Rupture of a Spinal Dermoid Cyst May Lead to Dissemination and Progress of Fatty Tissue in the Central Spinal Canal and Intracranial Subarachnoid Space

A Case Report

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SUMMARY – *Intradural dermoid cysts may rupture and subsequent subarachnoid dissemination of lipid droplets has been described before. However, the rupture of a spinal dermoid cyst into the central spinal canal is a rare entity. In this context, dissemination of fat into the intracranial subarachnoid space with local progression is a peculiar finding that, to the best of our knowledge, has not been published so far. We describe the case of a 28-year-old man with a dermoid cyst at the upper lumbar level as part of a complex congenital craniospinal malformation, presenting with new unspecific neurologic symptoms. CT and MRI revealed disseminated intraventricular and subarachnoid lipid droplets intracranially and in the spine not present on previous CT and MRI scans obtained eight years earlier. Thus, repeated rupture of a spinal dermoid cyst with subarachnoid spread and/or secondary proliferation should be suspected.*

Introduction

Spinal dermoid tumours are rare, benign, slow-growing lesions that may extend to the subarachnoid space. They arise from ectopic embryonic remnants of ectoderm within the spinal canal at the time of neural tube closure¹. They can be located intramedullary, intradural-extramedullary and extradurally^{2,3}. Usually there is no communication between the dermoid cyst and the subarachnoid space.

Case Report

A 28-year-old man with a congenital craniospinal malformation and a lumbar myelomeningocele was admitted to our hospital with a two-week history of headache, vertigo

and dizziness. A spina bifida neural tube defect had been treated immediately after birth. Because of the myelomeningocele the patient was paraplegic below T9. During physical examination no additional neurologic deficits were found. All laboratory examinations were within normal range.

CT of the head revealed disseminated hypodense lipid tissue in the basal cisterns and the subarachnoid space (Figure 1A). MRI confirmed a Chiari II Type malformation and also multiple T1-hyperintense fat droplets in the basal cisterns (Figure 1 B,C) that were not present eight years earlier (Figure 2A-C). An additional spinal MRI showed that the distribution pattern of the fatty tissue at cervical level had changed (Figure 3A,B) compared to the previous examination eight years before (Figure 3C).

Figure 1 Brain CT (A) and axial T1-weighted MR (TR822/TE15) (B,C) in 2010 demonstrate a remarkable progress of subarachnoid perimesencephalic lipid load in the Sylvian Fissure and sulci.

Discussion

Spinal dermoid tumours constitute 1% of intraspinal tumours³. They may rupture spontaneously⁴ by trauma, or during surgery⁵. Spinal dermoid tumours can be associated with bony malformations, myelomeningoceles, hypertrichosis and/or dermal sinus tract⁶. They occur predominantly in the lumbosacral region (60%) followed by the upper thoracic (10%) and cervical levels (5%)¹. Dermoids consist of two distinct portions, one fatty and the other solid or cystic. They might be calcified⁴ and can contain dermal appendages such as hair, epithelium, sebaceous and sweat glands⁷. Because of their lipid content, dermoid tumours are hyperintense on T1 weighted magnetic resonance (MR) images and hypodense in computed tomography (CT). Dermoids grow slowly and become typically apparent during adulthood³, either by mass effect or with acute rupture. Frequent clinical symptoms after acute rupture are headache and/or seizures. Other symptoms may be temporary sensorimotor syndromes and aseptic chemical meningitis⁸. Regarding the CT and MR investigations covering an eight-year interval and the newly acquired clinical symptoms, we have reasonable suspicion of a repeated rupture of the dermoid cyst with consecutive intracranial

Figure 2 Brain CT (A,B) and axial PD-weighted MR (TR3000/TE17) (C) show a minimal focus of lipid droplets in the perimesencephalic cistern in 2002.

lipid droplet accumulation and/or secondary fat proliferation. Zhang et al. described a case series of 12 patients with ruptured spinal dermoid tumours, finding minimal changes in the spinal distribution pattern on MRI only in a single case during a follow-up of 12 years; the remaining patients had no dynamics in the lipid dissemination. They hypothesized that it might be very difficult to absorb the potentially slow-moving droplets in the spinal canal⁹. So far, only a few case reports of a one-time ruptured spinal dermoid tumour have been published^{4,9-14}. To the best of our knowledge, there is no publication describing evidence for a repeated rupture and an intracranial subarachnoid proliferation of the lipid spread.

