Malignant tumors of soft tissues and bones of head at children. Diagnostics, differential diagnostics, features of clinical course, principles of treatment.

Pediatric Surgical Dentistry

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(Viber)

Plan and organizational structure of lecture

№ з/п	Basic stages of lecture and their maintenance	Type of lecture. Facilities of activation of students. Materials of the methodical providing	Distribution of time
1	Preparatory stage. Determination of actuality of theme, educational aims of lecture and motivation	Look. of p 1 p 2	5%
2	The basic stage of teaching of lecture is the -Подготовительный stage. determination actuality of theme, educational aims of lecture and motivation 1. Statistics 2. Actuality of theme of lecture the "Malignant tumours of soft fabrics and bones of person for children. Diagnostics, differential diagnostics, features of clinical flow, principles of treatment ". 3. Etiologic trading posts, influencing on forming of malignant tumours of maxillufacial area for children. 4. A tumour is a pathological process of excrescence of cages in which a mitosis is not controlled and the phenomena of biological atypical develop. 5. Classification of malignant growths of FMA for children. 6. Pathogeny of malignant tumours of fabrics of FMA for children. 7. Feature of clinical displays malignant tumours of soft fabrics and bones of facial skeleton for children. 8. Methods of diagnostics. 9. Holiatry. 10. Postoperative period, rehabilitation.	Clinical lecture. Lecture with the use of evidentness.	85% - 90%
1 2 3	Final stage Resume of lecture, general conclusions. Answers for possible questions. Task for selfstyding of students	Answers on possible questions.	5%

Background

- Environmental causes of childhood cancer have long been suspected by many scientists but have been difficult to pin down, partly because cancer in children is rare and because it is difficult to identify past exposure levels in children, particularly during potentially important periods such as pregnancy or even prior to conception. In addition, each of the distinctive types of childhood cancers develops differently—with a potentially wide variety of causes and a unique clinical course in terms of age, race, gender, and many other factors.

Classification

Malignant tumours in child's age frequently have connective-tissue origin. The cancer of oral cavity tissues at children arises rarely. According classification of world health organization and histological classification the tumors of skin and oral cavity divided into some groups:

I. Tumors from multi-layer plain epithelium.

1. Intraepithelial carcinoma (carcinoma in situ).
2. Planocellular cancer:
   1) spindle cell carcinoma;
   2) lymphoepithelioma;
   3) verrucous carcinoma.

II. Tumors from secretory epithelium (tumors of salivary glands).

Classification

III. Tumors from soft tissues:

- Fibrosarcoma.
- Liposarcoma.
- Leiomyosarcoma.
- Rhabdomyosarcoma.
- Chondrosarcoma.
- Malignant hemangioendothelioblastoma (angiosarcoma).
- Malignant hemangiopericytoma.
- Lymphoblastic lymphosarcoma..
- Malignant (neuro)schwannoma (neurofibrosarcoma).

IV. Tumors from melanocytes (malignant melanoma)

V. Tumors of obscure histogenesis.

1. Granular cell myoblastoma.
2. Kaposi's sarcoma.

Glossary

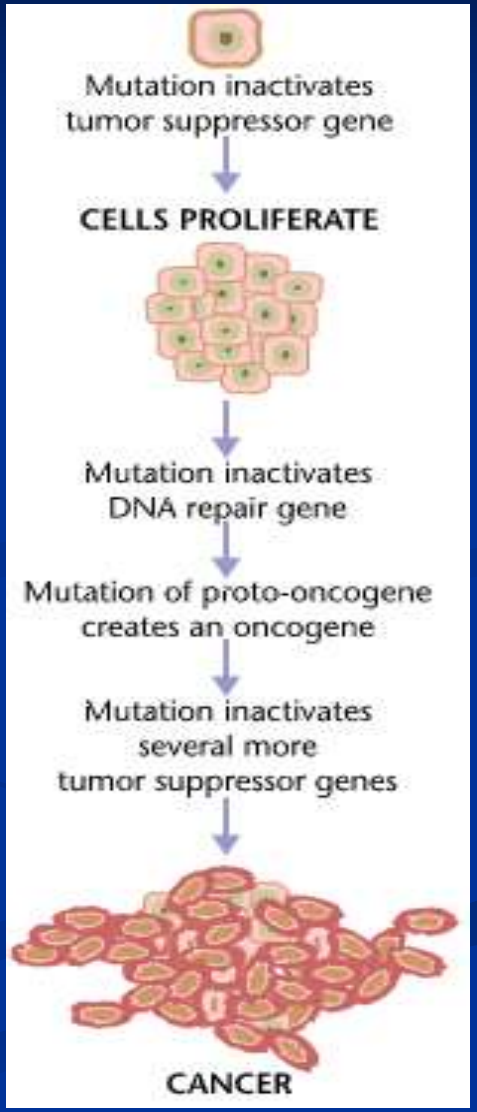
- The following closely related terms may be used to designate abnormal growths:
- **Invasive** tumor is another synonym of **cancer**. The name refers to invasion of surrounding tissues.
- **Pre-malignancy**, **pre-cancer** or **non-invasive** tumor: A neoplasm that is not invasive but has the potential to progress to cancer (become invasive) if left untreated. These lesions are, in order of increasing potential for cancer, atypia, dysplasia and carcinoma in situ. The following terms can be used to describe a cancer:
- **Grade**: a number (usually on a scale of 3) established by a pathologist to describe the degree of resemblance of the tumor to the surrounding benign tissue.
- **Stage**: a number (usually on a scale of 4) established by the oncologist to describe the degree of invasion of the body by the tumor.
- **Recurrence**: new tumors that appear at the site of the original tumor after surgery.
- **Metastasis**: new tumors that appear far from the original tumor.
- **Median survival time**: a period, often measured in months or years, over which 50% of the cancer patients are expected to be alive.

Glossary

- **Transformation:** the concept that a low-grade tumor transforms to a high-grade tumor over time. Example: Richter's transformation.
- **Chemotherapy**: treatment with drugs.
- **Radiation therapy**: treatment with radiations.
- **Adjuvant** therapy: treatment, either chemotherapy or radiation therapy, given **after** surgery to kill the remaining cancer cells.
- **Neoadjuvant** therapy: treatment either chemotherapy or radiation therapy, given **before** surgery to shrink a tumor to make its resection easier.
- **Prognosis**: the probability of cure/remission after the therapy. It is usually expressed as a probability of survival five years after diagnosis. Alternatively, it can be expressed as the number of years when 50% of the patients are still alive. Both numbers are derived from statistics accumulated with hundreds of similar patients to give a Kaplan-Meier curve.
- **Cure**: A cancer patient is "cured" or "in remission" if they live past the time by which 95% of treated patients live after the date of their diagnosis of cancer. This period varies among different types of cancer; for example, in the case of Hodgkin's disease this period is 10 years, whereas for Burkitt's lymphoma this period would be 1 year.The phrase "cure" used in oncology is based upon the statistical concept of a median survival time and disease-free median survival time.

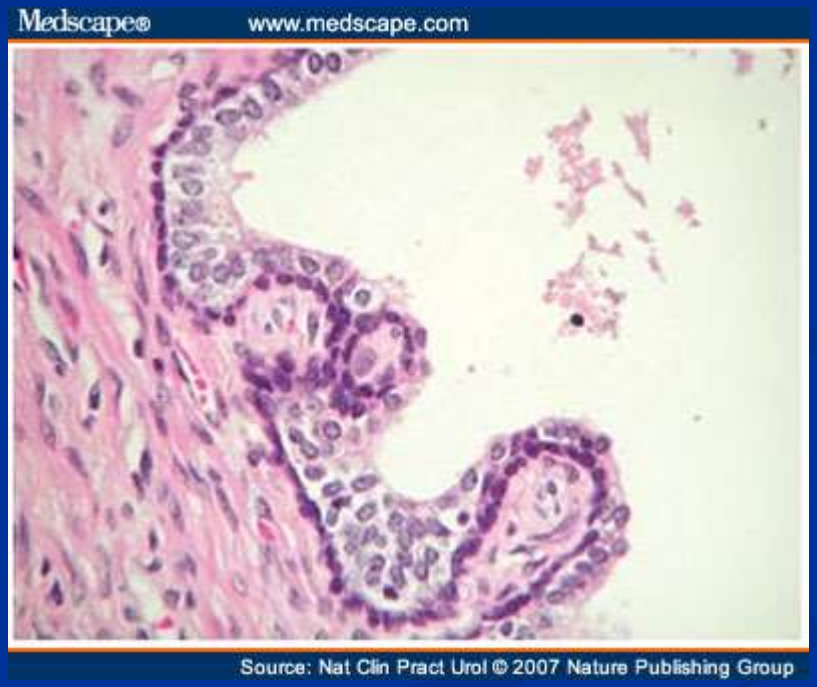
Pathophysiology

- Cancer is fundamentally a disease of regulation of tissue growth. In order for a normal cell to transform into a cancer cell, genes which regulate cell growth and differentiation must be altered. Genetic changes can occur at many levels, from gain or loss of entire chromosomes to a mutation affecting a single DNA nucleotide. There are two broad categories of genes which are affected by these changes. Oncogenes may be normal genes which are expressed at inappropriately high levels, or altered genes which have novel properties. In either case, expression of these genes promotes the malignant phenotype of cancer cells. Tumor suppressor genes are genes which inhibit cell division, survival, or other properties of cancer cells. Tumor suppressor genes are often disabled by cancer-promoting genetic changes. Typically, changes in many genes are required to transform a normal cell into a cancer cell.



Squamous cell carcinoma

- **Squamous cell carcinoma**, sometimes termed *epidermoid carcinoma,* is defined as a malignant neoplasm that is derived from or exhibits the morphologic features of squamous epithelium. As discussed earlier, squamous cell carcinoma is often the end stage of a series of alterations in stratified squamous epithelium, beginning as an epithelial dysplasia and progressing until the dysplastic epithelial cells breach the basement membrane and invade into the connective tissue. It can also arise de novo from the overlying stratified squamous epimelium, having a relatively short premalignant phase.



