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Case Report

Chronic Injury of Distal Tibiofibular Syndesmosis with Ankle Fracture Dislocation: A Case Report

Ehsan Mahmoudi[1], Mohammad Hossein Nabian[2,*]

[1] Resident, Department of Orthopedic Surgery, Shariati Hospital, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
[2] Assistant Professor, Department of Orthopedic Surgery, Shariati Hospital, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

[*] Corresponding author: Mohammad Hossein Nabian; Center for Orthopedic Trans-Disciplinary Applied Research (CORTA), Tehran University of Medical Sciences, Tehran, Iran. Tel: +98-9126305095, Email: dr.nabian@gmail.com

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Abstract

Background: Syndesmotic injury is one of the major causes of ankle pain and arthritis in athletes. Syndesmotic instability may remain undetectable when occurring with ankle fractures.
Case Report: A 59-year-old man presented to the orthopedic clinic with a history of surgery for fracture-dislocation of ankle two months before his visit. During revision surgery, we performed an open reduction, tension band wiring (TBW), and syndesmotic screw fixation. The results were satisfactory, with an almost full ankle range of motion (ROM) and good skin condition.
Conclusion: Early diagnosis and treatment of syndesmosis injury can prevent the complications such as chronic pain, osteoarthritis (OA), and stiffness. There is no consensus on the treatment of syndesmosis injury, but the main factors in determining the treatment plan are tibiofibular joint stability or instability and the amount of time that the injury has occurred. Magnetic resonance imaging (MRI) and computed tomography (CT) can also be used in addition to X-rays in cases of suspected syndesmosis injury.

Keywords: Ankle Injury; Syndesmotic Injury; Tibiofibular Ankle Syndesmosis; Distal Tibiofibular Joint

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Background

Syndesmotic injury has been reported in 1-18 percent of ankle sprains and is one of the major causes of ankle pain and arthritis in athletes, particularly when it is not diagnosed initially. The diagnosis of this condition is not always feasible and might be missed in isolated sprains. Moreover, syndesmotic instability may remain undetectable when occurring with ankle fractures (1).

Syndesmosis injuries are common; this type of injury is seen in in 5%-10% of ankle sprains and 23% of ankle fractures. Accompanying ankle fracture is frequent and usually happens in dorsiflexion, eversion, and external rotation (2). Chronic instability and widening of the distal tibiofibular syndesmosis result in ankle instability, persistent pain, poor ankle joint functional outcome, and osteoarthritis (OA) development. Chronic syndesmotic instability can cause a sensation of giving way and walking difficulty on uneven ground. In the clinical exam, it presents with pain, swelling, stiffness, and limitation of dorsiflexion in the tibiotalar joint (3).

Ankle dislocation is one of the most common types of dislocations referring to the emergency department that might occur with or without fracture (4). The stability of the joint is the key point in evaluation of an ankle fracture. An unstable ankle fracture is defined as fracture of both axes of the joint, including the medial axis (medial malleolus and deltoid ligament) and the lateral axis (lateral malleolus, anterior and posterior tibiofibular ligaments, and interosseous membrane). Also, the situation of soft tissue is important for evaluation of the fracture and making the final decision on surgery (5). Approximately, 250000 ankle fractures occur in the United States (US) annually, of which 21%-36% are associated with tibiotalar dislocation (6). This type of fracture accounts for a total of 9% of all weight-bearing joint fractures, with an average age of 46 years and a slight gender difference favoring women (7).

Combined injury of syndesmosis and the deltoid ligament results in an even greater instability of the talus; if left untreated, it can cause chronic instability and degenerative arthritis (8). Due to the high rates of intraarticular loose body, articular surface malreduction, post-traumatic OA, and chronic pain, the syndesmotic injury is important and requires special attention (6). In this report, we present a case of chronic distal tibiofibular syndesmotic injury with ankle fracture-dislocation.

Case Report

The patient was a 59-year-old man with a history of motorcycle accident (as a pedestrian) two months before his visit, in which his left ankle was injured based on the ankle radiographs taken immediately after the accident (Figures 1 and 2).

