



DRY TAP IN SPINAL ANAESTHESIA...IS TOLVAPTAN THE CULPRIT?

Dr. Shantnu Bhanwala¹, Dr. Abraaq Asma Riyaz², Dr. Mansha Madan^{*3}, Dr. Yawar Shoaib Ali⁴, Dr. Simarjot Singh Sodhi⁵

¹MBBS, Post-graduate student, Department of Anaesthesiology, Hamdard Institute of Medical Sciences And Research, New Delhi-110062 E-mail Id: drshantnu95@gmail.com ORCID : 0009-0000-2197-2624

²MBBS, MD Anaesthesiology, Associate Professor Department of Anaesthesiology, Hamdard Institute of Medical Sciences And Research, New Delhi-110062 E-mail Id: abraql1@gmail.com ORCID: 0009-0007-8001-8540

^{*3}MBBS, MD Anaesthesiology, DNB Anaesthesia, Fellowship in Pain and Palliative Medicine, Assistant professor, Department of Anaesthesiology, Hamdard Institute of Medical Sciences And Research, New Delhi-110062 E-mail Id: drmansha.madan@gmail.com ORCID ID: 0009-0006-9792-2053

⁴MBBS, MS, MCH Neurosurgery, Associate Director, Department of Neurosurgery, Sarvodya Hospital, Faridabad, Haryana 121006 E-mail Id: yawarsh@gmail.com ORCID:0009-0002-5021-3576

⁵MBBS, MS Orthopaedics, DNB Orthopaedics, Assistant Professor Orthopedics, Hamdard Institute of Medical Sciences and Research, New Delhi E-mail id - simarjotsodhi@gmail.com ORCID: 0000-0002-4712-4970

***Corresponding Author:** Dr. Mansha Madan

^{*}MBBS, MD Anaesthesiology, DNB Anaesthesia, Fellowship in Pain and Palliative Medicine, Assistant professor, Department of Anaesthesiology, Hamdard Institute of Medical Sciences And Research, New Delhi-110062 E-mail Id: drmansha.madan@gmail.com ORCID ID: 0009-0006-9792-2053

ABSTRACT

For Lower limb surgeries in elderly patients, regional anaesthesia is generally favoured due to its stable cardiovascular profile and smoother postoperative recovery. However, factors such as medication effects and age-related spinal changes can complicate its administration. We report the case of an 80-year-old female with hypertension, prior stroke, and chronic hyponatraemia on tolvaptan, who presented with a left femur fracture for proximal femoral nailing. Multiple spinal attempts at different interspaces using 23- and 25-gauge Quincke needles produced the characteristic “give-way” sensation but no cerebrospinal fluid return, resulting in a dry tap. The procedure was subsequently converted to general anaesthesia. Tolvaptan, a vasopressin receptor antagonist causing aquaresis, may have contributed to reduced CSF volume and dehydration. This case highlights the importance of recognising drug-related causes of failed spinal anaesthesia. Detailed preoperative assessment, adequate hydration, and preparedness for alternative anaesthetic techniques are essential for safe management in high-risk elderly patients.

Introduction

In elderly patients, regional techniques are commonly preferred for lower limb surgery, as they provide stable haemodynamics and quicker recovery. Spinal anaesthesia is performed blindly using a landmark-based technique. Nonetheless, degenerative spinal changes, patient position, obesity and other anatomical challenges often make the procedure technically demanding. We report a case of an elderly female with poor functional status scheduled for surgery in whom a dry spinal tap was encountered. There have been case reports about dry spinal taps, however, a correlation with Tolvaptan is nowhere to be found.

Case Presentation

An 80-year-old female with a history of fall presented with a left femur fracture and was scheduled for closed/open reduction with proximal femoral nailing (PFN). The patient had poor functional status. Pre-anaesthetic evaluation revealed left ventricular ejection fraction (LVEF) of 50% on 2D echocardiography and no evidence of provokable myocardial ischaemia. She had a history of hypertension since the last 10 years, and was on tab Telmisartan 40 mg+ tab Amlodipine 5 mg+ tab Metolar 2.5 mg. She had a past history of stroke for which she was on tab Ecosprin 75mg HS. She had chronic hyponatraemia for which she was started on tablet Tolvaptan 15mg. After multidisciplinary assessment, she was deemed fit for surgery under high-risk consent. On the day of surgery, after a quick pre-operative evaluation, the patient was shifted in OT, all monitors attached, HR-83/min, BP-130/85 mm Hg. 18 G IV cannula secured and Ringer lactate started. Regional anaesthesia was planned, and spinal anaesthesia was initially attempted at the L3–L4 interspace in sitting position via both median and paramedian approaches using a 25-gauge Quincke needle. Both attempts failed to yield cerebrospinal fluid (CSF) despite flushing the needle beforehand to confirm patency. Two additional attempts at the L4–L5 interspace also proved futile.

