

Original Article - Case Report

A case report of ultrasound-guided peri-ligamentous steroid injection for grade 1 ankle sprain in elite kabaddi athlete

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ABSTRACT

The role of using local steroid administration for acute grade 1 ankle ligament injury is debatable. Here, we are presenting a case of an elite kabaddi athlete who sustained this type of injury in an international kabaddi tournament. To facilitate the functional recovery and return to play, a peri-ligamentous local steroid under ultrasound guidance was given. Numerical Pain Rating Score (NPRS) has improved nearly 70% after the first 48 hours from the intervention, helping him to progress very rapidly in his rehabilitation program. Although World Anti-Doping Agency (WADA) has recently placed local steroid injections under strict scrutiny, they are still a viable option when carefully selected. A higher level of evidence is required to confirm this intervention.

Keywords

Kabaddi athlete, peri-ligamentous steroid injection, ankle sprain.

Abbreviations

World Anti-doping agency (WADA); Therapeutic Exemption Form (TUE); Anterior Talo-fibular ligament (ATFL); Magnetic Resonance Imaging (MRI), Ultrasound (USG), nonsteroidal anti-inflammatory drug (NSAID).

INTRODUCTION

An acute ankle sprain is the most common lower limb injury among contact sports athletes, especially in basketball, soccer, American football or rugby, and kabaddi. Kabaddi is a traditional Indian contact sport that is hybrid in a way that it includes certain components of wrestling, rugby, and soccer. In kabaddi, sudden movements of a raider to escape or evade a stopper, and a raider turning back after tagging the opponent(s) can sometimes result in twisting movements of the ankle¹.

The use of local steroid injections for musculoskeletal injuries is highly debatable. Steroids, being potent anti-inflammatory agents, provide symptomatic relief if given locally in acute injuries so that early functional rehabilitation could be incorporated. Until 2022, the World Anti-doping agency (WADA) had not put local steroids on their 'in-competition' prohibited drug list². However, Chang et al. studied the detection in urine of the steroid administration, such as triamcinolone, even if it had been given locally³. A lot more evidence had surfaced on the subject, therefore WADA has finally put the 'in-competition' use of local steroids on their prohibited list. After this update, the same should be practiced after informing the governing body by filling out the Therapeutic Exemption Form (TUE).



Figure 1. Ultrasound-guided peri-ligamentous injection of steroid for right ATFL injury

CASE REPORT

21-year-old male professional kabaddi player had a twisting injury to the right ankle while playing kabaddi, followed by pain and swelling. The acute episode was managed by POLICE protocol⁴, along with two medications that included (A) A combination of proteolytic enzymes and (B) A Combination of serratiopeptidase and nonsteroidal anti-inflammatory drug (NSAID) for initial 3 days. The athlete recovered with residual pain on the lateral side of the right ankle after 3 days; subsequently, MRI was done which suggested a Grade 1 sprain of the right Anterior Talo-fibular ligament (ATFL) along with mild effusion of the ankle joint. On examination, he had localized pain on the inversion. The local part of ultrasonogram (USG) confirmed the sprain and edema around the ATFL. USG is a diagnostic medical procedure that uses high-frequency sound waves to produce images. It is a non-invasive and painless procedure that is widely used in medicine because it is safe, relatively inexpensive, and provides real-time images of the body

The athlete wanted residual pain relief to engage in the rehabilitation protocol better to get an early

return to play during the competition period. We decided to consider the option of peri-ligamentous ATFL steroid injection after having a discussion with the team physiotherapist, interventional radiologist, league orthopedic surgeon, and athlete himself. The proper consent of the same was obtained after thoroughly explaining the procedure, its benefits, and its pitfalls. According to the revised guideline of WADA 2022, we submitted the TUE for this intervention.

