Case Report

Squamous cell carcinoma in a maxillary odontogenic keratocyst: A rare entity

Anisha Maria, Yogesh Sharma[1], Amit Chhabria

Department of Oral and Maxillofacial Surgery, Modern Dental College and Research Centre, Indore, [1]PDA, Bhopal, India

Address for correspondence:
Dr. Anisha Maria,
Department of Oral and Maxillofacial Surgery, Modern Dental College and Research Centre, Indore, India.
E-mail: anisha.maria@hotmail.com

ABSTRACT

Odontogenic cysts in the maxilla are common but a malignant change in an odontogenic cyst is a comparatively a rare occurrence; however, these entities present with clinical and radiographic features similar to benign, expansible, central, odontogenic tumor, or cyst of the jaws. A patient reporting with squamous cell carcinoma arising from an odontogenic keratocyst of right maxilla has been worked up clinically, radiographically, and pathologically. The case was surgically managed and followed up. A 54-year-old male patient with a compressible, rapidly growing swelling of right maxilla was clinically diagnosed to be a case of odontogenic cyst. On radiologic examination it appeared similar to a cystic lesion. An incisional biopsy obtained from the cyst wall showed it to be odontogenic keratocyst with histologic evidence of malignant transformation. The pathogenesis of the tumor, the biologic progression, and prognosis and overall clinical and histopathogical features of this rare malignancy is reported and discussed.

Key words: Maxillectomy, odontogenic keratocyst, squamous cell carcinoma

INTRODUCTION

The epithelial lining of odontogenic cysts can undergo simple cystic expansion, keratinization, or dysplastic transformation. The most common neoplasms arising from the lining of odontogenic cysts are benign odontogenic tumors such as odontoma, calcifying odontogenic tumor, ameloblastic fibroma, calcifying epithelial odontogenic tumor, and adenomatoid odontogenic tumor. However, it is well known that the lining of an odontogenic cyst may transform into a mucoepidermoid carcinoma or a squamous cell carcinoma (SCCA).[1-4]

These two entities usually present with clinical and radiographic features similar to benign, expansile, central, and odontogenic tumors or cysts of the jaws. Paresthesia and lymphadenopathy are uncommon. On radiographic examination they appear similar to the cystic lesions from which they arose. More recent reviews place the total number of reported cases of carcinomatous change in odontogenic cysts at around 75.[5-8] Carcinomatous change occurs in less than 1% of the odontogenic cysts.[9] A total of 80% of SCCAs are diagnosed after the age of 40 years (mean age 57 years, range 4-90 years) with a 2:1 male:female ratio. Metastases from these lesions are not common (< 20%)[3,4,6,10] and most are moderate to well-differentiated carcinomas. The 2-year survival rate from all SCCAs is between 53% and 63%.[3,6,8,11] A malignant change in odontogenic keratocysts (OKC) has been rarely reported. In a review of the literature, only 15 reports of SCCA developing from OKCs were found.[7,12-15] Most of these cases were treated in two phases, with enucleation or incisional biopsy as phase 1. When carcinoma was found unexpectedly, further treatment included radical resection in most of the cases, neck dissection and radiation, or chemotherapy in one-third of the cases.[7,12-15]

The purpose of this paper is to review the literature and

Access this article online

Quick Response Code:

Website: www.njms.in

DOI: 10.4103/0975-5950.94486

to report a case with radiographic and histopathological evidence of SCCA arising in an odontogenic keratocyst (OKC) of the maxilla.

Case Report

A healthy 54-year-old man with no significant medical, dental, or surgical history presented to the Oral and Maxillofacial Surgery Department with a complaint of a slowly growing, painless swelling in the right cheek since 6 months. He had no history of tobacco, alcohol, or illicit substance use. The overlying skin was normal in color, texture, and consistency. The swelling was not tender to palpation. Intraoral examination revealed a swelling in the right side of maxillary alveolus obliterating the buccal vestibule. It extended from second premolar to the last molar and was compressible with egg shell crackling. The overlying mucosa was normal in color, texture, and consistency. The teeth were not mobile, displaced, or tender to percussion. No anesthesia, paresthesia, visual disturbance, or nasal obstruction were reported or observed. There was no cervical lymphadenopathy. A systemic physical examination was negative. A panoramic radiograph showed mild opacification of the right maxillary sinus.

Dental roots appeared intact and no other pathology was noted except for generalized adult periodontal disease. Axial and coronal computed tomography (CT) scans showed a soft tissue mass filling the whole right maxillary sinus, eroding the orbital plate, and the posterolateral wall of the sinus [Figures 1a-c].