The patient was then repositioned in lateral with feet supported and chest flexed onto the knees, which improved identification of spinal landmarks. A midline approach was attempted at the L3–L4 level with a 23-gauge Quincke needle, although loss of resistance was felt, no cerebrospinal fluid could be aspirated despite multiple repositioning and needle adjustments. The needle was rotated 90° in case the bevel opening was partially outside the subarachnoid space, and slight withdrawal and advancement were performed; however, no backflow of CSF was observed. A third attempt at the L2–L3 interspace using the same needle and approach again produced the typical give-way feel but still failed to yield CSF. After so many attempts at changing position, space, needle, a mutual decision with surgeon was made and the surgery was done under general anaesthesia instead of spinal anaesthesia.

Discussion

The phenomenon of a dry tap during spinal anaesthesia poses a clinical conundrum. Although rare, it necessitates prompt reasoning and adaptation by anaesthesiologists. Reported causes include technical errors, blocked needle lumen, improper patient positioning, or anatomical/physiological variations such as prior spine surgeries, reduced CSF pressure, or apposition of the arachnoid against the pia mater. Dehydration and reduced CSF volume may further contribute to lack of free flow. Several adjunctive strategies have been described to improve accuracy in such situations.^{2,3} In our case, we tried to rule out all the possibilities, however the dehydration due Tolvaptan could not be ruled out intraoperatively.

Vasopressin receptor antagonists (VRAs), or vaptans, represent a novel class of agents with the unique ability to promote *aquaresis*, defined as the excretion of electrolyte-free water without accompanying solute loss. Tolvaptan, a selective vasopressin V₂-receptor blocker, promotes excretion of free water without significant electrolyte loss. While beneficial in hyponatraemia and volume overload, its aquaretic action may contribute to dehydration, potentially reducing CSF volume.. Consequently, VRAs have been explored in the management of conditions associated with water retention, most notably congestive heart failure (CHF), where they facilitate symptomatic

improvement by correcting dilutional hyponatremia and reducing volume overload⁴. In conclusion, while Tolvaptan is effectively used for hyponatraemia and polycystic kidney disease, it comes with its spectrum of side effects, increased thirst, frequent urination, dehydration, liver function abnormalities, dyselectrolytaemia, allergies, headaches, and Gastric disturbances.

Tsui et al. introduced an electrically insulated needle to provide real-time confirmation of intrathecal placement, even in the absence of CSF flow.^{5,6} Imaging modalities such as fluoroscopy, CT, or pre-procedural ultrasound can also improve success rates by delineating vertebral anatomy.⁷ In our case we did not attempt to inject the drug in absence of CSF flow, although some authors have reported safe spinal blocks despite absent CSF flow, the risk of complications—including subdural injection, high spinal, or spinal haematoma—should not be underestimated.

Conclusion / Clinical Message

Dry spinal tap is an under-recognised but significant challenge in elderly high-risk patients. A dry spinal tap, or failed cerebrospinal fluid (CSF) collection during lumbar puncture, poses diagnostic and therapeutic challenges, often linked to technical issues or pathological causes such as spinal canal obstruction or severe dehydration. Addressing underlying causes is crucial for improving success rates and patient outcomes. Many geriatric patients are on newer drugs like Tolvaptan for the management of chronic hyponatraemia. The likely possibility of tolvaptan induced dehydration leading to a dry spinal tap should be kept in mind before attempting spinal anaesthesia in such patients.

REFERENCES

1. Duniec L, Nowakowski P, Kosson D, Łazowski T. Anatomical landmarks based assessment of intravertebral space level for lumbar puncture is misleading in more than 30%. *Anaesthesiol Intensive Ther* 2013;45(1):1–6
2. Ramachandran K, Ponnusamy N: Dry tap and spinal anesthesia. *Can J Anaesth*. 2005, 52:1104-5. 10.1007/BF03021615
3. Sahu DK, Kaul V, Parampill R: "Dry tap" during spinal anaesthesia turns out to be epidural abscess . *Indian J Anaesth*. 2012, 56:287-90. 10.4103/0019-5049.98779
4. Izumi Y, Miura K, Iwao H. Therapeutic potential of vasopressin-receptor antagonists in heart failure. *Journal of pharmacological sciences*. 2014;124(1):1–6.
5. Tsui BC, Wagner A, Cave D, Seal R: Threshold current for an insulated epidural needle in pediatric patients . *Anesth Analg*. 2004, 99:694-6. 10.1213/01.ANE.0000130617.79600.05
6. Tsui BC, Wagner AM, Cunningham K, Perry S, Desai S, Seal R: Threshold current of an insulated needle in the intrathecal space in pediatric patients. *Anesth Analg*. 2005, 100:662-5. 10.1213/01.ANE.0000143953.31973.5F
7. Hudgins PA, Fountain AJ, Chapman PR, Shah LM: Difficult lumbar puncture: pitfalls and tips from the trenches. *AJNR Am J Neuroradiol*. 2017, 38:1276-83. 10.3174/ajnr.A5128