

Combination of Hyperbaric Oxygen and Negative Pressure Therapy to Prevent Mortality in Patients with Necrotizing Fasciitis

Melissa D. Weber, APNP; Jeffrey A. Niezgoda, MD, FACEP; Sue Fregien, MD; Kathleen M. Nelson, RN, CWCN; Dawn Walek, RN

Center for Comprehensive Wound Care and Hyperbaric Oxygen Therapy, St. Luke's Medical Center, Aurora Health Care and Hyperbaric and Wound Care Associates, Milwaukee, Wisconsin, USA

Introduction

Patients with necrotizing fasciitis have mortality rates often exceeding 50 percent. Patients with truncal involvement and subsequent multisystem organ failure rarely survive. In most settings, the management of necrotizing fasciitis consists of aggressive surgical debridement and parenteral antibiotic therapy. The Center for Comprehensive Wound Care and Hyperbaric Oxygen Therapy includes adjunctive hyperbaric oxygen therapy and negative pressure therapy in a novel, aggressive and comprehensive approach. In the setting of necrotizing fasciitis, hyperbaric oxygen therapy enhances white blood cell oxidative killing mechanisms, potentiates the effectiveness of antibiotic therapy, and improves survival of marginally viable tissue. Vacuum Assisted Closure (VAC) therapy utilizes sub atmospheric pressure to promote and hasten wound healing by increasing local blood flow, continuously removing wound drainage, and decreasing bacterial load and dead space. All cases of necrotizing fasciitis treated in the past two years were reviewed. Twenty-one patients received our aggressive treatment protocol and all survived. One case of severe truncal necrotizing fasciitis is summarized. Our data suggests that excellent outcomes can be achieved when a multi-faceted, comprehensive approach is utilized in the management of this devastating and often lethal condition.

