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ORIGINAL ARTICLE

Osteitis and mucosal inflammation in a rabbit model of sinusitis ☆,☆☆



Carlos Augusto Correia de Campos^{a,b,*}, Eduardo Landini Lutaif Dolci^{a,b},
Leonardo da Silva^{a,b}, José Eduardo Lutaif Dolci^{a,b},
Carlos Alberto Herrerias de Campos^b, Ricardo Landini Lutaif Dolci^{a,b}

^a Faculdade de Ciências Médicas, Santa Casa de São Paulo, São Paulo, SP, Brazil

^b Department of Otorhinolaryngology, Santa Casa de São Paulo, São Paulo, SP, Brazil

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KEYWORDS

Sinusitis;
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Abstract

Introduction: Several experimental studies have shown osteitis after the onset of sinusitis, supporting the idea that bone involvement could participate in the dissemination and perpetuation of this inflammatory disease. However, procedures commonly performed for the induction of sinusitis, such as antrostomies, can trigger sinusitis by themselves.

Objective: To evaluate osteitis in an animal model of sinusitis that does not violate the sinus directly and verify whether this is limited to the induction side, or if it affects the contralateral side.

Methods: Experimental study in which sinusitis was produced by inserting an obstructing sponge into the nasal cavity of 20 rabbits. After defined intervals, the animals were euthanized and maxillary sinus samples were removed for semi-quantitative histological analysis of mucosa and bone.

Results: Signs of bone and mucosal inflammation were observed, affecting both the induction and contralateral sides. Statistical analysis showed correlation between the intensity of osteitis on both sides, but not between mucosal and bone inflammation on the same side, supporting the theory that inflammation can spread through bone structures, regardless of mucosal inflammation.

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☆☆ Institution: Department of Otorhinolaryngology, Santa Casa de São Paulo, São Paulo, SP, Brazil.

* Corresponding author.

E-mail: guto-campos@uol.com.br (C.A.C. de Campos).

PALAVRAS-CHAVE

Sinusite;
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Conclusion: This study demonstrated that in an animal model of sinusitis that does not disturb the sinus directly osteitis occurs in the affected sinus and that it also affects the contralateral side.

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Osteíte e inflamação mucosa em um modelo experimental de rinossinusite**Resumo**

Introdução: Diversos estudos experimentais evidenciam osteíte após estabelecimento de sinusite, corroborando para a ideia de que o envolvimento ósseo poderia participar na disseminação e perpetuação do processo inflamatório. Porém procedimentos realizados para indução da doença nestes modelos, como antrostomias, podem, por si só, desencadear osteíte.

Objetivo: Avaliar osteíte em um modelo de rinossinusite em que não ocorre manipulação sinusal e verificar se esta é limitada ao lado de indução, ou se acomete o lado contralateral.

Método: Estudo experimental em que induziu-se rinossinusite em 20 coelhos, por meio de obliteração temporária com esponja de uma das cavidades nasais. Amostras de tecido sinusal foram submetidas à análise histológica semiquantitativa, após sacrifício dos animais em intervalos regulares.

Resultados: Foram observados sinais de inflamação óssea e mucosa mais intensa no lado de indução, mas também contralateral. Testes estatísticos evidenciaram correlação entre a osteíte de ambos os lados, porém não entre inflamação óssea e mucosa de um mesmo lado, apoiando a teoria de que a inflamação poderia se disseminar através do tecido ósseo, independente da inflamação mucosa.

Conclusão: O presente estudo evidenciou a existência de osteíte, tanto no lado de indução quanto no contralateral, em modelo experimental em que não ocorre manipulação sinusal.

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Introduction

Several factors may contribute to the onset and persistence of sinonasal inflammation, leading to chronic rhinosinusitis (CRS). These range from alterations related to the host, such as immunodeficiencies and mucociliary disease, to characteristics associated with etiological agents, such as the capacity to form biofilms and bacterial superantigens.¹

Among these, the involvement of the paranasal bones in CRS development and maintenance has been investigated. The close contact between bone and mucosa in this region and radiological findings in patients with CRS suggest the involvement of this tissue.²⁻⁴

Several studies have disclosed the presence of sinus bone inflammation in patients with CRS, usually using tomographic assessment or histological analysis.^{2,5,6} This incidence varies from 36% to 100%,^{4,7,8} depending on the method chosen for patient inclusion and the form of assessment. Apparently, the incidence is greater when histological evaluation is performed, showing that, depending on the intensity of osteitis, there may not be evidence of inflammation on tomographic assessment.^{8,9}

In this sense, Lee et al. prospectively evaluated 121 patients with CRS treated surgically. Based on tomography, they observed signs of osteitis affecting 36% of patients (82% ethmoid, 64% sphenoid, 45% maxillary, without evaluation of the frontal sinus) but observed histological signs

in 53%.⁴ Other studies showed that tomographic signs of osteitis are associated with greater disease intensity in anatomopathological examinations^{7,9} and worse outcome in surgical treatments.⁶

The most commonly reported signs indicative of osteitis in patients with CRS are periosteal thickening, osteoblast proliferation, bone resorption and new bone formation, and inflammatory cell infiltration.^{2,4,5,7-9}

Although these studies have provided evidence of the existence of bone inflammation in cases of CRS and some clinical implications, others have pointed out that osteitis does not occur in all patients. Also, they have indicated that it greatly increases if the patient has been previously submitted to surgery (from 6.7% to 58%), which may suggest the importance of other factors for its onset, such as surgical trauma.⁴ Another important fact is that we found no clinical studies that evaluated the presence of bone inflammation in acute episodes of rhinosinusitis. That is because acute rhinosinusitis (ARS) is usually treated non-surgically, making it difficult to collect samples for histological analysis. Determining whether osteitis is present at the early stages or if it arises only with the persistence of sinonasal inflammation would aid to further understand its role.

For this purpose, experimental animal models are used, usually rabbit models, in which bone and mucosal inflammation are assessed, and other factors commonly associated

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