Squamous cell carcinoma

- **Etiology**

Squamous cell carcinoma of the head and neck is most commonly associated with the use of alcohol and tobacco. The risk for oral cancer is additive and is up to 40 times greater than in those who neither smoke nor drink. In squamous cell carcinoma, mutations in the p53 gene correlate with drinking and smoking habits. Some 15% of patients have a viral etiology. Epstein-Barr virus (EBV) has been implicated in the development of nasopharyngeal carcinoma. Human papillomavirus infection is another factor implicated in the carcinogenesis of upper aerodigestive tract tumors. In particular, human papillomavirus-16 (HPV 16) can be isolated in up to 72% of oropharyngeal cancers. The recent increase in cancer of the tongue and tonsils in developed countries, particularly in patientsyoungerthan45, has been linked to HPV infection.

Environmental exposures to paint fumes, plastic byproducts, wood dust, asbestos, and gasoline fumes have been implicated as risk factors. Gastroesophageal reflux disease is now thought to be a significant risk factor for cancer of the larynx and especially the anterior two thirds of the vocal cords. Irritation from poorly fitting dentures also has been implicated. Dietary deficiencies are also important risk factors. Vitamin A deficiency and iron deficiency associated with Plummer-Vinson syndrome have been linked to oral and pharyngeal cancers.

Squamous cell carcinoma

- **Pathophysiology**

Squamous cell carcinoma is thought to arise from keratinizing or malpighian epithelial cells. The hallmark of squamous cell carcinoma is the presence of keratin or "keratin pearls" on histologic evaluation. These are well-formed desmosome attachments and intracytoplasmic bundles of keratin tonofilaments. The term epidermoid can be substituted for squamous.

Morphologically, squamous cell carcinoma is variable and may appear as plaques, nodules, or verrucae. These, in turn, may be scaly or ulcerated and white, red, or brown. Verrucous carcinoma has a more favorable prognosis because of infrequent nodal and distant metastasis.

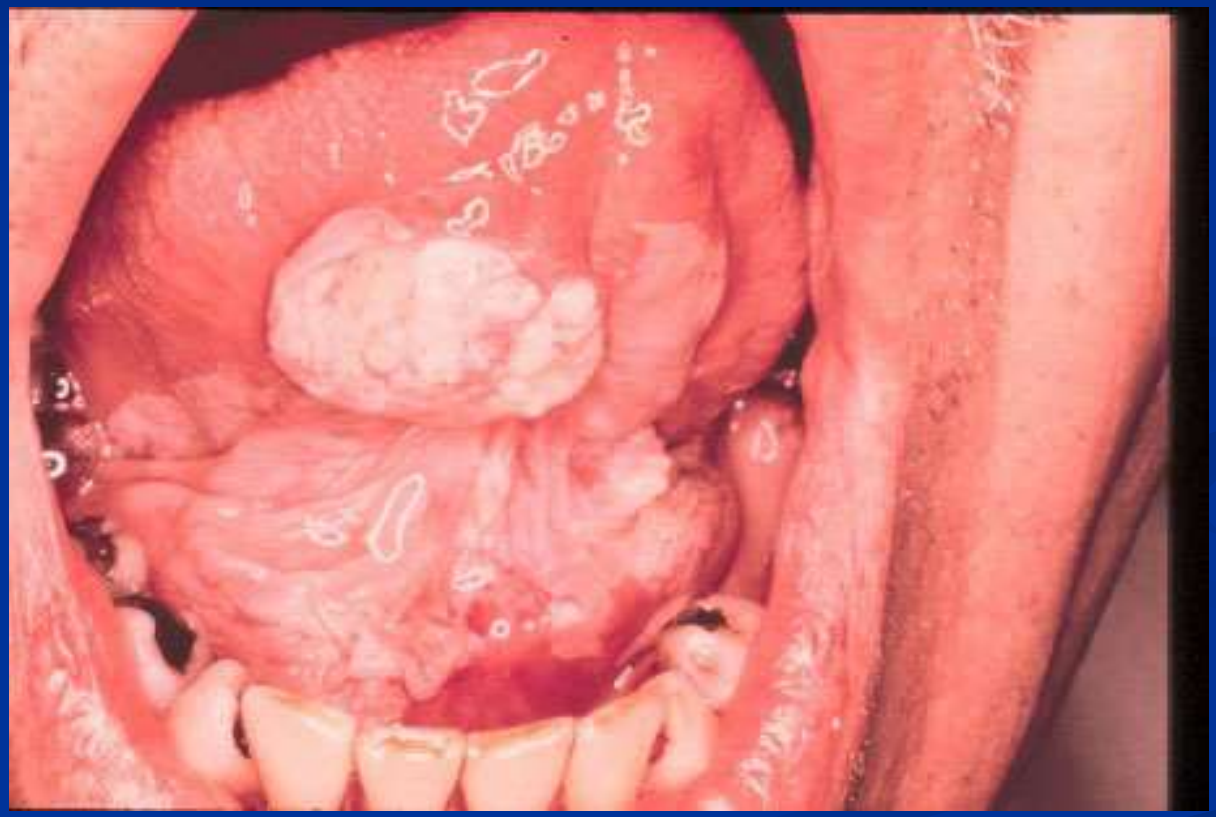
Squamous cell carcinoma

- **Clinical presentation**

Squamous cell carcinomas usually begin as surface lesions with erythema and slight elevation. These lesions are termed erythroplasia and deserve biopsy. These early red lesions are asymptomatic and may be either carcinoma in situ or invasive carcinoma. One third of lesions are pure white; they are known as leukoplakia but only 10% of them are carcinoma in situ or invasive carcinoma. The most common sites for squamous cell carcinoma are the floor of the mouth, the tongue, the soft palate, the anterior tonsillar pillar, and the retromolar trigone. Tender, painful lesions usually are suggestive of perineural invasions. When lesions become palpable masses, symptoms such as a vague persistent sore throat or ear infection occur.

In more advanced cases, dissemination to ipsilateral submandibular and jugulodigastric nodes is common, and the patient may present with a mass in the neck. When lymph node or remote bone and organ metastases are associated with an early oral primary lesion, often a second, more advanced primary upper aerodigestive or lung cancer is responsible for the metastases.

Squamous cell carcinoma



TNM clinical classification

- Factors that influence choice and type of treatment are the site and stage of the primary tumor. The TNM staging system used for head and neck cancers is a clinical staging system that allows physicians to compare results across patients, assess prognosis, and design appropriate treatment regimens. T refers to tumor size at the primary site, N refers to the status of the cervical chain of lymph nodes, and M refers to the presence or absence of distant metastases.

- **T = Extent of the primary tumor**
- **N = State of regional lymph nodes**
- **M = Metastases**
- The same system is employed for laryngeal tumors. The basic premise of these systems is that smaller cancers with no nodal disease have a better prognosis than a larger lesion with positive neck nodes.

TNM clinical classification

- T - Primary tumor
  - Tis - Preinvasive cancer (carcinoma in situ)
  - T0 - No evidence of primary tumor
  - T1 - Tumor 2 cm or less in greatest dimension
  - T2 - Tumor larger than 2 cm but not larger than 4 cm
  - T3 - Tumor larger than 4 cm
  - T4 - Tumor with extension to bone, muscle, skin, antrum, neck
  - Tx - Minimum requirements to assess primary tumor cannot be met
- N - Regional lymph nodes
  - N0 - No evidence of regional lymph node involvement
  - N1 - Evidence of involvement of a movable homolateral regional lymph node smaller than 3 cm
  - N2a - Evidence of involvement of a movable homolateral regional lymph node 3-6 cm
  - N2b - Evidence of involvement of multiple homolateral regional lymph nodes smaller than 6 cm
  - N2c - Evidence of involvement of contralateral or bilateral regional lymph nodes smaller than 6 cm
  - N3 - Any lymph node larger than 6 cm
  - Nx - Minimum requirements to assess the regional nodes cannot be met
- M - Distant metastases
  - M0 - No evidence of distant metastases
  - M1 - Evidence of distant metastases
  - Mx - Minimum requirements to assess the presence of distant metastases cannot be met

Squamous cell carcinoma

- ***Sites and Incidence***

  The incidence of squamous cell carcinoma differs between anatomic sites. Some anatomic sites are relatively resistant, whereas others are particularly susceptible. When all anatomic sites are considered, the (lower lip is the most susceptible site. Within the confines of the oral cavity, the lateral and ventral aspects of the tongue and the adjacent floor of the mouth are the most susceptible sites, followed by the posterior soft palate, particularly in the areas adjacent to the tonsillar pillars. Less frequently, the gingiva and alveolar ridge area is the site of origin. The buccal mucosa, especially above the occlusal line, is seldom involved. Compared with other intraoral sites, carcinomas arising on the hard palate and dorsum of the tongue are relatively rare.

