



## CASE REPORT

# Gluteal compartment syndrome after total hip replacement. A presentation of two cases<sup>☆</sup>

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### KEYWORDS

Compartment syndrome;  
Buttock;  
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### PALABRAS CLAVE

Síndrome compartimental;  
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Artroplastia total de cadera

**Abstract** Many postoperative complications have been described after a total hip arthroplasty, with early and acute, as well as late, complications being reported. Two cases of compartment syndrome of the buttock are described following a hybrid total hip arthroplasty (cemented stem and press-fit and screwed acetabulum) performed on 2 patients of 60 and 68 years old, both diagnosed and treated 24–48 h after the surgery. Both cases had a primary prosthesis with no previous significant pathological findings. This condition is still rare, and few cases have been described at the medical literature.

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### Síndrome compartimental glúteo tras el implante de artroplastia total de cadera. A propósito de 2 casos

**Resumen** Numerosas complicaciones posquirúrgicas tras la implantación de una artroplastia total de cadera han sido descritas a lo largo de los años, diferenciándose entre las precoces o postoperatorias inmediatas y las tardías. Presentamos 2 casos de síndrome compartimental glúteo como complicación de la implantación de prótesis total híbrida (vástago cementado y cótilo impactado atornillado) en 2 pacientes de 60 y 68 años respectivamente, en los cuales se diagnosticó y trató el proceso a las 24–48 h de la cirugía. En ambos casos se trataba de prótesis primarias y ninguno de ellos presentaba antecedentes patológicos de interés, siendo estos casos poco frecuentes y, en consecuencia, con escasas publicaciones en la literatura médica.

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## Case report

Two male patients, aged 60 and 68 years, respectively, were operated of total hip arthroplasty under spinal anesthesia between November and December 2000. Patients 1 and 2 showed no previous history of disease and were not following any medical treatment. Both had a normal weight (patient 1 weighed 76 kg and measured 174 cm; patient

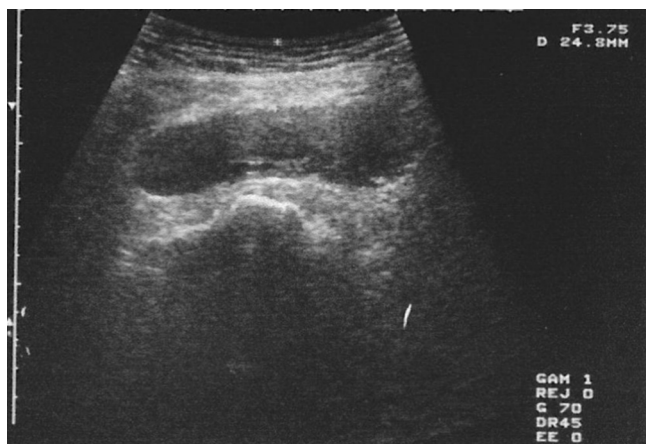
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2 weighed 65 kg and measured 169 cm). Both cases had right osteoarthritic hips and were implanted a total hybrid prosthesis with cemented stem and impacted acetabulum, with 2 screws in the ileum. Both cases were approached by the Moore posterolateral route, separating the external rotators and dislocating the femoral head by a posterior route. Both patients remained hemodynamically stable during the intervention, with no abrupt changes in their vital signs. Bleeding was considered normal and customary in these interventions (patient 1: 70 cc; patient 2: 80 cc). We did not observe significant intraoperative or postoperative blood loss and it was not necessary to transfuse any of the 2 patients. This fact is important to rule out the rare intraoperative possibility of injury to the femoral circumflex artery. We placed a subfascial drain in both cases and referred patients to the postoperative control room. Both remained stable during the immediate postoperative period. Drains were scarcely productive (350 and 380 cc) and were removed in the first 24 h. Both patients followed a postoperative recovery in their corresponding wards, with no incidents or immediate complications, and remaining in bed for the first 12 h. Assisted ambulation on crutches with partial load was allowed in the following 12 h. Antithrombotic prophylaxis with low molecular weight heparin (dalteparin sodium: 3500 IU/24 h/subcutaneously) was initiated at 6 h of surgery. Postoperative analgesia consisted of paracetamol 1 g/8 h/intravenously, alternating with metamizole 2 g/8 h/intravenously, leaving morphine as a rescue therapy.

