

Does Ligamentotaxis Reduce the Risk of Avascular Necrosis of the Talus after Lateral Subtalar Dislocation

P Stojiljkovic^{1,2,3,4}, S Milenković^{1,2,3,4}, M Mitković^{1,2,3,4}

¹University of Nis, ²Medical Faculty, Orthopaedic and ³Traumatology Clinic, ⁴University Clinical Centre of Nis, Serbia

Received:
01-Feb-2023;
Revision:
19-Jul-2023;
Accepted:
18-Aug-2023;
Published:
30-Oct-2023

ABSTRACT

Lateral subtalar dislocations are rare and severe injuries caused by high-energy trauma, and they require urgent treatment. We reported two cases of lateral subtalar dislocation, which were treated with different methods. In case of open lateral subtalar dislocation, we used the method of distractional external fixation; the final outcome was good, without avascular necrosis of the talus. The case of closed subtalar dislocation has been treated with open reduction and K-wires fixation. The final outcome was poor, with avascular necrosis of the talus. Our opinion is that ligamentotaxis of the ankle and subtalar joint with unilateral external fixation unloads the talus and reduces the possibility of the development of avascular necrosis of the talus.

KEYWORDS: Avascular necrosis, external fixation, lateral subtalar dislocation, ligamentotaxis, talus

INTRODUCTION

Subtalar dislocations are a rare and severe injury often resulting from high-energy trauma, representing 1-2% of all dislocations. The foot is displaced laterally in about 25% of cases.^[1] All of the subtalar dislocations represent urgent conditions requiring urgent treatment. The reduction of closed subtalar dislocations can be closed or open in cases where closed reduction is not possible. One series shows that 32% of patients with subtalar dislocation require open reduction.^[2] Inability to reduce lateral subtalar dislocations can be caused by interposition of the posterior tibialis tendon in case of rupture of the flexor retinaculum.^[3,4] Associated injuries and complications can lead to poor results. Complications include avascular necrosis of the talus, infection, post-traumatic osteoarthritis requiring arthrodesis, and chronic subtalar instability. Negative prognostic factors include lateral and complicated dislocations, total talar extrusions, and associated fractures. Soft tissue injuries, extraarticular and intraarticular fractures, avascular necrosis of the talus, and open subtalar dislocation were associated with worse outcomes.^[5,6] Avascular necrosis of the talus is a rare complication that occurs after closed subtalar dislocations, and it is generally only noted with high-energy and open injuries. Talar avascular necrosis

is reported in up to 50% of patients after a complicated lateral subtalar dislocation.^[5] AVN of the talus can be a significant problem because the collapse of the talar dome leads to pain and disability of the ankle and subtalar joints and degenerative changes of the ankle and subtalar joints.^[7] We present two cases of lateral subtalar dislocation treated with different methods. Open lateral subtalar dislocation has been treated with the method of distractional external fixation, whereas closed lateral subtalar dislocation has been treated with the method of open reduction and K-wires fixation.

CASE PRESENTATION 1.

A 40-year-old patient was admitted to our institution due to a left foot injury when he landed on it incorrectly while playing basketball—clinically visible lateral dislocation of the foot and eversion. X-ray showed lateral subtalar dislocation. Urgently, 35 minutes after hospitalization, we tried closed reduction under spinal anesthesia, unfortunately, without any success. We then

Address for correspondence: Prof. S Milenković, Medical Faculty, University of Nis, Bul. Dr. Zorana Djindjica 81, 18000 Nis, Serbia.
E-mail: sasaortoped@gmail.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Stojiljkovic P, Milenković S, Mitković M. Does ligamentotaxis reduce the risk of avascular necrosis of the talus after lateral subtalar dislocation. *Niger J Clin Pract* 2023;26:1584-7.


