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Case report

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Keywords

*Epidural block, regional
anesthesia, pneumocephalus.*

Pneumocephalus as complication of epidural block: report of a case and its treatment

Neumoencefalo como complicacion de bloqueo peridural: informe de un caso y tratamiento empleado

Abstract

Complications arising from regional anesthesia and, in this case, the central blocks (epidural and subarachnoid) cause sympathetic blockade, sensory analgesia, and motor block at greater or lesser extent depending on the technique used, the dose, concentration, and volume of drug used. These are very useful techniques in many surgical procedures and for prolonged and effective postoperative analgesia, but the debate about the safety, effectiveness, and benefits of these techniques has increased with its widespread use. Major complications are rare, but when they appear they result in serious developments. This is especially unusual in the obstetrical and gynecological procedures, where patients are young and healthy and in which a complication or irreversible injury will be hardly understandable. There are very few recorded series of cases of patients affected by the complications related to neuraxial blockades. One of the largest includes 500,000 patients who underwent epidural block for labor, estimating 1/47,000 complications. The aforementioned complications are diverse in literature and the severity may vary.

A female 38-year-old patient with an extensive history of diagnosis of diabetes mellitus and hypertension, undergoing hysterectomy after two childbirths, goes through her operation and postoperative period without problems, but after 24 hours reports a severe headache that won't yield to the usual analgesics and its intensity increases in the next few hours. The Neurology service detects meningeal signs and severe pain, a CT scan of the skull is performed, and pneumocephalus is reported.

Resumen

Las complicaciones derivadas del procedimiento del grupo de la anestesia regional, y en este caso los bloqueos centrales (epidurales y subaracnoideos) causan bloqueo simpático, analgesia sensitiva y bloqueo motor en mayor o menor medida dependiendo de la técnica utilizada, la dosis, la concentración, el volumen de fármaco utilizado. Son técnicas muy útiles en gran cantidad de procedimientos quirúrgicos, así como para obtener una analgesia prolongada y eficaz en el postoperatorio. El debate acerca de la seguridad, la eficacia y los beneficios de estas técnicas ha aumentado desde finales del siglo XX, cuando se ha generalizado su uso. Las complicaciones mayores no son muy frecuentes, pero cuando aparecen suelen ser graves. Esto es especialmente llamativo en los procedimientos obstétricos y ginecológicos, en los que las pacientes son jóvenes y sanas y en las que una complicación o lesión irreversible será difícilmente entendible. No existen grandes series de pacientes en las que se hayan valorado las complicaciones ligadas a los bloqueos neuroaxiales. Una de las mayores es la que incluye a 500,000 pacientes sometidas a bloqueo epidural para el parto, estimando las complicaciones en 1/47000. Son diversas las complicaciones referidas en la literatura y su gravedad es muy variable.

Paciente femenina de 38 años de edad con antecedente de diabetes mellitus e hipertensión arterial, secundigesta, que se somete a histerectomía, cursa su trans y postoperatorio inmediato sin mayores problemas, pero a las 24 horas inicia con cefalea intensa que no cede ante los analgésicos habituales, e incluso aumenta conforme pasan las horas siguientes, por lo que se interconsulta a Neurología, detectando datos meníngeos y dolor intenso, por lo que se realiza una tomografía de cráneo y se detecta neumoencéfalo.

Palabras clave

Bloqueo epidural, anestesia regional, neumoencéfalo.

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Introduction

Epidural anesthesia-analgesia (AAED) techniques have been used for many years. The technique of choice for certain cases, such as analgesia for women in labor, is other times selected for the benefits it can offer in major surgery, such as better pain control (superior to any other analgesia technique) and the reduction of postoperative morbidity and mortality in high-risk patients. However, it is necessary to assess the risk-benefit ratio because this technique is not free of complications. Some may be considered only adverse effects of the drugs used, while others are direct complications from a neurological injury inflicted by needle trauma, infections, toxic effect of the drugs applied, or a compromised spinal cord due to ischemia or compression due to bruises or abscesses, and may be serious.¹

It is necessary to assess the risk-benefit ratio at decision-making time. Historically, the reported probability of a serious injury has been of 0.005% to 0.7%. Recent series, however, report that although serious injuries derived from an epidural hematoma or an abscess can be observed in 0.6 obstetric cases out of 100,000, up to 17 cases per 100,000 occur in non-obstetric cases.² In another recent series, it was documented that the joint probability of hematoma or epidural abscess occurred in up to 1 in every 1,026 blocks.

