Removal of Displaced Foreign Body From the Maxillary Sinus Using Replaceable Bony Windows and Saline Irrigation, Followed by Suctioning of the Foreign Body

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A foreign body can be displaced into the maxillary sinus during dental surgery. Dental implants can migrate into the maxillary sinus due to poor bone density and/or poor initial stability in the posterior maxilla. Other foreign bodies, such as tooth roots or metallic objects, can migrate into the sinus due to the doctor's inexperience. Migrated foreign bodies in the sinus can cause significant complications such as inflammatory reactions, sinusitis, and fungal infections, and the dental implant can be displaced into the sphenoidal sinus. To extract displaced foreign bodies from the sinus, the Caldwell-Luc approach or the lateral window approach, combined with endoscopic surgery, antrally or transnasally, have been reported. However, when the Caldwell-Luc or lateral window approach is performed without a sinus graft, the access window may not be replaced by a new bony wall in the lateral wall of the sinus. To remove foreign bodies, the use of endoscopy is definitely effective; but this procedure, which requires specific training and equipment, has some disadvantages. The aim of this report is to present a simple procedure to remove a foreign body using saline irrigation and suctioning of the foreign body from the sinus, and how to maintain the integrity of the lateral wall of the maxillary sinus using a replaceable bony window after the removal of a foreign body from the sinus. Saline irrigation and suction are simple and quick techniques to remove foreign bodies from the sinus. This technique does not require special equipment, including that of endoscopy. (Implant Dent 2011;20:1–000)

Key Words: displaced foreign body, replaceable bony window, sinus graft, ultrasonic piezoelectric bone surgery, platelet-rich fibrin block

Various surgical techniques for the removal of a foreign body from maxillary sinuses have been reported. However, the access window in the lateral wall of the maxillary sinus cavity is not replaced by a bony wall when sinus grafting is not performed. The replaceable bony window provides an access window into the sinus cavity and maintains the integrity of the lateral wall of the sinus cavity after the removal of a foreign body from the sinus.

CASE REPORT 1

A 27-year-old man was referred, by his family dentist, to the Department of Oral and Maxillofacial Surgery, Catholic Medical Center of Daegu, for the removal of a tooth root that intruded into the maxillary sinus. The root was displaced by improper manipulation of an elevator during the extraction of a severely decayed right maxillary second premolar. Radiographic examination showed the displaced tooth root in the sinus (Fig. 1). The patient did not complain of any problems associated with the sinus. The patient was scheduled to have the intruded root removed using a replaceable bony window. A sinus graft was not planned. Prophylactic Flomoxef sodium (Flumarin; Ildong Pharmaceutical Co., Korea, 500 mg iv) was administered 1 hour before surgery on April 5, 2007. After the administration of a local anesthetic solution (2% lidocaine with 1:100,000 epinephrine), a vestibular incision was made, and the mucoperiosteal flap was elevated to expose the lateral wall of the maxillary sinus.
anterior vertical osteotomy was made 3 mm above the sinus floor and the to make the replaceable bony window. Silfradent srl, Sofia, Italy), was used sonic piezoelectric device (Surgybone, Daegu, Korea), connected to an ultrasonic saw insert (S-Saw, Bukboo Dental Co., Seoul, Korea) 500 mg three times per day was used for 7 days and the sutures Cefditoren pivoxil (Meiact; Boryung Pharm., Seoul, Korea) to achieve passive primary closure. Postoperative grafting (Fig. 8). The bony portion of the window was replaced and the flaps were sutured using PTFE suture (Fig. 9). Implants were uncovered, at a private practice, after 6 months of healing and all implants were stable. Cone beam CT scans revealed bone formation at sites 3 and 4 in the sinuses (Fig. 10).

