

ANALGESIA EPIDURAL EM DOENTE COM SÍNDROME DE NICOLAU PARA TRATAMENTO COM OXIGENOTERAPIA HIPERBÁRICA

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Palavras-chave:

- Analgesia Epidural;
- Oxigenação Hiperbárica;
- Síndrome de Nicolau

Resumo

A síndrome de Nicolau é uma complicação rara que ocorre após injeção intramuscular, levando a necrose isquémica da pele, tecidos moles e músculo a nível regional.

Os autores apresentam o caso de um doente de 3 anos de idade, admitido com síndrome de Nicolau após injeção intramuscular de penicilina, proposto para realização de tratamento com oxigenoterapia hiperbárica. No 3º dia de internamento foi colocado um cateter epidural para analgesia. Vinte e quatro horas após a realização do bloqueio epidural o doente tinha a dor controlada, e após 48 horas foi extubado, sem intercorrências. Realizou todas as sessões em câmara hiperbárica sem qualquer intercorrência.

Há vários tratamentos descritos para a síndrome de Nicolau, no entanto, devido à baixa incidência desta complicação, nenhum tratamento padrão foi ainda estabelecido. O tratamento da dor recorrendo a analgesia epidural parece ser uma boa opção, particularmente em doentes em idade pediátrica, permitindo uma melhor adesão à restante terapêutica efetuada.

EPIDURAL ANALGESIA FOR HYPERBARIC OXYGEN THERAPY IN A PATIENT WITH NICOLAU SYNDROME

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Keywords:

- Analgesia, Epidural;
- Hyperbaric Oxygenation;
- Nicolau Syndrome

Abstract

Nicolau syndrome is a rare complication following intramuscular injection, leading to local ischemic necrosis. The authors present a case of a 3-year-old boy who was admitted with Nicolau syndrome after intramuscular penicillin injection and then proposed for hyperbaric oxygen therapy. On the 3rd day after admission an epidural catheter was inserted and a perfusion of ropivacaine was initiated. Twenty four hours after the epidural block the pain was under control and 48 hours after the block the patient was extubated. The hyperbaric oxygen therapy treatment was performed without any events.

There are numerous treatments described for Nicolau syndrome, however, there is no gold standard treatment established. Pain treatment with epidural analgesia seems a good option, particularly in pediatric patients, allowing a satisfactory adherence to the other treatments. The authors also attested the security and efficacy of epidural catheters during hyperbaric oxygen therapy.

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INTRODUCTION

Nicolau syndrome (*livedoid dermatitis, embolia cutis medicamentosa*) is a rare complication following intramuscular injection, leading to local ischemic necrosis of the skin, soft tissue and muscular tissue. It was first described by Nicolau in 1924 after intramuscular injection of bismuth salts for the treatment of syphilis, and since then, cases have been re-

ported after injection of anti-inflammatory drugs, steroids, antibiotics and other drugs.¹ The pathogenesis of this syndrome is not yet fully understood, but it is thought to involve direct vascular injury, perivascular inflammation and vascular constriction. The diagnosis is clinical, and it usually presents with pain on the site of injection, hyperemia, skin discoloration, redness, abscess formation and eventual progression to necrosis.

There are many treatments described for Nicolau syndrome, however, a gold standard treatment remains to be established.

The authors describe a case of a patient with Nicolau syndrome following penicillin injection, in whom epidural analgesia was effectively and safely used during the period of hyperbaric oxygen therapy treatment.

CASE REPORT

A 3-year-old male patient, previously healthy, weighing 15 kg, presented with pain, intermittent claudication, and a cold and pale left lower limb immediately after an intramuscular penicillin injection (made on the superolateral quadrant of the left buttock), for the treatment of scarlet fever. A few hours later he was admitted in the emergency department with partial necrosis and edema of the left foot toes (Fig. 1), livedoid discoloration of the left buttock and left foot and diminished pulses in the left foot.