An incisional biopsy was done intraorally through the buccal vestibule which was reported as an invasive, well-differentiated, keratinizing SCCA developing in an odontogenic keratocyst. Elsewhere the cyst was lined in the part by a regular layer of parakeratinized stratified squamous epithelium supported by a thin fibrous capsule consistent with the appearance of an odontogenic keratocyst. In one area the lining showed increasing dysplastic change, transforming ultimately into invasive keratinizing SCCA [Figures 2a and b]. The tumor was graded as T4N0M0. The patient was taken up for surgery and through a Weber Fergusson incision with a subciliary extension [Figure 3] a hemimaxillectomy was done which included the orbital floor. The orbit was supported with a fascia lata sling and the wound closed over gauze packing [Figure 4]. The excised specimen [Figure 5] was sent to the pathologist to review the margins. All the margins were reported to be clear. The healing was uneventful and an interim obturator was placed [Figure 6] and since no nodes were positive a neck dissection was not carried out. The maxillary sinus carcinoma is most likely to metastasize to the retropharyngeal group of lymphnodes.[15] Therefore a month after the surgery the patient underwent prophylactic radiotherapy of the neck and the surgical site, where a total dose of 50

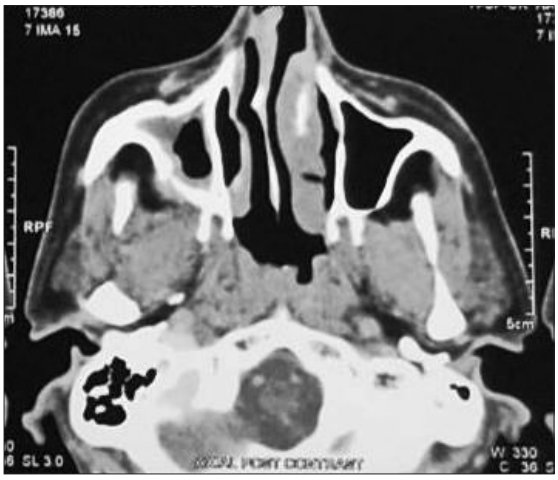

Figure 1a: C.T: Axial section 1

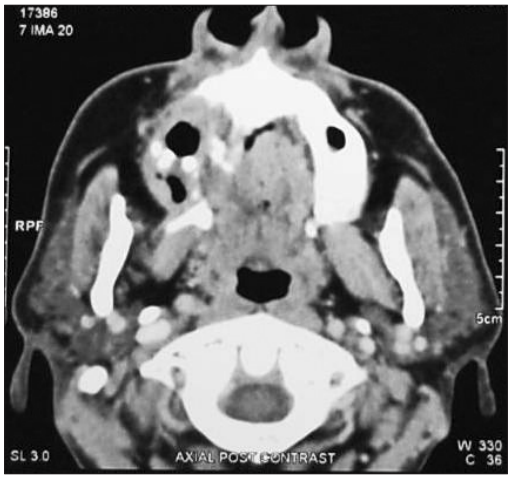

Figure 1b: C.T: Axial section 2

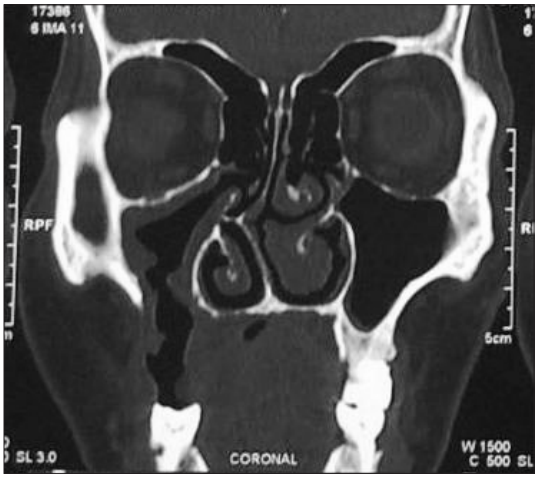

Figure 1c: C.T: Coronal section

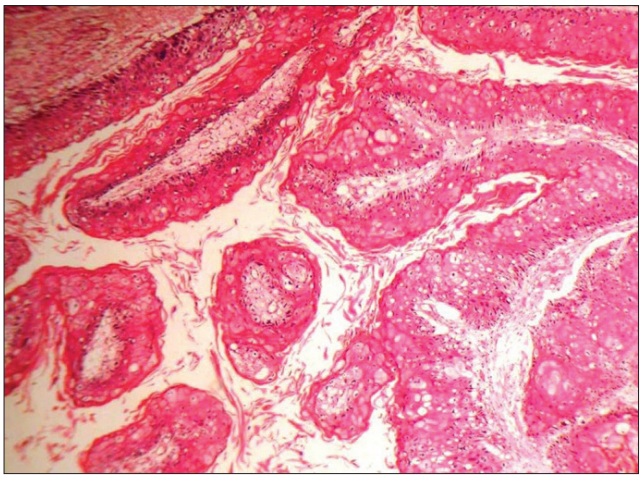

Figure 2a: H and E (10×) histopathologic view showing cystic lining and epithelial flecks

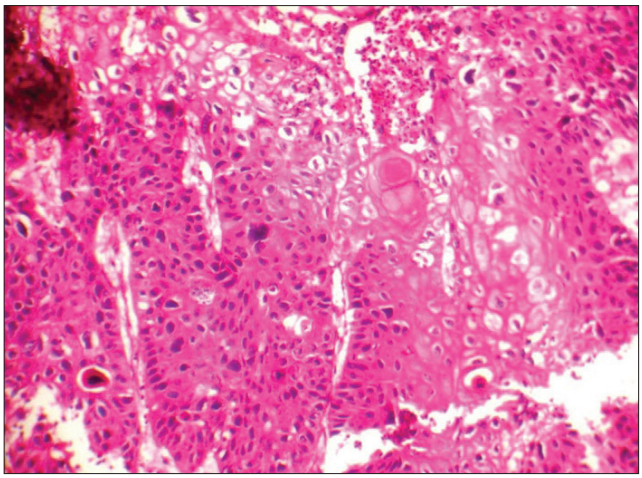

Figure 2b: H and E (40×) histopathologic view showing cystic lining and keratin pearls

