Aneurysmal Bone Cysts

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Overview

Aneurysmal Bone Cysts (often abbreviated ABCs) are non-malignant tumors that are more commonly seen in pediatric patients, and can grow aggressively. ABCs can lead to morbidity if they involve the growth plate of bones. They can happen in any bone, but are most frequently found in the tibia, femur, and vertebrae. Their expansile nature can provoke inflammation, disruption of joints, and pain. Researchers believe that aneurysmal bone cysts form due to a vascular malformation. However, the definitive cause remains unknown (Stevens and Stevens, 2021).

Etiology

Based on recent molecular findings of the recurrent rearrangement involving the USP6 gene, the aneurysmal bone cyst is considered a neoplastic, rather than a reactive, lesion. The correlation of radiographic, clinical, and histological findings is crucial for the diagnosis of an ABC, and such a correlation is also crucial in order to differentiate the primary from the secondary form of the disease (Nasri and Reith, 2023).

Clinical Presentation

Patients with ABCs will typically experience a debilitating onset of pain, a palpable mass, or swelling. It is very common to see variability in the clinical presentation of these lesions because aneurysmal bone cysts can have different growth rates, with doubling times ranging from months to years, even in the same location. Due to the variability in growth rate, differences in imaging appearance is evident. Focal neurological symptoms can occur if the lesion involves the skull or

spine. Patients who present with a pathological fracture can experience acute pain (Restrepo et al., 2022).

Demographic

In the general population, aneurysmal bone cysts have a predilection for young adults and children. A male-to-female ratio of 1:1.16 is noted, and they are diagnosed more frequently in the second decade of life (Restrepo et al., 2022).

Biopsy / Histology / Radiographs

It can be very challenging to differentiate an ABC from a malignancy solely based on radiographs. As such, it is vital to confirm the diagnosis by means of a biopsy before proceeding with the treatment. It is crucial to perform an image-guided core biopsy of a suspected ABC with an orthopedic surgeon so as to not compromise salvaging the afflicted limb. The results of the biopsy, along with the radiographs, should be discussed in a multidisciplinary team, because it has been proven that a comprehensive approach (radiographic, clinical, and pathological) increases diagnostic accuracy and providing optimal treatment for patients who suffer from bone tumors (Restrepo et al., 2022).

ABCs appear as circumscribed multilocular or spongy cystic lesions. The cysts are filled with blood and the size ranges from a few millimeters to several centimeters. Microscopically the cystic spaces do not have endothelial lining and are surrounded by thick fibrous septae. The septae have scattered osteoclast-like multinucleated giant cells, uniform bland spindle cells, capillaries, and varying amounts of matrix. Approximately, half of cases show basophilic woven bone known as “blue bone” (Noordin et al., 2019).

The radiographic features of ABCs help in diagnosing the disease. On radiographs, they appear as eccentric metaphyseal expansile lytic lesions containing “fluid-filled” levels. Conventional radiographs show an eccentric radiolucent lesion with expansile remodeling bone. A subperiosteal bone is commonly present, and a thin surrounding rim of the periosteum is also present (Nasri and Reith, 2023). Plain radiographs have good diagnostic accuracy for cysts involving the appendicular skeleton. A combination of plain film with MRI and CT is indispensable on body parts which are difficult to evaluate on plain film – such as chest walls, pelvic areas, temporo-mandibular joints or the spine (Noordin et al., 2019).

Differential Diagnosis

It is very important to differentiate primary ABCs from lesions with ABC-like changes. It could be reasonably mistaken for others types of lesions, like chondroblastoma, giant cell tumors of bone, fibrous dysplasia, osteoblastoma, or even osteosarcoma (Nasri and Reith, 2023).

Treatment

Nonoperative management may be considered in selected cases considering the benign nature of the lesion. Options for nonoperative management include splinting of extremity lesions, drug treatment, radiation therapy, and wait-and-watch. There are also minimally invasive strategies, such as angiographic embolization, percutaneous intralesional injections, radionuclide ablation, cryoablation, and stem cell injections (Noordin et al., 2019).

Prognosis

The prognosis is generally good because an ABC is a nonmalignant condition. Fracture healing is commonly successful using bone grafts and bony stabilization. Surgical resection with intralesional curettage and adjuvants has been shown to result in recurrence-free outcomes in 80-90% of cases. Aneurysmal bone cysts require long-term follow-up due to the risk of recurrence. Depending on the apparent biological activity of the lesion, more or less frequent follow-up visits may be required; though, there is no general protocol regarding follow-ups. However, for the more aggressive lesions, follow-up visits are advisable every 2-4 months (Noordin et al., 2019).

Professional Relevance

ABCs are relevant to me as a Dental Hygienist because it is a rapidly destructive and growing bone lesion that can affect young people and children. It is extremely important to recognize when something abnormal is happening to a patient and to be able to refer them to the appropriate specialist, so they can receive the proper and necessary treatment. As a Dental Hygienist, I need to put all my effort into taking care of my patients, and doing the intraoral examination, as well as the routine radiographs, is crucial to finding any abnormality which could place the patient's life at risk. If a patient is diagnosed with an ABC, possible risks include tooth mobility, root resorption, or migration of teeth (Iyengar et al.. 2016).

Citations

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