

Bilateral lower limb compartment syndrome: a potentially destructive complication of breast reduction

M Malahias, S Ghorbanian, P Lemonas

Barts and The London NHS Trust, UK

ABSTRACT

Compartment syndrome is a serious condition in which the pressure in the limb increases and potentially compromises capillary circulation with subsequent ischaemic complications. This case report presents a case of bilateral lower limb compartment syndrome after bilateral breast reduction for back pain. The patient was an otherwise healthy 24-year-old Afro-Caribbean woman. This report aims to highlight the need for an increased index of suspicion for compartment syndrome in any post-operative patient complaining of lower limb pain.

KEYWORDS

Compartment Syndromes – Surgery, Plastic

Accepted 17 December 2011; published online 30 April 2012

CORRESPONDENCE TO

Samim Ghorbanian, Plastic and Reconstructive Surgical Department, The Royal London Hospital, Whitechapel Road, Whitechapel, London E1 1BB, UK
T: +44 (0)7515 521 296; E: samim.ghorbanian@gmail.com

Case history

We present a case of spontaneous bilateral compartment syndrome occurring in an otherwise healthy 23-year-old Afro-Caribbean woman undergoing a bilateral breast reduction with a mastopexy due to back pain. Normal compartment pressure in the lower limb has been delineated traditionally as a range between 0mmHg and 12mmHg.¹ Pressures in this range are vital as normal capillary perfusion pressure, which ensures adequate blood supply to a limb, ranges between 20mmHg and 30mmHg. Compartment syndrome occurs when a closed anatomic space has pressures greater than perfusion pressure, leading to loss of circulation and dysfunction of the tissues in that compartment. Vogt first described the condition in 1943 and reported the event in the anterior compartment of soldiers after prolonged marching.¹

The total operative time for this patient was 4 hours 15 minutes with the patient supine on a standard operating table throughout. The operating table was horizontal throughout except during the last 20 minutes of the operation where the patient was sat up for comparative purposes. The patient was not overweight, did not have sickle cell disease and there were no intra-operative complications. During the first hour of recovery from anaesthesia she began complaining of increasing pain in both legs. Within hours this developed from a dull, non-specific ache to agonising pain, felt most acutely on the anterolateral aspect, particularly on the right leg.

The initial differential diagnosis of deep vein thrombosis was investigated and ultrasonography of both legs and the inferior vena cava was carried out. Both the blood results and ultrasonography excluded the presence of any venous occlusion. The patient continued to be in agonising pain and bilateral calf compartment pressures were measured at 32mmHg in the right lateral, 24mmHg in the right anterior, 31mmHg in the left deep posterior and 23mmHg in the left lateral compartment of the lower leg. All other compartment pressures were measured as 20mmHg or below. At the time the patient's diastolic pressure was 54mmHg.

On confirming a diagnosis of bilateral lower leg compartment syndrome, immediate decompression of both lower limbs was performed as described by Mubarak *et al.*² The muscles were found to be bulging through the incised fascia and were clearly oedematous but still viable as confirmed by their colour and contractility. All four areas were released. After 48 hours of strict leg elevation, the clinical symptoms improved gradually and it was possible to close the skin directly without any undue tension or the need for skin grafts. The serial creatine kinase measurements showed a steady return to normal levels after peaking at 5,140iu/l on the third day after admission.

Discussion

The occurrence of compartment syndrome bilaterally in a young patient without any history of blunt trauma or other

predisposing factors may be puzzling. Such forms of compartment syndrome have been coined 'well leg syndrome'.³ Comparing our case with cases reported previously, there are clear differences. Our patient was young, supine and had a shorter operative time.²⁻⁴ Previous reports have documented that interface pressure between the patient's legs and the operating table may play a role in the pathophysiology of this syndrome. It is of note that gel pads were used to reduce interface pressure.³ Various other theories have been developed in an attempt to explain the exact pathophysiological mechanism, including developed calf muscles in young men and inadvertent pressure applied by one of the surgeons leaning on the patient, although none provide a compelling explanation for this phenomenon.

Certain hypotheses could be put forward in this particular case. For example, a reduction in compartment size could cause reduced blood flow secondary to thromboembolic stockings, which the patient was wearing throughout the operation. Furthermore, gel pads may not be effective enough at reducing interface pressure for there to be protection against compartment syndrome.

The decision to carry out fasciotomies is based on the compartment pressures. It has been suggested that patients with pressures over 30mmHg, in conjunction with a clinical presentation, should undergo a fasciotomy. Not relieving the pressure for periods longer than eight hours could result in irreversible ischaemic damage to the leg.² McQueen and Court-Brown advocate the consideration of the patient's perfusion pressure (Δ_p), defined as the diastolic pressure minus the intracompartmental pressure.⁵ A Δ_p of less than

30mmHg indicates a fasciotomy. Although no single value can serve as an absolute indicator for a fasciotomy, the essential clinical feature of compartment syndrome in conscious patients is severe pain; out of proportion to the injury and aggravated by passive muscle stretch,⁴ such pain post-operatively requires careful consideration of compartment syndrome.

Conclusions

No matter how carefully surgery is performed and how optimised the environment is in modern theatres, one can never predict completely the safe completion of any intervention. Regardless of how remote, unpredictable events may occur at any time and convert a 'routine' operation into a litigious nightmare. The timely recognition of such a complication in the acute stage is vital as the clock is ticking and permanent damage can be averted if the window of opportunity is not missed.

References

1. Mar GJ, Barrington MJ, McGuirk BR. Acute compartment syndrome of the lower limb and the effect of postoperative analgesia on diagnosis. *Br J Anaesth* 2009; **102**: 3–11.
2. Mubarak SJ, Owen CA. Double-incision fasciotomy of the leg for decompression in compartment syndromes. *J Bone Joint Surg Am* 1977; **59**: 184–187.
3. Kavouni A, Ion L. Bilateral well-leg compartment syndrome after supine position surgery. *Ann Plast Surg* 2000; **44**: 462–463.
4. Pearse MF, Harry L, Nanchahal J. Acute compartment syndrome of the leg. *BMJ* 2002; **325**: 557–558.
5. McQueen MM, Court-Brown CM. Compartment monitoring in tibial fractures. *J Bone Joint Surg Br* 1996; **78**: 99–104.