

A CLINICOPATHOLOGICAL STUDY OF JAW LESIONS AT A TERTIARY CARE CENTRE

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ABSTRACT

BACKGROUND

Jaw bones are exceptional developmentally in having embryonal neuroectodermal cells on one hand and tooth germs on other. They cause destruction of the jaw bones and pose diagnostic challenge.

MATERIAL AND METHODS

Patients attending Oral and Maxillofacial Surgery Department at Osmania General Hospital during the period January 2013-May 2016 presenting with complaints of gradually progressive of jaw swelling, toothache and with radiological evaluation showing osteolytic, sclerotic, and cystic change were subjected to surgical excision. Representative tissue samples were processed routinely and stained by haematoxylin and eosin.

RESULTS

A total of 55 cases of lesions involving jaw bones were studied out of which 21 cases occurred in females and 34 cases in males. 47 lesions were encountered in mandible and 7 lesions in maxilla. A single case of firm-to-hard submandibular swelling was also included in the study. The lesions were categorised into cysts, odontogenic tumours, reactive bone lesions, giant cell lesions, and primary bone tumours. Ameloblastoma was the most common odontogenic tumour type, 15/55; one ameloblastoma case was recurrent followed by radicular cyst 7/55 and dentigerous cyst accounting for six cases and variety of other lesions.

CONCLUSION

A whole gamut of lesions occurred in the jaws presented with a considerable overlap in clinical, histological, and radiological features. The present study revealed mostly cystic and benign neoplastic lesions.

KEYWORDS

Jaw lesions, Cystic lesions, Odontogenic cysts, Ameloblastoma.

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INTRODUCTION: Aetiology of jaw tumours is unknown. A variety of lesions of varied aetiology occur in jaw of different age groups causing minimal-to-massive destruction of underlying bone. These lesions require reconstructive and recontouring of the facio-maxillary bones for better cosmetic purpose. These lesions are derived from embryonal neuroectoderm, tooth germs, its remnants, and bone proper. They present as nonneoplastic tissue proliferation (Hamartoma) cystic lesions, benign and malignant neoplasms.⁽¹⁾ At times, these lesions mimic each other clinically, histologically, and radiologically; therefore, require a definite histologic diagnosis. Jaw tumours constitute 3% of all bone tumours with a tendency for local recurrence in 20% of the cases for inadequately resected tumours.⁽²⁾ Imaging and radiologic characteristic are pathognomonic of

jaw lesions and at times are misleading and similar in different lesions.

The age of the patient, location of the lesion, relation to tooth, margins, tissue mineralisation, adjacent tissue, periosteal and soft tissue reactions along with clinical details helps in differential diagnosis.^(3,4) The first line of investigation is plain x-ray. CT and MRI are useful in preoperative evaluation in assessing the lesion proper, its bony involvement, and extension into soft tissues. MRI is superior to CT scan in cystic lesions and in defining extension of lesion into the soft tissues in aggressive lesions. The present study is undertaken to assess the diagnostic problems in jaw lesions.⁽⁴⁾

MATERIAL AND METHODS: A total 55 patients admitted in maxillofacial surgery wards from year January 2013 to May 2016 are included in this study. A preoperative assessment was done based on clinical, radiological, and FNAC diagnosis. FNAC in cases with cystic degeneration yielded straw coloured and haemorrhagic fluid, which proved to be noncontributory for majority of cases. The surgical procedure carried out in these patients were enucleation, tumour resection with adjacent healthy tissue, i.e. wide

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excision, hemimandibulectomy, and radical mandibulectomy.

Multiple bits given from the tumour including the resected margins were routinely processed and stained by using H and E method. The data was reviewed with respect to age, gender, location, laterality, radiological features, and histopathological subtypes. The data was processed using Microsoft Excel and necessary tables were prepared.

RESULTS: The histomorphological appearance of 55 jaw lesions encountered in this present study are classified as shown in Table 1 - Table 7.

