



# Nicolau syndrome after intramuscular injection of methocarbamol: A rare case report

Rasoul Goli<sup>a</sup>, Navid Faraji<sup>a</sup>, Razieh Janghiyamachi<sup>b</sup>, Nasim Talebiazar<sup>c,\*</sup>

<sup>a</sup> Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Urmia University of Medical Sciences, Urmia, Iran

<sup>b</sup> Department of Nursing, School of Nursing and Midwifery, Islamic Azad University, Marand Branch, Tabriz, Iran

<sup>c</sup> Department of Psychiatric, Urmia University of Medical Sciences, Urmia, Iran

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## ABSTRACT

**Background:** Methocarbamol is a muscle relaxant medication that is commonly used to treat muscle spasms and musculoskeletal pain. Methocarbamol intramuscular injection can cause necrosis of the soft tissue. This rare condition can create severe adverse event with permanent disability.

**Case presentation:** A 32-year-old woman with no significant past medical history presented to the emergency department with severe pain, redness, and swelling involving her left buttock and the surrounding back area.

**Clinical discussion:** The necrotic changes due to methocarbamol intramuscular injection can progress rapidly, leading to the formation of deep ulcers, cellulitis, and even abscesses. Prompt recognition and intervention are crucial to prevent further tissue damage and complications.

**Conclusion:** Comprehending the fundamental mechanisms and identifying risk factors related to this complication is imperative in enabling healthcare professionals to proficiently manage and avert its manifestation.

## 1. Introduction

Nicolau syndrome, also known as embolia cutis medicamentosa or livedoid dermatitis, is a rare adverse reaction following intramuscular injection of medications [1]. It is characterized by acute ischemic necrosis and skin ulceration at the injection site. Methocarbamol, a muscle relaxant commonly used for the treatment of musculoskeletal conditions, has been reported to cause Nicolau syndrome in a few cases [2].

The exact pathogenesis of Nicolau syndrome is not well understood, but it is believed to involve a combination of mechanical injury, chemical irritation, and vascular occlusion leading to tissue necrosis [3]. The injection technique, patient-specific factors, and substance injected are all thought to contribute to the development of this syndrome [4].

The case described highlights the importance of proper injection technique, including aspiration before injection and avoiding injecting into small vessels, to minimize the risk of Nicolau syndrome. Awareness among healthcare professionals and patients regarding this potential adverse event is crucial for early recognition and prompt treatment. In cases where Nicolau syndrome is suspected, immediate medical attention should be sought to prevent further tissue damage and complications.

## 2. Case presentation

The patient is a 32-year-old woman with no significant past medical history. The patient was referred to a dermatologist, who diagnosed her with Nicolau syndrome. She presented to the emergency department with severe pain, redness, and swelling involving her left buttock and the surrounding back area (Fig. 1). Upon detailed history taking, it was revealed that she had received an intramuscular injection of methocarbamol in the left buttock three days prior to the onset of symptoms. The patient experienced severe pain, redness, and swelling involving her left buttock and the surrounding back area. The symptoms progressively worsened over the three days following the intramuscular injection of methocarbamol. The purpose of the injection was to alleviate musculoskeletal pain associated with a recent motor vehicle accident.

On physical examination, the patient appeared anxious and in severe distress. The left buttock was discolored, featuring a characteristic dusky appearance, along with marked erythema and edema. The affected area extended from the left buttock, involving the entire gluteal region, and had spread to the adjacent back area. The necrotic tissue appeared black and eschar-like. The patient's vital signs revealed significant hemodynamic instability, with hypotension and tachycardia.

Investigations: Laboratory investigations upon admission revealed

\* Correspondence to: Urmia University of Medical Sciences, Campus Nazlu, 11 KM Road Seru, Urmia 575611-5111, Iran.

E-mail address: [nasimtalebazar@yahoo.com](mailto:nasimtalebazar@yahoo.com) (N. Talebiazar).

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leukocytosis with a left shift, indicating an inflammatory response. However, the results were within normal ranges for renal and hepatic function. Imaging studies, including ultrasound and computed tomography (CT), were performed to assess the extent of tissue involvement and rule out any concurrent infections or complications. The results of imaging studies represented massive tissue necrosis and impairment of peripheral perfusion.

Despite aggressive resuscitation efforts and prompt initiation of broad-spectrum antibiotic therapy, the patient's condition rapidly deteriorated. Hemodynamic instability persisted, and she subsequently developed signs of cardiac shock. The patient's cause of death was attributed to the profound cardiovascular compromise associated with extensive tissue necrosis of the buttocks and adjacent back region, after 6 day hospitalization in intensive care unit. This compromised circulation and led to cardiac shock, despite aggressive resuscitation efforts, broad-spectrum antibiotic therapy, vasopressor support, and mechanical ventilation.