Squamous cell carcinoma

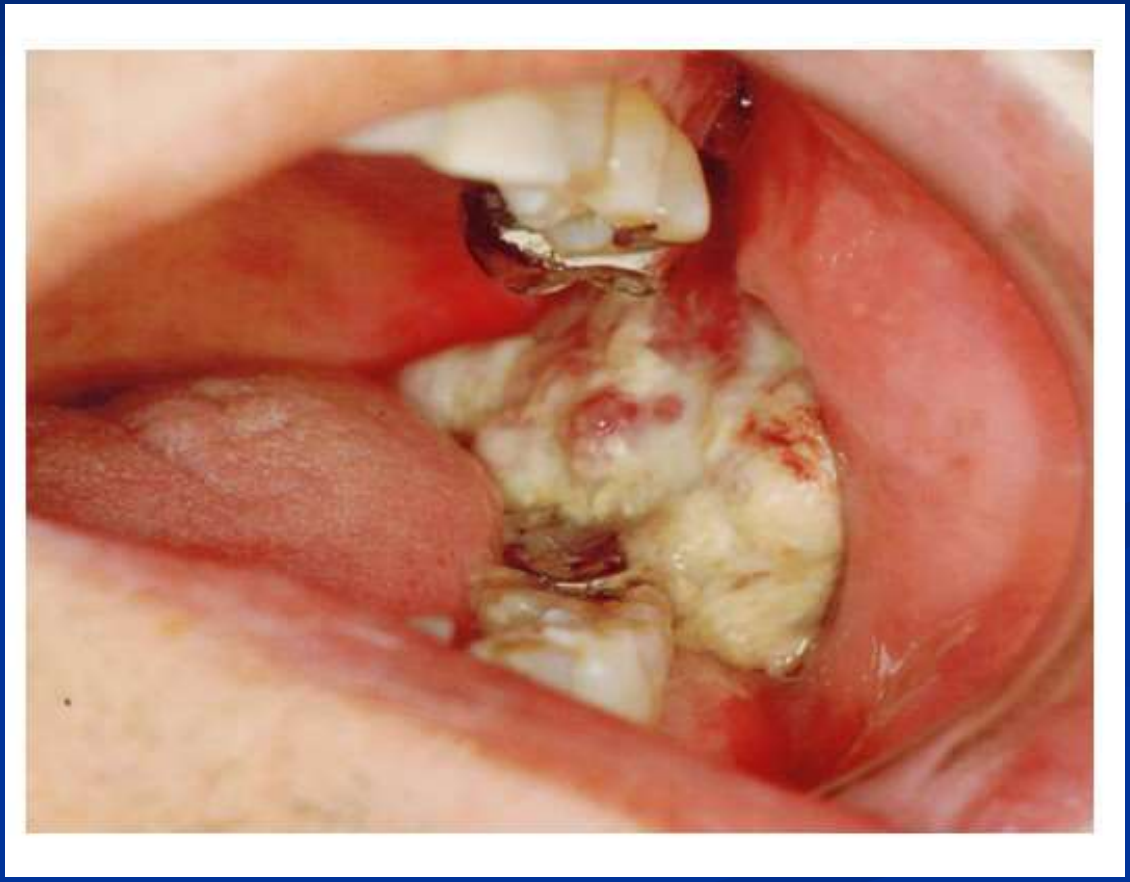
- ***Treatment***

  Clinicians usually treat squamous cell carcinoma of the oral cavity by surgical excision, radiation therapy, or both. Depending on the size, site, and stage of the lesion, surgical treatment may consist of local excision or a combination of local excision and regional lymph node dissection. For example, squamous cell carcinoma of the vermilion border of the lower lip is usually well differentiated, often diagnosed at an early stage, and can usually be cured by local excision. By contrast, squamous cell carcinomas of the lateral border of the tongue or floor of the mouth are usually not as well differentiated, often diagnosed at later stages, and metastasize sooner. These lesions usually require extensive treatment (usually a combination of surgery, radiation, and possibly chemotherapy) and have a much poorer prognosis.

Spingle cell carcinoma

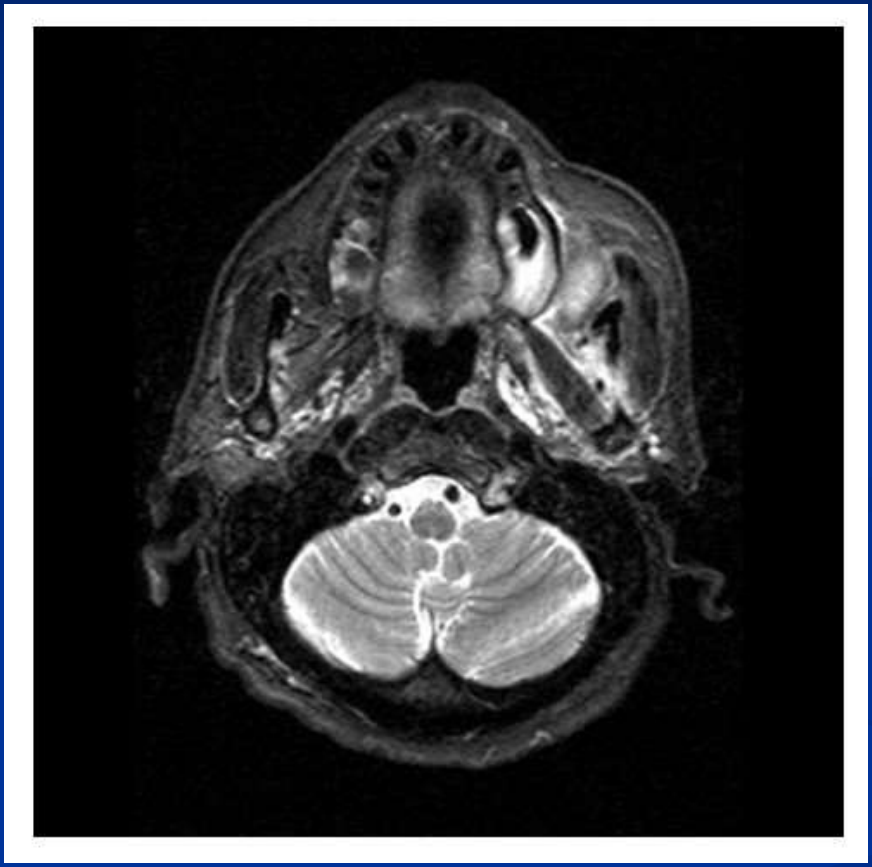
- Spindle cell carcinoma (SpCC), also known as sarcomatoid carcinoma or pseudosarcoma, of head and neck is a rare neoplasm. SpCC is known as a high malignant variant of squamous cell carcinoma, which is composed of conventional squamous cell carcinoma component, either in-situ and/or invasive and malignant spindle component with sarcomatous appearance. Although it is generally accepted that SpCC is a monoclonal epithelial neoplasm, and the sarcomatous components are derived from squamous epithelium with divergent mesenchymal differentiation, the diagnosis, classification and management of this tumor infrequently may become subject matter deluded of its histological variety in sarcomatous components. These sarcomatous components commonly resemble to fibrosarcoma or malignant histiocytoma, and while rare, foci resembling to chondrosarcoma and/or osteosarcima differentiation may be observed.

Spingle cell carcinoma



- **Gross finding of the tumor**. Intraoral examination showed exophytic, polypoid mass with irregular surface in the mandibular molar region.

Spingle cell carcinoma



- **Axial MRI imaging of the tumor**. The margin of the lesion was clear, no invasion was observed.

Verrucous carcinoma

- Verrucous carcinoma (VC) refers to a clinicopathologic concept implying a locally aggressive, clinically exophytic, low-grade, slow-growing, well-differentiated squamous cell carcinoma with minimal metastatic potential.

  Verrucous carcinoma typically involves the oral cavity, larynx, genitalia, skin, and esophagus.

  In 1948, Ackerman first described verrucous carcinoma in the oral cavity as a low-grade tumor that generally is considered a clinicopathologic variant of squamous cell carcinoma.
- HPV infection is thought to facilitate or cause verrucous carcinoma
- Chronic inflammation may lead to the development of verrucous carcinoma
- Oral verrucous carcinoma is associated with poor dental hygiene, ill-fitting dentures, and low socioeconomic status. Oral verrucous carcinoma has a higher incidence in males and in immunocompromised patients

Oral verrucous carcinoma

Oral verrucous carcinoma (Ackerman tumor, oral florid papillomatosis)

- The oral cavity is the most common site of occurrence of verrucous carcinoma.
- Early lesions appear as white, translucent patches on an erythematous base. They may develop in previous areas of leukoplakia, lichen planus, chronic lupus erythematosus, cheilitis, candidiasis, or submucous fibrosis.
- The more fully developed lesions are white, soft, cauliflowerlike papillomas with a pebbly surface that may extend and coalesce over large areas of the oral mucosa.
- Ulceration, fistulation, and invasion locally into soft tissues and bone (eg, mandible) may occur. Oral verrucous carcinoma most commonly occurs on the buccal mucosa. Other sites of involvement are the alveolar ridge, upper and lower gingiva, floor of the mouth, tongue, tonsils, and vermilion border of the lip.
- Painful nonmalignant lymphadenopathy can be seen with concurrent infection or inflammation.
- Tumors most often grow around the lymph nodes rather than metastasizing to them. If metastases do occur, they usually remain limited to the regional lymph nodes.
- Oral verrucous carcinoma involving the hard palate and upper alveolus is considered more aggressive.
- In these patients, the majority of the tumors present at advanced stages

Lymphoepithelioma

- **Lymphoepithelioma** is a type of poorly differentiated nasopharyngeal carcinoma characterized by prominent infiltration of lymphocytes in the area involved by tumor. Lymphoepithelioma is also known as "class III nasopharyngeal carcinoma" in the WHO classification system. Most cases are associated with Epstein-Barr virus infection.[1]
- Lymphoepithelioma may also be referred to as **Schmincke-Regaud tumor**, after the German pathologist and French radiologist .
- **Lymphoepithelioma-like carcinomas** are carcinomas that arise outside of the nasopharynx, but resemble a lymphoepithelioma histologically. Lymphoepithelioma-like carcinomas may be found in almost any epithelial organ, including the lung, thymus, breast, colon, endometrium, prostate, and skin

Malignant tumors of salivary glands

- Malignant tumors are less common and are characterized by rapid growth or a sudden growth spurt. They are firm, nodular, and can be fixed to adjacent tissue, often with a poorly defined periphery. Pain and neural involvement are common. Eventually, the overlying skin or mucosa may become ulcerated or the adjacent tissues may become invaded. Surgery, followed by radiation therapy, is the treatment of choice for resectable disease. Currently, there is no effective chemotherapy for salivary cancer.

Malignant tumors of salivary glands

- ***Mucoepidermoid carcinoma*** is the most common salivary gland cancer, typically occurring in people in their 20s to 50s. It can manifest in any salivary gland, often in a minor salivary gland of the palate, or it can occur deep within the bone, such as in the wall of a dentigerous cyst. Intermediate and high-grade mucoepidermoid carcinomas may metastasize to the regional lymphatics, which must be addressed with surgical dissection or postoperative radiation therapy.
- ***Adenoid cystic carcinoma*** is the most common malignant tumor of minor salivary glands (and of the trachea). It is a slowly growing malignant transformation of a much more common benign cylindroma. Its peak incidence is between ages 40 and 60, and symptoms include severe pain and, often, facial nerve paralysis. It has a propensity for perineural invasion and spread, with disease potentially extending many centimeters from the main tumor mass. Lymphatic spread is not a common feature of this tumor, so elective nodal treatment is less common. Although the 5- and 10-yr survival rates are quite good, the 15- and 20-yr rates are quite poor, with most patients developing distant metastases. Pulmonary metastases are common, although patients can live quite long with them.
- ***Acinic cell carcinoma***, a common parotid tumor, occurs in people in their 40s and 50s. This carcinoma has a more indolent course, as well as an incidence of multifocality.
- ***Carcinoma ex mixed tumor is adenocarcinoma*** arising in a preexisting benign carcinoma ex mixed tumor. Only the carcinomatous element metastasizes.

