

## Tooth transplantation — A treatment modality in periodontosis

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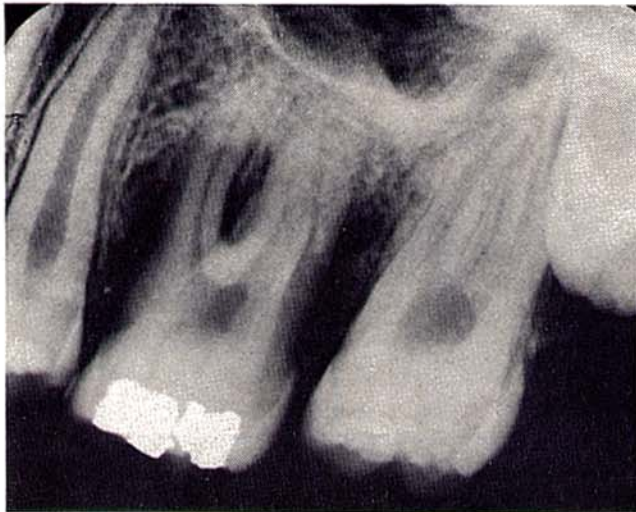
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### ABSTRACT

Treatment of severe bone loss about a maxillary first molar, in an adolescent patient, by extraction and transplantation with a developing maxillary third molar is described. Although there was osseous repair of the bony defect, root development was absent and the periodontal ligament space appeared lost. Since the cells investing the developing tooth are responsible for root formation and the development of the periodontal tissues, it is proposed that these cells are damaged before transplantation. In order for root development to continue with the formation of cementum, periodontal ligament and alveolar bone, it is suggested that developing teeth might be cultured prior to transplantation, so that the damaged root sheath and dental follicle can regenerate.

The precise etiology and pathogenesis of periodontosis are still unclear. Recent studies have found characteristic micro-organisms in lesion sites<sup>1-3</sup> and differences in certain host factors in patients with periodontosis.<sup>4,5</sup> However, there is as yet no satisfactory explanation to account for the symmetrical pattern of severe bone loss, precocious onset, predilection for females and familial tendency of this disease.

The clinician, presented with a patient with periodontosis, is restricted to a limited number of treatment modalities. The teeth may be kept under a strict maintenance program,<sup>(6)</sup> or extraction may be carried out in order that adjacent teeth not be jeopardized by the disease process. Extraction, however, leads to the difficulties of prosthetic replacement in usually a young patient. The patient with a first molar with severe bone loss and a



**Fig 1** Preoperative radiograph. There is severe bone loss about the maxillary left first molar and the unerupted developing third molar is present.

developing third molar affords the clinician the opportunity of removing the diseased tooth, transplanting the developing molar into the extraction site and eliminating the immediate need for prosthetic replacement.

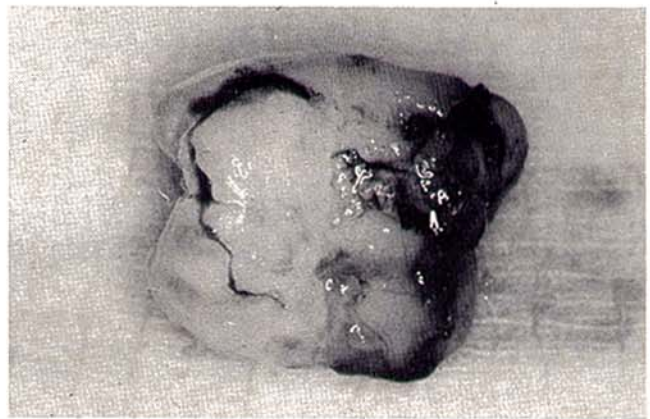
Baer and Gamble<sup>7</sup> initially described transplantation of developing third molars in periodontal lesions about first molar teeth. They showed that autotransplantation could be a method of repairing alveolar bony defects which resulted from periodontal disease. The following case report illustrates this technique in an adolescent patient with molar-incisor type periodontosis.

#### CASE REPORT

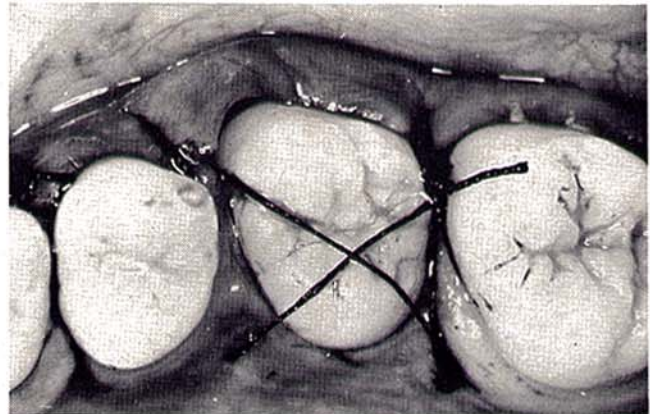
In October 1978, a 15-year-old black female presented at the Graduate Periodontic Clinic at the University of Toronto, complaining that a number of her teeth felt loose.

