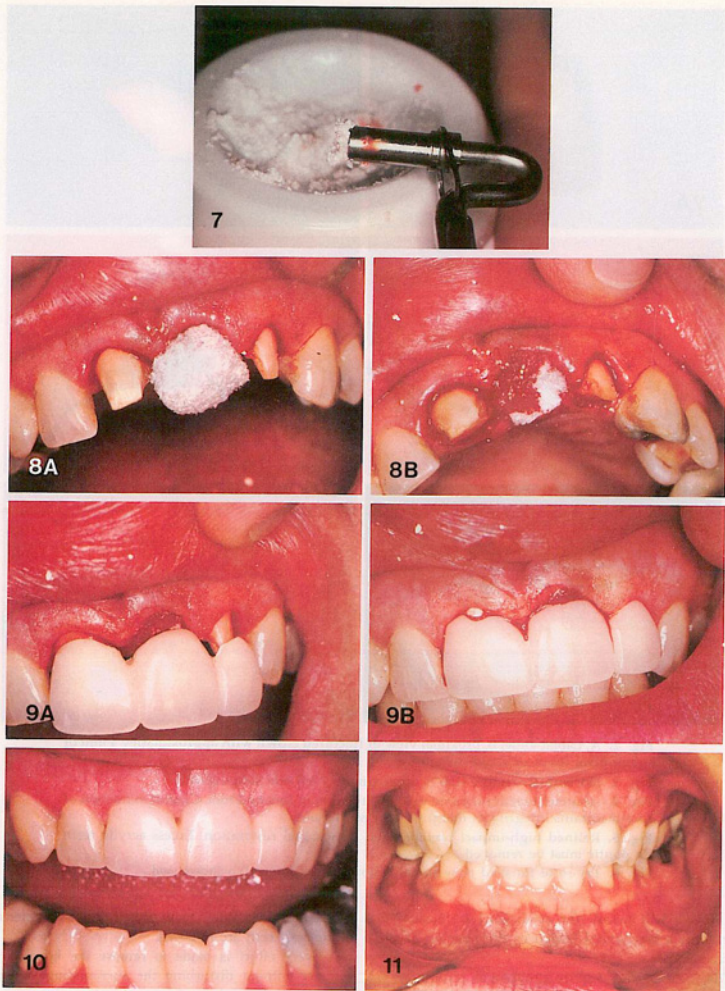
The fixed partial denture provisional restoration is first completed in wax and then invested and heat processed in appropriate acrylic resin.

CLINICAL TREATMENT

The abutment teeth are prepared before the removal of hopeless teeth to permit the dentist to function in a

bloodless field. When tooth preparation is completed, the hopeless teeth are removed.

Every effort is made to remove the hopeless teeth intact without disturbing the surrounding supporting tissues. If the teeth are fractured and require removal in segments, effort should be made to carefully free the gingival tissues from the fractured fragments (Fig. 2). The interdental papilla and the position of the free marginal gingiva around the extraction site are maintained (Figs. 3 and 4).



See opposite page for legends.

The prefabricated high-impact heat-processed provisional restoration is carefully fitted to the adjacent abutment teeth (Figs. 5 and 6). If the pontic does not totally cover the opening of the extraction site, additional

acrylic resin is added to assure that the provisional pontic mechanically seals the opening. The resultant pontic should be oval or convex and fit into the socket to a depth of 1 to 2 mm. Traditional pontic designs such as the

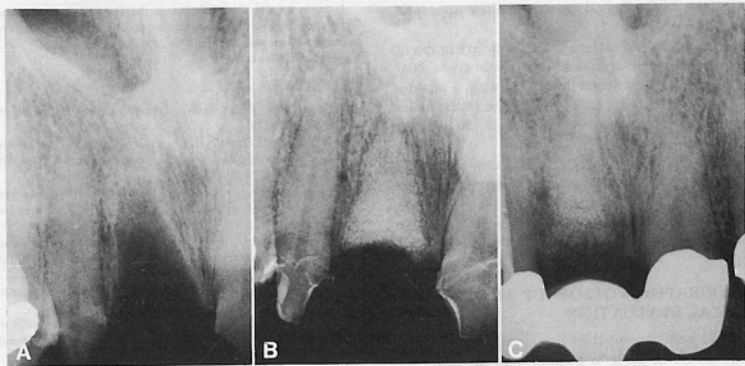


Fig. 12. Radiographs. A, Same day of treatment; B, durapatite, day of placement; C, durapatite, 6 months with final restoration.

ridge lap, modified ridge lap, or the sanitary pontic will not provide the desired esthetic results in this treatment method.⁹

To attain proper healing of the extraction opening and later permit appropriate oral hygiene, the oval surface of the pontic must be completely smooth and indentation free. All occlusal refinements and esthetic adjustments are made and the provisional restoration is completely polished and prepared for cementation.

