

## Compartment syndrome obscured by post-operative epidural analgesia

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### Abstract

Compartment syndrome is an orthopedic emergency that require early recognition and urgent intervention to avoid catastrophic complications. High index of suspicion is required for early diagnosis based on a constellation of signs and symptoms that include pain out of proportion and worsened by passive stretching, altered sensorium and palpable tenseness. Any event thus, that masks pain, may lead to delay the diagnosis of compartment syndrome. We report here a case of polytrauma where post-operative analgesia was administered using epidural catheter, which obscured pain and lead to delay in recognition of compartment syndrome. Authors wish to share a lesson, learned at the expense of tragedy.

### Introduction

Compartment syndrome, first described by Volkman<sup>1</sup> is an orthopedic emergency, which occurs when perfusion pressure of fascial compartment falls below the tissue pressure with resultant ischemia of muscles and nerves of the compartment.<sup>2</sup> It is shown that muscles can tolerate only four hours of ischemia after which irreversible changes ensue.<sup>3</sup> Early recognition and urgent intervention are of paramount importance to avoid complications like muscle necrosis, neurologic deficit, ischemic contracture and necrosis. High index of suspicion like pain out of proportion and worsened by passive stretching, is required to make the diagnosis. Any event thus, that masks pain, may lead to delay the diagnosis of compartment syndrome.<sup>3-5</sup> Thus any clinical situation like intoxicated or unconscious patients or patients with concomitant nerve injury diagnosis of compartment syndrome is delayed. We report here a case of polytrauma where post-operative analgesia was administered using epidural catheter which obscured pain and lead to delay in recognition of compartment syndrome.

### Case Report

A young 32-years-male patient victim of motor vehicle accident was admitted with the diagnosis of bilateral fracture femur and fracture of both bone right leg. After stabilizing the general condition and splintage of fractures, the patient was rushed to emergency operation theatre and fractures were stabilized. Epidural catheter was maintained for top up infusion of 3 mg Morphine in 10 mL normal saline every 12 hourly, to control pain. Patient was completely free of pain and passive stretching was not significant during the period of epidural analgesia. Epidural catheter was removed after 28 h after last dose at 24 h, when patient was asymptomatic. It is after four hours of removal, patient started complaining of progressive pain unrelieved by appropriate oral analgesic. Clinical examination revealed swollen compartment of leg with altered sensorium and significant pain on passive stretching. Extension of toe and dorsiflexion of ankle was remarkably absent. Dorsalis pedis was not palpable and posterior tibial artery was doubtful. Nail bed circulation was present. Compartment pressure measurement further confirmed the diagnosis. Patient was immediately taken to operating room and four compartment fasciotomy was done. Dead muscle was noted in anterior and lateral compartment, which were excised. Pain significantly improved with return of distal pulses. Further debridement was performed on 3rd and 5th day. Fasciotomy wound was closed by split skin grafting by 10<sup>th</sup> day.

### Discussion

Diagnosis of compartment syndrome is essentially clinical and high index of suspicion is the key. Most common cause of this entity is trauma, usually a fracture. About 4.3% of all patients of tibial shaft fracture, 3.1% of diaphyseal fracture of forearm and 0.25% of distal radial fracture develop compartment syndrome.<sup>6</sup>

The underlying pathophysiology is ischemia - perfusion - ischemia cycle. In a clinical setting it is difficult to pin point the precise time when compartment pressure started increasing. Thus its measurement by either needle or catheter technique is recommended in high risk patients. Normal pressure in muscle compartment is below 10-12 mmHg. Various invasive<sup>7</sup> and non-invasive methods<sup>2,6</sup> are often employed for continuous measurement of compartment pressure.

Patient controlled analgesia (PCA) gained increasing popularity<sup>8</sup> for post-operative pain management after its first description in the year 1971.<sup>9</sup> However, this technique has its

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own potential complications in polytraumatized victim with extremity injury, which were reported subsequently. Iaquineto *et al.*<sup>10</sup> reported increased prevalence of neurological complications in patients who were managed with continuous epidural analgesia in comparison to those managed by oral analgesia. Strecker *et al.*<sup>11</sup> also reported a case in which compartment syndrome remained undetected because early symptom of pain was masked by epidural analgesia. Price *et al.*<sup>3</sup> further described compartment syndrome of thigh after corrective osteotomy associated with post-operative epidural analgesia. Harrington *et al.*<sup>4</sup> reported delayed diagnosis of compartment syndrome in a case of Gustillo II tibial fracture who was on PCA. Richards *et al.*<sup>5</sup> further reported four cases of in which the diagnosis of compartment syndrome was delayed due to PCA following intramedullary nailing and recommended avoiding PCA in favor of intermittent intramuscular morphine injections. Glynn *et al.*<sup>12</sup> observed that epidurally administered local anesthetics causes sympathetic blockade and thereby tends to increase blood flow, which in turn contribute to rise in intra-compartmental pressure. In contrast, epidurally administered opioids do not abolish the normal vasoconstrictor response. Johnson *et al.*<sup>13</sup> and Mar *et al.*,<sup>14</sup> based on literature search concluded that there is no convincing report that PCA or regional analgesia delays diagnosis of compartment syndrome provided continuous monitoring of patients is done.

### Conclusions

Epidural infusion of morphine or local anesthetic is an excellent mode of analgesia; however, it has the potential to obscure cardinal clinical features of compartment syndrome

especially in polytraumatized patients. In light of our experience and literature review, we recommend frequent clinical evaluation, extra vigilant monitoring of analgesic demand and invasive or non-invasive measures is warranted to detect early harbinger of the capricious entity called compartment syndrome.

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