Chondrosarcoma of the Mandible: Report of a Case

SUMMARY

Chondrosarcoma (CHS) is an uncommon malignant tumour of unknown aetiology, which is characterized by the production of cartilaginous tissue and the absence of production of bone tissue. Maxillary and mandibular localizations of CHS are extremely rare and have a poor prognosis. Usually, the lesion presents as a slow growing painless swelling, firm to palpation, frequently associated with paraesthesia and loosening of teeth. Radiographically, CHS is characterized by radiopaque and radiolucent areas, either alone or in combination. The most acceptable treatment is wide local resection with a tumour-free margin of 2 to 3 cm.

This article presents the case of an 80-year-old woman with a large tumour mass that had originated in the mandible, resulting in facial asymmetry, and speech and feeding difficulties. The clinical course and characteristics with the radiopaque features of the tumour and the final microscopic examination of the specimen set the diagnosis of a mandibular CHS. The epidemiology, clinical, radiographic and histological appearance, the aetiology, treatment and prognosis of CHS are also discussed in detail according to the recent literature.

Key Words: Chondrosarcoma; Mandible; Malignant Tumour

Introduction

Chondrosarcoma (CHS) of the maxillofacial region is undoubtedly a very rare tumour. The histological features of CHS have been extensively discussed and, according to the World Health Organization definition, CHS is “a malignant tumour characterized by the formation of cartilage but not of bone by the tumour cells” [4]. The lesion is further subdivided as central or peripheral, depending on whether it originates from inside the bone or from the bone surface [20] “as extra-osseous when it arises in soft tissues and as primary or secondary according to its development from normal or pre-existing pathologic tissues” [14]. The primary type arises from previously normal cartilage, bone or periosteum, and the secondary type from pre-existent chondromas. The secondary type has a longer clinical course and a better prognosis [9].

Histologically, CHS can further be sub-classified into clear-cell, dedifferentiated, myxoid, and mesenchymal CHS subtypes [14]. In the head and neck region the majority of CHS arise in the maxillonasal area because of the probable origin of the tumour from the cartilaginous portion of the nose [20].

In this report we present a rare case of a chondrosarcoma of the mandible of an 80-year-old woman that had resulted in facial asymmetry and speech and feeding difficulties, presented as a swelling 4 months before her admission. We also discuss the epidemiology, clinico-pathologic, and radiographic features, aetiology, treatment, as well as the prognosis of CHS according to the more recent literature.

Report of a Case

An 80-year-old woman was referred to the Oral and Maxillofacial Surgery Clinic of the “G.Papanikolaou” Hospital of Thessaloniki for evaluation of a swelling of the left side of her face and intermittent pain that she had noticed for the past 4 months, resulting in speech and feeding difficulties.
Extraoral examination disclosed facial asymmetry due to a firm mass of the left mandibular body. Intraoral examination revealed a moderately painless, firm to palpation, tumour extending from the midline to the left molar region of the edentulous mandible. The buccal as well as the lingual bone cortices had been expanded, with invasion of the lesion into surrounding soft tissues. The overlying mucosa was smooth with blue colour and without signs of infection. The dimensions of the lesion were estimated to be approximately 6 x 3 x 2 cm.

There was no left lower lip hypoesthesia whereas cervical examination was negative for lymphadenopathy. From the patient’s history resulted that the gradually increasing tumour was considered initially as an odontogenic infection and she had been prescribed antibiotics for a long period of time. An incisional biopsy was performed and the lesion was diagnosed as a giant-cell lesion. A panoramic radiograph showed a large osteolytic radiolucent lesion extending from the symphysis to the left molar region of the mandible. Computed tomography (CT) revealed also a solid tumour mass in the left side of the mandible, with extensive destruction of the lingual and buccal plates. Radioisotope scintigraphy revealed no pathological lesion in other bones. A chest radiograph was also negative for the presence of metastatic lesions.
The patient had a medical history of hyperthyroidism, ventricular fibrillation and hypertension. The serum calcium, phosphorous and alkaline phosphatase levels were normal. The rest laboratory tests, blood and urine analysis, as well as the biochemical tests, were also within normal levels.

