Intracerebral Penetration of a Zygomatic Dental Implant and Consequent Therapeutic Dilemmas: Case Report

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This case report describes a unique intracerebral penetration of a zygomatic implant inserted in the pterygoid region. A 47-year-old female patient developed severe persistent headaches immediately after two zygomatic and two standard implants were inserted under general anesthesia. However, no additional treatment or radiologic assessment was performed at that time by the treating surgeon. The maxilla was rehabilitated with an implant-supported fixed denture 3 months after the implants were placed. An episode of acute left maxillary sinusitis occurred shortly after insertion of the fixed denture. Treatment with antibiotics was insufficient, and the patient developed chronic left maxillary sinusitis. The patient presented herself to a neurologist with symptoms of chronic fatigue and severe headaches. Cerebral magnetic resonance imaging demonstrated the intracerebral penetration of a foreign body that resembled a dental implant. The authors sought to resolve the intracerebral penetration of the foreign body, along with the persistent maxillary chronic sinusitis with its concomitant risk of ascending cerebral infection. Computer-assisted preoperative planning associated with computer-assisted three-dimensional transfer should be used to avoid such a dangerous complication. Postoperative computed tomography assessment should be performed after zygomatic implant surgery. Finally, any neurologic impairment of the patient after pterygoid implantation should also be treated immediately. INT J ORAL MAXILLOFAC IMPLANTS 2010;25:416–418

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Speech alterations and problems in maintaining hygiene of the dental prosthesis, apical excess emergence in the infratemporal fossa, buccosinusal fistula secondary to defective surgical closure, and chronic gingivitis have also been described. Severe sinus infection was rarely present, although sinus membrane perforations happen often during this type of surgery. However, the present case report describes a unique intracerebral penetration of a zygomatic implant inserted in the pterygoid region.

CASE REPORT

A 47-year-old female patient presented to the Department of Oral and Maxillofacial Surgery, Cliniques Universitaires Saint Luc, Université Catholique de Louvain. The patient had been referred from the neurological clinic with a complaint of chronic severe headaches. The patient’s medical history at the time of presentation included cholecystectomy and appendectomy. No medications were being used at the time of the consultation.
Two zygomatic implants and two standard implants had been implanted in the maxilla under general anesthesia, in another hospital, 1 year before the present consultation. Severe headaches were reported from the first day of the surgery. However, no additional treatment or radiologic assessment was performed at that time by the surgeon. The maxilla was rehabilitated with an implant-supported fixed denture 3 months after the surgery. An episode of acute left maxillary sinusitis occurred shortly after insertion of the fixed denture. Treatment with antibiotics was insufficient, and the patient developed chronic left maxillary sinusitis. Two additional antral surgeries were then performed without success. Radiologic assessment via a computed tomographic scan confirmed only the presence of the left maxillary sinusitis. The patient presented herself to a neurologist with symptoms of chronic fatigue and severe headaches. Cerebral magnetic resonance imaging demonstrated the intracerebral penetration of a foreign body that resembled a dental implant (Fig 1). The zygomatic implant passed through the left maxillary sinus and the left pterygopalatine fossa between the maxillary branch of the trigeminal nerve and internal jugular vein. The intracerebral penetration was situated in the left temporal fossa, between the foramen rotundum and foramen ovale. Impairment of the cranial nerves was not apparent during the clinical examination. However, purulent exudate and peri-implant inflammation were observed at the distalmost left molar implant.

**DISCUSSION**

The placement of zygomatic implants in the pterygoid region was described as a solution for the severely atrophied maxilla. However, significant errors can be induced by only a slight deviation of the drill path direction at this site. Vrielinck et al described the correct pathway for a pterygoid implant: entrance in the region of the former second molar, following an intrasinusal trajectory in a dorsal and mesiocranial direction, where it should perforate the posterior sinusal wall and the pterygoid plates. Then the implant continues upward between both wings of the pterygoid process, where it finds encroachment in the scaphoid fossa of the sphenoid bone. It should be noted that major care has to be taken to ensure a proper mesiocranial direction. If the implant is placed too far laterally, it will emerge in the infratemporal fossa. If it is placed too far medially, it will end up in the nasopharynx or the sphenoid sinus. If the implant is inclined too far cranially, it will enter the pterygopalatine fossa. For an implant directed too horizontally, no bony structures will be encountered. In the present patient, the pathway of the inserted zygomatic implant on the site of the pterygoid was too cranial and too apical and the implant ended in the temporal fossa.

Computer-assisted approaches were developed to help surgeons in transferring virtual planning of zygomatic and pterygoid implants to the operative sites. Computed tomographic scan–based navigation and stereolithographically fabricated surgical guides have been described and validated. However, even with a computer-assisted drill guide, the average angular deviation between the axes of the planned and the actual pterygoid implant was significant at 10.18 degrees (ranging between 1.7 and 18 degrees). The average distance deviation at the coronal point of the implant was 3.57 mm (range, 0.2 to 7.8 mm), and apically it was 7.77 mm (range, 1.1 to 16.1 mm). The two major problems that needed to be resolved in the present patient were the intracerebral penetration of the foreign body and the persistent maxillary chronic sinusitis. Two approaches were invoked to safely remove the zygomatic implant and prevent the infection from ascending to the temporal fossa. The first treatment option consisted of neurosurgical access through cranial trepanation associated with intraoral removal of the zygomatic implant. This approach allows for intracranial viewing of the implant during its removal. It also enables the neurosurgeon to perform surgery immediately if any neurovascular intracranial complication occurs. The second option proposed was to remove the coronal

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**Fig 1** Coronal MRI (T2) showing the 1-cm intracerebral penetration of the atypical zygomatic implant (white arrows), which contributed to the chronic maxillary sinusitis.
part of the implant after cutting the zygomatic implant as high as possible at the level of the roof of the maxillary sinus, using only an intraoral approach. However, this technique would lead to the loss of the fixed denture. This technique also would have left the apical part of the implant in place, healing the infection but not the symptoms related to the intracerebral penetration (severe and persistent headaches). However, both of these approaches were refused by the patient, who developed depression.

CONCLUSION

Positioning of zygomatic implants at the level of the pterygoid site should proceed very carefully. Computer-assisted preoperative planning, associated with computer-assisted three-dimensional transfer (navigation, surgical guide, or both) should be used. Immediately, postoperative radiologic assessment (computed tomographic scans) should also be performed in all patients. Finally, any neurologic impairment of the patient after surgery should be investigated immediately.

REFERENCES