CASE REPORT

Fibrous Dysplasia Involving the Left Maxilla – Report of a Case with Significant Diagnostic Aspects

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ABSTRACT

Fibrous dysplasia (FD) is characteristically demonstrated as a benign, developmental bony disorder, having a fibro-osseous origin. It can involve either single or multiple bones in the craniofacial or extracranial region. FD can occur alone or in conjunction with cutaneous and/or endocrine anomalies. Mutation of GNAS1 gene (guanine nucleotide-binding protein, alpha-stimulating activity polypeptide 1) is thought to be responsible for its occurrence. Radiographically, a characteristic ground-glass radio opacification of bone might be a discerning feature. Histopathologically, there is a replacement of the normal bone by cellular and loosely fibrous connective tissue, containing variable and irregular shaped and sized bony trabeculae. The management of this fibro-osseous disorder depends on the size, shape, anatomic conformity, and limits of extension, based on which non-surgical/pharmacological or surgical intervention remains the modus operandi. A keen eye regarding its malignant transformation should be kept as well, since, though rare, it might prove to be fatal. Herein, we report a case of fibrous dysplasia in a 19-year-old boy with relevant clinical, radiological, and histopathological diagnostic features along with its management and follow-up.

Key words: Bony trabeculae, craniofacial, fibrous dysplasia, ground-glass appearance, GNAS1 gene

INTRODUCTION

Fibro-osseous lesions comprise a diverse group of disorders, being characterized by replacement of normal bone by fibrous tissue, containing a newly formed mineralized product. FD belongs to fibro-osseous lesion spectrum. FD terminology was first coined by Lichtenstein in 1938.[1] However, other fibro-osseous entities are there – and these include cemento-osseous dysplasia, ossifying fibroma, etc.

FD is a benign non neoplastic condition, in which normal bone is substituted by fibrous connective tissue stroma, possessing discreet areas of bony trabeculae, predominantly consisting of woven bone.[2] It is deemed to an uncommon developmental anomaly, which can be divided into three variants, namely, monostotic, polyostotic, and craniofacial.[3] In addition, other subgroups such as polyostotic type associated with cutaneous abnormalities, that is, pigmented skin lesions exist, which was first elucidated by Jaffe and Lichtenstein.[4] Polyostotic variant of FD accompanied by pigmented skin lesions and endocrine dysfunctions such as precocious puberty in women and hyperthyroidism have been reported in the literature. A craniofacial form of FD confined to the bones of craniofacial complex, for example, sphenoid, occipital is also there.[5]

Post-zygotic mutations of the GNAS1 gene are held accountable for FD. The clinical severity of on the time in fetal or postnatal life, during which the mutation occurs, involving the undifferentiated pluripotent stem cells, which are the osteoblastic and/or melanocytic/endocrine cell precursors.[6]

Monostotic FD (MFD) affects both the jaws; however, the maxilla is the more common site of

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involvement. It is usually diagnosed during the 2nd decade of life, with both genders having nearly equal propensity of its development. It usually presents as a slow enlarging painless swelling of the affected region and radiologically a "ground-glass" fine opacification is often evident. Histopathology demonstrates irregularly shaped trabeculae of woven bone, in a fibrous connective tissue stroma. Varying treatment modalities including wait and watch, surgical management, or pharmacological methods are there.[7]

CASE REPORT

A 19-year-old male patient reported to the Department of Oral Pathology and Microbiology with the chief complaint of discomfort and mild pain associated with a swelling located in the left upper jaw. Family history of the patient showed nothing significant. The hematological and thyroid assays revealed no abnormalities. The patient's father told that the extraoral and intraoral features began developing gradually about 2 years ago and attained its present dimension approximately 6 months before. Previous medical and surgical histories were non-contributory. A thorough examination of the boy yielded significant findings.

Extraorally, a mildly diffuse swelling involving the left side of the face was evident, extending from the infraorbital aspect of the left eye region, coursing toward left nasolabial fold and causing obliteration of the alae of the nose. Visible asymmetry of the left side of face involving zygomaticomalar and midface region along with slight downward slanting of angle of mouth was evident. On palpation, the swelling was hard, unyielding, and not tender. The skin overlying the swelling was taut, normal in coloration, and the temperature was also normal, without any obvious abnormalities [Figure 1].

Intraorally, a diffuse, expansive, somewhat bosselated swelling was extending from buccal aspect of 22–28 region involving the attached gingivae and mucobuccal fold along with obliteration of the vestibular fold. Marked expansion of the buccal cortical plates was observed. The overlying mucosa was smooth, shiny, stretched, and slightly pale in appearance. On palpation, the swelling was bony hard and non-tender. The temperature overlying the swelling was normal, and there were no visible signs of any ulceration, bleeding, or discharge. All the regional teeth were vital [Figure 2].