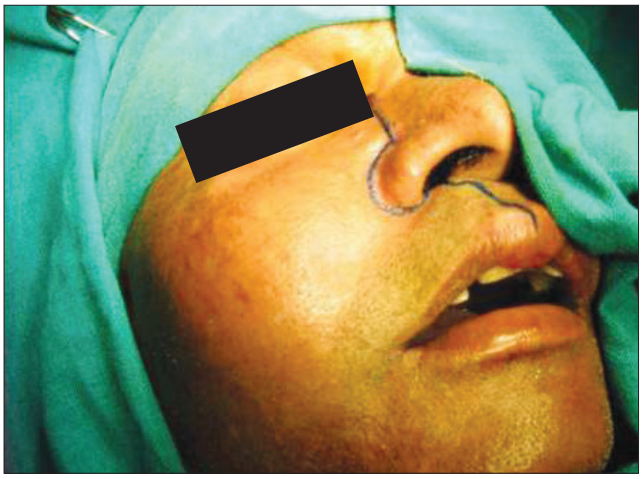

Figure 3: Weber Fergusson with subciliary extension

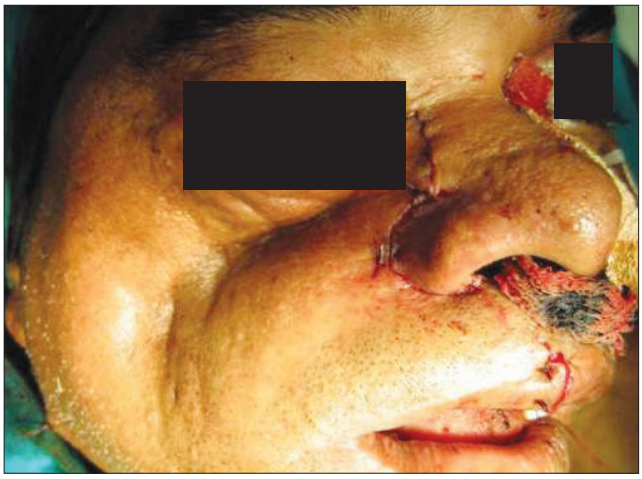

Figure 4: Closure

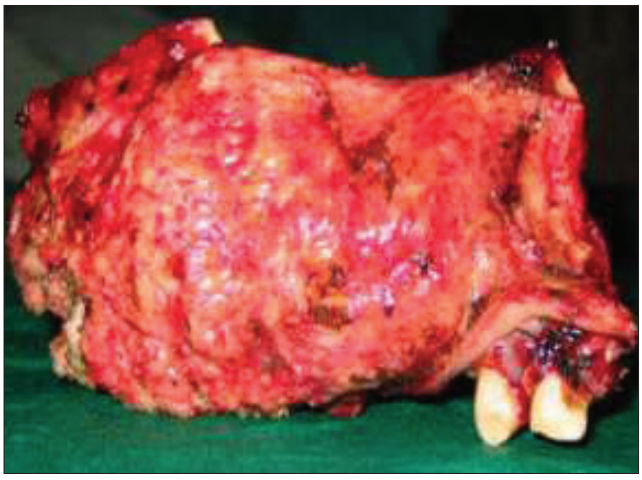

Figure 5: Excised specimen

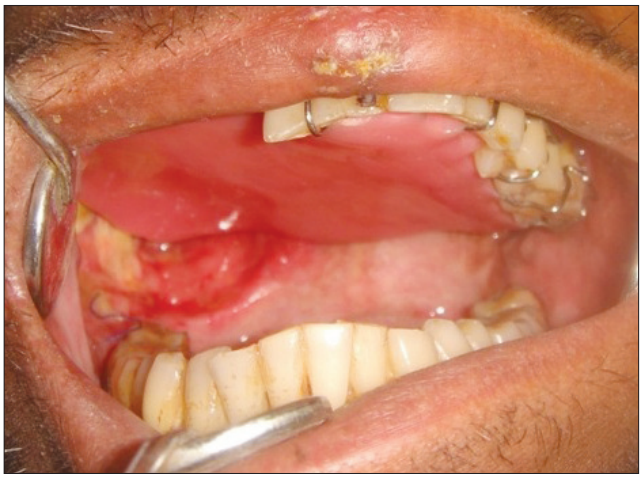

Figure 6: Postoperative obturator in place

Gy was delivered in 25 fractions at the rate of 2 Gy/day for 5 days a week. The patient was followed up for 2 years and showed no signs of recurrence till then. He was lost to follow-up after that.

Discussion

Malignancies arising in the wall of cysts are reported to be rare.[16,17] Eversole *et al.* (1975)[3] estimated on the

basis of 32 accepted cases of central carcinoma that 75% were associated with a cyst.[1,2,9] Gardner (1975) reviewed the literature and found 25 acceptable cases of SCCA in a cyst.[2,7] The literature reports only 15 cases of malignant transformation in an OKC.[7,12-15] Before a diagnosis of a carcinoma arising in an odontogenic cyst can be accepted, it is important to eliminate secondary involvement of a cyst by an unrelated adjacent carcinoma or cystic degeneration in a primary intraosseous carcinoma or in a metastatic deposit.

In 1975, Gardner proposed the following criteria for diagnosis of SCCA arising in a odontogenic cyst.[18-22]

1. A microscopic transition area from benign cystic epithelial lining to invasive SCCA.
2. No carcinomatous changes in the overlying epithelium.
3. No source of carcinoma in the adjacent structures.

A 4th criterion was added by Waldron.[19] The possibility that the lesion represents a metastasis from a distant tumor must be ruled out by physical and radiological examination and the subsequent clinical course.

Our case fulfills all of Gardner's criteria.