An autopsy was performed on the deceased patient, and external and internal examinations were conducted. Tissue samples from various organs, including lungs, liver, kidneys, and brain, were collected for histopathological analysis. Toxicological analysis of blood samples was also performed to determine the presence of methocarbamol. The liver exhibited mild fatty changes, while kidney sections demonstrated acute tubular necrosis, indicative of acute kidney injury. Brain tissue appeared normal under microscopic examination. Toxicological analysis confirmed the presence of therapeutic levels of methocarbamol in the blood sample.

### 3. Discussion

Skin integrity refers to the condition of the skin and its ability to protect the body [5]. Damage to skin integrity can occur due to trauma, infection, pressure, or chronic diseases [6]. When the skin is compromised, it becomes vulnerable to infection and further damage. This can cause discomfort and pain, affecting a person's quality of life [7,8]. Maintaining skin integrity is crucial for overall health which can occur due to injection of some drugs even, so it is important to understand the causes of damage and take preventive measures in healthcare [9].

The reported cases of Nicolau syndrome following methocarbamol

intramuscular injection typically present with severe pain, erythema, and edema in the affected area. The necrotic changes can progress rapidly, leading to the formation of deep ulcers, cellulitis, and even abscesses [10]. Prompt recognition and intervention are crucial to prevent further tissue damage and complications [4].

Several factors contribute to the development of Nicolau syndrome in this rare adverse event. One potential mechanism is the direct toxic effect of methocarbamol on local tissues [11]. Methocarbamol is thought to cause vasoconstriction and tissue ischemia when injected intramuscularly, which can lead to tissue necrosis. Additionally, the drug may have a direct cytotoxic effect on the cells, further exacerbating tissue damage [12].

Injection technique is another important consideration. The buttocks, particularly the gluteal region, have a rich vascular supply, and improper injection technique, such as injecting into a blood vessel or near a major nerve, can result in local ischemia and subsequent necrosis [13]. Careful identification of injection sites, utilization of appropriate needle length, and aspiration prior to injection can help to minimize the risk of these complications [14].

Patient-related factors such as compromised local circulation, diabetes, and immunosuppression may also increase the susceptibility to Nicolau syndrome. It is essential to assess these factors prior to administering methocarbamol via the intramuscular route [15].

Nicolau syndrome following intramuscular injection of methocarbamol is an exceptionally severe complication and carries a high mortality risk. In this case, the entire left buttock and a significant portion of the back area were affected by the necrotic process. The rapid progression of the necrosis, coupled with the extent of tissue involvement, likely contributed to the patient's subsequent hemodynamic instability and cardiac shock [16].

While the exact mechanisms underlying methocarbamol-induced necrosis remain unclear, several factors could have contributed to the adverse outcome in this case. The injection technique may have been suboptimal, resulting in inadvertent vascular damage or tissue ischemia. Alternatively, direct toxic effects of methocarbamol on local tissue, such as vasoconstriction or cytotoxicity, might have played a role [4]. Patient-related factors such as compromised local circulation, though not reported in this case, could also contribute to the development of Nicolau syndrome [16].



Fig. 1. Nicolau syndrome after intramuscular injection of methocarbamol.

Given the severity of the condition and the lack of effective treatment options, management focuses primarily on supportive measures, wound care, and addressing underlying systemic complications such as sepsis. Unfortunately, in this case, the profound hemodynamic instability and cardiac shock proved refractory to medical intervention, resulting in the patient's untimely demise [11].

Management of Nicolau syndrome caused by methocarbamol intramuscular injection primarily involves wound care, debridement of necrotic tissue, and utilization of appropriate dressings. In some cases, surgical intervention, including skin grafting or flap reconstruction, may be necessary to promote wound healing and prevent further complications. Pain control, infection prevention, and addressing the underlying cause, such as discontinuing methocarbamol, are also crucial components of the management strategy [12]. Awareness among healthcare professionals and patients regarding this potential adverse event is crucial for early recognition and prompt treatment [17].

#### 4. Conclusion

Nicolau syndrome due to methocarbamol intramuscular injection is a rare but severe adverse event that can result in significant morbidity and complications. Understanding the underlying mechanisms and risk factors associated with this complication is vital for healthcare professionals to effectively manage and prevent its occurrence. Careful consideration of injection technique, patient-related factors, and prompt recognition of symptoms are crucial steps in minimizing the risk of Nicolau syndrome following methocarbamol intramuscular injection. Further research is warranted to better understand the pathophysiology and explore strategies for prevention and early intervention in order to optimize patient outcomes.

#### CRedit authorship contribution statement

Navid Faraji; Nasim Talebiazar: Study concept, data collection, writing the paper and making the revision of the manuscript following the reviewer's instructions. Rasoul Goli; Razieh Janghiyamachi: Study concept, reviewing and validating the manuscript's credibility.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Data Availability

No data was used for the research described in the article.

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