

DENTO-MAXILLARY RADIOLOGY AND IMAGING

Course 8

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8.1. MALIGNANT TUMORS CHARACTERISTICS

Tumoral formations, cancerous, defined by specific anatomo - pathologic characteristics, also imaging detected:

- focal diffuse defined,
- unencapsulated,
- nearby tissular infiltrative and invasive producing:
 - infiltration,
 - invasion,
 - regional destruction.

INTERNAL STRUCTURE

The internal structure is almost always inhomogeneous, composed of cells which bear a partial resemblance to a normal cell type in their organ of origin being undifferentiated:

- structural - atypical;
- architectural – anaplasia.

Imaging methods show their cellular and tissular alterations, with inhomogeneous contrast uptake due to malignant type of tumoral vascular supply.

EVOLUTION

They have a rapid evolution with locally tissular invasion and destruction, being capable of spreading to distant tissues by metastasation and also reappear after surgical resection.

Imaging methods show cancerous invasion in surrounded adipose tissue and to distant tissues metastasizing secondary spread.

DIFFERENTIAL DIAGNOSIS - MALIGN VERSUS BENIGN

Imaging methods detect malignant tumors as diffuse defined masses with internal structure inhomogeneity, which infiltrate nearby tissues with invasion and destruction. Due to malignant type of tumoral vascular supply their contrast uptake may be: inhomogeneous, nodular, ring – shape or in mosaic.

8.2. RADIOGRAFIC DIAGNOSIS

Malignant tumors are identified by characteristic morpho-pathological criteria as space occupying formations:

- osteolytic or osteocondensing,
- focal diffuse defined,
- unencapsulated,
- invading, infiltrating and destroying nearby anatomic structure:
 - lamina dura,
 - nasal floor,
 - regional cortical bone.

8.3. CT - SCAN EVALUATION

Detect invasive characters of malignant tumors:

- diffuse defined,
- inhomogeneous native and after intravenously contrast substance administration,
- with infiltration of the regional adipose coating tissue and
- eventually identify a secondary regional or distant disseminated metastases.

8.4. MRI - EXAM DIAGNOSIS CONTRIBUTION

Offer a native tissular contrast which will define by specific signal variation the malignant tumoral characters:

- inhomogeneity

- diffuse outlined,
- infiltrative capacity,
- inhomogeneous contrast uptake,
- infiltration of the regional adipose coating tissue and
- eventually detect secondary loco - regional or distant disseminated metastases.

8.5. MAXILLARY MALIGNANT NON - ODONTOGENIC TUMORS HISTOLOGY

Histologic, maxillary malignant non-odontogenic tumors classify in:

- carcinomas,
- sarcoamas,
- plasma cell neoplasm,
- malignant lymphomas.

8.5.1. CARCINOMAS

May also be classified in primitive and metastatic with delineation of some cellular types:

- primitive:
 - squamous cell,
 - adenocarcinomas,
 - mucoepidermoid.
- metastatic:
 - osteolytic,
 - osteosclerotic.

SQUAMOUS CELL CARCINOMAS

With epithelial origin, frequently are localized in oral cavity or oral floor, initially affecting an epithelial coating tissue nearby osseous tissue but, due to rapidly invasive character infiltrate regional anatomic skeletal structures.

More often involve mandible in the third molar region and maxillary in tuberosity region.

Radiographic are detected as regional diffuse defined osteolysis without: marginal osteosclerosis, internal calcifications, periosteal reaction.

Extraosseous invasion by destroying cortical bone with nearby soft tissues infiltration.

In the case of maxillary tuberosity implication the evolution is to antral further destruction.

CT - scan and especially MRI accurately detect and characterize the soft tissues carcinoma with adequate revealing of the regional osseous invasion.

ADENOCARCINOMAS

They may have regional different origins, those affecting maxillary skeletal structure being less invasive than squamous cells one.

