

## CASO CLÍNICO

# Subcutaneous Cervical Emphysema After Labour Epidural Analgesia: A Clinical Case of an Uncommon Complication

## *Enfisema Cervical Subcutâneo Após Epidural para Analgesia de Trabalho de Parto: Caso Clínico de uma Complicação Pouco Frequente*

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### Palavras-chave

Analgesia Epidural; Analgesia Obstétrica; Enfisema Subcutâneo; Enfisema Mediastínico

### Keywords

*Analgesia, Epidural; Analgesia, Obstetrical; Mediastinal Emphysema; Spontaneous Subcutaneous Emphysema*

## ABSTRACT

The authors report a rare case of iatrogenic subcutaneous cervical emphysema after lumbar epidural catheter insertion for labour analgesia.

Although lumbar epidural analgesia is the gold standard in labour analgesia, some complications may occur. Subcutaneous emphysema is a rare complication following identification of the epidural space with loss-of-resistance technique with air. Being usually a self-limited condition, the treatment is conservative. Its resolution is dependent on the amount of air trapped and usually resolves in a few days.

One way to avoid this complication is the use of saline solution in the loss of resistance technique for identification of the epidural space. If loss of resistance to the injection of air is to be used, it is necessary to adopt some preventive measures.

## RESUMO

Os autores descrevem um caso raro de enfisema cervical subcutâneo iatrogénico após inserção de cateter epidural lombar para analgesia de trabalho de parto. A técnica epidural, apesar de ser considerada o *gold standard* na analgesia de trabalho de parto, não é isenta de complicações. O enfisema subcutâneo, embora raro, é uma possível complicação na pesquisa do espaço epidural com a técnica de perda de resistência com ar. Sendo geralmente uma condição autolimitada, o tratamento é conservador e a sua resolução depende da quantidade

de ar retida, que normalmente é reabsorvida em poucos dias.

Uma forma de evitar esta complicação é o uso de solução salina na técnica de perda de resistência para identificação do espaço epidural. No entanto, se for utilizada a técnica de perda de resistência com ar, devem ser adotadas algumas medidas preventivas.

## INTRODUCTION

Epidural anaesthesia is widely used for obstetrical procedures, namely for labour analgesia.<sup>1</sup> The epidural space is most commonly identified by the loss-of-resistance (LOR) technique. It is based on the LOR perception when the advancing needle passes through the *ligamentum flavum* into the epidural space during compression of the plunger of a syringe. Usually the syringe is filled with air or liquid, depending on the anaesthesiologist's preference.<sup>2</sup>

In a recent Cochrane systematic review, authors concluded that there was no difference between air and saline in the LOR technique for identification of the epidural space.<sup>3</sup>

When loss of resistance to air is used complications such as pneumocephalus, subcutaneous emphysema, venous air embolism, and spinal cord and nerve root compression were described in the literature.<sup>4-7</sup>

The authors report a rare case of iatrogenic subcutaneous cervical emphysema after lumbar epidural catheter insertion for labour analgesia.

## CASE REPORT

An 18-year-old African-descendent, gesta 1 para 0, was

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admitted in a tertiary maternity, in active labour, after an uncomplicated 39-week pregnancy. After the parturient arrived in the delivery room, the anaesthesiology team was called because she wanted epidural analgesia for labour.

The pregnant woman did not have any significant past medical history or allergies and did not take any medication. At physical examination the woman presented an axillar temperature of 36.3°C, regular and symmetrical radial pulse, heart rate of 95 beat/min, arterial pressure of 130/60 mmHg, weight 70 kg and height 1.65 m. Pulmonary and cardiac auscultation were normal. There were no changes of the dorsal-lumbar spine and vertebral landmarks were adequate. Blood count and clotting tests were normal.

The patient was in active labour, with 4 cm of cervix dilation, regular contractions and a pain intensity of 7 in 10 at Numeric Verbal Scale.

