ODONTOGENIC TUMORS
Introduction

• Group of lesions arising from the tooth producing apparatus or its remnants

• May originate from epithelial and/or ectomesenchymal odontogenic tissues

• 1% of all jaw tumors
Classification of Odontogenic Tumors
WHO Histological Typing of Odontogenic Tumor, 1992
1. Neoplasms and other tumours related to the odontogenic apparatus

1.1. Benign

1.1.1. Odontogenic epithelium without odontogenic ectomesenchyme

1.1.1.1. Ameloblastoma

1.1.1.2. Squamous odontogenic tumour

1.1.1.3. Calcifying odontogenic tumour (Pindborg tumour)

1.1.1.4. Clear cell odontogenic tumour
1.1.2. Odontogenic epithelium with odontogenic ectomesenchyme, with or without dental hard tissue formation
1.1.2.1. Ameloblastic fibroma
1.1.2.2. Ameloblastic fibrodentinoma (dentinoma) and ameloblastic fibro-odontoma
1.1.2.3. Odontoameloblastoma
1.1.2.4. Adenomatoid odontogenic tumour
1.1.2.5. Calcifying odontogenic cyst
1.1.2.6. Complex odontoma
1.1.2.7. Compound odontoma
1.1.3. Odontogenic ectomesenchyme with or without included odontogenic epithelium

1.1.3.1. Odontogenic fibroma

1.1.3.2. Myxoma (odontogenic myxoma, myxofibroma)

1.1.3.3. Benign cementoblastoma (cementoblastoma, true cementoma)
1.2.
1.2.1.
1.2.1.1.
1.2.1.2.
1.2.1.3.
1.2.1.4.
1.2.2.
1.2.2.1.
1.2.2.2.
1.2.3

Malignant
Odontogenic carcinomas
Malignant ameloblastoma
Primary intraosseous carcinoma
Malignant variants of other odontogenic epithelial tumours
Malignant changes in odontogenic cysts
Odontogenic sarcomas
Ameloblastic fibrosarcoma (ameloblastic sarcoma)
Ameloblastic fibrodentinosarcoma and ameloblastic fibro-odontosarcoma
Odontogenic carcinosarcoma
Ameloblastoma
Definition

Ameloblastoma is a true neoplasm of odontogenic epithelial origin, which does not undergo differentiation to the point of enamel formation.

Robinson’s definition

Ameloblastoma is a tumor that is usually **Unicentric**, **Nonfunctional**, **Intermittent in growth**, **Anatomically benign** and **Clinically persistent**.
Histogenesis

Resemblence of tumor epithelium to enamel organ

Ameloblastoma arises from dental epithelium

• Precise point of origin → unknown
• Enamel organ

• Points in favor
  • Histological similarity
  • Site → most common in the areas of presence of supernumerary teeth
  • Often missing tooth at the site of lesion
  • Association with unerupted tooth

• Points against
  • Age
• Cell rests (Serre, Mallasez)

  • Points in favor
    • Age

  • Points against
    • Site → occurrence of ameloblastoma in between roots of teeth is rare
• Oral mucosa

• Points in favor
  • May show connection to overlying epithelium
  • Occurrence of extraosseous lesions
  • Histological similarity to basal cell carcinoma

• Points against
  • Connection to overlying epithelium may be incidental or secondary
  • Extraosseous lesions are rare
  • Radiation response is opposite to that of basal cell carcinoma
• Cysts of dental origin

• Points in favor
  • Cases that clinically and radiographically diagnosed as cysts but histopathologically as ameloblastoma

• Points against
  • Evidence is debatable
Epidemiology

• 17-58% of odontogenic tumors

• Second most common odontogenic neoplasm after odontoma
  • Many recent studies show ameloblastoma to be the most common odontogenic neoplasm
Clinical features

• Age and gender distribution
  • Age
    • Age range → 4-92 years
  • Median age → 35 years
  • Maxillary ameloblastomas → higher age (45.6 years)
  • Extraosseous ameloblastoms → older age

• Gender
  • Males → 53%
  • Females → 47%
• Site distribution

• Mandible : Maxilla = 5:1
  • Mandible → 81%
    • Molar ramus area → 70%
  • Maxilla → 19%
    • Molar area → 47%
    • Antrum and floor of nose → 20%