Malignant tumors of salivary glands

Symptoms and Signs

- Most benign and malignant tumors manifest as a painless mass. However, malignant tumors may invade nerves, causing localized or regional pain, numbness, paresthesia, causalgia, or a loss of motor function.

Diagnosis

- Biopsy
- CT and MRI for extent of disease
- CT and MRI locate the tumor and describe its extent. Biopsy confirms the cell type. A search for spread to regional nodes or distant metastases in the lung, liver, bone, or brain may be indicated before treatment is selected.

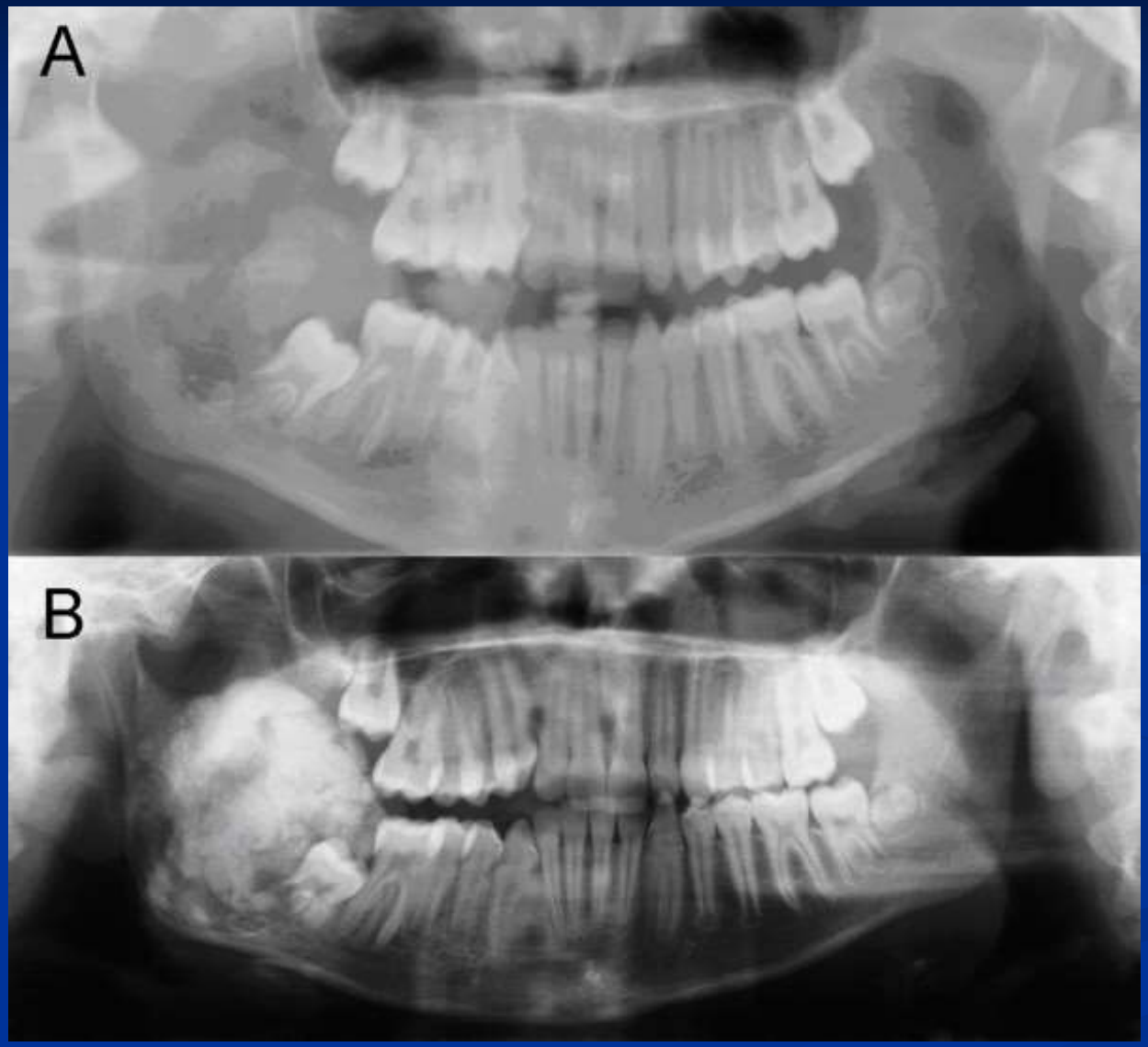
Treatment

- Surgery, sometimes plus radiation therapy

Infantile fibrosarcoma

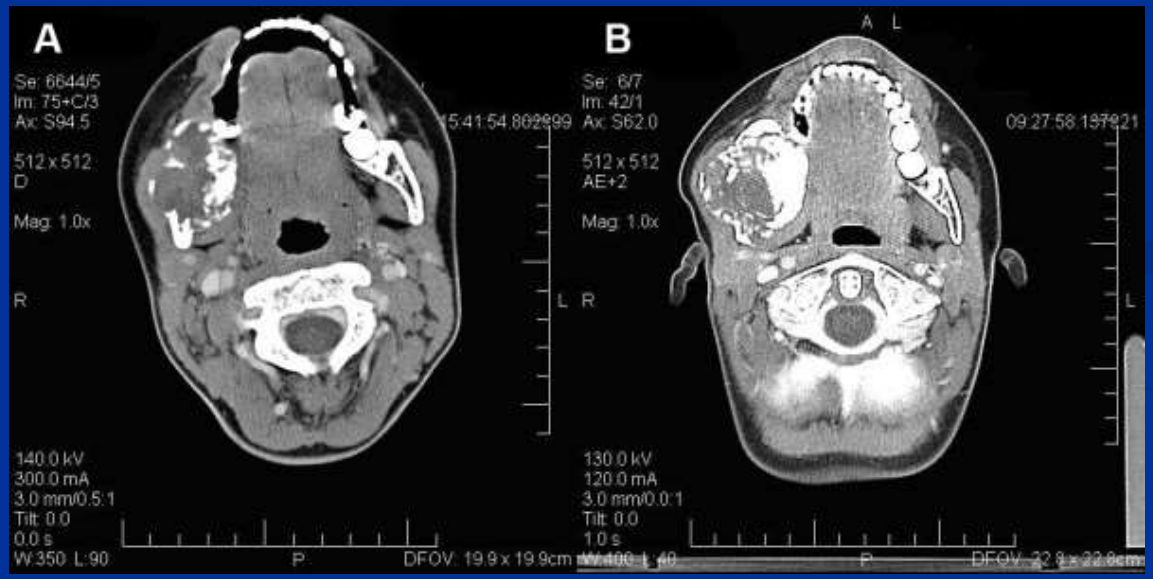
- Infantile fibrosarcoma affects neonates and infants. Although its histologic appearance simulates adult-type fibrosarcoma, its natural history is much more favorable.Most infantile fibrosarcomas are diagnosed during the first 3 months of life, and the extremities in the head and neck region are the most common sites. Rapid growth of the mass in proportion to the size of the child is an alarming characteristic.

Fibrosarcoma



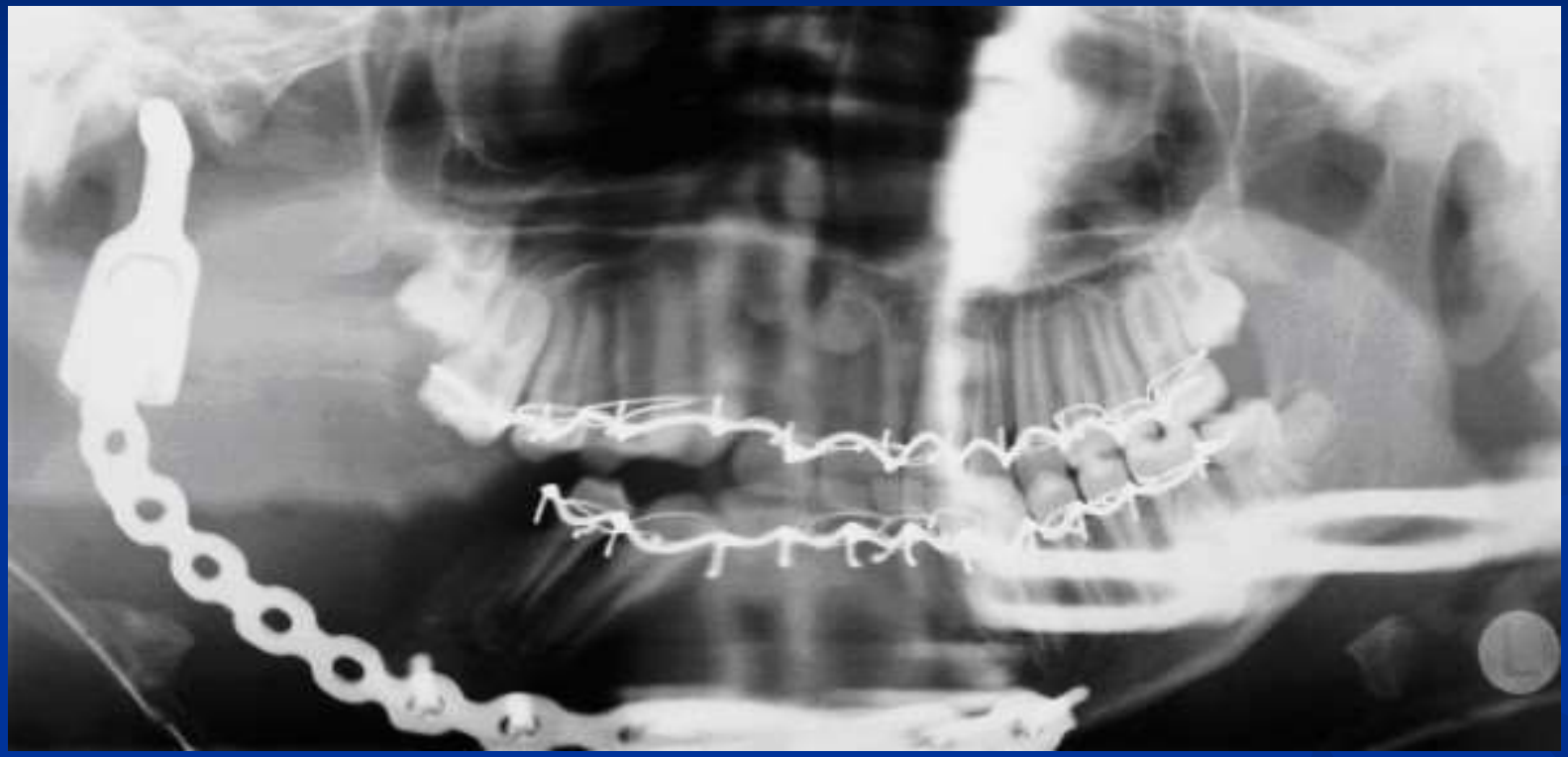
- A: Panoramic radiography at first presentation: A large radiolucent lesion with irregular borders infiltrating the right ramus of the mandible. Displacement of tooth 47.
- B: Panoramic radiography after 3 months: The growth of the tumour mass is visible with a striking increase of radio-opaque structures.