Odontogenic Cysts	No. of Cases
Inflammatory Radicular Cyst	6
Residual Cyst	1
Developmental Dentigerous Cyst	6
Odontogenic Keratocyst	5
Odontogenic Keratocyst with Orthokeratinised Epithelium	2
Nonodontogenic Cysts	Nil

Table 1: Cysts of Epithelial Origin

Epithelial	
Cystic Ameloblastoma	5
Follicular Ameloblastoma	5
Acanthomatous Ameloblastoma	1
Plexiform Ameloblastoma	1
Unicystic Ameloblastoma	1
Desmoplastic Ameloblastoma	1
Recurrent Ameloblastoma	1
Squamous Odontogenic Tumours	1
Mesenchymal	
Calcifying Odontogenic Fibroma	1
Malignant Odontogenic Tumours	
Primary intraosseous carcinoma (Well-Differentiated To Poorly-Differentiated Carcinoma)	1

Table 2: Odontogenic Tumours

Inflammatory	
Acute Osteomyelitis	1
Chronic Osteomyelitis (Fungal)	1
Fibroosseous	
Fibrous Dysplasia	2
Ossifying Fibroma	1
Cement Ossifying Fibroma	1
Osseous Dysplasia	Nil

Table 3: Reactive Bone Lesions

Peripheral Giant Cell Granuloma (Epulis) with Bone Extension.	1
Central Giant Cell Granuloma	1

Table 4: Giant Cell Lesions

Benign	
Osteoma	1
Malignant	
Malignant Hemangiopericytoma	1

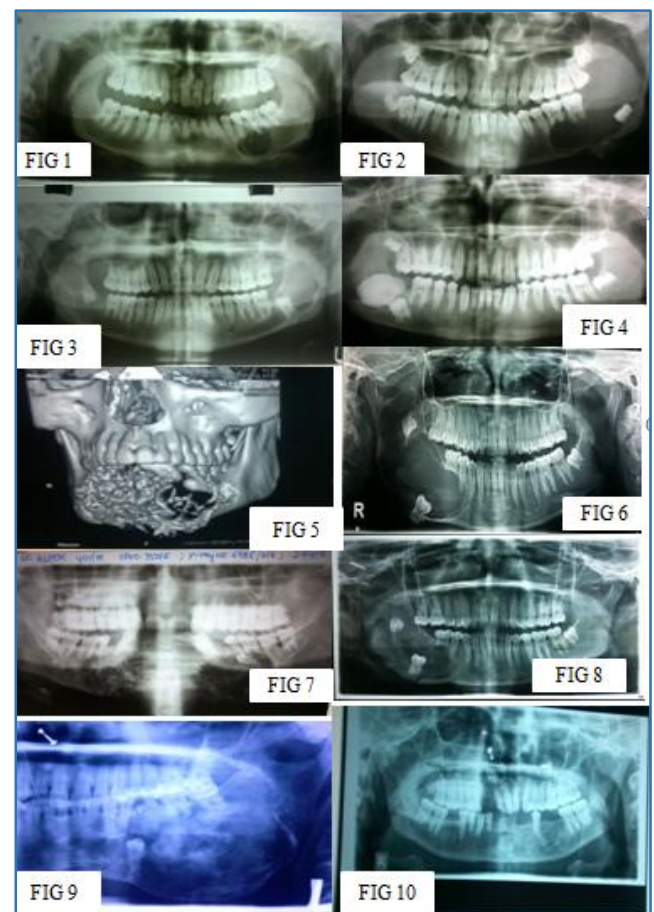
Table 5: Bone Tumours

Squamous Cell Carcinoma (Oral Cavity)	5
Lymphoma (Parotid Gland)	1

Table 6: Miscellaneous Lesions (Infiltrative Malignant Lesions)

Intranodal Squamous Odontogenic Tumour	1
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Table 7: Extraosseous Odontogenic Tumour



Radiological Appearance of Different Jaw Lesions

- Fig. 1:** Radicular Cyst Associated with Mandibular Teeth.
- Fig. 2:** Dentigerous Cyst Turned to Ameloblastoma.
- Fig. 3:** Bilateral Dentigerous Cyst with Impacted Teeth.
- Fig. 4:** Odontome with Impacted Tooth.
- Fig. 5:** 3D Reconstruction in Ameloblastoma showing Honeycomb Appearance.
- Fig. 6:** Cystic Ameloblastoma.
- Fig. 7:** Desmoplastic Ameloblastoma.
- Fig. 8:** Unicystic Ameloblastoma.
- Fig. 9:** Calcifying Epithelial Odontogenic Tumour.
- Fig. 10:** Central Giant Cell Granuloma.