Figure 1 - Partial necrosis and edema of the left foot toes

He was admitted in the pediatric ICU, sedated and mechanically ventilated and initiated treatment with enoxaparin 15 mg subcutaneously twice daily. On the second day after admission he was diagnosed with rhabdomyolysis (CK 110360 U/L; DHL 5988 U/L and myoglobin 14470 ng/mL). On that same day a fasciotomy was performed. He was then proposed for 10 sessions of hyperbaric oxygen therapy (HBOT), and completed the first session on that day. On the 3rd day after admission, an epidural catheter was inserted in the L3-L4 space (loss of resistance at 2 cm, catheter introduced 3 cm in cephalic direction), for analgesia purposes, and 3 mL of 0.2% ropivacaine plus 0.6 mg of morphine were administered. A perfusion of 2.2 mL of 0.2% ropivacaine was then initiated with an electrical infusion pump. Twenty four hours after the epidural block the pain was under control with the epidural analgesia and the systemic analgesia was stopped. Forty eight hours after the block, the patient was extubated without any occurrence. He was able to perform the other 9 sessions of hyperbaric oxygen therapy without any events and without any pain, and with a favorable evolution of the lesions (Fig. 2). The epidural catheter was removed after the treatment was concluded, and presented with no deformations or configurational changes.



Figure 2 - Favorable evolution of the lesions

DISCUSSION

Nicolau syndrome is a rare adverse reaction after intramuscular injection of certain drugs, however, it is not related to the properties of the drug itself, but with its administration rate and pharmacological form.²

Some risk factor have been described in the literature, such as the injection site (the thigh is the most affected place), the depth of the muscle (it was found that in up to 12% of cases the needles used for intramuscular injection are too short to reach the muscle, especially in women), the frequency of drug administration and the action of the drug itself.³ According to Saputo and Bruni, this syndrome is more frequently found in the pediatric population, in children below 3 years old.⁴

Intramuscular injection is one of the most frequent routes of drug administration in healthcare institutions. Although the intramuscular route may appear easy to administer, it can lead to complications, therefore it is vital to determine if it is the most adequate route for each case.

The pathogenesis of Nicolau syndrome is not yet clear. It has been suggested to be due to accidental intra-arterial injection, but the most common hypothesis is that it is caused by local arterial vasospasm secondary to sympathetic stimulation caused by local release of norepinephrine. Other potential mechanisms are the ischemia following vascular or perivascular injection and arterial embolism.^{1,5,6}

The diagnosis is clinical, with the development of a livedoid lesion being pathognomonic. Patients usually develop pain around the site of injection, followed by erythema and a hemorrhagic patch, and, later, an ulcer or necrosis of the skin, subcutaneous tissue and muscle.⁷ Up to one third of the patients can develop neurological signs, such as hypoesthesia or even paraplegia.² Secondary infection can occur. A skin biopsy will show nonspecific inflammation and necrosis, with focal thrombosis of small and medium vessels. Other causes must be excluded, such as necrotizing fasciitis, vasculitis and cutaneous embolization of cardiac myxoma or cholesterol emboli.

There is still no gold-standard treatment for Nicolau syndrome. Conservative measures like pain control, debridement, skin grafting and dressings are usually used. Vasoactive drugs such as heparin and pentoxiphiline, steroids and antibiotics have also been used with some benefit.⁸ Recently, there are some descriptions of the use of hyperbaric oxygen therapy (HBOT) in this kind of pathology.⁹⁻¹¹ During the healing process, the oxygen demands of the tissues increase. HBOT consists in inhalation of 100% oxygen in a total body chamber, where atmospheric pressure is increased and controlled, which can increase the dissolved oxygen content up to 12 times that of a patient in a normobaric environment. The tissue diffusion of oxygen is also increased, as well as the generation of reactive oxygen (ROS) and nitrogen (NOS) species. HBOT not only increases the delivery of oxygen to damaged tissues, but also stimulates angiogenesis, collagen synthesis, stem cell migration and local immune response.¹²

The use of epidural catheters during HBOT is not contraindicated, however, there are no references in the literature to

whether they are safe or not. Epidural pumps can malfunction or be deformed due to the higher pressures in the hyperbaric chamber, and this should be a concern during this kind of treatment.¹³ The infusion pump that was used was checked regularly for any deformation or failure and it was assured that the infusion volume never changed during the hyperbaric chamber time. The epidural catheter was used during the 9 sessions of HBOT (the first session was performed before the catheter placement) without any complications, with optimal efficacy and avoiding having an intubated and ventilated patient inside a hyperbaric chamber, with all the inherent risks.

CONCLUSIONS

Healthcare personnel must be aware of characteristics of Nicolau syndrome, following intramuscular injection of a common drug such as penicillin, and avoid unnecessary injection in children.

The use of epidural analgesia during this kind of treatment should be considered, given its successful profile, especially in the pediatric population.

The authors also attested the security and efficacy of epidural catheters during hyperbaric oxygen therapy.

Conflict of Interests

The authors have no conflict of interest to declare.

Confidentiality of data

The authors declare that they have followed the protocols of their work center on the publication of patient data.

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