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• Clinical presentation

• Usually slow growing and asymptomatic

• Most common presentation → swelling and facial asymmetry
  • Slow growth → reactive bone formation → gross enlargement and distortion

• Later stages
  • Thinning of bone → egg shell crackling

• If untreated → perforate bone → spread to soft tissues → excision difficult

• Average size → 4.3 cm

• Pain → not usual symptom (25% cases)
• Other symptoms

• Displacement, mobility and resorption of teeth
• Paresthesia
• Occlusal alterations
• Failure of eruption
• Radiographic features

• Multilocular, cyst like radiolucent areas with well defined margins
  • Honeycomb pattern
  • Soap bubble appearance

• Few radiolucent areas with small daughter cysts

• Bony margins ➔ typically scalloped
• May be associated with impacted tooth

• Roots of adjacent teeth → resorption or displacement

• May perforate
  • Periosteum is rarely perforated
• Desmoplastic ameloblastoma
  • Small size

• Irregular radiolucent areas having irregular calcifications

• Indistinct margins
  • May resemble fibro-osseous lesion
Histopathological features

• Six histopathological subtypes
  • Follicular
  • Plexiform
  • Acanthomatous
  • Basal cell
  • Granular cell
  • Desmoplastic
• Mixtures of different patterns is common

• Most tumors show predominance of one pattern

• Few lesions are composed of purely one subtype

• Lesions are subclassified according to the most predominant pattern
• Histologic subtype may have prognostic implications for recurrence

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Follicular</td>
<td>29.5%</td>
</tr>
<tr>
<td>Plexiform</td>
<td>16.7%</td>
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<tr>
<td>Acanthomatous</td>
<td>4.5%</td>
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• Background stroma

• Characteristically composed of fibrous connective tissue

• Moderately to densely collagenized

• Produces a typical eosinophilic background

• Fibroblastic cells → parallel orientation of nuclei

• Fascicular arrangement of collagen
• Epithelial component

•Disconnected islands, stands and cords
• A prominent budding growth pattern and rounded extensions of epithelium recapitulating enamel organ morphology
• Islands tend to show a prominent colour gradation between peripheral and central cells

• Colour seen in the central portion depends on the subtype
• Peripheral layer
  • Tall columnar cells
  • Nuclei
    • Hyperchromatic
    • Round to oval
    • Roughly same location within the cytoplasm \(\rightarrow\) palisaded appearance
    • Away from basement membrane and separated from it by a small clear vacuole \(\rightarrow\) reverse polarity

• Mimic the normal embryonic development of the tooth bud at the stage of enamel matrix production
• Classical features of ameloblastoma (*Vickers and Gorlin*)

1. Peripheral layer of tall columnar cells with hyperchromasia
2. Reverse polarity of nuclei
3. Subnuclear vacuole formation
Proliferating epithelium

Exerts an inductive effect on surrounding connective tissue

Zone of hyalinization of collagen immediately adjacent to the epithelium
• Inductive effect of epithelium the surrounding connective tissue
• Follicular ameloblastoma

  • Most commonly encountered variant

  • All the core features

  • Grows mainly in islands
• Follicular ameloblastoma
• Central cells
  • Typically polyhedral to spindle shape
  • Angular nuclei
  • Poorly defined cytoplasm with delicate fibrilar processes that connect adjacent cells
  • Stellate reticulum like appearance
• Tumor islands closely simulate enamel organ
• Enlarged islands with cystic degeneration

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• Acanthomatous ameloblastoma
  
  • Closely resembles follicular type
  
  • Shows core features common to most ameloblastomas
  
  • Grows primarily in island like pattern
• Acanthomatous ameloblastoma
• Squamous cells replace stellate reticulum like cells
• Tendency to keratinize in the most central portions

• Typically parakeratin
• Triple layer colour pattern
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• Granular cell ameloblastoma

• Relatively rare subtype

• Found as an admixture with other patterns (particularly follicular)

• Shows the core histologic features
• Granular cells in the central portion of epithelial islands, strands and cords.
• Cells are
  • Large with oval to polygonal outline
  • Nucleus displaced to the periphery
  • Cytoplasm → distended and packed with numerous coarse granules and stains weakly eosinophilic
  • Cell membranes poorly demarcated
• Basal cell ameloblastoma

