Case Report

An Infected Dermoid Cyst Without a Sinus Tract: A Rarity Mimicking a Spinal Tumor

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Spinal dermoid cysts are rare and account for 0.8% to 1.1% of spinal intramedullary Tumors. Only a few cases of infected spinal dermoid cysts have been reported in the literature and most of them were associated with a dermal sinus as the source of infection. We report a case of an infected spinal dermoid cyst in the absence of a dermal sinus in a 3-year-old child who underwent excision of cyst. On a long-term follow-up of about 10 years, there was no evidence of any recurrence. However, bowel and bladder dysfunction persisted. In the light of the current literature, we discuss the clinical presentation, etiopathogenesis, radiological features, management, and long-term outcome of an infected conus dermoid cyst.

**Keywords:** Cyst, dermoid, infection, sinus, spine, tumor

**Abstract**

Spinal dermoid cysts are developmental tumors of the brain and spinal cord, which arise from the inclusion of ectopic embryonic rests of ectoderm that are usually associated with midline closure defects. Their occurrence in the spinal cord is rare and accounts for 0.8%–1.1% of spinal intramedullary tumors.[1,2] Spinal dermoids arise at the time of neural tube closure between the third and the fifth week of embryonic development. About 50% cases of dermoid cysts are associated with a dermal sinus tract.[3] However, they can also be acquired secondary to implantation of dermal fragments into the spinal subarachnoid space following an accidental trauma, lumbar puncture, or surgery.[4] Spinal dermoids are most commonly located in the lumbosacral region (cauda equina and conus medullaris), followed by the upper thoracic and cervical regions.[5,6] They are common in the extradural and the intradural extramedullary location. They usually present during the second and third decades and are often associated with other congenital spinal abnormalities such as bony malformations, myelomeningocele, hypertrichosis, and/or a dermal sinus tract.[7,8] Rarely a dermoid cyst can infect and if so, a dermal sinus tract is usually the cause of the infection.[9-15] In the absence of a dermal sinus, diagnosing an infected dermoid cyst is very difficult, as it mimics an intramedullary spinal tumor. We report a case of an infected spinal dermoid cyst in the absence of a dermal sinus, which mimics a conus tumor.

**Case Report**

A 3-year-old child presented to us with a 4-day history of urinary and fecal incontinence. He had chronic obstructive symptoms of the bladder and bowel as well as progressive weakness of the lower limbs for 3 months. He had lower back pain that aggravated at night and was relieved by sitting. One month before his presenting complaints, he experienced recurrent attacks of upper respiratory tract infection and an episode of high-grade fever (for 2 days). Neurological examination revealed increased tone in the lower limbs with a grade IV power and absent knee and ankle jerk reflexes on both sides. Babinski was positive on both sides. He had diminished sensations in the lower limbs without sacral sparing, a painful limping gait, and an absence of anal reflex. X-ray of the dorsolumbar spine showed

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widening of the spinal canal, increased interpedicular distance, and scalloping of the posterior vertebral border [Figure 1]. Magnetic resonance imaging (MRI) of the lumbosacral spine revealed a 7.5 × 2.5 cm–sized space-occupying lesion in the lumbar region extending from L1 to S2, which was hypointense on T1-weighted images and hyperintense on T2-weighted images and with a peripheral contrast enhancement [Figure 2]. A separation of the caudal roots from the lesion was not visualized distinctly. The radiological diagnosis was conus ependymoma.

