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## Triangle of symmetrical peripheral gangrene: Diabetes, infection and vasopressor

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### Abstract

Symmetrical peripheral gangrene (SPG) is a rare disorder leading to ischemic necrosis of extremities. We present a rare case of idiopathic SPG in a 67-year-old male who admitted for left upper limb necrotizing fasciitis. Diabetes patient can reveal their manifestation in variety of complications. SPG can result from a variety of conditions that cause disseminated intravascular coagulation and lead to distal hypoperfusion. The treatment is aimed at the control of the underlying disease and wound management.

**Keywords:** SPG: Symmetrical peripheral gangrene, DIC: Disseminated intravascular coagulation, ANA: Anti-nuclear antibody

### Introduction

Symmetrical peripheral gangrene (SPG) is characterized by symmetric, distal limb ischemia not associated with any specific vaso-occlusive disorder<sup>[1]</sup>. It classically occurs bilaterally and in the absence of an established thrombotic disease. Disseminated intravascular coagulation (DIC) is central to the pathogenesis of SPG, with certain hypercoagulable states presumed to play a role in disease initiation<sup>[2, 3]</sup>. This knowledge is important as the management of SPG is aimed at reversal of DIC and the causative phenomenon. This can be achieved medically; however, surgical intervention is frequently required. Although treatable if detected early, SPG has high morbidity and mortality, mainly because of its association with serious conditions and the rapid spread of gangrene to proximal areas.

### Case Presentation

A 67-year-old, male presented with septic shock and disseminated intravascular coagulation (DIC) secondary to necrotizing fasciitis (Fig 1) over left upper limb was admitted to the intensive care unit. This was a past history of psoriasis which was treated with prednisolone 5 mg daily for 1 year and 6 months. The blood pressure was 70/40 mmHg, The patient was treated with antibiotics, recombinant thrombomodulin, continuous hemofiltration/ and NIV support.

### On admission

Hemogram showed Total count of 24,000 platelet 1.75 lakh, creatine of 3.2 mg/dl, CRP 72, Procalcitonin > 200, ABG showed, metabolic acidosis with a pH of 7.3 Hco<sub>3</sub> 10 co<sub>2</sub> 19.9 lactate 7.20. HbA<sub>1c</sub> was 7.1 and random blood sugar was less than 120 mg/dl Blood and urine culture showed no growth. However, tissue culture of the left upper limb reported significant growth of E-Coli. The laboratory tests of the patients are shown in Table 1.

Other investigations Venous, Arterial Doppler, CT angiogram of right upper limb, color Doppler and bilateral lower limb arterial and venous Doppler study were normal. ANA weakly positive cytoplasmic speckled. (1:100), suspected secondary to infection.

The patient was treated with empirical antibiotics Colistin, targocid and Meropenem, and fluconazole. Other supportive measures given included vasoactive agents, norepinephrine, and dopamine for nearly 90 hours. Three days after admission, all digits in the four extremities exhibited progressive pallor. On the third day, the patient underwent debridement of the left upper limb, (Fig2).

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Vacuum dressing (Fig 3) was done for 10 days. Administration of norepinephrine was discontinued, over the next 3 days and, peripheral gangrene developed (Fig 4). The patient's glucose levels were monitored regularly and kept under good control.

The patient became hemodynamically stable after twelve days. However, the right upper limb distal digit upto DIP was gangrened over, and both lower limbs were discolored, although spared from gangrene due to early intervention. We suspected the gangrene was secondary to vasoactive agents. With continued supportive treatments, the patient recovered quickly without additional spread of gangrene. The patient underwent amputation of the affected digits and the left upper limb healed with vacuum dressing. Patient underwent skin grafting for the left upper limb (Fig 5) over the lesion of necrotizing fasciitis, and amputation upto DIP joint for right upper limb.



**Fig 3:** Vacuum dressing of the left upper limb



**Fig 1:** Necrotizing Fasciitis of left upper limb



**Fig 4:** Gangrene of the right hand



**Fig 2:** Post vacuum dressing



**Fig 5:** Discoloration of lower limb



**Fig 6:** Post skin grafting of left upper limb

### Discussion

SPG is an infrequently reported entity characterized by microvascular ischemia and dry gangrene of the extremities (limbs, ears, and nose) [1]. Not only does this lead to life-altering repercussions even after treatment but also carries a high rate of mortality. In most cases, it is a result of DIC causing thrombotic occlusion of capillaries and downstream hypo perfusion. The etiology is diverse and includes sepsis, heart failure, shock, malignancies, hypercoagulable conditions (commonly protein C and S deficiency), myeloproliferative neoplasms which lead to hyper viscosity of the blood, various autoimmune conditions including systemic lupus erythematosus, antiphospholipid antibody syndrome, and cryoglobulinemia [4, 5]. Reports in literature have also associated this entity with infections such as malaria, dengue, and meningococemia [3, 6, 7]. Other causes include sickle cell anemia, cold agglutinin disease, and inotrope use. Idiopathic SPG has also been reported [1].

There is no abnormality in the large blood vessels, and the condition needs to be differentiated from other causes of gangrene such as peripheral vascular disease, thromboangitis obliterans, embolic phenomena, and Raynaud's phenomenon. The management is specific to the cause and treatment modalities, depending on the etiology, including anticoagulation, antibiotics, immunosuppression, hemodynamic optimization, and withdrawal of the inotropes if possible [1, 8]. Anecdotes are available to support the use of hyperbaric oxygen, trimethaphan for sympathetic ganglion block, topical nitroglycerine, and intravenous epoprostenol, phentolamine, and nitroprusside [1, 9]. These therapies require more evidence before they can be a part of the standard treatment. Plasmapheresis and thrombolysis have not been found to be effective. Surgical management of the affected areas is often required in the form of debridement or amputation if the affected areas cannot be salvaged [8]. The cause and treatment in idiopathic SPG, as in the case presented, remain obscure, and the selective involvement of nose and fingers with auto amputation is captivating.

Intravenous fluid and appropriate parenteral antibiotics should be started early [10, 11]. Vasopressor agents, commonly used in the management of sepsis-induced hypotension, may aggravate this condition [12]. The treatment

priority is usually the underlying condition and detecting DIC; therefore, SPG is typically not treated immediately, instead early control of sepsis and timely recognition of DIC is essential as in our patients. Identification and treatment of the underlying cause is the most important part of the treatment.

### Conclusions

SPG can occur as an idiopathic phenomenon. The management and both the short- and long-term outcomes in such a case remain undefined. Efforts should be made to not miss any underlying disease process such as malignancy, thrombophilia, infection, and autoimmune disease. The intriguing case presented here was brought to notice a year after the event and was characterized by a very rapid clinical course with no apparent lasting effects on health, albeit resulting in functional limitation and disfigurement.

### Lessons to be learnt

SPG can occur as secondary to vasopressor or sepsis, or diabetes can be life threatening. Hence the treating doctor needs to be extra vigilant while treating such patients. Although treatable if detected early, SPG has high morbidity and mortality, mainly because of its association with serious conditions and the rapid spread of gangrene to proximal areas while Vasopressors are lifesaving agents, they can also cause morbidity and mortality and hence good high degree supervision must be there.

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### Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association. Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data. Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

### Conflicts of interest

The authors have no conflicts of interest to declare.

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