

## Case Report

# An unusual presentation of compartment syndrome following deep venous thrombosis

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## ABSTRACT

A young female in her early 30s was admitted in medicine department of our hospital for swelling in left lower limb with decreased urine output. She had history of lower segment caesarean section (LSCS) done for obstructed labour and was bedridden. Venous color Doppler was done which was suggestive of deep vein thrombosis (DVT) in left lower limb. Surgery reference was sent for increased left lower limb swelling. On examination there was compartment syndrome in left lower limb for which urgent fasciotomy was done in emergency setting and patient was transferred under surgery department. Later debridement was done for unhealthy muscles and multiple cycles of VAC were applied when wound was healthy and granulated. In between VAC dressings, hypertonic saline dressings were also done to decrease muscle oedema. Patient was kept on LMWH injection. Patient was discharged on Tab Dabigatran after approximately 1 month of admission with stable vitals and edematous left lower limb. After 4 cycles of VAC application patient was planned for STSG. Debridement and STSG from right thigh to cover raw area along with assistance from plastic surgery department. Patient was vitally stable postoperatively with minimal soakage was done of right thigh donor area. Postoperatively dressing was removed which showed healthy graft uptake with no collection underneath it.

**Keywords:** DVT, Compartment syndrome, Fasciotomy, VAC

## INTRODUCTION

Deep-vein thrombosis (DVT) is a blood clot which forms within the deep veins, usually of the leg but can occur in the arms, mesenteric and cerebral veins.<sup>1</sup> This usually occurs when blood flow decreases or becomes blocked.<sup>2</sup> It is an obstructive disease which hinders venous reflux mechanism and is the third most common cause of death from cardiovascular disease after heart attacks and stroke.<sup>3</sup>

DVT can lead to various complications such as varicose veins, tachycardia, heart failure and more commonly pulmonary embolism Annual incidence of DVT is 80 cases per 100,000 with a prevalence of lower limb DVT of 1 case per 1000 population.<sup>4</sup> The percentage of involvement of particular site depends on the location and is as follows,

distal veins 40%, popliteal 16%, femoral 20%, common femoral 20%, and iliac veins 4%.<sup>5</sup> Main pathophysiological mechanisms involved in DVT are damage to vessel wall, blood flow turbulence and hypercoagulability. DVT leading to compartment syndrome is unusual. Acute compartment syndrome occurs when increased pressure within a compartment bounded by fascial membranes compromises the circulation and function of tissues within that space. The increased pressure compromises the function and with time the viability of the limb is affected. However, the diagnosis can be challenging as symptoms associated with acute compartment syndrome can also be found in other more common conditions.<sup>6</sup> This delay is longer in patients where there is no trauma to the limb. This case highlights about an unusual presentation of compartment syndrome

with swelling as the first presenting feature resulting in fasciotomy as it is only the definitive treatment.<sup>7</sup>

### CASE REPORT

A young female in her early 30s was admitted in medicine department of our hospital for swelling in left lower limb with decreased urine output for 2 days. She had history of LSCS i/v/o obstructed labour and was bedridden. Venous colour doppler was done which was suggestive of DVT in left lower limb. Surgery reference was sent for increased left lower limb swelling.

On examination there was compartment syndrome in left lower limb for which urgent fasciotomy was done in emergency setting and patient was transferred under surgery department. Later debridement was done for unhealthy muscles and multiple cycles of VAC were applied when wound was healthy and granulated. In between VAC dressings, hypertonic saline dressings were also done to decrease muscle oedema. Patient was kept on LMWH injection. Patient was discharged on Tab Dabigatran after approximately 1 month of admission with stable vitals and oedematous left lower limb (Figure 1).