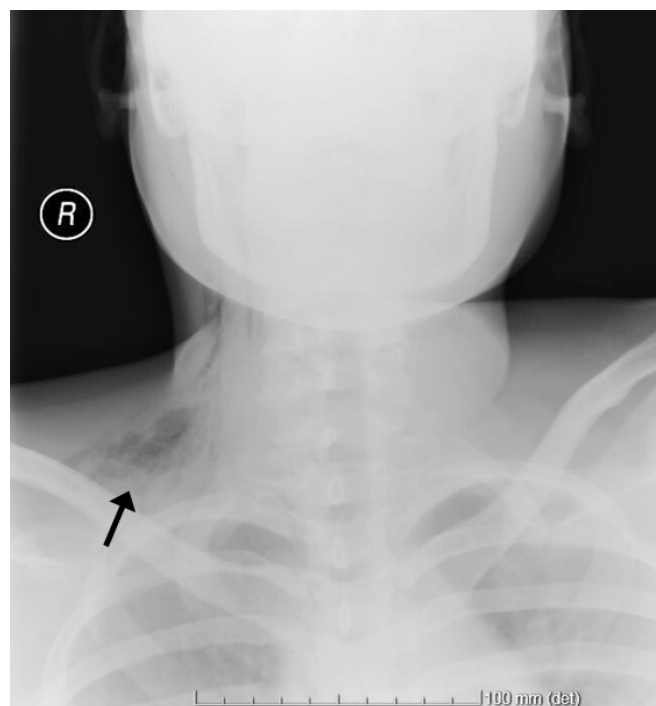
After the pregnant woman signed the informed consent, the resident placed a lumbar epidural catheter with the patient in the left lateral decubitus position. The L3-L4 inter-apophyseal space was searched without difficulty, and subcutaneous and intramuscular infiltration with 1% lidocaine was performed. After infiltration, two attempts to identify the epidural space were tried midline with an 18-gauge Tuohy needle, using the technique of loss of resistance to injected air. A total estimated of 3-5 ml of air was injected prior to satisfactorily locating the epidural space. No blood, cerebrospinal fluid, or air was obtained on aspiration. The epidural catheter was introduced without difficulty, remaining 4 cm in the epidural space. No clinical signs of subarachnoid block were detected after the injection of 2 ml of dose test of 2% lidocaine. Therefore, an additional bolus of 12 ml (20 mg of 2% ropivacaine and 10 µg sufentanil) was performed, with good analgesic quality. Programmed intermittent epidural boluses (PIEB) was used to maintain labour analgesia, with ropivacaine and sufentanil. The procedure was done with continuous cardiocographic monitoring. Fourteen minutes later, analgesia from T8 to S1 was present bilaterally. The entire procedure was performed under the supervision of a senior anesthesiologist.

Labour progressed favourably, with an eutocic delivery of a 3.490 kg healthy neonate, with Apgar index 9/9/10, six hours after placement of the epidural catheter. It was subsequently removed intact, just before transfer to postpartum ward. Two hours later the woman complained of discomfort in the cervical region.

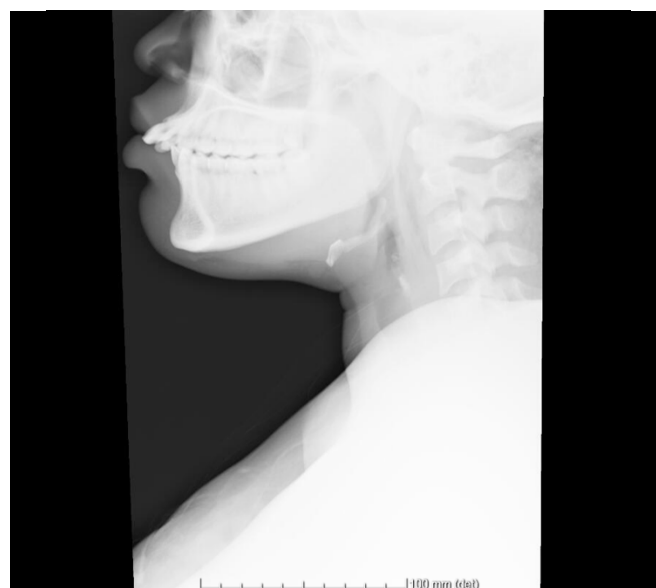
She had no other symptoms, like dyspnoea or meningism. Local palpation revealed right cervical crepitus of approximately 3 cm diameter. The remaining physical examination had no other sites of crepitus, neck pain, neurological or hemodynamic changes, fever or inflammatory signs at the site of epidural puncture. Cardiac and pulmonary auscultations were normal.

The approach chosen in this case of cervical subcutaneous

emphysema was a close monitoring of the emphysema area, early detection of possible alarm signs (dyspnoea, dysphagia, hoarseness) and request a cervical and thoracic X-rays. The imaging tests confirmed the presence of subcutaneous air in the right supraclavicular region, with no signs of pneumothorax or pneumomediastinum, as shown in Figs. 1 and 2. After 12 hours, a new re-evaluation was made: the patient remained asymptomatic, and there was a reduction of the emphysema area.



**Figure 1. Antero-posterior Cervical Radiograph Showed Soft Tissue Emphysema, with Air Trapping into the Right Side of the Neck (arrow)**



**Figure 2. Lateral Cervical Radiograph Showed Subcutaneous Emphysema, with Air Trapping Into the Level of Hyoid Bone in the Anterior Triangle of the Neck (arrow)**

All the puerperium was uneventful, and the patient was discharged 36 hours after delivery. One week later the emphysema had been completely absorbed.