The steps of the procedure were as follows: (1). The local part of the right ankle was prepared with betadine and alcohol applications, and right-sided ATFL was marked with the sterile methylene blue surgical marker pen under the USG probe. (2). Using the 24-gauge needle, 2 ml of 2% plain lignocaine was injected under USG guidance from the ATFL ligament to the skin throughout the pathway to get the local anesthetic effect (**Figure 1**). (3). The main injecting solution was prepared by mixing 1 ml of triamcinolone acetonide (40 mg), 0.5 ml each of 0.5% Ropivacaine, and 2% Lignocaine. (4). Under the guidance of the USG, a 22-gauge needle was inserted from the skin to the outer (superficial) sheath of the ATFL (**Figure 2**) and 50% of the solution was injected (~1 ml), the rest of the solution

(~1 ml) was inserted into the inner (deep) sheath of the AFTL (**Figure 3**) which was seen to get slightly diluted inside the ankle joint.

Pre- and post-procedure NPRS (numerical pain rating score)⁵, the assessment showed an immediate improvement of 5 points (pre-procedure pain was 7 which was improved to 2). The athlete was given a strict rest for 48 hours post-injection. Post 48 hours his NPRS was nil on rest and 2 on the activity.

The athlete engaged in rehabilitation protocol better after the intervention and fully recovered and returned to play within one week.

DISCUSSION

1.1 ATFL sprain - Prevalence, examination, and its routine management

The lateral ligament complex of the ankle joint includes 3 intracapsular ligaments: the anterior tibiofibular (ATFL), calcaneofibular (CFL), and

posterior talofibular (PTFL) ligaments. Out of these, the Anterior talofibular ligament (ATFL) is the most common injured structure in young athletes (15 to 35 years of age)⁶. It is approximately 2 mm thick, 7 mm wide, and 10 mm long. It plays a key role in withstanding inversion and plantarflexion of the ankle. Isolated ATFL injuries account for nearly 60% of ankle sprains owing to the fact that it is the weakest ligament in the lateral collateral complex of the ankle, but in 20% of both ATFL and CFL are involved⁷⁻⁹. In kabaddi, ankle and ATFL injuries are very common due to the nature of the sport¹. In the severity grading system, grade I is an injury to a few ligament fibers, local tenderness without instability, grade II is more fibers damage with more extent of tenderness but with slight instability and abnormal motion. Grade III is a complete tear with distinct instability¹⁰.

On clinical examination, the anterior drawer test assesses the integrity of the anterior talofibular ligament (ATFL)¹¹. If the ATFL is ruptured, in 50%