Under general anaesthesia, an intraoral excision of the tumour was performed with a marginal ostectomy of the mandible. The postoperative course and the wound healing were uncomplicated, and 10 days later the patient was dismissed from the clinic.

Microscopic examination of the specimen showed a nodular pattern of neoplastic cells, divided by fibrous tissue. The nodules presented increased cellularity and cells of varying sizes and shapes. In some sites of the tumour malignant cartilaginous tissue and multinucleated chondrocytes with eosinophilic cytoplasm were recognized. Foci of osteoid and nuclear anaplasia were also present. The surgical margins were free of tumour. A diagnosis of the CHS was made.

10 months later the patient came back to our Clinic with a local recurrence. More special examination disclosed a firm, painful mass extending from the left floor of the mouth to the left submandibular space. A second, wider resection was planned; however, the careful evaluation of the medical history and the age of the patient, in combination with the estimated potential risk of an extended operation to her compromised health status resulted in referring the patient to radiotherapy.

**Discussion**

CHS is an exceedingly rare primary tumour of the jaw and facial skeleton. The most common sites that have been reported for tumour development in the rest of the body are in following order: pelvis, rib, femur, humerus, spine, scapula, tibia, fibula, sacrum and sternum. It is estimated that, excluding multiple myeloma, CHS represents the second most common primary malignancy of bones. CHS of the facial skeleton is much rarer than in other bones, presumably because of the scarcity of cartilage in this area.

Various reports estimate that 6.4% to 12% of all CHSs will be located in the head and neck region, whereas between jaws, maxilla is more frequently affected.

The anterior maxillary region, buccal and palatal, has been reported to be the most commonly involved area in the vicinity of the lateral incisors and canines. When the lesion arises in the mandible, the premolar and molar regions, the symphysis, as well as the coronoid and condylar processes, are commonly involved sites.

The peak age of tumour occurrence is the third to fifth decades, with a range of 17 months to 75 years, and a male to female ratio is 1:1 to 2:1. Some authors have also indicated that CHS presents a slight prevalence in males when it involves the lower jaw.

In the mandible, CHS usually presents as a slow-growing swelling with progressive loosening or displacement of the teeth. The swelling is usually of long duration, firm to palpation and painless, while the overlying mucosa appears without erythema or ulceration. When the lesion arises within or around the temporomandibular joint, limitation of the movement of the mandible, pain during mastication, deviation of the jaw to the same or opposite side, numbness or paraesthesia, and loosening and resorption or exfoliation of the teeth, may be the principal clinical features.

If the mass compresses local nerves there will be corresponding neurological symptoms, such as radiating pain, numbness or paraesthesia. The symptoms when the CHS develops in the rest of the maxillofacial region depend on the site and size of the lesion, and may include nasal obstruction, diplopia, epistaxis, sinusitis, visual loss, headaches, orbital pain, photophobia, lacrimal duct obstruction, anosmia, proptosis and displacement of the orbit, hoarseness, fatigue and dysphagia, have also been reported.
Radiographically, the CHS appears as radiopaque area or as ill-defined radiolucent area\textsuperscript{5,9,20,24} containing foci of calcification from the neoplastic cartilaginous tissues\textsuperscript{5,8,9,11,15,17,20,24,26}. The appearance may have an image of multilocular radiolucent areas\textsuperscript{9,15} with dense central calcifications or with a hazy radiopaque periphery suggestive of a sunray pattern\textsuperscript{8,13}. There can even be minimal bone destruction when infiltration has occurred between osseous trabeculae, regardless of the actual size of the tumour.