Histomorphology of Jaws Lesions (H and E Stain):

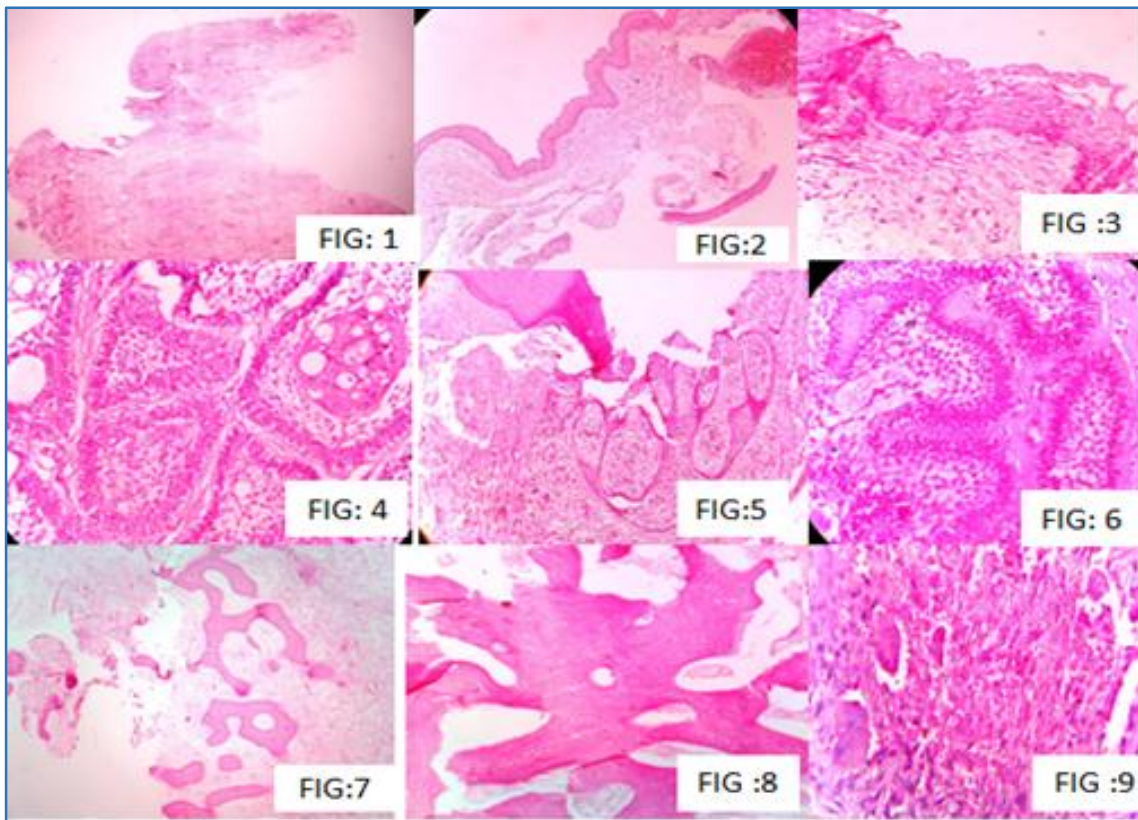


Fig. 1: Radicular Cyst. **Fig. 2:** Dentigerous Cyst. **Fig. 3:** Odontogenic Keratocyst.
Fig. 4: Plexiform Ameloblastoma. **Fig. 5:** Unicystic Ameloblastoma. **Fig. 6:** Acanthomatous Ameloblastoma.
Fig. 7: Ossifying Fibroma. **Fig. 8:** Osteoma. **Fig. 9:** Central Giant Cell Granuloma.

