Intraosseous Ganglion of the Navicular with a Successful Surgical Outcome: A Case Report

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INTRODUCTION AND PURPOSE:

Intraosseous ganglia are rare, non-neoplastic, cystic bone lesions that are often diagnosed once they become symptomatic with pain, particularly, when involving the wrist or ankle joint.[1-7] They can present with articular communication or soft tissue extension. The small collection of literature on this osseous lesion shows different method of treatment by means of curettage, with or without grafting.[6-11] Efficacy of these surgical methods is variable throughout literature in regards to rate of recurrence of pain,[2,12-13] and recurrence of the lesion.[1,14] Thus, the aim of this study is to demonstrate a successful surgical approach by means of bone curettage and utilization of calcium phosphate bone cement for the navicular.

CASE STUDY:

A 52-year-old female presented for a second opinion due to a new onset of palpable mass and local pain to the talonavicular joint of the left foot. Patient denied any significant past medical history.

On physical exam, patient had an antalgic gait, favoring the right side, secondary to discomfort in the left medial ankle and arch. Pain was more localized to the dorsal aspect of the navicular, rather than along the posterior tibial tendon or at its insertion on the navicular tuberosity. The patient had an MRI (Image 1&2) which showed cystic changes throughout the dorsal and lateral margin of the navicular with surrounding bone marrow edema. There was also a soft tissue extension of the cystic change with an adjacent extraosseous multilobular cyst component along the dorsal lateral margin of the navicular. The patient's visual analog score (VAS) was 8.5 preoperatively.

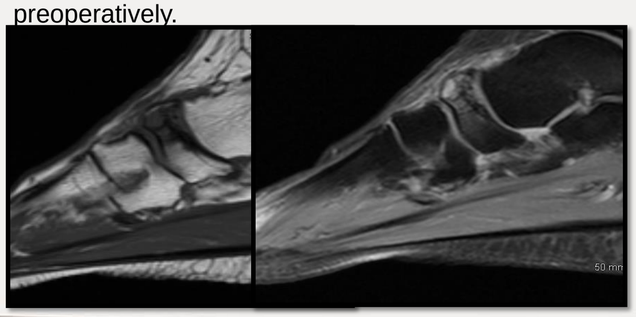

Image 1&2 : MRI reveals low signal intensity on T1 images and high signal intensity on T2 for intraosseous ganglion

SURGICAL PROCEDURE:

At the dorsal foot, lateral to the tibialis anterior, and medial to the extensor hallucis longus tendon, a linear incision was made over the top of the talonavicular joint. Articular surface of the talonavicular joint was evaluated and the cartilage surface was intact and appeared healthy. The cystic formation was identified at the dorsal lateral aspect of the navicular and extended in to the body of the bone (Image 3), without any joint involvement. The cyst was then curettaged and a jelly-like liquid was identified and removed. The tissue was sent for histological evaluation. Lastly, calcium phosphate bone cement was applied, dried, rasped, and flushed.

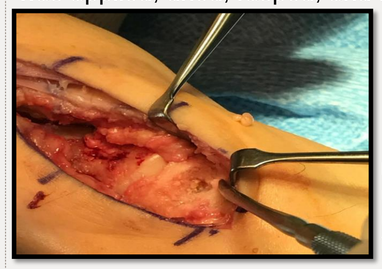

Image 3 : Cystic lesion noted to dorsal aspect of navicular and extends into the body

HISTOLOGICAL ANALYSIS:

The high power histological image showed collapse of the cyst wall. Visible in the center was a loose, myxoid area with spindle cells, typical of findings seen in a ganglion cyst. The rest of the cyst wall was a dense, hypocellular fibrous wall with a few chronic inflammatory cells (Image 4). The histologic findings are somewhat non-specific and could be seen with degenerative arthritic changes; but given more prominent fibrous cyst elsewhere and the clinical findings, the findings were compatible with a ganglion cyst involving the bone.

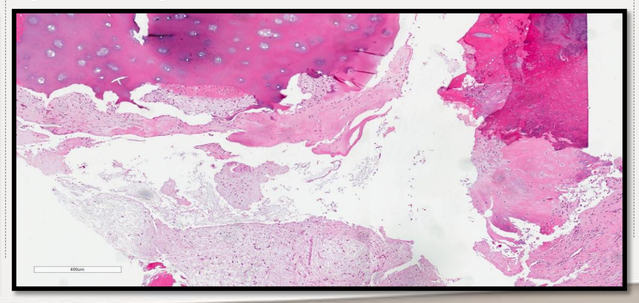

Image 4: High power histological image on the Intraosseous ganglion

POST-OPERATIVE MANAGEMENT:

Post operatively, the patient was instructed on remaining non-weight bearing to the left foot. Immediate post-operative radiographs confirmed that the curettage was successful with the packing of the bone into the region of the cyst that was related on the MRI (Image 5). Post- operative radiographs were performed at 1, 3, 6 and 52 weeks (Image 6). Patient was transitioned to be partial weight bearing after 3 weeks, full weight bearing after 7 weeks, and returned to work after 10 weeks. At the 12 month assessment, patient continued to have a full range of motion at the talonavicular joint, with a VAS of 1. Full incorporation of calcium phosphate bone cement is still pending.

