Blood patch for the treatment of post-dural puncture tinnitus

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Abstract
Audiometric disturbances are recognised as potential complications after spinal or epidural anaesthesia; however, incidences of tinnitus occur less frequently. We report a case of a patient with severe bilateral tinnitus post-lumbar puncture who was treated with an epidural blood patch. A 40-year-old ASA I lady (a medically fit patient with no known medical problem) presented with ongoing bilateral severe tinnitus for 6 days after a lumbar puncture. Venous blood (18 mL) was injected into the epidural space using a 16G needle. The patient completed the Tinnitus Handicap Inventory Questionnaire before the blood patch, 3 h, 24 h and 1-month post-procedure. An audiogram was also conducted before and 1 month after the blood patch. The patient scored 84 (grade 5) on the Tinnitus Handicap Inventory before the blood patch. Three hours post-procedure, her score improved to 16 (grade 1), with complete resolution by 24 h. Audiogram revealed a low-frequency mild sensorineural hearing loss in the left ear prior to the procedure. By her 1-month follow-up, her hearing loss was back to normal. In our experience, an epidural blood patch is an effective treatment for post-dural puncture tinnitus. Its effects are instantaneous and complete resolution is achieved by 24 h.

Keywords
Otolaryngology, lumbar puncture, tinnitus

Introduction
Procedures involving the insertion of a needle into the interspinous space have values as a diagnostic tool and for epidural and spinal anaesthesia. Audiometric disturbances have long been recognised as a potential complication; however, incidences of tinnitus occur less commonly. Although this may be accompanied by a headache (and frequently overshadowed by it), failure to diagnose and treat tinnitus can affect a patient’s quality of life. Its rarity presents a challenge for treatment, as the underlying assumption is that it shares a common aetiology with post-dural headaches. It would thus seem plausible to use an epidural blood patch, as evidenced here in this case report, for the treatment of post-dural puncture tinnitus.

Case
We report a case of a 40-year-old ASA I lady who presented with ongoing bilateral severe tinnitus for 6 days after a lumbar puncture. The patient also suffered from a headache that resolved by Day 6; however, her tinnitus had persisted. She described the tinnitus as severe and had caused great emotional distress. In addition, she reported subjective minor hearing losses in both ears, which were not fluctuating. There were no visual or balance problems — no vertigo, dizziness, ear fullness or migraines. Cranial nerve and otoscopic examinations were both normal. Audiogram revealed a normal hearing in the right ear and a low-frequency mild sensorineural hearing loss in the left ear (Figure 1). Tympanograms were normal.

She had been involved in an early Alzheimer’s randomised controlled trial for the last 3 years and had been getting a trial medication or placebo every 3 months. She was otherwise well and not on any other medications. As part of the trial, she was required to have a lumbar puncture yearly. She reported no long-lasting neurological sequela after the previous two
lumbar punctures, usually only reporting mild headache that would eventually subside. However, this time, she presented with refractory bilateral tinnitus persisting for 6 days. In view of her ongoing symptoms, a decision was made to perform a blood patch. The patient had not received any medical therapy prior to this.

For the procedure, 20 mL of venous blood was extracted from the patient’s right antecubital fossa and 18 mL of blood were injected into the epidural space with a 16G epidural needle. She reported immediate resolution of the tinnitus in her right ear, and by 24 h, the tinnitus in her left ear had also resolved. The patient completed a Tinnitus Handicap Inventory Severity Scale2,3 before and after the procedure. She scored 84 on the scale pre-procedure, which is classed as grade 5 or ‘catastrophic handicap’. She was discharged on the same day with questionnaires to complete. She was reviewed at 1 month in the otolaryngology clinic. A repeat audiogram revealed that her hearing was back to normal (Figure 2).

Discussion

This case illustrates that tinnitus may arise secondary to lumbar puncture and that an epidural blood patch can dramatically alleviate the symptoms. Improvement was noted almost instantaneously and showed complete resolution at 24 h. These effects persisted 1 month after the procedure.

Tinnitus remains a debilitating symptom, not uncommonly associated with frustration, depression and even suicide. The cause of tinnitus post-lumbar puncture remains unknown, although one suggestion is that a dural leak may result in a decrease in cerebrospinal fluid (CSF) pressure and thus intra-labyrinth pressure. This relationship exists because the subarachnoid space is directly linked to the cochlea via the cochlea aqueduct and the composition of the perilymph resembles that of CSF. It has been proposed that pressure imbalances within the perilymph and endolymph could lead to auditory symptoms such as tinnitus. Another theory is that continued CSF hypovolaemia causes traction on the vestibulocochlear nerve as it crosses the posterior cranial fossa, resulting in neurapraxia of the nerve.4

Tinnitus remains a rare complication of lumbar punctures and neuraxial anaesthesia, and it would be difficult to predict which patients would develop them. Fog et al.5 showed that larger diameter spinal needles led to increased incidences of hearing loss although this does not necessarily apply to cases of tinnitus. For this case report, we have been unable to gain information on the lumbar puncture equipment, as it was part of an ongoing clinical trial.

This is the first case report of tinnitus post-lumbar puncture, with objective symptom scoring before and after the procedure. To date, only a few cases of tinnitus have been reported, all following either a spinal or an epidural anaesthesia.6–12 The tinnitus in these reports completely resolved with the application of a blood patch, except for one case that resolved with an epidural anaesthesia administered for a completely separate operation 8 years after the initial insult.7 Similarly, Narchi et al.8 reported on a patient who experienced persistent tinnitus for 4 years before successful treatment with a blood patch. The latter two cases show that the effects are potentially reversible regardless of timing and that efforts should be made to diagnose and treat post-spinal tinnitus. All the studies report a different time course from onset to resolution, ranging from hours to days for the onset of tinnitus and similarly hours to days for resolution after an epidural blood patch.

Conclusion

In summary, an epidural blood patch is an effective treatment for post-lumbar puncture tinnitus. Clinicians should be wary of a previous spinal puncture when encountered with cases
of tinnitus as the onset may be delayed and remain persistent for several years after the initial injury.

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