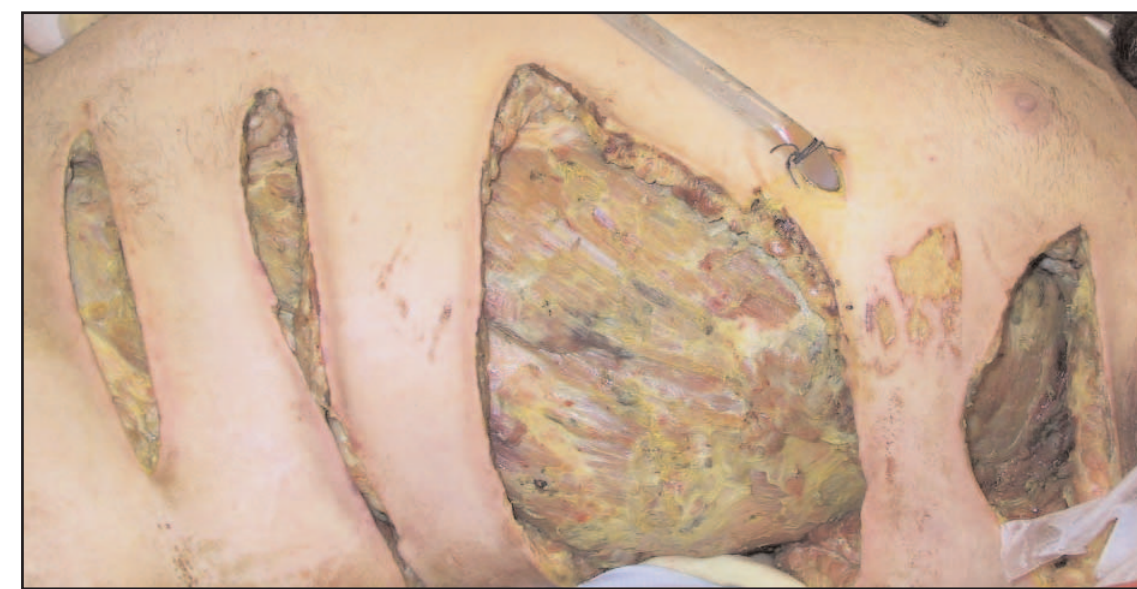
Case Summary

S.P. is a 31-year-old white male with an unremarkable past medical history who developed a fever that lasted 24 hours and spontaneously resolved without treatment. Two days later he developed a sudden onset of left shoulder and upper thoracic pain while lifting a treadmill. He was treated in the emergency department with anti-inflammatory medication without relief. Over the next 48 hours, the pain progressively worsened and he became lethargic. He was again evaluated in the emergency department on 5/31/02 and admitted with sepsis. He was found to have a left empyema which required tube thoracostomy and initiation of parenteral antibiotics. Over the next several hours, he developed hemodynamic instability and rapidly progressive erythema of the left hemithorax. The diagnosis of necrotizing fasciitis was suspected, and the patient was taken to the operating room emergently on 6/1/02. Intraoperatively, necrotic muscle and fascia was found involving the anterior chest, the left upper arm, axilla and shoulder, and extending to the left flank, lower abdomen, scrotum and anterior left thigh. He was evaluated by the Wound Care and Hyperbaric Medicine consult service and adjunctive hyperbaric oxygen therapy was immediately initiated postoperatively. He required multiple surgical debridements over the subsequent days due to progression of the necrotizing process. He underwent twice daily hyperbaric oxygen treatments throughout this period. On 6/9/02, vacuum assisted closure therapy was initiated and hyperbaric oxygen therapy was continued on a daily basis.

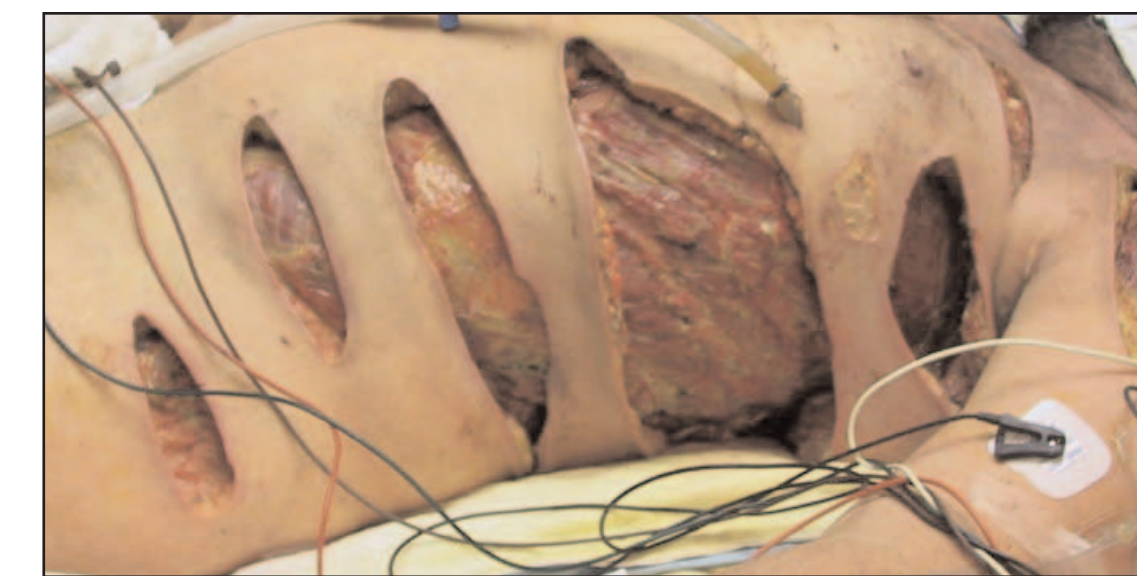
Points of Discussion

- Culture of left chest fluid positive for Group A Beta Hemolytic Strep.
- Patient's daughter had recent strep pharyngitis infection prior to patient's presentation to ER.
- Total of 38 hyperbaric treatments, over 25 days (bid for 13 days).
- Total of 6 surgical debridement procedures.
- 6/27/02 underwent primary closure of right side -