Radiologically, orthopantomograph (OPG) showed maxillary and mandibular full assortment of permanent teeth alongside a mixed radiopaque and radiolucent lesion extending from 22 to 28 regions; having a characteristic "ground-glass" appearance, encroaching toward the left maxillary sinus. The margins of the lesion were ill defined and blended subtly with the surrounding bone [Figure 3].

Axial computed tomography (CT) scan revealed the presence of a mixed area of bony expansion involving buccal cortical plate, extending anteriorly from mesial aspect of 22 to posteriorly towards 28 region. Marked thinning of the buccal cortices was noted. A "ground-glass" appearance within the expanded cortical plate was evident [Figure 4]. Mucosal thickening along with constriction of sinus

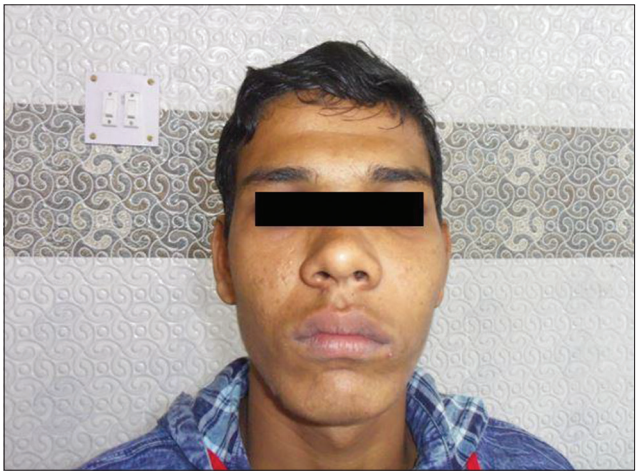

Figure 1: Extraoral photograph of patient showing mildly diffuse swelling in the left side of the face with obliteration of nasolabial fold

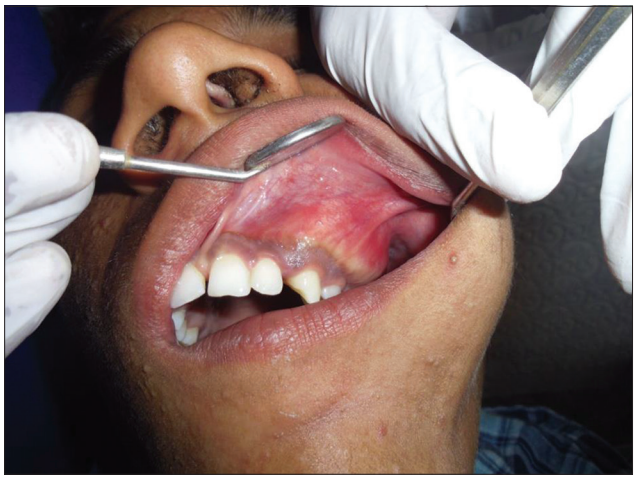

Figure 2: Intraorally a diffuse, expansive swelling was seen extending from buccal aspect of 22 to 28 regions

space was observed in the right frontal sinus along with cortical thickening of the left maxilla [Figure 5]. The radiological features were suggestive of a fibro-osseous lesion.

An incision biopsy was performed, from the relevant anatomical intrabony location. The tissue specimen was subjected to histopathological analysis. The biopsied gross specimen was whitish-yellow bony fragment having gritty consistency. The sections stained with H & E revealed the presence of multiple variably and irregularly shaped and sized bony trabeculae predominantly composed of immature bone, encasing plump osteocytes within them; discreetly dispersed in a cellular and loosely fibrous connective tissue stroma. Occasionally, mature bony trabecular areas were evident. The bony trabeculae mostly did not possess any sort of osteoblastic rimming and some of them were interconnected with each other in a cuneiform pattern. Neither the connective tissue stroma nor the bony trabeculae showed any sign of pleomorphism or dysplastic changes. The overall histopathological features were suggestive of "Fibrous Dysplasia" [Figure 6].

Based on the clinical, radiological, and histopathological findings, a provisional diagnosis

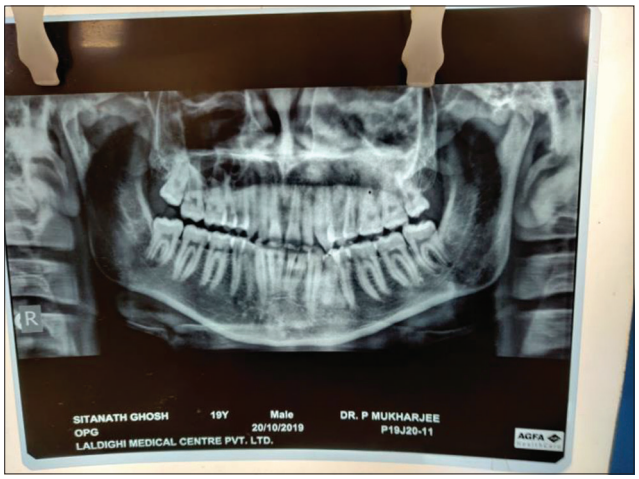

Figure 3: Orthopantomograph (OPG) shows maxillary and mandibular full assortment of permanent teeth alongside a mixed radiopaque and radiolucent lesion extending from 22 to 28 regions; having a characteristic "ground-glass" appearance

