



## Successful Management of Fulminant Anaerobic Soft Tissue Infection via Direct Subcutaneous Oxygen Infiltration and Aggressive Debridement: A Case Report

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### Abstract

This report presents a critical case of a 12-year-old male patient who developed a life-threatening anaerobic infection following a high-altitude fall and extensive Morel-Lavallée-like decollement of the gluteal region. Despite initial complications following percutaneous drainage, the patient was saved through a combination of radical surgical debridement, high-dose antibiotic therapy (Penicillin and Metronidazole), and an unconventional but effective method of direct local oxygen insufflation into the affected tissues. This case highlights the potential of oxygen as a direct bacteriostatic agent in anaerobic environments when conventional methods are insufficient.

**Keywords:** Soft Tissue; Anaerobic environments; Hyperbaric oxygen therapy

### Introduction

Anaerobic soft tissue infections remain a major cause of morbidity and mortality in surgical practice, particularly when they arise in the setting of closed degloving injuries such as Morel-Lavallée lesions [1]. Rapid tissue necrosis, toxin-mediated systemic toxicity and delayed diagnosis frequently culminate in fulminant sepsis and limb- or life-threatening complications [1,3].

Since the 1960s, Hyperbaric Oxygen Therapy (HBOT) has been regarded as an important adjunct in the management of clostridial myonecrosis and other severe anaerobic infections, owing to its ability to increase tissue oxygen tension, inhibit toxin production and enhance leukocyte-mediated bacterial killing [2,4,5]. However, the availability of HBOT remains limited, particularly in resource-constrained settings and in urgent scenarios where transfer to a hyperbaric facility is not feasible [2,5].

### Case Presentation

#### Patient: 12-year-old male

**Mechanism of Injury:** Fall from height into a shaft, resulting in blunt body trauma and a massive unilateral gluteal decollement.

**Initial Complication:** Following a needle aspiration (puncture) intended to evacuate a hematoma, a mixed anaerobic infection developed rapidly, spreading to the contralateral limb. The procedure was carried out at the patient's bedside by a non-surgical member of the intensive care team.

#### Therapeutic intervention

**The treatment strategy was aggressive and multi-modal:**

**Surgical:** Daily debridement in a dedicated operating theater, involving wide incisions and excision of all non-viable tissues. The infection necessitated the exposure of the sciatic nerve and significant resection of the gluteal musculature.

**Pharmacological:** High-dose intravenous Penicillin (40 million units daily) combined with Metronidazole.

**Oxygen Infiltration (Key Intervention):** Inspired by surgical literature regarding tissue oxygenation, medical-grade oxygen was injected directly into and around the infected areas using a 50cc Janet syringe. This was performed daily under strict aseptic conditions to create anaerobic barrier and inhibit toxin production.

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## Results and follow-up

The progression of necrosis was halted within several days of initiating oxygen infiltration. The patient underwent a slow but complete recovery. Long-term follow-up (years later) revealed full functional restoration and growth, with no significant physical impairment despite the extensive muscle loss during the acute phase.

## Discussion

The cornerstone of management for such infections remains early and repeated radical surgical debridement, combined with broad-spectrum antibiotic therapy active against anaerobes [1,3]. In our patient, daily debridements with wide exposures, including temporary exposure of the sciatic nerve and extensive resection of necrotic gluteal musculature, were required to obtain local control. High-dose intravenous penicillin and metronidazole were administered according to established regimens for severe anaerobic soft tissue infections [1].

In our setting, hyperbaric oxygen therapy was not available. Motivated by the underlying pathophysiology and the published experience with local oxygen therapies [2,4-7], we used direct subcutaneous injection of medical-grade oxygen as a simple, reproducible method to increase oxygen tension in and around the infected tissues. This technique was applied daily under sterile conditions, in conjunction with aggressive debridement and systemic antibiotics. Clinically, the progression of necrosis halted within several days of initiating oxygen infiltration, and the infection did not cross the "oxygenated" boundary created around the involved area.

## Conclusion

To our knowledge, there are very few reports of repeated manual subcutaneous oxygen infiltration being used as an adjunctive therapy

in fulminant anaerobic soft tissue infection in children. The approach described is inexpensive, requires only readily available oxygen and standard syringes, and can be implemented in virtually any operating theatre or intensive care unit. Nevertheless, it should not be viewed as a replacement for hyperbaric oxygen therapy where available, but rather as a pragmatic alternative in resource-limited or time-critical scenario.

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