Ain-Shams Journal of Anesthesiology

CASE REPORT

Open Access

An incidental finding of xanthochromia during spinal anaesthesia in a patient posted for lower limb surgery

Sumedha Mehta[1*], Kavita Adate[1] and Kiran Valake[1]

Abstract

Background Xanthochromia is the yellowish discoloration of cerebrospinal fluid associated with serious conditions like subarachnoid haemorrhage and spinal cord tumour which raises concerns regarding safety when presented during spinal anaesthesia. There is limited literature regarding the clinical implications of spinal anaesthesia in xanthochromia.

Case presentation We report a case of a 31-year-old male patient with an incidental finding of xanthochromia cerebrospinal fluid during spinal anaesthesia. The patient with a history of fall was posted for lower limb orthopaedic surgery under subarachnoid block. In the process of administering the block, the pale yellow coloured cerebrospinal fluid was encountered.

Conclusion We conclude that proceeding with spinal anaesthesia in xanthochromia should be at the discretion of the anaesthesiologist and further investigations for the diagnosis can be considered for the management in such cases.

Keywords Xanthochromia, Cerebrospinal fluid (CSF), Spinal anaesthesia, Case report

Background

Yellow discoloration and coagulation of the CSF was first described in meningitis by Georges Froin in 1903 and in spinal tumours by Max Nonne, also known as Nonne-Froin sign (Koton and Bisharat 2017). This case report discusses the incidental finding of xanthochromia and literature regarding clinical implications and safety of spinal anaesthesia in such cases.

Case presentation

We report a case of a 31-year-old male patient who was admitted to our institution for orthopaedic treatment and had an incidental finding of xanthochromia. The patient had a history of a fall from height and suffered from a fracture of the third lumbar vertebra and a closed fracture of the distal tibia of the right leg with no head injury. The patient was operated on in a private hospital for a lumbar fracture. After an un-eventful post-operative stay at this hospital for 2 weeks, the patient shifted to our institution for surgery on a tibia fracture. On admission, a detailed history and clinical examination was done. There was no history of associated comorbidities and no history of loss of consciousness, headache, vomiting, and ENT bleeding after the fall. CT brain done in the previous hospital was normal with no new symptoms or neurological deficit detected; head injury was ruled out by neurosurgical opinion. X-ray of the right tibia showed a closed fracture of the distal tibia, so open reduction and internal

*Correspondence:
Sumedha Mehta
drsumedhamehta1@gmail.com
[1] Department of Anaesthesiology and Critical Care, Smt. Kashibai Navale Medical College & General Hospital, Q-1, Doctor's Staff Quarters, SKNMC & GH, Narhe, Pune, India

fixation were planned. On the second day of admission, the patient had a high-grade fever; on the investigation, the patient was diagnosed with dengue fever which was treated with intravenous fluids and paracetamol. Investigations showed derangements in the liver enzymes and an increase in serum bilirubin 1.6 mg/dl. After a week, the patient recovered from dengue, and liver enzymes and bilirubin showed a decreasing trend. Platelet count and coagulation profile, electrocardiography (ECG), and chest X-ray were within normal limits.

After 1 week of adequate recovery from dengue and optimization, the patient was posted for surgery under spinal anaesthesia. After confirming nil by mouth status, informed written consent, and site of operation, the patient was shifted to Operation Theatre. All standard American Society of Anaesthesiologists (ASA) monitors were attached like ECG, non-invasive blood pressure, and pulse oximetry. Under all aseptic precautions in a sitting position, a 26-G Quincke's needle was inserted at the L4-L5 interspace. On reaching the subarachnoid space on the first attempt and after removing the stylet, we found pale yellow-coloured cerebrospinal fluid at the needle hub as shown in Figs. 1 and 2. Xanthochromia was identified, and considering the clinical implications of xanthochromia, we decided to abandon the spinal anaesthesia. A sample of yellow-coloured CSF was collected under all aseptic precautions and sent to the laboratory for further analysis. We proceeded with general anaesthesia. Surgery went uneventful with minimal blood loss. The patient was extubated and shifted to the ward post-operatively. Xanthochromia was diagnosed by visual detection, and CSF analysis showed slightly increased protein 50 mg/dl, and sugar and cytology were normal, with no growth on culture. Also, the patient did not show any signs and symptoms of subarachnoid haemorrhage, so a repeat CT brain was not done. The patient recovered well and was discharged uneventfully from the hospital after 2 weeks.