## DISCUSSION

Lumbar epidural analgesia is the gold standard in labour analgesia, however, some complications may occur.

It is probable that the complication here described had been the result of the loss of resistance to air technique, used to identify the epidural space.

In general, anaesthesiologists with less experience tend to inject a larger volume of air, especially when they find it difficult to confirm the correct placement of the epidural needle.<sup>8</sup>

It is important to define and establish the volume of air that can be injected in the epidural space, in order to avoid complications, as this technique is widely used. Although we all know that complications are more likely to appear when larger volumes of air are injected, pneumocephalus has been reported to occur after injecting just 3 mL.<sup>8</sup>

There have been a few published case reports of subcutaneous emphysema as a result of loss of resistance to air in identifying the epidural space, with subcutaneous emphysema observed in the supraclavicular, cervical, thoraco-lumbar, and abdominal regions.<sup>4,6,9</sup> A common factor in these cases was multiple attempts, using upwards of 20 mL of air, before the epidural space was identified.

In this particular case, after some difficulties in identifying the epidural space with air, three hypotheses can be drawn to explain the entrapment of air in the cervical region. First, air injected into epidural space may have exited through the lumbar intervertebral foramina and moved cephalad along the deep fascial planes of the back, which are continuous with those of the neck. Subsequently, air in this compartment may escape into the subcutaneous tissue and be felt as crepitus. Second, the epidural air may have migrated cephalad while remaining in the epidural compartment. Since the epidural space terminates cranially at the foramen magnum, cephalad movement of the injected air would be limited to this level, where it may then diffuse through the cervical intervertebral foramina into the deep fascial planes and the subcutaneous tissue of the neck. Third, any air injected subcutaneously in the lumbar area may have migrated cephalad in this compartment, eventually to localize in the neck.<sup>4</sup>

Given this, since the patient had no signs of subcutaneous emphysema at the dorsal-lumbar level, it seems more likely that the second or third hypotheses had occurred. The positioning of the patient seems to be the determining factor to explain the area where the emphysema appeared. The fact that the technique was performed with the patient in left lateral decubitus, and the fact that the patient remained in this position most of the time during labour may explain

the site of emphysema. In addition, the Valsalva manoeuvre and the sitting position during the expulsive period seem to have precipitated the cephalic displacement of the air and the beginning of the symptomatology in the immediate postpartum period.

The symptoms of a cervical subcutaneous emphysema can be oedema, discomfort and/or local pain, and may be associated with odynophagia, dysphagia, dyspnoea, wheezing, pneumothorax or pneumomediastinum. Extrinsic airway compression and air embolism (via the valveless vertebral venous plexus of Batson) are some of the serious clinical problems likely to occur as a result of subcutaneous emphysema.<sup>8</sup> The diagnosis is made through physical examination (crepitation on palpation) and supported by imaging exams, demonstrating trapped air in the region.

Being usually a self-limited condition, the treatment is conservative (surveillance and analgesic support). Its resolution is dependent on the amount of air trapped and usually resolves in a few days. In more severe cases, it may be necessary to make small local incisions to release the air.

In our centre, the epidural space is usually identified using the loss-of-resistance to air technique, yet it is the first described case of cervical emphysema, even being a resident training centre.

Although rare, one way to avoid this complication would be the use of saline solution in the loss of resistance technique for identification of the epidural space. If loss of resistance to the injection of air is to be used, it is necessary to adopt some measures. It's convenient to insert the Tuohy needle until the increased resistance of the ligamentum flavum is encountered before the stillette is removed and the syringe is attached. This happens, in general, at a depth of 2.5-6 cm depending on the size of the patient. In order to identify the epidural space, a minimum injection of air should be used, and a 5 mL free running syringe is advisable, being important to reduce the frequency of syringe recharges.<sup>10</sup> Cervical subcutaneous emphysema, a potentially serious complication of the loss of resistance to the injection of air technique, seems to occur more often than reported. So, whenever this technique is used to find the extradural space, there should be an extra care to prevent the appearance of this complication.

### Responsabilidades Éticas

**Conflitos de interesse:** Os autores declaram não possuir conflitos de interesse.

**Suporte financeiro:** O presente trabalho não foi suportado por nenhum subsídio ou bolsa.

**Confidencialidade de dados:** Os autores declaram ter seguido os protocolos do seu centro de trabalho acerca da publicação dos dados de doentes.

**Protecção de pessoas e animais:** Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial.

### Ethical Disclosures

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**Confidentiality of data:** The authors declare that they have followed the

protocols of their work center on the publication of data from patients.

**Protection of human and animal subjects:** The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

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