Concluding, MRI is not only the modality of choice for detecting spinal dermoid tumours, but also for follow-up examinations. Further reports are warranted to confirm the evidence of a repeated spinal dermoid cyst rupture and a concomitant subarachnoid fat proliferation.

Conclusion

Intradural dermoid cysts may rupture with subsequent subarachnoid dissemination of lipid droplets.

Figure 3 Sagittal T1- (TR 400 / TE 7.4) (A) and short tau inversion recovery (STIR)-weighted MR (TR 2500 / TE 60) (B) in 2011 reveal a reallocation of the lipid droplets within the central spinal canal. C) Sagittal proton density-weighted MR of the cervical spine performed in 2002 demonstrates lipid droplets in the central spinal canal and ambient cistern.

Dissemination of fat into the intracranial subarachnoid space is a peculiar finding. In case of a local intracranial progression due to

a repeated rupture of the cyst over time it may cause new neurologic symptoms like headache, dizziness and vertigo.

References

- 1 Netsky MG. Epidermoid tumors. Review of the literature. *Surg Neurol.* 1988; 29 (6): 477-483. doi: 10.1016/0090-3019(88)90144-9.
- 2 Messori A, Polonara G, Serio A, et al. Expanding experience with spontaneous dermoid rupture in the MRI era: diagnosis and follow-up. *Eur J Radiol.* 2002; 43 (1): 19-27. doi: 10.1016/S0720-048x(01)00432-6.
- 3 Lunardi P, Missori P, Gagliardi FM, et al. Long-term results of the surgical treatment of spinal dermoid and epidermoid tumors. *Neurosurgery.* 1989; 25 (6): 860-864. doi: 10.1227/00006123-198912000-00002.
- 4 Calabro F, Capellini C, Jenkins JR. Rupture of spinal dermoid tumors with spread of fatty droplets in the cerebrospinal fluid pathways. *Neuroradiology.* 2000; 42 (8): 572-579. doi: 10.1007/s002340000345.
- 5 Scott RM, Wolpert SM, Bartoshesky LE, et al. Dermoid tumors occurring at the site of previous myelomeningocele repair. *J Neurosurg.* 1986; 65 (6): 779-783. doi: 10.3171/Jns.1986.65.6.0779.
- 6 Quigley MR, Schinco F, Brown JT. Anterior sacral meningocele with an unusual presentation. Case report. *J Neurosurg.* 1984; 61 (4): 790-792. doi: 10.3171/Jns.1984.61.4.0790.
- 7 Stendel R, Pietila TA, Lehmann K, et al. Ruptured intracranial dermoid cysts. *Surg Neurol.* 2002; 57 (6): 391-698; discussion 698. doi: 10.1016/S0090-3019(02)00723-1.
- 8 Lunardi P, Missori P. Supratentorial dermoid cysts. *Surg Neurol.* 1991; 75 (2): 262-266. doi: 10.3171/Jns.1991.75.2.0262.
- 9 Zhang Y, Cheng JL, Zhang L, et al. Magnetic resonance imaging of ruptured spinal dermoid tumors with spread of fatty droplets in the central spinal canal and/or spinal subarachnoidal space. *J Neuroimaging.* 2013; 23 (1): 71-74. doi: 10.1111/J.1552-6569.2012.00750.x.
- 10 Searce TA, Shaw CM, Bronstein AD, et al. Intraventricular fat from a ruptured sacral dermoid cyst: clinical, radiographic, and pathological correlation. Case report. *J Neurosurg.* 1993; 78 (4): 666-668. doi: 10.3171/Jns.1993.78.4.0666.
- 11 Karadag D, Karagulle AT, Erden A, et al. MR imaging of a ruptured intraspinal dermoid tumour with fat droplets in the central spinal canal. *Australas Radiol.* 2002; 46 (4): 444-446. doi: 10.1046/j.1440-1673.2002.01103.x.
- 12 Goyal A, Singh D, Singh AK, et al. Spontaneous rupture of spinal dermoid cyst with disseminated lipid droplets in central canal and ventricles. *J Neurosurg Sci.* 2004; 48 (2): 63-65. doi: 10.1007/S00701-012-1362-9.
- 13 Garg A, Gupta V, Gaikwad S, et al. Isolated central canal rupture of spinal dermoid: report of two cases. *Australas Radiol.* 2003; 47 (2): 194-197. doi: 10.1046/j.0004-8461.2003.01152.x.
- 14 Cha JG, Paik SH, Park JS, et al. Ruptured spinal dermoid cyst with disseminated intracranial fat droplets. *Br J Radiol.* 2006; 79 (938): 167-169. doi: 10.1259/Bjr/17232685.

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