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CLINICAL REPORT

Reversal of the intrusion of a natural tooth located between two implant-supported crowns: A 7-year follow-up report

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ABSTRACT

In patients with implant-supported restorations, intrusion rarely occurs in nonconnected natural teeth. This clinical report describes the intrusion of a natural tooth located between 2 implant-supported crowns after 4 months of normal function. The second premolar was intruded by 3 mm. The intrusion was completely reversed after interproximal contact adjustments, and the tooth position was stable at the 7-year follow-up. (J Prosthet Dent 2022;127:680-3)

Intrusion has been reported for the natural tooth abutment of tooth-implant connected fixed prostheses, with an incidence rate of up to 5.6%.[1] These intrusions have been reported to be major complications of nonrigid connected fixed dental prostheses. A systematic review has indicated that the incidence of natural tooth intrusion with a nonrigid connection was 8.19%, while that with a rigid connection was 0%.[2] Intrusion of nonconnected natural teeth adjacent to implant prostheses is rare. The authors are aware of only 2 previous reports describing this condition, both with short follow-up times of 3 to 6 months [3,4] The present report describes the 7-year follow-up of a patient with the intrusion of a nonconnected natural tooth between 2 implant-supported crowns.

CLINICAL REPORT

A 61-year-old, partially edentulous man presented to the Department of Prosthodontics, Peking University School and Hospital of Stomatology, for implant-supported restorations. His medical history was unremarkable. A complete mouth examination revealed moderate periodontitis. After treatment, the periodontal condition was stabilized, and an implant (Standard Plus; Institut Straumann AG) was placed at the maxillary right first premolar position and another (Standard; Institut Straumann AG) at the maxillary right first molar position. Fourteen weeks later, 2 implant-supported metal-ceramic crowns (a cemented single crown on the first premolar implant and a screw-retained single crown on the first molar implant) were delivered (Fig. 1). At the 1-week recall, both prostheses appeared to function normally.

At the 4-month recall, an interocclusal space was detected between the right maxillary and mandibular second premolar, both natural teeth. In addition, the root of the right mandibular first premolar had fractured. Clinical examination and radiography indicated an intrusion of the maxillary right second premolar since the implant-supported prostheses had been delivered. A 3-mm interocclusal space was noted (Fig. 2), and the intruded tooth was not abnormally mobile. Dental floss could not pass through the interproximal contact between the premolar and the adjacent implant-supported prostheses, but he voiced no complaints about this intruded tooth.

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Figure 1. Right buccal segment at time of prosthesis placement. A, Buccal view. B, Occlusal view. C, Antagonist teeth. D, Periapical radiograph.