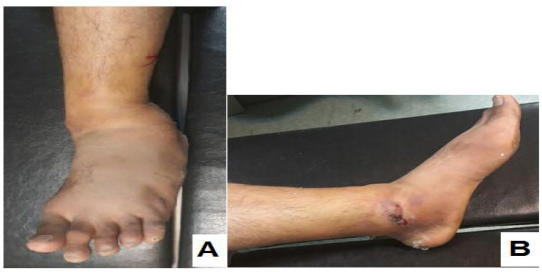

Figure 1. (A) Valgus deformity and external rotation of foot; (B) sweling, laceration, and bruise on medial malleolus

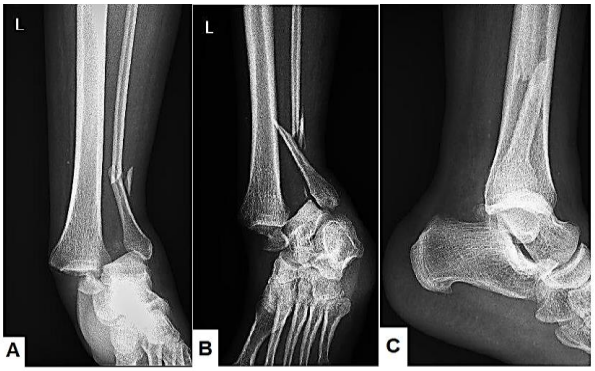

Figure 2. (A) Anteroposterior (AP) view X-ray of medial malleolus fixation and dislocation of subtalar joint; (B) ankle mortis shows lateral malleolus fixation fracture and disruption of interosseous membrane; (C) lateral view

The patient underwent surgery for fracture-dislocation of the left ankle. The previous surgical team performed lateral malleolus fixation without any intervention for treatment of syndesmotic injury and medial malleolus, probably because of the inappropriate condition of the skin of the medial ankle. Figure 3 shows the early post-operation results.

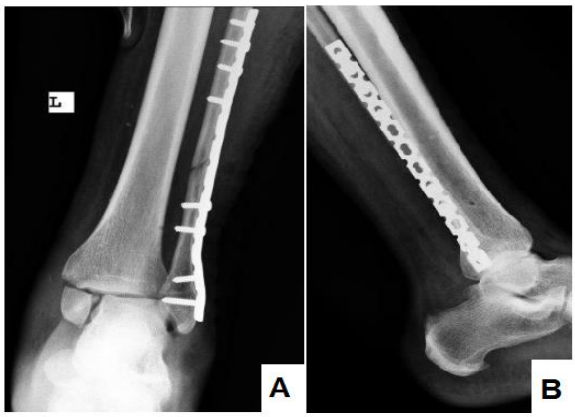

Figure 3. (A) Early post-operative X-ray after first surgery, subtalar subluxation remained; (B) lateral view

The patient was referred to our clinic in Shari'ati hospital, Tehran, Iran, eight weeks after the first operation for revision surgery. At that time, the patient suffered from ankle stiffness [range of motion (ROM) between 10 to 20 degrees plantar flexion] and deformity. Figure 4 shows the condition of the skin and ankle at the time of admission.

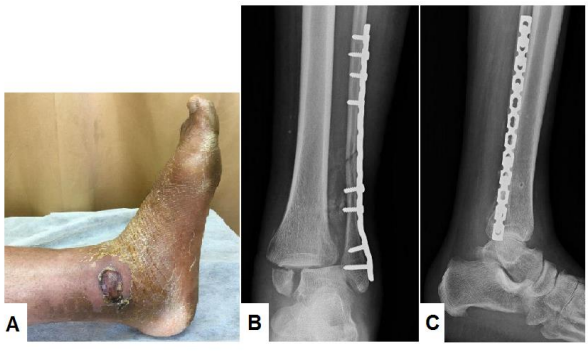

Figure 4. (A) Skin condition before revision surgery; (B) anteroposterior (AP) view X-ray showing tibiotalar dislocation and interosseos ossification; (C) lateral view of ankle

During revision surgery, the ankle joint was first opened by an incision far from the wound on the medial malleolus. Then, we explored neurovascular structures and tendons of the medial area, talus joint surface, and medial malleolus. During an open reduction, high amounts of soft tissue and scar were removed from the medial malleolar surface, previous fracture site, and the ankle joint. Under C-arm guidance, an appropriate reduction of medial malleolus was performed. Then, the fracture was fixed using two pins and tension-band wire (TBW).

