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Olgu Sunumu

Symmetrical Peripheral Gangrene: A Case Study

Faruk ÇİÇEKCİ*, Çiğdem SİZER*, Şule ARICAN*

SUMMARY

Symmetrical peripheral gangrene (SPG) is defined as ischemia of two or more than two extremities without the existence of a major vein occlusion. A 78-year-old female patient was admitted to the intensive care unit because of hypertension, chronic obstructive lung disease, congestive heart disease, and cerebrovascular attack. The patient stayed hypotensive in spite of high-dose vasopressor treatment. After the development of sepsis and DIC, fast-developing gangrenous necrosis was observed which was most apparent in the right foot and in the 1st, 2nd, and 3rd distal digits of the right hand. Infusion of noradrenaline and other vasopressor agents was gradually tapered and stopped. Intensive fluid replacement with dekstrane 40.000 and pentoxifylline was administered for SPG treatment. Cyanotic appearance of the foot disappeared, but dry gangrenous forms in the right hand became permanent. The patient died due to multiple organ failure on the 18th day of her intensive care stay.

Key words: *symmetrical peripheral gangrene, severe sepsis, noradrenaline infusion, disseminated intravascular coagulation*

ÖZET

Simetrik Periferik Kangren: Olgu Sunumu

Simetrik periferik kangren (SPK), büyük ven tıkanıklığı olmaksızın iki ya da daha fazla ekstremite iskemisi olarak tarif edilmektedir. Yetmiş sekiz yaşında kadın hasta, hipertansiyon, kronik obstrüktif akciğer hastalığı, konjestif kalp hastalığı ve serebrovasküler atak nedeni ile yoğun bakımda yatırıldı. Hasta yüksek doz vazopresör tedavisine rağmen hipotansif seyretti. Sepsis ve DIC tablosu geliştikten sonra sağ ayakta daha belirgin, sağ el 1., 2. ve 3. distal digitallerinde hızlı gelişen gangrenöz nekroz görüldü. Noradrenalin ve diğer vazopresör ajanların infüzyonu azaltılarak kesildi. SPG tablosu tedavisi için yoğun sıvı replasmanı, dekstran 40.000 ve pentoksifilin uygulandı. Ayaktaki siyatonik görünüm kayboldu, ancak sağ elde kuru gangrenöz yapılar kalıcı hâle geldi. Hasta yoğun bakımın 18. günü multiple organ yetmezliğinden öldü.

Anahtar kelimeler: *simetrik periferik gangren, ağır sepsis, noradrenalin infüzyonu, yaygın damariçi kuagulasyon*

INTRODUCTION

Symmetrical peripheral gangrene (SPG) is defined as systemic ischemia observed in at least two regions -such as a genital organ, the ear, the nose tip, or a distal extremity- without major vein occlusion [1,2]. In the literature possible etiological factors are listed as obstructive intracardiac lesions [3], sepsis [4], vasospastic states [5,6], minor vein occlusions [7], protein C deficiency [8], vasopressor agent use [9,10], low cardiac output [11,12], disseminated intravascular coagulation (DIC) [13,14], factor-V Leiden mutation [15], parenteral abuse of sublingually administered buprenorphine [16], Raynaud disease, protein C deficiency, sickle cell anaemia, and paraneoplastic syndromes [17]. The cause of iatrogenic SPG was found to be systemic vasopressor infusions with or without sepsis.

In this study, we aim to discuss the clinical profile, aetiological factors and outcome of a case of SPG with persistently low blood pressures, and superadded component of DIC who required high doses of vasopressors.

