Surgical management of a calcaneal solitary bone cyst in a 16-year-old girl: A case report

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Abstract— Solitary bone cysts are one of the most common types of benign musculo-skeletal lesions. The calcaneus is an uncommon primary localization and when affected can cause significant heel pain, gait disturbance and pathological fractures. Treatment of calcaneal solitary bone cysts remains controversial. Conservative options include observation and injections with corticosteroids. Surgical treatment consists of intralesional curettage and reconstruction of the defect with allo- or autografts, or decompression and supplementary fixation of the cyst with screws and plates. We present an uncommon case of a calcaneal solitary bone cyst treated with intralesional curettage and reconstruction with a cancellous bone allograft.

Keywords— Bone Cyst, Solitary Cyst, Allografts, Orthopedic Surgeries

1. Introduction

Solitary bone cysts (SBC) are one of the most common types of benign musculo-skeletal lesions. They represent 3% of all primary bone tumors and are usually encountered in the proximal humerus or femur1. The calcaneus is an uncommon primary localization for SBC and when present can cause significant heel pain, gait disturbance and pathological fractures[1,2]. Solitary bone cyst are usually encountered in the first 2 decades in men more often than females[1].

Treatment of calcaneal SBC`s remains controversial. Conservative options include observation and injections with corticosteroids[1,2]. Surgical treatment consists of intralesional curettage and reconstruction of the defect with allo- or autografts, or decompression and supplementary fixation of the cyst with screws and plates[1,2]. We present an uncommon case of a calcaneal SBC treated with intralesional curettage and reconstruction with a cancellous bone allograft.

2. Case report

A 16-year-old Easter European female patient was admitted to our institution with complains of right heel pain during ambulation with an onset of 1 month. Physical

examination did not reveal any deformities in the affected foot and no loss of fuctionality was noted. Conventional x-ray examination revealed an oval osteolytic lesion with distinc, well-defined margins located in the right calcaneus (Fig.1). A CT scan was also performed which revealed a large cystic lesion in the right calcaneus (Fig.1). Laboratory tests were unremarkable. Our patient had no significant family history or recent trauma.

Considering the clinical presentation and imaging characteristics of the lesion, the most likely diagnosis was solitary bone cyst. Our differential diagnosis also included aneurismal bone cyst. Patient was elected for surigcal treatment because of the increased risk of pathological fracture. Surgery was done with a lateral approach to the calcaneus. A large cavity filled with clear fluid and thin membrane covering was discovered. Careful curettage of the defect was performed, after which reconstruction was done with 50 cm^3 of demineralized cancellous bone allograft. Histological examination confirmed a diagnosis of solitary bone cyst. Postoeprative x-rays showed satisfactory packing of the cyst cavity with the used allograft (Fig.2) A walking cast was applied after which a non-weight bearing rehabilitation protocol was initiated. Soon after suture removal a medium sized surgical wound dehiscence occurred, which we treated with conservative means. At the first follow-up 1 month after surgery, there were no signs of SBC recurrence. The patient will transition to a partial-weight bearing program at 6 weeks post-surgery.



Figure 1. A – Diagnostic x-ray of the right foot revealing a osteolytic, well-defined lesion in the calcaneus. B,C – CT scan of the same foot showing a large unicameral cystic lesion.



Figure 2. Postoperative x-rays of the affected foot.

3. Discussion

Although calcaneal SBC can be asymptomatic and an incidental finding in many patients, they usually are considered biologically active lesions especially in younger patients. Dynamic follow-up or simple observation is advocated by some authors for patients with asymptomatic calcaneal SBC. A large systematic review by Levy et al. noted that only 1,1% of SBC achieve spontaneous healing with this treatment strategy but with no reported complications[1]. It was also mentioned that the presence of an expanding SBC in the antero-lateral part of the calcenus which is the most common localization of the lesion, leads to weakness of the lateral cortex and an increased risk of pathological fractures in these cases[1,2].

Corticosteroid injection is another well know method for treatment of SBC first introduced in 1979 by Scaglietti et al.[3]. Although a minimally invasive and low risk procedure, often multiple injections are required to achieve a therapeutic effect. Clinical symptom recurrence with this method is common, and patients usually require additional surgical treatment[3].

Surgical treatment is considered in all cases of persistent heel pain and increased risk of pathological fracutre. Decompression of the cyst by minimal curettage and augmentation with canulated screws achieves success by lowering intracystic pressure and stimulating new bone growth. Shirai et al. report a cyst healing rate of 88,2% with the usage of a cannulated hydroxyapatite pin for the treatment of calcaneal SBC[4]. Open curettage and reconstruction with autograft and allografts is still considered by many the golden standard for treatment of calcaneal SBC`s. In Levy et al.`s systematic review

this method has the highest success rate with more than 80% of cases achieving complete heel pain resolution[1]. Patients with autograft augmentation tend to have higher cyst consolidation rates than those with allografts. However, this method is not without complications as the most common ones include wound dehiscence, skin necrosis, infections, postoperative fractures and cyst recurrence[1,2]. Alternatives as synthetic bone allografts can also be used as good results are reported in the treatment of other benign bone lesions[5]. Endoscopic and mini-invasive imaging guided techniques are becoming more popular especially in pediatric patients. In Zhou et al.`s series of 33 pediatric patients with SBC`s, complete or partial cyst healing was achieved in 90,9% of patients[6]. Their protocol includes endoscopic curettage, sclerotherapy and injectable bone grafting. No serious complications were reported. Terzidis et al. also report for good results from endoscopic curettage and allograft augmentation in young soccer players[7].Abrishami et al. report for good results after percutaneus CT-guided cement agumentation in a patient with calcaneal SBC, with full recovery and no complications[8]. Although this method is considered relatively safe, Woods et. al. report a serious complications that they encountered after injecting bone cement for a calcaneal bone cyst[9]. Vascular extravasation of bone cement is a potentially devastating complication that should be considered when performing percutaneus procedures for SBC.

4. Conclusion

Adequate treatment of calcaneal solitary bone cyst remains controversial. Although a standard procedure, open curettage and bone augmentation with allografts comes with an increased risk of complications. Mini-invasive methods should always be considered especially in pediatric patients because of the lower complication rate and faster recovery.

5. References

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