Access this article online	
Quick Response Code: 	Website: www.njcponline.com
	DOI: 10.4103/njcp.njcp_79_23



Figure 1: (a): Closed lateral subtalar dislocation; (b, c): X-rays showing lateral subtalar dislocation; (d, e): X-rays after open reduction and K-wires fixation

continued open reduction with anteromedial approach to the talus. Intraoperatively, we noticed interposition of the posterior tibialis within the retinaculum. After reduction, two K-wires were placed through talonavicular joint and talus [Figure 1]. After the surgery ankle joint and foot were immobilized with plaster cast. Postoperative X-ray showed fracture of posterior process of the talus. The wound healed primarily without any complications. We included analgesic therapy, 2-day antibiotic prophylaxis, and low molecular weight heparin. The patient was in good health and shape; he smoked for over 20 years. Plaster cast immobilization was taken off after a month when he started with physical therapy. Partial weight-bearing started 6 weeks after surgery. On follow-up examination, after 2 months, X-ray showed signs of avascular necrosis of the talus, confirmed by magnetic resonance imaging [Figure 2]. The patient continued with physical therapy and partial weight-bearing for one more month. We suggested to him further surgery, drilling of the talus, subtalar fusion, or triple arthrodesis, which he refused because he was satisfied with his condition. Clinically, foot was without swelling, the patient had pain of moderate intensity during long period of walking or standing.

CASE PRESENTATION 2.

A 29-year-old patient was admitted with open lateral subtalar dislocation when he fell off from a height



Figure 2: (a, b): X-rays, 4 months after lateral subtalar dislocation showing early signs of avascular necrosis of the talus; (c, d): MRI, 5 months after the injury showing avascular necrosis of the talus

of 3m. Debridement of soft tissue and reduction of subtalar dislocation were performed urgently after admission under general anesthesia. External fixator by Mitkovic was placed with the previous distraction (Ligamentotaxis). Pins of external fixator were placed, 2 in the tibia, 1 in calcaneus, and 1 in the first metatarsal bone. The wound healed by secondary intention. The patient was immobilized and given antibiotic prophylaxis and low molecular weight heparin. External fixator was removed 6 weeks after the injury. After those 6 weeks, he started physical therapy with partial weight-bearing. Full weight-bearing was allowed 2 months after the injury. The final functional result of treatment was good, and ankle joint function was satisfactory; there were no signs of avascular necrosis of the talus a year after the injury [Figure 3].

DISCUSSION

Subtalar joint dislocation is defined as a simultaneous dislocation of the subtalar and talonavicular joint.^[8] Lateral subtalar dislocation is a rare injury; in literature, about 25% of the cases were described.^[1] Lateral subtalar joint dislocations are produced by forced eversion with the foot in dorsiflexion.^[8] Inability to reduce lateral subtalar dislocations can be caused by interposition of the posterior tibialis tendon in case of rupture of the flexor retinaculum.^[3,4] Subtalar dislocations are



Figure 3: (a): Open lateral subtalar dislocation; (b): X-rays showing lateral subtalar dislocation; (c): X-rays after reduction and distractive external fixation; (d): Image of the foot during the wound healing by secondary intention; (e): Image of the foot, after the external fixator removed; (f, g): X-rays a year after the injury showing no sign of avascular necrosis of the talus. (From Milenkovic S, Mitkovic M, Bumbasirevic M. External fixation of open subtalar dislocation. *Injury* 2006;37:909-13, with permission)

