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Case Report

ISOLATED ABDUCENS NERVE PALSY AFTER LUMBAR PUNCTURE – A CASE REPORT

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SUMMARY – Isolated abducens nerve palsy following lumbar puncture is a rare complication. In scientific literature, it has been mostly described after performing spinal anesthesia in anesthesiology literature rather than in neurological literature. Isolated abducens nerve palsy usually occurs from one to three weeks after performing lumbar puncture and it is important to connect it with this procedure and exclude other possible etiologies. The actual incidence of this complication is unknown. We describe a 32-year-old male patient who presented with unspecific headache attributed to cavernous malformation and two developmental venous anomalies. While searching for headache etiology, lumbar puncture was performed. Two days after lumbar puncture, the patient presented with isolated abducens palsy of the right eye. Our planned diagnostic evaluation included measuring intracranial pressure by noninvasive optic sheath nerve sonography and repeating brain magnetic resonance imaging. We also planned to treat the patient with epidural blood patch, which is usually successful when performed as soon as the diagnosis is established. Unfortunately, our patient refused diagnostic and therapeutic proposal, so it was impossible to know final outcome. In conclusion, we want to highlight these complications, especially to young doctors and specialists who might see it rarely.

Key words: *Abducens palsy; Lumbar; Dural puncture; Complication*

Introduction

Abducens nerve palsy after lumbar puncture is a rare post puncture complication which was first described in 1891 by Quincke[1]. On searching scientific literature, it is mostly described after spinal anesthesia as case reports. According to some data, it is more frequent after spinal anesthesia (4%), myelography (18%), diagnostic lumbar puncture (12%), epidural anesthesia (11%), continuous spinal anesthesia (4%), and other puncture procedures (4%). Palsy of other cranial nerves can appear after lumbar puncture, but abducens nerve palsy is the most frequent one[2]. Because abducens palsy after lumbar puncture is a rare complication, it is hard to know its exact incidence. According to some retrospective studies, the incidence is <1:5800. It is more frequent in patients younger than 50 years and twice as high in women (probably because of epidural anesthesia during delivery). A larger diameter of the needle gauge is connected with this disorder even though it can appear with small atraumatic needles[3].

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Case Report

We report on a 32-year-old male patient who was admitted to our department because of occipital headache lasting for the past 2 months. For the last 4 days, headache was accompanied with nausea, vomiting, and short paresthesias of the whole body. Lumbar puncture was performed and it showed macroscopically clear, uncolored cerebrospinal fluid. Cerebrospinal fluid analysis revealed white blood cell count 2, protein 0.61 g/L, and oligoclonal bands type 1. Magnetic resonance imaging (MRI) of the brain showed a combination of cavernous malformation and developmental venous anomaly in the left insular region (Fig. 1). Brain MRI also showed a developmental venous anomaly in the left frontal area. The procedure of digital subtraction angiography did not reveal any AV malformations or aneurysms. Neurovascular consultant team consisting of a neurosurgeon, neurologist and neuroradiologist recommended conservative treatment, so the patient was discharged from the hospital. Two days after discharge, the patient came to the ophthalmology emergency department because of diplopia and post puncture headache. For one month, he was wearing eye cover but did not feel any relief, so he was referred to the neurology emergency department. Neurological examination showed a right abducens nerve lesion with diplopia while looking at the right. Rehospitalization with new diagnostic workup and treatment was recommended to the patient. Considering a hypothesis of possible intracranial hypotension in our patient, we planned diagnostic follow-up. Diagnostic follow-up included neuroimaging with repeated brain MRI and measuring intracranial pressure, firstly by noninvasive methods by measuring optic nerve sheath sonography. This procedure is usually performed in our department and later on, depending on the results, it is possible to do invasive measuring of intracranial pressure with lumbar manometer. By confirming our hypothesis of intracranial hypotension in accordance with scientific literature, we planned to perform a therapeutic epidural blood patch. Unfortunately, the patient decided to refuse hospitalization with our diagnostic and therapeutic approach, so further monitoring of the patient's abducens nerve palsy and its outcome was not possible.

