

Dural sac

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The thecal sac or [dural sac](#) is the membranous sheath of [dura mater](#) that surrounds the [spinal cord](#) and the [cauda equina](#). The thecal sac contains the [cerebrospinal fluid](#) in which the spinal cord 'floats'.

The dural sac and closely adherent [arachnoid mater](#) on its inner surface, are a barrier to drug migration into and out of the cerebrospinal fluid during epidural anesthesia. The termination of the sac well below the [conus medullaris](#) (classically found at L1 in the adult) also provides a degree of safety when performing spinal anesthesia, offering multiple spinal levels for intrathecal drug administration with low risk for direct spinal cord trauma.

Age-related anatomic variations exist in the location of the caudal termination of the dural sac that can affect neuraxial anesthesia. During early development in utero, the spinal cord exists throughout the entire spinal canal. Differential growth of the vertebrae compared to the nerves and cord account for a relative ascension of the cord within the canal over time. By birth the sac ends at S3 or S4, with the conus medullaris terminating at the L3 or L4 level. It is not until approximately 1 year of age that anatomic relationships resemble that of the adult. It is thus possible to enter the dural sac during caudal anesthesia in very young infants. If spinal anesthesia is used in this population, a low approach to entering the dural sac is warranted to avoid the cord.

In clinical practice, Xie et al., noted that the end section of the [thecal sac](#) is apparently different in patients with [Tarlov cyst](#) compared with that of the normal population.

They conducted a clinical study based on magnetic resonance imaging (MRI).

The study included 30 patients with Tarlov cyst and 30 healthy volunteers as the control. The L4, L5 cross-section areas, the L4, L5 anteroposterior diameters, and the terminal length of the thecal sac were measured from the lumbosacral spine MRI. Results The L4, L5 cross-section areas and the L4, L5 anteroposterior diameters are larger for the Tarlov cyst patients than the controls, but the terminal

length of the thecal sac is shorter.

The Tarlov cyst is correlated with a short broad end of the thecal sac. Possibly, this anatomical variant is a causative factor of Tarlov cyst ¹⁾.

Pathology

The majority of dural pathologies involving [nerve root sleeves](#) remain asymptomatic, while those of the [dural sac](#) commonly lead to pain and neurological symptoms. Saccular dural diverticula (type I) and dissections between dural layers (type II) pathologies were treated with good long-term results occluding their dural defects, while [dural ectasias](#) (type III) were managed conservatively ²⁾.

¹⁾

Xie C, Zheng X, Zhang N. Tarlov Cyst Is Correlated with a Short Broad Terminal of the Thecal Sac. J Neurol Surg A Cent Eur Neurosurg. 2016 Dec 27. doi: 10.1055/s-0036-1596058. [Epub ahead of print] PubMed PMID: 28027566.

²⁾

Klekamp J. A New Classification for Pathologies of Spinal Meninges, Part 1: Dural Cysts, Dissections, and Ectasias. Neurosurgery. 2017 Mar 17. doi: 10.1093/neuros/nyx049. [Epub ahead of print] PubMed PMID: 28327939.

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