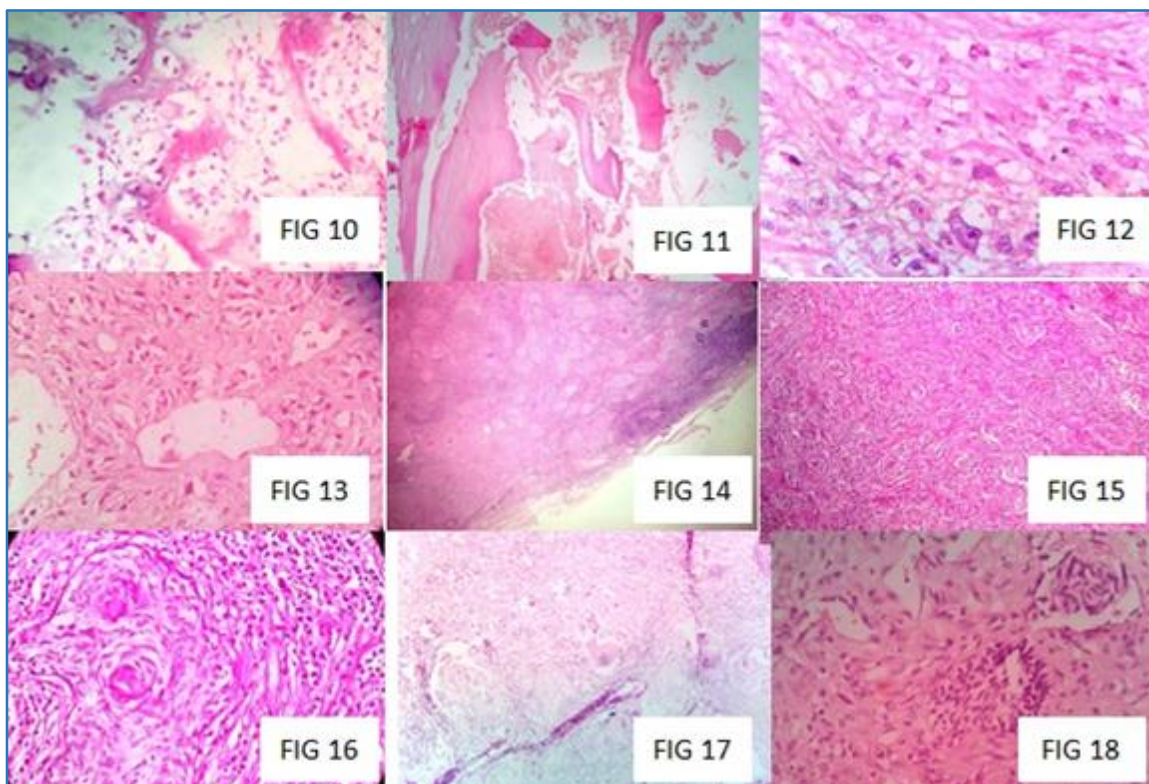


Fig. 10: Fibrous Dysplasia, **Fig. 11:** Osteomyelitis, **Fig. 12:** Primary Intraosseous Carcinoma,
Fig. 13: Hemangiopericytoma, **Fig. 14-16:** Extraosseous Intralymphnodal Squamous Odontogenic Tumour,
Fig. 17: Infiltrative Squamous Cell Carcinoma, **Fig. 18:** Odontogenic Rests.

DISCUSSION: Jaw lesions are classified by different authors based on its embryologic origin, aetiology clinico-morphological manifestations. WHO has classified in 2005 epithelial cysts as odontogenic and nonodontogenic cysts. It has classified recently odontogenic keratinocyst as Keratinising Odontogenic Tumour (OKT) for its aggressive behaviour though benign.⁽⁵⁾ Odontogenic cysts and tumours are commonly occurring lesions reported by various authors in different epidemiological studies. Complications occurring in cystic lesions are pathologic fractures, infections, and rarely malignant transformation drawing clinical attention and followup.

Cysts: Most commonly occurring cysts in jaw are odontogenic cysts, which are derived from odontogenic epithelium. They are broadly grouped under two categories inflammatory and developmental.^(2,3) In our study, 7 cases of radicular cysts were reported with age ranging between 16-54 years with a mean age of 30 years. Three cases occurred in males, four in females. Four cases were observed in maxilla on left side, three cases occurred in mandible out of which two were on right side. radicular cysts are inflammatory in origin and result due to pulpar necrosis of infected diseased tooth and results in proliferation of odontogenic epithelial remnants leading to cystic degeneration. Residual cyst are also inflammatory odontogenic cysts seen in maxillary bones resulting from incomplete resection of cyst in the periapical zone of a previously extracted diseased tooth.^(2,3)

Developmental: In present study, six cases of dentigerous cysts were reported in the age group of 11-40 years with a mean age of 24 years. All cases occurred in mandible. Male to female ratio was 5:1. Four cases occurred on right side and one case on left side. Dentigerous cyst common in children and young adults radiologically showing a unilocular cavity surrounding the crown of the unerupted tooth. Histologically, these cysts were lined by flattened cuboidal epithelial cells and leading to confusion at times with odontogenic tumours.⁽²⁾ In the present study, radicular cyst commonly occurred in maxilla followed by dentigerous cyst in mandible. A similar observation was made by Mohammed et al⁽⁶⁾. They were mostly unilocular, slow growing, and expansile in nature and prone for pathological fractures.