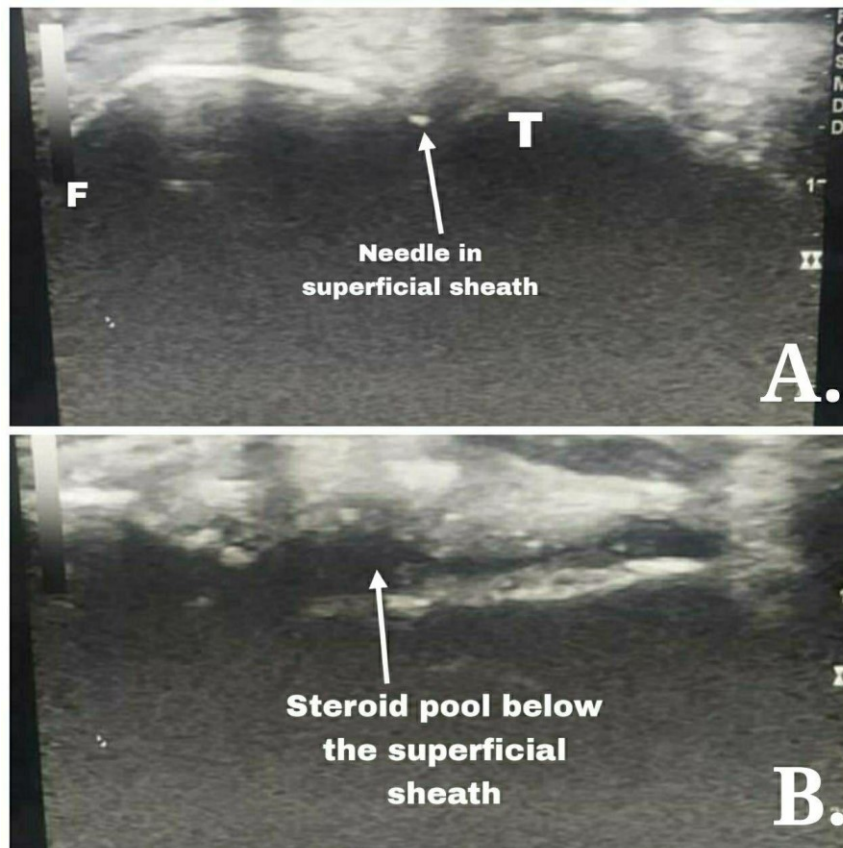


Figure 2. Sonogram image showing needle tip in the superficial sheath of the ATFL A. and steroid pool post-injection in B. T = Talus, F = Fibula; image acquired during intervention.

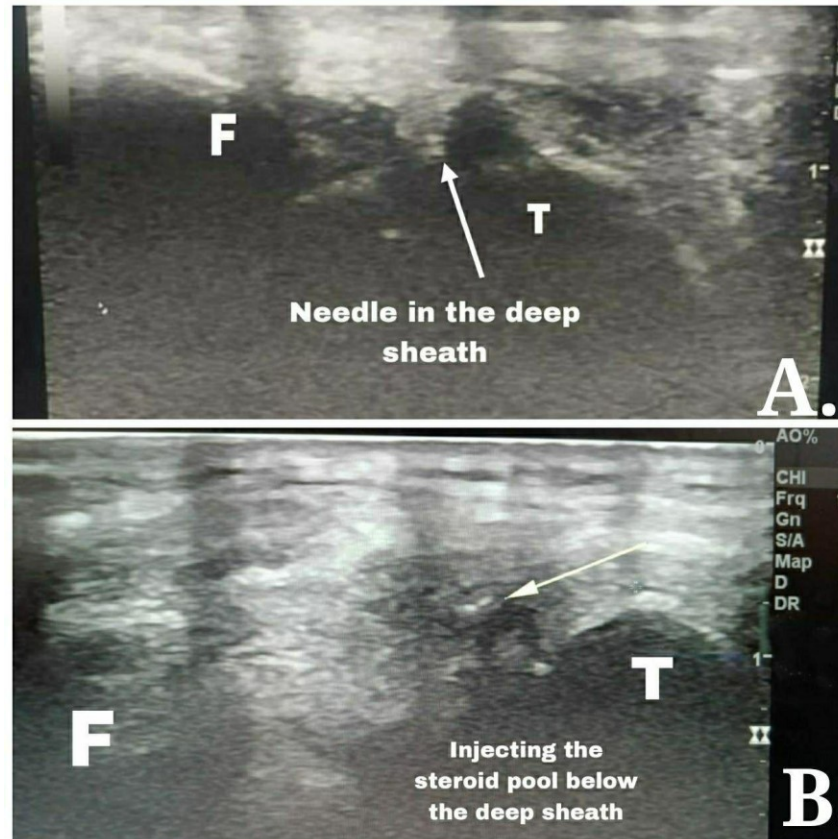


Figure 3. Sonogram image showing needle tip in the deep sheath of the ATFL A. and steroid pool post-injection in B. T = Talus, F = Fibula; image acquired during intervention.

of cases a ‘dimple sign’ can be seen in the anterior aspect of the joint¹².

For investigations, Ultrasonography in spite of its high inter-observation bias gives us the flexibility to check the ligament status in real-time while doing eversion and inversion. X-ray radiography is essential to rule out any other bony fractures and should be done according to Ottawa rules. Magnetic Resonance Imaging (MRI) should be considered if intervention is planned¹³.

