Osseointegrated Implant Anchorage in a Growing Adolescent

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Temporary osseointegrated implants provide rigid orthodontic anchorage but may present problems in growing patients. The present case report of an adolescent male illustrates the successful use of a retromolar implant for anchorage to manage an asymmetric malocclusion. Following extraction of an ankylosed mandibular (Md) 1st molar and opposing maxillary (Mx) 1st molar, a retromolar implant was used for mesially translation of Md and Mx 2nd and 3rd molars to achieve a symmetrical Class I occlusion. Conclusions are: (1) the mandible is usually the critical arch for anchorage control relative to partially edentulous, acquired malocclusions, (2) indirect anchorage via retromolar implants is a reliable and versatile means for controlling the anterior limit of the dentition, (3) the anchorage wire extending from a retromolar implant in a growing patient should be positioned immediately beneath the brackets in the buccal segments, and (4) developing Md 3rd molars can be conserved by positioning the retromolar implant buccal and distal to the 3rd molar crypt. (Semin Orthod 2006;12:272-283.)

A series of basic science reports developed the concept of osseointegrated orthodontic implant anchorage.[1-6] In 1990, an osseointegrated retromolar implant was used as indirect anchorage to move 2nd and 3rd molars mesially to close an atrophic 1st molar extraction site.[7] This was the first published report of an osseointegrated implant being used as a temporary anchorage device (TAD). In 1996, palatal implants were introduced for management of malocclusion in the maxillary arch.[8-10] Currently, a broad array of bone plates,[11] miniature osseointegrated implants,[12] and miniscrews are available.[13-16] Nonintegrated miniscrews[17-19] are popular devices that are proving to have numerous advantages and disadvantages.[20-30] From a biomechanical perspective, osseointegrated TADs provide superior anchorage because they are rigid endosseous devices. However, osseointegrated TADs present unique problems in growing patients that are similar to ankylosed teeth.[31-34] The current case report describes the successful use of a retromolar implant for anchorage to manage asymmetric, partially edentulous malocclusion in an adolescent male.

Although nonintegrated TADs may be useful for some malocclusions,[35] they may loosen during treatment,[12,36] move within the bone,[23] or fail altogether as a source of anchorage.[28] In contrast, osseointegration is defined as the direct contact between a dental implant and surrounding bone without an intervening fibrous tissue layer at the interface.[37] If the purpose of implants is to provide absolute anchorage, a rigid bone-implant interface is essential. The reliability of osseointegrated implants approaches 100%.[37,38] In contrast, nonintegrated implants are less reliable as anchorage units and are often associated with soft tissue irritation/infection.[17,19,35,39] However, nonintegrated TADs

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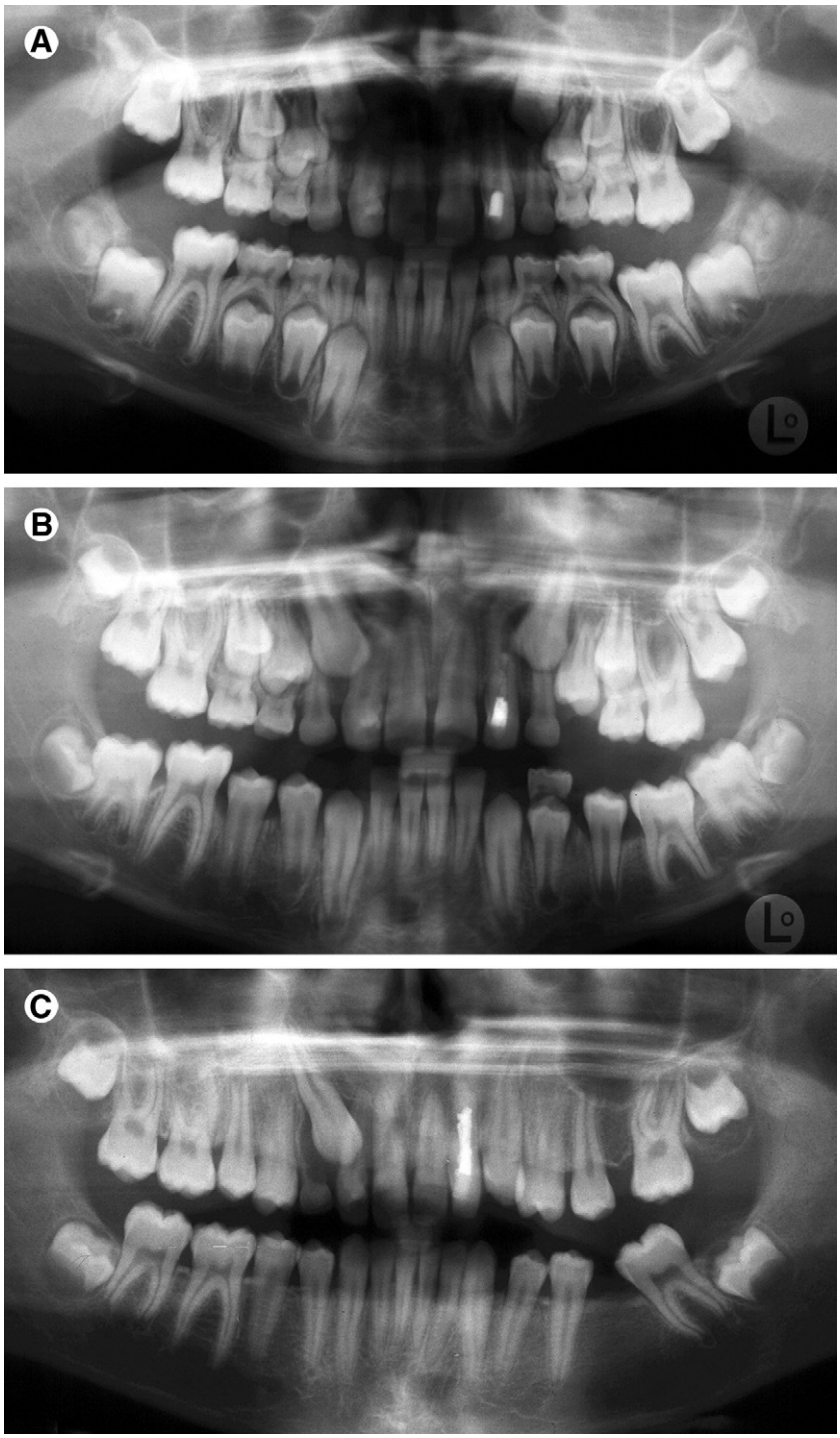

Figure 1. (A) Pretreatment panoramic radiograph; 9-year 10-month-old male. (B) Panoramic radiograph immediately before extraction of the left Mx and Md 1st molars; 10-year 11-month-old. (C) Panoramic radiograph demonstrates manifestation of the developing malocclusion on the left side: mesial tipping of the Md 2nd molar, distal drift of the Md premolars, and mesial drift of the Mx 2nd molar; 13-year 0-month-old.