• Rarest histologic subtype

• Occurs primarily in extraosseous lesions

• Basaloid appearing cells occupy the central portions of the islands
• Basaloid cells in place of stellate reticulum like cells
• Characteristic colour gradation difficult to appreciate
• Peripheral cells tend to be low columnar or cuboidal

• Often do not demonstrate reverse polarity with subepithelial vacuole

• Hyperchromatism and peripheral palisading are retained
• Desmoplastic ameloblastoma
  
  • Shows some variation from core features

• Dense collagenous stroma
  • Hyalinized and hypocellular
• Desmoplastic ameloblastoma
• Greater tendency to grow in thin strands and cords
• Peripheral cells are often flattened or cuboidal
• Occasional classic islands of follicular ameloblastoma

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• Plexiform ameloblastoma

  • Distinct from other histologic subtypes

  • Often lacks many of the core histopathological features

  • Sparse fibrous connective tissue stroma
    • Often loose and myxoid

  • Predominance of strand like growth pattern

  • Strong tendency for interconnection
• Plexiform ameloblastoma
• Cellular growth pattern closely simulating dental lamina stage
  • Strands composed of bilayer of cuboidal cells
• Rounded nodules of epithelium proliferating off the dental lamina like strands
  • Differentiation towards Bud stage of odontogenesis
• Strands may expand because of proliferation of cells → resembling stellate reticulum
Unicystic ameloblastoma

• First documented by Robinson and Martinez

• Accounts for 10-15% of all intraosseous ameloblastomas

• Can originate as
  • De novo as a neoplasim
  • Neoplastic transformation of non-neoplastic cysts
• Clinical features

• Younger age group (Avg. \( \rightarrow \) 22.1 years)

• Mandible (90%)
  • Posterior region

• Higher percentage associated with impacted teeth
• Histopathological features

Luminal

Intraluminal

Mural

Islands occurring isolated in the connective tissue wall

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Peripheral (extraosseous) ameloblastoma

• Uncommon (1% of all ameloblastomas)

• Originates either from remnants of dental lamina or surface epithelium
Clinical features

- Middle age (mean → 52 years)
- Slight male predilection
- Mandible : maxilla = 2:1
- Gingival and alveolar mucosa
- Painless, non-ulcerated, sessile/pedunculated
- 3mm-2cm on size
• Histopathological features

• Islands of ameloblastic epithelium in lamina propria underneath the surface epithelium

• Plexiform/follicular pattern most common

• Connection with overlying epithelium → 50%
• Peripheral ameloblastoma
Malignant ameloblastoma and ameloblastic carcinoma

- Malignant behaviour in ameloblastoma → 1%

- Metastases
  - Lung
  - Cervical lymph nodes
  - Vertebrae
  - Bones
  - Viscera
• Histopathological findings

• Malignant ameloblastoma $\rightarrow$ same as non-metastasizing ameloblastoma

• Ameloblastic carcinoma $\rightarrow$ cytologic atypia
  • ↑ N/C ratio
  • Nuclear hyperchromatism
  • Presence of mitosis
  • Necrosis in tumor islands
  • Areas of dystrophic calcifications
Squamous odontogenic tumor
• Rare benign epithelial odontogenic tumor

• First described by Pullon et al (1975)

• Previously reported as
  • Benign epithelial odontogenic tumor
  • Acanthomatous ameloblastoma
  • Acanthomatous ameloblastic fibroma
  • Hyperplasia and squamous metaplasia of residual odontogenic epithelium
  • Benign odontogenic tumor, unclassified
Histogenesis

• Rests of Malassez
  • Lesions associated with alveolar process

• Remnants of dental lamina
  • Lesions associated with unerupted teeth

• Surface epithelium or rests of Serre
  • Extraosseous lesions
Clinical features

• Age
  • Wide age range
  • Peak $\Rightarrow$ 3rd decade

• Slight male predilection

• Mandible more common

• Multiple and familial lesions have been reported
• Radiographic features

  • Triangular or semicircular radiolucency located in alveolar bone along the lateral surface of roots