Radiographic may appear:

- with indifferentiable characters to those with squamous cells,**
- with tumoral net defined osteolytic radiolucency similar to ameloblastoma.**

MUCOEPIDERMOID CARCINOMAS

Although malignant lesion has many times contour and structure characters of benign type related with “honeycombing” ameloblastoma aspect, some lesions have clear malignant characters.

METASTATIC CARCINOMAS

They are secondary bone dissemination of primitive carcinoma from: bronchus, mammary glands, thyroid gland and rectum.

Mostly of them appear radiographically as osteolysis with typical malignant characters.

Others appear as osteocondensation, also of malignant type and with periosteal reaction especially those from mammary glands and prostatic carcinomas.

8.5.2. SARCOMAS

According to cellular types these highly aggressive tumors may be classified in:

- osteosarcomas,**
- chondrosarcomas,**
- fibrosarcomas,**
- reticular cell,**
- lymphosarcomas,**
- Ewing sarcoma.**

OSTEOSARCOAMAS

Together with multiple myeloma, they are the most frequent primitive osseous tumors.

Although mainly affects long bones nearby knee articulations, osteosarcomas involve maxillary in 5% of cases.

They arise in several clinical settings:

- post radiation therapy or
- as a complication of pre-existing bone abnormalities:
 - osteogenesis imperfecta,
 - fibrous dysplasia,
 - Paget's disease,
 - osteomyelitis,
 - bone infarct,
 - osteochondromatosis,
 - giant cell tumor.

By the site of origin they may be classified into:

- extraskeletal, arising in soft tissue,
- juxtacortical, arising from the periosteal surface,
- conventional type, arising within the medullary cavity.

EXTRASKELETAL FORMS

They are forms like rhabdomyosarcoma or liposarcoma secondary affecting regional osseous structure by nearby malignant invasion.

Mostly appearing as inhomogeneous diffuse defined osteolysis, they usually associate a periosteal typical reaction.

JUXTACORTICAL FORMS:

Arising from the periosteal surface there may be delineated as:

- PAROSTEAL OSTEOSARCOAMAS,
- PERIOSTEAL OSTEOSARCOAMAS.

PAROSTEAL OSTEOSARCOAMAS

They are the most frequent type. Maxillary localization has mainly man affecting.

Radiographic are detected as a loco-regional mass of osteocondensation attached to an external osseous surface and separated by a linear radiolucency corresponding to the periosteal.

PERIOSTEAL OSTEOSARCOMAS

They are more rarely, mainly man 2/1 affecting,

Radiographic detected as a more radiolucent mass than periosteal, with an usually thickened cortex and rarely an adjacent periosteal reaction as Codman triangle or perpendicular to bone surface speculations.

MEDULLARY CONVENTIONAL FORMS

Are also mainly man affecting, with inflammatory type clinic symptoms, dominated by painfully local edema,

Radiographic are precocious detected as regional osteolysis which widen alveolo-dental space and remove dental adjacent roots.

In advanced forms appear typical radiographic aspects: “moth eaten bone” or inhomogeneous, diffuse defined osteolytic masses, with “sun rays” periosteal reaction and varying osteocondensation degree.

CHONDROSARCOMAS

They are cartilaginous tumors which rarely involve maxillary, appearing in adults and elderly, equally both sexes affecting.

Are hardly differentiable from benign lesions, so any maxillary cartilaginous tumor will be considered potentially malignant and such as treated.

Clinic manifest by painless marked local edema with extrusion and dental instability, which become symptomatic explosive in anatomical adjacent structures: headaches, visual disorders, nasal symptom.

Radiographic appear as malign type osteolytic changes: “moth eaten bone”, solitary or multiple diffuse defined osteolysis, usually with various ossification and calcifications.

Imaging diagnosis methods as CT and MRI have superior possibilities by easily detecting characteristic densities or signal variations.

CT- scan having specific abilities in calcium deposits detection, is the elected diagnosis method due to the fact that chondrosarcomas are usually associated with characteristic calcification.

A distinct form of chondrosarcoma is the mesenchymal form:

- very aggressive and metastasizing,**
- Ewing sarcoma related and as well as this, with good respons**

to radio- chemotherapy.

