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## ‘COMPARTMENT SYNDROME OF FOREARM - A CASE STUDY .’

Rangari A.R.,<sup>1</sup> Shinde J<sup>2</sup>, Badwe Y,<sup>3</sup> Shahare K.<sup>4</sup>

1. PG Scholar, Department of Shalyatantra, Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra.
2. Professor & HOD, Department of Shalyatantra, Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra.
3. Professor and HOD, Department of Shalyatantra, All India Institute of Ayurveda, New Delhi
4. PG Scholar, Department of Shalyatantra, Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra

**Abstract: Introduction-** Compartment syndrome is special entity, common in leg, forearm, thigh and arm, due to increased intra compartment pressure within a limited space area. Compartment syndrome is a condition in which increased tissue pressure within a limited space compromises the circulation and function of the contents of that space. This happens when intramuscular pressure is elevated over a certain level for a period sufficient to reduce capillary perfusion. The inadequate tissue perfusion then leads to inadequate tissue oxygenation to the nerves as well as muscles within the affected compartment. **Method** – A 45 years old female patient having abscess impending compartment syndrome of left forearm was planned for fasciotomy which is the necessary and immediate treatment. .In this case study urgent fasciotomy was done to prevent irreversible sequelae, as pressure that is not quickly relieved and may lead to necrosis of the soft tissues and permanent disability. **Result-** Compartment syndrome of forearm was successfully treated by surgical procedure without damaging any nerve and any complications. No recurrence was not noted upto 6 months after surgery. **Conclusion-** Compartment syndrome should be managed carefully as to relieve the pain and to avoid the necrosis in the muscle compartment. For better prognosis and least chances of recurrences, accurate diagnosis should be done as soon as possible and urgent fasciotomy should be done with meticulous precaution.

**Keywords-** compartment syndrome; fasciotomy; forearm.

### Corresponding Author:

**Dr. Akanksha Ravindra Rangari,**

PG Scholar, Department of Shalyatantra,

Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra, India,

[Email-trigyarangari27@gmail.com](mailto:Email-trigyarangari27@gmail.com), Mob no. 9922027263

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## INTRODUCTION-

Compartment syndrome is special entity, common in leg, forearm, thigh and arm, due to increased intra compartment pressure within a limited space area<sup>1</sup>. Compartment syndrome is a condition in which increased tissue pressure within a limited space compromises the circulation and function of the contents of that space. This happens when intramuscular pressure is elevated over a certain level for a period of time sufficient to reduce capillary perfusion. The inadequate tissue perfusion then leads to inadequate tissue oxygenation to the nerves as well as muscles within the affected compartment<sup>2</sup>. Acute compartment syndrome (ACS) is a condition in which increased pressure within a closed fascial compartment limits circulation to tissues, sometimes resulting in tissue necrosis<sup>3</sup>. Although rare, acute compartment syndromes of the upper arm exist and are severe complications of trauma or after orthopedic, vascular, or other surgery of the limbs. Most common are the compartment syndromes of the lower arm and lower leg. An upper leg compartment syndrome occurs less frequently and a compartment syndrome of the upper arm is even less common<sup>4</sup>.

The causes includes – narrowed space due to tight dressings /plasters cast, lying on one limb in comatose patients, increased content within the compartment due to trauma like fractures, edema, ischemic injury, haematoma, positioning after trauma ,burn, injury, etc, high pressure injection injuries like gun injury, oil based material injury ,extravasation, of chemotherapeutic drugs, snake bite<sup>5</sup>. ACS occurs when pressure