Odontogenic Keratocyst: We reported seven cases of odontogenic cysts all occurring in mandible with an age range of 21-54 years and mean age of 35 years. 5 cases were reported on right side and two on the left side. Histologically, these cysts showed stratified squamous lining with well-defined basal layer of palisading keratinocytes and superficial parakeratotic layer. It is known for its recurrence potential.⁽⁶⁾ Keratocystic odontogenic tumour has a genetic basis. Cysts lined by orthokeratotic epithelium have no recurrence potential and they simulate epidermoid cysts. Nonodontogenic cysts like nasopalatine cyst and nasolabial cyst were not reported in the present study.

Odontogenic Tumours: In our study, odontogenic tumours are the most common lesions occurring in the age range of 13-68 years with a mean age of 40 years. Male to female ratio was 8:7. Ten cases of ameloblastoma occurred on right side and five cases occurred on the left side. A single case of recurrent ameloblastoma occurred in mandible of a 17 year old male. They are known to arise from odontogenic tissue comprising of epithelial and mesenchymal components. Clinically, they can be frankly neoplastic to nonneoplastic to hamartomatous lesion. Precise diagnosis is mandatory to avoid delay and over treatment.⁽⁷⁾ Ameloblastomas are the most common epithelial tumours seen in middle-aged individuals. Radiologically, they are multilocular cysts with honeycomb appearance rarely. They can be unilocular also. They present mostly in mandible, histologically shows epithelial strands or islands of cells, which are columnar resembling ameloblasts in a palisaded fashion along with proliferation of stromal fibroblasts.

Ameloblasts are known enamel producing cells. Liquefaction in the epithelium and stroma causes cystic degeneration. It is known to infiltrate the adjacent tissue requiring wide local excision.^(2,3) Desmoplastic ameloblastomas shows collagenous stroma with active bone formation and has to be differentiated from fibro-osseous lesion, unicystic ameloblastoma, calcifying epithelial odontogenic tumour, and adenomatoid odontogenic tumour.^(2,3)

Squamous odontogenic tumour:⁽³⁾ We reported a single case of squamous odontogenic tumour in the present study. Histologically, it shows islands of well differentiated non keratinising squamous epithelium surrounded by mature fibrous connective tissue. Cystic change or calcification can occur with invasion into cancellous surrounding bone.⁽³⁾

A single case of calcifying odontogenic fibroma was reported in this study. It showed fibroblasts, myxoid matrix intermingled with collagenous tissue resembles dental follicle, and foci of calcification with cement-like substance.

Odontogenic tumours mixed with epithelial and mesenchymal components were not reported in the present series. A lone case of malignant odontogenic tumour primary intraosseous carcinoma was reported in a 45 year old male occurring in mandible had radiologically osteolytic lesion. Histologically, it showed sheets and clusters of squamous cells with nuclear atypia and poor differentiation. Ameloblastic resemblance was not noticed thus ruling out ameloblastic carcinoma.⁽⁸⁾

Fibro-osseous lesion:^(2,3) In present study, two cases of fibrous dysplasia were noted arising in the mandible involving majority of the ramus presenting radiologically with mixed density in a 35 year old and 18 year old males histologically characterised by cellular proliferation of fibroblasts with trabeculae of woven bone. It has genetic basis missense mutation involving the G protein. Fibrous dysplasia can occur as monoostotic, polyostotic forms, and in McCune-Albright syndrome showing multiple bone lesions and hyperpigmentation.

Ossifying Fibroma^(2,3): A forty year old male presented with hard swelling in maxilla, which showed fibrous tissue admixed with lamellar and woven bony trabeculae rimmed by osteoblasts with focal calcification in a dense fibrous stroma leading to a diagnosis of ossifying fibroma, a feature which distinguishes it from fibrous dysplasia.

