CASE REPORTS

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Primary Intraosseous Carcinoma of the Mandible: A Case Report

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ABSTRACT

Objective: To present a rare case of primary intraosseous carcinoma arising from the mandible and to discuss the ensuing course and the management of the patient.

Methods:

Design: Case Report
Setting: General Tertiary Government Training Hospital
Patient: One

Result: A 56-year-old man consulted for a right mandibular mass of 4 months that started as a small bony swelling which gradually increased to its present size of 8 x 6 cm. Incisional biopsy revealed invasive squamous cell carcinoma and the patient underwent segmental mandibulectomy and bilateral selective neck dissection (levels 1 to 3). Final histopathologic findings revealed squamous cell carcinoma.

Conclusion: Primary intraosseous carcinoma of the mandible was diagnosed since there was no overlying mucosal ulceration, other types of odontogenic carcinoma were ruled out, and no other distant primary tumor was noted from the time of examination until six months post-treatment.

Keywords: *primary intraosseous carcinoma; squamous cell carcinoma; odontogenic tumor; epithelial rest of Malassez; dental lamina*

Primary Intraosseous Carcinoma (PIOC) is a rare tumor of the jaw that is probably derived from the remnants of odontogenic tissue, either the epithelial rests of Malassez or the remnants of the dental lamina.[1] The World Health Organization (WHO) in 1972 suggested the term" primary intraosseous carcinoma" and classified the lesion as an odontogenic carcinoma.[2]

This condition may arise in the confines of jaws either from a pre-exisiting epithelial lesion rather than a previous odontogenic cyst or de novo. There are cases of malignant transformation of odontogenic tumors or odontogenic cysts while primary intraosseous carcinoma arising de novo has been infrequently reported.[2]

The largest series identified 40 cases of de novo PIOC between 1970 and 2004 with very few reported cases in Asia and none from the Philippines.[3] To the best of our knowledge based

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on a search of HERDIN Plus, MEDLINE (PubMed) and Google Scholar using the terms "mandibular primary intraosseous carcinoma" and "intraosseous mandibular carcinoma" there have been no reported cases of PIOC in the Philippines. We report one such case.

CASE REPORT

A 56-year-old man from Ormoc City, Leyte consulted for a right mandibular mass. *(Figure 1)* Five years prior to admission, he noted carious first and second right mandibular molars associated with intermittent, mild to moderate, non-radiating, gnawing pain. He self-medicated with Mefenamic Acid, 500 mg per tablet, thrice a day, as needed for pain.

Four months prior to admission, the patient finally had his carious teeth (nos. 29-30) extracted by a dentist. The surgery was apparently uneventful, with only mild swelling and bleeding of approximately three tablespoons, for which he was advised to apply pressure and take Tranexamic Acid 500 mg per tablet every eight hours for three days and Amoxicillin 500 mg per tablet every 8 hours for one week.

Two weeks after extraction, the patient noted an enlarging mass over the right mandible just below the tooth extraction sites. The mass was approximately 1-2 cm in diameter, firm, non-tender, non-movable, irregular in shape, and accompanied by throbbing pain, swelling, and mild- to moderate-grade fever with chills. The mass rapidly increased in size, prompting him to consult a general practitioner who prescribed Clindamycin 300 mg per capsule every six hours for 7 days and Celecoxib 200 mg per tablet every 12 hours as needed for pain. There was relief of pain and fever but the mass gradually became larger and more painful. The remaining unextracted teeth over the mass were not loose. There was no history of denture use prior to, or after the appearance of the mass.

Six weeks prior to admission, alarmed by the rapidly enlarging mandibular mass, the patient consulted another general practitioner who ordered an anteroposterior X-ray of the skull that revealed an extensive radiolucent lesion extending from the right mandibular angle to the left mandibular parasymphysis. *(Figure 2)* A three-dimensional facial computed tomographic (CT) scan showed osteolytic destruction extending from the right mandibular angle to the left mandibular parasymphysis, and teeth 23-28 over the lesion appeared to be floating. *(Figure 3)* The patient was then advised to see an ear, nose and throat (ENT) specialist.

