Tarlov cyst

- Unilateral Painless Legs and Moving Toes Syndrome with Bilateral Tarlov Cysts
- A Validation of the Tarlov Cyst Quality-of-Life Survey in Men Surgically Treated for Symptomatic Spinal Tarlov Cysts
- Coexistence of a Tarlov cyst, pudendal neuropathy, and pelvic lipomatosis in the clinical course of a traffic-related injury while commuting: a case report
- Successful Surgical Ligation of a Giant Tarlov Cyst at the Cyst Neck Including the Nerve Root: A Case Report
- High Prevalence of Small-Fiber Neuropathy in Patients with Tarlov Cysts: Toward a More Comprehensive Clinical Understanding
- Prolonged arm block from inadvertent subdural cannulation during a thoracic epidural insertion
- Spontaneous regression of a sacral Tarlov cyst
- Microsurgical reinforced radiculoplasty for the treatment of postoperative recurrent sacral Tarlov cysts

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Type II spinal meningeal cyst.

A Tarlov cyst, also known as a perineural cyst or sacral nerve root cyst, is a fluid-filled sac that forms on the nerve roots at the base of the spine, typically in the sacral region. These cysts are named after American neurosurgeon Isadore Tarlov, who extensively studied and described them. Tarlov cysts are usually benign and non-cancerous.

Perineural cysts (Tarlov cysts): arise in the space between the perineurium and endoneurium, usually on sacral roots, and occasionally show delayed filling on myelography. Usually associated with remodeling of adjacent bone

Tarlov cyst is an abnormal expansion of the spinal nerve sleeve and communicates with the subarachnoid space via a perineural fistula.

Tarlov cysts (TCs) occur most commonly on extradural components of the sacral nerve and coccygeal nerve roots.

Classification

Although asymptomatic Tarlov cysts (TCs) are reported in up to 13% of the population, symptomatic TCs are rare (less than 1%), The most common location of symptomatic TCs is sacral nerve roots

Etiology

In clinical practice, Xie et al., from the Department of Neurosurgery, Wenzhou Medical University Second Affiliated Hospital, Wenzhou, China and Shanghai Jiaotong University School of Medicine, Xinhua Hospital, Shanghai, China, 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)].

Some incidents or conditions that might potentially cause the asymptomatic cysts to become symptomatic are traumatic injuries such as falls, automobile accidents , heavy lifting, childbirth, and epidurals. Trauma to the spinal cord, an increase in the CSF pressure, or a blockage of the CSF can result in cyst formation. Read “What happens in spinal cord injuries?”. It is also noted that the herpes simplex virus can cause the Tarlov cyst symptoms to worsen during a herpes virus outbreak, but there is no known “connection” related to any virus or infection with causing Tarlov cysts to develop.

There is significant clinical evidence that collagen mutations or connective tissue disorders such as Marfan's, Ehlers-Danlos, Sjogren's, Loeys-Deitz, Lupus, MCTD (mixed connective tissue disorders), UCTD (undifferentiated connective tissue disorders) are predisposing or contributing to the cysts developing. A number of Tarlov cyst patients have also been diagnosed with a connective tissue disorder, and many more of their biological family members, who may or may not have Tarlov cysts, have been diagnosed with one of the above mentioned connective tissue disorders (CTD).

Epidemiology

These lesions are often found incidentally on magnetic resonance imaging, with an estimated prevalence of 4%-9%.

They are located most prevalently at the S2, S3 level of the sacrum.

A significant percentage (11%) of patients have cysts at more than one location of the spine.

Some patients have cysts at all sections of the spine, including cervical, thoracic, lumbar, and sacral.

Clinical features

Tarlov cyst clinical features

Diagnosis

Sometimes they are found incidentally with magnetic resonance imaging.

The TCs appear on MRI to be dilated or ballooned areas of the sheaths that cover nerve roots.

They exhibit delayed filling with contrast medium on myelography, which is one of the criteria used by Tarlov to distinguish perineural cysts from meningeal diverticula.

Cyst aspiration both with and without injection of fibrin glue may serve as a useful diagnostic tool to (1) determine symptom etiology and (2) identify patients who might have achieved temporary improvement between the time of cyst aspiration and refill with cerebrospinal fluid as potential candidates for neurosurgical intervention of cyst fenestration and nerve root imbrication [2)]

Differential diagnosis

It is sometimes confusing to make an accurate diagnosis as to the cause of the symptoms if there are multiple diagnoses found, such as herniated discs, ruptured discs, DDD (degenerative disc disease). It is sometimes diagnostically conclusive that the cysts are the cause of symptoms when pain is improved by aspirating the fluid from the cysts. Although using a needle to aspirate CSF from the cysts can temporarily relieve symptoms, eventually the cysts will refill and the symptoms will recur usually within hours.

Lumbar juxtafacet cyst

Subarachnoid cysticercosis may extend to nerve root sleeve causing back pain and radiculopathy, which may present with similar magnetic resonance imaging manifestations to Tarlov cysts. Hence, spinal subarachnoid cysticercosis should be considered as an important differential diagnosis of arachnoid cyst and sacral Tarlov cyst [3)].