The child underwent excision of the lumbosacral lesion in prone position. Via a midline vertical incision, the D12 to S3 spinous process and lamina were exposed. L5, S1, and S2 spina bifida was noticed. D12 to L4 laminotomy was performed and the vascularized pedicle laminar flap was raised. A thinned out dura and a terminally expanded cord was found. The dura was opened from D12 to S3. A well-defined, grayish red, capsular, elongated, vascularized mass lesion was found, which was adherent to the nerve roots [Figure 3A]. The lower end of the lesion was gently separated from the nerve roots and filum terminale by microsurgery. Filum terminale was confirmed and cut. A vertical incision was then taken over the lower end of the mass, and to our surprise thick, brown, and nonfoul smelling pus under pressure was encountered and drained [Figure 3B]. The solid lesion was dissected from the caudal to the cranial end. The lower two-thirds of the lesion was completely excised. At its upper end, the lesion was found to be firmly adherent to the cord parenchyma and nerve roots and was hence left untouched. Adequate excision of the lesion was performed [Figure 4]. A thorough wash with antibiotic solution was performed followed by primary closure of the dura. The lower end of the lamina was then fixed with nonabsorbable sutures and a negative suction drain was kept followed by layered wound closure. The postoperative course was uneventful. His back pain disappeared and power in both lower limbs improved. Pus examination showed the presence of gram-positive
cocci and culture grew *Staphylococcus aureus* and *Escherichia coli*. Based on the culture and sensitivity reports, the patient was administered intravenous cefotaxime and amikacin for 2 weeks followed by oral antibiotics for 4 weeks. Histopathological examination of the lesion showed evidence of a dermoid cyst with an infection [Figure 5].

At 1 month follow-up, there was no back pain and complete improvement in lower limb power but was no improvement in impaired bladder and bowel functions. On a long-term follow-up of about 10 years, there was no evidence of any recurrence [Figures 6 and 7]. However, bowel and bladder dysfunction persisted.

**Discussion**

Spinal intramedullary abscesses are rare, the first of which was reported in 1890 with dermal sinuses being the main cause. [16] Most of the intramedullary abscesses are of hematogenous origin, and the primary source of infection is from the respiratory tract or from an infective endocarditic lesion. Uncommonly, they occur as a result of a congenital dermal sinus. [17] Dermoid cysts are benign spinal cord lesions resulting from the displacement of cutaneous epithelial tissues during embryonic development. They are often associated with other developmental anomalies such as a sinus tract, sacral dimple, tufts of hair, or spina bifida. Symptoms of dermoid cyst can occur as a result of its mass effect, an associated tethered cord, local leakage of the cyst contents, or due to cyst rupture. Occasionally, the dermoid cyst may rupture or get infected, thereby varying its presentation. The rupture may occur spontaneously, following trauma, or postoperatively thus leading to the spread of its contents throughout the subarachnoid space and the ventricular system resulting in meningitis, spinal arachnoiditis, or hydrocephalus. [18,19] If infected, it results in an abscess formation that may either be localized like in our case or may spread to the spinal cord parenchyma resulting in a holocord abscess. The source of infection in a spinal dermoid cyst includes anatomic spinal canal defects.

![Figure 3: MRI of the lumbosacral spine axial views showing space-occupying lesion, which is hypointense on T1-weighted images (A) and hyperintense on T2-weighted images (B)](image)

![Figure 4: Intraoperative photomicrograph showing well-defined, grayish red, capsular, elongated, vascularized mass lesion (A), lesion containing pus (B), and empty cavity with free lumbosacral roots after adequate excision of the lesion (C)](image)
such as dermal sinus tracts, hematogenous spread from an extraspinal focus of infection, contiguous spread from an adjacent focus of infection, direct inoculation (i.e., penetrating trauma, post neurosurgery), or cryptogenic mechanisms (i.e., no documented extra spinal focus of infection).[16]

Definitive diagnosis of dermoid cysts can be made by tissue sample examination. However, the MRI is the imaging modality of choice. The presence of a liquid and solid component gives dermoid cysts a heterogeneous appearance on MRI. On T1-weighted images, compared to the spinal cord, the liquid component (secretions of sebaceous glands, liquid lipid metabolites, and cholesterol) appears hyperintense whereas the solid component appears hypo to isointense.[20] On T2-weighted images, the liquid component shows decreased signal intensity whereas the solid component appears hyperintense. On the basis of the heterogeneity of the T1- or T2-weighted signals, a lack of contrast enhancement, and the signal characteristics of the lipid content, an MRI can help differentiate a dermoid cyst from the intrinsic glial tumors of the spinal cord.[21]