The following are some of the most important complications:

- a. Post-dural-puncture headache (25%) - is more frequent in young patients after accidental meningeal puncture. Its incidence has decreased due to the use of smaller, non-cutting trocars.
- b. Back pain (18-25%) - is a frequent cause of discomfort and of patient rejection of future regional anesthesia. It is usually an acute self-limiting pain.
- c. Hypotension (12-23%) - presents a systolic pressure below 100mmHg or a decrease in

systolic pressure by 20%.⁽¹⁾ It is produced by the blockage of sympathetic preganglionic fibers, causing distal vasodilatation and accentuated by the position that the patient must maintain after the application (dorsal decubitus).

- d. Neurological complications - they have the lowest incidence but are the main source of fear before the procedure is performed. Clinically, they are characterized by nuchal rigidity, intense headache, local pain, fever, leukocytosis, weakness of the lower extremities (after the fourth day) and paraplegia (24 hours after weakness of the extremities). It is defined as permanent damage to the spinal cord and/or its nerve roots. The main etiological factors are the (direct or indirect) damage produced by a trocar or catheter, neurotoxicity of local anesthetics, spinal cord ischemia due to hematoma or vasoconstriction, and infection producing temporary or permanent paralysis.

- e. Pneumocephalus is a collection of air in the intracranial compartments, intraventricular, subarachnoid, subdural, or extradural. It is a rare complication of epidural anesthesia that occurs when air is injected accidentally into the subarachnoid space with the loss-of-resistance technique. This technique has been associated with other complications such as compression of the cauda equina and a high rate of dural puncture. Clinical manifestations of pneumocephalus include frontal headache, paresthesias, meningeal signs, changes in blood pressure, loss of consciousness, and mydriasis. The diagnosis is confirmed with CT or MRI. It usually reabsorbs spontaneously in less than 3 days if its origin was an epidural anesthesia.

Case report

A 38-year-old female patient underwent a hysterectomy due to the presence of uterine fibroids. For the anesthetic procedure, a regional block using an epidural was performed. The immediate postoperative period went without complications for both the surgical operation and the anesthetic procedure. At 24 hours, in the hospital ward, the patient suffered a severe headache of a 9/10 scale, dizziness, and unsteadiness when walking. The Anesthesiology service counteracted those symptoms. Not yielding to intravenous analgesia like local patches, they requested interconsultation with the Neurology service. The patient was examined and a meningeal sign associated with intense headache was detected. A cranial tomography was indicated and the presence of air

in the skull and spine was observed. (Figures 1-3) Pneumocephalus was diagnosed and treatment started consisting of hydration, antibiotic therapy, intravenous steroids, and consultation with the hyperbaric medicine service of the Central Military Hospital. At 72 hours from onset, a session was performed using hyperbaric oxygen at 3 ATAS for 90 minutes in a multi-place chamber twice a day, resulting in improvement of the symptomatology by diminishing the headache at 30 minutes into the session and decreasing the rigidity at 60 minutes into the session. She was discharged without complications. A control tomography of the skull showed a reduction in the amount of intracranial air that had been observed in the first study. (Figures 4-6)

Figure 1,2 y 3. Neuro-axis tomography with the presence of air before therapeutic measures.