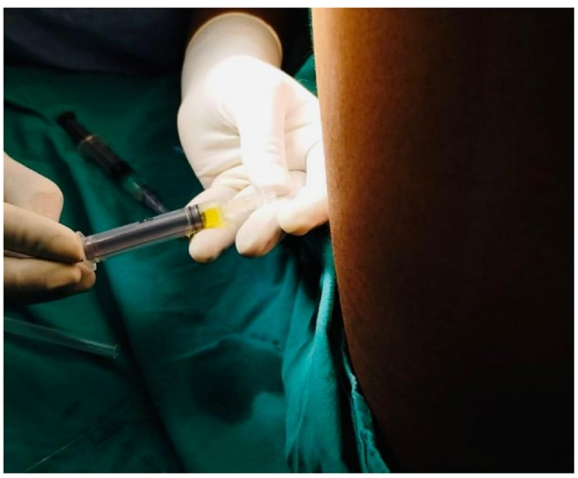

Fig. 1 Xanthochromia CSF

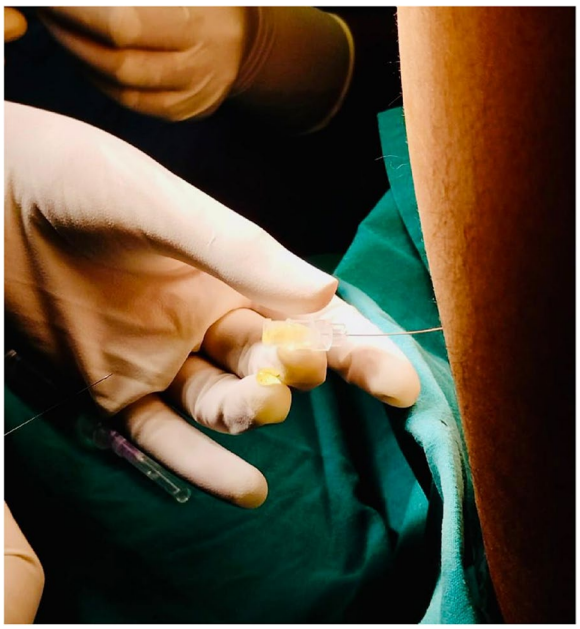

Fig. 2 Xanthochromia

Discussion

Xanthochromia is a yellow, orange, or pink discoloration of the CSF, most often caused by the lysis of RBCs resulting in haemoglobin breakdown to oxyhaemoglobin, methemoglobin, and bilirubin (Seehusen et al. 2003). Xanthochromia is associated with subarachnoid haemorrhage (SAH), Guillian-Barre Syndrome, intracranial bleed, spinal cord tumours, acute purulent meningitis, blood dyscrasias, hyperbilirubinemia, high CSF protein, and traumatic spinal tap (Koton and Bisharat 2017; Seehusen et al. 2003). The most common cause of xanthochromia is subarachnoid bleed which can be missed with negative CT brain. The sensitivity for detecting a bleed by CT decreases from up to 95% on day 1 to less than 10% in 3 weeks, with the sensitivity of CSF analysis for xanthochromia remaining constant near 100% over this time (Petzold et al. 2005). Diagnosis of xanthochromia can be done by direct visualisation in which the CSF sample is centrifuged, and the supernatant is visually inspected for yellow colour. The second method is spectrophotometry which is considered superior to visual inspection (Sidman et al. 2005; Petzold et al. 2004).

One of the causes of xanthochromia was cited as subarachnoid haemorrhage. In our case, this is the probable cause as the patient had a history of fall from height. However, there were no signs or symptoms of head

injuries or increased intracranial pressure and CT brain which was done within 12 h of fall was normal. We can assume that it was missed or was minor so that it was not detected. Another possibility can be spine surgery with instrumentation resulting in localised trauma. However, there was no neurological signs or symptoms to support that assumption. We consider dengue fever can be a contributing factor to xanthochromia due to an increase in serum bilirubin level. However, serum bilirubin does not cross the blood–brain barrier and was not significantly raised in our case. Viral or bacterial meningitis was the least likely cause as CSF analysis was normal with no correlating clinical signs.

Our initial plan was regional anaesthesia as surgery was of the lower limb with no major contraindications for the same. However, when we encountered yellowish CSF, we were in a dilemma whether to proceed or abandon the procedure. We considered general anaesthesia to be the safer option for surgery.

Gokahmetoglu et al. reported a similar finding of xanthocromic CSF during spinal anaesthesia; they decided to abandon the surgery for further investigation. The patient was subsequently diagnosed with Froin syndrome due to an intramedullary mass lesion resulting in spinal blockade, high CSF proteins, and xanthochromia (Gokahmetoglu et al. 2014).

