



# Pyoderma gangrenosum: skin grafting and hyperbaric oxygen as adjuvants in the treatment of a deep and extensive ulcer\*

Pioderma gangrenoso: enxerto de pele e oxigenoterapia hiperbárica como adjuvantes no tratamento de úlcera extensa e profunda

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**Abstract:** Pyoderma gangrenosum is a rare dermatosis of unknown etiology and variable clinical presentation. The disease is challenging for the medical staff, from the frequent diagnostic difficulties to the lack of scientific evidence with a good level to support the management of extensive and refractory cases. Our patient is a 50 year-old man with an extensive and deep ulcer on the left leg, which exemplifies the therapeutic difficulties inherent to the disease and who, fortunately, has progressed with excellent result after association of hyperbaric oxygen therapy and skin grafting to the immunosuppression therapy initially proposed.

**Keywords:** Hyperbaric oxygenation; Pyoderma gangrenosum; Skin transplantation

**Resumo:** Pioderma gangrenoso é dermatose rara de etiologia não completamente compreendida e apresentação clínica variável. A doença apresenta muitos desafios à equipe médica, desde a freqüente dificuldade diagnóstica até a inexistência de evidências científicas com bom nível para condução de casos extensos e refratários. Apresentamos o caso de um paciente masculino, 50 anos, com úlcera extensa e profunda em perna esquerda, que exemplifica bem a dificuldade terapêutica e que, felizmente, evoluiu com excelente resultado após associação de oxigenoterapia hiperbárica e enxertia de pele ao tratamento imunossupressor inicialmente proposto.

**Palavras-chave:** Oxigenação hiperbárica; Pioderma gangrenoso; Transplante de Pele

## INTRODUCTION

Pyoderma gangrenosum (PG) is a non-infectious, neutrophilic dermatosis that affects the skin and occasionally, the subcutaneous tissue. It was first described by Brocq in 1916 as geometric phagedenism; the term PG was introduced in 1930 by Brunsting *et al*, in reference to the equivocated idea of an infectious etiology.<sup>1,2</sup>

This is a rare disease, with a difficult diagnosis and oftentimes a challenging treatment. As the histologic findings are unspecific, the diagnosis is essentially clinic and made after the exclusion of other pathologies.<sup>3</sup> Because this illness has an unpredictable behavior, and few prognostic indicators, treatment must be tailored to the case severity, the patient's health status and the presence of associated systemic diseases.<sup>3</sup>

Hyperbaric oxygen therapy (HBO) is already well documented as an adjuvant therapy to PG, promoting symptomatic relief and helping in the cicatrization process.<sup>4,8</sup> The procedure consists in the inhalation of oxygen (O<sub>2</sub>) at a 100% concentration, with the patient positioned inside a chamber with a pressure superior to the atmospheric one.<sup>5</sup> This environment, rich in O<sub>2</sub>, increases the amount of oxygen dissolved in the plasma, stimulating inflammatory and proliferative events that are necessary for wound cicatrization process.<sup>5</sup>

Skin grafting in PG wounds, though well documented in the literature as an option in selected cases,<sup>6,9</sup> remains as a topic of discussion. On one hand, there is the patient's lack of complete response to the available clinical treatments. On the other hand, there

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is the risk of losing control of an illness that still challenges medical knowledge.

We report one case that clearly exemplifies the therapeutic difficulties inherent to this disease, and which evolved well after the association of several therapeutic options.

### CASE REPORT

A fifty year-old male presented with an erythematous-violaceous nodule on the anterior part of the left leg, which evolved to an ulcer with local pain after a surgical intervention. After three surgical debridements and progressive worsening of the ulcer, he was referred to the emergency room of a tertiary hospital. Physical examination showed a deep and extensive ulcer on the left leg, with exposure of muscular tissue and areas of purulent secretion and necrosis; the borders were altered by the recent surgical intervention (Figure 1).

After the exclusion of vascular and infectious causes, and based on clinical and histological findings, the diagnosis of pyoderma gangrenosum (PG) was established (Figure 2). The patient responded well to the therapy initially started: antibiotics for the secondary infection and immunosuppression with corticosteroid in a dose equivalent to 1mg/kg/day prednisone. Considering the extension of the lesion and the aggressive behavior of the disease, azathioprine was introduced early on, 20 days after the start of the corticosteroid therapy, with the goal of weaning from the corticosteroids in a medium time frame. Because of the wound extension, HBO was introduced concomitantly, to help in the cicatrization process. Forty-five days after treatment beginning, there was a prominent superficial neovascularization on the ulcer (Figure 3).

Corticosteroid therapy was maintained until significant improvement in the aspect of the lesion was achieved, followed by a slow and gradual reduction of dosage after 40 days of use, and complete suspension 90 days after the medication was introduced.

Due to incomplete re-epithelization of the wound, and considering its large dimensions and the presence of well-vascularized granular tissue, we opted, five months after the starting of the treatment, for a partial autologous skin graft on the ulcer bed. The graft was performed whilst the patient was still receiving azathioprine and HBO. There was graft take and complete closure of the wound (Figures 4 and 5). The patient is still using azathioprine, and in 10 months of follow-up did not have relapses or complications.