Despite the debridement of the distal tibiotalar joint and anatomical fixation of the medial malleolus, the subluxation of the ankle joint was still present. Therefore, an incision was made at the site of the previous surgical scar of the lateral malleolus. Dissection was performed deep down to the surface of the plate and ossification of the interosseous membrane was clearly observed before it was released using osteotome and periosteal elevator. The quality of reduction was confirmed by C-arm, and then, two syndesmosis screws were placed for the patient. Due to the proper and stable reduction of the joint, we found no need to reconstruct the anterior-inferior tibiofibular ligament (AITFL). Figure 5 shows the appropriate condition of the joint surface following the revision surgery.

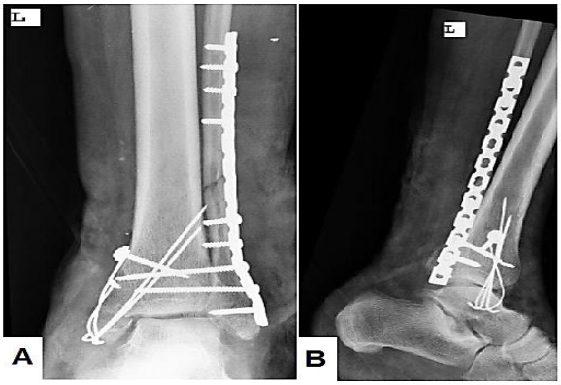

Figure 5. (A) Anteroposterior (AP) X-ray after medial malleolus fixation with tension-band wire (TBW) and syndesmose screw; (B) lateral view after revision surgery

The patient was discharged with a splint, non-weight-bearing exercises for eight weeks, and regular visits to the clinic. Partial weight-bearing was started for the patient afterward. As shown in figures 6 and 7, two months after the revision surgery, the skin was in an appropriate condition and an acceptable ROM was achieved (10 degrees dorsiflexion to 40 degrees plantar flexion).

Figure 6. (A) Anterior view of ankle joint after 2 months; (B) skin condition of medial malleolus 2 months after revision surgery

Figure 7. Anteroposterior (AP) and lateral views of ankle 2 months after revision surgery

Discussion

The syndesmosis of distal tibiofibular is a crucial factor of ankle stability and weight-bearing (3). The actual rate of syndesmotic injury is higher than before, as we can see in late syndesmosis calcification (up to 32%) in professional football players (1). Syndesmotic injuries may cause joint instability and disability, which can be prevented by early diagnosis and appropriate treatment. Otherwise, the patient may suffer from long-term complications such as delayed recovery, chronic pain, infection, malunion or nonunion, skin necrosis, recurrent sprains, and OA (4, 8). The most influential factors on the outcome of this condition are fracture type, the injury mechanism (severe fracture patterns with high-energy mechanisms), and underlying medical diseases (4).

Radiographs and magnetic resonance imaging (MRI) are two main diagnostic modalities for such lesions, both acute and chronic. Three views of anteroposterior (AP), mortise, and lateral ankle are needed. Plain radiographs are shown to yield high false-positive results, as a result of the low specificity of 44% to 58%. Computed tomography (CT) scan has a higher sensitivity and specificity in detecting syndesmotic injuries and can be used for confirmation of diagnosis and precise evaluation of fibula. MRI, as a less invasive modality, provides a clear visualization of anterior-inferior and posterior-inferior tibiofibular ligaments (8).

