

Aneurysmal Bone Cysts of the Jawbone

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Aneurysmal bone cysts are an intra-osseous accumulation of blood-filled spaces surrounded by cellular fibrous connective tissue. A rare non-malignant osseous tumor that comprises 1-6% of all primary osseous tumors. ABC's are not true cysts, though it is included in their name, is due to an overgrowth of multinucleated giant cells surrounded by a fibrous connective tissue layer. They are well known for affecting the long bones and vertebrae but can affect any bone in the body. ABC's of the head and neck region make up about 2-3% of occurring ABC's and can be identified as a unilocular or multilocular radiolucency's, usually in the posterior of the mandible (Richardson). Often occurring as painful or with a burning sensation, patients who have head and neck associated ABC's can appear with swellings over the affected area due to the expansive behavior of the lesion and the bone that covers it. Clinically this lesion presents as a "blood-filled sponge" with a hollowed-out center and many canals running in a matrix of dissolved bone and empty spaces. Histologically, these cysts are composed of osteoclasts, hemosiderin, and extravasated red blood cells. ABC's that occur in the jawbone have the ability to affect the teeth in which if the lesion spreads to has shown to resorb roots completely.

From the rare occurrence of these bone tumors, the etiology is still uncertain with suggestions being due to a vascular malformation but according to recent study it is theorized that they could form as a result from another primary bone tumor, trauma, or as the primary bone tumor itself (Stevens). The balance of bone remodeling in the osteoclast to osteoblast ratio falls

in heavy favor of osteoclasts within the lesion, consequently leading to the hollowing out effect apparent in ABC's. Osteoclasts are multinucleated giant cells who originate from monocyte fusion, typically ending up with 2-12 nuclei per cell. Osteoclasts attach to the bony extracellular matrix through binding proteins and create resorption pits called Howship's lacunae, where they acidify the bony environment and cause breakdown of the bone (Parvizi). T-cells, which are activated in the inflammatory response, produce membrane-bound and soluble RANKL which assists in the maturation and formation of osteoclasts explaining the overgrowth and imbalance of the giant cells. Cytokines such as IL-1 and TNF-a, are also known to be more abundant in sites of infection which also directly stimulate osteoclast activity by RANKL and M-CSF augmentation (Parvizi).

Patients with ABC's in the head and neck area can present clinically with a swelling that may develop rapidly. Often found in the mandible, they are painful for the patient with paresthesia on the affected side attributable to the destructive expansile nature of the cyst. ABC's severely weakens the bone making them prone to fracture which would clinically present as a subjective amount of pain for the patient. Depending on how far along the lesion has progressed, patients may also present with mobility in the teeth due to the resorption of the roots which could also cause the patient pain, swelling, and redness in the gums. Facial deformities are also noticeable in certain phases of the ABC of the head and neck due to the expansion and thinning of the cortical plates. Impingement may also occur on the capsule of the TMJ in lesions expanding toward the condyles of the mandible making it difficult to open the mouth. Generally, ABC's typically are of pediatric pathology, affecting people in their second decade or younger with a slight 1 to 1.3 predilection for females (Stevens).

These pseudocysts, which look like blood filled sponges when dissected, are an intraosseous accumulation of variable sized blood-filled spaces that is surrounded by fibrous

fascia-like edematous connective tissue. Common biopsy methods include needle biopsy or core needle biopsy which involves using a thin needle to remove a small sample of tissue from the cyst for further examination. Histologically ABC's are a fibrous-osseous tissue where you will find fragments of osteoid, fibroblasts, blood filled cystic spaces with hemosiderin in pockets of hemorrhage, spindle cells, and multinucleated giant cells (Alvarez-Martinez). ABC's are considered a difficult lesion to diagnose and treat but key radiographic signs help with evaluative clues to the diagnosis. They can present as unilocular or multilocular radiolucency's usually in the posterior third of the mandible with "eggshell" sclerotic borders and the circumscribed cavity containing dividing septa. CT scans and MRI help with the diagnosis by further defining the characteristics seen in radiographs by creating 3D images and showing fluid-fluid levels (Stevens).

Differential diagnosis for aneurysmal bone cyst's includes chondroblastoma, simple bone cysts, osteoblastoma, but mainly unicameral bone cysts and osteosarcomas in the pediatric population (Restrepo). Treatment of an ABC depends on the age of the patient, extension, aggressiveness, and location of the lesion. Surgical excision is the preferred method of treatment for an ABC of the head and neck, but alternative methods of treatment include surgical excision by intralesional curettage, intralesional excision, en block excision, enucleation of the cyst, and sometimes supplemented with cryosurgery (Stevens). Surgical excision of the ABC is known to have a 20 percent recurrence rate within the first year of removal of the cyst, thus making frequent checkups a regular routine for the next 5 years after surgery. Without treatment, ABC's will continue to expand in a balloon like fashion causing damage to everything surrounding its circumference. Usually occurring in the mandible, ABC's will weaken the bone leading to painful fractures, exaggerated swelling in the jaws, loss of function in the TMJ, and depending on the case loss of teeth or eventual complete loss of the jawbone.

That is why it is important for dental hygienists to be able to know the nature of an aneurysmal bone cyst, symptoms they produce, and the key radiographic details. These cysts occur from more than one etiology in people in their 2nd decade or younger making it an important matter for dental hygienists to advocate to the people about maintaining regular dental visits and informing the public that it is not only for the care of your teeth but also for any pathology in the head and neck. As principle for dental hygienists, we must find ways to educate the public about the dangers of not receiving dental care, particularly in this case the younger population where pathology can occur in their developmental phases. True care is needed where it is neglected most and endowed with knowledge it is therefore within the dental hygienist's scope to advocate and educate to the best of our abilities for the care of the public's best interests.

Citations

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