**DISCUSSION**

The displacement of a foreign body into sinuses is a common complication. Displaced foreign bodies can cause serious complications if not removed from the sinus. Various surgical methods for the retrieval of foreign bodies have been reported. The Caldwell-Luc approach, the lateral window approach, or endoscopic transantral/transnasal surgery are commonly used procedures for the retrieval of foreign bodies. The Caldwell-Luc approach has some disadvantages such as postoperative numbness, paresthesia, facial asymmetry, and dental problems. The lateral window approach provides better direct vision to verify the foreign body in the sinus than an approach through the alveolar socket, and sinus bone grafting could be followed after the removal of the foreign body from the sinus. However, the lateral window or Caldwell-Luc approach for the retrieval of a foreign body violates the integrity of the lateral wall of the sinus and the access window may not be replaced by a bony wall if the sinus bone graft is not performed at the same time (as shown after the classic Caldwell-Luc operation). In addition, a sinus graft is not indicated in all patients after the removal of a foreign body from the sinus. Sinus grafting is
contraindicated when the patients have a history of sinus-related pathology or severely perforated sinus membranes. In addition, except for displaced dental implants into the sinus, a bone graft is not required in most patients after the removal of a foreign body from the sinus. The replaceable bony window maintains the integrity of the lateral wall of the sinus after the removal of the foreign body. A piezoelectric saw insert-assisted osteotomy has some advantages such as speed, precision, and minimal bone loss.16–18 The lateral bony window made by the piezoelectric saw insert with a thin blade is precisely repositioned, whether bone grafting in the sinus was performed, because of the tilted osteotomy into the sinus and the minimal bone loss during osteotomy.19,20 The replaceable bony window acts as a homologous barrier over the bone graft in the sinus. Replaceable bony windows not only prevent soft tissue invasion into the grafted site as a barrier but also act as osteoinductive/osteconductive substrates for new bone formation in the sinus and new bony wall in the lateral wall of the sinus.19,20 Previous studies reported the potency for new bone formation with replaceable bony windows in the maxillary sinus without bone grafts in humans.19,21 Histological evidence to confirm new bone formation, in human sinuses, with replaceable windows and no bone grafts for sinus augmentation has been previously reported.19 As an alternative to bone grafting for sinus augmentation, patient’s blood, gelatin sponges, platelet-rich plasma, and platelet-rich fibrin blocks with concentrated growth factors grafted in the new compartment under the elevated sinus membrane has shown successful new bone formation in the sinus.22–26 Endoscopic surgery is less invasive than the Caldwell-Luc approach and effectively verifies the presence of a foreign body in the sinus.7,10,11 However, endoscopic surgery is limited to a specialist with special training, and requires special equipment.11 Saline irrigation through a small incision site of sinus mucosa into the sinus cavity mobilizes displaced foreign bodies in the sinus, and a surgical suction apparatus aspirates the saline and foreign body at the same time. This technique is a simple and quick method to retrieve a foreign body out of the sinus, and does not require special instruments, as endoscopy does.

**CONCLUSION**

Replaceable bony window regenerates new bony walls at the site of access windows, without additional sinus bone grafting, and maintains the integrity of the lateral wall of the maxillary after the removal of the foreign body.
body from the sinus. Saline irrigation into the sinus cavity and simultaneous suctioning of the foreign body, which does not require special equipment, is a less invasive and simpler method than endoscopy.

Disclosure

The authors claim to have no financial interest in any company or any of the products mentioned in this article.

REFERENCES

Remocão de corpo estranho deslocado da cavidade maxilar e a succão são técnicas simples e rápidas para remover corpos ultrassônicos do osso, bloco de fibrina rica em plaquetas. O enxerto da cavidade não é realizado. A janela óssea é substituída por uma parede óssea quando o seguidas por succão do corpo estranho.

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Extracción de un cuerpo extraño desplazado en el seno del maxilar usando ventanas óseas reemplazables e irrigación salina, seguido por la aspiración del cuerpo extraño

ABSTRACT: Se han reconocido varias técnicas quirúrgicas para la eliminación de un cuerpo extraño de los senos maxilares. Sin embargo, la ventana de acceso en la pared lateral de la cavidad del seno maxilar no se reemplaza con una pared ósea cuando no se realiza el injerto del seno. La ventana ósea reemplazable ofrece una ventana de acceso a la cavidad del seno y mantiene la integridad de la pared lateral de la cavidad del seno luego de la extracción del cuerpo extraño del seno. La irrigación salina y aspiración son técnicas rápidas y simples para eliminar cuerpos extraños del seno. Esta técnica no requiere equipos especiales, incluso los de endoscopia.