Treatment

Tarlov cyst treatment

Case series

2016

Elsawaf et al., retrospectively reviewed their clinical data archive from 2002 to 2014. Fifteen patients who were operated on due to symptomatic sacral perineural cysts were enrolled in the study. Patients' symptoms, radiographs, intra-operative findings, and clinical results were evaluated. All 15 patients underwent microsurgical excision of the cyst. The literature on this topic available in PubMed was also reviewed.

There were 5 men and 10 women included in the study, with a mean age of 31 years (range 7-60 years). Preoperative symptoms include low back pain, coccydynia, buttock pain, perianal pain and radicular pain. All of the patients underwent surgical resection. The mean follow-up was 54 months (range 3-160 months). All the patients experienced complete or substantial resolution of the preoperative local and radicular pain after surgery.

Cyst excision is an effective and safe technique for symptomatic sacral perineural (Tarlov) cysts. Careful patient selection is vital to the management and treatment of this difficult and controversial pathology [4)]

Burke et al., performed a retrospective review of data from consecutive patients who were surgically treated for symptomatic TCs from September 2011 to March 2013. Clinical evaluations and results from surveying pain and overall health were used. Univariate statistical analyses were performed.

Twenty-three adults (4 males, 19 females) who had been symptomatic for a mean of 47.4 months were treated with laminectomy, microsurgical exposure and/or imbrication, and paraspinous muscle flap closure. Eighteen patients (78.3%) had undergone prior interventions without sustained improvement. Thirteen patients (56.5%) underwent lumbar drainage for an average of 8.7 days following surgery. The mean follow-up was 14.4 months. Univariate analyses demonstrated that an advanced age ($p = 0.045$), the number of noted perineural cysts on preoperative imaging ($p = 0.02$), and the duration of preoperative symptoms ($p = 0.03$) were associated with a poor postoperative outcome. Although 47.8% of the patients were able to return to normal activities, 93.8% of those surveyed reported that they would undergo the operation again if given the choice.

This is one of the largest published studies on patients with TCs treated microsurgically. The data suggest that patients with symptomatic TCs may benefit from open microsurgical treatment. Although outcomes seem related to patient age, duration of symptoms, and extent of disease demonstrated on imaging, further study is warranted and underway [5)].

Potts et al., retrospectively reviewed all consecutive cases of symptomatic giant sacral Tarlov cysts treated with microsurgery at the Department of Neurological Surgery, University of California, San Francisco, California, USA between 2003 and 2011. The main outcome measure was self-reported symptom relief. Postoperative imaging, surgical complications, and subsequent treatments were also recorded.

Thirty-five patients were treated. Mean age was 52 years. All patients presented with a chief

complaint of sacral-perineal pain. The mean cyst size was 3.6 cm (largest diameter). Follow-up beyond the initial hospital stay was available in 86% (median 8 months). Ninety-three percent reported improvement in pain at some point during the postoperative course but 50% of those developed recurrent pain symptoms. Postoperative imaging was available in 69% of the patients in whom 92% showed complete obliteration (25%) or reduction in cyst size (67%).

The combination of microsurgical cyst fenestration and the use of vascularized muscle pedicle flaps to fill the cystic cavity and the epidural space results in obliteration or reduction in size of the majority of cysts and is associated with initial improvement in pain in most patients. However, delayed recurrence of pain was common with this technique [6].

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Twenty-two patients with symptomatic Tarlov cysts were surgically treated. An emulsion balloon was placed into the lumbar subarachnoid cistern through a trocar, so as to temporarily block cerebrospinal fluid flow, then the thecal sac was opened and the inlet of the fistula was sealed by suture of a muscular patch and reinforced by fibrin glue. At last the cyst wall was imbricated and the bony cavity was filled with pedicled muscle flaps.

Comparing the preoperative and postoperative pain scores according to visual analog scale, 2 patients were slightly improved; 18 patients were substantially improved, including 3 completely pain-free cases. Only 2 patients were unchanged in pain, and both of them were multiple cysts. As a whole, the postoperative pain score is much better than the preoperative score (2.4 vs 7.5, $P<0.01$). Bladder weakness was slightly improved, and bowel dysfunction was almost unchanged after operation. During follow-up, cyst recurrence was found in one patient.

The balloon-assisted fistula sealing procedure is safe and effective for Tarlov cyst, especially for the single cyst. It's a good complement to the cyst wall imbricating procedure [8].

2011

In 13 consecutive patients (10 female, 3 male), MRI revealed sacral perineural cysts and excluded other pathologies. Micro-communication between the thecal sac and the cysts was shown by delayed

contrast filling of the cysts on postmyelographic CT. Surgical fenestration achieved free CSF communication between the thecal sac and cysts in all patients. The patient histories, follow-up examinations and self-assessment scales were analyzed. Symptoms at initial presentation included lumbosacral pain, pseudoradicular symptoms, genital pain and urinary dysfunction. Mean follow-up was 10.7 ± 6.6 months.

