Physiologic Reconstruction of The Ankle Syndesmosis After Heterotopic Ossification of a Neglected Salter-Harris Type III Ankle Fracture in a High Caliber Athlete

Mark Solomon DPM, FACFAS1-3, Khoa Nguyen DPM, PGY-3, Alexander Mount DPM, AACFAS4,5
1. Morristown Medical Center, Atlantic Health System, New Jersey
2. Advocare The Orthopedic Center, New Jersey

Statement of Purpose

There is limited literature describing syndrometic reconstruction that recreates and preserves functional pivoting motion of the ankle. A player from a Salter-Harris type III (SH3) fibula fracture complicated by heterotopic ossification and resultant disability. Physial injuries are missed up to 8% in all ankle fractures (1). Neglect in early diagnosis and subsequent treatment eventually led to instability, pain and inability to participate in high impact sports. We present a case in which surgical reconstruction became essential to an athlete’s rapid return to sports with preservation of syndrometic motion after sustaining an overlooked SH3 injury with complications.

Literature Review

After an exhaustive review of the literature, the aforementioned situation has not been described. In isolation, there is abundant discussion regarding syndrometic reconstruction (2-7). Complications after sustaining both physical and syndrometic injuries are also readily accessible. Additionally, there is information regarding rehabilitation of the athlete with this pathology (2). However, there is minimal research involving some, but not all of these variables. Bodhi et al. (3) described the pathogenesis of heterotopic ossification as trauma to the ligaments extending proximal to involve the interosseous ligament. The retrospective review of five patients with a final diagnosis of the distal fibula as a suspected surface osteosarcoma. However, the study did not address the significance of physiological reconstruction of syndromes in elite athletes and none of the described injuries were repaired. Movarek et al. (4) proposed a novel approach to preserve the syndromic motion by reconstructing the interosseous ligament using semitendinosis allograft and suture button fixation. The six reported cases, however did not include athletic population with previous physical trauma.

Case Study

A 16-year-old male high school baseball player presented with a chronically unstable and painful right ankle that precluded him from playing as a shortstop. The history began in March of 2011, as a result of a sledding accident where the right ankle rotated into an abnormal position and sustained a SH3 fibular fracture. A visit to the ER failed to manage neither a SH3 fibular fracture nor a ligamentous rupture. The patient was able to participate in his basketball team. Immediately thereafter, pain and instability began to limit full activities. In July 2011, due to intolerable disability the patient was seen by a pediatric orthopedist. Appropriate conservative care and passed lateral to medial tunnel, extended superior to 2.5cm tunnel 2.5 cm proximal to the ankle joint. Locking fibular plate application to reduce malunion in injuries: ESSKA-AFAS consensus and guidelines. Knee radiology. Dec 2013: 676-9

Case Study Continued

Figure 1 - Initial X-ray

1. Arthroscopic debridement of ankle joint
2. Open incision for bony overgrowth extraction
3. Suture-button was placed 3.5 cm proximal to the ankle joint
4. Two parallel tunnels were drilled 1 cm and 2.5 cm proximal to the tibio-lalar joint
5. Pre-tensioned semitendinosis allograft passed medial to lateral through 1cm tunnel, extended superior to 2.5cm tunnel and passed lateral to medial
6. Biodegradation fixation of allograft
7. Locking fibular plate application to reduce stress created by allograft along fibular cortex

Figure 2a and 2b – Frontal CT, Frontal MRI

On physical examination, there was no swelling or ecchymosis. An antalgic gait was identified with pain on palpation of the distal fibula. There was no pain on palpation of the distal ligament.

Procedure

Figure 3 - Post-op Xray

Figure 4 - POD # 112

Case Study

Results

Physical therapy was initiated during week one after surgery. The goal was to limit deconditioning of muscle mass and memory. Gradual transition from partial to full weight-bearing occurred over a 6-week period. Followed by work with an athletic trainer emphasizing sports specific movements. Full participation in baseball activities allowed return to sports. Figure 2 depicts the first return to athletic competition as a shortstop without a designated hitter.

Conclusion

Physiole injuries are often misdiagnosed and overlooked in non-surgical treatment of pediatric and adolescent ankle fractures. The ankle joint biomechanics can be altered significantly after syndrometic disruption due to the inability of the fibula to push the talus back into alignment (8). Further complications with heterotopic ossification can be found up to 50% in all syndrometic sprains (7). In our unique case, the patient was a highly recruited baseball player with an unfortunate malaligned ankle mortise secondary to heterotropic ossification from a previous SH3 fibular fracture.

Physiologic reconstruction became the primary goal for this patient. As described by Kageyama et al. (9), the unstable distal tibio-fibular disassociation must be reconstructed to achieve semi-rigid dynamic stabilization during running and pitching. In order to accommodate pre-injury rotation of the fibula, the subtuberous buttow of the fibula will be protected with a screw fixation and the sinus tarsi will be excised and decompressed. Posterior calcaneal fixation was utilized to prevent stress on the posterior ankle mortise. The ankle joint biomechanics can be altered significantly after syndrometic disruption due to the inability of the fibula to push the talus back into alignment (8). Further complications with heterotopic ossification can be found up to 50% in all syndrometic sprains (7). In our unique case, the patient was a highly recruited baseball player with an unfortunate malaligned ankle mortise secondary to heterotropic ossification from a previous SH3 fibular fracture.

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