Bilateral Leg Compartment Syndrome After Prolonged Lithotomy Position. Clinical Case Report

Síndrome compartimental bilateral de pierna tras posición de litotomía prolongada. Presentación de un caso clínico

Luis Díez-Albero[1] Lorena Moril-Peñalver[1] Andrés Lapeña-Martínez[1] Fernando López-Prats[1]

[1] Orthopedic Surgery and Traumatology Service, Hospital General Universitario de Elche, Alicante, Spain

Rev Chil Ortop Traumatol 2021;62(2):e153–e156.

Address for correspondence Luis Díez-Albero, Servicio de Cirugía Ortopédica y Traumatología, Hospital General Universitario de Elche, Carrer Almazara 11, Alicante 03203, España (e-mail: diezalberoluis@gmail.com).

Abstract

Background Compartment syndrome is a rare but severe complication resulting from a prolonged lithotomy position and the use of leg loops.

Purpose To present a case of bilateral compartment syndrome after prolonged lithotomy position associated with the use of leg loops.

Methods A 43-year-old man underwent urological surgery in the usual lithotomy position for a 6-hour period. Two hours after the end of the surgery, the patient presented severe pain and stiffening of the anterior and lateral compartments of both legs, elevated serum creatine kinase levels (the baseline value of 109 U/L increased to 7,689 U/L at 12 hours), and inability for passive dorsiflexion of both ankles. The patient reported no pain in the other compartments.

Results Suspicion of an anterolateral compartment syndrome resulted in an urgent bilateral fasciotomy; muscle perfusion was decreased, and it improved after fascial opening. Dressings were changed every 48 hours, and tissue viability was observed until the final closure at 4 days. At two weeks, the patient presented slight fatigue when walking with no assistance, in addition to swelling in the lateral compartment of both legs. Ten months after surgery, the patient walked with no assistance and with complete muscle function.

Conclusion Knowledge of the association between compartment syndrome and prolonged laparoscopic surgery is essential for an early diagnosis and immediate surgical treatment to avoid serious sequelae. In our patient, the good outcomes resulted from quick action, since diagnosis is often delayed. Limiting the lithotomy position to those surgical moments in which it is essential and changing the position of the legs every 2 hours during prolonged procedures can reduce the occurrence and incidence of compartment syndrome, preventing this complication.

Keywords

- compartment syndrome
- lithotomy
- leg loops
- fasciotomy
- intracompartmental pressure

received
February 15, 2021
accepted
March 31, 2021

DOI https://doi.org/10.1055/s-0041-1735298.
ISSN 0716-4548.

Thieme Revinter Publicações Ltda., Rua do Matoso 170, Rio de Janeiro, RJ, CEP 20270-135, Brazil

Resumen

Introducción El síndrome compartimental es una complicación infrecuente pero severa que puede aparecer ante una posición de litotomía prolongada y el uso de perneras.

Objetivo Presentar un caso de síndrome compartimental bilateral tras posición de litotomía prolongada asociada con el uso de perneras.

Material y Métodos Paciente varón de 43 años sometido a una cirugía urológica en posición habitual de litotomía durante un periodo de 6 horas. A las 2 horas de finalizar la cirugía, el paciente presentó dolor intenso y endurecimiento de compartimento anterior y lateral de ambas piernas, junto con una elevación de la creatina quinasa sérica (valor incial de 109 U/L que se elevó hasta 7.689 U/L a las 12 horas) y una imposibilidad para la flexión dorsal pasiva de ambos tobillos. El paciente no sentía dolor en el resto de los compartimentos.

Resultados Ante la sospecha de un síndrome compartimental anterolateral, se realizó fasciotomía bilateral urgente, y se observó una disminución de la perfusión muscular y mejoría de la misma tras apertura de la fascia. Se realizaron curas periódicas cada 48 horas, y se observó viabilidad del tejido hasta su cierre definitivo a los 4 días. A las 2 semanas, el paciente presentó fatiga ligera para la deambulación sin ayuda, con tumefacción en el compartimento lateral de ambas piernas. A los 10 meses de evolución, el paciente caminaba sin ayuda y con función muscular completa.

Conclusiones El conocimiento de la asociación del síndrome compartimental y la cirugía laparoscópica prolongada es esencial para un diagnóstico precoz y un tratamiento quirúrgico inmediato, para evitar graves secuelas. Los buenos resultados de nuestro paciente se deben a la rápida actuación, ya que normalmente se suele demorar. Para evitar su aparición o disminuir su incidencia, la posición de litotomía debería limitarse a aquellos momentos de la cirugía en los que sea imprescindible, modificando la posición de las piernas cada dos horas en caso de cirugías prolongadas, para prevenir dicha complicación.