The final diagnosis of ulcerative PG without subjacent disease was established after extensive complementary investigation, after excluding intestinal inflammatory diseases, hematologic and rheumatologic illnesses and neoplasia.

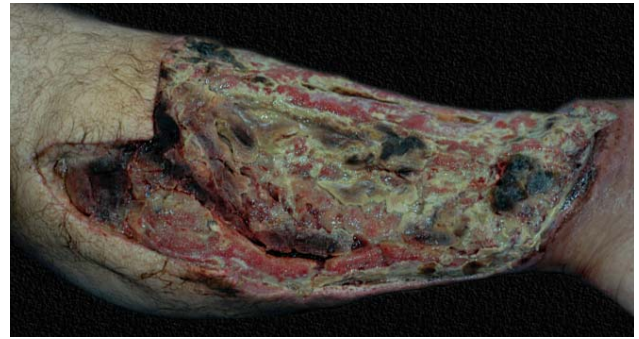


FIGURE 1: Pyoderma gangrenosum: extensive ulcer in the anterior-medial part of the left leg, with muscular tissue exposure, and areas of necrosis and purulent secretion; wound borders were altered by a recent surgical intervention

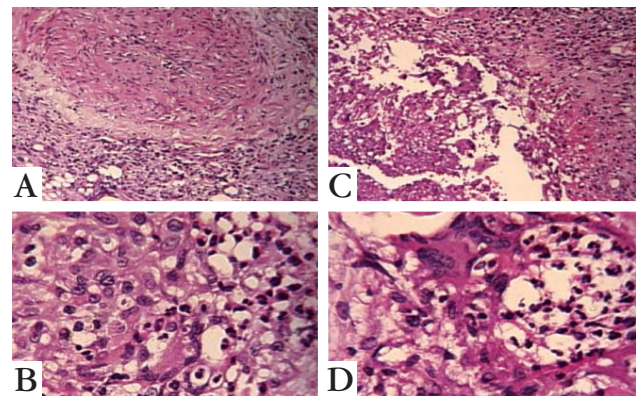


FIGURE 2: Pyoderma gangrenosum. Histology showing occluded vessel (A) and necrosis adjacent to a granuloma (B) (HE, 100x). Detail of the granuloma: showing multinuclear giant cell, histiocytes (C) and neutrophilic abscedation (D). (HE, 400x)



FIGURE 3: Pyoderma gangrenosum, 45 days after corticosteroid therapy, azathioprine and hyperbaric oxygen therapy: granular tissue with superficial neovascularization and partial re-epithelization



FIGURE 4: Pyoderma gangrenosum, autologous skin graft over the wound, showing good vascularization





FIGURE 5: Pyoderma gangrenosum: excellent final result after immunosuppression, hyperbaric oxygen therapy and partial skin grafting

## DISCUSSION

In extensive cases, as reported here, the initial treatment is based on systemic corticosteroid therapy, with an early introduction of immunosuppressive drugs (cyclosporine, azathioprine, cyclophosphamide) or sulphones (dapsone).<sup>3,10</sup> Treatment of associated diseases, when present, contributes to a better control of PG in most of the cases.<sup>3,9</sup>

Our patient responded in a satisfactory manner to the treatment proposed initially, with the interruption of the disease progression and a slow, although significant, improvement of the aspect of the lesion. HBO was introduced with the goal of accelerating the tissue regeneration process in the wound. This is a safe and effective therapy, with few adverse events and of relatively low-cost, which justifies its use in adjuvant treatment of ulcers that are refractory to conventional therapy.<sup>4</sup> This technique contributes to pain and infection reduction and also to the acceleration of cure process, increasing capillary angiogenesis.<sup>5,6</sup> The wound oxygenation also increases the collagen production by the fibroblasts, thus offering support to the

newly formed capillary vessels.<sup>6</sup> In the case reported, we considered that there was a marked improvement of the wound after a total of 81 HBO sessions. Although the same results could be achieved with only immunosuppression and wound care, the benefits of HBO and the simplicity of its implementation justify its use in extensive cases like the one described here.

In general, surgical procedures should be avoided in patients with PG, due to the potential risk of worsening any pre-existing lesions or triggering the appearance of new ones after the cutaneous trauma. The pathergy phenomenon, present in 20-30% of the cases, may be the cause of autologous skin graft rejection, both in the donating as well as in the receiving areas.<sup>3</sup> In the case reported, we considered that the risk of a skin grafting was justifiable and we chose to perform it after 5 months of diagnosis, maintaining the use of azathioprine and HBO, thus guaranteeing a better surgical result. Once again, we did not know if the patient would have evolved satisfactorily only with the previously instituted therapy. There are no scientific evidences that may offer a clear guidance in such cases. The decision in favor of skin grafting was made as a consensus between the dermatology and plastic surgery teams, after taking in consideration the risks, benefits, the patient's wishes and the possibility of a more effective and quick recovery. The excellent surgical result was due in part to the angiogenesis promoted by HBO, which helped not only the cicatrization process but also the good evolution and survival of the graft.

As with all diseases of difficult management therapeutic decisions must be customized, taking into consideration the patient's clinical status and the risk-benefit ratio of potentially risky procedures. □

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