CHAPTER **31**

ANEURYSMAL BONE CYSTS

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Aneurysmal bone cysts (ABC) are a unique and sometimes challenging malady to manage. Many are asymptomatic, but there are instances of ABCs that require surgical intervention (1). This article describes a technique applied to surgically treat an ABC in the distal aspect of the tibia in a pediatric patient.

An aneurysmal bone cyst is a benign osteolytic bone neoplasm. Although the specific etiology is not entirely understood, it is believed to be a reactive process of bone metabolism with a concurrent clonal neoplastic replication (1). The term aneurismal is derived from the concominent abnormal changes in hemodynamic pressure and flow within the bone. This lesion is characterized by blood filled hollow space with the presence of fibrous septa. The lesion itself may arise primarily or secondarily within a pre-existing bone tumor. Most ABCs are of primary origin but pre-existing tumors may include chondroblastoma, chondromyxoid fibroma, osteoblastoma, giant cell tumor, and fibrous dysplagia.

ABCs are noted with decreased radio-opacity on plain films and demonstrate a significant decrease in calcified bone contents when viewed in microscopic evaluation. Pathology reports will often include the descriptions of giant cells, spindle cells, osteoid, and hemosiderin-laden macrophages. ABCs are most commonly found within the long bones of the upper and lower extremity. Foot and leg ABCs account for nearly one-third of all documented cases. These lesions are often found within the medullary canal of bone, but can arise from cortical bone.

The presentation of this condition is often seen within the first and second decade of life. It is often an incidental finding on radiograph, but can present with specific pain in some instances. The onset of pain will begin within 6-12 weeks and may increase rapidly in symptomotology. Symptomatic, painful ABCs are often resistant to conservative care and will require surgical intervention. Minimally invasive surgical therapies have been proposed in the literature. These often involve a guided, percutaneus injection of sclerosing agents and osteocompatible products (2,3). Larger lesions may require an open evacuation and curettage to be performed. The recurrence of these lesions has been demonstrated to be as high as 20%.

CASE PRESENTATION

A healthy 14-year-old male presented with recent ankle pain that began less than 1 year prior. He experienced the pain after sporting activities, and had trouble participating in baseball during the previous 2 months. He described a dull pain that was only relieved through avoidance and needing to have nearly a 1-day recovery period between sporting events. His radiographic analysis demonstrated a skeletally immature architecture. The tibiotalar joint itself was unremarkable; however the distal aspect of the tibia, just superior to the physeal plate demonstrated a large expansile, radiolucent lesion (Figure 1). The radiologist report was high suggestive of an aneurismal bone cyst from plain film studies. Magnetic resonance imagining revealed a near-complete involvement of the distal tibia, with a surrounding cortical envelope thickness of less than 0.5 cm.

Open surgical intervention, through an anterior approach, was performed under general anesthesia with a muscle relaxant. The foot and leg were prepped and draped in a typical fashion and a thigh tourniquet was utilized.

Dissection overlying the anterior-lateral aspect of the distal tibia was performed. The incision was extended over the dorsal aspect of the talus for adequate deep exposure. This pathway was continued through subcutaneous tissues. Retraction of the medial and intermediate dorsal cutaneus nerve bodies was performed in a medial and lateral direction, respectively. Dissection continued through the superior extensor retinaculum and retraction of the muscle belly of extensor digitorum longus was performed medially while the peroneus tertious muscle was retracted laterally. Self-retaining retractors were used to maintain exposure, while the location was confirmed using intraoperative fluoroscopy. A window was designed to provide adequate entry into the internal chamber of the lesion in order to evacuate its contents, curette the margins, and reapply the cover fragment without prolapse.

The periosteum was scored sharply with a scalpel and a pneumatic sagittal saw was then utilized to create the window at a biased bevel (Figure 2). This window was lifted and removed from the surgical field. Suction with a Frazier-tip was performed and the remaining contents of the

Figure 1A. Plain film radiograph of the right ankle demonstrates a large, expansile lesion with decreased radiolucency and thinned cortical margins.

