CASE REPORT

Patient Safety in Surgery

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Bilateral lower extremity compartment syndrome after prolonged gynecological surgery in lithotomy position: a case report



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Abstract

Background Acute compartment syndrome is a rare but serious complication following gynecological surgery in the lithotomy position, potentially resulting in permanent neuromuscular dysfunction or limb loss, making early recognition and prompt management essential.

Case presentation A 41-year-old woman underwent a laparoscopic myomectomy for uterine fibroids, during which she was positioned in the high lithotomy and head-down position for 118 min. Six hours post-surgery, she experienced spasmodic pain and swelling in both lower extremities. Thirteen hours after surgery, her symptoms worsened, leading to the diagnosis of acute compartment syndrome in both legs. An emergency bilateral fasciotomy was performed, and the patient fully recovered within two months without any neuromuscular dysfunction.

Conclusions ACS should be an important differential diagnosis for lower extremity pain after gynecologic surgery, especially with prolonged lithotomy positioning. Gynecologists should be vigilant for ACS signs and symptoms to prevent delayed diagnosis.

Keywords Compartment syndrome, Laparoscopic myomectomy, Lithotomy position, Surgical complication, Fasciotomy

Background

Acute compartment syndrome (ACS) is a rare but serious complication following gynecological surgery in the lithotomy position. Despite its severity, ACS is infrequently reported in gynecological literature, leading to a lack of awareness and understanding among gynecologists. According to Bauer [1], the incidence of ACS after gynecological surgery ranges from 0.067 to 0.28%. ACS can cause permanent neuromuscular dysfunction or limb

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loss, making early recognition and proper management essential [2]. This case report of lower limb ACS following gynecological surgery aims to inform and alert the journal's global readership to this critical but often overlooked complication, emphasizing the need for vigilance and preventive strategies in similar surgical contexts.

Case presentation

A 41-year-old married woman, gravida 1, para 1, presented to our hospital for the surgical treatment of uterine fibroids, which were identified during a physical examination. The patient's medical history included a cesarean section at age 23 and breast nodule resection at age 36. A vaginal ultrasound revealed a well-defined, round, low-echo mass measuring $99 \times 88 \times 84$ mm on the

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right side of the uterus. An MRI confirmed a fibroid on the posterior uterine wall, approximately 105×71 mm in size. Physical examination and other diagnostic tests were normal, and the patient had no additional medical conditions such as diabetes, hypertension, or coronary heart disease.

Prior to entering the operating room for the myomectomy, the patient's legs were fitted with elastic compression stockings to prevent deep vein thrombosis (DVT). Following the administration of general endotracheal anesthesia, the patient was placed in the high lithotomy position with the head-down and feet-up orientation to provide optimal visibility of the pelvis (Fig. 1). The myomectomy was successfully carried out with an estimated intraoperative blood loss of approximately 100 mL. The patient's vital signs remained stable throughout the procedure and during the postoperative period.

After waking up from anesthesia, the patient complained of pain in both lower limbs. Six hours after the operation, the patient complained of increased cramping pain and swelling in both lower limbs. Initial examination of the legs revealed increased skin tension on palpation, but no signs of compression, ecchymosis, erythema, or elevated skin temperature. The dorsalis pedis pulses were palpable, and peripheral neurovascular assessments were normal. An urgent Doppler ultrasound of both legs ruled out deep vein thrombosis. Blood tests showed markedly elevated creatine kinase (CK) levels at 25,036 U/L (normal range: 30–135 U/L) and increased creatine kinase isoenzyme MB (CK-MB) levels at 186.8 ng/mL (normal range: 0-3.61 ng/mL).

Thirteen hours post-surgery, the patient reported worsening pain. Follow-up emergency blood tests revealed a further increase in CK levels to 27,229 U/L (normal range: 30-135 U/L) and CK-MB levels to 219.2 ng/mL (normal range: 0-3.61 ng/mL). Myoglobin was > 3000 ng/ ml (normal range: <58 ng/mL), aspartate aminotransferase (AST) was elevated to 827 U/L (normal range: 14-36 U/L), and alanine aminotransferase (ALT) was elevated to 198 U/L (normal range: 7-40 U/L). She was diagnosed with ACS and rhabdomyolysis, and physical examination showed swelling in both lower limbs (Fig. 2A-B). She was urgently re-admitted to the operating room by the orthopedic surgery team 14 h after the initial surgery for an emergency bilateral fasciotomy (Fig. 3A-B). Intraoperative findings indicated that all muscles in the four fascial compartments of both legs were viable, with no signs of muscle necrosis. Eight days following calf decompression, the patient's wound showed no infection, the swelling had significantly decreased, and skin tension was normal, detension incision suture of both lower limbs was performed (Fig. 3C-D). By the tenth day after decompression, the patient's serum CK level had dropped to 392.2 U/L. She showed no signs of renal failure during her hospitalization.