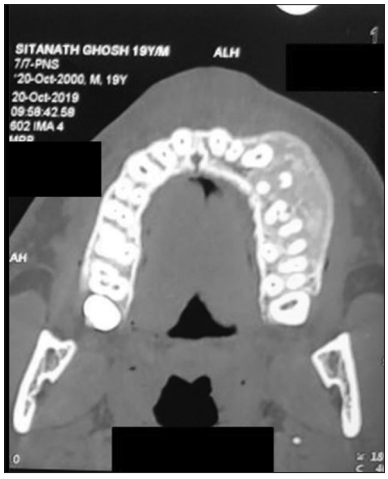

Figure 4: Axial computed tomography (CT) scan reveals the presence of a mixed ground-glass area of bony expansion involving buccal cortical plate, extending anteriorly from 22 to 28 regions with marked thinning of buccal cortices

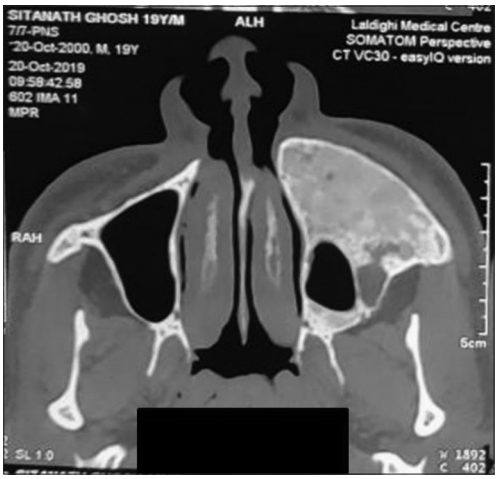

Figure 5: CT scan shows mucosal thickening along with constriction of sinus space in the right frontal sinus

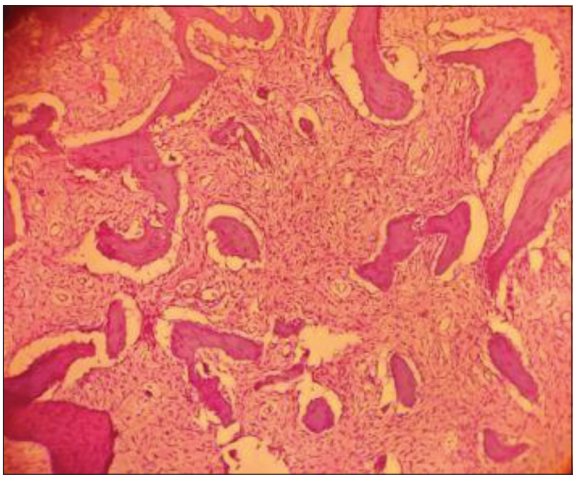

Figure 6: H and E stained section reveals the presence of multiple variably and irregularly shaped and sized bony trabeculae predominantly composed of immature bone, encasing plump osteocytes within them; discreetly dispersed in a cellular and loosely fibrous connective tissue stroma

of fibrous dysplasia of the left maxilla was made. Thereafter, necessary treatment modalities were clearly explained to the patient. Symptomatic relief of pain was done, and the boy was referred to the department of oral surgery for surgical remodeling of the expansile bone and was advised for periodic follow-ups. However, the father of the patient refused any surgical intervention and was inclined toward symptomatic relief. The patient was followed up after a period of 3 weeks and healing of the biopsied area was satisfactory.

DISCUSSION

Fibrous dysplasia (FD) is considered to be a neoplastic hamartomatous disorder of bony maturation and remodeling, characterized by disorganized fibrous bone replacing normal cortical and medullary bone. The resultant fibro-osseous bone is more elastic and structurally weaker. It comprises 2.5% of all bone tumors. The craniofacial and long bones, ribs are the usual sites of involvement.[8] FD can be conceptualized into four types, namely, (i) monostotic, (ii) craniofacial, (iii) polyostotic fibrous dysplasia – PFD (Jaffe-Lichtenstein type, a combination of PFD with cafe-au-lait pigmentation), and (iv) PFD (McCune-Albright syndrome, a combination of PFD with cafe-au-lait spots and multiple endocrinopathies). Mazabraud syndrome represents a culmination of intramuscular myxoma with PFD.[9]