Palabras clave

- síndrome compartimental
- litotomía
- perneras
- fasciotomía
- presión intracompartimental

Introduction

Compartment syndrome (CS) is a rare but severe complication resulting from a prolonged lithotomy position with leg loops. It affects 1 in every 3,500 patients operated on in this position.[1–3] In 1979, Leff and Shapiro[4] described the first case of CS associated with the lithotomy position.

Clinical Case

A 43-year-old male patient with Gilbert syndrome as the only relevant history underwent a Palminteri-like anterior bulbar urethroplasty in the usual lithotomy position for a 6-hour period. Two hours after the end of the surgery, the patient complained of intense pain and stiffening of the anterior and lateral compartments of both legs, in addition to intense pain on passive dorsiflexion of both ankles. He had no symptoms of peroneal nerve involvement or pain in other leg compartments.

Results

Intracompartmental pressure was determined due to suspicion of an anterolateral CS; the obtained value, of 40 mmHg, led to an urgent bilateral fasciotomy of both compartments, revealing a decrease in muscle perfusion and its improvement after fascial opening (►**Figure 1**). The patient presented a progressive oincrease in the levels of serum creatine kinase (CK), from a baseline value of 109 U/L to 7,689 U/L 12 hours after the fasciotomy. Dressings were changed every 48 hours, and tissue viability was observed until the definitive closure at 4 days. At two weeks, the patient presented slight fatigue when walking with no assistance, and the lateral compartment of both legs was swollen. Ten months after surgery, the patient walked with no assistance or any neuromuscular deficit.

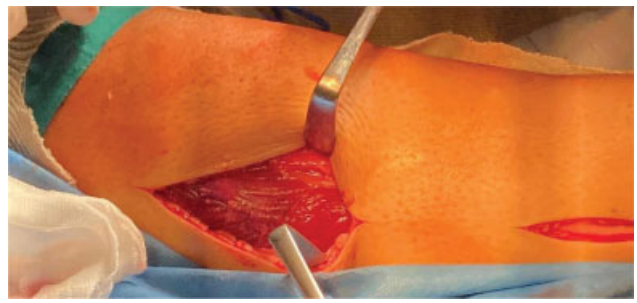

Fig. 1 Urgent bilateral fasciotomy of the anterolateral compartment of both legs. Fascial opening resulted in improved perfusion.

Discussion

This is a case of bilateral CS on healthy legs. Compartment syndrome often results from traumatic or vascular causes;[5] however, the scientific literature[2–4,6–9] reports some cases of CS associated with a prolonged lithotomy position. This complication arises from an increase in the intracompartmental pressure in the lower limbs produced by several factors: elevation of the lower limbs decreases the blood pressure (BP), which is already lower due to anesthetic agents; in addition, the use of leg loops increases the pressure in the supporting compartment, while hip and knee flexion decrease the venous return. All of these factors result in ischemia; once surgery is finished and the patient returns to a normal position, the rapid tissue reperfusion causes edema and increases the pressure, leading to CS.[2,5,6,8,9] As described by Matsen,[10] elevation of the leg alone causes a notable increase in intracompartmental pressure, of approximately 18 mmHg; as such, this position can be a very important factor in the development of this complication.

Delayed CS diagnosis causes irreversible muscle damage, resulting in limb dysfunction or amputation. Therefore, early diagnosis and surgical treatment are critical.[2,4,6,11,12] The diagnosis may be based on clinical history and physical examination alone. In case of doubts, however, the intracompartmental pressure can be measured to determine if it is higher than or within a 30 mmHg difference from the diastolic BP.[6]

Few cases of bilateral CS after prolonged lithotomy position have been described; in most reports,[8],[13] the surgical time ranged from 5 to 8 hours. Cases of CS have been described after surgeries lasting less than 2 hours; Stornelli et al.[11] reported a case after a surgery lasting only 90 minutes.

Regarding surgery duration and the lithotomy position, Yamamoto et al.[2] reported CS after a 16-hour procedure, with more intense symptoms and a greater increase in the levels of serum CK. A similar yet less florid case was described by García-Germán et al.[6] Oman et al.[14] presented a case of CS after a 6-hour gynecological surgery. As in our case, they performed a posterior compartment fasciotomy, but a revision surgery was required the next day to complete the fasciotomy of the three remaining compartments due persistence and worsening of the symptoms, with paresthesia on the left ankle and foot as a sequela. In these cases, which are similar to ours in terms of surgical time, the CS was more severe, perhaps due to the duration of the symptoms. Our patient has been hemodynamically stable, with no noticeable laboratorial or renal abnormalities; in addition, serum CK levels did not exceed 8,000 U/L, unlike the remaining cases,[2],[3],[7] [8] [9],[11] in which CK levels increased to 142,000 U/L. Similarly, during follow-up, our patient presented a rapidly-progressive improvement with no residual neurovascular deficits, as in the case presented by Stornelli et al.[11] This may be the result of early diagnosis and treatment, leading to a rapid limb recovery and prognostic improvement.