severe injuries requiring urgent treatments. The trauma causing this type of injury is frequently a fall from a considerable height or a motor vehicle accident. In American literature, many patients feature trauma after jumps during a basketball game, which has led to the term “basketball foot.”^[9] Subtalar dislocations occur as isolated injuries or are associated with local bone or soft tissue structures. Also, osteochondral talus injuries are not rare, which is why they can affect the final functional outcome. Furthermore, subtalar dislocations can be open, which also affects the final outcome of the treatment. After closed subtalar dislocations, good final functional results should be expected. In literature, an increased percentage of bad results after the open subtalar dislocations were described.^[6] Poor results include skin necrosis, superficial or deep infection, post-traumatic arthritis, avascular necrosis of the talus, chronic pain and swelling of the foot, and subtalar joint instability.^[1] Our approach and philosophy of treating all open subtalar dislocations consist of distractive external fixation, as we believe in theory that moderate manual distraction of ankle and subtalar joint unloads the talus, helps the revascularization of the talus and reduces the possibility of avascular necrosis of the talus.^[10-12] Unfortunately, A small number of clinical cases cannot prove our theory, but based on the previous clinical experience, we have a reason to stay optimistic. In the second closed lateral subtalar dislocation case, an acceptable method of open reduction and K-wire fixation was used, but avascular necrosis of the talus occurred as an unexpected outcome. Unfortunately, we will not find out whether the complication could have

been avoided by using distractive external fixation. We believe that the distractive external fixation is important, and in the future, we will use this method in cases with closed subtalar dislocations, which cannot be reduced with a closed method. Avascular necrosis of the talus is a severe complication that leaves long-term consequences and requires further surgery. Avascular necrosis of the talus is a severe complication that occurs as a result of open or closed subtalar dislocations. In our opinion, further clinical use of distractive external fixation in open and closed subtalar dislocation will show that moderate distraction of ankle and subtalar joint unloads the talus, helps the revascularization of the talus, and reduces the possibility of avascular necrosis of the talus.

CONCLUSION

Lateral subtalar dislocation represents a negative prognostic factor for the occurrence of avascular necrosis of the talus. Even though we did not scientifically prove it, due to the small number of cases, our theoretical thinking is that distractive external fixation unloads the talus and revascularizes it, conceivably reducing the possibility of the development of avascular necrosis of the talus.

Declaration of patients consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will

not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Veltman SE, Steller JAE, Wittich PH, Keizer J. Lateral subtalar dislocation: Case report and review of the literature. *World J Orthop* 2016;7:623-7.
2. Bibbo C, Anderson RB, Davis WH. Injury characteristics and the clinical outcome of subtalar dislocations: A clinical and radiographic analysis of 25 cases. *Foot Ankle Int* 2003;24:158-63.
3. de Palma L, Santucci A, Marinelli M, Borgogno E, Catalani A. Clinical outcome of closed isolated subtalar dislocations. *Arch Orthop Trauma Surg* 2008;128:593-8.
4. Waldrop J, Ebraheim NA, Shapiro P, Jackson WT. Anatomical considerations of posterior tibialis tendon entrapment in irreducible lateral subtalar dislocation. *Foot Ankle* 1992;13:458-61.
5. Goldner JL, Poletti SC, Gates HS^{3rd}, Richardson WJ. Severe open subtalar dislocations. Long-term results. *J Bone Joint Surg Am* 1995;77:1075-9.
6. Lancaster S, Horowitz M, Alonso J. Subtalar dislocations: A prognosticating classification. *Orthopedics* 1985;8:1234-40.
7. Adelaar RS, Madrian JR. Avascular necrosis of the talus. *Orthop Clin North Am* 2004;35:383-95.
8. Hoexum F, Heetveld MJ. Subtalar dislocation: Two cases requiring surgery and a literature review of the last 25 years. *Arch Orthop Trauma Surg* 2014;134:1237-49.
9. Simon LC, Schulz AP, Faschingbauer M, Morlock M, Jürgens C. "Basketball Foot"--long-time prognosis after peritalar dislocation. *Sportverletz Sportschaden* 2008;22:31-7.
10. Milenkovic S, Mitkovic M, Bumbasirevic M. External fixation of open subtalar dislocation. *Injury* 2006;37:909-13.
11. Milenkovic S, Radenkovic M, Mitkovic M. Open subtalar dislocation treated by distractional external fixation. *J Orthop Trauma* 2004;18:638-40.
12. Milenkovic S, Stanojkovic M. Hawkins type III fracture. Dislocation on the talus and fracture of the medial malleolus treated by distractional external fixation. *Unfallchirurg* 2008;111:112-6.