PALABRAS CLAVES: Cuerpo extraño desplazado, ventana ósea reemplazable, injerto del seno, cirugía ósea con ultrasonido piezoeeléctrico, bloque de fibrina rica en plaquetas

Remoção de corpo estranho deslocado da cavidade maxilar usando-se janelas ósseas substituíveis e irrigação salina, seguidas por sucção do corpo estranho

RESUMO: Diversas técnicas cirúrgicas para a remoção de um corpo estranho das cavidades maxilares foram relatadas. Contudo, a janela de acesso na parede lateral da cavidade maxilar não é substituída por uma parede ósea quando o enxertamento da cavidade não é realizado. A janela óssea substitutível fornece uma janela de acesso à cavidade e mantém a integridade da parede lateral da cavidade após a remoção de um corpo estranho da cavidade. A irrigação salina e a sucção são técnicas simples e rápidas para remover corpos estranhos da cavidade. Essa técnica não exige equipamento especial, incluindo o da endoscopia.

PALAVRAS-CHAVE: corpo estranho deslocado, janela óssea substitutível, enxerto da cavidade, cirurgia piezoeeléctrica ultrassônica do osso, bloco de fibrina rica em plaquetas

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REMOVAL OF DISPLACED FOREIGN BODY FROM THE MAXILLARY SINUS • SOHN ET AL

JAPANESE / 日本語
骨窩置換処置と生食注水法に続く異物吸引摘出処置で、上顎洞に迷入した異物除去

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研究概要:
上顎洞から異物を除去するためのさまざまな外科技術が報告されている。ただし、上顎洞底粘膜上術を施行しない場合に、上顎洞窩洞壁のアクセス骨窩は骨壁で置換されない。骨窩置換処置は上顎洞窩へのアクセス窩を提供し、さらに上顎洞窩から異物を除去した後にも上顎洞窩洞壁の完全性を維持する。生食注水法が異物除去法である上顎洞窩から異物を除去するためには簡単でしかも迅速な外科技術、内視鏡等の特殊装置も必要である。

キーワード：異物除去、骨窩置換処置、上顎洞底粘膜上術、超音波ビエゾエレクトリック骨外科処置、多血小板フィブリンブロック

CHINESE / 中国語
使用可置換骨窗和生理盐水冲洗，然后进行抽吸，从上颌窦取出异物

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摘要：
目前多种方法用于从上颌窦取出异物的外科手术技巧。这类方法在上颌窦对外界侵入的窗口，可置换骨窗提供进入窦腔的窗口，同时在从窦取出异物之后维持窦腔侧壁的完整性。生理盐水冲洗和抽吸是快速从窦取出异物的简便方法。这项方法不需要使用包括内镜等特殊仪器。

關鍵字：位移異物、可置換骨窗、異物移出、超音波波電骨外科手術、富血小板血漿纖維蛋白塊

KOREAN / 한국어
대체가능 골창 및 식염수 관류 후 이물질 흡인을 이용한 상악동 전위 이물질 제거

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요약:
상악동 이물질 제거를 위한 다양한 수술기법이 보고되어왔다. 그러나 상악동 측벽 접근 방법 상악동 이식이 시행되지 않는 경우 림벽에 의해 대체되지 않는다. 대체가능 골창으로 상악동 내 접근창이 제공되며, 상악동으로부터 이물질 제거 후 상악동 측벽 완전성 유지가 가능해진다. 식염수 관류 및 흡인은 상악동으로부터 이물질을 제거하는 간단하고 신속한 방법이다. 이러한 기술은 내시경을 포함한 특별한 장비를 필요로 하지 않는다.

키워드：전위 이물질, 대체가능 골창, 상악동 이식, 초음파 압전 골수술, 혈소판 풍부 섬유소 치단
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