Three weeks prior to admission, the patient consulted our outpatient department and was found to have a firm 8 x 6 cm non-ulcerated, non-bleeding, non-tender, fixed, irregularly shaped mandibular mass, extending from the right mandibular angle to the left mandibular parasymphysis with poor dental hygiene. *(Figure 4)* There were no other lesions of the surrounding buccal mucosa and the tongue was uninvolved and fully mobile. No cervical lymph nodes were palpated at all levels on both sides. The patient exhibited neither trismus nor malocclusion. The past medical history, family history and personal and social history were non-contributory.

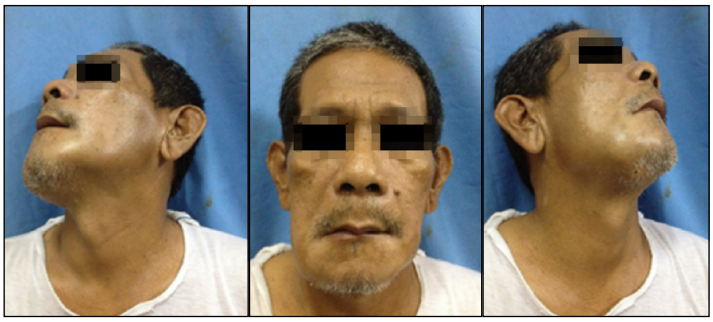

Figure 1. Frontal and oblique photos showing right mandibular swelling.

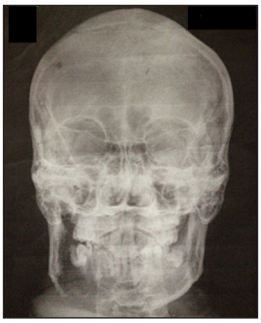

Figure 2. Skull X-Ray, antero-posterior view showing an extensive radiolucent lesion extending from the right mandibular angle to the left mandibular parasymphysis.

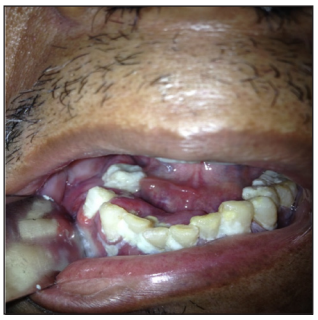

Figure 4. Intraoral 8 x 6 cm non-ulcerated, non-bleeding, non-tender, fixed, irregularly shaped mandibular mass, extending from the right mandibular angle to the left mandibular parasymphysis, with poor dental hygiene. The surrounding buccal mucosa and tongue were uninvolved and there was no trismus or malocclusion.

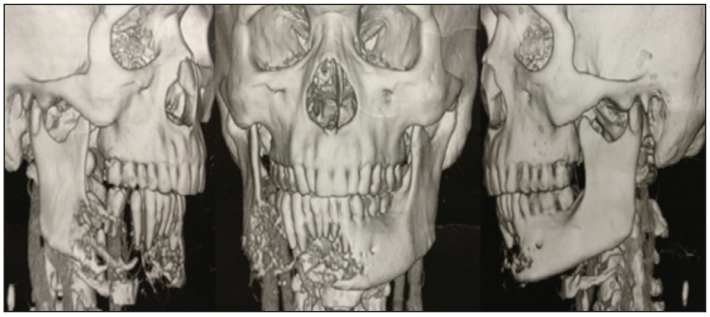

Figure 3. Facial 3D reconstruction CT-Scan showing osteolytic destruction extending from the right mandibular angle to the left mandibular parasymphysis; teeth no. 23-28 over the lesion appear to be floating.

An incision biopsy specimen was diagnosed as invasive squamous cell carcinoma, and the patient underwent segmental mandibulectomy from the right condylar neck to the left body with frozen section of the bony and soft tissue margins, application of Steinmann pin, and bilateral

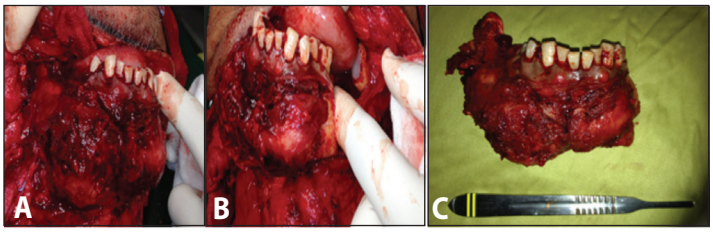

Figure 5A, B. Intraoperative images, segmental mandibulectomy from the right condylar neck to the left body. **C.** Gross specimen measuring 6 x 5 x 4.5 cm excised en bloc with 1.5 cm margins including ten mandibular teeth (nos. 20-28, 31).