She continued to recover well, with good wound healing and no infection. A follow-up examination two months later confirmed normal neurovascular function



Fig. 1 Typical lithotomy position for laparoscopic myomectomy at our institution, with the head tilted 25 degrees downward



Fig. 2 (A) Front view of bilateral lower limbs before surgery. (B) Back view of bilateral lower limbs before surgery



Fig. 3 (A) The lateral view of the right lower limb after fasciotomy on both sides of the leg. (B) The lateral view of the left lower limb after fasciotomy on both sides of the leg. (C) The lateral view of the right lower limb after suture of the calf tension-reducing incision. (D) The lateral view of the left lower limb after suture of the calf tension-reducing incision.

in both lower limbs. She had regained full unrestricted function and returned to a normal quality of life.

Discussion

We report a rare case of acute compartment syndrome of both lower extremities in a 41-year-old healthy woman who developed bilateral lower extremity ACS and rhabdomyolysis after a conventional laparoscopic myomectomy in the lithotomy and head-down positions for only 118 min. Existing studies have fully demonstrated that lithotomy position is a risk factor for ACS, especially when the operation time exceeds 2-4 h [3-9]. When patients undergo prolonged abdominal and pelvic surgery in the head-down tilted Lloyd-Davies/lithotomy position, the position of the lower limbs above the heart can lead to decreased perfusion pressure. The onset of compartment syndrome is precisely the initiating factor of lower limb perfusion disorder. This initiates a chain reaction that includes fluid leakage due to muscle necrosis and the breakdown of capillary wall integrity, leading to significant edema within the compartment. As the edema worsens, the pressure inside the compartment rises, further compromising vascular supply, perpetuating a vicious cycle [2, 10]. Once initiated, this cycle can escalate quickly, and if not recognized and treated in time, it can result in permanent damage to the muscles, nerves, and surrounding tissues within the compartment. The only effective treatment is surgical fasciotomy [11]. Delayed fasciotomy is the most important factor leading to poor prognosis, which may lead to limb necrosis, amputation and rhabdomyolysis, which may result in acute renal failure and pose a life-threatening risk. If ACS is not diagnosed and treated promptly with an urgent fasciotomy, it can advance to severe complications, including limb amputation and rhabdomyolysis [12], which may result in acute renal failure and pose a life-threatening risk. Therefore, leg pain after surgery is a serious symptom that requires immediate evaluation. Other related symptoms include paresthesia, loss of sensation, intact pulses, and tightness and swelling in the affected area [13].

In this case study, elastic compression stockings were used to prevent DVT in patients after surgery. It is unclear whether the use of elastic compression stockings to prevent DVT will induce ACS [14], but the constant pressure exerted by elastic compression stockings on the calf can reduce local blood flow [15, 16]. Literature has noted that ill-fitting ES can be a contributing factor to ACS [17]. Although the intermittent pneumatic compression device for the calf was not used in this case, it is also commonly used to prevent DVT after surgery. According to literature reports [8, 18, 19], the use of intermittent pneumatic compression is associated with the occurrence of ACS.

The most direct way to diagnose ACS is to measure the pressure in the fascial compartment (more invasive), which may not be familiar to non-orthopedic doctors [20, 21]. In this case, ACS was suspected due to calf pain and the exclusion of DVT. By conducting less invasive blood tests to monitor dynamic changes in CK and CK-MB levels [22], and correlating these findings with clinical symptoms, ACS was diagnosed early. This timely diagnosis allowed for prompt intervention, preventing more severe complications. Physicians should remain vigilant for the potential development of ACS in patients undergoing surgery in the lithotomy position. To reduce ACS risk, it is beneficial to limit the duration that patients' legs remain elevated and to periodically adjust the operating table position [23]. The use of sequential compression devices and anti-thromboembolic stockings warrants caution to prevent excessive external compression, which could exacerbate compartment pressure. Eliminating the pressure on the calf caused by the lithotomy position and reducing the pressure on the calf contact area during surgery are effective prevention strategies [24].

Conclusion

ACS should be considered an important differential diagnosis for lower extremity pain following gynecologic surgery, especially in cases involving prolonged lithotomy positioning. If not promptly diagnosed and treated, ACS can result in permanent neurovascular dysfunction, limb amputation, rhabdomyolysis, renal failure, or even death. We strongly encourage gynecologists to heighten their awareness of this potential complication and remain vigilant for signs and symptoms of ACS to prevent cases of delayed diagnosis.

Abbreviations

ACS	Acute compartment syndrome
DVT	Deep vein thrombosis
CK	Creatine kinase
CK-MB	Creatine kinase isoenzyme MB
٩ST	Aspartate aminotransferase
ALT	Alanine aminotransferase

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Not applicable.

Author contributions

Xiaowen Wang reviewed the literature and wrote the main manuscript text. Ziwei Zhao provided revision comments. Jie Chen and Hong Zhang were responsible for the surgical treatment of the patients described in this report. All authors read and approved the final version of this manuscript before submission.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

The patients who participated in this study signed an informed consent form, agreeing to undergo all procedures and allowing data to be collected and analyzed for research purposes. This study was not advertised and no compensation was provided to encourage patient consent.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report.

Conflict of interests

The authors declare no conflict of interests.

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