



## Case Report

# Do prophylactic steroids prevent chemical meningitis in surgery for epidermoid cysts? Case report and literature review

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## ABSTRACT

**Background:** Cranial and spinal epidermoid cysts (ECs) are rare and surgical resection can be complicated by chemical meningitis. Here, we treated a patient undergoing surgical resection of an intramedullary spinal EC with prophylactic steroids to help prevent postoperative chemical meningitis. Notably, we found a paucity of evidence regarding the efficacy of steroids used for this purpose.

**Case Description:** A 44-year-old male presented with a rare intramedullary thoracic EC. He was given oral dexamethasone postoperatively and did not subsequently develop chemical meningitis. Here, we reviewed the current literature regarding the efficacy of steroid use for this purpose, utilizing multiple electronic databases (Ovid MEDLINE, Ovid EMBASE, and Scopus). We found only three studies (one case report, one case series, and a randomized controlled trial), that involved patients who received steroids. Of the 24 patients given prophylactic steroids, none developed fever or meningismus. One patient received 8 days of oral dexamethasone. Eleven patients received intraoperative hydrocortisone irrigation alone, while final 12 patients received intraoperative hydrocortisone irrigation plus a 3 week postoperative tapering course of oral steroids. Notably, all of the nine patients who did not receive any steroids developed postoperative fever, with 78% demonstrating meningismus.

**Conclusion:** Here is level II evidence that establishes the efficacy of prophylactic steroids utilized in patients undergoing surgery for ECs to prevent postoperative chemical meningitis. Nevertheless, there is still no current consensus regarding either the type of steroid utilized, or the route of administration.

**Keywords:** Chemical meningitis, Dexamethasone, Epidermoid cyst, Hydrocortisone, Level of evidence

## INTRODUCTION

Epidermoid cysts (EC) are slow-growing lesions that account for less than 1% of all spinal lesions.<sup>[4]</sup> Notably, only 80 cases of intramedullary EC have been reported in literature.<sup>[5]</sup> At surgery, EC contain flaky material with a thin diaphanous wall, and leakage of its keratinous contents may cause postoperative chemical meningitis (e.g., symptoms including fever, headaches, and/or meningism),<sup>[1]</sup> that O'Malley and Haynes, cited as occurring in 0.3–5.5% of such cases.<sup>[8]</sup> Although steroids are often administered in an attempt to prevent possible chemical meningitis/neurological sequelae, there are no guidelines for their prophylactic use.<sup>[1,3,6]</sup>

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Here, we present a 44-year-old patient who underwent surgery for a thoracic intramedullary EC, who was given a prophylactic course of oral steroids postoperative operatively and did not develop chemical meningitis.

## CASE DESCRIPTION

### Clinical presentation

The now 44-year-old male had been diagnosed with an overactive bladder at the age of 20 and had been on dutasteride/tamsulosin for the past 24 years. Now, he presented with a 2 year history of progressive bilateral lower limb numbness/paraparesis, in conjunction with perianal, scrotal, and penile numbness. His neurological examination revealed impaired light touch and temperature sensation below the level of T1 bilaterally, and proprioceptive ataxia. He was hyper-reflexic in the right knee and ankle jerks and there was an extensor plantar reflex on the right. There was no motor deficit.

### Thoracic MR

The thoracic spine MRI demonstrated a well demarcated,  $1.3 \times 0.9 \times 2.0$  cm (TV  $\times$  AP  $\times$  CC) ovoid intramedullary lesion in the dorsal cord at T3/4; it expanded and displaced the cord to the left. There was also a smaller, caudal, and exophytic component. On the MR, the lesion was solid, homogeneous, and hypointense on T1-weighted images, hyperintense on T2-weighted images and did not enhance with gadolinium [Figure 1a and b]. It also demonstrated restricted diffusion (e.g., on diffusion weighted studies), while spectroscopy identified water and lactate within the lesion [Figure 1c].

### Surgery

A T2-T3 laminectomy with laminoplasty was performed. Once the dura was opened, the intramedullary cyst was immediately identified coming to the cord surface on the right; its exophytic component was glistening white and thin walled [Figure 2a and b]. A plane was developed between cyst and cord, enabling meticulous resection while avoiding spillage of cyst contents into the subarachnoid space.