Fibrosarcoma



- **Preoperative computed tomography scan in comparison to the scan at first admission, revealing the tumour progression.** A: CT before treatment: In the right mandibular angle a heterogenous mass of 3.0 × 3.6 cm is demonstrated, showing a rather sharp margin with cortical destruction. B: CT three months later: The computed tomography scan three months later reveals progression of the tumour mass (4.5 cm), with a further ballooning of the cortical structure and an increase of hard tissue, some osteolytic lesions and a central soft tissue component.

Fibrosarcoma



- **Panoramic radiography post operation.** The combined Recontruction locking plate with artificial condylus can be seen.

Malignant Lymphoma

- Malignant lymphomas are neoplasms of lyrnphoreticular origin that are divided into two main categories: non-Hodgkin's lymphoma (NHL) and Hodgkin's disease. As a group, malignant lymphomas represent the most frequently encountered malignant tumors in the head and neck in children being approximately equally divided in their frequency between Hodgkin's disease and the NHL.

Hodgkin's Disease

- Hodgkin's disease (HD) is a malignant neoplasm of lymphoreticular origin distinguished from NHL by diverse but distinctive morphologic features with one common denominator, the presence of Reed- Sternberg cells, which are widely accepted as the nooplastic cells in this disease. Its peak incidence is noted in adolescence and young adulthood; however, it may be noted even in very young children. Males are affected more often than females.
- As reviewed by Raney, HD has traditionally been classified into four stages depending on the extent of disease at diagnosis. Stage I HD signifies disease involving one lymph node region with stage II signifying involvement of two or more lymph node regions on the same side of the diaphragm, most often in the neck and mediastinum. Stage III indicates disease on both sides of the diaphragm, including the spleen and paraaortic lymph nodes. Stage IV indicates the presence of HD in extra-lymphatic sites, most often the liver and/or lungs, bone marrow, or bone. Symptoms such as unexplained fever with oral temperatures greater than 38" C for 3 or more consecutive days, shaking chills, drenching night sweats, and unexplained weight loss of 10% or more over a 6-month period are considered "B" symptoms, which impart a worse prognosis within each stage.

Hodgkin's Disease

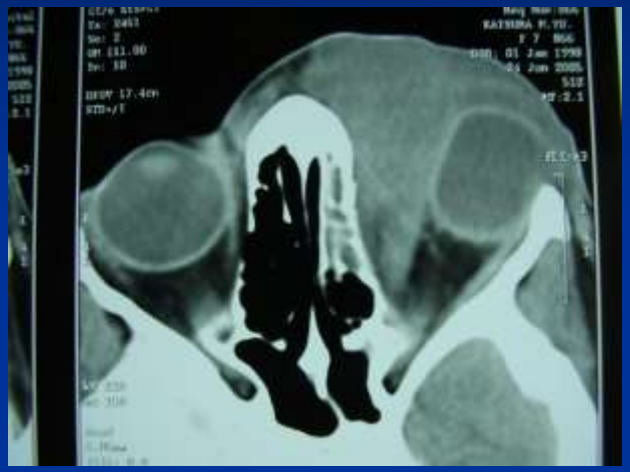
- Hodgkm's disease in the head and neck most commonly presents as a firm, rubbery, asymmetrically enlarged, nontender mass in the cervical lymph node chain. Primarily occurring in lymph nodes, involvement of the oral cavity or orophar-ynx, including Waldeyer's tonsillar ring, is uncommon. Hodgkin's disease is classified into four histologic subtypes: lymphocyte predominance, nodular sclerosing, mixed cellularity, and lymphocyte depletion. The prognosis varies according to the histologic subtype involved and the extent or stage of the disease at the time of prognosis.
- As indicated earlier, treatment for HD varies according to the stage of the disease and clinical,symp-toms. Most treatment programs include chemother-apy and radiation therapy, with some children treated solely with chemotherapy in an attempt to avoid the long-term side effects of radiation therapy. As pointed out by authors such as Raney and Handler, with advances in therapy, current 5-year survival rates for patients with involvement of either a single lymph node group (Stage I) or two or more lymph node regions on the same side of the diaphragm (stage 11) now exceeds *90%,* and 75% of patoni» with disseminated HD survive for 5 years or more.

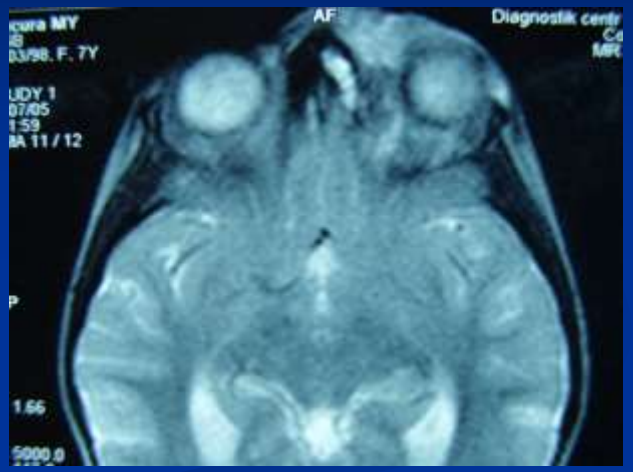
Non-Hodgkin's Lymphomas

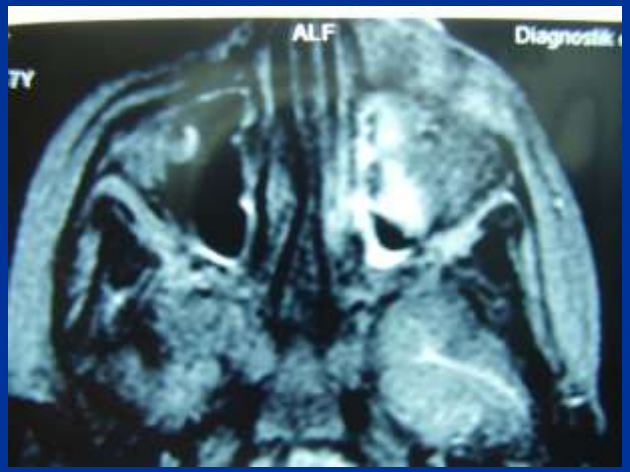
- The NHLs are a heterogenous group of neoplasms of the lymphoid system that may arise in the head and neck in the lymph nodes (nodal), in extranodal lymphatic areas (Waldeyer's tonsillar ring), or in extranodal, extralymphatic tissue, such as the mandible, salivary glands, pharynx, deep fascial spaces, paranasal sinuses, the orbit, and other areas. As pointed out by Miller, Young, and Novakovic; Wright, McKeever, and Carter; and Skarin and Dorfman, the classification or NHL has changed substantially in the past 25 years, differing from adult NHL in that the majority of childhood cases are high grade, demonstrate a diffuse growth pattern, and commonly involve extranodal sites.
- The majority of cases fall into one of three types: small, noncleaved cell lymphoma Burkitt's type (some authors use the terms Burkitt's lymphoma and small, noncleaved lymphoma synonymously; some use Burkitt's lymphoma and non-Burkitt's lymphoma as subtypes of small, noncleaved cell lymphoma; and others speak of them as "related" entities); lymphoblastic lymphoma; and anaplastic large cell lymphoma. The separation of each of these can be made based on morphologic and im-munohistochemical features. Unlike HD, which spreads to contiguous lymph node groups, NHL spreads in an unpredictable fashion such that most patients present with stage III or IV disease.

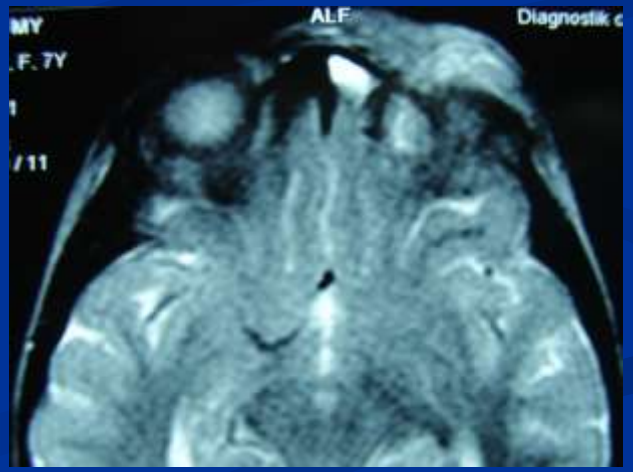
Aplastic lymphoma

Aplastic lymphoma









Rhabdomyosarcoma

- Rhabdomyosarcoma, a malignant neoplasm of skeletal muscle origin, is the most common soft-tissue sarcoma in children, accounting for over half of all such lesions occurring in childhood. There are two key age ranges for rhabdomyosarcoma in children: 2 to 6 years of age and adolescence. According to Miser and Pizzo and others the early peak is due primarily to their occurrence in the head and neck region and genitourinary tract.
- Three histologic subtypes are recognized: embryonal and its botryoid variant, alveolar, and pleomorphic. The embryonal subtype accounts for most rhabdomyosarcomas in infancy and childhood occurring within the deep soft tissues or along mu-cosal surfaces.
- The most common clinical finding is a mass occurring in any region of the head and neck where striated muscle or its mesenchymal progenitor cells exist. There are three primary sites of involvement for rhabdomyosarcoma in the head and neck in children: the eyelid and orbit, parapharyngeal sites, and remaining head and neck sites. The para-meningeal sites include the infratemporal fossa, nasal cavity, nasopharynx, paranasal sinuses, and middle ear. Orally, the tonsil and soft palate are most frequently involved. Typically a rapidly growing, often nonulcerated soft-tissue mass, rhabdomyosarcoma may spread by either lymphatic or hematogenous routes.
- As discussed by Kraus and others, rhabdomyosarcoma arising in the head and neck region have a wide variation in survival dependent on site, with orbital lesions having the highest survival of any site in the body and parameningeal tumors having a worse prognosis. Age, sex, respectability, and tumor, node, metastasis (TNM) stage are also important prognostic variables. Multidrug therapies, which may include surgery as well as multidrug chemotherapy and external beam radiotherapy, have improved survival. In a study by Kraus and others, overall 5-year survival was 74%, with each variable contributing to the TNM system being statistically significant in determining survival.

