INTRODUCTION

More than 600,000 cases of venous thromboembolism are estimated to occur each year in United States. Pulmonary embolism complicates about 50% of cases of untreated proximal deep vein thrombosis (DVT) and contributes to 10-15% of hospital deaths. Less frequent manifestation of venous thrombosis include phlegmasia alba dolens, phlegmasia cerulean dolens and venous gangrene. These form a clinical spectrum of the same disorder and result from acute massive thrombosis and obstruction of venous drainage of the extremity. In phlegmasia alba dolens, the thrombosis only involves major deep venous channels of the extremity. In phlegmasia cerulean dolens, it extends to collateral veins, resulting in massive fluid sequestration and more significant edema. Without established gangrene, these changes are reversible, if proper measures are taken. In phlegmasia alba dolens cases, 40-60% also have capillary involvement, which results in irreversable venous gangrene involving the skin, subcutaneous tissue, and/or muscle.

CASE REPORT

A 45 years female presented with pain in right lower limb along with swelling, for the last five days. Pain and swelling gradually progressed. She was shown to a private practitioner, who diagnosed her as a case of DVT and put her on low molecular weight heparin (LMWH) and on oral anti coagulants, without much relief to the patient. For the last three days, she ed having bluish discoloration of the same limb, starting from distal part and gradually involved almost whole of the lower limb. For the last two days, she started having blister formation in the limb and was referred to our hospital. There was no history of trauma. There was no history of fever, cough, dyspnoea. There was no loss of weight or loss of appetite.

When we examined the patient, she was unable to walk, had marked swelling of whole of right lower limb, with areas of gangrenous patches involving around 70% of the limb, with areas of blister formation (Fig. 1). All peripheral pulses were well palpable. Due to marked swelling and gangrenous areas, it was not possible to subject her for Doppler examination and so she was subjected to venous angiography. Her venography was done from left femoral vein puncture, by retrograde approach. Due to large thrombus, guide wire could not be negotiated beyond right external iliac vein. There was total occlusion beyond external iliac vein on right side, duo to thrombus. In left common iliac vein, there was non occluding thrombus.

Investigations

HB - 11gm/dl; TLC - 10880/cubic milliliter; Lipids : Total cholesterol - 110mg/dl, Triglycerides - 112 mg/dl, HDL - 36 mg/dl, LDL - 50 mg/dl; Homocystine - 6.27 µmol/L (normal < 15 µmol/L); Lipoprotein (a) - 48.6 mg/dl (normal < 30 mg/dl); Serum fibrinogen - 130 mg/dl (normal 200-400 mg/dl); INR - 1.4 (on admission); Cardiolipin antibodies : IgG - 3.7 GPL/ml (abnormal>23), IgM - 2.1 GPL/L (abnormal > 11); Protein C - 0% (normal 70-130%); Protein S - 10% (normal 65-130%); Platelet count - 2.2 lac/mm³; X-ray chest - normal; Ultrasound of abdominal organs - normal; Echocardiography - normal.

Patient was kept in steep leg elevated position, given intravenous fluids and was given streptokinase infusion, 2.5 lac units over half an hour and then one lac units/hour for 24 hours. Then she was put on LMWH for five days and also on oral anti coagulants, monitoring INR, which was maintained between 2-3. She was also put on antibiotics.

Patient started improving with decrease in swelling of the limb. She slowly had desquamation of skin. Patient was shifted to surgical ward, where debridgement of skin was done. Patient went into septicemia, which was successfully managed with antibiotics. Finally, when healthy wound was obtained(Fig. 2), she was subjected to skin grafting. She is

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Abstract

Venous gangrene is a rare condition. We report a case of venous gangrene, treated successfully with thrombolytic therapy and subsequently by skin grafting.
on regular follow up with INR being maintained between 2-3 and skin graft is well taken up (Fig. 3).

**DISCUSSION**

Venous gangrene is characterized by progression of DVT to limb necrosis, despite palpable or Doppler identifiable peripheral pulses. Although this disorder can occur in patients with metastatic cancer,\(^1,2\) or heparin induced thrombocytopenia, the pathogenesis is obscure.\(^3,4\)

Phlegmasia alba dolens, phlegmasia cerulean dolens and venous gangrene occur at any age but are more common during 5th and 6th decade of life. Incidence is higher in males. Malignancy is most common triggering factor and is present in about 20-40% of patients with phlegmasia cerulean dolens. Other associated risk factors include hyper-coagulable states, surgery, trauma, ulcerative colitis, gastroenteritis, heart failure, vena caval filter insertion, May Thumer syndrome (compression of left iliac vein by right iliac artery) and pregnancy.

Patients with phlegmasia cerulean dolens present with clinical triad of edema, agonizing pain and cyanosis. Massive fluid sequestration can lead to bleb and bullae formation.

Venous gangrene complicating heparin induced thrombocytopenia may be associated with oral anticoagulant therapy including warfarin.\(^3,4\) Coagulation factors studies in these patients during warfarin use show persistence of thrombin generation despite warfarin therapy, but severe depletion in protein C, which is vitamin K dependent natural anticoagulant.

Warkenter TE also found that during warfarin therapy in cancer associated DVT, venous gangrene developed when INR reached 6, and at this level, protein C was severely reduced but thrombin anti thrombin complexes remained markedly elevated. They concluded that high INR was a surrogate marker of severely reduced protein C.\(^5\) Fig. 4 shows the mechanism of warfarin associated venous limb gangrene complicating heparin induced thrombocytopenia.

Conservative management of phlegmasia and venous gangrene include steep leg elevation, anticoagulation, fluid resuscitation. If heparin induced thrombocytopenia occurs, discontinue heparin and replace it with alternative anticoagulant. Surgical thrombectomy performed through...
a femoral venotomy always allows instant decompression of venous hypertension, but regardless of thrombectomy, in patients with phlegmasia cerulean dolens, it is associated with high rate of rethrombosis. Also, it can not open the small venules that are affected in venous gangrene. For this reason, thrombolysis seems to be an attractive alternative in management of venous gangrene. In 1970, Pacquet et al. was first to use thrombolysis for treatment of phlegmasia cerulean dolens. Fasciotomy alone, or in conjunction with thrombectomy or thrombolysis, reduces compartment pressures. Finally, if all effort fail and amputation is required, delay the procedure as long as possible. Take all precautions to reduce edema, allow venous channels to reanalyze, and allow necrotic tissue to demarcate.

Despite all therapeutic modalities, phlegmasia cerulean dolens and venous gangrene remain life threatening and limb threatening conditions with overall mortality of 20-40% and amputation rate of 12-50%. The postphlebitic sequelae are apparent in 60-94% of survivors.

Our patient did not have any predisposing cause for DVT. She did not have any manifest malignancy on clinical examination, X-ray of chest and ultrasonography of abdomen. She developed venous gangrene after starting LMWH and warfarin, but did not have evidence of thrombocytopenia, and INR was not raised. This suggests that it was not due to heparin induced thrombocytopenia or warfarin induced. She continued to receive warfarin and still improved, with INR being maintained between 2-3. So it could be idiopathic form of venous gangrene, unrelated to malignancy and drug use. She was treated with thrombolysis and finally given skin grafting.

REFERENCES