

- tors, recognition, prevention, and treatment. *J Oral Maxillofac Surg* 63:1567, 2005
5. Ruggiero SL, Fantasia J, Carlson E: Bisphosphonate-related osteonecrosis of the jaws: Background and guidelines for diagnosis, staging and management. *Oral Surg Oral Med Oral Pathol Oral Radio Endod* 102:433, 2006
 6. Gerhards F, Kuffner HD, Wagner W: Pathological fractures of the mandible: A review of the etiology and treatment. *Int J Oral Maxillofac Surg* 27:186, 1998
 7. Ezsias A, Sugar W: Pathological fractures of the mandible: A diagnostic and treatment dilemma. *Br J Oral Maxillofac Surg* 32:303, 1994
 8. Lam DK, Sandor G, Holmes HI: A review of bisphosphonate-associated osteonecrosis of the jaws and its management. *J Can Dent Assoc* 73:417, 2007
 9. Ruggiero SL, Woo SB: Bisphosphonate-related osteonecrosis of the jaws. *Dent Clin North Am* 52:111, 2008
 10. American Association of Oral and Maxillofacial Surgeons. Position paper on bisphosphonate-related osteonecrosis of the jaws. *J Oral Maxillofac Surg* 65:369, 2007
 11. Mark RE, Cillo JE, Ulloa JJ: Oral bisphosphonate-induced osteonecrosis: Risk factors, prediction of risk using serum CTX testing, prevention and treatment. *J Oral Maxillofac Surg* 65:2397, 2007
 12. Curi MM, Cossolin GSI, Koga DH, et al: Treatment of avascular osteonecrosis of the mandible in cancer patients with a history of bisphosphonate therapy by combining bone resection and autologous platelet-rich plasma: Report of 3 cases. *J Oral Maxillofac Surg* 65:349, 2007
 13. Freiberger JJ, Padilla-Burgos R, Chhoeu AH, et al: Hyperbaric oxygen treatment and bisphosphonate-induced osteonecrosis of the jaws: A case series. *Oral Maxillofac Surg* 65:1321, 2007
 14. Abu-Id MH, Warnke PH, Gottschalk J, et al: "Bis-phossy jaws"—High and low risk factors for bisphosphonate-induced osteonecrosis of the jaws. *J Craniomaxillofac Surg* 36:95, 2008
 15. Ellis E III, Price C: Treatment protocol for fractures of the atrophic mandible. *J Oral Maxillofac Surg* 66:421, 2008
 16. Assael LA: Treatment of mandibular angle fractures: Plate and screw fixation. *J Oral Maxillofac Surg* 52:757, 1994
 17. Engroff SL, Kim DD: Treating bisphosphonate osteonecrosis of the jaws: Is there a role for resection and vascularized reconstruction? *J Oral Maxillofac Surg* 65:2374, 2007
 18. Nocini PP, Saia G, Bettini G, Blandamura S, Chiarini L, Bedogni A: Vascularized fibula flap reconstruction of the mandible in bisphosphonate-related osteonecrosis. *Eur J Surg Oncol* 20:1, 2008
 19. Coletti D, Ord RA: Treatment rationale for pathological fractures of the mandible: A series of 44 fractures. *Int J Oral Maxillofac Surg* 37:216, 2008

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Removal of a Maxillary Third Molar Accidentally Displaced Into the Infratemporal Fossa via Intraoral Approach Under Local Anesthesia: Report of a Case

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The surgical removal of impacted maxillary third molars is a procedure routinely carried out by dentists and oral surgeons, and it is usually associated with low rates of complications and morbidity.^{1,2} These

complications frequently include fracture of the tuberosity, tooth root fracture, perforation of the maxillary sinus, prolapse of the buccal fat pad, and displacement of the roots or tooth into the maxillary

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FIGURE 4. Exposure of displaced tooth trapped into fibers of buccinator muscle.

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discussed with the patient and his parents, and they decided that an attempt at surgical removal should be undertaken.

