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CASE REPORT

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A stepwise management approach to an unexpected cause of a yellow CSF tap; A case report

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ABSTRACT

Chemical meningitis is a feared complication to the skin antiseptic solutions used in skin preparation during neuraxial blocks. We report a case of a yellow CSF tap with a suggested management protocol.

MAIN POINTS

Yellow CSF tap could indicate a possible CSF contamination with Povidone-iodine.
A contaminated spinal needle can be a source of chemical meningitis.
Use of disposable spinal trays for skin preparation should be encouraged to avoid the possibility of CSF contamination.
A stepwise management protocol for contaminated spinal needle may help to decrease the incidence of chemical meningitis.

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Chemical meningitis; aseptic meningitis; CSF tap; antisepsis; povidone-iodine; spinal anesthesia

1. Introduction

Essentially, skin asepsis is a preparatory step before the institution of neuraxial blocks to avoid bacterial meningitis [1]. Povidone-iodine (PI) and chlorhexidine are commonly used antisepsis solutions for skin disinfection before neuraxial blocks [2], and they are linked to the development of neurotoxicity of both neural tissue and Schwann cells [2,3].

We report a case with a yellow CSF tap that warrants our attention to make a stepwise approach to avoid the possibility of chemical meningitis.

2. Case report

A 31-year-old male patient was admitted to the operation room for left knee arthroscopic acute cruciate ligament (ACL) reconstruction under spinal anesthesia. After patient assessment and laboratory results revision, informed consent was taken for spinal anesthesia. An intravenous sedative was given to the patient in the form of 2 mg of midazolam. Under complete aseptic condition, L3-L4 space was chosen for lumbar puncture.

In our hospital, we use a reusable spinal anesthesia tray. The tray commonly contains a clamp, sponge-holding forceps, gallipot, gauze, and sterile drapes. A sterile peeling and opening of required syringes, gloves, and the spinal needle were done by an anesthesia technician. A 25 G BD® Spinal Needle, Spain, was used for lumbar puncture. Skin preparation was done with Povidone Iodine 10% that was let to dry before needle puncture. During PI pouring in the gallipot, spillage occurred over the spinal needle plastic cover. Wiping of betadine was immediately done by sterile gauze. After subcutaneous infiltration of the skin with 3 ml of lidocaine, the plastic cover of the spinal needle was removed. However, a yellow stain at the tip of the spinal needle was noticed and wiped thoroughly by a clean sterile gauze.

An easy lateral approach of lumbar puncture at the level of L3–4 space was achieved successfully. However, after withdrawal of the needle stylet a yellowish CSF appeared in the needle hub. To avoid the possibility of chemical meningitis and be sure that the yellow stain was not on the outer surface of the needle hub, the bupivacaine syringe was attached to the hub but spiration revealed a yellow CSF tab. Consequently, withdrawal of the spinal needle was done, and the contaminated bupivacaine syringe was discarded. Another sterile bupivacaine syringe and spinal needle were prepared. The new spinal needle was introduced through the previous attempt puncture with a gainful clear CSF tap. Before attaching the new bupivacaine syringe, a few milliliters of CSF were left to trickle out to be sure that no PI was left inside the tissue planes. After a negative aspiration test, 4 ml of hyperbaric Bupivacaine 0.5% plus 20 micrograms of Fentanyl were injected intrathecally. A successful