The other differential diagnosis of dermoid cysts on imaging includes lesions with high lipid content such as teratomas and lipomas. However, the diagnosis of an infected dermoid cyst on the basis of MRI is difficult. As opposed to the classical MRI findings of a dermoid cyst, in our case the lesion appeared hypointense on T1-weighted images and hyperintense on T2-weighted images and showed a peripheral rim of contrast enhancement, which are classical features of conus ependymoma. Also, in our case the presence of an infection and an absence of associated anomalies were the additional probable reasons for an incorrect radiological diagnosis.

Management of dermoid cyst is complete excision whenever possible. However, complete excision may not be possible because of the tight adherence of the cyst

Figure 5: Histopathological examination showing mucous-secreting epithelium with smooth muscles

Figure 6: Postoperative MRI of the lumbosacral spine sagittal view showing low-lying cord without evidence of recurrent or residual lesion on postcontrast T1-weighted images (A) and T2-weighted images (B)

Figure 7: Postoperative MRI of the lumbar spine axial view showing no evidence of recurrent or residual lesion on postcontrast T1-weighted images (A) and on T2-weighted images (B)
capsule to the spinal cord or the nerve roots thereby posing a high risk of causing neurological deficits.\[^{[23]}\]

Partial excision should be performed in such patients to avoid neurological deficit and a follow-up should continue until new symptoms occur due to dermoid tumor regrowth. In addition, complete excision is also not possible when a dermoid cyst gets infected due to intense adhesion. Management of such an infected dermoid cyst depends on whether the infection is localized to the dermoid cyst or has progressed beyond the cyst. When the infection is limited to the cyst, drainage of pus and excision of the cyst is curative, as in our case. In some cases, an infected dermoid cyst may result in a holocord syrinx, which may also get infected. Often in a holocord abscess that is associated with an infective dermoid cyst, substantial regression of the thoracic, lumbar, and sacral abscesses can be achieved by performing one level laminectomy, drainage of the pus-containing cyst, biopsy of the capsule followed by antibiotics in accordance to the culture and sensitivity and hence there is no need to perform a separate procedure for such a holocord pathology. Most of the studies showed complete or near complete regression of the intramedullary lesion at short-term follow-up. However, there are no long-term radiological follow-ups.\[^{[11,23]}\]

The outcome of an infected dermoid cyst also depends on the presence or absence of a holocord abscess. Compared to an extensive lesion, a localized disease is observed to have a good outcome. In case of a holocord lesion, complete neurological recovery is rare due to spinal cord microinfarcts.\[^{[17]}\]

Clinical recovery always appeared good in terms of improvement in limb powers and ability to walk with or without support. However, the prognosis of bladder and bowel function remains guarded.\[^{[11]}\]

At the short-term follow-up, a significant improvement in limb power was reported but there was no improvement in bladder and bowel functions.\[^{[23]}\]

Literature search reveals, unlike in our case, long-term follow-up has not been reported even in a single patient. Our case highlights that even after a long-term follow-up of about 10 years, there is no radiological evidence of recurrence. In addition, we suggest that once a patient’s urinary and bladder functions are impaired, recovery is usually not possible even after a long-term follow-up of about 10 years.

**Conclusion**

An infected conus dermoid cyst without a dermal sinus is rare. Contrast MRI findings may be confusing and may mimic spinal intramedullary tumors. However, besides intraoperative findings, the final diagnosis is mainly based on tissue sample examination. Near complete or complete excision of the infected dermoid cyst is recommended in all symptomatic patients. Clinical outcome depends on the presenting symptoms. Though motor power can improve following successful excision of the lesion, bladder and bowel symptoms may not improve even after a long-term follow-up.

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