Besides one CSF fistula, no surgical complications were observed. Five patients did not improve after surgery; in four of these cases multiple cysts were found, but small and promptly filling cysts remained untreated. Seven patients reported lasting benefit following surgery; three of these had single cysts, and all had cysts >1 cm. One patient initially benefited from cyst fenestration but experienced recurrent pain within 2 months postoperatively. Re-myelography revealed delayed contrast filling of the recurrent cyst; however, surgical revision did not lead to an improvement despite successful fenestration and collapse of the cyst revealed by postoperative imaging.

Microsurgical fenestration of sacral perineural cysts to the thecal sac is a surgical approach that has shown success in the treatment of lumbosacral pain, pseudoradicular symptoms, genital pain and urinary dysfunction associated with sacral perineural cysts. The analysis, however, shows that mainly patients with singular large cysts benefit from this treatment [9].

2009

Over a seven year period 4000 patients underwent surgery for lumbar disk herniation. In three patients neurological symptoms were caused by large sacral perineurial cysts. Methods of choice for diagnosis of Tarlov cysts are lumbosacral magnetic resonance imaging and computerized tomography myelography. The majority of Tarlov cysts are asymptomatic. In case of large (> or = 1.5 cm) and symptomatic perineurial cyst, as in three patients reported in this article, microsurgical treatment was successful. Although rare, perineurial (Tarlov) cysts must be taken into consideration when approaching to patient with low back and radicular pain. Authors review the medical literature, pathological and pathophysiological features and treatment options of sacral perineurial cysts [10].

Case reports

Tarlov cyst case reports.

Links

Tarlov Cyst Disease Foundation

http://www.tarlovcystfoundation.org/

Clinical Trials

NCT02595190

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)

Tracz J, Judy BF, Jiang KJ, Caraway CA, Yang W, De Macena Sobreira NL, Khan M, Witham TF. Interventional approaches to symptomatic Tarlov cysts: a 15-year institutional experience. J Neurointerv Surg. 2023 Jul 4:jnis-2023-020564. doi: 10.1136/jnis-2023-020564. Epub ahead of print. PMID: 37402574.

3)

Tao B, Li T, Ji K, Shang A. Spinal nerve root sleeve cysticercosis: a case report and review of the literature. J Med Case Rep. 2023 Feb 22;17(1):80. doi: 10.1186/s13256-022-03733-9. PMID: 36814326; PMCID: PMC9945364.

4)

Elsawaf A, Awad TE, Fesal SS. Surgical excision of symptomatic sacral perineurial Tarlov cyst: case series and review of the literature. Eur Spine J. 2016 Nov;25(11):3385-3392. Review. PubMed PMID: 27154168.

5)

Burke JF, Thawani JP, Berger I, Nayak NR, Stephen JH, Farkas T, Aschyan HJ, Pierce J, Kanchwala S, Long DM, Welch WC. Microsurgical treatment of sacral perineural (Tarlov) cysts: case series and review of the literature. J Neurosurg Spine. 2016 May;24(5):700-7. doi: 10.3171/2015.9.SPINE153. Review. PubMed PMID: 26745352.

6)

Potts MB, McGrath MH, Chin CT, Garcia RM, Weinstein PR. Microsurgical Fenestration and Paraspinal Muscle Pedicle Flaps for the Treatment of Symptomatic Sacral Tarlov Cysts. World Neurosurg. 2016 Feb;86:233-42. doi: 10.1016/j.wneu.2015.09.055. PubMed PMID: 26423931.

7)

Burke JF, Thawani JP, Berger I, Nayak NR, Stephen JH, Farkas T, Aschyan HJ, Pierce J, Kanchwala S, Long DM, Welch WC. Microsurgical treatment of sacral perineural (Tarlov) cysts: case series and review of the literature. J Neurosurg Spine. 2016 Jan 8:1-8. [Epub ahead of print] PubMed PMID: 26745352.

8)

Zheng X, Li S, Sheng H, Feng B, Zhang N, Xie C. Balloon-assisted fistula sealing procedure for symptomatic Tarlov Cysts. World Neurosurg. 2016 Jan 20. pii: S1878-8750(16)00095-4. doi: 10.1016/j.wneu.2016.01.016. [Epub ahead of print] PubMed PMID: 26802871.

9)

Neulen A, Kantelhardt SR, Pilgram-Pastor SM, Metz I, Rohde V, Giese A. Microsurgical fenestration of perineural cysts to the thecal sac at the level of the distal dural sleeve. Acta Neurochir (Wien). 2011 Jul;153(7):1427-34; discussion 1434. doi: 10.1007/s00701-011-1043-0. PubMed PMID: 21562735; PubMed Central PMCID: PMC3111602.

10)

Sajko T, Kovać D, Kudelić N, Kovac L. Symptomatic sacral perineurial (Tarlov) cysts. Coll Antropol. 2009 Dec;33(4):1401-3. PubMed PMID: 20102100.