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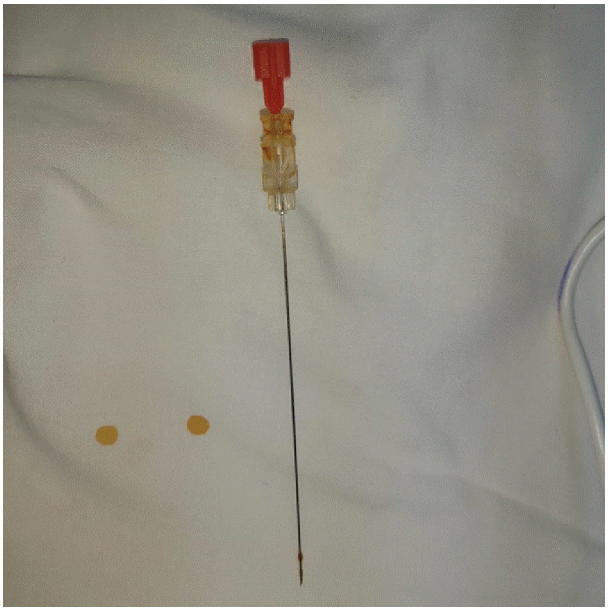
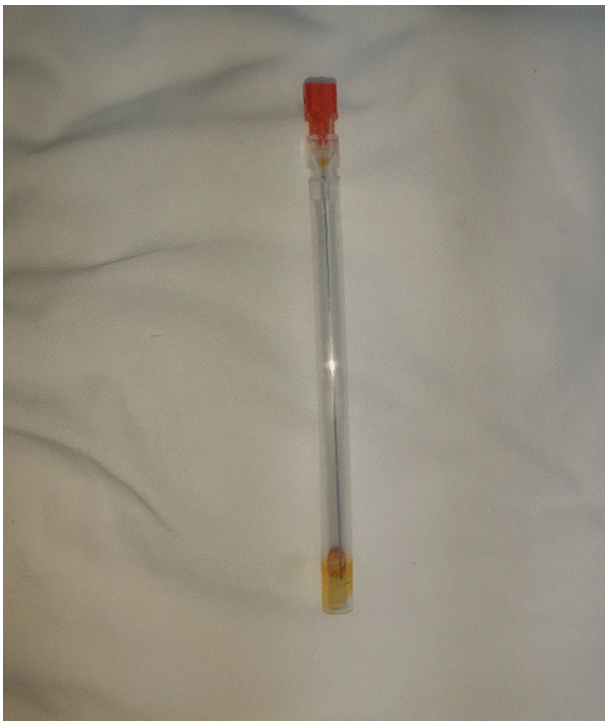
desirable surgical level was obtained, and surgery commenced thereafter. The patient was discharged home without any complications or signs of chemical meningitis.

3. Discussion

Skin antisepsis is an integral part of the aseptic technique performed before central neuraxial blocks (CNB). PI and chlorhexidine gluconate are the most commonly used antiseptic solutions [4]. We used PI 10% for skin antisepsis as this was the local protocol in our hospital. Unfortunately, we do not have commercially prepared disposable spinal trays, so spillage of PI occurred during its pouring.

Despite safety guidelines recommend the use of Chlorhexidine gluconate for skin preparation as it possesses many advantages over PI such as rapid onset, longer duration, superior bactericidal effect, and less skin sensitivity. However, it should be kept away from all equipment and drugs used for CNB and should be left to dry before a needle puncture. Also, guidelines recommend that the operator should change his gloves before the procedure if contaminated by chlorhexidine and to use a low concentration of chlorhexidine to avoid neurotoxicity [4].





Chemical or aseptic meningitis is a rare complication of spinal anesthesia. Its diagnosis is difficult and commonly done by exclusion. Contamination of spinal needles and syringes with the antiseptic solution can cause meningeal irritation and aseptic meningitis [5].

Iatrogenic meningitis can occur following spinal anesthesia, epidural anesthesia, lumbar puncture, or myelography [6]. Studies showed that chemical meningitis may occur if PI or chlorhexidine contaminated the CSF even at a dose of fewer than 0.1 ml of the solution [1].

As the spinal needle had a stylet; we thought that Betadine solution will not leak to the interior of the needle, but this was not the case. When we passed the dura with the 1st needle, a yellow tap was noticed and we discovered that PI leaked through the needle. Thus, we tried to ensure that no PI droplet could be passed to the subarachnoid space and we managed that situation as described.

Aseptic meningitis can present within the 1st 24 h after dural puncture with acute onset of headache, photophobia, neck stiffness with absent fever, negative CSF cultures for organisms, and normal CSF glucose levels. Aseptic meningitis is usually a self-limiting disease [5].

Although Xanthochromia is a yellow, pink, or orange discoloration of the CSF that can be caused by subarachnoid hemorrhage, traumatic tap, or hyperbilirubinemia [6], and bloody and dry taps are well known [7,8]. However, a yellow tap in our case was a warning sign of the possibility of CSF contamination with PI. The possibility of PI contamination as a cause was not described before. A stepwise management approach in the form of withdrawal of the contaminated needle, institution of a new needle inside the same tissue track, and allowing a few drops of CSF to drop out of the needle can prevent PI from finding access to the subarachnoid space. In fact, awareness about this mishap and rigorous compliance with skin antisepsis recommendations are the cornerstones in protection against chemical meningitis. Moreover, manufacturing spinal needle covers with a blind end could offer more protection.

4. Conclusion

A yellow CSF tap could be caused by Povidone-iodine contamination. A stepwise management approach to manage this incident could prevent the development of chemical meningitis. However, adherence to the safety guidelines with the use of Chlorhexidine and the disposable spinal trays for skin preparation could obviate this problem.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Authors' contributions

H.M. developed the design of the study. T.M and H.M took the lead in writing the manuscript. H.M., T.M. and K.S performed the literature search, manuscript preparation, and revision. All authors read and approved the final manuscript before submission.

Competing interests

The authors declare that they have no competing interests.

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