

# The Overwhelming Postsplenectomy Sepsis: Role of Plastic Surgeon

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**Summary:** The overwhelming post-splenectomy infection (OPSI) is a feared late complication of splenectomy, with high morbidity and a mortality rate of up to 50%. Although the management of this syndrome is the duty of clinical physicians, the interest of plastic surgeons in OPSI is related to the injury that can occur in tissues with an end circulation, such as the limb extremities, nasal tip, and lips. In the management of OPSI, surgical techniques are not highlighted. The role of the plastic surgeon can be fundamental for the prevention of further extension of the necrotic tissue, improving as much as possible the vascularization around it. Moreover, a critical role in the management of OPSI is avoiding superinfection of the necrotic areas by combining different techniques and methods, such as surgical debridements, negative pressure wound therapy, and conservative treatment. Last but not least, functional and aesthetic restoration of the injured parts is of paramount importance for the final outcome. In this article, we describe the management of two unvaccinated patients with necrosis of the extremities after OPSI. (*Plast Reconstr Surg Glob Open* 2023; 11:e5109; doi: [10.1097/GOX.00000000000005109](https://doi.org/10.1097/GOX.00000000000005109); Published online 17 July 2023.)

The overwhelming post-splenectomy infection (OPSI) or postsplenectomy sepsis syndrome is a feared late complication of splenectomy, with high morbidity and mortality rates. It can start as a nonspecific, flu-like prodrome and may rapidly worsen to fulminant septic shock within 24–48 hours of the onset.<sup>1</sup> The prevalence of OPSI in postsplenectomy patients is 0.1%–0.5%, with a mortality rate of up to 50%.<sup>2</sup> The most frequent cause of OPSI is pneumococcal infection; other common bacteria are *Neisseria* and *Haemophilus influenzae* type-B.<sup>3,4</sup> Although OPSI frequently has a fulminant course, rare, less-severe clinical cases have been described in which gangrene had time to develop in the extremities.<sup>2,5</sup>

The interest of plastic surgeons in OPSI is related to the injury that can occur in tissues with an end circulation, such as limb extremities, nasal tip, and lips. In 1990, Fogarty et al described a splenectomized patient with bilateral gangrene of all fingers and toes, with necrosis of the nose tip and upper lip caused by pneumococcal septicemia.<sup>5</sup> Amputation of necrotic

extremities was needed in this case.<sup>5</sup> In this article, we describe our management of two patients with necrosis of the extremities after overwhelming postsplenectomy sepsis.

## CASE 1

A nonsmoking 49-year-old man with hypertension and hyperuricemia presented to our hospital with a 5-day history of fever, diarrhea, and shortness of breath. Eight years before, he underwent splenectomy due to autoimmune thrombocytopenia and has never been vaccinated. The patient required immediate hospitalization for sepsis. Blood culture showed pneumococcal septicemia. He presented generalized purpuric rash, with both hands, ears, and feet cold and cyanosed, requiring plastic surgery referral. Diagnosis of disseminated intravascular coagulation was made. In the following days, he developed gangrene of all fingers and toes as well as skin necrosis of the tip of the nose (Fig. 1A, B). Hyperbaric therapy was performed to improve vascular impairment and tissue viability. One month later, the patient underwent surgical debridement and transmetacarpal amputation of the right fourth and fifth metacarpus and transphalangeal amputation (P1) of the right thumb, index, and middle

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**Fig. 1.** An unvaccinated 49-year-old man with a history of splenectomy due to autoimmune thrombocytopenia presented with pneumococcal septicemia. A diagnosis of disseminated intravascular coagulation was determined and he developed full-thickness necrosis involving the cartilage and lateral planes with partial loss of the narinal edge (A) and gangrene of all fingers and toes (B). He underwent hyperbaric therapy followed by right hand transmetacarpal amputation on the fourth and fifth metacarpus and transphalangeal amputation on the first, second and third fingers, and left hand a transmetacarpal amputation from the second to the fifth metacarpus and at the level of distal metaphysis of the first metacarpus were performed. Three months later, split-thickness skin grafts were performed for the coverage of the hands and feet. Regarding the nose tip, he underwent debridement of necrotic tissue, and a secondary forehead flap a year and a half later was used for the reconstruction. At 4-years follow-up, no complication occurred with good satisfaction of the patient (C, D).

fingers. Transmetacarpal amputation from the left second to the fifth metacarpus and at the level of distal metaphysis of the left first metacarpus was performed. Regarding the lower limbs, transmetatarsal amputation at the distal diaphysis level from the first to the fifth metatarsal of both feet was carried out. Regarding the nose tip, debridement was done, leaving a full-thickness skin defect involving cartilage and lateral planes with partial loss of narinal edge. Three months later, split-thickness skin grafts were performed for the coverage of hands and feet. The nasal tip

defect was reconstructed with a forehead flap a-year-and-a-half-later due to the patient's choice. During the first-year, two revisional procedures of the nasal tip, fat grafting in forearm scars, and plasty to augment the first web-space of the right hand were performed. After 4-years of follow-up, no complications occurred with good satisfaction of the patient (Fig. 1C, D). The patient is able to perform most of the daily activities, with the exception of using a knife and tying shoes. He is back to driving and working, and he does not use prostheses.

