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A spinal dermoid tumor that ruptured into the subarachnoidal space and syrinx cavity

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ABSTRACT
The widespread use of computed tomography (CT) and magnetic resonance (MR) imaging has increased the preoperative diagnosis of dermoid tumors and detection of their complications. In particular, cases of ruptured dermoid tumors, which may manifest as emergent conditions with variable clinical pictures, have typical CT and MR imaging findings. In this report, we present a case of a spinal dermoid tumor, which ruptured into the syrinx cavity and subarachnoidal space.

Key words: • *magnetic resonance imaging* • *spinal neoplasms* • *dermoid*

Spinal dermoid tumors are rare, benign, slow growing tumors that arise from the inclusion of ectopic embryonic remains of the ectoderm and mesoderm in the spinal canal at the time of neural tube closure. These tumors may often become acutely symptomatic after rupture or infection. Fat droplets spreading into the subarachnoid space secondary to rupture of the tumor are also typical findings in magnetic resonance (MR) imaging (1). Although it is rare, the rupture of a dermoid tumor into the syrinx cavity formed in the spinal cord has been reported in the literature (2). In this report, we present MR imaging findings of a case of a spinal dermoid tumor that ruptured into the syrinx cavity and subarachnoidal space.

Case report

A 24-year-old male patient was admitted to emergency service with a suddenly developed headache and vision problems. The patient was referred to our clinic for radiological examination and a craniospinal MR imaging examination was performed with a 1.5 T unit (Magnetom Vision, Siemens, Erlangen, Germany). During the cranial MR imaging examination, both before and after intravenous (IV) Gd-DTPA injection, T1-weighted (T1W) (TR/TE, 630/14 ms) turbo spin echo (TSE) and T2-weighted TSE (T2W) (TR/TE, 4200/110 ms) multiplanar images were obtained. Additionally, before IV Gd-DTPA injection, TSE T1W (TR/TE, 600/14 ms) and T2W (TR/TE, 4500/112 ms) images were obtained, and after IV injection, fat-suppressed T1W axial and sagittal images were obtained.

In cranial MR imaging examination, hyperintense fat particles in the basal cisterns, cerebral sulci, and lateral ventricles were observed on T1W images (Fig. 1). In the spinal MR imaging examination, a slightly lobulated contoured, heterogeneous tumoral mass was observed on T1W and T2W images, at the level of the conus medullaris; with hyperintense regions within it on T1W image, which was suppressed, on fat-suppressed sequences (Fig. 2). Fat intensity, which filled the syrinx cavity inside the spinal cord adjacent to the tumor by the cranial side, was detected. All of these MR imaging findings, such as location of the mass, non-enhancement, and observation of fat particles in the intraventricular-subarachnoid space and syrinx cavity were in accordance with a ruptured dermoid tumor. In pathological examination following surgery, histological type of the mass was determined as dermoid tumor. The patient had subtotal resection, additional neurological findings were not observed, and the patient received follow-up care during the postoperative period.

Discussion

Dermoid tumors are rare, benign, congenital lesions, which comprise 1% of both intracranial and intraspinal tumors (1). The clinical his-

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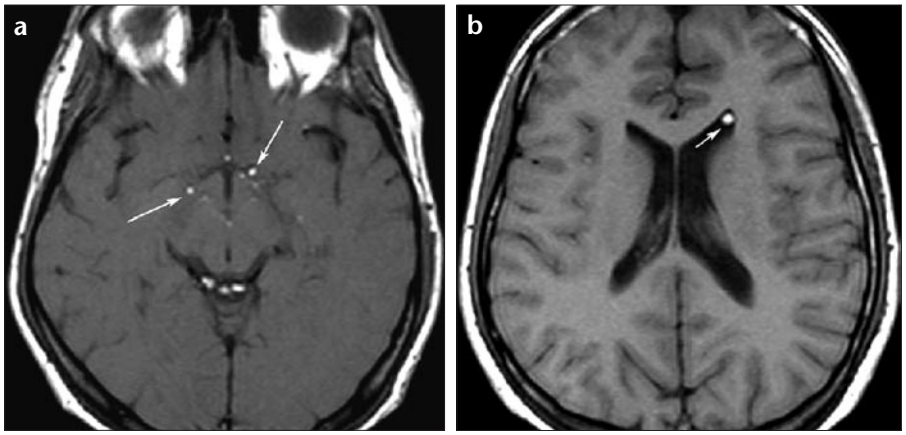

Figure 1 a, b. On axial T1-weighted cranial MR images **(a, b)** fat droplets (*arrows*) are observed in cisterns and the left lateral ventricle.