A carcinoma arising in a cyst would behave the same as any other carcinoma affecting the jaw bones. Resection with wide margins, addressing the neck nodes and postoperative radiation therapy if metastasis is suspected, remains the mainstay of management planning in such cases. Most of the malignancies of paranasal sinus are SCCA followed by adenocarcinoma. Evidence of distant metastasis can be checked with bone scans and abdominal sonography.[20]

In the staging of maxillary sinus cancers, local extension into pterygoid and infratemporal fossa has prognostic value. Ohngren's line, representing an imaginary plane from the medial canthus of the eye to the angle of mandible, separates the maxillary sinus into anteroinferior (infra structure) and superoposterior (supra structure) sites. Infrastructure carcinoma is associated with good prognosis and suprastructure has poor prognosis because of steady spread of these tumors to the eye, skull base, pterygoids, and infratemporal fossa.[21]

The patient presented with the typical symptoms of an odontogenic cyst. Cortical thinning and perforation of the posterior maxillary wall and orbital plate can occur with a large untreated odontogenic keratocyst. The absence of adjacent root resorption or displacement of teeth was consistent with an odontogenic cyst. The patient fitted into the age group range for developing an odontogenic keratocyst (20–40 years).[2,3,4,10] Only 15% of odontogenic keratocysts and 20% of all central SCCAs arise in the posterior maxilla.[2,3,4,8,10] Schwimmer *et al*.,[18] carried out a review of the literature and found 56 cases that strictly adhere to Gardner's criteria. They showed the mean age at diagnosis to be 57 years with a 2:1 male to female ratio. The mandible was affected four times as frequently as the maxilla. This made our case a very rare lesion case.