DISCUSSION:

Although soft tissue ganglia was described by Hippocrates as "knots of tissue containing mucoid flesh," Crabbe was the first to use the term "intraosseous ganglion" in 1966 because he was unable to distinguish his 10 intraosseous ganglia samples from soft tissue ganglion.[15,16] Histologically, they are identified by presence of acellular mucinous material, spindled cells proliferating in myxoid background, with an outer fibrous capsule and possible reactive new bone formation.[17] Although these cystic lesions are considered benign osseous tissue, they are often associated with pain and fracture. [1,4- 7,18]

Theories for pathogenesis include trauma,[2] vascular disruption,[19] mucoid degeneration,[14] proliferation of synovial rest cells,[20] synovial herniation, and local metaplasia[4]. Treatment options vary, and there is no consensus on an ideal treatment method due to the discrepancy in reported recurrence rate of pain and intraosseous lesion. Shears et al. reported full consolidation of ungrafted bones after removal of all benign tumors, including intraosseous ganglion cyst, without any fractures or recurrence of pain.[11] Other case studies concluded that grafting is the favored method of treatment;[5, 7-10] of these studies, some reported intraosseous ganglion recurrence as high as 7%[1] and pain recurrence as high as 40%.[12,13]

Image 5 : Immediate post-operative imaging.

Image 6 : Post-operative radiograph at 52 weeks.

To date, intraosseous ganglia have scarcely been reported in the foot. The results of this surgical procedure compared favorably; our patient was able to ambulate at 3 weeks and returned to work at 10 weeks after surgery. No recurrence, new onset of pain or complication was noted to the navicular. One can conclude that although intraosseous ganglia of the lower extremity are rare, if encountered, they can safely and effectively be treated as demonstrated in this study

REFERENCES:

1. Ferkel, R. D., Field, J., Scherer, W. P., Bernstein, M. L., & Kasimian, D. (1999). Intraosseous ganglion cysts of the ankle: a report of three cases with long-term follow-up. *Foot & ankle international*, *20*(6), 384-388.
2. Helwig, U., Lang, S., Baczynski, M., & Windhager, R. (1994). The intraosseous ganglion A clinical-pathological report on 42 cases. *Archives of orthopaedic and trauma surgery*, *114*(1), 14-17.
3. Schajowicz, F. R. I. T. Z., Sainz, M. C., & Slullitel, J. A. (1979). Juxta-articular bone cysts (intra-osseous ganglia): a clinicopathological study of eighty-eight cases. *Bone & Joint Journal*, *61*(1), 107-116.
4. Ashwood, N., & Bain, G. I. (2003). Arthroscopically assisted treatment of intraosseous ganglions of the lunate: a new technique. *The Journal of hand surgery*, *28*(1), 62-68.
5. Vasu Pai, M. S. (2008). Intraosseous Ganglion of the Ankle: A Case Report.
6. Yu, K., Shao, X., Tian, D., Bai, J., Zhang, B., & Zhang, Y. (2016). Therapeutic effect of bone cement injection in the treatment of intraosseous ganglion of the carpal bones. *Experimental and therapeutic medicine*, *12*(3), 1537-1541.
7. Yajima, H., Murata, K., Kawamura, K., Kawate, K., & Takakura, Y. (2008). Treatment of intraosseous ganglia and bone cysts of the carpal bones with injectable calcium phosphate bone cement. *Hand Surgery*, *13*(03), 167-173.
8. Guo, H., Wei, J., & Liu, C. S. (2006). Development of a degradable cement of calcium phosphate and calcium sulfate composite for bone reconstruction. *Biomedical Materials*, *1*(4), 193.
9. Stubbs, D., Deakin, M., Chapman-Sheath, P., Bruce, W., Debes, J., Gillies, R. M., & Walsh, W. R. (2004). In vivo evaluation of resorbable bone graft substitutes in a rabbit tibial defect model. *Biomaterials*, *25*(20), 5037-5044.
10. Scholten, P. E., Altena, M. C., Krips, R., & van Dijk, C. N. (2003). Treatment of a large intraosseous talar ganglion by means of hindfoot endoscopy. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*, *19*(1), 98-100.
11. Shears, E., Dehne, K., Murata, H., Abudu, A., Grimer, R. J., Tillman, R. M., & Carter, S. R. (2001). Healing of ungrafted bone defects of the talus after benign tumour removal. *Foot and Ankle Surgery*, *7*(3), 149-155.
12. Than, S., & Ireland, D. C. R. (1992). Intraosseous ganglion cyst of the lunate: diagnosis and management. *The Journal of Hand Surgery: British & European Volume*, *17*(4), 429-432.
13. Waizenegger, M. (1993). Intraosseous ganglia of carpal bones. *The Journal of Hand Surgery: British & European Volume*, *18*(3), 350-355.
14. Nigrisoli, P., & Beltrami, P. (1971). Subchondral cysts of bone. *Lo Scapello*, *20*(4), 165.
15. Capps, E., Page, T. E., & Rouse, W. H. D. (1927). Hippocrates: on joints. *Heinemann, London*.
16. Crabbe, W. A. (1966). Intra-osseous ganglia of bone. *British Journal of Surgery*, *53*(7), 610-614.
17. Horvai, A. E., & Link, T. M. (2012). *Bone and soft tissue pathology*. Elsevier Health Sciences.
18. Mazhar, F. N., Shahverdi, M. H., & Moghaddam, Z. D. (2014). Lunate intraosseous ganglion cysts and chronic wrist pain-reporting six cases. *Archives of Iranian medicine*, *17*(11), 763.
19. Newland, Z., & Moore, R. M. (1986). Intraosseous ganglion of the ankle. *The Journal of foot surgery*, *25*(3), 241-246.
20. Sim, F. H., & Dahlin, D. C. (1971, July). Ganglion cysts of bone. In *Mayo Clinic Proceedings* (Vol. 46, No. 7, pp. 484).