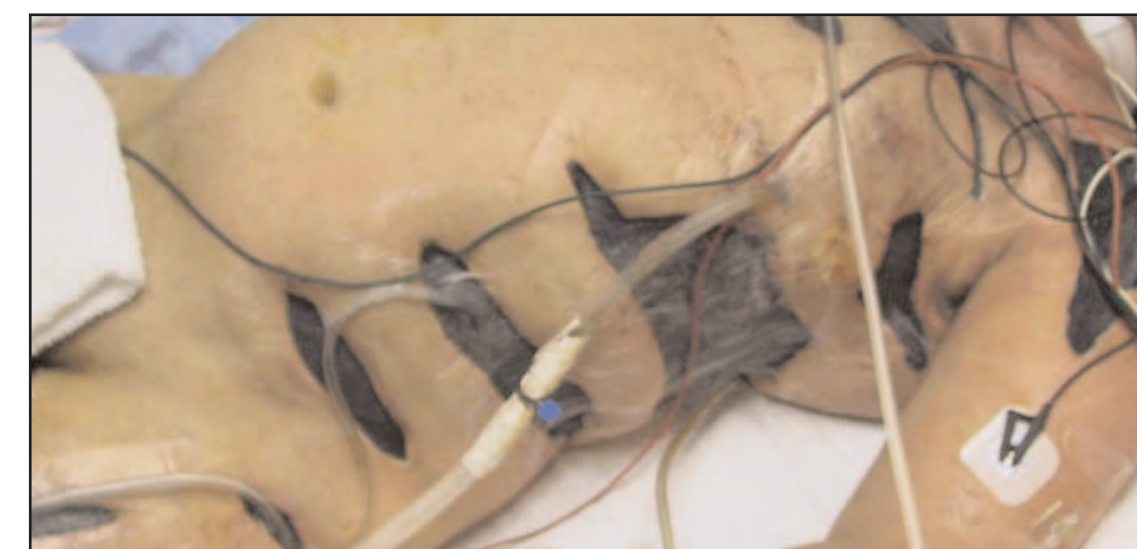
- chest wound, STSG of left anterior shoulder and distal abdominal wounds, cadaveric STSG of left lateral chest wall, and pectoralis muscle flap coverage of left axillary vessels and left chest wall defect.
- 7/8/02 underwent STSG of left flank, left lower abdomen, left hip and left upper abdomen.
- Final surgical procedure on 7/29/02, left axillary wound closed with omental flap and STSG.



6/6/02



6/9/02



6/9/02



6/19/02



7/12/02



4/3/03

Discussion

Necrotizing fasciitis is a rapidly progressive soft tissue infection oftentimes initially manifesting as a benign cellulitis. Patients with necrotizing fasciitis have mortality rates that often exceed 50 percent. In most medical centers, the management of necrotizing fasciitis is limited to surgery and antibiotics. At our facility, our comprehensive treatment protocol combines aggressive surgical debridement and parenteral antibiotics, with adjunctive hyperbaric oxygen and VAC. Our report demonstrates an extreme case of necrotizing fasciitis managed with our protocol, resulting in an excellent outcome. Over the past two years, a review of all cases of necrotizing fasciitis admitted to St. Luke's Medical Center in Milwaukee, WI, was completed. This analysis found 46 patients with a diagnosis of necrotizing fasciitis. Twenty-one of these 46 patients with intraoperatively confirmed necrotizing fasciitis were seen in consultation by the Wound Care and Hyperbaric Medicine service. All 21 of these patients were managed with our comprehensive protocol as described above. Outcome analysis revealed that there were no deaths in the comprehensive protocol group, compared to 4 deaths in the remaining 25 patients (non-referred group), a mortality rate of 16 percent. Our synergistic approach prevented mortality and facilitated preparation of the wounds for surgical closure.

Conclusion

Necrotizing fasciitis is an aggressive and devastating soft tissue infection usually associated with extreme mortality rates (often exceeding 50 percent), as well as significant morbidity. We conclude that excellent outcomes can be achieved when a comprehensive treatment protocol that adds hyperbaric oxygen therapy and negative pressure therapy (VAC) to standard surgical debridement and parenteral antibiotics are utilized early after the diagnosis of necrotizing fasciitis is established.

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