Only 20% of all central SCCAs have lymph node involvement; metastasis is uncommon. Several features of this case support the histologic findings of carcinomatous degeneration in the lining of an odontogenic keratocyst. No lesion was noted on the visible mucosal surfaces around the cyst, nor was there any evidence of a primary tumor elsewhere in the body. Discovery of SCCA arising in this odontogenic keratocyst was unexpected as in the other reported cases.[1,3,12,7,13-15] There were no signs of nerve paresthesia probably because the malignant change was confined within the cyst wall and was in the early stages of formation and the presence of a pre-existing cyst allows for the diagnosis of the pathology before the carcinoma spreads to involve the nerve bundle.

There were also no signs of invasion into the nasal cavity or development of eye symptoms.

The etiological factors associated with a malignant transformation in an odontogenic cyst are largely unknown. The patient had no genetic predisposition nor did he have any abusive habits. There was no other lesion detected elsewhere in the body.

Waldron and Mustoe[19] reviewed 36 cases of malignant transformation in odontogenic cysts and reported a 2-year survival rate of 53% if node was positive. This case was N0M0 and we predicted a better prognosis for this patient. Local recurrence is the major cause of treatment failure (45%) and recurrence is reported to occur within a year. Patients treated with radiotherapy and surgery had a better survival rate (52%) than radiotherapy alone or surgery alone. Cervical metastasis is rare, only 8% and the prognosis is worse for these patients.[22]

The preferred treatment in our case was wide resection with a primary reconstruction of the maxilla if possible. The frequency of cervical metastasis in a maxillary tumor is low,[23] so it obviates the need for a routine neck dissection.

A thorough understanding of the tumor biology and cellular kinetics is mandatory in such cases before rendering prompt surgical treatment. The odontogenic keratocyst has been one of the most controversial pathological entities of the maxillofacial region since Phillipsen first described it in 1956.[24] The WHO's recent

classification of head and neck tumors has reclassified the odontogenic keratocyst as a benign neoplasm, recommending the term "keratocystic odontogenic tumor (KCOT)." Very rarely the epithelial lining of KCOT shows features of epithelial dysplasia and malignant transformation to SCCA.[24]

Recent genetic and molecular research has lead to an important breakthrough as to the physiopathology of KCOTs. Some proliferation markers like PCNA, p53, Ki67 have been shown to be correlated with this tumor. Other markers known to be rapidly induced in response to growth factors, tumor promoters, cytokines, bacterial endotoxins, oncogenes, hormones, and shear stress such as COX-2 are under study to shed some light over the biological mechanisms involved in the development of this aggressive neoplasm of the jaws and explain why it undergoes a carcinomatous change.[24]

Since only 1% of all odontogenic cysts undergo a carcinomatous change, these carcinomas present with clinical features similar to a benign expansile lesion of the jaws, not associated with pain or paresthesia. On plain radiographs they appear similar to cystic lesions from which they arise. Marcelo Cavalcanti *et al*.[25] have stated that a CT scan would be a more sensitive tool for detecting a carcinomatous change in the lesion due to better appreciation of the destruction to surrounding structures like the resorption of the orbital plate which took place in our case.

This case report analyzes the origin, clinical signs and symptoms, radiological features, and surgical outcome of a malignant transformation of an odontogenic keratocyst involving the maxilla. The current case illustrates the importance of adequate microscopic investigation of all excised cysts.