increases within a confined closed fascial space causing subsequently reduced blood flow and tissue perfusion that may lead to ischemic pain, possible soft-tissue damage, and limb-threatening. With a character of increased intracompartmental pressure, it is a surgical emergency and commonly occurs in the lower leg, forearm, thigh, foot, gluteal region, hand, and abdomen. The incidence rate of ACS was reported 30.4% especially in shaft and proximal regions of tibia<sup>6</sup>. Compartment syndrome has Features of It compromises circulation and function mainly of muscles and nerves .It often maintains the normal colour and temperature of the fingers and distal pulses may not be obliterated in spite of severe muscle ischemia. Muscle ischemia more than 4 hours causes muscle death and myoglobinuria. Irreversible nerve damage develops if ischemia persists for 8 hours. Progressive, persistent severe pain which is aggravated by passive muscle stretching is the diagnostic sign .Tense tender regional lymph node is typical. Pulse will be usually normally felt in compartment syndrome, but is an indication of fasciotomy .may become absent if there is associated arterial injury. It is common in calf and forearm closed injuries causes haematoma leading to increased pressure .It is often associated with fracture of the underlying bone which in turn compresses the major vessel further aggravating the ischemia causing pallor, pulselessness, pain, paresthesia, diffuse swelling and cold limb. If allowed to progress it may eventually lead to gangrene or chronic ischemic contracture with deformed, disabled limb<sup>7</sup>. To prevent

serious complications induced by ACS, fasciotomy should be done before irreversible tissue necrosis occurs, thus there is a strong clinic bias toward doing fasciotomy empirically or prophylactically in patients who are considered to be at high risk and/or who have concerning clinical findings. It is generally recommended that conducting a prophylactic fasciotomy, which may be unnecessary, is better than do it too late, or ignoring a true ACS, given the potential systemic risks (rhabdomyolysis and myonecrosis) and functional loss associated with untreated ACS solutions.

**Case report-** A 45 year's healthy female was reported to OPD of shalyatantra of our institute with a chief complains of pain and swelling at left forearm since 15 days .The swelling was initially small in size which gradually increased with time to which she reported to our OPD. Her occupational status was a masseuse .There was no history of fever, local temperature raised and redness at left forearm, pallor at swelling site. Patient was no known case of hypertension, diabetes mellitis or any other illness .Patient was not on anti-coagulants, no any known allergy and no recent history of IV injection. On examination there were all signs of inflammation like calor, rubor and dolor, foereaem was tense and tender, on moving the fingers, pain exacerbates. Patient complained of tingling sensation in the fingers. Examination of the upper limb showed restriction of the forearm above and restricted movements of flexion. Examination of the cervical spine, shoulder and elbow, as well as radial and ulnar arterial flow, was

normal. On palpation, swelling was tender, firm and non-fluctuant. There were no signs of paresthesia or pulselessness .Based on above clinical findings, a provisional diagnosis of abscess impending to compartment syndrome was taken into consideration. The other possible diagnosis such as abscess, cellulitis, thrombophlebitis, necrotising fasciitis, stress fracture ,tendinitis or radiculopathy ,peripheral nerve entrapment was considered as the probable diagnosis. Ultrasonography was done which revealed there is ill defined minimally vascular echo complex measuring approx.4x5cm at medial part of upper forearm just below elbow joint involving muscle plane s/o inflammatory collection? Mass lesion. Further planning was done for surgical procedure for fasciotomy of swelling at left forearm. After performing all necessary investigations and obtaining informed consent of the patient and relatives, patient was taken under right supraclavicular block and right axillary block .By taking all aseptic precautions, painting, draping and isolation of the operative field was done. Then incision line was marked and vertical linear incision was taken over the skin .Incision deepened upto fascia covering the flexor carpi ulnaris muscle, compartment was visualized .Incision taken over the muscle and muscle separated. Haematoma drained .cavity washed with betadine and H<sub>2</sub>O<sub>2</sub> solution and Normal Saline. Haemostasis achieved. Flexor carpi ulnaris muscle sutured with vicryl 2-0. Skin closure was done with ethilon 3-0. Betadine-soaked gauze kept over suture line .Dressing done with roller bandage and crepe

bandage applied. Good antibiotic coverage was given along with other supportive medications with left upper limb elevation. All findings and clinical features confirmed the diagnosis of compartment syndrome of left forearm. Periodic follow up of the patient was taken.

pressure in one of the compartments of the body. Resulting in ischemia of tissues .In lower limb vessels, nerves and muscles are enclosed by tight unyielding fascia. This is the reason why even small amount of blood within the compartment can give rise to compartment syndrome .It is classified into two types Acute –following trauma especially bones of legs and chronic-due to repeated