  • Apex towards alveolar crest

  • Hyperostotic border may be present

  • May mimic chronic periodontitis

  • Pericoronal in some cases

  • Peripheral lesions → saucerization of bone
Histopathological findings

- Islands and broad strands of well differentiated squamous epithelium
- Mature fibrous connective tissue
- Islands are well demarcated from surrounding connective tissue
• Squamous odontogenic tumor
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• Basal layer of flat cells
• Internal cells exhibit squamous differentiation
• Vacouliization and microcyst formation
• Little variation in cell shape, size and staining quality

• Intraepithelial calcification is often seen
  • Irregular or lamellar

• Keratin production may be seen
Differential diagnosis

• **Ameloblastoma**
  - Ameloblastic changes in the peripheral cells

• **Well differentiated SCC**
  - SOT islands ➔ well defined
  - Cells lack variation in cell shape, size and staining quality
  - Mitotic figures ➔ rare
• SOT like proliferations in dentigerous and radicular cyst
  • Non-neoplastic reactive process
  • Seldom form microcysts
  • Do not contain intraepithelial calcifications
Calcifying epithelial odontogenic tumor
• Uncommon benign odontogenic neoplasm that is exclusively epithelial in origin

• First described and named by Pindborg (1955)
  • Pindborg tumor

• Less that 1% of odontogenic tumors
Histogenesis

• Earlier thought to be type of ameloblastoma or odontome
  • Pindborg showed that there were no ameloblast like cells

• Pindborg suggested
  • Reduced enamel epithelium
  • Stratum intermedium

• Amyloid deposition → immunologic response to stratum intermedium cells
Clinical features

• Age
  • 30-50 years

• No gender predilection

• Mandible : maxilla = 3:1

• Posterior region
• Asymptomatic

• Painless, expansile, hard, bony swelling

• Egg shell crackling and perforation

• Tooth tipping, rotation, migration, mobility, root resorption
Radiographic features

• Radiolucent $\rightarrow$ mixed $\rightarrow$ radiopaque
  • Mixed $\rightarrow$ 65%
  • Radiolucent $\rightarrow$ 32%
  • Radiopaque $\rightarrow$ 3%

• *Wind driven snow* appearance

• May be unilocular or multilocular
Histopathological features

• Proliferation of well defined squamous odontogenic epithelium in form of sheets, islands, cords and strands

• Well defined individual cell morphology and intercellular bridges
• **Cell shape**
  • Polygonal to round to oval
  • May be highly irregular and pleomorphic

• **Cell size**
  • Normal squamous cells similar to oral mucosa cells
  • Much larger irregular cells as seen in epithelial dysplasia

• **Cytoplasm**
  • Richly eosinophilic
  • Occasional glycogen rich clear cells

• **Nuclear morphology**
  • Highly variable
  • Single to multinucleated
• Tumor cells with large centrally located hyperchromatic nuclei

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• Tumor cells with variability in nuclear size, shape and staining
• Clear cell change

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• Fibrous connective tissue stroma containing hyalinized deposits of congo red positive amyloid

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• Apple green birefringence under polarized light
• Calcification of amyloid material

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• Concentric layers of calcification within amyloid material → Liesegang rings

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• Special stains for amyloid material

• Congo red
  • Bright orange-red
  • Apple green birefringence in polarized light

• Crystal violet
  • Metachromatic staining

• Thioflavin T
  • Blue fluorescence
Clear cell odontogenic tumor/carcinoma
• Low grade carcinoma of odontogenic origin

• First described by Hansen et al as *clear cell odontogenic tumor with aggressive potential*

• Renamed as *clear cell odontogenic carcinoma*

• Also known as
  • Clear cell ameloblastic carcinoma
  • Clear cell ameloblastoma

• Extremely rare
• 90% cases arise in mandible

• Female predilection (70%)

• Wide age range

• Expansion of jaw with loosening of teeth and pain

• Ragged area of radiolucency
Histopathological features

• Poorly circumscribed

• Sheets or islands of cells with abundant clear cytoplasm

• Cells
  • Uniform in size
  • Central or eccentrically placed nuclei
  • Well defined cell membrane
  • Some nuclear pleomorphism
  • Mitosis not prominent
  • PAS positive granules may be present in some cells
Ameloblastic fibroma
and
Ameloblastic fibro-odontoma
“Neoplasms composed of proliferating odontogenic epithelium embedded in a cellular ectomesenchymal tissue that resembles the dental papilla, with varying degrees of inductive change and dental hard tissue formation”

