CASE REPORT

REVIEW AND CASE REPORT OF IDIOPATHIC LOWER EXTREMITY COMPARTMENT SYNDROME AND ITS TREATMENT IN DIABETIC PATIENTS

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SUMMARY - Diabetic muscle infarction is a rare complication of diabetes mellitus. However, idiopathic compartment syndrome in the diabetic patient is even a rarer disease, which has been reported only in three cases up to date. The disease seems to occur in patients affected by type 1 diabetes mellitus with a history of poorly controlled glucose levels. MRI aids in the diagnosis by delineating the edema of the muscle. However, definitive diagnosis is made using the Stryker needle unit. Treatment is accomplished by immediate two-incision fasciotomy. We present a case where a 34 yr-old female with a long standing history of poorly controlled Type 1 diabetes mellitus presented with a painful right lower extremity and was diagnosed with compartment syndrome. In our patient, a single incision fasciotomy to release the pressure was sufficient and might be considered as an alternative and less morbid procedure in the diabetic patient with already poorly healing tissues. We conclude that the muscle infarction in these patients is from diffuse microangiopathic disease leading to muscular infarction and fluid accumulation in the cells causing a decrease in the space in the compartment in question causing compartment syndrome.

Key-words: compartment syndrome, diabetes, diabetic muscular infarction, fasciotomy, complication.


Nous rapportons le cas d’une femme de 34 ans dont le diabète de type 1 était mal contrôlé de longue date, qui a présenté un tableau douloureux du membre inférieur droit rapporté à un syndrome des loges. Chez notre patiente, une seule incision d’aponévrectomie a suffi pour réduire la pression, et peut être considérée comme une alternative thérapeutique moins lourde chez le patient diabétique généralement exposé aux troubles de cicatrisation. En conclusion, l’infarctus musculaire chez ces patients est lié à une microangiopathie diffuse conduisant à la nécrose musculaire et à l’œdème intracellulaire, réduisant le volume dans le compartiment musculaire en cause, aboutissant au syndrome des loges.

Mots-clés : syndrome des loges, diabète, infarctus musculaire diabétique, fasciotomie, aponévrectomie, complication.
M uscle groups are bound together by restrictive sheaths of fascia, which make up a compartment. Compartment syndrome (CS) is a condition in which elevated pressure in a specific compartment impedes the flow of blood to the area. This results in tissue ischemia and impairment in function of the limb, and eventual cell death.

Only three cases of idiopathic CS have been described up to date in the literature, and all occurred in patients with a history of poorly controlled type 1 diabetes mellitus. Treatment of CS is usually emergency surgical treatment that consists of at least two fascial incisions to decrease the compartmental pressure.

We report an ICS in a 34-year-old female with type 1 diabetes mellitus who developed spontaneous compartment syndrome in her right lower extremity, which was successfully treated with fasciotomy performed through a single incision.

We also review the literature and discuss diagnosis and treatment of this rare disease.

**CASE PRESENTATION**

An obese 34-year-old female with a 24 yr history of type 1 diabetes mellitus presented to the emergency department with three weeks of a gradually worsening right lower extremity pain. The patient, who had a history of diabetic neuropathy affecting both lower extremities, presented to the emergency room complaining of recent onset of numbness of the lateral aspect of her right leg and dorsum of her right foot between the 1st and 2nd toe. The patient denied any aspect of her right leg and dorsum of her right foot pain.

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**DISCUSSION**

Muscle groups in the extremities are bound by thick, fibrous, fascial planes, which make up compartments. The fascia are relatively unyielding to muscle swelling. When the pressure in a specific compartment increases, there is compromise of blood flow to the area, causing tissue ischemia. The relative decrease in space proportionately increases the pressure in the compartment. The result is a compartment syndrome with an impairment of function and tissue damage, leading to eventual tissue death. Compartment syndrome may occur anywhere in the upper or lower extremities [1-4].

In the lower extremity, there are four compartments bound by fascial planes [5]. The lateral compartment contains the peroneus longus and peroneus brevis muscles and the superficial peroneal nerve. The anterior compartment contains the tibialis anterior, digital extensors, anterior tibial artery and vein, the deep peroneal nerve and the extensor hallucis longus. The deep posterior compartment contains the long digital flexors, flexor hallucis longus, posterior tibialis, posterior tibial artery and vein, the tibial nerve, and peroneal artery and vein. The superficial posterior compartment contains the gastrocnemius and soleus muscle complex [5].