The surgical procedure was performed with the patient under local anesthesia at the Oral and Maxillofacial Surgery Clinic at the School of Dentistry of Ribeirão Preto, University of São Paulo, and consisted of a small incision parallel to the fibers of the buccinator muscle and superficial dissection, taking only 15 minutes. The tooth was found immobilized by the fibers of the buccinator muscle (Fig 4), presenting no difficulties for removal (Fig 5). The postoperative period was uneventful, and the patient recovered his mandibular movements 2 weeks after surgery (Fig 6).

Discussion

Displacement of maxillary third molars into the infratemporal fossa is associated with lack of the basic principles of surgical technique such as poor anatomic knowledge, inadequate flap and decreased visibility during surgical extraction, incorrect extraction technique, distolingual angulated tooth, third molar



FIGURE 5. Displaced left maxillary third molar removed after use of hemostatic clamp.

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FIGURE 6. Patient's mouth opening 2 weeks after retrieval procedure.

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crowns above the level of the adjacent molar root apices, and limited bone distal to the third molar.^{4,7,8}

The exact anatomic location of the displaced tooth is difficult to determine, and this often presents an involved surgical problem.⁶ Maxillary third molars are usually displaced through the periosteum into the infratemporal fossa and located lateral to the lateral pterygoid plate and inferior to the lateral pterygoid muscle.⁴ Furthermore, maxillary teeth that are trapped under the mucoperiosteal flap may be pushed superiorly into the infratemporal fossa during attempts of retrieval.¹

Radiographic examination has been suggested to locate the displaced tooth and usually requires different views such as occlusal, panoramic, occipitomental, and lateral.⁸ Nonetheless, the radiographic examination may lead to an incorrect diagnosis, because anatomic structures at the region of the infratemporal fossa (and generally the maxillofacial region) are superimposed on radiographs.^{5,6} Therefore the cone-beam volumetric tomography scan is recommended because it provides superior imaging of the region, allowing an exact and detailed location of the displaced tooth to be determined, as well as a lower dose of irradiation.

Gulbrandsen et al¹ commented that before they removed a left maxillary third molar from the infratemporal fossa through a hemisoronal approach, the patient underwent 2 attempts at removal of this tooth from the maxillary sinus where it was supposed to be. In addition, during the first attempt, severe hemorrhaging was encountered, necessitating ligation of the internal maxillary artery and transfusion. Oberman et al⁶ attempted to remove a left maxillary third molar from the infratemporal fossa using the panoramic radiograph to determine the tooth's location and an intraoral approach, which involved removing the lat-

eral superior wall of the sinus and part of the zygomatic bone, but the tooth was not reached.

Clinically, a patient with a maxillary third molar displaced into the infratemporal fossa either is asymptomatic or has symptoms of chronic infection, such as swelling and pain, limitation of mandibular motion because of the location of the dislodged tooth between the coronoid process and the posterolateral wall of the maxilla, or trismus due to fibrosis.^{1,4,5} In our case the patient had pain and mechanical impediment to adequate mouth opening, and the cone-beam volumetric tomography scan showed clearly that the displaced tooth was just barely inside the infratemporal fossa, which justified the retrieval surgery.

Access for surgical removal of the tooth from the infratemporal fossa not only is difficult to obtain but has the potential for morbidity because of the structures running through it.⁸ The infratemporal fossa is bounded in front by the posterior surface of the maxilla, behind by the styloid process, above by the infratemporal surface of the greater wing of the sphenoid, medially by the lateral pterygoid plate, and laterally by the ramus of the mandible. It is occupied by the lateral and medial pterygoid muscles, the branches of the mandibular nerve, the otic ganglion, the chorda tympani, the maxillary artery, and the pterygoid venous plexus.⁴