(WHO defn, 1992)
• Ameloblastic fibroma was first reported by Kruse in 1891

• Lesions with similar morphology with dental hard tissue formation
  • Ameloblastic fibroodontinoma
  • Ameloblastic fibro-odontoma

• Cahn and Blum, 1952
  • AF \(\rightarrow\) AFO \(\rightarrow\) Odontoma
  • Continuum representing different stages of evolution
Ameloblastic fibroma
Clinical features

• Age
  • Children and young adults
  • Second decade

• Gender
  • No predilection
  • Slight male predilection

• Site
  • Posterior mandible
  • First molar-second premolar area \(\rightarrow\) 80\% cases
• Clinical presentation

  • Painless, slow growing, expansile lesion

  • Pain
  • Tenderness
  • Mild swelling

  • 75% cases $\rightarrow$ associated with impacted tooth
Radiographic features

- Well defined, unilocular or multilocular radiolucency
- Smooth, well defined outline
- Sclerotic border
- 1-8 cm in size
- May mimic dentigerous cyst
Histopathological features

• Gross
  • Smooth surface and often exhibits a lobulated configuration
  • Well defined capsule may not be present
• Light microscopic features

  • **Epithelial component** characterized by proliferating islands, cords, and strands

  • Peripheral layer of cuboidal or columnar cells and central area resembling stellate reticulum

  • Mitosis is rare

  • Cystic degeneration usually not seen
• **Ectomesenchymal component** → embryonic, cell-rich mesenchyme that mimics dental papilla

• Cells are round or angular and are fibroblast like

• Very little collagen

• Degree of cellularity varies within the same tumor and different tumors

• Cell free zone of hyalinization may be found around the epithelial-connective tissue interface
• Islands of odontogenic with peripheral ameloblast-like cells and ectomesenchymal stroma resembling dental papilla
• High power view showing central stellate reticulum like cells
• Slender strands of odontogenic epithelium lacking stellate reticulum like cells

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• Higher power showing double layer of columnar cells and more cellular stroma

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Ameloblastic fibro-odontoma
“A lesion similar to ameloblastic fibroma, but showing inductive changes that lead to formation of dentin and enamel

(WHO Defn)

• First delineated by Hooker, 1972

• 1-3% of all odontogenic tumors
  • 7% in age less than 16
Clinical features

• **Age**
  - First two decades of life (98%)
  - Average age → 9 years

• **Gender**
  - Slight male predilection

• **Site**
  - Posterior mandible
  - Posterior maxilla
  - Exclusively intraosseous
• Clinical presentation

  • Painless, slow-growing, expansile

  • Swelling

  • Failure of tooth eruption

  • Most AFOs associated with unerupted tooth
Radiographic features

• Well circumscribed, expansile radiolucency

• Solitary or multiple, small radiopaque foci

• Most lesions 1-2 cm in size
Histopathological features

• Strands, cords and islands of odontogenic epithelium

• Cell-rich, dental papilla like ectomesenchymal stroma

• Varying amounts of dentin-like material and osteodentin

• Occasionally enamel matrix
• Typical ameloblastic fibroma like area merging with odontoma like area
• Induction of thin layer of atubular dentin in the stroma by the ameloblast like cells
Ameloblastic fibrosarcoma
• Malignant counterpart of ameloblastic fibroma

• May arise de novo or malignant transformation of ameloblastic fibroma
Clinical features

- Young patients
- Females (1.5:1)
- Mandible > maxilla
- Pain, swelling
- Rapid growth
- Destruction of bone and loosening of teeth
- Ulceration and bleeding
Radiographic features

• Unilocular or multilocular radiolucency

• Severe bone destruction

• Poorly defined margins
Histopathological features

• No apparent change in odontogenic epithelium
  • Less prominent

• Mesenchymal component
  • Highly cellular
  • Hyperchromatism and pleomorphism
  • Mitosis is prominent

• Dysplastic dentin or small amounts of enamel may be formed
Odontoma
• Any tumor of odontogenic origin !!!