1) Pre - op



2) Incision



3) Intra - op



5) Wound Closure



5) Suture line



6) Post op Fallow up

**DISCUSSION** - Compartment syndrome is a serious condition characterized by increased

injury to the muscles of the leg –may be induced by exercise<sup>9</sup>. The pathophysiology of acute compartment syndrome starts when the intracompartment pressure increases

than that of the end capillary pressure. This impedes the venous return. The early symptoms are pain and paresthesia. The presence of clinical assessment (5P) - pain, pallor, pulselessness, paresthesia and paralysis occurs 12 hours of the onset of compartment syndrome. The necrosis of muscles and was the most serious or irreversible stage of ACS. When the intracompartmental pressure further increases the arterial flow gets compromised. Decreased blood flow leads to tissue hypoxia and further accentuates the problem. If this condition is not treated on time it can cause limb loss<sup>10</sup>. Compartment syndrome. Acute compartment syndrome of forearm mostly seen following fracture or crush injury of forearm. However, intracompartmental pressure (ICP) > 30 mmHg can be used as a threshold to aid in diagnosis. However, a single normal ICP reading does not exclude acute compartment syndrome. Acute compartment syndrome due to pressure to forearm is a rare condition<sup>11</sup>. Although fractures are being most common other uncommon causes are extravasations of IV drugs (mannitol, dextrose, and norepinephrine) and contrast agents, percutaneous radial artery intervention, veinpuncture<sup>12</sup>. Our patient has no history of coagulative disorder or on anticoagulant therapy. ACS is a clinical diagnosis. We have operated the patient based on clinical diagnosis. Injury to the major nerves, palmar cutaneous branch of median nerve should be avoided while placing the incision<sup>13</sup>. Compartment syndrome in the forearm is an uncommon diagnosis for intermittent

forearm pain. The combination of a suggestive history and positive ICP measurement still remains the golden standard in diagnosing compartment syndrome. Recent studies suggest magnetic resonance imaging (MRI) as an alternative to compartment pressure measurement to diagnose Compartment syndrome because it is non-invasive and easily tolerated<sup>14</sup>. Measurement of intracompartmental pressure is not required but can aid in diagnosis if uncertainty exists. Compartment pressures are often measured with a manometer, a device that detects intracompartmental pressure by measuring the resistance that is present when a saline solution is injected into the compartment<sup>15</sup>. The normal pressure within the compartment is between 0 mmHg to 8 mmHg. By introducing a transducer catheter within 5 cm of injury zone Compartment pressure more than 30mmhg of the diastolic blood pressure is suggestive of increase compartment pressure and it is the indication of urgent fasciotomy<sup>16</sup>.

A 45 years old female patient having abscess impending compartment syndrome of left forearm was planned for fasciotomy which is the necessary and immediate treatment. In this case study urgent fasciotomy was done to prevent irreversible sequelae, as pressure that is not quickly relieved and may lead to necrosis of the soft tissues and permanent disability. In the present case study ,the patient was a masseuse by occupation and it can be concluded that due to excessive exertion and

exercise led her to compartment syndrome of forearm .The patient was thoroughly followed up for a period of 5 months and no signs of recurrence as well as well as complications were observed .

### Conclusion:

Compartment syndrome is a clinical condition that is characterized by functional loss of muscle and nerve tissues and develops because of ischemia which can occur due to increased perfusion pressure within closed muscle fascia of the extremities. Compartment syndrome should be managed carefully as to relieve the pain and to avoid the necrosis in the muscle compartment for better prognosis and least chances of recurrences, accurate diagnosis should be done and urgent fasciotomy should be done with meticulous precaution. ACS is a surgical emergency that requires prompt diagnosis to prevent permanent tissue necrosis. Diagnosis is primarily based on clinical suspicion. In this case study, this is a rare cause of compartment syndrome following excessive exercise to forearm. It is very important for the surgeon to have high degree of clinical suspicion and early surgical management to prevent any catastrophic result.

**Consent of patient-** The written consent has been taken from relatives before the procedure as well as to publish the case report without exploring identity of the patient.

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