The symptoms of acute ATFL injury include pain, swelling, weakness, and instability of the ankle joint. Most patients with grade I and II injuries recover quickly with conservative management. A non-operative 'functional treatment' includes immediate use of POLICE protocol (protection, optimal loading, ice, compression, elevation)¹⁴ along with a short period of immobilization till the resting pain subsides. The serratiopeptidase, NSAIDs, and oral combination of proteolytic enzymes such as

trypsin, chymotrypsin, rutoside, and bromelain are helpful to subside pain and edema. Once resting pain subsides, early range of motion, weight-bearing, and neuromuscular training exercises should be presumed gradually^{6,14}. After returning to practice or play, it is wise to give protection with a Kinesio tape or bandage in the initial days to boost the athlete's confidence. Still, it should be gradually weaned off to prevent dependency.

1.2 Rationale of using peri-ligamentous steroids in elite athletes

Traumatic ligament sprains are a common cause of ‘lost playing time in professional athletes which has negative financial consequences. Therefore, it is reasonable, for the informed patient, to provide a safe means of treatment; the goal of which is to return the player to the sport as quickly as possible while minimizing symptoms that hinder the optimum performance of the athlete. Several studies

were successful in treating athletes with intra-articular, intrabursal, peri-ligamentous, lumbar epidural, and intramuscular local steroid injections³. The local steroid inside the tendon/ligament, compared to around it, can lead to necrosis and rupture. It is unanimously condemned due to the unknown risk of steroid-induced collagen dysplasia. The rationale for using steroid injection in our case was to get faster pain relief so that strengthening exercises could be incorporated early¹⁵.

If injuries involve more than one ligament or more than grade 1 on the severity scale or injuries also involving surrounding structures then athletes should be encouraged to stick to the structured rehabilitation protocol, rather than local steroids. In most institutions, the two corticosteroids used most routinely are triamcinolone and methylprednisolone. These are generally mixed with a local anesthetic, either lidocaine 1% or a long-lasting anesthetic such as bupivacaine or ropivacaine 0.25%.

Nichols¹⁶ reviewed the risks of locally injected corticosteroids in the treatment of athletic injuries. He identified twenty-five studies that primarily examined the usage/efficacy of corticosteroid injections in the treatment of various athletic injuries. Of the 983 subjects who received corticosteroid injections in these studies, only minor complications of treatment were reported. He found eighteen selected studies that primarily described complications of corticosteroid injections in the treatment of athletic injuries. Of these, tendon and fascial ruptures were predominant. He concluded that the existing medical literature does not provide precise estimates for complication rates following the therapeutic use of injected corticosteroids in the treatment of athletic injuries.

1.3 Role of USG

On USG, thickened ligaments are due to edema surrounding it, suggestive of acute injury, whereas thinner ligaments are suggestive of chronic injury and require healing with fibrosis which is inhibited by steroids. The thinner ligament would require autologous PRP (Platelet rich plasma) injection to get the robust healing^{17,18}

USG is crucial for this intervention as injecting a needle in a peri-ligamentous location is not possible to confirm without it.

CONCLUSION

Functional recovery can be facilitated by local steroid injections in carefully selected injuries, especially in elite athletes who are under constant medical supervision. The ultrasound-guided peri-ligamentous method is preferred over the intraligamentous technique to mitigate the unknown risk of steroid-induced collagen dysplasia. This is the single case report of the proposed intervention, Randomized controlled trials with a larger number of elite athletes, in order to have a higher level of evidence, are required.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgements

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Team manager on behalf of the franchise (Date- 22/02/2022). The intervention was performed during an international private kabaddi tournament; therefore, a therapeutic exemption form was filled up by us and the authority was informed.

Informed consent was obtained from the athlete as well as the private organization's behalf on which the athlete played after explaining the correct indications of the intervention, its complications, and other treatment options.

The authors affirm that participants provided informed consent for the publication of the images in Figures 1, 2, and 3.