Another case in a 58 year old male who underwent hemimandibulectomy with cartilaginous areas on macroscopy histologically showed a combination of fibrous tissue and cementum-like acellular material leading to a diagnosis of cement ossifying fibroma.^(2,3) Juvenile trabecular and psammomatoid variants are reported in other studies, which in our study were not encountered and should not be mistaken for osteosarcoma, which occurs in sinonasal bones.⁽²⁾

Reactive Bone Lesions^(2,3): A case of chronic osteomyelitis was noted in a 45 year old male patient in right mandible. Histologically, sequestrum was seen on sections. Another case of acute on chronic osteomyelitis in a 35 year old male patient with fungal elements on histopathology was also noted. Inflammatory lesions occur in the jaws and are due to diseased tooth by local spread of microorganisms resulting in acute and chronic osteomyelitis the later needs to be differentiated from fibrous dysplasia.^(2,9)

Giant Cell Lesion⁽²⁾: We noted in a 29 year female patient at the lower alveolus of mandible a lesion causing irregular destruction of the bone leading to the excision. Histologically proving to be PGCG extending into the bone. Another case of 62 year old female patient presented with solitary pedunculated bluish firm mass medially in the oral cavity with radiological evidence of severe bone loss in the mandible was reported as central giant cell granuloma.⁽²⁾ Central giant cell granuloma is characterised by osteoclastic type giant cells with fibroblastic stroma. Giant cells are seen at areas of haemorrhage and throughout.

A unique case of extraosseous intralymphnodal squamous odontogenic tumour was reported in a 26 year old female with clinically a firm swelling in the submandibular region adducted to angle of mandible. A FNAC was attempted, which revealed squamous cells with mild pleomorphism in a background of inflammatory cells reported as suspicious of metastatic deposit from squamous cell carcinoma along with a differential diagnosis of necrotising sialadenitis though ductal and acinar cells native of salivary glands were not present. The resected specimen was histologically proven as squamous odontogenic tumour in lymph node characterised by a thin fibrocollagenous capsule with many lymphoid aggregates in the cortical areas with germinal centres.

There were extensive concentric aggregates of squamous cells with vesicular nuclei and keratinous cytoplasm with keratin pearl formation. In between, the clusters of these cells were seen lymphocytes, plasma cells, and eosinophils. Focal areas showed characteristic odontogenic epithelium with peripheral palisading of ameloblasts. No mitosis and necrosis was seen in the

tumour. Adjacent resected lymph nodes showed reactive follicular hyperplasia.

We also noted in a 68-year-old male an ulcerated hyperemic lesion involving the left mandibular alveolus infiltrating into the adjacent bone radiologically. A biopsy was performed, which revealed malignant hemangiopericytoma grade 3 characterised by proliferation of blood vessels lined by spindled cells with marked nuclear atypia with increased mitosis. Subsequently, the same was proven on the excision specimen of the lesion along with the mandible and confirmed using immunohistochemical markers.⁽¹⁰⁾ A forty-five-year-old female presented with a submandibular swelling with a small hyperdense sclerotic lesion in the proximal body of mandible. She underwent hemimandibulectomy along with resection of submandibular gland. It was immunohistologically proven as diffuse large B cell lymphoma of submandibular salivary gland with infiltration into the mandible. An unnecessary hemimandibulectomy could have been avoided in this case with an extensive preoperative assessment using ancillary techniques.⁽¹¹⁾

We also noted five cases of squamous cell carcinoma arising from the oral mucosa with bone infiltration. The diagnosis of primary lesion in the oral cavity with ulceration was missed on technical grounds and delay in consultation in four cases leading to local bone and soft tissue extension. One of the case had underwent hemimandibulectomy for a metastatic deposit from carcinoma tongue with previous history of hemiglossectomy in a 30-year-old male patient.⁽¹²⁾

CONCLUSION: This study has proved that huge variety of lesions occur in jaw bones. There is a significant clinical, radiological, and histological overlap contributing to diagnostic dilemma and inappropriate treatment. Hence, an integrated approach and familiarity of histomorphology helps in overriding the clinico-diagnostic confusion.

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