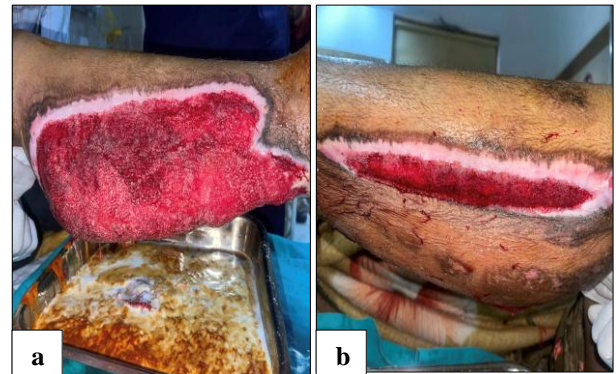
**Figure 1: Left lower limb (pre-VAC application).**

Patient was again admitted after 6 weeks and 3 cycles of VAC dressings were applied. Venous and arterial colour doppler were again done on readmission which showed evidence of subacute DVT in common femoral and superficial vein.

Magnetic resonance imaging (MRI) left lower limb was advised by plastic surgery department to rule out lymphedema. MRI was suggestive of diffuse oedematous changes involving subcutaneous, inter and intramuscular planes from thigh to foot, left gluteal region and left side of lower abdomen (Figures 2 and 3).

After 4 cycles of VAC application patient was planned for STSG. Debridement and STSG from right thigh to cover raw area over left calf and lateral aspect was done after 1 month of admission along with assistance from plastic surgery department. Patient was vitally stable postoperatively with minimal soakage of right thigh donor area for which supradressing was done. On POD4 dressing

was removed which showed healthy graft uptake with no collection underneath it (Figure 4).



**Figure 2: (a) Left lower limb medial aspect (post 1st cycle of VAC application), and (b) left lower limb lateral aspect (post 1st cycle of VAC application).**



**Figure 3: (a) Left lower limb medial aspect (post 4th cycle of VAC application), and (b) left lower limb lateral aspect (post 4th cycle of VAC application).**



**Figure 4: (a) Left lower limb medial aspect (after debridement +STSG), and (b) left lower limb lateral aspect (after debridement +STSG).**

### DISCUSSION

Venous thromboembolism (VTE) which includes both DVT and pulmonary embolism (PE) is associated with significant mortality and morbidity in hospitalized patients and consequently represents a major public health

problem.<sup>8</sup> Patients are at higher risk of VTE following surgery and the risk directly correlates with the duration of the surgery.<sup>9-11</sup> Therefore VTE carries a significant threat to patients. Even after appropriate courses of anticoagulation and recovery from acute VTE events, patients are still at risk of developing complications. More than 20% of patients will suffer with a recurrent VTE attack.<sup>9</sup> Moreover approximately half of those diagnosed with DVT will develop post-thrombotic syndrome and approximately 4% of those with PE will eventually acquire chronic pulmonary hypertension.<sup>12,13</sup> In light of its severe morbidity and mortality risk stratification and prevention is necessary among patients undergoing surgeries.<sup>14</sup> DVT has an estimated incidence of 67 per 100 000 per year in the general population.<sup>15</sup>

In recent years, patients with DVT have increased more than any other medical illness because of ageing population, improved diagnostic ability, increased surveillance and a higher prevalence of comorbidities such as obesity, surgery, cancer and chemotherapy.<sup>16-18</sup> In the past, it was considered that if there had been immobilization and an added risk factor such as the above-mentioned conditions, it was sufficient to make the diagnosis and start anticoagulation. DVT as a single pathological entity usually do not cause compartment syndrome except in cases of extensive thrombosis such as phlegmasia cerulea dolens in which venous return is via collateral vessels only and phlegmasia alba dolens in which there is total venous return occlusion.<sup>19</sup> The treatment of DVT with IVC filter has been linked with compartment syndrome.<sup>20</sup> Differentiating among DVT and haematoma as a cause of swelling and limb pain is crucial as anticoagulation will accelerate bleeding thereby increasing intra-compartmental pressures.<sup>21</sup> ACS is a surgical emergency and delay in diagnosis and treatment has been associated with higher morbidity and mortality.<sup>22</sup> This is true for atraumatic cases in which making a diagnosis of ACS is much more difficult.<sup>23,24</sup> Common causes of atraumatic compartment syndromes include prolonged immobilization during surgery, hypothyroidism, long-standing uncontrolled diabetes, insect and snake envenomation, use of anticoagulant therapy, occlusive acute deep vein thrombosis, and repetitive chronic trauma.<sup>25-33</sup> Our patient had no history of trauma leading to a delay in diagnosis.