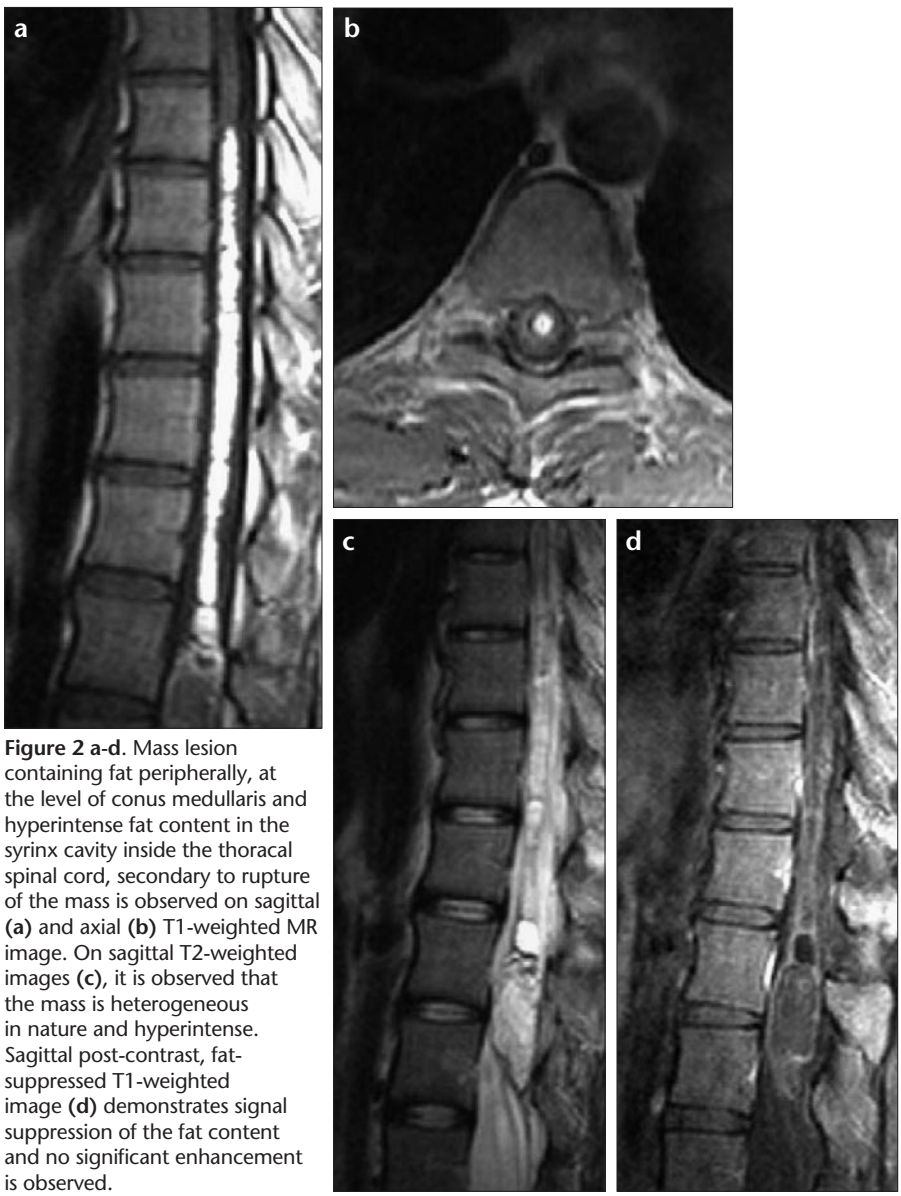

Figure 2 a-d. Mass lesion containing fat peripherally, at the level of conus medullaris and hyperintense fat content in the syrinx cavity inside the thoracal spinal cord, secondary to rupture of the mass is observed on sagittal **(a)** and axial **(b)** T1-weighted MR image. On sagittal T2-weighted images **(c)**, it is observed that the mass is heterogeneous in nature and hyperintense. Sagittal post-contrast, fat-suppressed T1-weighted image **(d)** demonstrates signal suppression of the fat content and no significant enhancement is observed.

