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Letter to Editor

OLLIER'S DISEASE

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ABSTRACT

Spranger type 1 is a rare bone condition known as Ollier's disease (OD). It is characterized by numerous enchondromatosis with a distinctive asymmetrical arrangement. This illness affects only the appendicular bones. There is a lack of complete comprehension of the pathophysiology of enchondromatosis. Several publications have recently proposed that heterozygous mutations in the PTHR1, IDH1, and IDH2 genes can cause OD. Phalanges and metacarpals are the bone structures most frequently affected by multiple enchondromas. OD is characterized by asymmetrical osteolytic lesions that have well-defined sclerotic edges when viewed through the lens of radiology. Even though the therapy is conservative in the vast majority of cases, numerous potential treatment alternatives for challenging patients are explored.

KEYWORDS: *Ollier's disease, enchondromatosis, hyaline, cartilage, bone*

INTRODUCTION

Chondromas are benign tumors most typically found in the hand's phalanges. Chondromas are composed of hyaline cartilage and are almost always asymptomatic. These growths are referred to as enchondromas when they originate in the medullary canal. Chondromas can occasionally develop on the bone surface, termed periosteal and juxtacortical chondromas. Osteochondromas are the most prevalent type of benign cartilaginous tumor. At the same time, enchondromas, second to Ollier's disease (OD), also known as enchondromatosis, is characterized by an abnormal accumulation of cartilaginous ulcerations that can be highly variable in terms of size, multitude, location, transformation, early onset, prognosis, and need for surgery (1). Enchondromatosis is characterized by multiple enchondromas (three or more). The lymphangiomas have been linked to OD and Maffucci syndrome, which is also an enchondromatosis (2, 3). OD is an extremely uncommon form of bone disease that affects just the appendicular skeleton and typically results in an uneven distribution of affected bones. Although it is considered a benign bone tumor, there is a five to fifty percent chance that it will develop into malignant chondrosarcoma. For diagnostic testing, radiographic, histopathological, and morphological examinations are all necessary steps. It is possible to improve the prognosis and minimize tumorigenesis and deformity by gaining a better knowledge of the clinical features and pathological aspects, particularly in patients who are adolescents (4).

The incidence of OD is believed to be one in every 100,000 people (5). Because moderate phenotypes of OD that do not

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involve skeletal deformities are occasionally missed, the true incidence of the disease may be higher than previously thought. Spranger et al. (6) developed a comprehensive categorization of enchondromatosis based on the radiographic appearance, anatomic site, and disease inheritance method. Based on the case descriptions of enchondromatosis, Halal and Azouz (7) later added three subgroups to their categorization system: generalized enchondromatosis with irregular vertebral lesions; generalized enchondromatosis with mucopolysaccharidosis; enchondromatosis with inverted vertebral bodies.

Pathophysiology

There is still much mystery around the process of how enchondromatosis develops. In its most fundamental form, OD is an aberration in the development of the limb bud. When it manifests itself in post fetal life, this error causes the long bones to expand in diameter rather than in length. The idea that enchondromatous lesions are essentially the displaced cartilaginous remains of normal epiphyseal cartilage cells was first postulated by Jaffe and Lichtenstein in 1943. Regarding the origin of enchondroma, this view is still generally recognized as accurate. Anomalies in the signaling pathways that control the proliferation and differentiation of chondrocytes could be to blame for the creation of intraosseous cartilaginous foci in enchondromas. These foci can be found in the bone (8). In patients with OD, the development of enchondromatous lesions can be caused by homozygote mutations and point mutations in the parathyroid-related peptide type 1 receptor (PTHR1) (9). OD has been recently linked to heterozygous mutations in the isocitrate dehydrogenase (IDH) gene, primarily in IDH1 (98%) and IDH2 (2%). These mutations displayed a condition known as antineoplastic mosaicism, similar to that observed in fibrous dysplasia and osteochondroma. The genetic inheritance pattern for OD is unknown, but it is hypothesized that it is not a straightforward Mendelian pattern (10, 11). Because of this, it would appear that OD is the clinical manifestation of a heterogeneous collection of different molecular abnormalities (12).

Clinical features

The following characteristics serve as pathognomonic indicators of OD: beginning in infancy or childhood; radiological changes that are confined to the longitudinal ends of the skeleton with stripped of rarefied areas and subsequent involvement of the epiphysis and the emergence of slight discoloration in the metaphysis and epiphysis in conjunction with the appearance of growth; the existence of cartilage on histological examination in a sample of tissue obtained from the radiolucent region seen on the radiographs. There is significant clinical diversity in the manifestation of OD, particularly concerning the size, quantity, location, and age at which symptoms first appear (13). The symptoms of OD typically appear in the first decade of a person's life. However, the condition has also been observed in adolescents and adults.

These lesions manifest themselves and expand before puberty but quickly transform into normal bone (14). OD affects males twice as frequently as it does females, in contrast to enchondromas, which are equally common in both sexes. Patients typically appear with asymptomatic bone tumors when they are seen. Even though lesions often occur on both sides of the body, with a unilateral preference that results in asymmetric distribution, a symmetric bilateral presentation on both sides has also been recorded (15). Although the appendicular skeleton is the most common site of involvement, the vertebrae of the trunk can also be affected in more severe cases. Enchondromas are uncommon in the carpal bones, as opposed to the phalanges and metacarpals, where they are more typically found. The femur and the tibia are two of the long bones that are commonly affected by OD. The femoral trochanters are typically affected, although the femoral neck is usually spared from the effects of the condition (16). OD can be found in the femoral neck, and it can cause a posterior inclination of the femoral neck fractures epiphysis, which can look like a slipping capital femoral epiphysis. Other bones implicated include pelvis, fibula, and humerus; however, ribs, thorax, and skull are involved only very infrequently; typically, vertebral bones and bones of the craniofacial region are not involved (13). Scoliosis can develop in the pelvis more often than any other trunk bone. The existence of growths on the extremity is the cause of the most prevalent symptom that patients report, which is a cosmetic deformity.