In an interesting case report by Minz et al., the author encountered xanthochromia and decided to proceed with spinal anaesthesia. They were able to achieve adequate subarachnoid blockade with no postoperative complications (Minz et al. 2022).

Adabala et al. in their case report recommended that subarachnoid block should be abandoned when encountered with yellow CSF as it may be associated with CSF obstruction, spinal tumour, or vertebra deformity that may make the sensory and motor anaesthesia unpredictable (Adabala et al. 2019). In our case, considering the same possibilities, we decided to abandon the surgery under spinal anaesthesia and proceeded with general anaesthesia. We want to share our experience as we have not encountered xanthochromia previously, with limited literature and experience, proceeding with spinal anaesthesia in our case was a critical decision. After extensive literature research we found few case reports in which anaesthesiologist faced the similar problem of xanthochromia with the difficult decision-making regarding anaesthesia (Gokahmetoglu et al. 2014; Minz et al. 2022; Adabala et al. 2019; Singh et al. 2015). The opinion regarding the safety of subarachnoid block in xanthochromia varies with anaesthesiologist, so decision to proceed or abandon anaesthesia should be individualised depending on history, associated signs, and symptoms of the patient.

Conclusions

Literature shows there are high chances of undiagnosed subarachnoid bleed and spinal tumours, so we conclude that proceeding with spinal anaesthesia should depend on the discretion of anaesthesiologist.

Abbreviations

CSF Cerebrospinal fluid
CT Computerized Tomography
ENT Ear, nose, and throat
ECG Electrocardiography
ASA American Society of Anaesthesiologists

Acknowledgements

None.

Authors' contributions

All authors equally contributed to preparing this manuscript. We confirm that the manuscript has been read and approved by all the authors, that the requirements for authorship are met by all authors regarding the preparation of the manuscript, and that each author believes that the manuscript represents honest work.

Funding

None.

Availability of data and materials

None.

Declarations

Ethics approval and consent to participate

Not taken. We have submitted a case report, and this does not require ethical committee approval in our institution as we were not studying any drug or new intervention. We have taken informed written consent from the patient which is standard in our institution.

Consent for publication

We have taken informed written consent from the patient for the publication.

Competing interests

The authors declare that they have no competing interests.

Received: 2 June 2023 Accepted: 10 November 2023
Published online: 19 November 2023

References

Adabala V, Govil N, Agarwal R, Masaipeta K (2019) Nonne-Froin sign – dilemma for subarachnoid block. Arch Anesthesiol Crit Care 5:71–2. https://doi.org/10.18502/aacc.v5i2.755

Gokahmetoglu G, Aksu R, Biçer C, Bayram A (2014) Incidental finding of Froin syndrome during spinal anesthesia in a 72-year-old patient. J Pain Relief 3(5):158. https://doi.org/10.4172/2167-0846.1000158

Koton Y, Bisharat N (2017) Nonne-Froin sign. QJM 110(5):321–322. https://doi.org/10.1093/qjmed/hcx052

Minz EE, Chilkoti GT, Mundael N, De A, Nandnan J (2022) Yellow-tinged cerebrospinal fluid: is it safe to proceed with subarachnoid block? J Indian Coll Anaesth 1:92–93. https://doi.org/10.4103/jica.jica_35_22

Petzold A, Keir G, Sharpe LT (2004) Spectrophotometry for xanthochromia. N Engl J Med 351(16):1695–1696. https://doi.org/10.1056/NEJM200410143511627. PMID: 15483297

Petzold A, Keir G, Sharpe TL (2005) Why human color vision cannot reliably detect cerebrospinal fluid xanthochromia. Stroke 36(6):1295–1297. https://doi.org/10.1161/01.STR.0000166344.75440.b9. Epub 2005 May 5. PMID: 15879320

Seehusen DA, Reeves MM, Fomin DA (2003) Cerebrospinal fluid analysis. Am Fam Physician 68(6):1103–1108. PMID: 14524396

Sidman R, Spitalnic S, Demelis M, Durfey N, Jay G (2005) Xanthrochromia? By what method? A comparison of visual and spectrophotometric xanthrochromia. Ann Emerg Med 46(1):51–55. https://doi.org/10.1016/j.annemergmed.2004.11.008. PMID: 15988426

Singh T, Hooda S, Anand A, Bihani P (2015) Subarachnoid block in an undiagnosed isolated traumatic subarachnoid hemorrhage. J Neurosurg Anesthesiol 27(1):72–73. https://doi.org/10.1097/ANA.0000000000000067. PMID: 24733053

Publisher's Note