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Clinical case

Genetic susceptibility to maxillary sinus pathology development in the presence of an odontogenic cyst

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ABSTRACT

Clinically it appears that some patients with etiological factors (dental pathology in the maxillary sinus) exhibit sinus disease and others do not. The aim of this paper is to present the case of a female patient, with a periapical lesion, with symptoms of sinus pathology and the possibility of genetic influence on exacerbated response in the presence of the maxillary sinus pathology of dental origin, through genetic sequencing of IRAK4 gene.

The surgical procedure was performed under general anaesthesia. The cyst was enucleated, the dental roots were extracted, a curettage and an irrigation with physiologic saline 0.9% were performed.

This work opens new perspectives for research on the role of a specific polymorphism in the IRAK4 gene in the host response. Thus, it may provide valuable data for understanding the phenomena that underlie the recurrence of maxillary sinus pathology and also advance knowledge to improve therapeutic decisions.

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Suscetibilidade genética para desenvolver patologia do seio maxilar na presença de um cisto odontogénico

Palavras-chave:
Cisto odontogénico
Sinusite maxilar
Proteína humana IRAK4
Resposta do hospedeiro
Polimorfismo genético
Predisposição genética

RESUMO

Clinicamente parece que alguns pacientes com fatores etiológicos de origem dentária apresentam patologia sinusal e outros pacientes não. O objetivo deste trabalho é apresentar um caso de uma paciente do sexo feminino, com lesão periapical e sintomas de sinusite, e a possibilidade de influência genética sobre a resposta exacerbada na presença de patologia do seio maxilar de origem dentária, através da sequenciação do gene IRAK4.

O procedimento cirúrgico foi realizado sob anestesia geral. O cisto foi enucleado, as raízes dentárias foram extraídas, foi realizada curetagem e irrigação do seio maxilar com soro fisiológico 0,9%.

Este trabalho abre novas perspectivas sobre o papel de um polimorfismo específico no gene IRAK4 na resposta do hospedeiro. Assim, pode fornecer dados valiosos para a compreensão dos fenómenos que estão na base da recorrência da patologia do seio maxilar e também promover o avanço no conhecimento nas decisões terapêuticas.

Introduction

The odontogenic maxillary sinusitis comprises a sinus mucosa inflammation. Dental pathology is considered to be the etiologic factor in 10% to 12% of the maxillary sinusitis cases.[1]

The paranasal sinuses mucosa exhibits specific features: it is much thinner and composed by ciliated and nonciliated pseudostratified columnar epithelium.[2] The cilia act in mass, producing co-ordinated sequential beating and thus, creating a wave-like motion, generally in the direction of the ostium. Obstruction of the ostium may cause decreased ciliary activity, promoting the bacterial growth.[3,4] The mentioned reasons for the anaerobic bacteria multiplication include: reduced blood supply to the sinus mucosa, decreased amount of oxygen in the maxillary sinus, decreased ciliary activity and low pH.[5]

The displacement of bacteria from infected periapical tissue often results in acute or chronic sinusitis. The infected periapical tissue can originate from apical periodontitis, periodontal diseases, implant therapy, tooth extraction, foreign bodies and odontogenic cysts.[6]

The possible radiographic changes present in a sinusitis include: thickened sinus mucosal membrane, an air-fluid level or complete opacification.[7] Therefore, to get a correct odontogenic maxillary sinusitis diagnosis a detailed medical history is required; a complete physical examination and specific imaging probes are also required.[5]

Some authors believe that there is a considerable interindividual variability in the degree of activation of the innate immunity and inflammatory responses to infection.[8–10] Some of these authors, particularly in recent studies, have related some genetic variations in the Interleukin-1 receptor-associated kinase-4 (*IRAK4*) gene with the rhinitis susceptibility and with the prevalence of Gram-positive infections in critically ill adults.[9,10]

IRAK4 is a serine-threonine kinase that was considered to be a key player in the signalling of the MyD88-depending pathway of the Toll-like/IL-1-receptor (TIR) and in other Toll-like receptor (TLR) signalling, except for the TLR320.[11] The study of Sutherland et al. suggested that the *IRAK4* haplotype clade marked by 29429A (428Thr) alters the susceptibility to Gram-positive bacteria infections, by decreasing cellular response to TLR ligands.[9]

The authors intend to present a case of an infected root accompanied by an odontogenic cyst, with connection with the maxillary sinus, present in a 35-year-old patient. The main purpose of this paper is to explain the possibility of a genetic influence on the exacerbated response present in this case concomitant with odontogenic maxillary sinus pathology, through *IRAK4* gene sequencing.

Case report

A 35-year-old woman presented complaints of left and right facial swelling at a general medicine query. She was diagnosed with an "acute bilateral maxillary sinusitis and left ethmoid sinusitis", for which a 10-day course of cefprozil (250 mg twice a day) was prescribed. After this period, the patient still mentioned the presence of symptoms: headache, several episodes of facial brownish and foul-tasting fluid (draining from her left naris and mouth). In the presence of such symptoms, a treatment for allergic rhinitis and sinusitis was adopted that consisted of administering oral antihistamine, oral antibiotic (Amoxicillin/clavulanic acid – 875/125 mg) and intranasal steroid. Due to the persistence of symptoms and because of the occurrence of an odontogenic pain, the patient attended a dental appointment. She had left facial swelling, which was painless and firm, with no fluctuation or discoloration of the overlying skin, apparently with no warmth and with a bony consistence.

The intra-oral exam revealed the presence of root fragments, corresponding to the first and the second maxillary pre-molars, of the right (teeth 14 and 15) and left (teeth 24 and 25) side (Fig. 1).