Postoperative radiographs showed a correct implantation and placement of the prosthetic implants, as well as the position of the screws, without protrusion thereof. During the second postoperative day (approximately at 36 h), the patients complained of severe pain and swelling in the surgical wound, as well as in the outer part of the thigh, with numbness in the ipsilateral limb to the operated hip. One patient presented inability for foot dorsiflexion. He underwent an urgent electromyogram (EMG) which showed neuropathy by compression of the sciatic nerve. Due to a suspected diagnosis of massive hematoma, both cases underwent ultrasound scans (Fig. 1). Clinically, none of the 2 patients suffered fever syndrome and their constants were normal at the time of study.



**Figure 1** Ultrasound scan performed to guide the suspected diagnosis of massive hematoma.

As the pain increased abruptly after 3 h in parallel to peripheral neuropathy symptoms, the diagnosis of compartment syndrome by hematoma was established, affecting gluteal compartments by tension. Surgical revision was the preferred treatment.

## Results

In both cases we conducted fasciotomies and drained hematomas of 2.8 and 2.7 l, respectively, without finding active bleeding of any relevant vessel (Table 1). The contents were calculated by weighing, after subtracting the weight of the gauzes.

Both patients followed a correct postoperative control, dramatically improving their pain and neurological symptoms in the first hours after the end of spinal anesthesia. In one patient, paresthesias persisted until the eleventh week after surgery, albeit decreasing in symptoms and electromyography, and with recovery *ad integrum*.

We did not use a manometer to measure compartment pressure in any of the 2 patients due to the controversy existing about its usefulness, to a lack of availability and so as not to delay the therapeutic surgical drainage.

These patients have been clinically and radiologically assessed every year and both present scores of 6/6/6 on the Merle d'Aubigné scale at 12 years, with correct radiological adaptation of the implants and with no signs of osteolysis or loosening.

## Discussion

Compartment syndrome involves an increase in interstitial pressure in an osteofascial compartment caused by an increase of its contents (hematomas, bleeding, increased capillary permeability) and decrease of the continent (tight bandages or localized external compression),<sup>6,7</sup> which produce an increase of tissue pressure which affects microcirculation, causing ischemia mainly in muscles and nerves.

Gluteal compartment syndrome is a rare entity among compartment syndromes, with very few literature references on the subject and in most cases referring to isolated instances. It has been described in association with numerous diseases, especially traumatic (in femoral fractures<sup>1</sup> and their treatment with intramedullary nailing, pelvic fractures and soft tissue contusions<sup>1,2</sup>), spontaneous or posttraumatic lesions of the superior gluteal artery<sup>3</sup> and medial femoral circumflex artery,<sup>1</sup> in patients with impaired consciousness or prolonged immobilization,<sup>3-5</sup> and in connection with intramuscular drug abuse<sup>4,5</sup> and rhabdomyolysis<sup>6</sup> induced by exercise,<sup>3</sup> among others. Although the general causes of bleeding are well known (alcoholism, anticoagulant therapy, liver pathology, etc.), they have not been reflected as direct causes of gluteal compartment syndrome. There are even reports of occurrence in the contralateral gluteal region,<sup>6</sup> mainly caused by obesity, prolonged surgical time and lateral decubitus position during surgery, as well as poor positioning of the posterior gluteal support.<sup>6</sup> Nevertheless, our patients had no relevant history of disease.

There are several approach routes for the implantation of a total hip arthroplasty, with the posterolateral, anterior and anterolateral being the most common. In the present

**Table 1** Evolution of the two cases.

	Age (years)	Weight (kg)	Height (cm)	Start of symptoms (h)	EMG	Ultrasound	Postoperative drain (recovery)	Compartmental syndrome drainage	Clinical evolution
Patient A	60	76	174	36	Not performed	Positive	350 cc	2800 cc	Normality (3 days)
Patient B	68	65	169	36	Positive	Positive	380 cc	2700 cc	Normality (120 days)

cases, we used the posterolateral route, as is habitual in our service. While this approach route may have a higher index of iatrogenic sciatic nerve injuries, there are no literature references regarding an increase in bleeding, compared to other routes. There are currently no works mentioning the approach route, the surgical time and the type of anesthesia as risk factors, perhaps because of their extreme rarity.