When CHS arises in the temporomandibular joint, erosion of the surrounding bony structures (the glenoid space, auditory canal and base of the cranium), an increase in the articular space and length of the condylar neck may be seen\textsuperscript{11,20}. When teeth are involved, the tumour may mimic an osteosarcoma. A widened periodontal ligament\textsuperscript{8-15}, a “moth-eaten” appearance of septal bone loss, together with a loss of lamina dura\textsuperscript{15} and root resorption, are sometimes seen\textsuperscript{13,14,19}.

Histologically, the CHS is characterized by a various degree of cellular pleomorphism\textsuperscript{22}, multinucleated cells, areas of spindle cells, mitotic figures and amount of myxomatous matrix\textsuperscript{12}, usually poorly organized\textsuperscript{5,9,11,17,21}. CHSs are divided into grades I to III, based on their histological appearance. The histological grade constitutes a prognostic factor for survival\textsuperscript{15}. Grade I CHSs often have a lobular architecture, they range from cell proliferation resembling benign cartilage to those with increased numbers of chondrocytes in a chondroid to myxomatous stroma\textsuperscript{3,15}. Grade II tumours often have a myxoid stroma with enlarged chondrocyte nuclei displaying occasional mitotic figures. Increased cellularity is frequently noted at the periphery of the cartilaginous lobules. Grade III CHSs are markedly cellular, often with a spindle cell proliferation. Mitotic figures may be numerous\textsuperscript{15,20}. The histological appearance of mesenchymal CHS is characteristically a biphasic picture. Undifferentiated areas appear as sheets of primitive mesenchymal cells, similar to a small-cell anaplastic sarcoma. However, islands of relatively well-differentiated cartilaginous tumour enable the pathologist to make the specific diagnosis of mesenchymal CHS. Because of its rich vascular component, this lesion has been associated with hemangiopericytoma\textsuperscript{4,21,23,25,26}.

The aetiology of CHS is unknown. However, some authors have reported that the most frequent predisposing conditions for the tumour development include multiple hereditary exostosis\textsuperscript{17,22,24}, Ollier’s disease\textsuperscript{22,24} and Maffucci’s syndrome\textsuperscript{22}. Previous intravenous Thoratras contrast use\textsuperscript{4}, Paget’s disease of bone\textsuperscript{5,17}, chondrodysplasia\textsuperscript{17}, chondromyxoid fibroma, osteochondroma\textsuperscript{17} and previous irradiation have also been reported to represent less frequent predisposing conditions\textsuperscript{3,8}.

The aetiology for site predilection when chondrogenic tumours occur in jaws remains unresolved. It has been suggested that the presence of cartilage cells (vestigial rests) in the anterior maxilla makes this region a particular site of CH prevalence\textsuperscript{8,9,13,24}, while in the mandible, the posterior part is more frequently involved possibly because of remnants of Meckel’s cartilage\textsuperscript{8,9}. Other authors rather indicate that the preference of chondrogenic tumours for particular areas of the jaws may have some other basis than just the presence of cartilaginous residues. For example, cartilage cells may originate from areas of chondroid bone mesenchymal differentiation, or from the chondroblasts associated with the mandibular condyle or disc\textsuperscript{8,9,14}.

The diagnosis of CHS is made from the combination of the history and clinical features of the tumour (colour, dimensions, surface, consistency), the radiographic findings from plain radiographs, CT and MRI (radiopaque area or radiolucent area containing foci of calcification from cartilaginous tissues) and is completed with the histopathologic examination of the lesion.

The differential diagnosis, when CHS is arising in the mandible, in early stages, includes an infected cyst\textsuperscript{22}, or an odontogenic infection\textsuperscript{22}. From the clinical examination, the lack of localized pain and the normal temperature of the region reduce the potential that the lesion could be an infectious disease. Also the lack of teeth excludes the likelihood of an odontogenic infection\textsuperscript{22}. The radioisotopic scintigraphy that reveals no pathological lesion in other bones and the absence of systemic complaints minimizes the likelihood that the lesion might be a metastatic lesion or a process secondary to a systemic disease. If this were a central giant-cell granuloma secondary to hyperparathyroidism, the patient might well have a history of renal calculi and/or abdominal pain. A normal serum Ca\textsuperscript{2+} assessment also rule out this disease\textsuperscript{22}. In the differential diagnosis of CHS a cystic-like process should also be included. The firmness of the lesion and the fact that cysts normally are compressible when they have expanded through bone also rule out the diagnosis of a cystic lesion\textsuperscript{22}. Plain radiographs and computerized tomography also confirm that the lesion is a solid tumour. The absence of thrills or bruits also reduces the potential that this could be a vascular lesion\textsuperscript{22}.

