Titanium screw anchorage for traction of many impacted teeth in a patient with cleidocranial dysplasia

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Introduction: Cleidocranial dysplasia (CCD) is a rare inherited skeletal dysplasia, often with prolonged retention of deciduous teeth and several impacted permanent successors and supernumerary elements.

Methods: This article demonstrates the usefulness of titanium screws for orthodontic anchorage to induce eruption of the impacted teeth in a patient with CCD. A boy, aged 10 years 11 months, had a number of impacted permanent teeth. After the supernumerary teeth were extracted and the incisors were surgically exposed, 2 titanium screws were placed in the palate without incisions or flap surgery. After implantation, a lingual arch appliance was placed, and orthodontic load began 4 weeks after surgery with an elastic chain.

Results: After 4 months of traction, 3 impacted incisors had erupted into the mouth.

Conclusions: This new method for retraction of impacted teeth can reduce the patient’s treatment time and psychological stress. Treatment with titanium screws for traction of impacted teeth might be a new treatment strategy for managing CCD patients. (Am J Orthod Dentofacial Orthop 2007;131:666-9)

Cleidocranial dysplasia (CCD) is a rare inherited form of skeletal dysplasia. The most obvious characteristics of CCD are malformations of the head and the clavicle. In the facial and dental regions, both skeletal and dental abnormalities are observed. Generally, mandibular prognathism due to increased mandibular length and a short cranial base are noted. The maxilla is short vertically but not anteroposteriorly. However, the dental abnormalities are more striking. Some reports described retained deciduous teeth, failed eruption of the permanent successors, and many supernumerary elements in both jaws. One dental treatment strategy is traction of impacted teeth after extraction of supernumerary teeth and prolonged retention of deciduous teeth. However, it is sometimes difficult to place an orthodontic load on impacted teeth in CCD patients; they have few anchorage teeth because of many impactions.

Recently, dental implants, screws, and miniplates have been used to obtain orthodontic anchorage. These materials can provide skeletal anchorage for various tooth movements without requiring active patient compliance. Titanium screws have gradually gained acceptance for skeletal anchorage during various tooth movements, because these devices are convenient compared with dental implants and miniplates. In some reports, screws were used for anchorage in tooth movement, intrusion or retraction of anterior teeth, and protraction of mandibular molars. However, there have been few reports about titanium screws as orthodontic anchorage for impacted teeth.

In this article, we demonstrate the usefulness of titanium screws for orthodontic anchorage to induce eruption of several impacted teeth in a patient with CCD.

CASE PRESENTATION

A boy, aged 10 years 11 months, had a chief complaint of a protrusive chin and impacted permanent teeth. A concave profile due to maxillary hypoplasia was noted. On the panoramic radiograph, prolonged retention of the deciduous teeth and more than 20 impacted supernumerary and permanent teeth were observed in both jaws (Fig 1, A). Therefore, we planned...
Extraction of the supernumerary teeth and traction of the impacted permanent teeth. After placement of a lingual arch appliance in the maxilla, the deciduous incisors showing prolonged retention were extracted. Then, 3 incisors were surgically exposed, and attachments were bonded. Traction was continuously applied for a year; however, the incisors were not exposed in the oral cavity (Fig 2). It was thought that there was insufficient anchorage for simultaneous traction on all 3 incisors.

Consequently, we planned to implant titanium screws for orthodontic anchorage. Two titanium screws (AbsoAnchor, Dentos, Taegu, Korea) (diameter, 1.3 mm; lengths, 10 and 12 mm) were implanted under local anesthesia by an orthodontist. No mucoperiosteal incision or flap was made, but screw holes were made with a 1.0-mm round bur and a twist drill at 500 rpm with continuous normal saline-solution irrigation. The 1.3-mm screws were then placed through the attached gingiva by using a self-tapping method with continuous irrigation.

After placement, the lingual arch appliance was modified and replaced. The archwire went over the head of the titanium screws (Figs 3 and 4). By using an elastic chain, an orthodontic load of 50 g began 4 weeks after surgery. The elastics were changed once a month. After 4 months of traction, 3 impacted incisors were exposed into the mouth (Fig 4). The lingual arch appliance and titanium screws completely opposed the traction force.

DISCUSSION

Dental treatment of adult CCD patients mainly consists of a surgical-prosthetic approach. After extraction of supernumerary teeth or retained deciduous teeth, dental implants or dentures are placed to reconstruct the occlusion. However, a surgical-orthodontic approach is generally planned for adolescent CCD patients. In general, removal of deciduous and supernumerary teeth will improve the possibility of spontaneous eruption. Jensen and Kreiborg reported that most CCD patients with many supernumerary teeth had lower frequencies of spontaneous eruption. However, Jensen and Kreiborg reported that most CCD patients with many supernumerary teeth had lower frequencies of spontaneous eruption. It is difficult to induce eruption on many impacted teeth simultaneously because of few anchorage teeth. Because the duration of treatment in these patients is generally long, Jensen and Kreiborg proposed autotransplantation of impacted teeth to reduce the duration of treatment. To obtain anchorage to retract many impacted teeth, a method that used intermaxillary elastics between the maxillary and mandibular lingual arch appliances was introduced. A method that used a chincap with intermaxillary elastics was also reported. These methods are quite effective for retraction of impacted teeth, but they require extensive patient compliance and have less predictability.

Recently, dental implants, titanium screws, and miniplates have been used to provide ortho-
odontic anchorage. There are 2 approaches to using these materials for skeletal anchorage: direct or indirect. It is simple and useful to load the orthodontic force between the implant and the teeth, but it is sometimes difficult to load the force directly. Roberts et al. placed a dental implant in the retro-molar area and used it for skeletal anchorage during closure of the space left by a missing mandibular first molar. They placed a Brånemark fixture and attached the anchorage wire between the implant and the first premolar. We also used the same mechanics for mesialization of mandibular molars using titanium screws. Furthermore, a palatal implant fixed with a lingual arch appliance to reinforce the orthodontic anchorage is a notable indirect application of skeletal anchorage. We believe that indirect use of skeletal anchorage greatly expands the clinical applications of implant anchorage.

For this patient, it was simple to load the traction force between the screws and the impacted teeth. However, it was impossible to place the screw for direct loading, because of many impacted permanent teeth in the alveolar bone area; screws could only be placed in the palate. In addition, we also considered screw placement in the contralateral jaw and then placing intermaxillary elastics from the screw to the impacted teeth. However, this method also required patient compliance, and there were many impacted teeth in the mandible. Therefore, we chose the indirect method of placing titanium screws in the palate with a lingual arch appliance on them. This method allowed cancellation of the undesirable reciprocal force caused by traction of the impacted teeth and made it possible to retract many impacted teeth simultaneously. Moreover, we placed the screws without incisions or mucogingival flap reflection. This procedure is less invasive and significantly reduces the patient’s pain and discomfort after placement surgery compared with miniplate and dental implant placement.

Fig 3. Intraoral photographs: A, titanium screws implanted in palate; B, after placement of lingual arch appliance on screws.

Fig 4. Intraoral photographs: A, start of traction after implantation; B, 1 month later; C, 2 months later; D, 4 months later.
CONCLUSIONS

This new method of retraction of many impacted teeth can reduce the patient’s treatment time and psychological stress. Treatment with titanium screws for traction of impacted teeth might be a new treatment strategy for CCD patients.

REFERENCES