Delaying the retrieval procedure may increase the risk of infection, foreign-body reaction, and patient discomfort.^{1,4,5,7} Winkler et al⁵ reported on a patient in whom swelling, pain, and mouth opening impairment developed 7 years after the displacement of the right maxillary third molar to the infratemporal fossa. The histologic analysis of the tooth showed external resorption of the root and a necrotic pulp. According to some authors, a possibility exists for retained teeth to migrate.^{4,8} Nonetheless, according to others, migration of the tooth is impossible because of fibrosis and anatomic boundaries.¹ Furthermore, the patient is relieved to have the tooth recovered.^{1,4}

Many surgical approaches have been suggested in the literature to recover a maxillary third molar displaced into the infratemporal fossa, such as long incision in the buccal sulcus¹⁻⁸ that can be associated with the hemicoronal approach,¹ Gillies's approach,² Caldwell-Luc approach through the maxillary sinus after removal of the whole posterior wall,⁵ and resection of the coronoid process.⁸ Paoli et al⁹ applied only the coronal approach in a case in which both maxillary third molars were displaced into the infratemporal fossa. The use of image-intensifying cineradiography^{2,8} and the use of an 18-gauge spinal needle introduced at the temporal region deep to the zygomatic arch¹¹ have also been proposed during the retrieval procedure to allow the surgeon to accurately

locate and deliver the tooth without the need for extensive temporal dissection. Some authors prefer to postpone the retrieval surgery for several weeks so that fibrous tissue formation can immobilize the tooth. Exploration before the formation of a fibrous capsule may cause displacement of the tooth deeper toward the base of the skull.^{12,13}

In our case the tooth was displaced not too deeply into the infratemporal fossa; therefore, the intraoral approach was chosen and showed satisfactory results without any additional procedure. If removal of the displaced tooth is indicated and the intraoral approach proves unsatisfactory, the use of Gillies's approach should be applied first, as proposed by Dawson et al,² instead of the hemicoronal approach. The hemicoronal approach allows excellent access with minimum risk of damage to the facial nerve, the subsequent scar is normally hidden within the hairline, and postsurgical pain and edema are minimal,¹ but it involves considerable morbidity.⁶

Unfortunately, an attempt to remove a tooth from the infratemporal fossa could entail serious risk of hemorrhage or neurologic injury and may ultimately fail to deliver the tooth; thus the patient must be advised about the risks.^{1,8}

In conclusion, there is no universal treatment applicable to all maxillary third molars with displacement in the infratemporal fossa, and an oral and maxillofacial surgeon can choose which treatment is most appropriate for each case. The decision should be guided by the precise location of the tooth, the signs and symptoms presented by the patient, the surgeon's knowledge and skill, and the patient's wishes.

References

1. Gulbrandsen SR, Jackson IT, Turlington EG: Recovery of a maxillary third molar from the infratemporal space via a hemicoronal approach. *J Oral Maxillofac Surg* 45:279, 1987
2. Dawson K, MacMillan A, Wiesenfeld D: Removal of a maxillary third molar from the infratemporal fossa by a temporal approach and the aid of image-intensifying cineradiography. *J Oral Maxillofac Surg* 51:1395, 1993
3. Sverzut CE, Trivellato AE, Lopes LM, et al: Accidental displacement of impacted maxillary third molar: A case report. *Braz Dent J* 16:167, 2005
4. Dimitrakopoulos I, Papadaki M: Displacement of a maxillary third molar into the infratemporal fossa: Case report. *Quintessence Int* 38:607, 2007
5. Winkler T, von Wovern N, Odont L, et al: Retrieval of an upper third molar from the infratemporal space. *J Oral Surg* 35:130, 1977
6. Oberman M, Horowitz I, Ramon Y: Accidental displacement of impacted maxillary third molars. *Int J Oral Maxillofac Surg* 15:756, 1986
7. Grandini SA, Barros VM, Salata LA, et al: Complications in exodontia—Accidental dislodgment to adjacent anatomical areas. *Braz Dent J* 3:103, 1993
8. Patel M, Down K: Accidental displacement of impacted maxillary third molars. *Br Dent J* 23:57, 1994