Acute compartment syndrome as a result of venous thrombosis is uncommon. Generally massive iliofemoral proximal venous thrombosis or phlegmasia cerulea dolens causes elevated compartment pressures which leads to acute compartment syndrome. Distal popliteal vein occlusion rarely causes compartment syndrome and when it occurs it is secondary to total or near total occlusion of venous outflow.<sup>34</sup> Rhabdomyolysis is a rare cause of compartment syndrome. Typically, it involves multiple extremities. Usually there is an identifiable precipitant for rhabdomyolysis such as strenuous exercise in a patient with sickle cell trait, intravenous heroin injection, army fitness test or influenza A-induced.<sup>35</sup> Presence of severe

pain which is not responding to opioids, tense leg compartment, pain that worsens on dorsiflexion, preceding trauma suggestive of a musculoskeletal injury, absence of skin changes should bring ACS as the most definitive diagnosis.

The Caprini risk score (CRS) is a well-validated and practical VTE risk assessment tool that has been implicated to reduce rates of postoperative VTE.<sup>36</sup> The adoption of CRS and related prophylaxis protocols had led to significant reduction in the incidence of postoperative VTE. Commonly, the treatment was given anywhere from 3 months to 6 months. However, it has become more complex since identifying conditions promoting hypercoagulability, such as factor V Leiden and prothrombin gene mutations, homocysteinemia, antiphospholipid syndrome, and congenital deficiency of factor S, factor C and antithrombin 3, as well as some of rare conditions such as plasminogen inhibitors. If these situations are present in a recessive fashion, a second risk factor is necessary to promote thrombogenesis.

Focus is mainly on the prevention of DVT. Clinicians along with nurses and pharmacists play an important role in educating patients about DVT prophylaxis. Nurses should educate patients on the importance of ambulation, taking prescribed anticoagulation medications and complying with compression stockings. In both the operating room and post-surgery, DVT prophylaxis is important. Each hospital has guidelines on DVT prophylaxis and treatment and healthcare workers should follow them.<sup>37</sup>

Due to the increased risk of thromboembolism, patients with malignancy would benefit from thromboprophylaxis. National Comprehensive Cancer Network (NCCN) guidelines recommend low molecular weight heparin or anticoagulation with unfractionated heparin in hospitalized cancer patients as thromboprophylaxis. Mechanical prophylaxis to be used instead of anticoagulation therapy in patients with active bleeding, evidence of hemorrhagic coagulopathy or thrombocytopenia (platelet count below 50,000/MCL). Contraindications to mechanical prophylaxis include severe arterial insufficiency and acute deep venous thrombosis.

Imaging modalities available to evaluate for DVT include diagnostic ultrasound, vascular studies, CT venograms, and point-of-care ultrasound (POCUS). Contrast venography is usually considered as the gold standard for DVT diagnosis, however point-of-care compression ultrasound is currently regarded as first-line imaging tool in the emergency department as it is more safe, cost-effective, and non-invasive.<sup>38-39</sup>

Other treatment options like thrombolysis can also be used. Tissue plasminogen activator (TPA) is a thrombolytic drug but they lead to excessive bleeding. As a result, these thrombolytic drugs are only administered in emergency

situations. Inferior vena cava filters and mechanical thrombectomy are other modalities which are used.

The risk of pregnancy-related VTE increases due to prothrombotic state in pregnancy, blood flow stagnation, and vascular traumas during delivery, particularly with assistive devices and cesarean section.

## CONCLUSION

The prevention of VTE in peripartum patients with the risk factors should be treated with anticoagulation therapy and it is an important standard treatment for DVT. This prevents new clot formation and reduces the risk of recurrent venous thromboembolism.

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