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ORIGINAL ARTICLE

Role of multidetector computed tomography in assessment of fibro-osseous lesions of the craniofacial complex

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Abstract *Aim:* To assess the role of multidetector CT in assessment of fibro-osseous lesions of the craniofacial complex.
Materials and methods: This study included 25 patients. Their age ranged from 15 to 64 years with a mean age of 37.56 ± 15.17 years. All the studied individuals were chosen selectively regarding complaint (those with known fibro-osseous lesions, facial disfigurement, and facial swelling) regardless of age and gender and examined using MDCT in detection of the lesion, and assessment of the extensions.
Results: In the present study, the cranio-facial fibrous dysplasia represented almost half of the presented cases (48%) followed by osteomas (36%) then ossifying fibroma (12%) and brown tumor (4%). 13 out of 25 cases in this study were pathologically proven to be fibro-osseous lesions and surgically operated. The final diagnosis was made by consensus of imaging, clinical findings and pathological features.
Conclusions: Multi-detector row CT images, including reformations, better delineate craniofacial complex anatomy than do single-detector row CT images. Using multi-slice CT scanning in the craniofacial complex becomes possible to depict the complete path of complex structures.

1. Introduction

Fibro-osseous lesions (FOLs) of the craniofacial complex are represented by a variety of disease processes that are characterized by pathologic ossifications and calcifications in association with a hypercellular fibroblastic marrow element and share microscopic features (1). Whereas some are diagnosable histologically, most require a combined assessment of clinical, microscopic and radiologic features.

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In turn, some fibro-osseous lesions (FOLs) of the craniofacial complex are unique to that location whereas others are encountered in bones from other regions (2).

FOLs can involve paranasal sinuses, skull base, and maxillofacial region. Fibrous dysplasia, ossifying fibroma, and osteoma are three distinct entities that lie along a continuum from the least to the most bony content. They have similar appearance and makeup; however, their clinical implication varies (3).

Fibrous dysplasia is a benign dysplastic process of altered osteogenesis that may occur within a single bone (monostotic) or multiple bones (polyostotic) (1). When polyostotic fibro-osseous lesions typical for fibrous dysplasia are associated with other anomalies and endocrinopathy, this variant form constitutes the McCune-Albright syndrome (MAS). McCune-Albright syndrome (MAS) consists of at least 2 of the following 3 features: (1) polyostotic fibrous dysplasia (PFD), (2) café-au-lait skin pigmentation, and (3) autonomous endocrine hyperfunction (e.g., gonadotropin-independent precocious puberty). Other endocrine syndromes may be present, including hyperthyroidism, acromegaly, and Cushing syndrome (4).

Monostotic fibrous dysplasia of the craniofacial complex is often confused with other FOL, typically ossifying fibroma and diffuse sclerosing osteomyelitis of the mandible, diseases that manifest unique clinicoradiologic features (1).

Depending on the type and location of FD, the signs and symptoms vary and include facial deformity and asymmetry, vision changes, hearing impairment, nasal congestion and/or obstruction, pain, paresthesia, and malocclusion (5).

Improvement in CT imaging and software allows for accurate surgical simulation and intraoperative navigational tools may guide the surgeon throughout the contouring. Advanced CT software is useful for superimposition of pre- and post-operative images. These can then be compared to follow-up CT scans to determine the stability of the result or the presence of regrowth (5).

Malignant transformation of FD has been reported in less than 1% of cases of FD (6). Typically the malignancy is a sarcomatous lesion, most often osteosarcoma but fibrosarcoma, chondrosarcoma, and malignant fibrohistiocytoma have also been reported (7).

Fibrous dysplasia may also be associated with soft tissue myxomas, the Mazabraud syndrome is a rare syndrome comprising of fibrous dysplasia: usually polyostotic, multiple soft tissue (intramuscular) myxomas: typically in large muscle groups. It is most frequently seen in women (~70%) and usually present in middle age (mean age 46; range 17–82). There is an increased risk of osseous malignant transformation (8).

Radiologically the affected bones are usually expanded with an intact cortex and lose the normal cortico-medullary differentiation, being replaced classically by a homogeneous ground glass appearance, although mixed lucencies and sclerosis are also common (9).

1.2. Ossifying Fibromas

These are neoplasms in the true sense, exhibiting progressive proliferative capabilities with bony expansion and, importantly, well defined margins radiologically. Specific subtypes include psammomatoid variant of ossifying fibroma, trabecular variant of ossifying fibroma, gigantiform cementoma, and cemento-ossifying fibroma (1).

- **Trabecular Juvenile Ossifying Fibroma (TrJOF)**: The maxilla and the mandible are the dominant sites of incidence of TrJOF. Origin in extragnathic locations is extremely rare. Clinically, TrJOF is often characterized by a progressive and sometimes rapid expansion of the affected area; pain is a rare symptom (10).
- Radiographically, JTOF is an expansive lesion and may be fairly well demarcated, with cortical thinning and perforation. Depending on the amount of calcified tissue produced, the lesion will show varying degrees of radiolucency or radiodensity. Ground-glass as well as a multilocular honeycomb appearance has been described (11).
- Unlike TrJOF, psammomatoid juvenile ossifying fibroma (PsJOF) is a lesion that affects predominantly the extragnathic craniofacial bones, particularly centered on the periorbital, frontal, and ethmoid bones (12).
- PsJOF is clinically manifested as bone expansion that may involve the orbital or the nasal bones and sinuses. Orbital extension of sinonasal tumors may result in proptosis, and visual complaints including blindness, nasal obstruction, ptosis, papilledema, and disturbances in ocular mobility (1).
- *Radiographic examination of JPOF* shows a round, well-defined, sometimes corticated osteolytic lesion with a cystic appearance. Sclerotic changes are evident in the lesion which may show a ground-glass appearance. The lesions appear less dense than normal bone (11).

1.3. Osteoma

An osteoma is a benign osteogenic tumor characterized by compact or cancellous bone proliferation. It may be classified as peripheral, central, or extraskeletal. A peripheral osteoma arises from the periosteum, a central osteoma from the endosteum, and an extraskeletal osteoma in the soft tissue (13).

Osteomas are found mainly in the craniofacial bones. A peripheral osteoma (PO) occurs most frequently in the paranasal sinuses. The frontal-ethmoidal sinus is the most frequent site in the paranasal sinuses. Other locations include the orbital wall, temporal bone, pterygoid processes, and external ear canal (14).

Patients with osteomas should be evaluated for Gardner's syndrome (GS). This syndrome is an autosomal dominant disease characterized by gastrointestinal polyps, multiple osteomas, skin and soft tissue tumors, and multiple impacted or supernumerary teeth (15).

The imaging appearance reflects the underlying pathology, with ivory osteomas appearing as very dense radiodense lesions, similar to normal cortex, whereas mature osteomas may demonstrate central marrow (16).

Lesions that may resemble fibro-osseous lesions (FOLs) include a number of neoplastic, nonneoplastic, and metabolic disease processes that may manifest with clinical, radiographic, and histopathologic features that closely resemble those seen in fibro-osseous lesions (FOLs). It should be differentiated from paget, cherubism, osteosarcoma, cementoblastoma, proliferative periostitis, central giant cell granuloma, and hyperparathyroidism (1).

The purpose of the present study was to assess the role of multidetector CT in assessment of fibro-osseous lesions of the craniofacial complex.