Clinical and radiographic examinations revealed the clinical pattern of molar-incisor type periodontosis. Sanative therapy was initially carried out. However, bone loss about the maxillary left first molar was so extensive that a favorable response to conventional periodontal treatment could not be anticipated (**Fig 1**). An unerupted maxillary left third molar was present in the early stage of root formation and it was believed that transplantation of this developing third molar into the first molar extraction site might afford the best opportunity for repair of the alveolar bony defect.

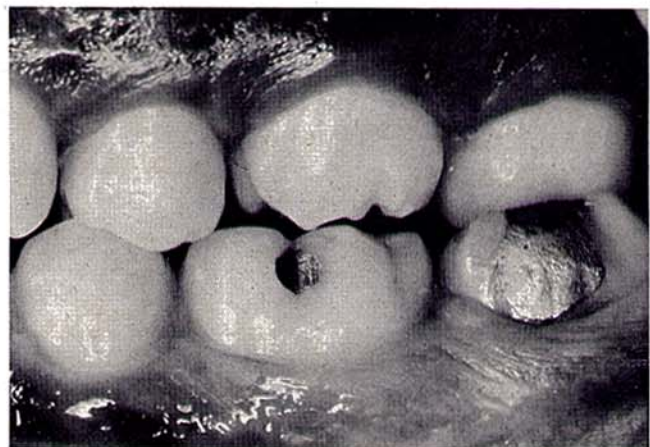
In February 1979, the maxillary left first molar and maxillary left third molar (**Fig 2**) were extracted. The inter radicular bone at the extraction site was removed so that the implanted third molar would be out of occlusion. The transplant was then stabilized with 3-0 silk sutures (**Fig 3**)



**Fig 2** Developing third molar before transplantation, with portions of the root sheath and dental follicle attached to the root.



**Fig 3** Transplant stabilized in extraction site with 3-0 silk sutures.



**Fig 4** Transplant erupting into occlusion 15 months post operatively.

and a periodontal dressing for two weeks. After stabilization was removed, the transplant was examined at monthly intervals under the following parameters: mobility, pocket depth, occlusion, pulpal status, clinical symptoms, bone fill, root development and periodontal ligament space.

At 15 months postoperatively, mobility was less than 1 mm, the sulcus probed less than 2 mm with no bleeding,





Fig 5 Fifteen-month postoperative radiograph. Osseous repair of the bony defect has occurred; however, root development of the transplant is absent and the periodontal ligament space appears lost.

the transplant had almost erupted into occlusion (Fig 4), responded within normal limits to electric pulp testing and remained free of clinical symptoms. Radiographic examination revealed that the alveolar bony defect was completely repaired; however, root development was not evident and the periodontal ligament space appeared lost (Fig 5).

## DISCUSSION

Root length plays a major role in the stability and prognosis of any tooth.<sup>8</sup> Most of the reported cases in the literature on tooth transplantation have failed to demonstrate any appreciable root development.<sup>9,10</sup>

Hertwig's epithelial root sheath is necessary for root development and the dental follicle is needed to form cementum, periodontal ligament and the bone that lines the socket.<sup>11</sup> Although care is taken not to disrupt these tissues during surgical removal of the developing tooth, damage or loss of some of the root sheath and dental follicle must undoubtedly occur. The tooth is then transplanted without these intact embryonic tissues and as a result continued root development and formation of a true gomphosis cannot occur. However, since repair of the alveolar bony defect usually occurs and the transplant erupts into occlusion, some of the cells of the dental follicle must survive.

If removed tooth germs are cultured and then transplanted into heterotopic sites, root development continues with the formation of cementum, periodontal ligament and bone.<sup>12,13</sup> It has recently been shown that if extracted roots are cultured with periodontal ligament cells and then implanted into bone, cementum will form on the roots, with Sharpey's fibres attached to the root and to the newly formed bone.<sup>14</sup> It may well be that in order for root development to continue and a true gomphosis to form, the transplant may initially have to be

cultured so that Hertwig's epithelial root sheath and the dental follicle can be regenerated by the cells surviving surgical removal. Following culture, a regenerated root sheath and dental follicle could then continue with their embryological role upon transplantation.

The transplantation of a developing tooth can provide the clinician with a useful modality of repairing alveolar bony defects which result from periodontal disease. Although pooled results tend to indicate about 73 per cent five-year survival rate for transplanted teeth,<sup>15,16</sup> this period could provide the necessary time for a young patient to adjust to the loss of a tooth and to its prosthetic replacement.

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