Two types of compartment syndromes have been described. Acute compartment syndrome is most often associated with trauma to the extremity such as long bone fractures, severe burns, crush injuries, ischemia/reperfusion injuries and infections [6]. The patient...
The patient experiences sudden onset of pain (most occurrence of idiopathic spontaneous compartment syndrome) with fasciotomy. In the absence of any obvious etiology, this presents an emergency and requires prompt treatment. The diagnosis can be made by using the Stryker needle unit. A review of the literature found 43 cases of DMI which, with its idiopathic nature solely related to diabetic patients [3, 8-10].

During cellular death, the basement membrane is disrupted and fluid enter freely into the cell and leads to edema and swelling of the tissues. The swelling and increase in the size of the muscle decreases the potential space where the muscles are housed, diminishing the flow of blood. This in turn propagates muscular ischemia and infarction [11]. The process is additively compounded and is postulated as causative factor in the cases where compartment syndrome eventually develops.

The diagnosis of compartment syndrome requires a high index of suspicion and use of adjunct modalities for the prompt treatment of the patient. The “6 P’s”, pain, pallor, parasthesia, pulselessness, paralysis and poikilothermia may be found upon presentation of the patient. The parasthesias and pain, which are out of proportion to the clinical findings, can direct the clinician towards the specific diagnosis. A definitive diagnosis can be made by using the Stryker needle unit. The needle is inserted directly into the compartment in question, and a pressure higher than 30 mmHg represents an emergency and requires prompt treatment with fasciotomy. In the absence of any obvious etiology in a diabetic patient, one should consider the rare occurrence of idiopathic spontaneous compartment syndrome. This appears to be a rare phenomenon with only three cases reported in the literature [2, 12, 13]. The patient experiences sudden onset of pain (most commonly in the thigh) accompanied by swelling and tenderness of that extremity. This appears to be an isolated event that occurs in patients who have a long-standing history of poorly controlled diabetes mellitus with other complications of the disease such as neuropathy, nephropathy, and retinopathy [7]. Several causes in diabetic patients have been postulated. One theory is that the metabolic disturbances in diabetes lead to accumulation of fluid in muscle tissue. Such a phenomenon in the leg could explain a rise in pressure in a limited fascial compartment, thereby compromising tissue perfusion and leading to tissue infarction. Another theory is that edema is secondary to muscle infarction as a result of microangiopathic occlusive vascular disease [14-16].

The diagnosis is confirmed with the use of the Stryker needle unit; a pressure higher than 30 mmHg requires fasciotomy for release of tension and avoidance of tissue death.

An MRI may be performed on patients presenting with signs and symptoms suggestive of compartment syndrome. Infarcted muscle often has increased water content, which is a consistent finding on MRI [3, 10, 18-20]. However, such abnormal images are nonspecific, as they can indicate edema from a tumor or inflammatory disease, such as neoplasm, muscle infection, and osteomyelitis.

Management of DMI can be conservative, with aggressive treatment of the diabetes, bed rest and adequate pain management with anti-inflammatory drugs [4]. When the patient presents with compartment syndrome the management rests on anticipation and a high index of suspicion, exclusion of other causes of muscle and nerve ischemia, and prompt and adequate fasciotomy, and debridement of all necrotic tissue. A practical understanding of the four muscle compartments in the leg is important in the definitive treatment of this condition. A two incision four compartment fasciotomy may be achieved by using an anterolateral and posteromedial incisions [8]. Following the skin incision, the two compartments on the affected side of the extremity are identified. Then, the raphe between the two compartments is found to ensure that both fascias are incised for their entire length. The medial fasciotomy requires the detachment of the soleus muscle from the tibia for satisfactory exposure of the two compartments with special attention not to injure the tibial neurovascular bundle that lies beneath the soleus muscle. The lateral fasciotomy is performed in the same fashion paying attention not to injure the superficial peroneal nerve.

In this case, a lateral compartment fasciotomy was performed foregoing the medial incision. Based on the present experience, we believe that fasciotomy performed through a single skin incision, is sufficient to decrease the pressure in the compartment affected and reduce the risk of delayed healing and infection that may derive from the two-incision technique.
REFERENCES