Extravasation of Irrigation Fluid to External Genitalia during Knee Arthroscopy: A Case Report

Joseph Eugene Nidhiry[1], Anoop Pilar[1], Rajkumar S Amaravathi[1], Keith Behram Tamboowalla[2]

Abstract

Extra-articular extravasation of irrigation fluid during arthroscopy is relatively common and is almost always limited to the subcutaneous tissue surrounding entry incisions. There are no complications and the reabsorption rate is fast. The fluid may leak into the thigh, popliteal fossa, or the leg. Fault in pressure sensor in the irrigation pump may cause excessive extravasation of irrigation fluid above the knee joint into the thigh and perineum. We would like to report a rare case of extravasation of irrigation fluid into the external genitalia during arthroscopic anterior cruciate ligament reconstruction.

Keywords: Knee, Anterior cruciate ligament, complication.

Introduction & Case

A 21-year-old male came with an alleged history of sustaining a twisting injury to the right knee 4 years back. Following the injury, the patient had severe pain and swelling in the knee. He was managed conservatively with Robert Jones compression bandaging. He was advised to undergo further imaging study; however, the symptoms improved and did not seek any medical attention further. Since the past 4 months, the patient started complaining of occasional knee pain and instability in the left knee after a trivial fall. Clinical examination and magnetic resonance imaging confirmed an old rupture of the anterior cruciate ligament (ACL) and a tear in the lateral meniscus.We proposed an ACL reconstruction with the semitendinosus graft. The operation was carried out under spinal anesthesia. The thigh was held in a clamp, with a pneumatic tourniquet (pressure, 350 mm Hg) at the top of the leg. However, the tourniquet was not inflated. The pump used was Arthrex Continuous Wave III Arthroscopy Pump (Model Ar6475). The irrigation fluid used was a normal saline isotonic solution with maximum pressure set to 40 mm Hg. Exploration of the joint confirmed the ACL rupture as well as a lateral meniscal tears. It was then noted that the thigh was becoming increasingly edematous and had a woody feel. Immediately, we realized that the arthroscopy pump reservoir that would be normally half-filled was filled to almost full capacity (Fig. 1).

The pump was subsequently changed. The surgery was continued, and ACL reconstruction was done using the semitendinosus graft. The lateral meniscus was partially resected as it was torn and flipped into the intercondylar area. The total duration of the surgery was one and a half hour. After removal of the drapes and tourniquet, swelling of the thigh and external genitalia was noted. (Fig. 2).

There was no compartment syndrome and pulses (posterior tibial and dorsalis pedis arteries) were all normal. Urology consultation was taken immediately and as suggested by them, catheterization was done along with application self-adherent wrap (3M™ Coban™ Self-Adherent Wrap) to the penis (Fig. 3).

After the spinal anesthesia wore off, there was no sensor y or motor disturbance. Blood pressure was normal and there was no sign of blood loss.

The patient was then monitored for symptoms of compartment syndrome. The patient did not give symptoms suggestive of compartment syndrome. Two days later, the Coban™ and urinar y catheter were removed. Oedema had subsided from the penis and thigh, and the patient was able to pass urine normally (Fig. 4).

Discussion

Prolonged surgical time, acute injuries causing capsular tears, excessive intra-articular pressure are some of the main cause for extravasation of fluid during arthroscopy [1, 2].

The common site for fluid extravasation in knee arthroscopy is the calf which

[1]Department of Orthopaedics, St Johns Medical College and Hospital, Bangalore, India
[2]Department of Orthopaedics, Bombay Hospital and Medical Research Centre, New Marine Lines, Mumbai- 400020.

Address of correspondence :
Dr. Anoop Pilar,
Department of Orthopaedics, St Johns Medical College and Hospital, Bangalore, India
E-mail: dranoopp07@gmail.com

Figure 1: Irrigation pump with faulty sensor. The fluid level in the sensor is above the normal level.

Figure 2: Clinical appearance of the infiltration of the thigh, external genitalia, and lower abdomen due to extravasation of irrigation fluid.

Figure 3: Self-adherent wrap (3M™ Coban™) applied to the penis to reduce the edema.

leads to compartment syndrome and also other sites[3,4].

Other sites include the thigh and perineum. Here, the extravasation of fluid occurs through the muscular attachments which connect the hip and knee like such as the quadriceps, hamstrings, and by diffusion along with the neurovascular structures.

