

# Cervical dural puncture and lumbar extradural blood patch

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*The authors report the successful treatment of post-dural puncture headache, consequent to a cervical dural puncture, with a lumbar extradural blood patch. The increase in intracranial pressure generated by the injection of autologous blood in the extradural space seems to be the likely mechanism for the prompt relief of post-dural puncture headache. We conclude that extradural injection of autologous blood at the same level of the dural puncture may not be necessary.*

*Les auteurs rapportent la réussite du traitement par un blood patch épidual lombaire d'une céphalée post-durale consécutive à une ponction cervicale de la dure-mère. L'augmentation de la pression intracrânienne générée par l'injection de sang autologue dans l'espace épidual semble constituer un mécanisme plausible du soulagement rapide de la céphalée post-durale. Les auteurs concluent que l'injection épidurale de sang autologue au même niveau que la ponction peut ne pas être nécessaire.*

Puncture of the lumbar dura occurs during the performance of a spinal tap and post-dural puncture headache (PDPH) is a complication of dural perforation.<sup>1</sup> A lumbar extradural blood patch (EBP) is the treatment of choice in the presence of persistent PDPH.<sup>2</sup>

We describe a case in which a lumbar EBP was successfully used to treat PDPH secondary to the puncture of the cervical dura.

## Case report

A 38-yr-old woman suffered a cervical dural puncture during the injection of extradural steroids for the treat-

ment of chronic neck pain. While advancing a 25-gauge Quincke needle at the C<sub>6-7</sub> interspace, leakage of spinal fluid was noted. The needle was withdrawn until no leakage was evident and then 5 mm further. Then, methylprednisolone 80 mg diluted to 8 ml in normal saline was given extradurally.

Two days later she developed headache that was located posteriorly and exacerbated by the upright position. She was told to avoid the upright position, to drink plenty of fluids, and to take acetaminophen 300 mg *po* every four to six hours. Her headache did not respond and four days after the dural puncture she was instructed to take Cafegot tablets (ergotamine tartrate 1 mg and caffeine 100 mg) 200 mg *po* tid. This regimen was continued for 24 hr but did not provide relief. The patient was referred for further evaluation and admitted to the hospital. Her physical examination was unremarkable. A midline scar was present in the cervical area. There were no visual or auditory disturbances. Her headache was still posteriorly located and constant. It improved dramatically in the recumbent position and worsened in the sitting position. She reported that she had never experienced this kind of headache and described it as unbearable. Four months previously she had undergone cervical discectomies with no relief of her neck pain, which was still confined to the posterior neck area and rated mild at that time. Her oldest MRI showed herniated discs at C<sub>5-6</sub> and C<sub>6-7</sub> and a more recent one showed signs of cervical discectomies. Under sterile conditions and in the sitting position a lumbar extradural blood patch was performed at the L<sub>3-4</sub> interspace with 20 ml autologous blood via a 17-gauge epidural Tuohy needle. Her headache resolved within one to two minutes of the completion of the procedure and she felt comfortable in maintaining the sitting position. One week after the procedure, and 12 days after her dural puncture, the patient was free of headache.

## Key words

ANAESTHETIC TECHNIQUES: extradural;  
COMPLICATIONS: post-dural puncture headache.

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## Discussion

Extradural blood patching is used to treat PDPH consequent to a lumbar puncture.<sup>2</sup> The continuous leakage of CSF from the dural hole and the reduction in CSF pressure seems to be the responsible mechanism of PDPH. Indeed the incidence of PDPH is directly related

to the needle size. The ability of an EBP to "seal" the dural hole and to allow the reestablishment of physiological intracranial pressure is thought to be the mechanism of the successful treatment of PDPH.<sup>3</sup> Since CSF production, under physiological conditions, is in the range of  $0.5 \text{ ml} \cdot \text{min}^{-1}$  this theory does not explain the *prompt* relief from PDPH that, on many occasions, follows the performance of an extradural blood patch.

Two theories have been proposed to explain this prompt response. The first suggests that the relief of PDPH is the result of the injected volume of blood in the extradural space increasing the pressure in the subarachnoid space. This increased pressure forces CSF inside the cranium and restores normal intracranial pressure.<sup>4</sup> Indeed epidural injections of 10 mL of local anaesthetics transiently increase CSF pressure.<sup>5</sup> The second theory postulates that a rapid coagulation response quickly creates a clot that stops CSF leakage.<sup>6</sup> It has been demonstrated, *in vitro*, that when CSF is mixed with blood, a clot will form in about 22 sec, some four times faster than an activated clotting time.<sup>6</sup>

This case supports the theory that the "volume" of the injected blood is the mechanism for the prompt relief of PDPH. Even though the incidence of PDPH is relatively low with the use of a 25-gauge needle, the recent medical history of this patient (i.e., documented dural puncture), the features of her headache (i.e., postural), and the temporal relationship of these events (headache two days after dural puncture) strongly support the diagnosis of PDPH. In our patient a placebo effect may have been responsible for resolution of PDPH but is unlikely. It is possible that the injection of 20 ml of autologous blood in the lumbar extradural space may spread to the cervical region. However, it is unlikely that the small amount of blood that reaches the cervical dura would seal a dural hole. Therefore the rapid clot formation along with the "sealing" effect is unlikely to have been the mechanism for resolution of PDPH. In addition, stopping CSF leakage does not restore physiological intracranial pressure immediately, since replacement of CSF is a relatively slow process.

In our patient PDPH did not recur. This is expected and can be ascribed to the natural history of the healing process of a dural puncture and, perhaps, to the ability of an EBP to form a clot. We postulate that the mechanical presence of this clot in the extradural space would sustain a prolonged increase in CSF pressure until the fibrinolytic dissolution of the clot itself.

In summary, we present a case where PDPH from a cervical dural puncture was successfully treated with a lumbar EBP. This case supports the "volume" theory as the mechanism for the prompt relief of PDPH and

suggests that blood patching at the same level of the dural hole may not be necessary.

#### References

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