There is no consensus on the treatment of the chronic syndesmotic injury. Previous studies have reported encouraging results with syndesmotic screw fixation and debridement of the distal tibiofibular joint (9, 10). In stable cases, the syndesmotic injury should be treated conservatively. Any unstable syndesmotic injury needs surgery to reduce the structures and keep them in the correct position. In subacute injuries (six weeks to six months), the syndesmosis is repaired and protected with screw fixation. When repair is not possible, ligament reconstruction should be considered by using an autologous peroneus brevis or longus tendon. However, the literature on this matter is scarce. A non-weight-bearing period of at least six weeks is needed after these treatments (8). In our patient, the AITFL was not reconstructed due to negative Cotton test, absence of distal tibiofibular diastasis on fluoroscopy, and ankle joint stability; and yet, we had acceptable results.

Kennedy et al. compared the effectiveness of two different surgical methods for patients with distal fibular fracture and syndesmosis disruption. They used an internal fixation method that was not described. This procedure was used with and without syndesmotic screw fixation and no significant difference was found between the groups with regard to pain, stiffness, swelling, and return to work. They postulated that there was no advantage in using syndesmotic screw fixation in addition to their internal fixation method for these patients (11).

As a less invasive technique, Schuberth et al. used an arthroscopic syndesmosis debridement and percutaneous screw fixation with satisfactory results (12). A bone block advancement of the AITFL and syndesmosis screw fixation was introduced by Beumer et al. with a successful outcome (13). Choosing the appropriate ligament and an optimal substitute for these reconstructive surgeries is still debatable (14).

Arthrodesis of the syndesmosis has been proposed for chronic cases. Katznelson et al. reported satisfactory outcomes in 5 patients who underwent arthrodesis (15). Pena and Coetzee suggested arthrodesis in patients with significant incongruency in CT scan after 6 months post-injury. However, they found the final functional outcome inadequate for active athletic performance (16).

There has been a shift from screw fixation toward suture-button fixation, because of the faster patient recovery and better functional results (17). Naqvi et al. evaluated the outcome of tightrope fixation versus screw fixation. There was no significant difference between the results of the two groups for return to full weight-bearing. However, the tightrope group could have started weight-bearing about a week earlier (18). A higher American Orthopedic Foot and Ankle Society (AOFAS) score was reported by Thornes et al. for suture-button in comparison with screw fixation during one-year follow-up. In addition, the screw fixation method showed a slower return to work (4.6 versus 2.8 months) and more hardware removal (75% vs. 0%) (19). Despite good outcomes of different surgical techniques, the gold standard treatment for chronic syndesmotic injury is yet to be determined.

Conclusion

In the presented case of chronic syndesmosis injury, the patient had multiple problems including an eight-week delay, malunion, scar formation in the site of previous surgery, an inappropriate skin condition, and fracture-dislocation of the ankle joint. All of them led us to perform an open reduction, syndesmotic screw fixation, and medial malleolus fixation by TBW. The final results were satisfactory, with an almost full ankle ROM and good skin condition on the affected area.

Because complications of chronic syndesmosis injury are numerous and disabling, early diagnosis and treatment of syndesmosis injury can prevent these complications. MRI and CT have more diagnostic power than X-ray to diagnose this damage. There is no consensus on the treatment of syndesmosis injury, but the main factors in determining the treatment plan are tibiofibular joint stability or instability and the amount of time that the injury has occurred. Also, there was no significant difference between the different treatment methods in outcome.

Conflict of Interest

The authors declare no conflict of interest in this study.

Acknowledgments

None.