### Histology

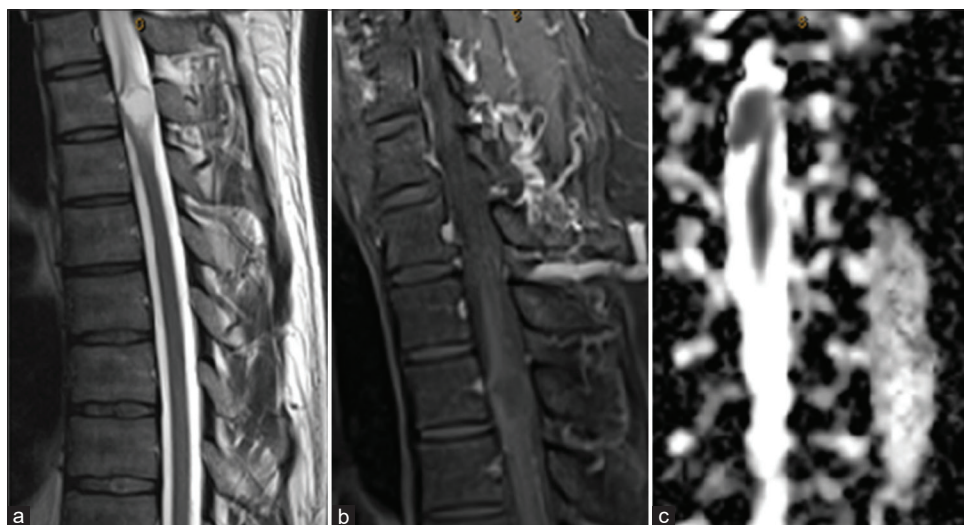
The histologic examination confirmed an EC lined with a thin layer of keratinizing stratified squamous epithelium on a fibrocollagenous base. It contained abundant anucleate squames. No dermal skin appendages were identified in the wall of the cyst and there were no luminal hair shafts [Figure 3].

### Steroid administration

The patient received a single dose of 8 mg of intravenous dexamethasone given at the time of induction of anesthesia. This was followed by a 7 day postoperative tapering course of oral dexamethasone (starting with 4 mg tid). Postoperatively, the patient never developed symptoms or signs of chemical meningitis and was discharged to rehabilitation shortly thereafter.

## DISCUSSION

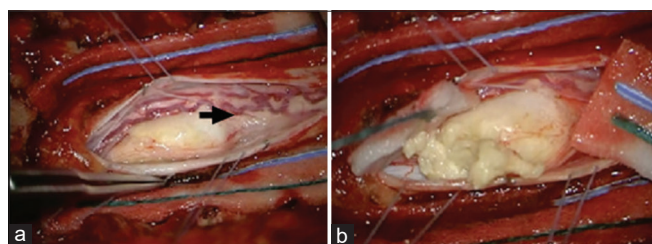
Surgical resection of ECs may result in intraoperative rupture with its cyst contents (cholesterol, keratin, and lipid) spilling into the subarachnoid space, resulting in a chemical



**Figure 1:** Preoperative magnetic resonance imaging of the thoracic spine shows a T3/4 intradural, intramedullary cyst. (a) On T2-weighted MRI, the cyst is hyperintense to spinal cord, with cord fibers splayed over the lesion. (b) There is no enhancement of the cyst with gadolinium. (c) The ADC map MRI, confirms restricted diffusion.

meningitis.<sup>[1,2,6]</sup> Such a use of steroids for prophylaxis is widely accepted.<sup>[2,3,6]</sup>