Figure 1B. The close proximity of the lesion to the physeal plate can be appreciated.

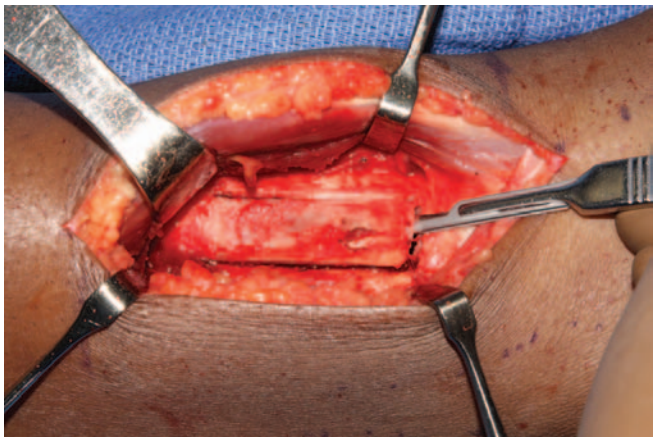

Figure 2. A windowed entry was created with a bevel over the lesion and was subsequently lifted.

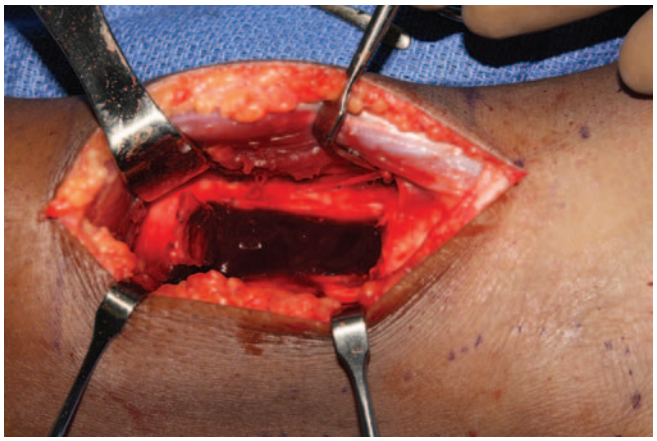

Figure 3. The mixed fibrous and liquid contents were exposed within the chamber and evacuated.

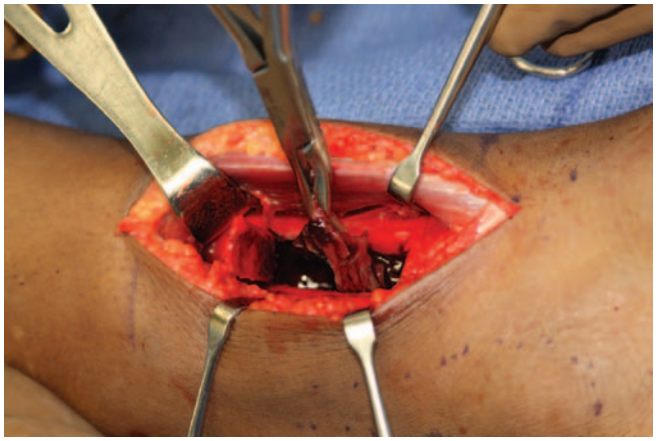

Figure 4. After the liquid contents were removed, the remaining fibrous tissue was debrided from the chamber wall and submitted for fresh frozen pathology specimen.

