Atypical Presentation of Navicular Aneurysmal Bone Cyst in a Symptomatic Pediatric Flatfoot Deformity: A Case Study

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STATEMENT OF PURPOSE:

Aneurysmal bone cysts (ABC) are rare in the foot, accounting for 4%-6.3% of all ABCs.[1] Approximately 80% of patients diagnosed with ABC are in the second decade of life.[1] While benign, pain and deformity are often the presenting symptoms.[1] This study's objective is to describe a rare case of a navicular ABC in symptomatic, pediatric flatfoot deformity that was successfully treated with curettage and bone grafting.

LITERATURE REVIEW:

ABCs are benign, locally aggressive, expansile bone lesions that most commonly occur in the metaphyseal region of long bones.[2] ABCs are usually located around the knee joint and rarely occur in the foot and ankle region.[2,3] However, when ABCs occur in the foot and ankle, the metatarsals and calcaneus are most commonly affected.[2,3] Although the etiology of ABC lesions is unclear, current literature describes the process as an intra-osseous, arteriovenous malformation.[2,3] While ABCs are generally incidental radiographic findings, symptomatic-ABCs usually present in the second decade of life with a slight female predilection.[3] ABCs appear as an eccentric, expansile, cystic lesion with cortical expansion and thinning on plain radiographs.[2] Magnetic resonance imaging (MRI) is useful for further evaluation and surgical planning of these lesions. Typically on MRI, ABCs are multiloculated lesions with "fluid-fluid levels" and "blood-filled spaces".[2]

Several surgical treatment options exist for ABCs such as curettage with or without bone grafting, arthroscopic assisted debridement, or wide resection of the lesion. Curettage with or without bone grafting is commonly utilized for treatment of these lesions with a 20%-30% rate of recurrence.[1] Wide resection of the ABC has the lowest rate of recurrence, but the highest associated morbidity.[1] Overall, most recurrences of ABCs are reported to occur within the first two years following treatment.[2]

CASE STUDY:

An 11-year-old female with no pertinent medical history presented to clinic with a chief complaint of a painful, flatfoot deformity and discomfort to the medial midfoot after walking for greater than two city blocks. On examination, the patient exhibited focal pain to the medial aspect of the navicular as well as pain with single and double heel raise.

CASE STUDY CONTINUED :

Forefoot abduction was also noted with decrease in bilateral arch height. Radiographs were performed which revealed an ill-defined, expansile, sclerotic lesion in the navicular **(Fig.1).** An MRI was obtained which demonstrated a multi-cystic lesion filling the navicular bone on T2 images **(Figs. 2A, 2B)**. This lesion appeared benign and most compatible with an ABC. After an extensive discussion with the patient and her family, a decision was made to proceed with curettage of the lesion and packing of the deficit with allograft bone.

Figure 1

In the operative procedure, a 4 cm, longitudinal incision was centered on the bone tumor between the tibialis anterior tendon and extensor hallucis longus tendon under fluoroscopy. After careful dissection through the subcutaneous tissue and deep fascia, a capsular incision was made providing exposure to the navicular lesion. A small drill bit was used to create a cortical window for access to the bone tumor.

Figure 2A (left) and 2B (right)

CASE STUDY CONTINUED:

Corticotomy was completed with osteotomes. Curettes and a rongeur were used to remove the cyst lining **(Fig. 3A)**. Once the tumor was removed, the specimen was sent to pathology and the cavity was irrigated **(Fig. 3B)**.

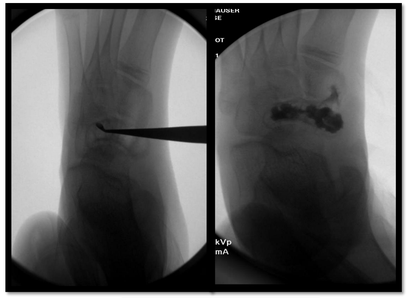

Figure 3A (left) and 3B (right)

Intraoperative fluoroscopy confirmed adequate resection of tumor when contrast applied to defect (**Fig. 4**). After removal of contrast and irrigation of the wound, demineralized bone matrix graft with lecithin carrier was impacted into the defect. Final fluoroscopic images confirmed adequate filling of the defect with bone graft.

Figure 4

CASE STUDY CONTINUED:

The capsule, deep fascia, and skin edges were re-approximated in the usual manner, and a sterile dressing was applied. The patient tolerated the procedure without difficulty and was taken to the recovery room in stable condition. Following surgery, the patient was placed in a below knee cast for six weeks. At six weeks post operatively, the patient was transitioned to touchdown weight bearing in a surgical shoe. The patient was then transitioned to regular shoes as tolerated at the ten week post operative visit. At six months post operatively **(Fig. 5)**, the patient was pain-free and returned to normal activity as tolerated. She revealed a non-antalgic gait and was able to participate in all desired activities with no restrictions or radiographic signs of recurrence.

Figure 5

ANALYSIS AND DISCUSSION:

Aneurysmal bone cysts are rare lesions in the foot and ankle. Local recurrence following curettage and bone grafting is as high as 22% with main risk factors being patient age and lesion size.[4] This report demonstrates successful curettage of an ABC within the navicular and preservation of osseous articulations in a pediatric patient. At one-year follow up, the patient had minimal pain with no evidence of recurrence.

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