

First Metatarsal Phalangeal Joint Reconstruction with Osteochondral Allograft

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Statement of purpose

First metatarsal phalangeal joint (MTPJ) osteoarthritis is a common problem seen in middle and late age adults. Arthritic changes can vary with some presenting with isolated osteochondral defects (OCD) at the metatarsal head¹. Osteochondral allograft transplantation systems (OATS) is a widely accepted procedure for knee and ankle OCD². Due to lack of fresh grafts, alternative allografts have been implemented. Chondrofix[®] Osteochondral Allograft (Zimmer Biomet) is an off-the-shelf product with decellularized hyaline cartilage and cancellous bone that has mechanical properties similar to native tissue. This case study demonstrates a unique joint preserving procedure using Chondrofix[®]; outlining the technique for first MTPJ reconstruction.

Literature review

Currently there are a few case series reviewing reconstruction of first MTPJ OCD using various treatment methods^{3,4}. Surgical treatment options found in the literature include use of microfracture subchondral drilling, particulated juvenile cartilage, and OATS. There are no documented cases showing the use of decellularized osteochondral allograft for reconstruction of first MTPJ OCD.

Case study

Five patients underwent First MTPJ reconstruction with application of Chondrofix[®] for isolated metatarsal head OCD. Preoperative assessment included standard x-ray evaluation, and all cases had preoperative MRI showing isolated first MTPJ OCD.

Surgical Technique

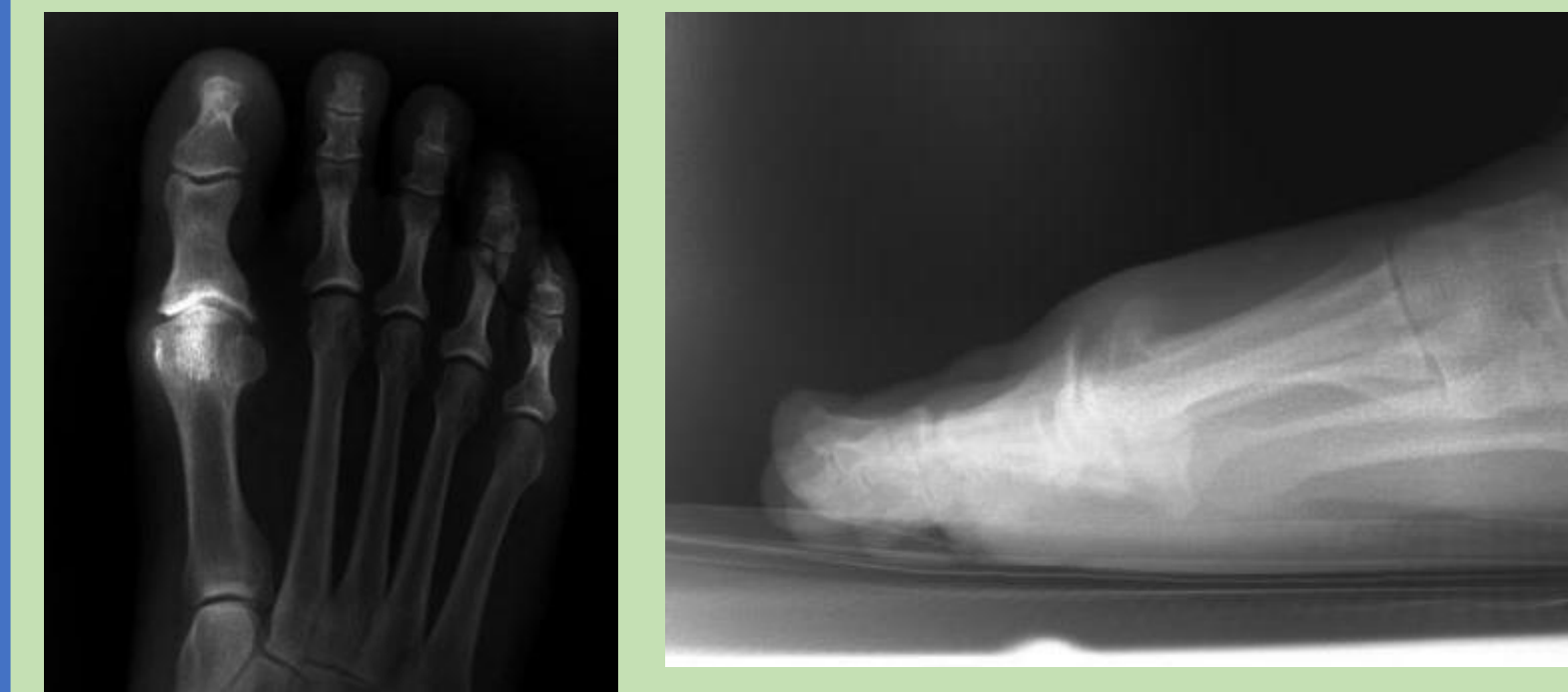
Under MAC sedation a Mayo block is performed with local anesthetics. The surgical site is prepped in the standard fashion with an ankle tourniquet utilized.