When FD affects a single bone, it is termed as MFD. The condition is seen in children and teenagers, usually not before 30 years of age. Likewise, our patient was 19 years old. There is no gender predilection. The discussed subject was a male. MFD, involving single focus in one bone, accounts for about 75% of all FD cases. The maxillary premolar molar regions of the jaws are the dominantly affected sites. Our subject exhibited likewise findings. The craniofacial bones are affected in almost 50% of PFD patients and in 10–27% of MFD patients.[10]

Clinically, MFD presents as a slowly enlarging, usually painless swelling of the affected bone, which might cause deformity or asymmetry. Our patient possessed similar features. The growth often ceases after puberty, pointing toward its self-limiting nature. Maxillary cases often involve a group of contiguous bones separated by cranial sutures – such as zygoma and sphenoid. In these cases, the craniofacial complex is being involved. FD is non-encapsulated and essentially benign in its clinicopathological course. MacDonald-Jankowski systematically evaluated nine cases of FD (MFD, PFD, and craniofacial) in the jaws. He found swelling in 95% and pain in 15% of cases. Both pain and swelling were noted in our case.[11] In case of PFD, long bone involvement is common with presentations such as pain, deformity, and pathological fracture.[12]

Mutation of the GNAS1 gene is held responsible for FD. FD results from a defect involving undifferentiated pluripotent stem cells. At certain times in the histodifferentiation phase within the embryo, a genetic mutation or deletion occurs, in the gene encoding for an intracytoplasmic transducer protein, that is GNAS1, required for bone maturation. If it occurs postnatally, all the daughter cells of this aberrant pluripotent stem cell will only be able to produce disorganized fibrous bone rather than mature bone. If the aberration occurs in the stem cells during early embryonic period, in addition to osteoblast precursors, the melanocytes and endocrine precursors are also affected. These findings are observed in PFD spectrum.[6]

Radiographic presentation of FD varies according to the degree of maturation of particular lesion. Initially, lesions exhibit destructive changes such as thinning of spongiosa with poor separation from surrounding bone. The chief radiographic feature is a "ground-glass" opacification, resulting from superimposition of myriad poorly calcified and disorganized bony trabeculae. The margins of the FD are ill demarcated and tend to blend imperceptibly with the surrounding bone. Our case demonstrated similar findings which could be corroborated in both OPG and CT analyses. In initial stages, the lesions are radiolucent, while in later phases, radio-opacity prevails. Maxillary involvement can lead to obliteration or constriction of the sinus space along with thickening of the affected cortical plates like sphenoid. Axial CT scan showed constricted sinus space in our patient.[13]

The histopathology of FD varies with the stage of development. FD replaces normal bone by cellular and loosely fibrous connective tissue stroma, containing variably and irregularly shaped and sized bony trabeculae. The trabeculae predominantly consist of immature, non-lamellar, and woven bone without osteoid or osteoblastic rimming. Early FD growths possess a richly cellular fibroblastic tissue. The trabecular arrangement

mimics Chinese characters and therefore is often referred to as "Chinese character trabeculae." Similar findings were evident in the present case too.[8]

FD warrants differentiation from other fibro-osseous lesions and similar conditions. The most important one is ossifying fibroma (OF). While FD establishes itself by the 2nd–3rd decade of life, OF is seen at an older age. OF is radiographically well demarcated from the surrounding bone, whereas FD is diffuse. Histopathologically, FD has a very monotonous appearance having only osteoid, but OF has multiple components histopathologically such as osteoid, cementoid, and giant cells. Radiographically, chronic diffuse sclerosing osteomyelitis (CDSO) might mimic FD in its poorly defined radiologic appearance, but showing features such as retained cortex and minimal extension, not evident in FD. CDSO is constantly associated with an abscessed or carious teeth, but not FD. Osteosarcomas (OS) might look alike FD radiographically in some instances, but OS will usually resorb a cortex rather than remodel as in FD, and expand outward from a destroyed cortex. Histopathologically, the pleomorphic and dysplastic features are not at all discernible in FD, but clearly seen in OS.[14]

Although rare, transformation into malignancy like OS can occur when aggravated by previous history of irradiation in the 3rd–4th decade of life. These are prognostically very poor, with a mean survival time of 3.4 years post-diagnosis.[15]

Treatment modalities of FD include surgical management, non-surgical management, and clinical watchful neglect. Clinical close observation should be done in cases where deformity or fracture is absent. Surgical recontoring/management is recommended in cases of craniofacial/skeletal bone asymmetry and deformity; in cases, where the swelling has grown aberrantly to interfere with vital functions. Pharmacological management by employing bisphosphonates like palmidronate have been tried for symptomatic relief of pain and improving functional efficacy.[16]

CONFLICTS OF INTEREST

Nil.

SOURCE OF SUPPORT

Nil.

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