Classification of malignant tumors of bones:

- Osteosarcoma.
- Periosteal osteosarcoma.
- Chondrosarcoma.
- Ewing's Sarcoma.
- Reticulosarcoma.
- Lymphosarcoma.
- Myeloma.
- Angiosarcoma.
- Fibrosarcoma.
- Liposarcoma.
- Malignant mesenchymoma.
- Undifferentiated sarcoma.
- Tumors which are not classified

The tumors of jaws more frequent meet at children of 7-12 years old, rarer – at teenagers 13-16 years, and most rarely – under age 1 year.

Chondrosarcomas

- **Chondrosarcomas** are malignant bone tumors in which die malignant cells produce abnormal cartilage exclusively and no osteoid or bone. Lesions may be *primary chondrosarcomas* (arising directly from bone cells as malignant neoplasms) or *secondary chondrosarcomas* (arising in a preexisting benign cartilaginous lesion such as enchondroma or osteochondroma). Lesions have been associated with Paget disease, Oilier disease (multiple enchondromatosis), and Maffucci syndrome (multiple enchondromatosis, hemangiomas, and fibromas). In the jaws, nearly all chondrosarcomas arise de novo without the preexistence of benign chondromas.

Chondrosarcomas

Clinical Features

- Chondrosarcoma of the jaws occurs at any age but has a peak incidence in patients in the 30- to 40-year-old age group. Nearly all lesions are confined to the anterior maxilla, where preexisting nasal cartilage is present, and the premolar areas of the mandible, the site of the em-bryonically derived Meckel cartilage.
- Lesions are expansile masses that produce distortion of the areas. In the larger lesions, pain and paresthesia may occur. In the anterior maxilla, nasal obstruction and breathing difficulties are often presenting signs.

Radiographic Features

- The radiographic appearance can be variable depending on the extent of calcification of the cartilaginous component. Commonly, it appears as an expansile "moth-eaten" radiolucent area with indistinct boundaries containing flecks or blotchy radiopacities throughout. Widening of the periodontal membrane of associated teeth is a common finding.

Chondrosarcomas

Histopathology

- A great deal of variability may occur in the histologic features of chondrosarcoma, because they may be well-differentiated and resemble a benign cartilaginous lesion or they may be anaplastic, composed of spindled cells with little evidence of cartilage formation. Most lesions exhibit a combination of abnormal cartilage surrounded by neoplastic cells. Lesions are graded I to III, depending on the amount and maturity of the Cartilage and the proportion and anaplasticity of the connective tissue cells. In grades II and HI, areas of myxoid tissue and cystic degeneration are present.

Treatment

- Treatment consists of wide surgical excision. The extent of the surgical margin depends on the size and grade of the lesion. Metastasis is usually to the lungs and other bones. The prognosis for jaw lesions is worse than for lesions occurring in other locations.

Osteogenic sarcoma

- **Osteogenic sarcoma** is an uncommon, highly malignant, primary neoplasm of bone with a soft-tissue counterpart with a similar histomorphology. As pointed out by Meyers and Gorlick, its peak age of occurrence is in the second decade of life, with the modal age of incidence being 16 years for girls and 18 for boys. The most common site of involvement is the distal femur followed by the proximal tibia and proximal humerus. Osteogenic sarcoma involving the jaws accounts for approximately 6.5% of all cases of this disease. A review of 56 cases of osteogenic sarcoma of the jaws by Garrington and others showed a median age of occurrence of 27 years, with 34% of mandibular cases and only 12% of maxillary cases occurring before 20 years of age. The neoplasm was noted to occur approximately twice as frequently in the mandible as in the maxilla, with swelling and pain being the most frequently described early symptoms. A review of 66 cases of osteogenic sarcoma of the jaws by Clark and others shows that swelling and pain are the most frequent presenting complaints. However, they found approximately equal involvement between the mandible and maxilla, listing the mandible, maxillary antrum, and alveolar ridge of the maxilla as the most frequent sites of occurrence.

Osteogenic sarcoma

- The radiographic findings are typically those of a poorly defined bone-destructive lesion suggestive of malignancy. It may be osteoblastic or osteolytic or may have a mixed radiographic appearance. Clark has reported that most of the lesions on the maxilla were osteoblastic, whereas most of those in the mandible were osteolytic. A frequently described radiographic feature is a "sun-ray" appearance, with delicate, hairlike trabeculae radiating in a sunburst fashion away from the peripheral surface of the lesion. This has been reported to occur in approximately 25% of cases. An additional radi-ographic finding in early osteogenic sarcoma of the jaws is symmetrical widening of the periodontal ligament space around one or more of the teeth in the area of the lesion.
- Histologically the osteogenic sarcoma is characterized by the production of tumor osteoid forming a malignant stroma that often appears fibroblastic. These tumors are typically classified histologically into osteoblastic, chondroblastic, or fibroblastic subtypes according to the dominant histologic pattern.
- Almost all patients with osteosarcoma have at least microscopic metastatic disease, with the most frequent site for metastasis being the lung. Although historically the treatment of choice for osteogenic sarcoma was radical surgical resection, the natural history is for recurrence, with almost 90% of patients developing recurrent metastatic disease. Although no definitive treatment protocol for osteosarcoma of the jaws exists today, August and others, in a review of 30 cases, pointed out the importance of early diagnosis, clear surgical margins, and aggressive adjuvant chemotherapy in improving disease-free and overall survival.

Ewing's Sarcoma

- After osteosarcoma, the Ewing's family of tumors (Ewing's sarcoma along with peripheral primitive neuroectodermal tumor [pPNET]) is the second most common primary malignancy of bone in children and adolescence. Ewing's sarcoma of bone and soft tissue, as well as pPNET, are round-cell tumors that nearly always demonstrate a translocation between the long arms of chromosomes 11 and 22 translocation and demonstrate a positive MIC2 antibody test, which is particularly helpful in differentiating them from other small, round-cell rumors. Lombart-Bosch and others in their review point out that the histologic and electron microscopic features of Ewing's sarcoma and pPNET, as well as expression of antigen expressed by the MIC2 gene, provide the basis for characterizing them as neuroectodermally derived neoplasms.

Ewing's Sarcoma

- Localized swelling and pain are the most frequent complaints at the time of presentation, although loose teeth may also be a presenting symptom. The soft tissue overlying the lesion may be erythematous and warm to the touch, being more suggestive of an inflammatory process than a neoplasm. Additionally, the patient may have fever, elevated erythrocyte sedimentation rate, and increased serum lactic dehydrogenase, anemia, and leukocytosis.
- The radiographic features are those of a diffuse bone-destructive lesion, appearing as an irregular, somewhat mottled, radiolucent lesion that may resemble an osteomyelitis. Although reduplication or lamination of the periosteum has been considered a common radiologic sign of Ewing's sarcoma, the review by Wood and others showed that of 86 cases in the literature in which the radiographic features were presented, only one case described true periosteal lamination, with two others describing periosteal lamination with "sun-ray" spicules. Eggli and others point out that computed tomographic and magnetic resonance imaging are invaluable in further delineating the extent of disease not readily visible on plain radiographs. Gallium scintigraphy and gadolinium-enhanced MR images are said to be best for following the response to therapy.

Ewing's Sarcoma

- Histologically, Ewing's sarcoma appears as sheets of cells with small, dark-staining nuclei and poorly defined cytoplasmic outlines. Mitotic figures are prominent, and necrosis was a common feature. Sheets of cells may be separated by vascular connective tissue septa. Intracytoplasmic glyco-gen is present, with periodic acid-Schiff (PAS) pos-itivity being an essential finding unless there is documented glycogen content on electron microscopy. Detection of MIC2 antigens along with molecular techniques to detect the t(l 1;22) translocation have generally improved the ability to diagnose these tumors.
- In the past, Ewing's sarcoma has been associated with an almost uniformly poor prognosis, with nearly all patients having micro-metastatic disease at the time of diagnosis. For the Intergroup Ewing's Sarcoma Study as reported by Siegal, the prognosis of head and neck Ewing's sarcoma was noted to be significantly better than that for Ewing's sarcoma overall. Of their patients who had been followed in the study for more than 3 years, 80% were alive and well, without known progressive recurrent or metastatic disease. Of 10 patients who had survived 5 years or more, none had died, and of the 5 patients in their study who had died, none had gnathic involvement.

Ewing's Sarcoma

- Although it was recognized early on that Ewing's sarcoma was a radiosensitive rumor, early metastasis to the lungs or other bones kept the 5-year survival rate very low. However, with the utilization of combined therapies, including surgery, multiagent chemotherapy, and radiotherapy, the overall survival rate improved dramatically. Rosin and others, for instance, reporting on their 10-year experience with adjuvant chemotherapy in combination with radiation therapy, surgery, or surgery and radiation therapy, showed an overall disease-free survival of 79% for at least 2 years.
- Because of the potential for postradiation sarcomas, particularly bone sarcoma in the field of radiation treatment, the importance of safe local control of the disease with intensive combination chemotherapy, surgery, and radiation is now emphasized. Granowetter pointed out that patients with metastatic disease either at diagnosis or in relapse might benefit from intensive therapy as facilitated by peripheral stem cell and antilogous bone marrow rescue programs.