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References

1. Yallappa M, A study on common injuries of Kabaddi players, International Journal of Physical Education, Sports and Health 2020; 7(3): 37-43
2. World Anti-Doping Agency, The World Anti-doping Code. The 2022 Prohibited List, International Standard, 2022 Retrieved from: https://www.wada-ama.org/sites/default/files/resources/files/2022list_final_en.pdf
3. Chang CW, Huang TY, Tseng YC, Chang-Chien GP, Lin SF, Hsu MC. Positive doping results

- caused by the single-dose local injection of triamcinolone acetonide. *Forensic Sci Int*. 2014;244:1-6. doi:10.1016/j.forsciint.2014.07.024
4. Bleakley CM, Glasgow P, MacAuley DC. PRICE needs updating, should we call the POLICE?. *Br J Sports Med*. 2012;46(4):220-221. doi:10.1136/bjsports-2011-090297
 5. Chuang LL, Wu CY, Lin KC, Hsieh CJ. Relative and absolute reliability of a vertical numerical pain rating scale supplemented with a faces pain scale after stroke [published correction appears in *Phys Ther*. 2016 Jun;96(6):917]. *Phys Ther*. 2014;94(1):129-138. doi:10.2522/ptj.20120422
 6. Lynch SA, Renström PA. Treatment of acute lateral ankle ligament rupture in the athlete. Conservative versus surgical treatment. *Sports Med*. 1999;27(1):61-71. doi:10.2165/00007256-199927010-00005
 7. Hertel J. Functional Anatomy, Pathomechanics, and Pathophysiology of Lateral Ankle Instability. *J Athl Train*. 2002;37(4):364-375.
 8. Milner CE, Soames RW. Anatomy of the collateral ligaments of the human ankle joint. *Foot Ankle Int*. 1998;19(11):757-760. doi:10.1177/107110079801901109
 9. Golanó P, Vega J, de Leeuw PA, et al. Anatomy of the ankle ligaments: a pictorial essay. *Knee Surg Sports Traumatol Arthrosc*. 2010;18(5):557-569. doi:10.1007/s00167-010-1100-x
 10. Hughston JC. The importance of the posterior oblique ligament in repairs of acute tears of the medial ligaments in knees with and without an associated rupture of the anterior cruciate ligament. Results of long-term follow-up. *J Bone Joint Surg Am*. 1994;76(9):1328-1344. doi:10.2106/00004623-199409000-00008
 11. Chapman MW. *Chapman's Orthopedic Surgery*. Lippincott Williams and Wilkins (LWW) 2000:2473-83.
 12. Aradi AJ, Wong J, Walsh M. The dimple sign of a ruptured lateral ligament of the ankle: brief report. *J Bone Joint Surg Br*. 1988;70(2):327-328. doi:10.1302/0301-620X.70B2.3126191
 13. Kaminski TW, Hertel J, Amendola N, et al. National Athletic Trainers' Association position statement: conservative management and prevention of ankle sprains in athletes. *J Athl Train*. 2013;48(4):528-545. doi:10.4085/1062-6050-48.4.02
 14. Wolfe MW, Uhl TL, Mattacola CG, McCluskey LC. Management of ankle sprains [published correction appears in *Am Fam Physician* 2001 Aug 1;64(3):386]. *Am Fam Physician*. 2001;63(1):93-104.
 15. Stephens MB, Beutler AI, O'Connor FG. Musculoskeletal injections: a review of the evidence. *Am Fam Physician*. 2008;78(8):971-976.
 16. Nichols AW. Complications associated with the use of corticosteroids in the treatment of athletic injuries. *Clin J Sport Med*. 2005;15(5):370-375. doi:10.1097/01.jsm.0000179233.17885.18
 17. Lai MWW, Sit RWS. Healing of Complete Tear of the Anterior Talofibular Ligament and Early Ankle Stabilization after Autologous Platelet Rich Plasma: a Case Report and Literature Review. *Arch Bone Jt Surg*. 2018;6(2):146-149.
 18. Blanco-Rivera J, Elizondo-Rodríguez J, Simental-Mendía M, Vilchez-Cavazos F., Peña-Martínez V. M, Acosta-Olivo C. Treatment of lateral ankle sprain with platelet-rich plasma: A randomized clinical study. *Foot and ankle surgery: of icial journal of the European Society of Foot and Ankle Surgeons*. 2022; 26(7), 750-754. <https://doi.org/10.1016/j.fas.2019.09.004>

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