Based on the history, physical findings and radiographic appearance of the CHS, one may hypothesize that is faced with of a mesenchymal origin neoplasm and that the most likely differential diagnosis should be made among a fibrosarcoma\textsuperscript{8}, fibrous dysplasia\textsuperscript{1-9}, osteosarcoma\textsuperscript{1-22}, primary lymphoma of bone, or plasma cell tumour\textsuperscript{22}.

Less likely lesions that must nevertheless be taken in account are the Ewing’s sarcoma (age, lack of pain and no temperature elevation minimize the likelihood), desmoplastic fibroma or central giant-cell granuloma. A possible odontogenic tumour, such as ameloblastoma and mixed tumours of the salivary glands, should also be included\textsuperscript{10,22}.

The treatment of choice for craniofacial CHSs is wide local excision\textsuperscript{1-3,5-7,9,11-13,15,17,18,20,22-26}, with a tumour-free
margin of 2 to 3 cm. Indeed some authors claim that the tumour has a great propensity for recurrence despite what seems to be adequate resection margins. The lesion is considered resistant to radiotherapy, hence radiation should only be used as a palliative measure when the tumour cannot be surgically extirpated, when the lesion recurs and spreads to surrounding tissue after surgery, or to alleviate pain. A series of patients treated with conventional photons combined with high-energy proton irradiation is reported. These cases all involved unresectable tumours of the cervical spine and base of skull with total photon-equivalent doses ranging from 6530 to 7500 cGy.

Systemic and intra-arterial chemotherapy have not been effective and are usually used for palliation. Ruark et al. used chemotherapy combined with radiation therapy as adjuvant treatment in selected cases of high-grade tumours, mesenchymal CHSs or rapid local recurrence with aggressive behaviour and potential for metastasis. Regimens varied from 1 to 8 cycles, most frequently used agents being cyclophosphamide, vincristine, methotrexate, doxorubicin and actinomycin D. Survival in this group of 5 patients ranged from 13 months to 94 months, with a median of 37 months.

The location of the primary lesion and the adequacy of surgical resection (tumour-free margins) are of prime prognostic significance for CHS of the jaws. In addition, the pathologic grade of CHS is indicative of its innate biologic behaviour and propensity for metastasis. So Grade I have been reported to be associated with up to 22% recurrence rate, while Grade II with a 60% recurrence rate. The most common cause of death due to the CHS of the jaws is uncontrolled local recurrence and extension into adjacent vital structures. Metastasis with high-grade CHSs is generally to lungs or bone. Of all CHSs, the centrally presenting ones (pelvis, trunk, proximal extremity, and head and neck) are associated with the poorest survival; of those involving the head and neck region, nasopharyngeal and posterior nasal cavity tumours carry the worst prognosis.

The 5-year survival for CHSs of the jaws and craniofacial bones appears to be poorer than that for CHS in other body sites, varying from 33% to 40%. The 5-year survival rate varies from 90% to 81% to 43%, respectively, for the grade I, II, and III forms, whereas for the 10-year survival rate the percentages are even more variable (83%, 64%, and 29%, respectively). The 5-year survival rate has been found not to differ significantly in children compared to adults. Henderson and Dahlin in 1963 reported that if the head and neck lesions were diagnosed early and treated adequately then a 70% 10-year survival rate could be achieved. In contrast, inadequate resection leads to a 10-year survival rate of less than 20%.

References


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