Ewing's Sarcoma

- **Metastasis** to the oral region from a malignant tumor elsewhere in the body is an uncommon but clinically important finding, because it may be the first indication that, the patient has a distant primary tumor. The vast majority of metastases from distant primary lesions to the oral region occur in the mandible, although the maxilla can also be affected. Although metastatic lesions within the mandible can be asymptomatic, most patients experience some degree of discomfort or pain, which is often followed by loosening of teeth or unilateral paresthesia or anesthesia of the lower lip or chin. The development of these symptoms should alert the clinician to the potential presence of metastatic disease. Some degree of swelling or expansion of the mandible, primarily in the molar region, is also often present. The pathway for the metastatic spread of tumor cells to the mandible from a distant primary, such as the kidney, has usually been ascribed to the paravertebral plexus of veins (Batson plexus).
- The radiographic appearance of the mandible at the site of a metastatic tumor deposit can range from an ill-defined radiolucency to an ill-defined radiopacity, or it may appear as a mixed radiolucent and radiopaque lesion. The microscopic appearance usually suggests that a lesion is metastatic, because the cells will often be present in clusters of various sizes that are separated by normal resident tissue or fibrous connective tissue replacement .
- The majority of tumors that metastasize to the jaw are adeno carcinomas. The site of origin of the most common primary tumors and the approximate relative frequency of metastasis to the jaws are as follows: breast (30%), lung (20%), kidney (15%), thyroid (5%), prostate (5%), colon (5%), stomach (5%), and cutaneous melanoma (5%).

Ewing's Sarcoma

If a tumor is suspected, tests to locate the primary tumor and any spread (metastasis) often include:

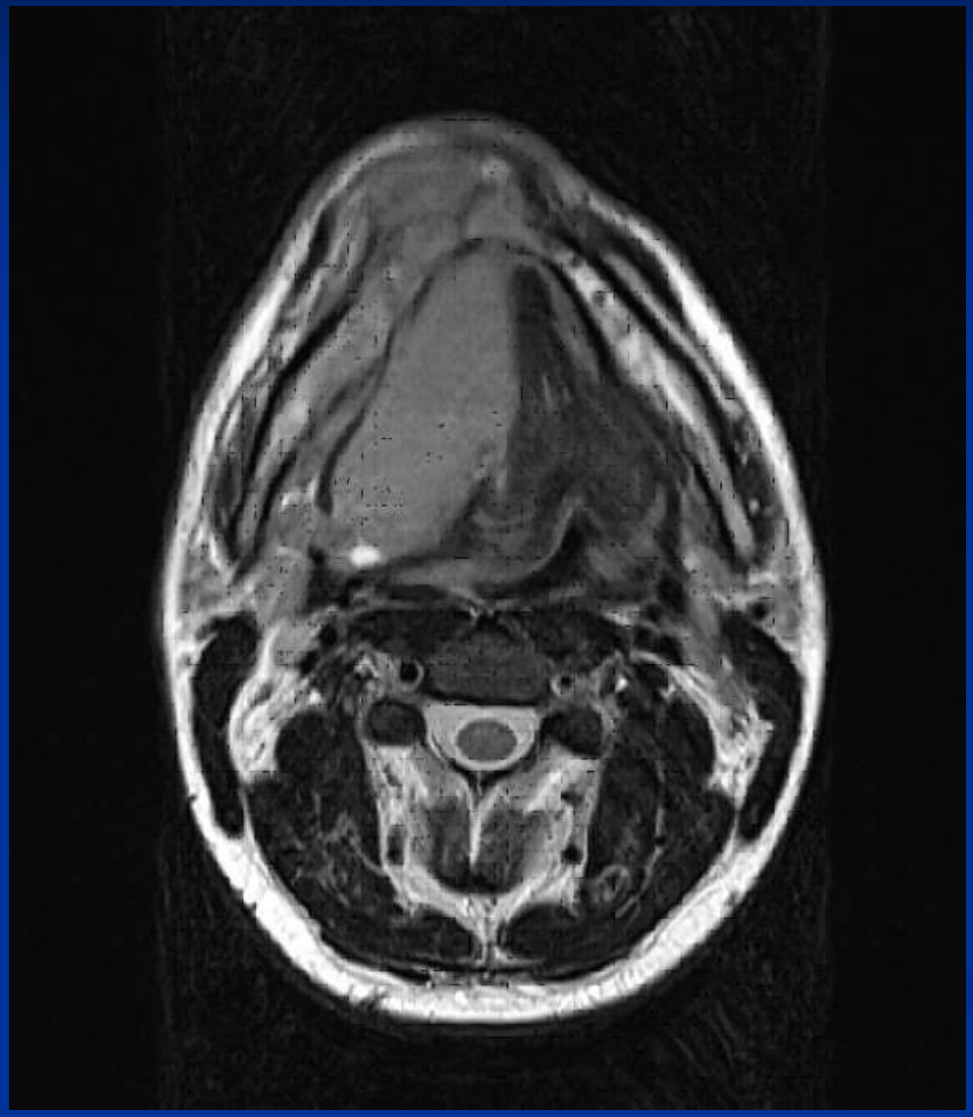
- Biopsy of the tumor
- Bone scan
- Chest x-ray
- CT scan of the chest
- MRI of the tumor
- X-ray of the tumor

Ewing's Sarcoma

Treatment should be done by a cancer specialist (oncologist) and often includes a combination of:

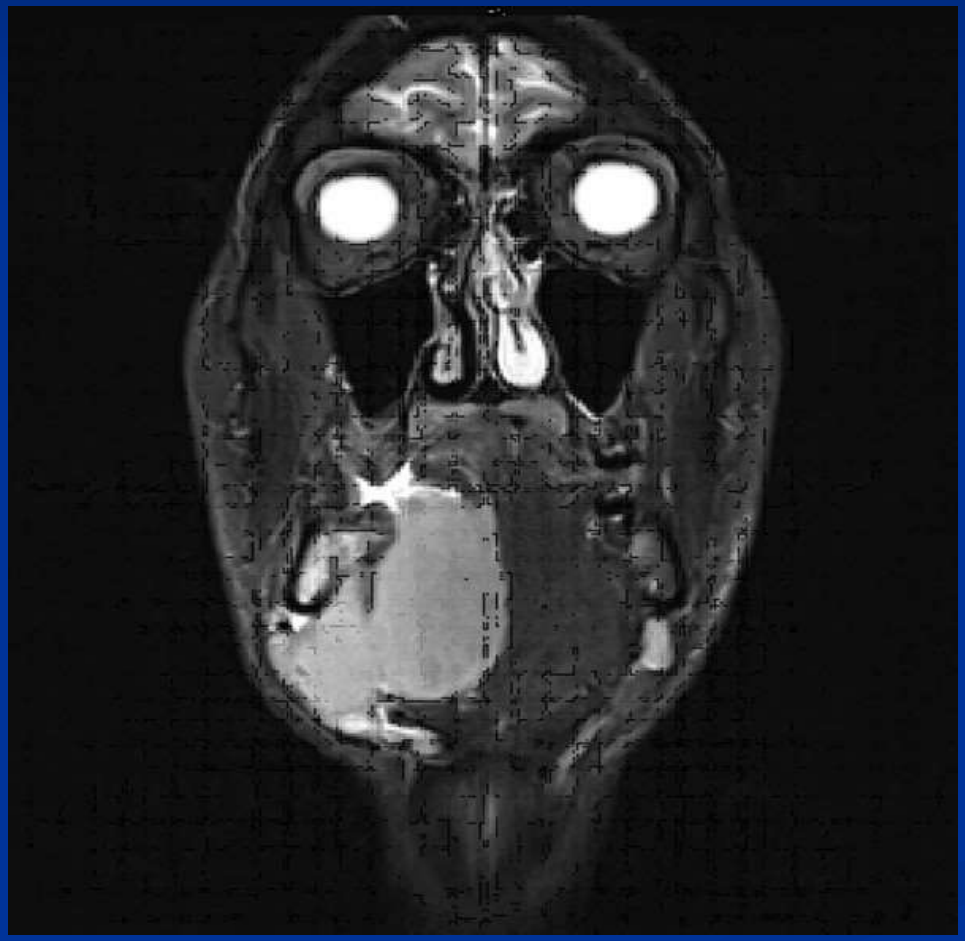
- Chemotherapy
  - Cisplatin
  - Doxorubicin
  - Etoposide
  - Ifosfamide
  - Methotrexate
- Radiation therapy to the tumor site
- Surgical excision (removal) of the primary tumor

Ewing's Sarcoma



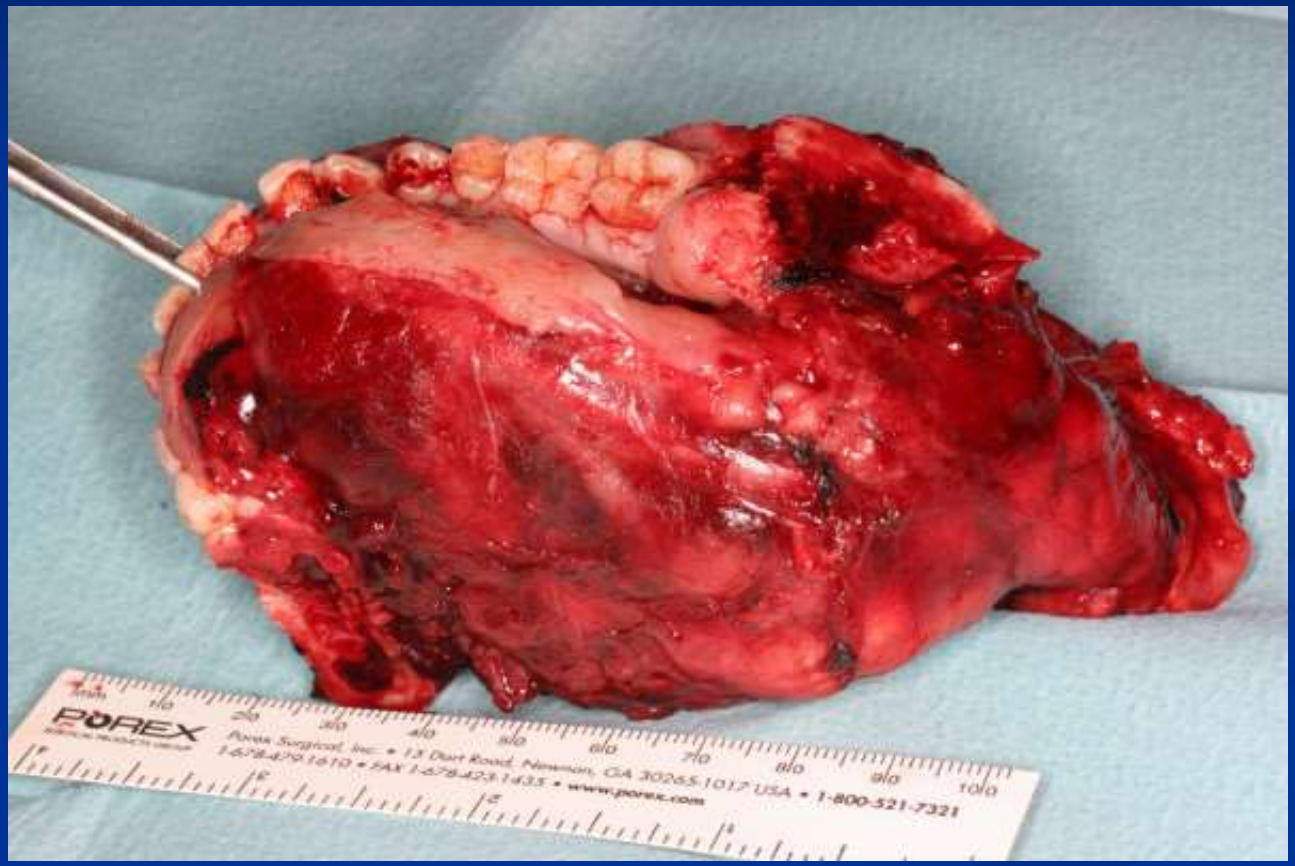
- Axial MRI scan revealing a bone destroying mass of approximately 7 × 8 × 6 cm3 surrounding the mandible and massively infiltrating the soft tissue of the floor of the mouth and the tongue.