In very unusual cases, bone shortening is the only clinical sign observed. This shortening could result from a problem with the bones' capacity to expand longitudinally. These growth abnormalities are either caused by an abnormal epiphyseal plate adjacent to the enchondromas or by the attachment of the epiphyseal cartilage by an anomalously thick periosteal sleeve formed as a reaction to the enchondromatous lesions. Both of these factors contribute to the condition. It is possible to have an asymmetrical premature physeal arrest, which can result in deformities around the joints. An angular deformity may develop due to the non-uniform distribution of enchondromas, which mainly affect the metaphysis. The concavity of the angular malformation is where vast enchondromatous are located. As the bone expands in a transverse direction, the metaphysis begins to widen and broaden due to this growth (17).

Consequently, abnormalities such as genu valgus and cubitus varus, restrictions in joint motion, and differences in leg length may develop. The weakening of the cortical bone over increasing lesions can lead to pathological fractures. Asymmetry of the face and palsies of the cranial nerves are additional possible complications. OD is characterized by a significantly lower incidence of neural compression than multiple hereditary exostoses (18).

Pathology

A macroscopic evaluation of an enchondroma will typically reveal multiple rounds or oval cartilaginous nodules. These nodules will be limited at their periphery by lamellar bone, and they will be separated from one another by intertrabecular blood and bone spaces in the solid cartilaginous matrix. Myxoid changes will appear as frayed edges of the matrix. On a microscope, there are delineated lobules of mature, hypocellular hyaline cartilage with few double-nucleated cells and slight cytologic atypia. The cellularity of the tumor, on the other hand, may change due to increased mitosis. Islands of developed, nonvesiculated hyaline cartilage cells of varying sizes and shapes are embedded in abnormally rich metachromatic staining extracellular substances inside a network of trabecular bone. There is no indication of any myxoid alteration in the matrix. The processes of calcification and ossification are quite widespread, particularly on the lobules of the cartilage's periphery. This pattern is known as bone encasement (19).

The use of needle cytology is an important part of the diagnostic process for OD. Papanicolaou staining of smears revealed a large number of cartilaginous particles with angular edges. There are also a few spherical dispersed cells and occasionally clustered together. The nuclei of the cells are spherical and arranged in an irregular pattern, and the cytoplasm is plentiful and pale. Binucleation, mild atypia, hypercellularity, and large pleomorphic nuclei are all acceptable markers for benign enchondromas in multiple enchondromatosis (20). These characteristics signal malignancy in a solitary cartilaginous tumor and are present in various enchondromas. Enchondromas and grade I chondrosarcomas are difficult to distinguish from one another until grade I chondrosarcoma demonstrate the distinctive penetration of the bone marrow along with the entrapment of the host's lamellar bone on both sides (20, 21).

It is important to distinguish OD from multiple inherited exostosis. In multiple hereditary exostoses, the localization of bone lesions is the most important factor in distinguishing enchondromas from osteochondromas; this is because osteochondromas are located at the bone surface, whereas enchondromas are located in the center of bones, which enables radiographic distinction between the two (22).

Treatment

OD is typically managed with a conservative approach, except when complications arise. Since the lesions do not cause significant damage to function, they do not need to be addressed. Surgery may be recommended when a patient has a deformity, a limb-length discrepancy, a pathological fracture, or has undergone malignant transformation. The following are some of the primary objectives of the treatment: obtaining the desired level of mechanical alignment; achieving standard walking length to achieve comparable limb length; alleviating the discomfort caused by a pathological fracture. Treatment focuses on the limb affected the most profoundly, as well as any associated abnormalities and consequences (23). Surgery is indicated for an angular deformity that is higher than 25 degrees. Not many therapy options are available for OD, particularly those that can improve the patient's looks (17). Intralesional curettage, which may or may not be accompanied by bone grafting and/or an artificial bone substitute, along with a variety of osteotomies and internal fixations, is a modality that is utilized frequently. These interventions do not address the issue of the uneven distribution of limb length in any way. Curettage and cementing had favorable outcomes in patients with OD affecting the distal femur (24). Osteotomy is possible, but it must be performed multiple times before success. Additionally, the existence of brittle bones is a concern that makes it difficult to do an internal fixation (24).

CONCLUSION

OD is an extremely uncommon condition characterized by asymmetrical and bilateral bone lesions that do not cause pain. The condition manifests as an aesthetic deformity, a limb-length disparity, and pathologic fractures. It is also linked to malignancies, particularly chondrosarcomas, and can cause pathological fractures. The OD must be distinguished from other conditions that can cause bone swellings. OD is often treated with a conservative approach, but reconstructive surgery following an amputation or excision in more severe cases may be necessary. The outlook for someone with OD is generally positive; nonetheless, annual surveillance is recommended for children and adults with the condition.

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