

## GLUTEAL COMPARTMENT SYNDROME AFTER PROSTATECTOMY CAUSED BY INCORRECT POSITIONING

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### Abstract

Gluteal compartment syndrome is an uncommon and rare disease. Most reasonable causes for the development of this disease are trauma, drug induced coma, Ehlers-Danlos syndrome, sickle cell associated muscle infarction, incorrect positioning during surgical procedures and prolonged pressure in patients with altered consciousness levels. The diagnosis requires a high index of suspicion, especially in postoperative patient where sedation or peridural anaesthesia can confound the neurological examination. Early signs include gluteal tenderness, decrease in vibratory sensation during clinical examination and increasing CK in laboratory findings.

We present a case of a 52 year-old patient, who developed gluteal compartment syndrome after radical prostatectomy in lithotomic position. After operation, diuresis decreased [ $<50\text{ml/h}$ ] and CK [93927 U/l], LDH [1528 U/l], creatinin [1.5 mg/dl] and urea [20 mg/dl] increased in laboratory findings. Despite peridural anaesthesia, the patient complained about increasing pain in the gluteal region and both thighs. His thighs and the gluteal region were swollen. Passive stretch of the thighs caused enormous pain. The compartment pressure was 92 mmHg. Therefore, emergency fasciotomy was performed successfully.

The gluteal compartment syndrome was most likely caused by elevated pressure on the gluteal muscle during operation. We suggest heightened awareness of positioning the patient on the operating table is important especially in obese patients with lengthy operating procedures.

*Key words:* Gluteal compartment syndrome, prostatectomy, incorrect positioning, therapy.

### INTRODUCTION

Incorrect positioning of the patient during operation could cause multiple complications. Most common are lesions of nerves and skin or soft tissue. The frequency of paralysis caused by incorrect positioning during general anaesthesia is up to 21%. The major reasons for these complications are direct compression and overstretching created by non physiological positioning of the extremities [1].

Acute limb compartment syndrome caused by incorrect positioning during operation can be a life threatening emergency. Reasons for developing a com-

partment syndrome are trauma of bones, soft tissue or vessels. In most of the cases, a combination of these factors is causative. Incorrect positioning during operation or tight plaster cast is also reasonable. The risk of developing a compartment syndrome is increased in combination with systemic hypoperfusion. Fracture of the tibia, radius or ulna is the most common implication of compartment syndromes caused by bone injuries. Concurrently tibialis anterior compartment is most commonly affected in the region of lower extremities, whereas in the forearm it is in the flexor compartment [2-4].

Gluteal compartment syndrome is a very rare disease and has been published in the literature most commonly as single case reports [5, 6]. Most reasonable causes for the development of this disease are trauma, drug induced coma, Ehlers-Danlos syndrome, sickle cell associated muscle infarction, incorrect positioning during surgical procedures and prolonged pressure in patients with altered consciousness levels [7-12].

The underlying pathomechanism is an initial trauma, which leads to an edema of a compartment. This edema results in rising pressure within a closed fascial space and compression of the veins. Compressions of the veins itself leads to fluid flow into the compartment and again increased pressure inside the compartment. This pressure reduces capillary perfusion below a level necessary for tissue viability and leads to irreversible ischemia and paralysis. Other factors as leukocytes, free radicals, TNF and leukotrienes are thought to be responsible for a complex mechanism leading to the leakage of fluid from the intravascular compartment to the extravasal [13, 14].

Most patients with compartment syndromes complain about pain and paraesthesia. Loss of two dot discrimination is a sensitive test to distinguish an increased compartment pressure and manifest compartment syndrome [15]. The regular pressure inside an anatomical compartment is between 0 to 8 mmHg. Pain and paraesthesia are associated with a pressure between 20 to 30 mmHg [16]. Pressure above 30 mmHg for more than 6 to 8 hours causes irreversible damage [17].

Typical findings during clinical examination are swollen compartment, tension and pain during passive extension. In some cases the colour of the skin can be rosy and the pulses can be detectable. Therefore, classical signs as pain, paraesthesia, pallor, pulselessness

and paralysis are developed in an advanced state of compartment syndrome and stand for direct or indirect injury of the vessels. Regional nerve blocks can cover the clinical symptoms. The most important examination is the measurement of the pressure inside the anatomical compartment, but is not always necessary in patients, who developed the classical signs of a compartment syndrome [18].