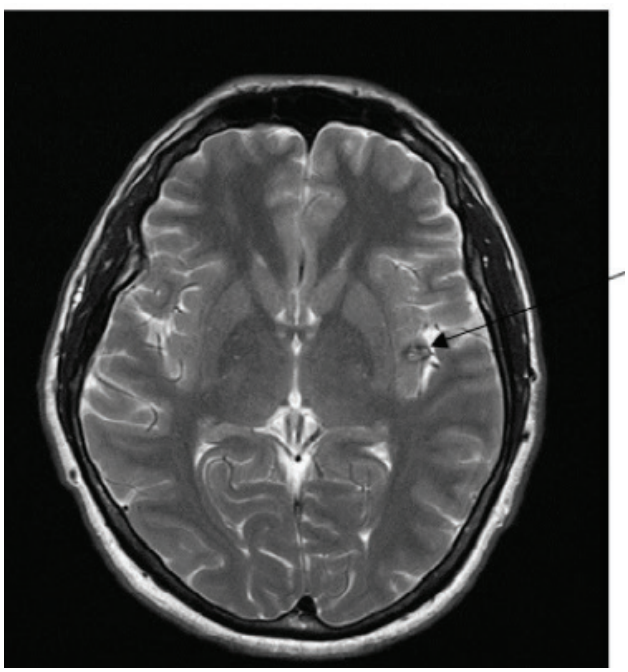

Fig. 1. Arrow on the brain magnetic resonance image shows a combination of cavernous malformation and developmental venous anomaly in the left insular region.

Discussion

Among others, intracranial hypotension is just one of the possible complications of lumbar puncture[4,5]. For explaining this case we have to emphasize that abducens nerve has a long intracranial course. By performing lumbar puncture, intracranial hypotension is induced, which leads to caudal displacement of the brain and brainstem structures[1,6]. Stretching of the nerve causes ischemia, which can lead to segmental demyelination and axonal interruption, although brain MRI is normal. In making a diagnosis of abducens palsy after lumbar puncture, it is important to establish the following features: it appears after one day to three weeks post procedure; a diagnosis is made by excluding other causes of diplopia (e.g., metabolic or structural causes); and brain MRI signs of intracranial hypotension are present and include midbrain shifting caudally, engorged dural sinuses, prominent epidural venous plexus enhancement in the upper cervical canal, diffuse smooth dural enhancement, convex superior margin of pituitary gland, and sagging optic chiasm draping over a pituitary gland[3,4,6].

Due to technical issues and high cost of MRI, it is less likely to be used to confirm intracranial hypotension. In case of confirming intracranial hypotension by MRI, it is more reliable to measure it by other methods. Many studies have shown that raised intracranial pressure leads to enlargement of the optic nerve sheath

diameter, so that one of the noninvasive and effective methods is optic sheath nerve sonography. Firstly, it was described to be useful in diagnosing traumatic brain injury and intracranial hypertension, and later on in establishing intracranial hypertension[7,8]. Fundus examination is noninvasive and may also be useful in this case but fundus changes occur several days after intracranial hypertension. Invasive methods of measuring intracranial pressure are less indicated in this case but can be done by lumbar manometer[6,9].

Concerning treatment, an epidural blood patch, especially in the first 24 hours, and also later can show benefits[3]. After excluding other diagnostic possibilities and establishing that abducens nerve palsy is attributed to lumbar puncture and by researching scientific literature on this topic, our plan was also to perform epidural blood patch. It is important to note that 50 % of patients recover spontaneously and surgical treatment of rectus medial muscle can be considered after 6-month persistence of abducens lesion[1,3].

Conclusion

An isolated lesion of the abducens nerve is one of the rare complications of lumbar puncture. Unfortunately, we did not follow-up our patient because of his withdrawal, but we proposed the pathophysiological mechanism of abducens nerve palsy etiology, diagnosis and treatment. It should be noted that, when it is verified that abducens nerve palsy is caused by lumbar puncture, it is recommended to establish intracranial hypotension. It can be done by noninvasive methods (e.g., optic sheath nerve sonography) and brain MRI showing classic signs of intracranial hypotension. In case of suspicious diagnosis, it is important to exclude other possible causes of abducens nerve palsy and keep it in mind because of proper treatment and earlier recovery of a patient. Writing about this issue we also wanted to draw attention to abducens nerve palsy after lumbar puncture, especially for young doctors and specialists who might see it rarely. What remains open for further investigations is to follow-up and establish the right incidence of this issue.