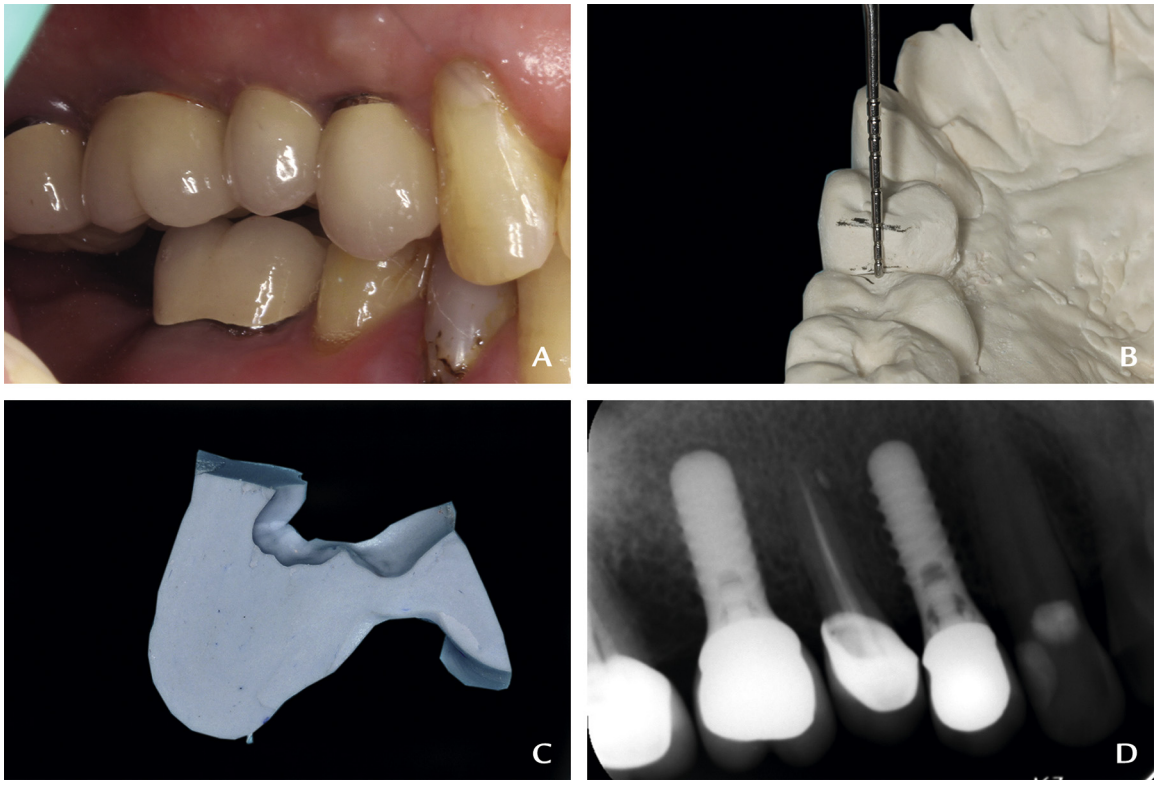

Figure 2. Intrusion of maxillary right second premolar 4 months after prosthesis placement. A, Buccal view. B, 3-mm intrusion indicated on stone cast. C, Cross-section of silicone occlusal registration also shows 3-mm interocclusal space between maxillary right second premolar and mandibular antagonist. D, Periapical radiograph.