• First coined by Broca, 1866
  • Tumor formed by overgrowth of complete dental tissue

• Thoma and Goldman → tumors composed of well-differentiated tooth structure

• Hamartomatous malformation of dental tissues or true neoplasm ???
• Three types (WHO classification)
  • Complex odontoma
  • Compound odontoma
  • Odontoameloblastoma

• Complex odontoma
  • Malformation in which all of the dental tissues are represented, and individual tissues are well formed but occur in disorderly pattern

• Compound odontoma
  • Malformation in which all the dental tissues are represented in a more orderly pattern than in complex odontoma so that the lesion consists of many tooth like structures
• 0.5 % of all oral biopsies

• 40-60% of all odontogenic tumors

• Compound odontoma > complex odontoma
Etiology

• Unknown

• Local trauma and infection

• Inherited or due to genetic mutation
Clinical features

• **Age**
  - 2\textsuperscript{nd} decade most common
  - Average age 19 years

• **Gender**
  - Equal frequency

• **Site**
  - Compound $\rightarrow$ anterior maxilla
  - Complex $\rightarrow$ posterior mandible $>$ anterior maxilla
  - Deciduous
    - Rare
    - Incisor-canine area
• Clinical presentation

  • Hard, painless masses, usually small

  • Impacted permanent or retained deciduous tooth

  • Swelling

  • Complex odontoma → may become large → facial asymmetry
Radiographic features

• Densely radiopaque mass of varying size

• Usually associated with unerupted or impacted teeth

• Surrounded by a radiolucent line → cystic follicle

• Often encased by a rim of sclerotic bone

• Compound odontomas → collection of tooth like structures of various sizes

• Developing odontoma → radiolucent
Histopathological findings

• Gross

  • Outer surface is smooth and lobulated

  • Cut section is solid like osteoma

  • Striated appearance with radially arranged markings

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• Microscopic appearance

  • Fibrous capsule

  • Dentin and enamel matrix

  • Pulp tissue, enamel organ and cementum are also seen in most cases

  • Lesions in active phase may show ameloblastic epithelium
• Fully calcified enamel $\rightarrow$ empty spaces

• Enamel matrix
  • Faintly hematoxyphilic
  • Fibrillar or whorled appearance $\rightarrow$ enamel prisms
  • Cross section $\rightarrow$ fish scale or hexagonal pattern
• Dentin is present in large quantities → forms the bulk of tumor

• Usually well formed with regular tubules
Compound odontoma with tooth like structures composed of dentin and enamel matrix supported by dense fibrous connective tissue
• Compound odontoma $\rightarrow$ cross section of multiple small tooth like structures

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• Complex odontoma consisting of sheets of tubular dentin and enamel spaces
• Complex odontoma → totally irregular arrangement of dental tissues
• Odontoma showing tubular dentin and enamel matrix with prismatic structure
• Complex odontoma with ghost cells
Odontoameloblastoma
• Extremely rare odontogenic tumor

• Consists of simultaneous occurrence of ameloblastoma and composite odontome

• Relatively undifferentiated neoplastic tissue associated with a highly differentiated tissue
Clinical features

• Any age but more frequent in children

• Mandible > maxilla

• Slowly expanding lesion

• Produces considerable destruction of bone and facial asymmetry
Radiographic features

• Central destruction of bone with expansion of cortical plates

• Numerous small radiopaque masses
  • May or may not bear resemblance to teeth

• Single irregular mass of calcified tissue
Histopathological features

• Complex distribution of
  • Columnar, squamous and undifferentiated epithelial cells, ameloblasts, stellate reticulum like cells
  • Enamel, enamel matrix, dentin, osteodentin
  • Dental papilla like tissue, cementum, stromal connective tissue and bone
• Many structures resembling typical and atypical tooth germ

• Sheets of typical ameloblastoma
  • Follicular
  • Plexiform
  • Basal cell
Treatment and prognosis

• Controversial

• Radical resection

• Recurrence after curettage
Adenomatoid Odontogenic Tumor
Clinical features

• Age
  • Predilection for young patients
  • 69% cases in second decade
  • Pericoronal AOT → younger age