A linear longitudinal incision is made over the dorsomedial aspect of the first MTPJ. Sharp and blunt dissection is carried down the level of the first MTPJ capsule. A linear longitudinal capsulotomy is made and the capsule is reflected to expose the first metatarsal head dorsally, medially, and laterally. Resection of any osteophytes is done with a sagittal saw. The first metatarsal head is then inspected to confirm MRI findings with OCD measurements taken.

An appropriately sized diameter and depth trephine is used, based on previously noted measurements. OCD area is then drilled to removed OCD and subchondral bone. Allograft plug is then inserted using provided instrumentation. Area is then inspected to ensure allograft plug is flush when compared to adjacent cartilage borders.

Area is then irrigated with normal saline, and the first MTPJ is put through full range of motion. The tissues are then closed in a layered fashion with appropriate closure of the capsule, subcutaneous tissue, and skin. Standard sterile dressings are applied and the tourniquet is then deflated.

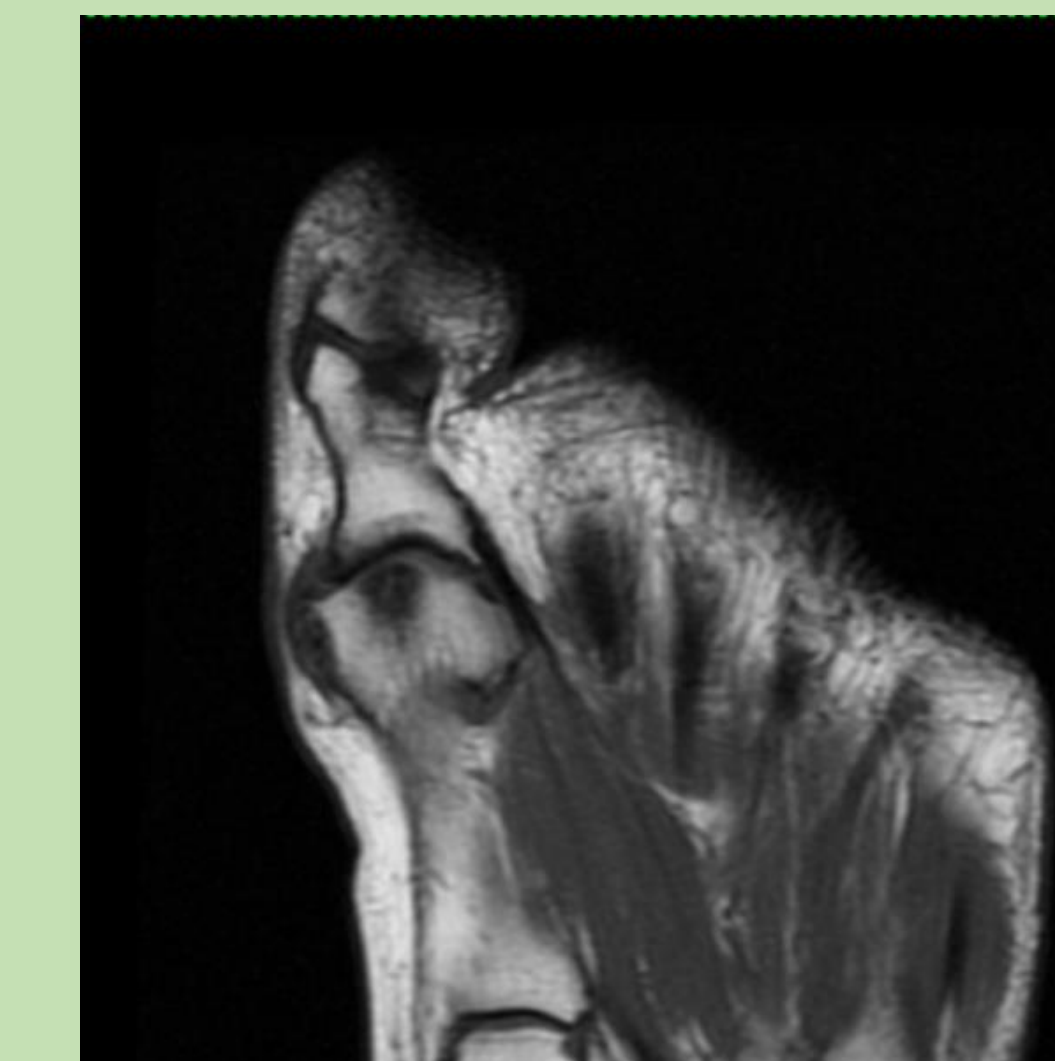
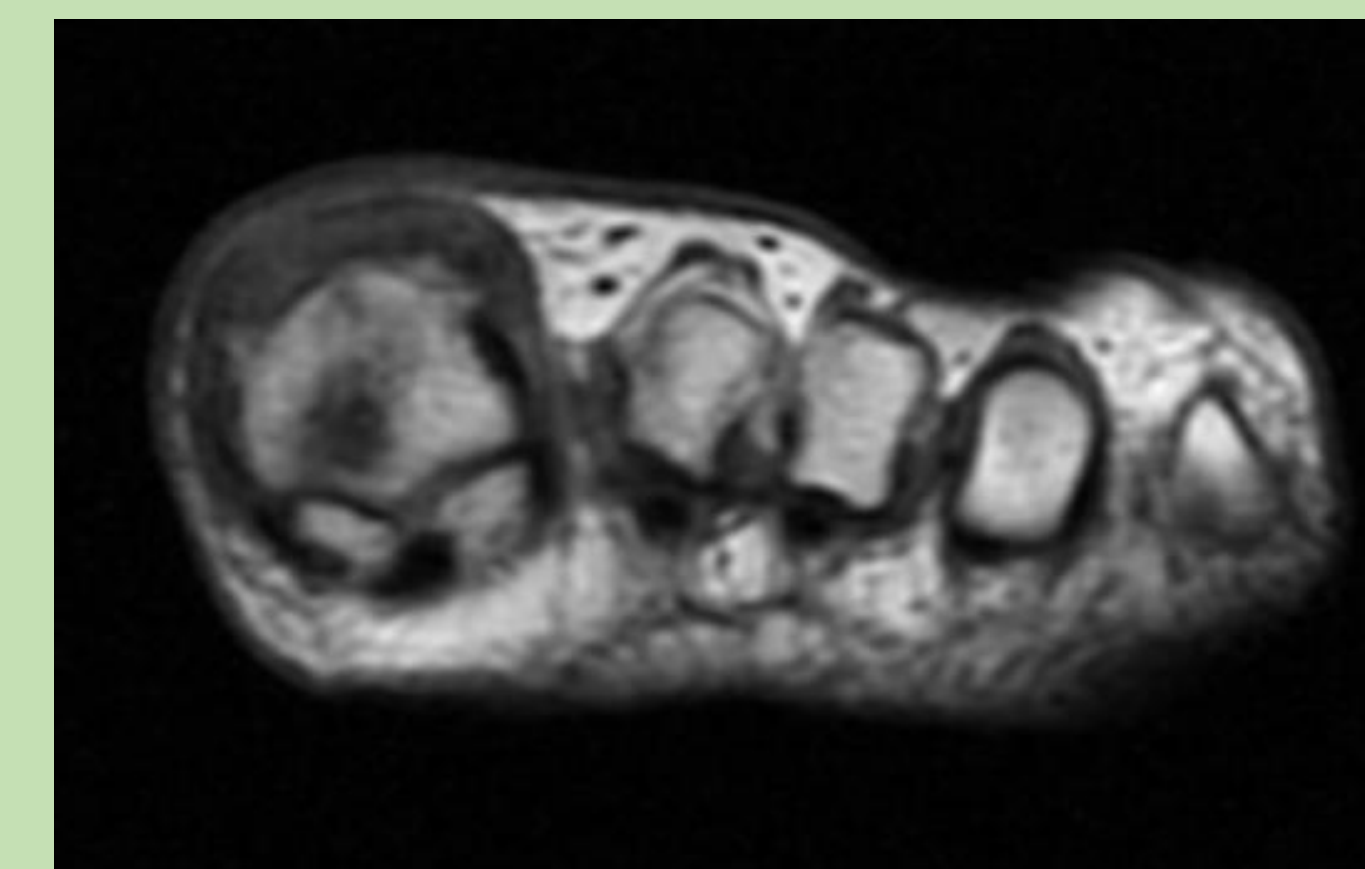
Pre-Op Radiographs



Post-Op radiographs



Pre-op MRI



Intra-operative



Analysis & Discussion

Patients with OCD of the first metatarsal head often have debilitating pain that requires surgical intervention. Described treatment options include open vs arthroscopic; bone marrow stimulation, cartilage transplantation, and particulated juvenile articular cartilage allograft. Osteochondral allografts can restore mechanical properties similar to both native cartilage and subchondral bone. Compared to other allograft options, Chondrofix[®] is readily available, and provides a bony scaffold to repair the OCD while still addressing the cartilage damage. This construct can also expedite the recovery process with early weight bearing. This technique provides surgeons with another option for first MTPJ reconstruction when isolated OCD are identified preoperatively. Further research is needed with long-term comparative trials to determine what treatment is best for first MTPJ OCD.

References

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4. Van Dyke, B, Berlet GC, Daigre JL, Hyer CF, Phibin TM. First Metatarsal Head Osteochondral Defect Treatment With Particulated Juvenile Cartilage Allograft Transplantation: A Case Series. Foot and ankle International. 2018; 39(2):236-241.