Lithotomy position is frequently used in general and colon surgery as well as in gynaecologic and urologic surgery, because it gives an excellent access to the abdomen and perineum. Typical of this positioning is a variety of complications including lumbosacral plexus stretch, sciatic and peroneal nerve injury and compartment syndrome of the legs. Risks of these complications depend on the nutritional status, skin condition, circulatory disorder of the extremities and length of the surgical procedure. The surgeon's rule in

preventing such complications are safe patient positioning, optimal intraoperative care and postoperative surveillance.

Here, we report a case of a patient, who developed gluteal compartment syndrome after prostatectomy.

#### CASE REPORT

A 52 year-old patient was diagnosed with prostate carcinoma. Therefore, he underwent radical prostatectomy. This operation was done in lithotomic position and lasted for 7 hours. Afterwards, the patient was treated at intensive care unit. During that time, diuresis decreased [ $<50\text{ml/h}$ ] and CK [93927 U/l], LDH [1528 U/l], creatinin [1.5 mg/dl] and urea [20 mg/dl] increased in laboratory findings. Despite peridural anaesthesia, the patient complained about increasing pain in the gluteal region and both thighs (Fig. 1).



*Fig. 1.* Closer view of the swollen gluteal region and thighs. The patient is in prone position.



*Fig. 2.* Opening of the right gluteal fascia by longitudinal shiny incision starting from the sacroiliac joint to the lateral knee joint.

During clinical examination, we saw swollen thighs and a swollen gluteal region. Passive stretch of the thighs caused enormous pain. The pulse of both lower extremities was detectable. Measurement of intraoperative compartment pressure showed results of 92 mmHg. Therefore, emergency fasciotomy was performed immediately. Relieving incision was done by longitudinal shiny incision of the gluteal fascia starting from the sacroiliac joint to the lateral knee joint (Fig. 2). For temporary cover of the wound Epigard® was used and the patient was again transferred to intensive care unit. Under forced diuresis, CK, creatinine and urea returned to normal. After the swelling subsides, closure of the wound was done with a sliding flap. With intensive physiotherapy, our patient could walk without crutches after four months and showed a normal manner of walking one year after operation.

### DISCUSSION

Gluteal compartment syndrome is an extremely rare, often unrecognized condition most commonly caused by trauma or immobilization. If left untreated, nerves and muscles will be deprived of blood supply leading to nerve palsy and rhabdomyolysis, which can result in renal failure and sepsis [19].

The anatomy of the gluteal region is complex and should be treated as three different compartments, separated by their individual surrounding nondistensible boundaries. The gluteus maximus compartment is enveloped by its own tough fascia, the gluteus medius-minimus compartment, surrounded by the gluteal fascia and a deep iliac boundary and the tensor fascia lata, enveloped by the gluteal fascia and the lateral fibrous coverings of the hip. Finally, it is the nondistensible gluteal fascia and aponeurosis of the ileum, sacrum, coccyx, and iliotibial tract that confine these three compartments to their nonexpansive spaces [20].

Diagnosis of gluteal compartment syndrome requires a high index of suspicion, especially in postoperative patient where sedation can confound the neurological examination. The characteristic delay in diagnosis is often due to associated distraction factors, such as an altered mental status, peridural anaesthesia or orthopaedic injuries, which make the initial symptoms of gluteal tenderness and pain with passive movement difficult to ascertain. Early symptoms include gluteal tenderness and decrease in vibratory sensation. Laboratory findings usually show an increased CK of more than 3000 U/l. In some cases the patients can present myoglobinuria or sciatic nerve symptoms [21, 22].

There is still controversy as to compartment pressures that necessitate a prompt decompression by fasciotomy. There are authors, who recommend surgical intervention when the pressure is greater than 30 mmHg, whereas others use arterial-compartmental pressure gradients to make the determination [21, 23].

Care should be taken, when positioning a patient on the operating table to avoid complications. Placing a leg in a leg holder, with the knee and hip flexed in 90° significantly increases the pressure exerted on the gluteal region. Mean diastolic blood pressure and length of the operation need to be taken in account when a patient is positioned on the operating table. In

some cases pads can help to prevent these complications [22, 23]. Lithotomy position causes a high risk for paralysis of peroneus nerve and the ischaemic complications in the gluteal region. Therefore, it is important to check the correct position of the patient before every operation.

### CONCLUSION

In conclusion, we report a case of gluteal compartment syndrome following elective radical prostatectomy. Our patient was managed successfully with muscle compartment decompression and muscle debridement. The gluteal compartment syndrome was most likely caused by elevated pressure on the gluteal muscle during operation. We suggest that better awareness of positioning on the operating table is important especially in obese patients with lengthy operating procedures.

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