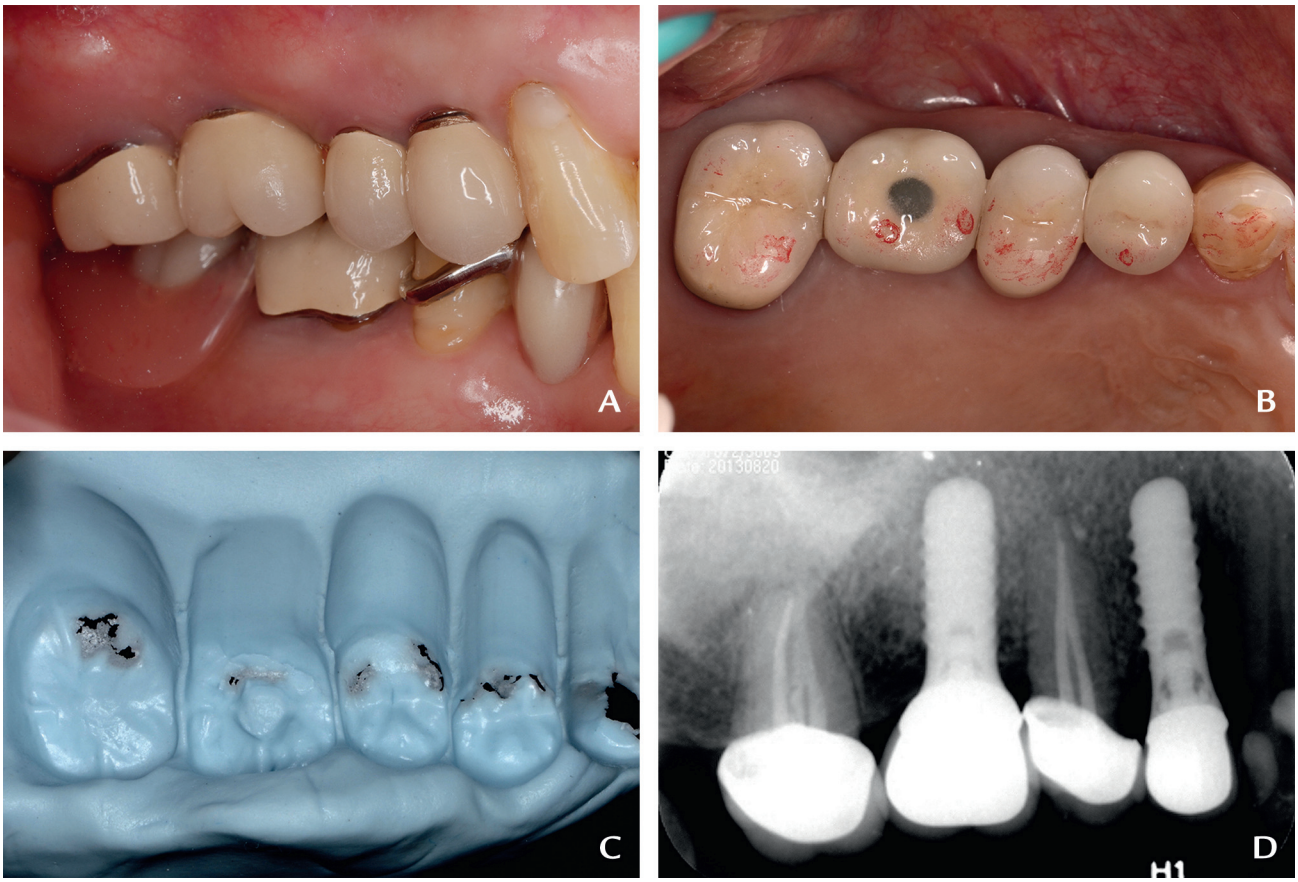

Figure 3. Complete reversal of intruded maxillary right second premolar 6 months after correcting proximal contact. A, Buccal view. B, Occlusal view. C, Silicone occlusal registration. D, Periapical radiograph.

The adjacent implant-supported prostheses were located at the same position as 4 months earlier but had tight proximal contacts with the maxillary second premolar. The periapical radiograph showed intrusion of the tooth compared with the radiograph made at the time of restoration placement. The implant-supported crown in the right maxillary first molar position was unscrewed and removed. The right second premolar exhibited no excessive mobility or signs of periodontal attachment loss.

To allow the natural intruded tooth to rebound, the proximal contacts between the adjacent implant crowns and tooth were adjusted until dental floss could pass through the contact. However, 2 weeks later, the proximal contacts were again tight. Therefore, the proximal surfaces were adjusted again until the interproximal contacts between the intruded premolar and the adjacent implant-supported prostheses had stabilized and were normal. A removable dental prosthesis restored the missing mandibular tooth. Six months after the initial correction, the intrusion began to reverse, and the interocclusal space was closed (Fig. 3). Normal occlusal contact with its antagonist was maintained at the 7-year recall (Fig. 4).

DISCUSSION

Four mechanisms have been proposed to account for the intrusion of natural teeth connected to implants: disuse atrophy, debris impaction, mechanical binding, and impaired rebound memory.[5,6] When the normal function of a tooth is reduced, disuse atrophy of the periodontal ligament may occur. The rebound of the natural tooth after an intrusive occlusal force may be mechanically inhibited, as debris enters the contact between the tooth and restoration. In addition, the mechanical binding of the sidewalls may occur when the adjacent contact plane is different from the long axis of the tooth. The constant pressure placed on the tooth results in the loss of elastic memory of the periodontal ligament, causing the tooth to move to a less traumatic invasive position. Excessive force has also been considered to cause intrusion. An in vitro study reported that the force transmitted and

Figure 4. Normal occlusal contact maintained at 7-year recall. A, Buccal view. B, Silicone occlusal registration. C, Periapical radiograph.

distributed to a natural tooth connected to an implant is strong and intermittent, potentially causing tooth intrusion.[7]

Cordaro et al[8] formulated several theories to explain the etiology of tooth abutment intrusion. These included parafunctional activity, types of attachment, operator experience, status of periodontal support (normal or reduced), and differences in the biomechanical behavior of the bone and periodontal ligament. Studies have shown that all situations of tooth intrusion of abutment teeth occurred in patients with normal periodontal support, while no intrusion occurred in patients with reduced periodontal support.[8] Furthermore, intrusion of the abutment teeth appeared to occur within the initial period after prosthesis loading. Sheets and Earthman 9 have suggested that the cause of intrusion is multifactorial and that intrusion is a reversible process.

In this patient, the intruded tooth was located between 2 implant crowns but was not connected to the implant prosthesis. The tooth with normal periodontal support was intruded by approximately 3 mm. The intrusion was suspected to have been caused by impaired rebound memory and mechanical binding. During the prosthesis delivery, the second premolar was cemented first, followed by the screw-retained first molar. The tight proximal contact may have occurred as the screw was finally tightened, delivering an apically directed resultant force to the adjacent natural tooth. After serial adjustments of the proximal contact and restoration of the missing mandibular teeth for better occlusal force distribution, the intrusion was completely reversed and was stable at the 7-year recall.

To avoid this type of complication, when an implant-supported fixed prosthesis approximates a natural tooth, the contact area should be carefully assessed and adjusted, especially after definitive tightening. Interproximal contacts that do not allow the passage of dental floss may prevent rebounding of the natural tooth and induce intrusion. Proximal contact adjustment can reverse the intrusion, and the position could be stably maintained for years. However, loss of proximal contacts adjacent to implant-supported prostheses have been well documented.[10]

SUMMARY

This report describes the reversal of natural tooth intrusion between 2 implant crowns, after adjustment of the proximal contact of the implant prostheses. The occlusion was stable at the 7-year recall.

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