

Primary cilia in odontogenic cysts: A Scanning Electron Microscopic (SEM) study

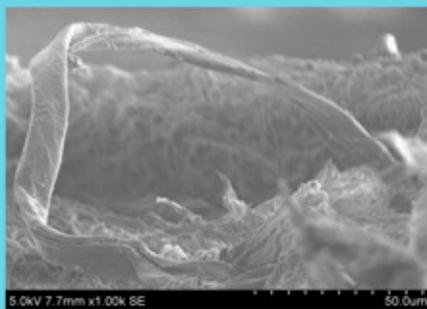
Introduction:

Primary cilia are solitary organelles projecting from the surface of cells. These cilia usually lack the central pair of microtubules needed to generate motile force and are thus described as having a 9-0 pattern. Primary ciliary proteins have been found associated with carcinoma, cystic lesion in kidney, pancreas & liver and recently in dentigerous cyst. Primary cilia have also been shown to play a critical role in Sonic Hedgehog (Shh) signalling and Ptch activity. Odontogenic cysts arise from tooth forming residues. Ptch gene inactivation and role of Shh signalling have been associated with odontogenic cysts (dentigerous cyst and OKC). Based on the presentation of a dentigerous cyst in an autosomal dominant polycystic kidney patient and the demonstration of primary cilia like structures on the cyst wall by using a SEM, a new hypothesis for the pathogenesis of dentigerous cyst is proposed recently. This study is performed to test the above said hypothesis & to check whether this hypothesis can be applied to other odontogenic cysts like OKC and periapical cysts.

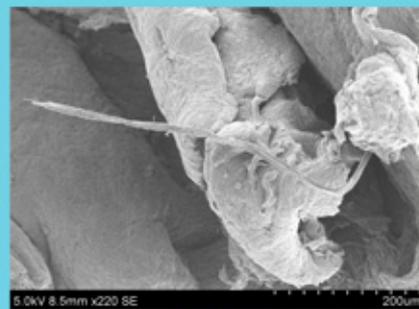
Aim: To demonstrate primary cilia on the epithelial lining of odontogenic cysts (Dentigerous cyst, OKC and periapical cysts) using SEM.

Materials and methods: An analytical study, done in an institutional setting. It was a scanning electron microscopic study. A total of 15 glutaraldehyde fixed specimens collected from the institute were used for SEM study. 5 OKC, 5 dentigerous cysts and 5 periapical cyst. The specimen were processed for SEM and scanning electron microscopic study of the cyst lining was done in NIT.

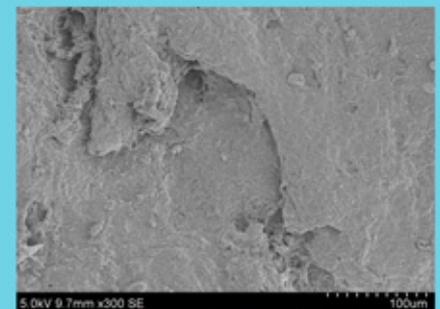
Results: The presence or absence of primary cilia on the epithelial lining of odontogenic cysts was detected with the help of SEM by 2 observers. It was found that primary cilia were present in the epithelial lining of all the cases of OKC and dentigerous cyst but not in any of the case of PA cyst.



Dentigerous cyst

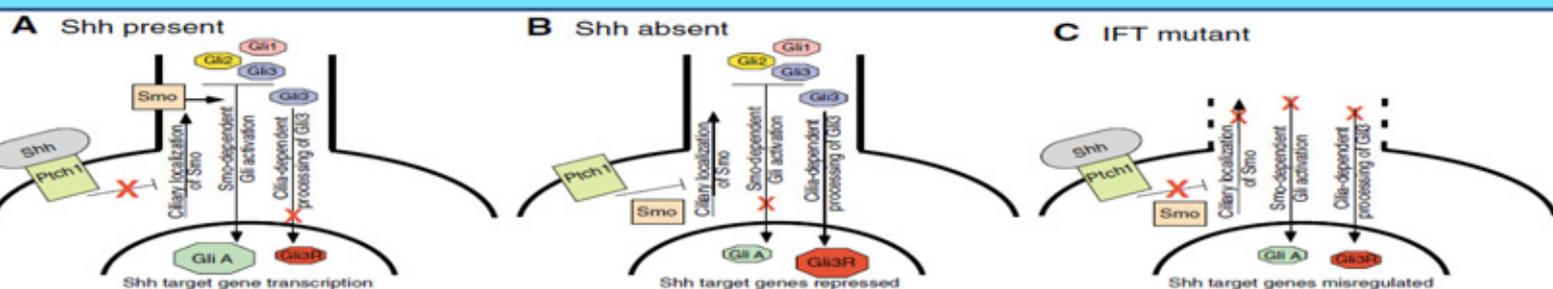


OKC



Periapical cyst

Discussion: Dentigerous cysts, odontogenic keratocysts and periapical cysts are commonly seen in the oral cavity yet their pathogenesis is not fully understood. Studies have shown that loss of Ptch and Shh signalling pathways are involved in the cystogenesis of dentigerous cyst and OKC. The Shh signalling pathway is active in the primary cilia. In our study the observation of primary cilia (PC) in the dentigerous cysts and OKC reiterates the fact that PC are involved in Shh signaling which plays an important role in the cystogenesis of these developmental cysts. This finding is consistent with the recent study where primary cilia were demonstrated in the cyst wall of dentigerous cyst in a patient having autosomal dominant polycystic kidney disease (ADPKD) (Anoop et al 2011). Research has focused on defects in signalling mediated by the primary cilia as the causative factor in ADPKD (Yoder B K, 2007). The absence of primary cilia in the radicular cysts shows that the pathogenesis of inflammatory cysts is entirely different from developmental odontogenic cyst such as dentigerous cysts and odontogenic keratocysts.



Further more elaborated studies are warranted for localization of loss of Ptch and Shh signalling pathways in these cysts.