CASE

A 78-year-old female patient was admitted to the intensive care unit because of cerebrovascular attack in addition to hypertension, chronic obstructive lung disease, and congestive heart disease. The

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* Konya Numune Hastanesi, Anesteziyoloji ve Reanimasyon Kliniği
Yazışma adresi: Uzm. Dr. Faruk Çiçekci, Hanaybaşı Mah. Alemdar Cad. 24/10 42100 Konya
e-mail: farukcicekci@yahoo.com

patient's vital signs were as follows: blood pressure: 64/47 mmHg, peak heart rate: 145/min., and body temperature: 38.8°C. The patient's laboratory values were as follows: WBC:18.3 x$10^3\mu$/L, Hb:10.9 g/dL, Hct:32.6%, plt:34.200/mm^3, urea: 88 mg/dL, serum creatinine: 1.46 mg/dL, PT:29 sec, aPTT:45 sec, INR:2.1, D-dimer: 895 ng/mL, fibrinogen: 75 mg/dL, arterial pH: 7.27; partial pressure of oxygen in arterial blood (PaO_2): 51 mmHg, fraction of inspired oxygen (FiO_2): 68%; partial pressure of carbon dioxide in arterial blood ($PaCO_2$): 68.4 mmHg, bicarbonate (HCO3-): 18.9 mmol/L, lactate: 8.1 mmol/L, and arterial oxygen saturation (SaO_2): 75%. On the 3rd day of intensive care stay, Staphylococcus haemolyticus was grown in the blood culture. The patient was assessed as in septic state. Vancomycine plus clindamycin were started for the treatment of sepsis. The patient underwent endotracheal intubation and was started on ventilator treatment. Since development of DIC symptoms was presumed, fresh frozen plasma was added to anticoagulation treatment. Persistence of arterial hypotension despite infusion of isotonic crystalloid fluids, central venous pressure (CVP) increased only to 12 mmHg. Thus, treatment began with noradrenaline (0.8 μg kg^{-1}/min) and dobutamine (5 μg/kg/min) infusions to achieve mean arterial pressure (MAP) equal to or higher than 65 mmHg. But MAP remained persistently low, despite fluid resuscitation and high doses of vasopressor infusions to maintain normotension. On the 5th day of intensive care stay, the first signs of cyanosis were observed in the extremities during the routine physical examination. Meanwhile noradrenaline infusion dose was increased to 4 μg kg^{-1}/min, and the dopamine infusion dose to 40 μg kg^{-1}/min. On the 6th day, fast-developing gangrenous necrosis was observed in the tarsal and metatarsal regions of the right foot which was more apparent in the distal phalanxes of the 1st, 2nd, and 3rd fingers of the right hand (Figures 1, and 2). Peripheral pulse could not be taken, and a pulse oximeter measurement could not be performed. The extremities were checked with Doppler US, but no occlusion was observed. Infusion of noradrenaline and other vasopressor agents was gradually decreased and stopped. Intensive fluid replacement consisting of dekstrane 40.000 (40 ml/hour) infusion and pentoxifylline at a dose of 100 mg 2x1 were administered for SPG treatment. At the end of the 8th day, cyanotic appearance in the foot disappeared, but the demarcation line became permanent in the dry gangrenous forms in the 1st, 2nd, and 3rd distal phalanxes of the right hand. Consultation from the plastic surgery for these gangrenous lesions suggested only antibiotics and medical dressing. The patient died due to multiple organ failure on the 18th day of her intensive care stay.

DISCUSSION

Symmetrical peripheral gangrene is defined as multiple extremity ischemia in two or more regions without the existence of major vein occlusion [7,18]. The exact pathophysiological mechanism of the vascular occlusion in SPG is not apparent. However, possibly, disseminated intravascular coagulation (DIC) together with low blood pressure results in occlusion of microcirculation in the affected regions. Thus, it is thought that the combination of thrombosis and vasospasm results in SPG. These findings are also supported by studies showing the existence of small blood vessel wall occlusions in the case of disrupted blood flow and the fall of intravenous pressure below

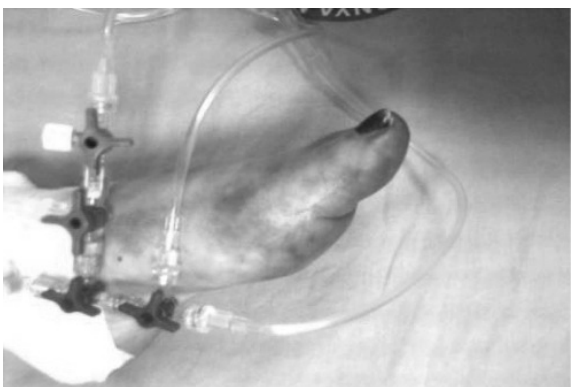

Figure 1.