PREVENTIVE RIDGE AUGMENTATION

Appropriate synthetic bone grafting materials such as periograf (Cook-Waite Laboratories, Inc., New York, N.Y.) in durapatite granule form (size 40 to 50 mesh) are moistened with a small amount of local anesthetic. A sterile amalgam carrier is loaded with the synthetic bone augmentation material and placed in the thoroughly cleansed socket (Fig. 7). Excess hemorrhaging is carefully sponged from the extraction site opening. Surgical suction should be avoided at this time so that the superficial durapatite crystals are not lost.

When the extraction site has been filled with the durapatite crystals, the provisional restoration is tried in the mouth again to determine whether the socket has

been overfilled with the durapatite, thereby preventing the pontic and abutment teeth from completely seating. A 1 mm space should exist between the durapatite crystals and the residual ridge surface of the pontic. A gelatin or collagen material (Gelfoam, The UpJohn Co., Kalamazoo, Mich.) is used to cover the durapatite crystals before cementation (Fig. 8). Cementation of the provisional restoration compresses the Gelfoam material and seals the extraction site opening (Fig. 9).

A 2- to 3-month healing period is recommended before removing the provisional restoration and making the final prosthesis (Fig. 10).

FINAL PROSTHESIS PONTIC DESIGN

The pontic design of the final restoration should mimic closely the form established by the provisional restoration (Fig. 11) and should contact the residual ridge completely. The form of the pontic's ridge-facing surface should be totally convex and is generally considered oval in form. The surface must be extremely smooth. The porcelain is polished and highly glazed and contacts the mucosal tissues in the extraction site depression. The most apical point of convexity should be in the labial quarter of the root face. This will permit a shallow

Fig. 7. Sterile amalgam carrier used to place durapatite crystals in socket.

Fig. 8. A, Large Gelfoam sponge is placed over extraction site. B, Gelfoam sponge compressed gently into region absorbing blood.

Fig. 9. A, Provisional restoration carefully seated over Gelfoam sponge. B, Provisional restoration compressing Gelfoam sponge and sealing extraction site.

Fig. 10. Two months after extraction. Complete soft tissue healing with healthy gingival tissues.

Fig. 11. Final porcelain-fused-to-gold restoration replacing the maxillary left central incisor.

tapering toward the lingual aspect and allow appropriate oral hygiene.

When the form and surface of the pontic are properly prepared, the patient is instructed to use interproximal threading devices and dental floss to maintain a plaque-free pontic surface. Patients should also be instructed to carefully cleanse the proximal surface of the adjacent abutment teeth.

When the patient has a high lip line, connectors may be extended cervically to esthetically compensate for the slight amount of loss in the vertical height of the interdental papilla. Care must be taken so that these connectors do not impinge on any part of the remaining papilla.

RADIOGRAPHIC FOLLOW-UP AND CLINICAL EVALUATION

Periodic postoperative radiographic and clinical evaluations should be made to monitor both the abutment teeth and the implanted durapatite crystals (Fig. 12). Patients should be reevaluated periodically. A 2½-year follow-up of nine patients showed no clinical or radiographic change in pontic-residual ridge relationship.

SUMMARY

A method of preventive ridge augmentation using durapatite granules to prevent residual ridge collapse in the region of fixed partial denture pontics has been described.

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Internal venting of castings to improve marginal seal and retention of castings

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The integrity of margins of castings and the ability of cements to seal the margin and retain the casting have been investigated since the advent of dental castings. The development of ceramometal crowns with margins that cannot be burnished has renewed interest in the study of marginal integrity.

Jorgensen,¹ in studying the film thickness of zinc phosphate cement, postulated that hydraulic pressure develops in the occlusal portion of castings during cementation. This pressure prevents full seating of the casting and created a marginal discrepancy. He found that as pressure was exerted on dental cements a separation of particles from the liquid occurred. The particles tended to accumulate in various regions on the preparation interface, increasing film thickness, especially on the occlusal surface.²

Methods advocated to overcome this problem general-

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