The gluteal region is broad and consists of 3 compartments,<sup>3,7</sup> the *gluteus maximus*, the *gluteus medius/minor*, and the *fascia lata* compartment, all with non-distensible osteofascial limits. Appearance of a compartment syndrome in this region necessarily requires a massive accumulation of edema or blood.

The diagnosis is not simple and involves a high degree of clinical suspicion based on clinical history and detailed physical examination. The most common symptom is intense pain at rest<sup>3</sup> and disproportionate with the underlying pathology,<sup>8</sup> resistant to analgesic treatment,<sup>1,3</sup> worsening with passive stretching of the limb and presenting swelling and ecchymosis<sup>1,6,8</sup> in the region (although some cases have been described which had a normal skin appearance<sup>5</sup>).

Neurological disorders may also appear and manifest as paresthesias and even sciatic nerve paralysis.<sup>3,6,8</sup> It is important to highlight that anesthesiological procedures such as nerve blocks, continuous epidural anesthesia and regional anesthesia may hinder clinical assessment.<sup>5,6,8</sup> The most common laboratory data<sup>7</sup> in this disease are blood loss anemia, metabolic acidosis with hyperkalemia and an increase in creatine kinase count (due to muscular necrosis caused by ischemia) with myoglobinuria.<sup>6</sup>

The recommended aids for diagnosis in unconscious, multiple trauma patients or when there is doubt about the clinical diagnosis, include arteriography, Doppler ultrasound, computed tomography (CT) and magnetic resonance imaging (MRI) scans. Nevertheless, one of the most widely known and accepted is the measurement of pressures within the compartment. There is some controversy<sup>3,4</sup> regarding the threshold for determining the diagnosis, but 2 criteria are generally accepted: absolute compartment pressure (decompression is recommended when this is greater than 30 mmHg) and differential pressure (when diastolic arterial pressure minus compartment pressure is less than 30 mmHg), although some cases of gluteal compartment syndrome with normal pressures have also been described. The use of EMG may be useful to evaluate sciatic nerve injury during subsequent monitoring.

Nevertheless, we believe that, upon clinical suspicion of this condition, conducting these additional tests should not be a reason to delay treatment through surgical drainage and decompression by fasciotomies, so as to avoid

irreversible neurological and muscle lesions. Rapid intervention is vitally important for the survival and viability of the affected tissue. Whitheside et al. reported that the muscle could survive a temporary ischemia for about 4 h before histological lesions occurred, whilst neurons only 33 min.

Two approach routes to the gluteal region have been described for decompression.<sup>8</sup> The route of Henry (in the shape of a question mark starting in the posterior superior iliac spine and descending to the trochanteric region) and the route of Janzing (posterior curved access, similar to the posterior approach route to the hip). However, we used the same surgical route as for the primary surgery. If there is paralysis of the sciatic nerve, then it should be exposed and decompressed.<sup>8</sup> It is important to highlight that, even after fasciotomy, the viability of marginal tissue is not resolved immediately, especially in cases with hypotension.

Performing early fasciotomies prevents complications such as myoglobinuria, which can lead to acute renal failure, sepsis, ischemic contractures, amputations and even death.

## Conclusions

Gluteal compartment syndrome is an infrequent disorder. Orthopedic surgeons should be aware of it and learn how to treat it promptly, as it can lead to severe complications and even death. A conscientious surgical technique regarding dissection and hemostasis, as well as a preoperative study of coagulation, appears essential in order to avoid this rare postoperative complication during total hip arthroplasty.

## Level of evidence

Level of evidence IV.

## Ethical responsibilities

**Protection of people and animals.** The authors declare that this investigation adhered to the ethical guidelines of the Committee on Responsible Human Experimentation, as well as the World Medical Association and the Declaration of Helsinki.

**Confidentiality of data.** The authors declare that they have followed the protocols of their workplace on the publication of patient data and that all patients included in the study received sufficient information and gave their written informed consent to participate in the study.

**Right to privacy and informed consent.** The authors declare having obtained written informed consent from patients and/or subjects referred to in the work. This document is held by the corresponding author.

### Conflict of interests

The authors have no conflict of interests to declare.

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