



## Correspondence

## Compartment syndrome: A rare but urgent complication after total laparoscopic hysterectomy



Acute lower leg compartment syndrome, also calling “well leg” compartment syndrome develops after the surgery, which is a rare but emergent complication with an estimated incidence of 1/3500 [1,2]. An increase of the compartment pressure (intracompartmental swelling or external compression, and arterial insufficiency or venous obstruction) and the decrease of the muscle tissue perfusion secondary to the ‘abnormal’ positioning of the limb results in ischemia and hypoxia change with a subsequent necrosis of the lower extremities (tissue, muscle and nerves), which needs amputation for life-saving. The most frequent attacked area was anterior compartment of the calf, followed by lateral and posterior compartment [2]. We shared a case describing a woman with compartment syndrome of the lower extremities to the audience and reminded the awareness of this unusual but urgent disease.

A 49-year-old female, gravida 2 parous 2, body mass index of 21.5 kg/m<sup>2</sup>, without any systemic diseases received the total laparoscopic vaginal hysterectomy. Operation was smooth but long (7 h and 25 min) and subcutaneous emphysema was found during the operation. Six hours after operation, sudden onset of acute and severe pain of bilateral lower extremities, accompanied with numbness and swelling. Physical examination showed the 37 and 38 cm of the circumference of right and leg legs, respectively, and positive Homan's sign but the presence of dorsal popliteal pulse and normal motor function. Laboratory data showed white blood count of 10800/ul (4500–11000), hemoglobin level of 12.2 g/dl (12–16), creatinine kinase of 33571 U/l, myoglobin level of 19668.0 ng/ml (10–92), creatinine of 1.13 mg/dl (0.5–1.2), potassium of 4.0 mmol/l (3.4–4.7), and D-dimer of 7.0 ug/ml (<0.5). Doppler ultrasound excluded the possibility of deep vein thrombosis. Pressure of the right and left compartment pressure was 11 mm Hg and more than 30 mm Hg, respectively (1–10 mm Hg). The patient received an urgent left calf fasciotomy and postoperative care, including negative pressure wound therapy with instillation and dwell time (polyurethane dressing). She was discharged without any sequelae three weeks later. The current case needs emphasis and reminds the awareness of all gynecologists who have performed minimally invasive surgeries.

First, the pathophysiology of compartment syndrome remains speculative and inconclusive, but there are several theories available. The most acceptable theory is the arterio-venous gradient theory (a decreased arterial pressure, increased venous pressure or vascular resistance), which results in a reduction of capillary perfusion beyond tissue viability and subsequently further damaging the endothelial cells and leaking fluid and plasma protein from vessel to interstitial space [2]. This is a vicious circle, ultimately leading to cessation of perfusion and necrosis of the affected structure. Golden

period is three hours because it may be irreversible (occurrence of necrosis) if ischemia state was delayed to find [2].

Second, long-lasting gynecologic surgery in the lithotomy position (7 h > mean of 352 min reported in women with compartment syndrome [2]) is the most important risk factor contributing to compartment syndrome in the current case. Trendelenburg and lithotomy positions, frequently used in the gynecologic surgery, significantly increase the calf's compartment pressure. It is reported that an elevation of the leg reduces the muscle perfusion and every centimeter of the compartment above the right atrium will decrease 0.78 mm Hg local arteriolar pressure [2]. Other risk factors include obesity (mean of 29.8 kg/m<sup>2</sup> reported in women with compartment syndrome), increased abdominal pressure due to pneumoperitoneum, intraoperative hypotension, hypovolemia, hypothermia, vasoconstrictive drugs, epidural anesthesia, and peripheral vascular disease [2,3], but only pneumoperitoneum was found in our presented case.

Third, prompt and accurate diagnosis and treatment is critical for compartment syndrome. Typically, there are five P's, such as pain, pallor, paresthesia, pulselessness, and paralysis [3]. Among the 5 P's, severe pain, similar to our patient's initial presentation, is the earliest and most reliable indicator [2]. When intracompartment pressure is over 30 mm Hg, fasciotomy can be considered because this procedure can release intracompartmental pressures and thus, decrease the chance of significant tissue damage. The current patient underwent an urgent fasciotomy and postoperative negative pressure wound therapy with complete recovery.

Fourth, since compartment syndrome is urgent and sometimes life-threatening, prevention is important. Unfortunately, no consensus was available yet. The following practice recommendation was suggested. Minimal use of the classic lithotomy position, adequate mobilization of the legs during operation, the use of intermittent compressive stockings and forced-air warming devices, a moldable bean bag for legs and the use of shoulder braces to reduce direct muscular compression of the leg, as well as the use of low pressure (or gas free) in the establishment of pneumoperitoneum are reported good for decreasing risk of occurrence of compartment syndrome [2].

Because of a trend toward to the increased use of minimally invasive surgeries, such as laparoscopic surgery in the management of various kinds of disease in women [4,5], surgeons should aware the diagnosis and management about the compartment syndrome. In addition, any prevention strategy, including the minimizing time spent in the classical lithotomy position and little use of Trendelenburg tilt and careful positioning of the legs is highly recommended.

## Conflicts of interest statement

The authors declare that they have no conflicts of interest.

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Chui-Ching Chiu

*Department of Obstetrics and Gynecology, Taipei Veterans General Hospital, Taipei, Taiwan*

*Institute of Clinical Medicine, National Yang-Ming University, Taipei, Taiwan*

Wen-Hsun Chang

*Department of Obstetrics and Gynecology, Taipei Veterans General Hospital, Taipei, Taiwan*

*Department of Nursing, Taipei Veterans General Hospital, Taipei, Taiwan*

I-Chia Lin

*Department of Obstetrics and Gynecology, Taipei Veterans General Hospital, Taipei, Taiwan*

*Institute of Clinical Medicine, National Yang-Ming University, Taipei, Taiwan*

Peng-Hui Wang\*

*Department of Obstetrics and Gynecology, Taipei Veterans General Hospital, Taipei, Taiwan*

*Institute of Clinical Medicine, National Yang-Ming University, Taipei, Taiwan*

*Department of Medical Research, China Medical University Hospital, Taichung, Taiwan*

\* Corresponding author. Department of Obstetrics and Gynecology, Taipei Veterans General Hospital, National Yang-Ming University, 201 Section 2, Shih-Pai Road, Taipei 11217, Taiwan. Fax: +886 255702788.

E-mail addresses: [phwang@vghtpe.gov.tw](mailto:phwang@vghtpe.gov.tw), [pongpongwang@gmail.com](mailto:pongpongwang@gmail.com) (P.-H. Wang).