9. Paoli JR, Gence E, Vives P, et al: Removal through the coronal approach of the upper wisdom teeth. Apropos of a case of bilateral migration into the temporal fossa [in French]. *Rev Stomatol Chir Maxillofac* 96:392, 1995
10. Durmus E, Dolanmaz D, Kucukkolbsi H, et al: Accidental displacement of impacted maxillary and mandibular third molars. *Quintessence Int* 35:375, 2004
11. Orr DL II: A technique for recovery of a third molar from the infratemporal fossa: Case report. *J Oral Maxillofac Surg* 57:1459, 1999
12. Shira RB: *Emergencies in Dental Practice—Prevention and Treatment* (ed 2). Philadelphia, PA, Saunders, 1972, pp 318-362
13. Kohn MN, Chase DC, Marciani RD: Surgical misadventures. *Dent Clin North Am* 17:533, 1973

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Horner Syndrome After Temporomandibular Joint Arthroscopy: A New Complication

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A healthy 58-year-old woman had undergone arthroscopy of both temporomandibular joints because of bilateral mandibular clicks and recurrent episodes of jaw block that did not respond to nonsurgical treatment. The preoperative examination showed general restriction of mandibular motility (maximal oral aperture 26 mm, right and left lateral deviation 11 and 8 mm, respectively, protrusion 10 mm, and dental erosion without significant muscular contractures). Magnetic resonance imaging demonstrated bilateral anterior disc displacement with reduction and restricted motility of the right condyle (Fig 1).

Uneventful arthroscopy of both joints was performed under general anesthesia, after conventional nasotracheal intubation. The head was placed in a “donut,” in a natural position, not overextended, with a mild tilt. The double puncture technique was used (first, 4 mL of a mixture of lidocaine and adrenaline was injected into the superior joint space using a 23-gauge needle, followed by continuous perfusion of lactated Ringer’s solution). During the procedure, the

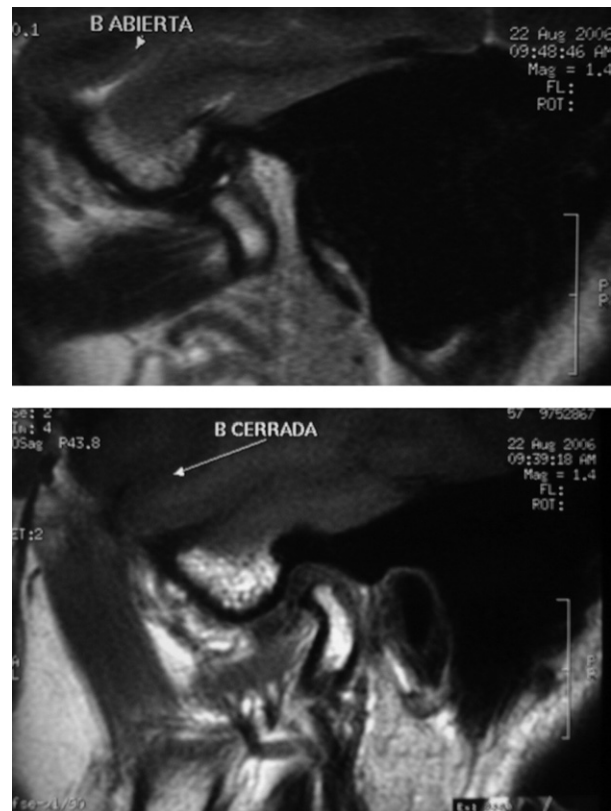


FIGURE 1. Preoperative magnetic resonance image demonstrating anterior disc displacement with reduction and restricted motility of right condyle.

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2.2-mm Dyonics 308 arthroscope and cannulas (Smith and Nephew, Melbourne, Australia) and the McCain instruments were used. Radiofrequency fulguration was applied over a fibrillation area. No change of