Ewing's Sarcoma



- Coronal MRI scan revealing a bone destroying mass of approximately 7 × 8 × 6 cm3 surrounding the mandible and massively infiltrating the soft tissue of the floor of the mouth and the tongue.

Ewing's Sarcoma



- Mandibular resection specimen.

Periosteal osteosarcoma of the mandible

- We report a rare case of periosteal osteosarcoma of the mandible in a 15-year-old girl. Extension of the tumour into the bone marrow by way of the periodontal ligament is demonstrated.
- A 15-year-old girl presented to a dentist with spontaneous pain and swelling of the right mandibular molar region. Suspecting an abscess, he incised the swelling but it continued to increase in size. Consequently, 1 month after initial presentation, he referred her to us.
- On examination there was a firm buccal swelling, covered with normal mucosa, measuring 20-10-15 mm. It was not tender to touch. The patient gave a history of extraction of the second premolars for orthodontic treatment but no history of trauma.

Periosteal osteosarcoma of the mandible

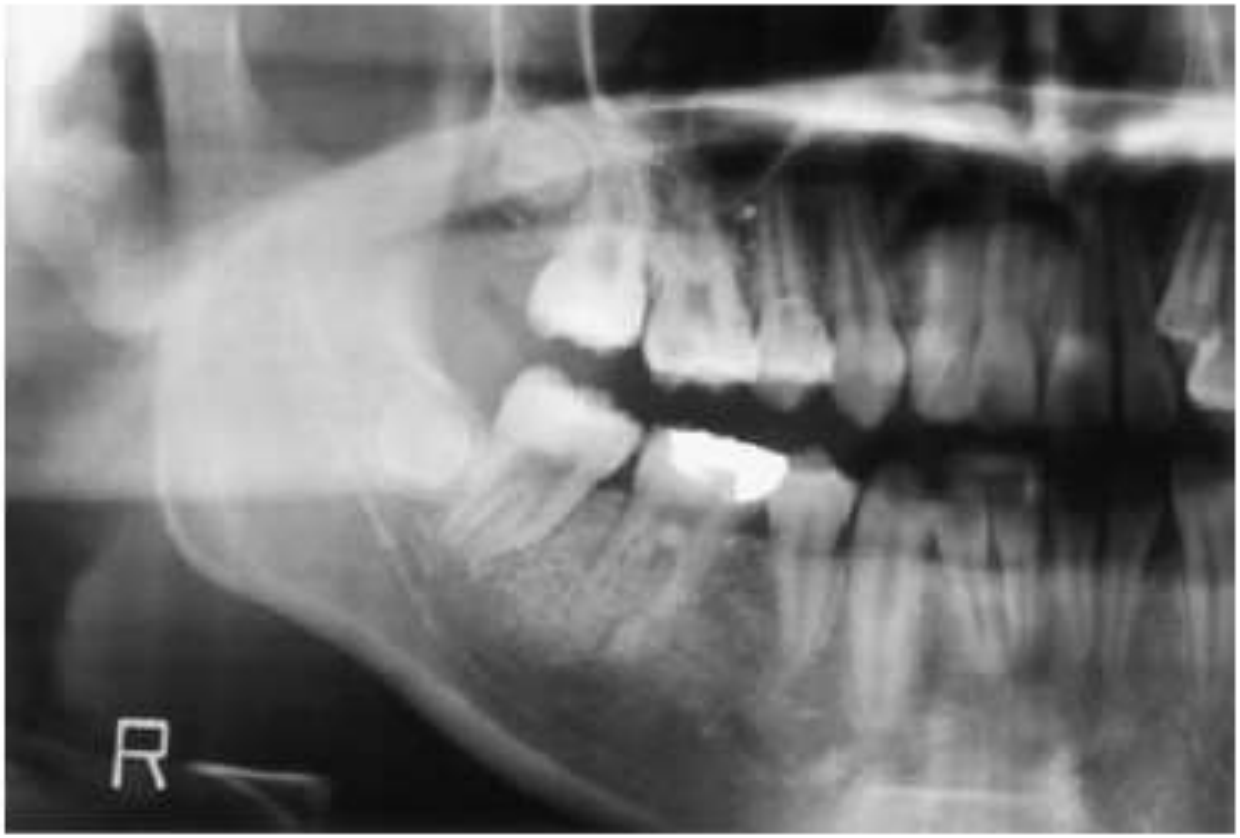


Figure 1 A cropped panoramic radiograph shows a mixed density lesion with ill-defined margins involving the right first molar

Periosteal osteosarcoma of the mandible

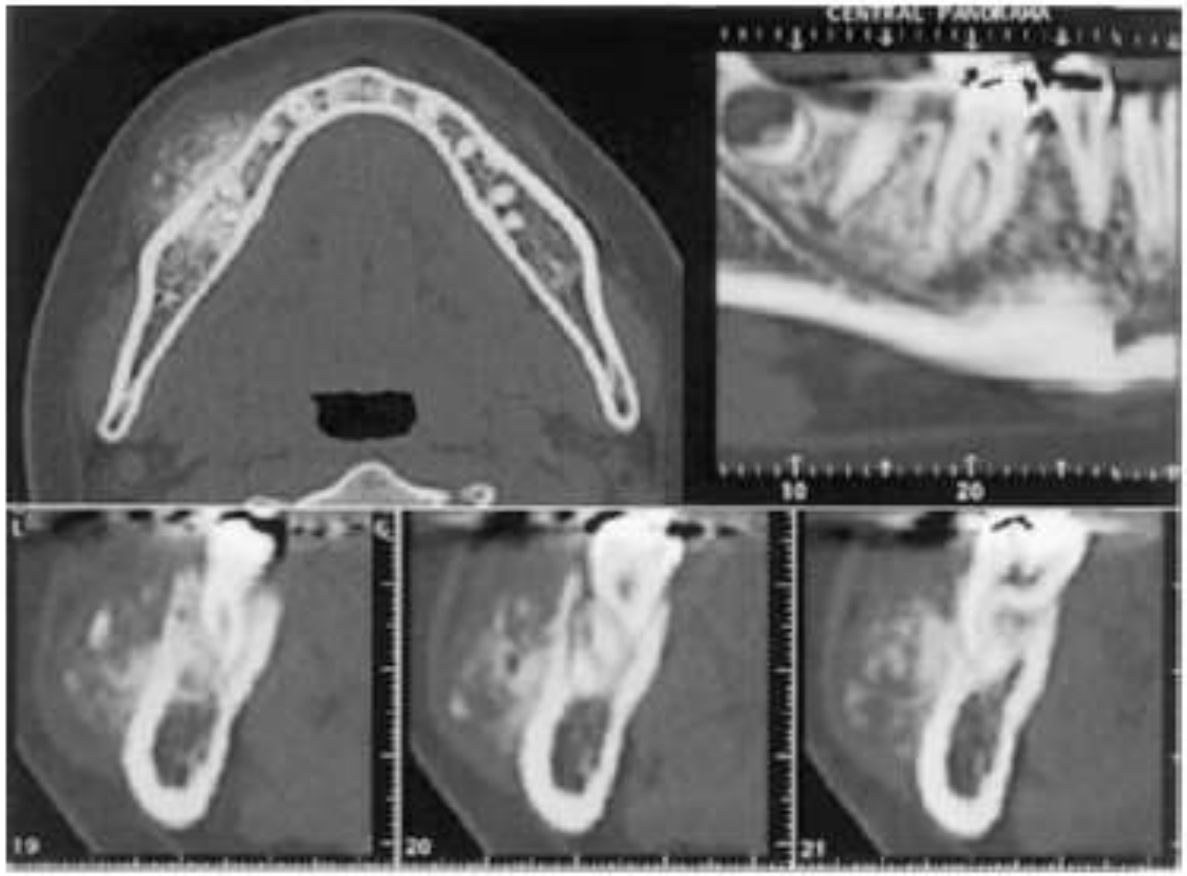


Figure 2 Above left: axial CT showing mixed-density lesion surrounding the roots of 46 (right lower first molar) with buccal expansion. However the buccal cortex is intact. Above right and below: MPR showing extensions to the tumour into the bone marrow by way of the periodontal ligament

Periosteal osteosarcoma of the mandible

- Osteosarcoma is the most common primary malignant tumour of bone. It can be divided into an intramedullary type that originates, and grows primarily, within the bone and a surface type. Surface osteosarcomas can be divided into two main categories, periosteal and parosteal. Periosteal osteosarcoma is characterised by a peak occurrence at approximately 20 years of age. The tumour is most often lobulated and well defined. Radiographically, the cortex is intact and sometimes thickened. There may be minimal medullary involvement. Histology reveals a tumour predominantly composed of poorly diferentiated malignant cartilage and bone with osteoid and fibrous components. The tumour may give rise to both local recurrence and metastasis.