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ORIGINAL ARTICLE

Digital design of functional surgery for odontogenic cyst intruding into maxillary sinus☆

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KEYWORDS
Maxillary sinus;
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Abstract
Introduction: Traditional Caldwell-Luc approach needs modifications for odontogenic cysts intruding into the maxillary sinus, to preserve sinus mucosa and bony contour. Recently, digital technology has been widely applied to the field of maxillofacial surgery, guiding the surgical plan and improving its accuracy.
Objective: This study attempted to present and evaluate the functional surgery of odontogenic cysts intruding into the maxillary sinus using a computer-assisted pre-surgical design.
Methods: Consecutive patients with odontogenic cysts intruding into the posterior part of the maxillary sinus were enrolled. Method I ''Bony wall reimplantation method'' was performed for large lesions exceeding the zygomatic alveolar crest but without apparent bone destruction of the anterior wall of the sinus, while Method II ''bone removal method'' was more convenient for small lesions near to the zygomatic alveolar crest. The gap was filled with a pedicled Buccal Fat Pad (BFP) after lesion removal and all cases were without inferior meatal antrostomy.
Results: A total of 45 cases were included in the study. 22 were operated using method I while 23 were operated with method II. Operations were completed in 20 min. Pain disappeared in 3.62 days on average, and swelling 6.47 days. Nasal bleeding occurred in 8 patients lasting 1–3 days. Suppurative inflammation was observed in 1 patient, and infection occurred after bone reposition. Other repositioned free bony wall was without resorption in CT images.
Conclusions: Sinus mucosa and bony wall should be conserved. Preoperative digital design can guide osteotomy effectively during the surgery. Bone reposition is not suitable for suppurative inflammation. The pedicled BFP is enough for drainage and inferior meatal antrostomy is not necessary.

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PALAVRAS-CHAVE
Seio maxilar;
Membrana sinusal;
Placa óssea;
Retalhos cirúrgicos

Desenho digital de cirurgia funcional para cisto odontogênico intrusivo em seio maxilar

Resumo
Introdução: A abordagem tradicional de Caldwell-Luc precisa de modificações para os cistos odontogênicos que se introduzem no seio maxilar, para preservar a mucosa sinusal e contorno ósseo. Recentemente, a tecnologia digital tem sido amplamente aplicada ao campo da cirurgia maxilofacial, orientando o plano cirúrgico e melhorando sua precisão.
Objetivo: Esse estudo teve como objetivo apresentar e avaliar a cirurgia funcional de cistos odontogênicos intrusivos no seio maxilar utilizando um desenho pré-cirúrgico assistido por computador.
Métodos: Foram recrutados pacientes consecutivos com cistos odontogênicos intrusivos na parte posterior do seio maxilar. O Método I, ''método de reimplante de parede óssea'', foi realizado em lesões grandes que excediam a crista zigomático-alveolar, mas sem destruição óssea aparente da parede anterior do seio, enquanto o método II, ''método de remoção óssea'' foi mais conveniente para pequenas lesões próximas à crista zigomático-alveolar. O espaço foi preenchido com um retalho pediculado do corpo adiposo bucal (CAB) após a remoção da lesão e todos os casos foram realizados sem antrostomia meatal inferior.
Resultados: Um total de 45 casos foram incluídos no estudo. Vinte e dois foram submetidos à cirurgia utilizando-se o método I, enquanto que 23 foram submetidos ao método II. As operações foram concluídas em 20 minutos. A dor desapareceu em média após 3,62 dias, e o edema, depois de 6,47 dias. Hemorragia nasal ocorreu em 8 pacientes com duração de 1 a 3 dias. A inflamação supurativa foi observada em 1 paciente e a infecção ocorreu após a reposição óssea. Outros retalhos reposicionados livres da parede óssea não mostraram reabsorção em imagens de TC.
Conclusões: A mucosa sinusal e a parede óssea devem ser preservadas; o desenho digital pré-operatório pode orientar a osteotomia de forma eficaz durante a cirurgia; a reposição óssea não é adequada para inflamação supurativa. O retalho pediculado de CAB é suficiente para a drenagem e antrostomia meatal inferior não é necessária.

Introduction

Maxillary sinus is vulnerable to be invaded by odontogenic cystic lesions owing to the anatomical relation to the upper alveolar bone.[1,2] These lesions usually intrude into the sinus through the inferior and posterior walls. Management of the maxillary sinus diseases is generally via Caldwell-Luc operation or functional endoscopic surgery.

However, cysts that are close to the osteomeatal complex can be removed endoscopically, while those lesions lying laterally or posteriorly are more easily removed by Caldwell-Luc approach, which provides a direct visualization and convenient manipulation. Medial and anterior parts of the sinus and the alveolar recess are difficult to access endoscopically, therefore, a complete enucleation may not be assured through an endonasal approach alone.[3] In addition, odontogenic cysts often require teeth extraction which may be performed only through an oral approach.[2] Consequently, Caldwell-Luc operation is superior to the endoscopic procedure in cases of odontogenic cysts intruding into the anterolateral or posterior part of the maxillary sinus.

The standard Caldwell-Luc procedure facilitates an access to the maxillary sinus through the canine fossa, which provides an optimal visualization of the anterior or inferior sinus walls, but for the posterolateral wall, it is a little difficult to operate under direct view, leaving some remnants of the cyst wall and a high recurrence rate. Furthermore, a radical removal of the sinus membrane and a permanent bone defect at the anterior sinus wall might cause a considerable blood loss and prolonged operation time during the surgery, meanwhile, higher complication rates including lingering pain and swelling, facial or dental paraesthesia, facial deformity and chronic maxillary sinusitis.[4] Several modifications have been reported in literatures, including bony wall reimplantation, sinus membrane preservation or without an inferior meatal antrostomy.[4,5]

Recently, digital technology has been widely applied to the field of maxillofacial surgery, guiding the surgical plan and improving its accuracy.[6,7] The purpose of the current study was to refine our experience and address our philosophy on the conservative treatment of cystic lesions intruding into the posterior part of the maxillary sinus with computer-assisted techniques, and to assess the intraoperative effectiveness and postoperative outcomes.

Methods

Study design

All procedures performed in studies were in accordance with the ethical standards of our hospital (N° 2016-57-T14) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study