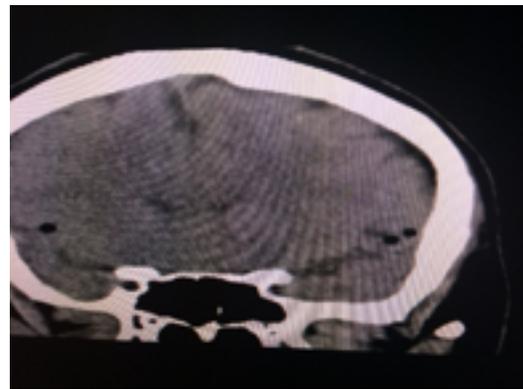
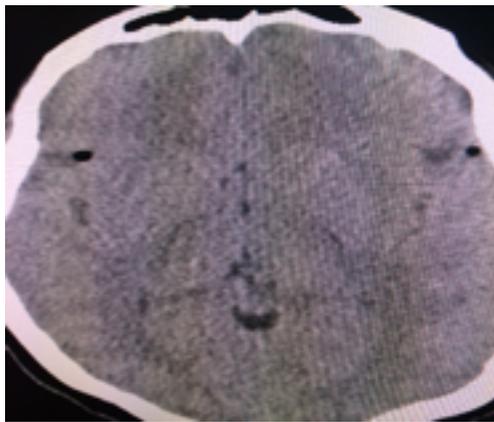
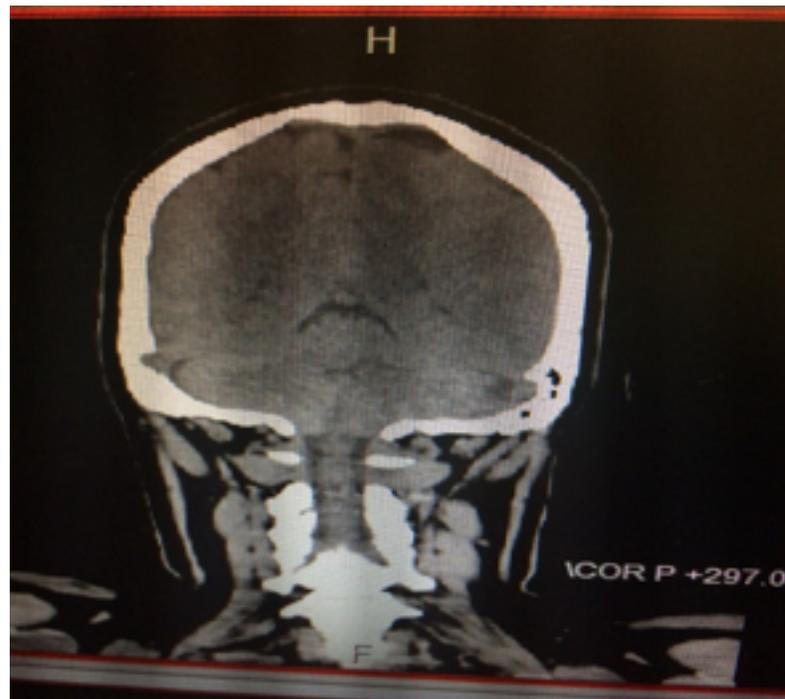
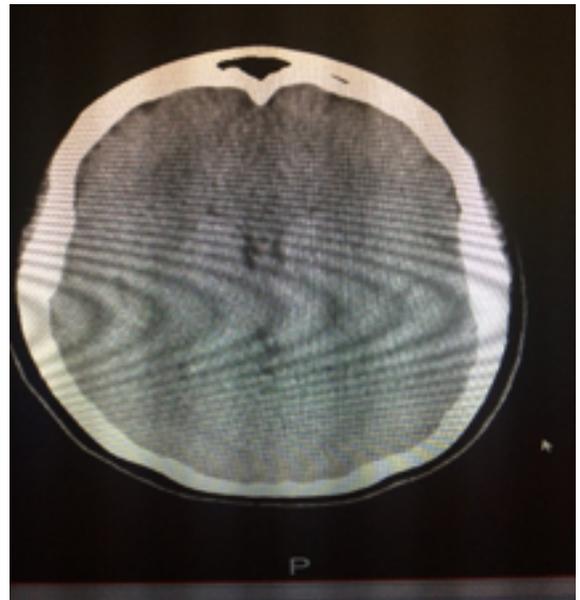


Figure 4,5 y 6. Tomography after therapeutic measures, including the hyperbaric chamber.



Discussion

It is important that the patients are well informed about the epidural procedure and its possible complications so they can fully cooperate at the time the puncture is performed. It should be applied only in the cases when it is indicated so that it really is a useful tool and not an added complication. Risk-benefit ratios should always be considered.

Although multiple and varied complications have been reported, it should be noted that they are rare, so patients and practitioners should not be afraid to use epidural anesthesia since it is a great advance in the branch of anesthesia and a great help to both the patient and the treating doctor. With respect to hyperbaric medicine, it is a complementary systemic treatment in which 100% oxygen is breathed at an atmospheric pressure higher than normal (760 mmHg at sea level) in a pressurized environment (hyperbaric chamber) at pressures of 1.5-3.0 ATA (Atmosphere Absolute). It is a safe procedure with few side effects when used safely by qualified medical and technical personnel and with an appropriate selection of patients. The first indications regarding the usefulness of the Hyperbaric Oxygen Therapy were for decompression sickness and gas embolism related to the practice of scuba diving and carbon monoxide poisoning, with subsequent applications in different fields of medicine. The hyperbaric chamber is currently one of the most effective options to treat pneumocephalus that occurs as a complication of surgical, diagnostic, and therapeutic events (iatrogenic gas embolism), or diving (which is less frequent).

Conclusions

Epidural anesthesia is a safe and effective technique, though not without risks such as the ones we have mentioned. Many of these complications can be avoided by having a qualified and knowledgeable practitioner perform the most appropriate technique for its specific case. In special cases, the use of hyperbaric oxygen for the adequate management of, in this case, pneumocephalus, is an effective and safe therapy to treat air embolisms and their complications.

Conflicts of interest

The authors state that there are no relevant conflicts of interest in this study.

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