References

1. Hofer JE, Scavone BM. Cranial nerve VI palsy after dural-arachnoid puncture. Anesth Analg. 2015;120(3):644-6. doi: 10.1213/ANE.0000000000000587.
2. Niedermüller U, Trinka E, Bauer G. Abducens palsy after lumbar puncture. Clin Neurol Neurosurg. 2002;104(1):61-3. doi: 10.1016/s0303-8467(01)00170-6.
3. Mills R, Radhakrishnan R, Moore DL, Sadhasivam S. Epidural blood patch relieves positional diplopia following lumbar punctures. Paediatr Anaesth. 2014;24(3):345-7. doi: 10.1111/pan.12324.
4. Béchard P, Perron G, Larochelle D, Lacroix M, Labourdette A, Dolbec P. Case report: epidural blood patch in the treatment of abducens palsy after a dural puncture. Can J Anaesth. 2007;54(2):146-50. doi: 10.1007/BF03022012.
5. Paun T, Zavoreo I, Jurašić M, Jadrijević Tomas A, Bašić Kes V. Spinal subdural hematoma associated with lumbar puncture – a case report. Acta Clin Croat. 2022;61(1):149-51. doi. org/10.20471/acc.2022.61.01.19.
6. Yaman ME, Ayberk G, Eylen A, Ozveren MF. Isolated abducens nerve palsy following lumbar puncture: case report and review of the mechanism of action. J Neurosurg Sci. 2010;54(3):119-23. PMID: 21423080.
7. Fichtner J, Ulrich CT, Fung C, Cipriani D, Gralla J, Piechowiak EI, *et al*. Sonography of the optic nerve sheath diameter before and after microsurgical closure of a dural CSF fistula in patients with spontaneous intracranial hypotension – a consecutive cohort study. Cephalalgia. 2019;39(2):306-15. doi: 10.1177/0333102418793640.
8. Lovrenčić-Huzjan A, Bosnar-Puretić M, Hustić I, Kobasić I, Budišić M, Ćorić L, *et al*. Optic nerve sheath sonography is a promising tool for assessment of raised intracranial pressure in patients admitted to neurological intensive care unit. Acta Clin Croat. 2020;59:50-4. doi: 10.20471/acc.2020.59.01.06.
9. Sekhri NK, Parikh S, Weber GM. Comparison of digital manometer and water column manometer pressures measurements during lumbar puncture. Med Devices (Auckl). 2019;12:451-8. doi: 10.2147/MDER.S225757.

Sažetak

IZOLIRANA LEZIJA ABDUCENSA NAKON LUMBALNE PUNKCIJE - PRIKAZ SLUČAJA

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Izolirana lezija abducensa nastala nakon lumbalne punkcije je rijetka komplikacija ovog postupka. U znanstvenoj literaturi izolirana lezija abducensa nakon lumbalne punkcije se češće opisuje nakon spinalne anestezije u anesteziološkim časopisima. Izolirana lezija abducensa obično se javlja nakon jednog do tri tjedna od lumbalne punkcije te ju je važno povezati sa samim postupkom punkcije i isključiti ostale potencijalne etiologije. Točna incidencija je nepoznata. Prikazujemo slučaj 32-godišnjeg muškarca koji se prezentirao nespecifičnom glavoboljom koja je bila uzrokovana kavernomom i dvjema razvojnim venskim anomalijama. Tijekom traženja etiologije glavobolje učinjena je lumbalna punkcija. Dva dana nakon lumbalne punkcije bolesnik se prezentirao s izoliranom lezijom abducensa desnog oka. Naš planiran dijagnostički algoritam uključivao je mjerenje intrakranijskog tlaka neinvazivnom metodom sonografijom ovojnice optičkog živca i ponavljanjem magnetne rezonancije mozga. Također smo planirali bolesnika liječiti krvnom zakrpom, što je inače uspješno ako se provede što ranije nakon postavljanja dijagnoze. Nažalost, bolesnik je odbio daljnji dijagnostički i terapijski prijedlog, tako da je bilo nemoguće saznati krajnji ishod. U zaključku, željeli smo istaknuti ovu komplikaciju, osobito za mlade liječnike i specijaliste koji se možda rijetko s njom susreću.

Ključne riječi: *Lezija; Abducens; Lumbalna punkcija; Komplikacija*