Radiographic appear as diffuse or net defined osteolysis, usually with various calcifications.

FIBROSARCOMAS

They are sarcoma type tumors, rarely involving maxillary level, with low grade of malignancy and bone origin, mainly affecting elderly people,

Radiographic appear as a diffuse defined osteolysis, without internal calcifications, destroying adjacent cortical bone and in regional soft tissues extension.

RETICULAR CELL SARCOMAS

They rarely involve maxillary level, without a characteristic radiographic aspect, most usually being identified as solitary or multiple osteolytic lesions, separated by spans of normal bone. Hardly differentiable by imaging methods from: ameloblastoma, metastases or mixoma.

EWING SARCOMA

Aggressive and metastasizing sarcoma tumor which rarely involve maxillary region, hence any regional localized lesion must be from an eventual metastases differentiated.

The scintigraphic all skeleton lesional balance are the most adequate imaging method.

Frequently involving young people,

Has a malignant radiographic aspect characterized by association of an medullar inhomogeneous osteolysis which destroy and expand the regional cortical bone with a multilamellated “onion-skin“ periosteal reaction usually with an adjacent soft tissue component.

8.5.3. PLASMA CELL TUMORS

They are the result of plasmocyte proliferation- pluripotent stem cell of B lymphocyte line - but with only in one clone origin and with corollary immunoglobulin monoclonal compound secretion,

Hence the generic name of the group disorders: monoclonal gammopathies.

According to aggressivity degree and lesional multiplicity may be deffined:

- **MULTIPLE MYELOMA**
- **SOLITARY PLASMOCYTOMA OF BONE**

MULTIPLE MYELOMA

It is the highly aggressive form of disease, with 20 months survival rate. They are mainly affected elderly people, being more frequently in man,

Has a disseminated, multifocal implying of the hematopoietic skeleton and in soft tissue extraosseous development.

Protein electrophoresis easily detects characteristic immunoglobulin A or G with a monoclonal light chain: kappa or lambda.

Also urinary monoclonal light chains are detected, the so-called Bence Jones proteinuria being present.

Radiography detects multiple sharply osteolytic lesions, drill holes like, without marginal sclerosis, localized in jaws and in other hematopoietic marrow-containing bones of the skeleton (skull, pelvis, scapula, vertebra, etc).

Bony lesion evolution may be worsened by often fracture outbreaks after minor traumas.

SOLITARY PLASMOCYTOMA OF BONE

It seems to be the mild aggressive form, slowly progressive, with 10 years survival rate. Also more frequently in man, at about 50 years of ages, rarely has a maxillary localization, usually at the level of mandible angle,

This form has normal peripheral blood picture and normal differential and clinical chemistry profile.

Radiography detects a well-defined osteolytic lesion, often multilocular, which destroy the cortical bone and invade the adjacent soft tissues, usually complicated with regional fracture trajectories.

It may slowly progress to aggressive form of disease, ab initio requiring a complex treatment: surgical ablation followed by loco-regional radiotherapy and further a carefully clinico-biological and imaging dispensarisation.

8.5.4. MALIGNANT LYMPHOMAS

The most frequently maxillary localized form is Burkitt lymphoma, a highly aggressive non - Hodgkin malignant lymphoma, resulted from malignant proliferation of some lymphocyte B clones triggered by Epstein-Barr viral

infection in specific tropical Africa climate condition, where may be endemic appearing.

There were also identified some different clinical forms of the disease in North America.

Immunohistologically the two described forms are identical and has in common a chromosomal abnormality: distal part translocation of 8 chromosome on 14 chromosome, which most probably gives them the highly aggressive character.

The disease with predilection involve: maxillary, abdomen, lymphatic nodes and endocrine glands.

At maxillary level, radiography identifies “moth eaten bone” aspect, a malignant type osteolytic lesion with destruction or perforation of the cortical bone, soft tissues extension and abnormally dental mobility.