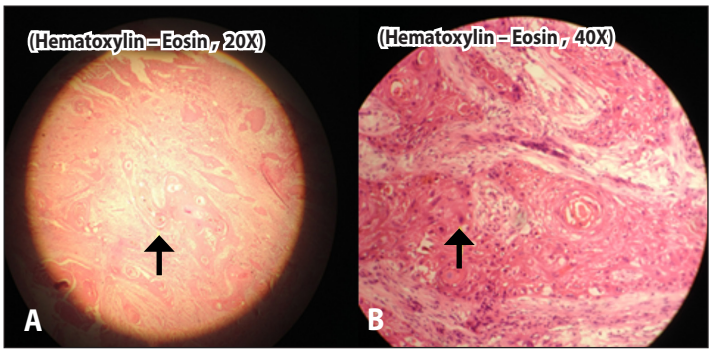

Figure 6. Histopathologic images, hematoxylin-eosin, **A.** low-power view (20X) showing island of epithelial cells, note the Keratin pearls (arrow); and **B.** high-power view (40X) showing dysplastic features such as cellular and nuclear polymorphism (arrow)

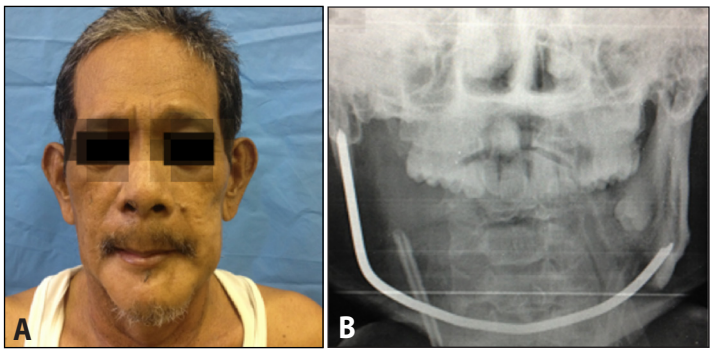

Figure 7A. 6-month post-operative follow-up photo; and **B.** Follow-up AP X-Ray of Mandible showing no signs of tumor recurrence

selective neck dissection (levels 1 to 3) under general anesthesia. Intraoperative findings revealed a firm 6 x 5 x 4.5 cm mass with irregular borders extending from the right angle of the mandible to the left parasymphysis. *(Figure 5 A, B)* The mass and mandibular segment was excised *en bloc* with 1.5 cm margins including ten mandibular teeth (nos. 20-28, 31). *(Figure 5C)* The surgery was uneventful with minimal blood loss and the patient had stable vital signs throughout.

Histopathological examination showed sections of malignant neoplasm composed of proliferating atypical squamous epithelial cells forming nests and sheets. The malignant cells had hyperchromatic to vesicular nuclei with prominent nucleoli, surrounded by moderate to abundant eosinophilic cytoplasm with defined borders. Individual keratinization and keratin pearls were observed. Mitotic figures were rare. The supporting stroma was infiltrated with lymphocytes and plasma cells. All surgical margins were clear. Histologically confirmed lymph nodes were all negative for metastasis and exhibited reactive lymph node hyperplasia. The final histopathological diagnosis was well-differentiated squamous cell carcinoma with all nodes negative for metastasis. *(Figure 6)*

The patient was discharged improved after the 7th post-operative day. No recurrence of the mass was been noted at follow-up 6-months post treatment. *(Figure 7A)* There were no sequelae aside from mild difficulty in articulation. The Steinmann pin was still in place with no signs of extrusion. *(Figure 7B)*