• Gender
  • Female to male ratio = 2:1
  • In patients above 30 years of age → female to male ratio = 1:2
  • Gingival lesions → female to male ratio = 14:1
• Site
  • Maxilla > mandible
  • Before age of 30 → max to mand = 2:1
  • After age of 30 → max to mand = 1:2

• Peripheral lesions → max to mand = 10:1
• Clinical presentation

• Usually asymptomatic
  • Most lesions discovered on routine radiographic examination

• Delayed eruption

• Slow growing bony expansion

• Infrequent presentations
  • Mobility of teeth
  • Facial asymmetry
  • Fracture of mandible
  • Nasal obstruction
Radiographic presentation

• Well demarcated, unilocular radiolucency

• Smooth corticated or sclerotic border

• Most cases are 1-3 cm in size

• Faint radiopaque foci (65%)
  • Better visualized in periapical view

• Displacement of teeth
• Pericoronal radiolucency (71%)
• Radiolucency does not “respect” the CEJ

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Histopathological features

• Gross
  • Soft, roughly spherical mass

• Fibrous capsule

• Cut surface
  • White to tan
  • Solid to crumbly
  • Cystic spaces of varying sizes
  • Minimal yellow brown fluid to semisolid material
  • Calcified masses
• Dentigerous specimens
  • Tooth embedded in solid tumor mass
  • Tooth projecting into a cystic cavity
• Light microscopic features

  • Cellular multinodular proliferation of spindle, cuboidal and columnar cells

  • Scattered duct like structures

  • Eosinophillic material

  • Calcifications in various forms

  • Loose, fibrovascular supporting stroma that may show considerable dialatation and congestion of vascular component

  • Fibrous capsule of variable thickness
• Cell rich epithelial nodules
  • Variably sized, cell-rich nests or nodules
  • Composed of spindle to cuboidal to polygonal epithelial cells
• Characteristic cell rich nodules
• Concentric layering of juxtranodular spindle cells
• Droplets of eosinophilic material seen between epithelial cells

• Clustering of tumor cells around the droplets
• Microcysts

• Varying numbers of duct-like structures with lumina of varying sizes

• Lumen lined by a single layer of cuboidal or columnar cells
  • Nuclei polarized away from the lumen

• Not present in all the cases
• Microcysts lined by cuboidal to columnar cells with pale basophilic flocculant material and residual droplet of eosinophilic material
• Lumen lined by an eosinophilic rim of varying thickness ("hyaline ring")
- Extremely tall columnar cells with intensely eosinophilic cytoplasm and markedly polarized nuclei
- Abut solid, partially calcified masses
Columnar cells in form of rosette
• Columnar cells arranged in convoluted double row with a band of eosinophilic material between two rows
• Internodular epithelial cells

  • Swirling steams of stellate reticulum like spindle cells to round or polygonal cell

  • Demonstrate zones of intense basophilia

  • Small amount of eosinophilic deposits or calcifications may be present
• Stellate reticulum like spindle cells between cell rich nodules and microcysts with areas of intense hyperchromasia

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• Small droplets of eosinophilic material and more basophilic calcifications

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• Cystic AOT
Association of AOT with other odontogenic cysts and tumors

• Dentigerous cyst
• AOT with CEOT like foci
• Odontoma
• Ameloblastoma
• Calcifying Odontogenic Cyst
Tumors of odontogenic ectomesenchyme
Central Odontogenic fibroma
• WHO has defined central odontogenic fibroma as

“Fibroblastic neoplasm containing variable amounts of apparently inactive odontogenic epithelium”
• Simple type of COdF
  • Composed of delicate fibrous and myxoid tissue with scant inactive appearing odontogenic epithelium

• WHO type or complex type
  • Composed of cellular mature fibrous tissue containing numerous islands and strands of odontogenic epithelium, without palisading, reverse polarization, or stellate reticulum
Clinical features

- **Age**
  - Wide age range
  - Rare in first decade

- **Gender**
  - Female predilection (2.8:1)

- **Site**
  - Maxilla = mandible
  - Anterior to first molar (specially in maxilla)
• Clinical presentation

