

### **Hyperbaric medicine for necrotizing fasciitis**

*To the Editor*

We have read with great interest the paper entitled necrotizing fasciitis: Role of early surgical intervention by Qazi et al.<sup>1</sup> The authors reported 25 cases of necrotizing fasciitis (NF) treated with standard measurements, particularly early surgical debridements, antibiotics and supportive therapy. Despite these aggressive intervention the mortality was 24% and the mean hospital stay was 37 days. They stated that they did not use hyperbaric oxygen for the management. It was not clear whether the Department of Surgery, Riyadh Medical Complex, Riyadh, Kingdom of Saudi Arabia, has no hyperbaric unit or the physicians who treated the cases did not recommend hyperbaric oxygen therapy (HBO2) for their patients.

Clearly, the origins and development of hyperbaric medicine are closely tied to the history of diving medicine. For more than 3 decade HBO2 has been an important therapeutic tool in special indications. It improves tissue oxygenation, stimulates wound healing, kills microorganisms, reduces ischemia reperfusion injury, constricts blood vessels, stimulates new blood vessel formation and exerts beneficial effects on biochemical and cellular processes. The British Hyperbaric Association and the International Undersea and Hyperbaric Medical Society recognize HBO2 for 14 medical and surgical indications. The properties of HBO2 have built the rationale for its use as therapy of choice in patients with decompression sickness, arterial gas embolism and severe carbon monoxide poisoning, and as adjunctive therapy for the treatment of osteoradionecrosis, NF and compromised skin grafts and flaps. The efficacy of adjunctive HBO2 in the treatment of lower extremity problem wounds in diabetic patients was proven. When used according to standard protocols HBO2 is a safe therapy with little adverse effects. Hyperbaric oxygen therapy has significantly improved the management of NF of the extremities, trunk, head and cervical region.<sup>2</sup> Under hyperbaric conditions the subcutaneous oxygen pressure in patients with NF rose higher in the vicinity of the infected area than in the healthy tissue.<sup>3</sup>

There are 2 main reasons to use HBO2 in NF: the polymorphism of the bacterial flora with a predominance of anaerobes; and the tissue necrosis due to an extensive disseminated microvascular obstruction within the infected area. It was found

that the association of HBO2 to antibiotics and surgery is based on strong pathophysiological findings as well as on evidences from animal and clinical studies.<sup>4</sup> Thirteen cases of cervical NF were treated with HBO2.<sup>5</sup> All patients recovered. The findings added further support to the literature on the importance of a prompt multidisciplinary approach with aggressive surgical intervention, broad-spectrum antibiotic therapy and HBO2. Thirty-three patients with perineal NF were treated by surgical debridement, antibiotic therapy, HBO2 treatment at 2.5 atmospher absolute pressure and surgical intensive care. Three patients died giving a mortality rate of 9.1%. The results indicated that HBO2 was an important therapeutic adjunct in the treatment of perineal NF.<sup>6</sup> Eleven patients with NF were treated in a hyperbaric chamber after a surgical operation and after administration of antibiotics.<sup>7</sup> A total of 8 patients (82%) recovered completely. The authors draw attention to the possible reduction of mortality of this serious disease when using HBO2.

Generally, NF is a serious, rapidly progressive infection that sometimes involves skin, subcutaneous tissue and muscle. Overall mortality rates of 33-73% have been reported.<sup>7</sup> Necrotizing faciitis is a life-threatening bacterial infection causing necrosis of the fascia, underlying skin and vasculature. The treatment for NF is a combination of surgical debridement, appropriate antibiotics and optimal oxygenation of the infected tissues.<sup>8</sup> Complete recovery of patients suffering from NF depends on early and aggressive surgical therapy as well as conservative therapy.<sup>9</sup> Significant morbidity and mortality attends NF when treatment is delayed due to toxemia, dehydration and severe biochemical disturbances.<sup>10</sup> Treatment usually involves appropriate antimicrobial therapy, control of systemic disease, thorough surgical debridement, gamma globulin administration and HBO2 when facilities exist. Hyperbaric oxygen therapy should be considered as a treatment adjunct in patients with NF. In addition, we hope that hyperbaric medicine should be introduced in Gulf region and used for the indications approved.

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## Reply from the Author

The authors appreciate the interest shown by the keen readers who has raised a genuine concern regarding the use of HBO<sub>2</sub>, which we now feel was not adequately addressed in our article. Although, we did not use HBO<sub>2</sub> as it is not available in our center but at the same time the scientific ground for using HBO<sub>2</sub> is still controversial. There are studies indicating that adjunctive use of HBO<sub>2</sub> reduces mortality<sup>11,12,13</sup> and others stating no beneficial effect of HBO<sub>2</sub> in necrotizing fasciitis.<sup>14,15,16</sup> However, all these studies are retrospective nonrandomized comparisons or small case series, hence, lack the authenticity. The mortality rate even with HBO<sub>2</sub> stays between 9.1-76%<sup>12,16,17</sup> except in one small case series of cervical necrotizing fasciitis which was also mentioned by the correspondent. The reader has mentioned our overall mortality of 24%, which include the delayed cases from other specialties. The main determinant of mortality is the delay in proper surgical treatment leading to wider area of involvement, septicemia and severe systemic dysfunction, hence, increasing mortality. This aspect was well highlighted in our study that early surgical treatment reduces mortality (9.1%) and is also observed by many other researchers.<sup>13,16-22</sup> Presently, the HBO<sub>2</sub> therapy is recommended as main treatment for decompression sickness, severe carbon monoxide poisoning, arterial gas embolism and as an adjunctive treatment in prevention and treatment of osteoradionecrosis, clostridial myonecrosis and to improve skin graft and flap healing.<sup>22,23</sup> There is a suggestive role of HBO<sub>2</sub> therapy in many other conditions including necrotizing fasciitis. One also has to consider the potential risks involved with the use of HBO<sub>2</sub> like pressure related traumas (barotraumatic otitis, pneumothorax) and oxygen toxicity (myopia, seizures), which sometimes can be fatal.<sup>22</sup>

Thus, we reiterate that early recognition and debridement are the cornerstones of management and should be the focus of our approach to this dreadful disease. However, the suggestive role of HBO<sub>2</sub> in the management of necrotizing fasciitis deserves high quality randomized controlled trails for proper evaluation of risks and benefits of HBO<sub>2</sub> therapy before final validation.

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