Other causes include fault in the pressure sensor resulting in increased irrigation pressure. The fluid then extravasates to the thigh, groin, and perineum. Pneumatic tourniquets usually prevent the extravasation of fluids to the groin and perineum, but in case of high irrigation fluids and faulty sensors, the tourniquets fail to prevent the diffusion of the irrigation fluid.

Intra-articular hypertension is protected by the pressure sensors, when the pressure sensors are at fault, the fluid level in the sensor exceeds the operating pressure and is no longer under the control of the sensors and becomes too high[5]. Studies have revealed when the knee is flexed to 90° degrees and the pressure exceeds 200mm Hg; the suprapatellar pouch ruptures causing extravasation of fluid into the surroundings [6].

In case of prolonged surgery, where the irrigation fluid exceeds 15 Litres, care should be taken by taking a regular note of the inflow and the outflow [7]. The compartments of the leg have to be constantly palpated and monitored to check for compartment pressures.

The Arthrex Continuous Wave III Arthroscopy Pump (Model AR6475) has a reservoir with a neoprene tube for sensing pressure. The console has a measured pressure bar graph which uses twenty coloured LEDs that illuminate to display the sensed pressure information in real-time ([Table 1).].

However, in our case, the green light was reservoir. We believe the over-filled reservoir led to a dysfunction of the pressure sensor which caused the extravasation. Hence, it is important to look at the fluid level in the reservoir. Also Further more, since the injury was an old one, the presence of a probable capsular tear is also possible. In our case, the lack of pressure control is the predisposing factor to this kind of complication.

The complication can be prevented by the right choice of equipment, correct use of arthroscopy pump, and regular maintenance of the pressure sensors[8 , 9] . The conser vative management with monitoring of the patient for the signs of the compartment syndrome is the treatment of choice in these kinds of complications [10].

Figure 4: Postremoval of Coban. Edema has subsided

Conclusion

Arthroscopy pump with the good pressure sensor system and with the record of inflow and outflow recorded during the long arthroscopic procedure reduces the unwanted side effects which cause discomfort to the patient. This complication is not lifethreatening, but it causes discomfort to the patient, which

Table 1: Measured pressure (±5%) readings in bar graph

Segments color measured pressure range displayed	
1–13	Green 8 mmHg to 98 mmHg
14–16	Yellow 105 mmHg to 120 mmHg
17–20	Red 128 mmHg to 150 mmHg

can easily be prevented by careful observations intraoperatively and by regular testing of the pressure sensor equipment.

References

1. Fowler J, Owens BD. Abdominal compartment syndrome after hip arthroscopy. Arthroscopy 2010;26:128-30.
2. Ekman EF, Poehling GG. An experimental assessment of the risk of compartment syndrome during knee arthroscopy. Arthroscopy 1996;12:193-9.
3. Belanger M, Fadale P. Compartment syndrome of the leg after arthroscopic examination of a tibial plateau fracture. Case report and review of the literature. Arthroscopy 1997;13:646-51.
4. Marti CB, Jakob RP. Accumulation of irrigation fluid in the calf as a complication during high tibial osteotomy combined with simultaneous arthroscopic anterior cruciate ligament reconstruction. Arthroscopy 1999;15:864-6.
5. Arthroscopic irrigation/distention systems. Health Devices 1999;28:242-81.
6. Noyes FR, Spievack ES. Extraarticular fluid dissection in tissues during arthroscopy. A report of clinical cases and a study of intraarticular and thigh pressures in cadavers. Am J Sports Med 1982;10:346-51.
7. Ogilvie-Harris DJ, Weisleder L. Fluid pump systems for arthroscopy: A comparison of pressure control versus pressure and flow control. Arthroscopy 1995;11:591-5.
8. Cavaignac E, Pailhé R, Reina N, Chiron P, Laffosse JM. Massive proximal extravasation as a complication during arthroscopic anterior cruciate ligament reconstruction. Knee Surg Relat Res 2013;25:84-7.
9. Bomberg BC, Hurley PE, Clark CA, McLaughlin CS. Complications associated with the use of an infusion pump during knee arthroscopy. Arthroscopy 1992;8:224-8.
10. Romero J, Smit CM, Zanetti M. Massive intraperitoneal and extraperitoneal accumulation of irrigation fluid as a complication during knee arthroscopy. Arthroscopy 1998;14:401-4.

Conflict of Interest: NIL
Source of Support: NIL

How to Cite this Article

Nidhiry J E, Pilar A, Amaravathi R S, Tamboowalla K B. Extravasation of Irrigation Fluid to External Genitalia during Knee Arthroscopy: A Case Report. Journal of Karnataka Orthopaedic Association. May-Aug 2019; 7(2): 46-48.