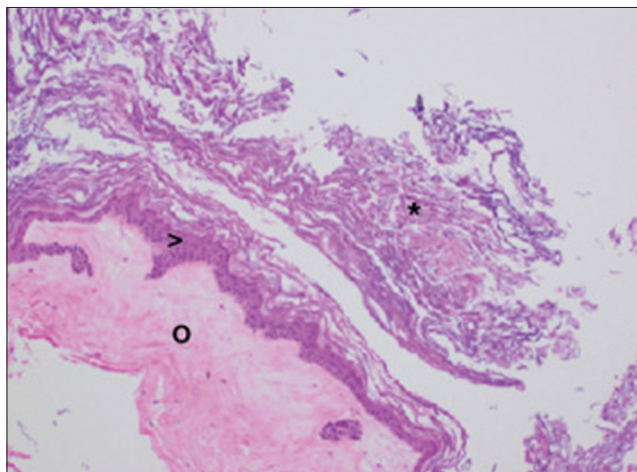
The authors reviewed three studies involving a total of 34 patients undergoing surgery for 14 cranial (posterior fossa), and 20 spinal ECs. Of the 24 patients given prophylactic steroids (most commonly intrathecal hydrocortisone irrigation; 22 cases), 13 included the posterior fossa and 11 included the spine. Only two patients developed fever or symptoms of meningism postoperatively; however, it is not clear whether one of these had been previously treated for chemical meningitis. The second patient had experienced two bouts of preoperative chemical meningitis [Table 1]. In 1967, Cantu and Ojemann reported the first successful management of a patient given prophylactic



**Figure 2:** Intraoperative photos. (a) Intramedullary cyst with an exophytic component visualized on opening the intact spinal dura and arachnoid. Nerve roots are seen splayed laterally (arrow). (b) Cyst contents were flaky and “pearl-like” in appearance.

oral methylprednisolone for 8 days following surgery for a posterior fossa EC.<sup>[3]</sup> Berger *et al.* also managed 11 patients following resection of a posterior fossa EC.<sup>[2]</sup>

In the randomized control trial, Kapoor *et al.*, 2003, 11 of the 20 patients with spinal ECs, treated with prophylactic steroids (e.g., intraoperative irrigation of the intrathecal



**Figure 3:** A low power photomicrograph of the cyst wall showing a stratified squamous epithelial lining (>), on a dense fibrocollagenous base (O) and anucleate squames within the lumen (\*). No skin adnexae were identified (hematoxylin and eosin, ×15).

**Table 1:** Summary of literature review for the use prophylactic steroids to prevent chemical meningitis.

Reference article	Type of paper	Number of patients	Location of epidermoid cyst	Type of steroid used and route of administration	Outcome assessed following steroid treatment
Cantu and Ojemann, 1967	Case report	1	Posterior fossa	Prophylactic regular corticosteroids, postoperatively for 8 days	Prophylactic steroids for 8 days – no meningismus Cessation of steroids for 24 h resulted in the development of headache, mental blunting, pronounced meningismus and fever (39.5 degrees). Four hours following single administration of 40 mg intramuscular methylprednisolone, there was a resolution of meningitic symptoms/signs
Berger <i>et al.</i> , 1985	Case series	13	Posterior fossa	12 patients; prophylactic intra-operative hydrocortisone irrigation + oral tapering dose postoperatively for 3 weeks One patient; treated for two bouts of preoperative chemical meningitis and received standard treatment as for prophylactically treated patients	Two patients developed chemical meningitis. Both responded “promptly” to dexamethasone treatment Remaining 11 patients – no meningismus
Kapoor <i>et al.</i> , 2003	RCT	20	Spinal	Prophylactic intraoperative hydrocortisone irrigation (11 patients) versus no irrigation (Control group – nine patients)	Hydrocortisone group – no fever or meningismus Control group – 100% developed postoperative fever, 78% developed meningismus

space with 0.01% hydrocortisone mixed with normal saline), demonstrated no postoperative signs of fever or meningismus. The nine patients in the control group (without intraoperative hydrocortisone irrigation) exhibited symptoms/signs of chemical meningitis (e.g., postoperative fever [ $P < 0.01$ ], and seven exhibited frank “meningismus” [ $P < 0.01$ ]).<sup>[6]</sup> Although, the number of patients included in this randomized controlled trial was small, a “trend” regarding the potential benefit of prophylactic treatment for patients undergoing surgery for EC with intraoperative steroids was demonstrated.

## CONCLUSION

The patient in the current case report, following surgery for an intramedullary EC, was given a postoperative, prophylactic course of oral dexamethasone that avoided postoperative meningitis/meningismus. A cursory review of literature showed Level II evidence that administering perioperative/postoperative steroids prophylactically in patients with spinal ECs may help prevent postoperative chemical meningitis.<sup>[7]</sup>

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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