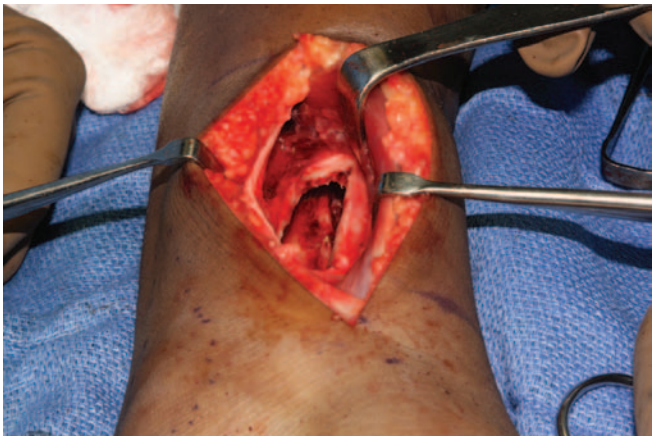

Figure 5. The chamber walls were gently curetted to avoid fracturing of the thin cortical boundries.

chamber were removed for fresh frozen pathology analysis (Figure 4).

While results were pending, gentle curettage was performed in the remaining walls of the chamber (Figure 5). The primary origin of hemodynamic influx was determined to stem from a superior aspect of the chamber, whereby normal cancellous bone was discovered.

A combined mixture of autogenic platelet rich plasma was combined with allogenic bone chips and biologic substitute was prepared (Figure 6). The pathologist assessment identified the specimen as fibrous nature and malignancy was not suspected. The prepared mixture was then used to fill the chamber and the windowed fragment was onlayed (Figure 7).

Multiple simple, interrupted sutures were applied through the periosteum of the window and the window edge. These were secured prior to deep fascia closure and skin closure (Figure 8). The foot and leg were placed in a hard Jones compressive cast. The patient was instructed to be non-weightbearing for 8 weeks postoperative.

REFERENCES

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3. Perlmutter DH, Campbell S, Rubery PT, Vates EG, Silberstein HJ. Aneurysmal bone cyst: surgical management in the pediatric cervical spine. Spine 2009;34:E50-3.
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Figure 6. The combination of allogenic bone chips, platelet rich plasma protein, and biologic substitute.

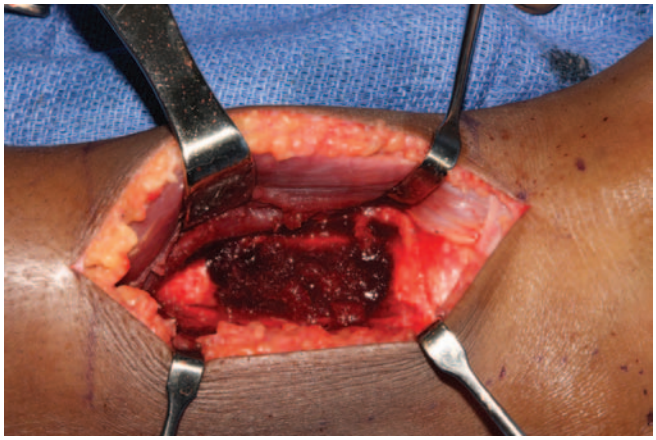

Figure 7. The chamber was packed with the orthobiologic mixture.

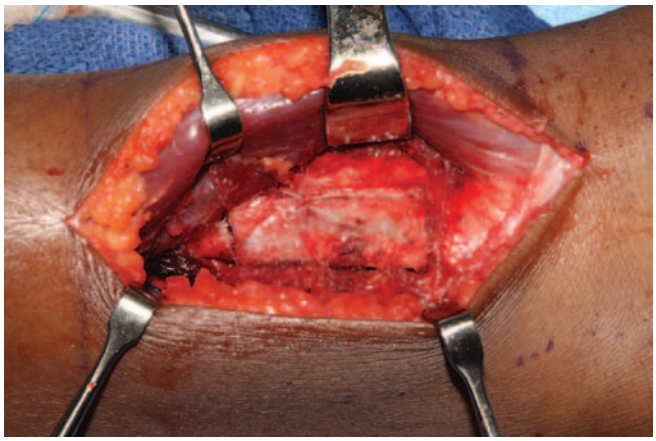

Figure 8. The window fragment was onlayed and periosteal suturing was performed.