## CASE 2

A healthy, nonsmoking 45-year-old woman with hypertension and thrombocytosis developed necrosis of distal phalanges of the hands and feet bilaterally, as well as necrosis of the bilateral plantar metatarsal and calcaneal areas. Twenty-one years before, she underwent splenectomy for Werlhof disease and had never been vaccinated. Two surgical steps were performed. In the first step, all necrotic skin was removed, and a dermal substitute (DS) was placed at the heel level. Six weeks later, after surgical debridement, retention sutures at the bilateral hand distal phalanges wounds were performed, and DS was placed at the bilateral calcaneal areas. At 3-months follow-up, secondary wound healing was occurring. She was able to use her hands for almost all activities except for fine movements. However, the patient has not returned for control visit, and long-term follow-up was not possible.

## DISCUSSION

Splenectomy results in a high risk of infections throughout the life of the patient, and one of the most feared complications is OPSI, which has high morbidity and mortality rates. Guidelines have been established to decrease the risk of infections in patients after splenectomy, taking into consideration patient education, appropriate immunizations, and antibiotic prophylaxis.<sup>1,3</sup> Lack of vaccination exposed our two patients to a high risk of infection. Due to general unawareness, patients should be well-informed about the increased risk of infection.<sup>6</sup> It is mandatory to vaccinate the splenectomized patient within 14 days for pneumococcus, *Haemophilus influenzae* type-B, and meningococcus, with booster doses for pneumococcus and meningococcus at 2 months and 5 years. In addition, the annual vaccination for seasonal influenza is highly recommended,<sup>7</sup> as it reduces the risk of postsplenectomy-sepsis.<sup>8,9</sup>

Although the management of this syndrome is the duty of clinical physicians, the role of plastic surgeon can be fundamental during and after the acute phase. Plastic surgeons should know the pathological mechanism of OPSI to act in the correct time and manner with adequate result.

In case 1, disseminated intravascular coagulation was responsible for tissue gangrene due to occlusion of the peripheral circulation, especially in the absence of anastomotic vessels. In case 2, the patient presented necrosis of body parts with end circulation similarly, probably due to her history of thrombocytosis. In the first phase, our patients underwent dressings, hyperbaric therapy, and multiple debridements to increase vascularity of the impaired sites and reduce risk of infection.

Soft tissue ischemic complications are the result of low perfusion in septic shock. Different clinical conditions can cause severe sepsis and shock. Hypotension is caused by vasodilatation induced by systemic inflammatory response syndrome to infection and exacerbated by vasopressor requirements. In addition, patients may lose fluids, proteins, and electrolytes from a large surgical wound. Fluid resuscitation is the mainstay of medical support for

patients with advanced sepsis combined with vasoactive amines associated with mechanical ventilation. Moreover, medical management includes nutritional support, intravenous immunoglobulins, and antimicrobial therapy.

The role of plastic surgeons in the treatment of soft tissue complications due to ischemia in infection disease is fundamental for the surgical source control of necrotizing soft tissue impairment. Surgical debridement should be early and aggressive to arrest the progression of inflammatory process. Indeed, radical debridement should be performed until healthy-looking tissue is reached.<sup>10</sup> Postoperative wound-care includes inspection of the debrided wound in less than 24 hours. It is fundamental, in case of extensive necrosis or necrosis not adequately debrided at the first operation, to return the patient to the operating room within 24–48 hours for further debridement until the infection is controlled. Surgeons' experience, skills, and knowledge are critical points for a successful management of these patients.

Dressings and autolytic or enzymatic debridement are essential for adequate wound healing.<sup>11</sup> Hyperbaric therapy,<sup>12–15</sup> as well as negative pressure wound therapy,<sup>16–18</sup> can be considered a supportive treatment. (See **figure, Supplemental Digital Content 1**, which shows an algorithm for the complementary role of surgical debridement and close observation, <http://links.lww.com/PRSGO/C658>.)

After the acute phase, patients often recover with permanent sequelae and cosmetic implications, becoming of primary importance during the post healing period. The plastic surgeon allows for functional and aesthetic restoration of the injured parts using different surgical procedures such as DS,<sup>18</sup> skin grafts, autologous fat graft,<sup>19–21</sup> local flaps,<sup>22</sup> or free flaps.<sup>23,24</sup> In case 1, we used split-thickness skin grafts for coverage of skin defects of hands and feet. Instead, the nasal tip defect needed a delayed reconstruction with a forehead flap. The decision of immediate or delayed reconstruction is based on several aspects, and it is fundamental to assess the patient's psychophysical condition and to consider the patient's aesthetic expectations.<sup>25</sup> The patient in case 2 required the application of DS at the heel level, and wound healing occurred by secondary intention. The patient in case 1 returned to his normal life, regaining his independence due to his special driving license, and returning to work.

## CONCLUSION

Our study focuses attention on one of the clinical conditions that can cause septic shock and OPSI by underlining the fundamental role of plastic surgeons in the surgical debridement of necrotizing soft tissue and subsequent control of surgical wounds.

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**DISCLOSURE**

The authors have no financial interest to declare in relation to the content of this article.

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