DISCUSSION

Primary intraosseous carcinoma (PIOC) is defined as squamous cell carcinoma that originates from the odontogenic epithelium entrapped within the jaw with no connection to the surface oral mucosa.[1]

First described by Loos in 1913, PIOC occurs in adults in their sixth to seventh decade with a male to female ratio of 3:1 usually in the ramus of the mandible.[1] The most common contributor is a reactive inflammatory stimulus with or without a predisposing genetic cofactor[1] and the classic head and neck squamous cell carcinoma risk factors of alcohol, tobacco or betel-quid use are not usually found in PIOC patients.[2] In our patient, the possible stimulus may have been the recent extraction of his carious teeth.

The clinical features in PIOC include pain and swelling of the affected area as seen in our patient.[2] In a pooled analysis of 33 cases recorded in literature performed by Thomas *et al*., pain was the most common presenting feature in 17 (54.8%) followed by jaw swelling in 16 (51.6%) and sensory disturbances in five (16.1%), while nonspecific clinical findings may mimic inflammatory dental processes.[3] Thomas *et al*. also found that PIOCs have varied radiographic findings such as cup or dish-shaped patterns, well-defined lesions, small radiolucent loculations and poorly-defined moth-eaten appearance.[3]

There are previous reports of patients in whom dental procedures (extractions and denture adjustments) were performed in an attempt to resolve the symptoms associated with the neoplasm[4] although our patient's pain and jaw swelling began following extractions.

Radiographic examination is one of the most effective methods for detecting PIOCs.[5] A CT scan is ideal for diagnosis but panoramic radiography is a simple but effective, low-cost alternative that can be used instead.[5] A lesion that is completely surrounded by bone can be regarded as one of intraosseous origin,[5] and primary intraosseous carcinomas exhibit radiolucencies with a wide variation in size and shape.[6]

Histologically, PIOC's vary from well-differentiated tumors exhibiting significant keratinization to non-keratinizing poorly differentiated carcinomas.[5] Primary intraosseous carcinoma is currently managed by wide surgical resection.[7] Aggressive surgical treatment comprising a segmental mandibulectomy with reconstruction is the best therapeutic option, either solely or in combination with radiotherapy or chemotherapy.[7]

Segmental resection or hemi mandibulectomy lead to significant patient morbidity.[7] Because loss of mandibular support to the teeth, tongue, and lip causes dysfunctions of mastication, swallowing, speech, airway protection, and oral competence, other reconstructive procedures include bridging plates and distraction osteogenesis.[8] Other options include free autologous bone grafts fixed with miniplates; post-operative radiotherapy is feasible with titanium plates.[8]

Radiotherapy and chemotherapy are never used alone for treatment[9] and should be considered only for lesions that cannot be surgically controlled. However, the effectiveness of these modalities is unclear because of a low number of cases and documented follow-up.[9] In their series of PIOCs, Huang *et al*. found that multimodality therapy did not improve the outcome of surgery alone.[10]

The tumor may metastasize to cervical lymph nodes, with nodal metastasis in PIOC reported to be as high as 50% in some series (and even be the first manifestation of the neoplasm).[10] A series of 17 PIOC patients undergoing elective neck dissection demonstrated occult metastases in levels I (53.3%), II (40%), and III (6.7%); hence, prophylactic selective neck dissection is recommended even in an N0 neck[11] as performed in our patient.

The prognosis of PIOC is generally poor. Of 12 cases of *de novo* PIOC reported by Elzay, a 40% two-year survival rate was noted with a reported survival time of only 13 months after initial diagnosis.[12] However, we have yet to document the long-term outcome for our patient.

In conclusion, our experience teaches us that in a patient presenting clinically with asymptomatic swelling of jaw of long duration and a radiographically ill-defined osteolytic lesion, PIOC should be considered. In our case, primary intraosseous carcinoma of the mandible was diagnosed as there was no overlying mucosal ulceration, other types of odontogenic carcinoma were ruled out, and no other distant primary tumor was noted from the time of examination until six months post-treatment. As physicians, early diagnosis of PIOC is a valuable service we can perform. Hence, accurate knowledge of this rare entity is must to prevent delayed diagnosis.

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