• May be asymptomatic

• Mild tenderness, sensitivity or paresthesia

• Slow growing

• Progressive enlargement

• Presence of cleft or depression in the palatal gingiva and palatal mucosa

• May perforate the palatal bone
Radiographic features

• Unilocular or multilocular radiolucency

• Loculated or scalloped periphery

• Well defined, often sclerotic borders

• Expansion or perforation of cortex

• Root resorption
Histopathological features

• Gross
  
  • Smooth well circumscribed mass
  
  • Lesions tend to shell out easily and completely from the surrounding bone
• Microscopic findings

• Fibous tissue of variable cellularity and density

• Variable amount of inactive appearing odontogenic epithelium

• Variable presence of calcifications resembling dysplastic dentin, cementum like tissue, or bone
• Mesenchymal component
  • Loosely to well collagenized
  • With or without myxoid areas
  • Sparse to moderate to dense cellularity
• Islands and cords of epithelium in densely fibrous stroma
• Epithelial component
  • Islands or cords
  • Few to numerous
  • Inactive appearing
• Serpentine strands of inactive odontogenic epithelium surrounded by a fibrous tissue with a fascicular configuration
- Calcifications
  - Focal to florid
  - Cemintum like
  - Dentin
  - Osteoid
  - Woven bone
• Foci of calcification

Prof. Shaleen Chandra
Peripheral odontogenic fibroma
• Uncommon tumor

• Soft tissue counterpart of COdF

  • Odontogenic gingival hamartoma
  • Peripheral ameloblastic fibrodentoinoma
Clinical features

• Wide age range

• No sex predilection

• Mandible > maxilla
  • More common on the fascial gingiva

• Slow growing firm and sessile gingival mass
  • 0.5-1.5 cm in diameter

• Normal overlying mucosa

• May be multifocal
Histopathological features

• Same as COdF

Prof. Shaleen Chandra
Odontogenic myxoma/ fibromyxoma
• WHO definition of odontogenic myxoma

“a locally invasive neoplasm consisting of rounded and angular cells that lie in an abundant mucoid stroma”
Clinical features

• Age
  • 2nd - 4th decades (75%)

• Gender
  • Slightly more common in females (1.5:1)

• Site
  • Mandible (2:1)
  • Molar premolar area
• Clinical presentation

• Cortical expansion and perforation are common

• Maxilla $\rightarrow$ extension into the sinus
Radiographic features

- Unilocular or multilocular radiolucency
  - Honeycomb
  - Soap bubble
  - Tennis racket
  - Spider web

- Displacement of teeth
- Resorption of roots

- Mixed radiopaque – radiolucent lesions (12%)
Histopathological features

• Gross
  • Well delineated but uncapsulated
  • Gray-white to tan-yellow
  • Rubbery, soft, or gelatinous
  • Cut surface is glistening, translucent and homogenous
• Microscopic findings

• Loosely arranged, evenly dispersed, spindle shaped, rounded, and stellate cells
  • Light eosinophilic cytoplasm

• Myxoid intercellular matrix

• Mild atypia and hyperchromatism

• Occasional mitosis

• Fine network of reticulin fibers
  • More collagen → fibromyxoma

• Inconspicuous vascularity
Central granular cell odontogenic tumor
• Rare benign odontogenic neoplasm that contains variable amounts of large eosinophilic granular cells and apparently inactive odontogenic epithelium

• Also known as
  • Central granular cell odontogenic fibroma
  • Granular cell ameloblastic fibroma
  • Central granular cell tumor of the jaws
Clinical features

• Older adults
  • More than half of the cases between $6^{th}$ to $8^{th}$ decade

• Females (3:1)

• Mandible (3:1)
  • Premolar molar area
• Locally aggressive

  • Cortical expansion and perforation

  • Facial swelling

  • Displacement of teeth

  • Maxillary sinus involvement
Radiographic features

• Unilocular or multilocular radiolucency

• Sclerotic border

• Mixed density
Histopathologic features

- Sheets or lobules of round to polygonal cells
  - Eosinophilic granular cytoplasm
  - Round to oval nuclei

- Cords and nests of odontogenic epithelium
  - Often have clear cytoplasm
  - No stellate reticulum like cells

- Thin septae of fibrous connective tissue

- Scattered, small, cementum like dystrophic calcifications
• Ultrastructural and immunohistochemical studies show that granular cells are non-epithelial in origin