References

1. MacLeod RI, Soames JV. Squamous cell carcinoma arising in an odontogenic keratocyst. Br J Oral Maxillofac Surg 1988;26:52-7.
2. Makowski GJ, McGuff S, van Sickels JE. Squamous cell carcinoma in a maxillary odontogenic keratocyst. J Oral Maxillofac Surg 2001;59:76-80.
3. Eversole LB, Sabes WR, Rovin S. Aggressive growth and neoplastic potential of odontogenic cysts with special reference to central epidermoid and mucoepidermoid carcinomas. Cancer 1975;35:270.
4. Gardner AF. The odontogenic cyst as a potential carcinoma: A clinicopathologic appraisal. J Am Dent Assoc 1969;78:746-55.
5. van der Wal KG, de Visscher JG, Eggink HF. Squamous cell carcinoma arising in a residual cyst: A case report. Int J Oral Maxillofac Surg 1993;22:350-2.
6. Muller S, Waldron CA. Primary intraosseous squamous carcinoma. Int J Oral Maxillofac Surg 1991;20:362-5.
7. Foley WI, Terry BC, Jacoway JR. Malignant transformation of an odontogenic keratocyst. Report of a case. J Oral Maxillofac Surg 1991;49:768-71.
8. Fanibunda K, Soames JV. Malignant and premalignant change in odontogenic cyst. J Oral Maxillofac Surg 1995;53:1469-72.
9. Stoelinger PJ, Bronkhorst FB. The incidence, multiple presentation and recurrence of aggressive cysts of the jaws. J Craniomaxillary Surg 1988;16:184-95.
10. Brown RM, Gough NG. Malignant change in the epithelium lining odontogenic cysts. Cancer 1972;29:1199-207.
11. Schwimmer AM, Aydin F, Morrison SN. Squamous cell carcinoma arising in residual odontogenic cyst: Report of a case and review of literature. Oral Surg Oral Med Oral Pathol 1991;72:218-21.
12. Star CH, Ng KH. Squamous cell carcinoma in an orthokeratinized odontogenic keratocyst. Inj J Oral Maxillofac Surg 1987;16:95.
13. Yoshida H, Omizawa K, Yusa H. Squamous cell carcinoma arising in association with an orthokeratinized odontogenic keratocyst. J Oral Maxillofac Surg 1996;54:647-51.
14. Moos KF, Rennie JS. Squamous cell carcinoma in a mandibular keratocyst in a patient with Gorlin's syndrome. Br J Oral Maxillofac Surg 1987;25:280-4.
15. Dabbs DJ, Schweitzer RJ, Schweitzer LE, Mantz F. Squamous cell carcinoma arising in a recurrent odontogenic keratocyst: Case report and literature review. Head Neck 1994;16:375-8.
16. Areen RG, McClatchey KD, Baker HL. Squamous cell carcinoma developing in an odontogenic keratocyst. Arch Otolaryngol 1981;107:568-9.
17. Zachariades N, Markaki S, Karabela Bouropoulou V. Squamous cell carcinoma developing in an odontogenic keratocyst. Arch Anat Cytol Pathol 1995;43:350-3.
18. Swinson BD, Jerjes W, Thomas GJ. Squamous cell carcinoma arising in a residual odontogenic cyst: Case Report. J Oral Maxillofac Surg 2005;63:1231-3.
19. Waldron CA, Mustoe TA. Primary interosseous carcinoma of the mandible with probable origin in an odontogenic cyst. Oral Surg Oral Med Oral Pathol 1989:67:716-24.
20. Huang SF, Chuang WY, Cheng SD, Hsin LJ, Lee LY, Kao HK. A colliding maxillary sinus cancer of adenosquamous carcinoma and small cell neuroendocrine carcinoma - a case report with EGFR copy number analysis. World J Surg Oncol 2010;8:92.
21. Mendenhall WM, Amdur RJ, Morris CG, Kirwan J, Malyapa RS, Vaysberg M, *et al*. Carcinoma of the nasal cavity and paranasal sinuses. Laryngoscope 2009;119:899-906.
22. Qureshi SS, Chaukar DA, Talole SD, D'Cruz AK. Squamous cell carcinoma of maxillary sinus: A Tata Memorial hospital experience. Indian J Cancer. 2006: 43:p26-9.
23. Johnson LM, Sapp JP, McIntre DM. Squamous cell carcinoma arising in a dentigerous cyst. J Oral Maxillofac Surg 1994;52:987-90.
24. Mendes RA, Carvalho JF, Isaac van der Waal I. Characterisation and management of the keratocystic odontogenic tumor in relation to its histopathological and biological features. Oral Oncol 2010;46:219-25.
25. Cavalcanti MG, Veltrini VC, Ruprecht A, Vincent SD, Robinson RA. squamous cell carcinoma arising from an odontogenic cyst-The importance of computed tomography in the diagnosis of malignancy. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2005:100:365-8.

How to cite this article: Maria A, Sharma Y, Chhabria A. Squamous cell carcinoma in a maxillary odontogenic keratocyst: A rare entity. Natl J Maxillofac Surg 2011;2:214-8.

Source of Support: Nil. **Conflict of Interest:** None declared.