tory of our patient was related to the localization of the lesion. Because of their slowly growing nature, dermoid tumors can reach rather large sizes without producing any symptoms or findings. While dimensions of the cyst are slowly enlarging, they will settle in the subarachnoidal space in a location suitable to their shape and they have tendency to adhere tightly to adjacent structures (3, 4). Although their nature is benign and development is slow, dermoid tumors have a high morbidity and mortality risk, especially when rupture occurs. A dermoid cyst can rupture during surgery, after a trauma (5), or spontaneously (6–9). If rupture has occurred, contents of the cyst will spread out along the subarachnoidal space and ventricular system. Clinical symptoms of acute rupture are headache, nausea, vomiting, vertigo, vision problems, aseptic chemical meningitis, hemiplegia, mental changes, and coma (6, 7, 9). Later on, the existence of fat droplets in the subarachnoidal and ventricular spaces may lead to arachnoiditis, ventriculitis, and, consequently, mental disorder may occur.

Spinal location of dermoid tumors can be seen more often than epidermoid cysts, which often have intracranial location (10). Spinal dermoid tumors can be intramedullary, intradural-extramedullary, or extradural (10, 11). They occur predominantly in the lumbosacral region (60%), involving the cauda equina and conus medullaris, and are quite rare in the upper thoracic (10%) and cervical regions (5%) (10, 12).

Dermoid tumors are typically unilocular cysts containing yellow or yellowish-brown viscous fluid with creamy contents of different types of fat (crystals of cholesterol, lipid metabolites, and keratin). High lipid content emanated from sebaceous glands causes high signal intensity on T1W spin echo images (13). The signal intensity may be heterogeneous related to different components in the cyst (14). Bone and cartilage might be found in the tumor itself and sometimes calcification can be seen in their walls. Dermoid tumors can be made up of 2 different pieces, one with a higher lipid content and the other with a solid or more liquid content, and this condition may lead to a liquid-liquid level (10).

MR imaging is a diagnostic method, which should be chosen for diagnosis of dermoid and epidermoid tumors (9, 15). MR imaging can demonstrate different components of dermoid cysts and fat particles in the subarachnoi-

dal space. Diagnostic accuracy of MR imaging will increase with the use of IV contrast medium, especially in determining meningeal inflammatory reaction related to the spreading out of tumoral contents.

Dermoid cysts usually indicate homogenous signal intensity, but in some cases a heterogeneous signal pattern related to the tumor content might be observed. High signal intensity related to fat content, especially in T1W images, provides easy recognition of fat particles, especially if localized in the cerebral sulci, fissures, perimedullary cistern, or central canal of the spinal cord. With the use of MR imaging, asymptomatic distribution of fat particles became more usual. Use of fat-suppressed sequences in MR imaging examinations is rather useful in demonstrating fat content. With this examination it is possible to eliminate the possible hemorrhage. In our case, on fat-suppressed sequences, fat content of the tumor was clearly demonstrated.

The differential diagnosis of spinal dermoid cysts includes lipomas, teratomas, and spinal cord tumors (astrocytoma, ependymoma). Lipomas are similar to dermoids as they both have a hyperintense appearance in T1W and T2W, but they are differentiated from dermoids by their smooth borders and typical midline localization. Teratomas are often confused with dermoid tumors as they may contain fat, but tumoral cells found inside teratomas cause contrast medium enhancement. Intraspinal tumors (astrocytoma, ependymoma) are isointense compared to the cord on T1W images and hyperintense on T2W images, showing enhancement on post-contrast T1W images.

The reported number of dermoid tumors are increasing due to the frequent use of MR imaging; thus, ruptured dermoid tumors are more frequently reported in the literature (2). Free fatty material within the ventricular system and intracranial cisterns were reported in all cases, but fat particles in the dilated central spinal canal were reported in only few studies (2, 7, 16). As the central spinal cord is accepted as a potential space, which is not normally open, the syringomyelic cavity formed by the dermoid tumor itself might explain the entrance of tumor content into it.

With the frequent use of MR imaging it was found that spontaneous dermoid rupture, which was previously thought of as a rather serious or fatal condition, is common and usually only slightly symptomatic or asymptomatic. MR imaging is the most important radiologic modality to diagnose such cases, to determine the distribution of ruptured tumor content into the subarachnoidal space, or into the central spinal canal as in this case, to determine complications such as hydrocephaly or meningitis after rupture, and for follow-up after surgery.

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