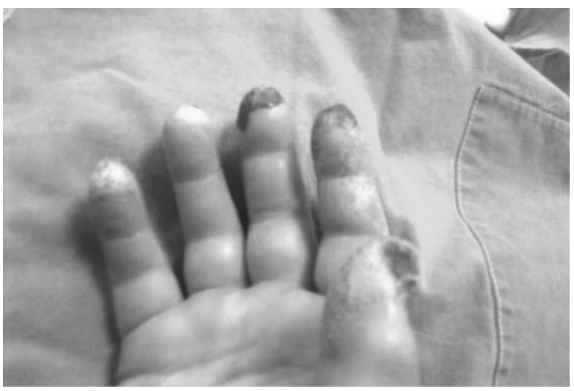

Figure 2.

critical values, despite the perfusion pressure of the digital arteries remain between 35 and 60 mmHg [19-21].

Diabetes mellitus, cold trauma, renal failure, and aggressive vasopressin use increase mortality risk by 40% in SPG cases [4].

In the initial stages of SPG, pallor, coldness, reddening, and cyanosis occur in the affected extremity. If the suitable treatment is not given at this stage, tubercles and bullae that cause the formation of gangrene in the fingers may occur, and eventually erythema secondary to abrasions in the skin may develop [4]. Major veins are not affected, and the pulsations can still be detected. Occlusions can be seen in the microcirculation of the regions that are affected by low blood pressure [5,7]. Vasopressor use for severe hypotension treatment before ideal fluid treatment may exacerbate this condition because it results in weaker microcirculation [9,10]. In fact, pathological examination of amputed samples showed that minor veins had extensive thrombus, whereas major veins did not have any thrombus [4].

It was concluded that the patient in this case report had septic shock (Staphylococcus. haemolyticus) and suffered from persistent low blood pressure, which required high dose vasopressor treatment. The patient also suffered from DIC and microcirculation leading to SPG and peripheral hypoperfusion, which resulted in multiple organ failure, which implicated coagulation disorders. In our case, though aggresive fluid resuscitation and high doses of noradrenalin, arteriel blood pressure remained at excessively low levels.

Peripheral shock causes low venous pressure, and necessitates an aggressive treatment. If low perfusion pressure lasts longer, it may cause peripheral ischemia. Distinctive diagnosis and early treatment of SPG are important issues in terms of mortality and morbidity. The first step in the treatment is that if the peripheral perfusion is too low, aggressive fluid replacement should be performed, and vasopressor treatment should be terminated if possible. Anticoagulation and antibiotherapy are other possible treatment methods for DIC. Furthermore, although various treatment modalities have been cited in the literature such as sympathetic blockage, IV vasodilators [22], acetyl salicylic acid [23], alpha-blockers, and phosphodiesterase inhibitor treatments that are applied locally in cases of digital ischemia, these treatment methods generally have not yieldedsatisfactory results [24]. Minor debridement and secondary skin grafting are generally not successful, and amputation is required when demarcation lines occur.

In conclusion, alertness and early intervention are necessary for early diagnosis of SPG. Close monitoring of coagulation parameters and fast correction of irregularities are necessary. When the patient needs inotropic agents and vasopressors, treatment with appropriate fluid replacement (in accordance with the sepsis guide). can be performed. Vasopressors should be stopped as soon as possible, and experienced staff should be employed in arterial cannulation to avoid multiple artery punctures.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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