To date, only cases[15],[16] of chronic CS have been treated using minimally-invasive fasciotomy. Our report shows an alternative to the early treatment of acute CS.

Conclusion

Knowledge of the association between CS and prolonged laparoscopic surgery is essential for an early diagnosis and immediate surgical treatment to avoid serious sequelae. In our patient, the good outcomes resulted from quick action, since diagnosis is often delayed. Limiting the use of the lithotomy position to those surgical moments in which it is essential, and changing the position of the legs every 2 hours during prolonged procedures can reduce the occurrence and incidence of CS, preventing this complication. New leg boots have been introduced and they apparently reduce the incidence of CS. In these devices, the patient's legs rest on a surface covered by a soft material held by adjustable bands. In addition, they enable the change in the position of the lower limbs during surgery and also support of the soles, reducing the compression of the peroneal nerve and the development of SC.

Conflict of Interests
The authors have no conflict of interests to declare.

References

1 Mumtaz FH, Chew H, Gelister JS. Lower limb compartment syndrome associated with the lithotomy position: concepts and perspectives for the urologist. BJU Int 2002;90(08):792–799
2 Yamamoto T, Fujie A, Tanikawa H, Funayama A, Fukuda K. Bilateral Well Leg Compartment Syndrome Localized in the Anterior and Lateral Compartments following Urologic Surgery in Lithotomy Position. Case Rep Orthop 2018;2018:2328014
3 Nishino M, Okano M, Kawada J, Kim Y, Yamada M, Tsujinaka T. Well-leg compartment syndrome after laparoscopic low anterior resection for lower rectal cancer in the lithotomy position: A case report. Asian J Endosc Surg ISSN 1758–5902. 2017https://pubmed.ncbi.nlm.nih.gov/28677871/
4 Leff RG, Shapiro SR. Lower extremity complications of the lithotomy position: prevention and management. J Urol 1979;122(01):138–139
5 von Keudell AG, Weaver MJ, Appleton PT, et al. Diagnosis and treatment of acute extremity compartment syndrome. Lancet 2015;386(10000):1299–1310
6 Christoffersen JK, Hove LD, Mikkelsen KL, Krogsgaarsd MR. Well Leg Compartment Syndrome After Abdominal Surgery. World J Surg 2017;41(02):433–438
7 García-Germán Vazquez D, Aragonés Maza P, Zorzo Codes C, López Gonzalez D. Sindrome compartimental en pierna sana, una complicación de la cirugía laparoscópica prolongada. Trauma Fund MAPFRE 2013;24(04):217–220
8 Dos Reis JMC, Queiroz LJM, Mello PF, Teixeira RKC, Gonçalves FA. Bilateral compartment syndrome of the lower limbs after urological surgery in the lithotomy position: a clinical case. J Vasc Bras 2019;18:e20180117
9 Enomoto T, Ohara Y, Yamamoto M, Oda T, Ohkohchi N. Well leg compartment syndrome after surgery for ulcerative colitis in the lithotomy position: A case report. Int J Surg Case Rep 2016;23:25–28
10 Matsen FA III. A practical approach to compartmental syndromes. Part I. Definition, theory, and pathogenesis. Instr Course Lect 1983;32:88–92
11 Stornelli N, Wydra FB, Mitchell JJ, Stahel PF, Fabbri S. The dangers of lithotomy positioning in the operating room: case report of bilateral lower extremity compartment syndrome after a 90-minutes surgical procedure. Patient Saf Surg 2016;10:18

12 Mortensen SJ, Zhang D, Mohamadi A, et al. Predicting factors of muscle necrosis in acute compartment syndrome of the lower extremity. Injury 2020;51(02):522–526
13 Simms MS, Terry TR. Well leg compartment syndrome after pelvic and perineal surgery in the lithotomy position. Postgrad Med J 2005;81(958):534–536
14 Oman SA, Schwarz D, Muntz HG. Lower limb compartment syndrome as a complication of radical hysterectomy. Gynecol Oncol Rep 2016;16:39–41
15 Mouhsine E, Garofalo R, Moretti B, Gremion G, Akiki A. Two minimal incision fasciotomy for chronic exertional compartment syndrome of the lower leg. Knee Surg Sports Traumatol Arthrosc 2006;14(02):193–197
16 Maffulli N, Loppini M, Spiezia F, D'Addona A, Maffulli GD. Single minimal incision fasciotomy for chronic exertional compartment syndrome of the lower leg. J Orthop Surg Res 2016;11 (01):61