References

1. Rammelt S, Zwipp H, Grass R. Injuries to the distal tibiofibular syndesmosis: An evidence-based approach to acute and chronic lesions. *Foot Ankle Clin*. 2008;13(4):611-viii. doi: 10.1016/j.fcl.2008.08.001. [PubMed: 19013399].
2. Gieroba TJ, Munn Z, Cundy PJ, Eardley-Harris N. Fixation methods for acute injuries of the ankle syndesmosis: A systematic review protocol. *JBI Database System Rev Implement Rep*. 2016;14(8):43-51. doi: 10.11124/JBISRIR-2016-003060. [PubMed: 27635744].
3. van den Bekerom MP, Lamme B, Hogervorst M, Bolhuis HW. Which ankle fractures require syndesmotic stabilization? *J Foot Ankle Surg*. 2007;46(6):456-63. doi: 10.1053/j.jfas.2007.08.009. [PubMed: 17980843].
4. Frank AL, Charette RS, Groen K. Ankle dislocation. *StatPearls*. 2020; [PubMed: 32119497].
5. Coull R, Williams RL. Fractures of the ankle. *Hosp Med*. 2002;63(9):556-7. doi: 10.12968/hosp.2002.63.9.1954. [PubMed: 12357861].
6. Lawson KA, Ayala AE, Morin ML. Ankle fracture-dislocations: A review. *Foot & Ankle Orthopaedics*. 2018;3(3): doi: 10.1177/2473011418765122.
7. Mandi DM. Ankle fractures. *Clin Podiatr Med Surg*. 2012;29(2):155-86, vii. doi: 10.1016/j.cpm.2012.01.002. [PubMed: 22424483].
8. de-Las-Heras Romero J, Alvarez AML, Sanchez FM, Garcia AP, Porcel PAG, Sarabia RV, et al. Management of syndesmotic injuries of the ankle. *EFORT Open Rev*. 2017;2(9):403-9. doi: 10.1302/2058-5241.2.160084. [PubMed: 29071125]. [PubMed Central: PMC5644422].
9. Beals TC, Manoli A. Late syndesmosis reconstruction: A case report. *Foot Ankle Int*. 1998;19(7):485-8. doi: 10.1177/107110079801900712. [PubMed: 9694129].
10. Harper MC. Delayed reduction and stabilization of the tibiofibular syndesmosis. *Foot Ankle Int*. 2001;22(1):15-8. doi: 10.1177/107110070102200103. [PubMed: 11206818].
11. Kennedy MA, Sama AE, Sigman M. Tibiofibular syndesmosis and ossification. Case report: Sequelae of ankle sprain in an adolescent football player. *J Emerg Med*. 2000;18(2):233-40. doi: 10.1016/s0736-4679(99)00201-2. [PubMed: 10699529].
12. Schuberth JM, Jennings MM, Lau AC. Arthroscopy-assisted repair of latent syndesmotic instability of the ankle. *Arthroscopy*. 2008;24(8):868-74. doi: 10.1016/j.arthro.2008.02.013. [PubMed: 18657734].
13. Beumer A, Heijboer RP, Fontijne WP, Swierstra BA. Late reconstruction of the anterior distal tibiofibular syndesmosis: Good outcome in 9 patients. *Acta Orthop Scand*. 2000;71(5):519-21. doi: 10.1080/000164700317381243. [PubMed: 11186412].
14. Miyamoto W, Takao M. Management of chronic disruption of the distal tibiofibular syndesmosis. *World J Orthop*. 2011;2(1):1-6. doi: 10.5312/wjo.v2.i1.1. [PubMed: 22474625]. [PubMed Central: PMC3302031].
15. Katznelson A, Lin E, Militiano J. Ruptures of the ligaments about the tibio-fibular syndesmosis. *Injury*. 1983;15(3):170-2. doi: 10.1016/0020-1383(83)90007-4. [PubMed: 6642626].
16. Pena FA, Coetzee JC. Ankle syndesmosis injuries. *Foot Ankle Clin*. 2006;11(1):35-50, viii. doi: 10.1016/j.fcl.2005.12.007. [PubMed: 16564452].
17. Porter DA, Jaggers RR, Barnes AF, Rund AM. Optimal management of ankle syndesmosis injuries. *Open Access J Sports Med*. 2014;5:173-82. doi: 10.2147/OAJSM.S41564. [PubMed: 25177153]. [PubMed Central: PMC4128849].
18. Naqvi GA, Shafqat A, Awan N. Tightrope fixation of ankle syndesmosis injuries: Clinical outcome, complications and technique modification. *Injury*. 2012;43(6):838-42. doi: 10.1016/j.injury.2011.10.002. [PubMed: 22036451].
19. Thornes B, Shannon F, Guiney AM, Hession P, Masterson E. Suture-button syndesmosis fixation: Accelerated rehabilitation and improved outcomes. *Clin Orthop Relat Res*. 2005;(431):207-12. [PubMed: 15685077].