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CLINICAL FINDINGS OF TARLOV CYST ACCORDING TO ITS LOCATION AND LEVEL IN LUMBOSACRAL SPINE ON MAGNETIC RESONANCE IMAGING

Original Research

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ABSTRACT

Background: Tarlov cysts are cerebrospinal fluid–filled sacs that most frequently arise in the lumbosacral region of the spine. Although often asymptomatic, they can present with a spectrum of neurological deficits when exerting mass effect on adjacent nerve roots. Symptoms such as numbness, pain, reflex loss, and bowel or bladder disturbances significantly affect patients' quality of life. Magnetic resonance imaging (MRI) remains the gold standard for detection and characterization of these lesions, offering detailed insights into their location, size, and relationship with surrounding structures.

Objective: To evaluate the clinical manifestations of Tarlov cysts in relation to their level and anatomical location using MRI in patients presenting with neurological deficits.

Methods: A descriptive cross-sectional study was conducted at Ghurki Trust and Teaching Hospital, Lahore, enrolling 60 patients under 40 years of age who presented with neurological complaints. Patients with claustrophobia, pacemakers, cochlear implants, or metallic implants were excluded. Data were collected using structured questionnaires and standardized proformas, and all patients underwent MRI for assessment of Tarlov cysts. A non-probability convenient sampling technique was adopted. Statistical analysis was performed using SPSS version 25 and Microsoft Excel, with descriptive statistics applied to evaluate clinical features and cyst locations. Ethical approval was obtained, and informed consent was taken from all participants.

Results: Of the 60 patients, 40 (66.7%) were female and 20 (33.3%) were male. The most common neurological symptom was numbness, observed in 50 patients (83.3%), followed by loss of reflexes in 40 patients (66.7%). Localized mass effects due to cyst compression were noted in 20 patients (33.3%), while bowel dysfunction occurred in 10 patients (16.6%). MRI revealed cyst localization most commonly in the sacral region in 28 patients (46.7%), followed by the lumbosacral region in 24 patients (40%), the cervical region in 14 patients (23.3%), and the lumbar region in 8 patients (13.3%).

Conclusion: The study demonstrated that Tarlov cysts were more common in females, with the sacral and lumbosacral levels being the most frequently involved sites. The clinical burden was predominantly neurological, with numbness and reflex loss being the most prevalent deficits. MRI proved to be indispensable in diagnosis, highlighting the importance of early recognition to prevent chronic complications.

Keywords: Bowel Dysfunction AND Tarlov Cyst; Female Predominance AND Spinal Cyst; Lumbar Spine AND Perineural Cyst; Magnetic Resonance Imaging AND Lumbosacral Spine; Neurological Deficits AND Sacral Cyst; Sacral Region AND Tarlov Cyst; Spine MRI AND Radiculopathy.

INTRODUCTION

Tarlov cysts, also known as perineural cysts, are fluid-filled sacs that develop around the nerve roots, most commonly in the sacral and lumbar regions of the spine. They were first described in 1938 as incidental autopsy findings (1). The reported incidence of Tarlov cysts is approximately 5%, with most cases remaining asymptomatic; however, a small proportion of patients—estimated at about 1%—develop clinically significant symptoms such as sacral or lumbar pain, sciatica, and coccydynia (2,3). Although rare, the disease disproportionately affects women, and its variable clinical presentation often contributes to delayed or missed diagnosis (4). The symptoms of Tarlov cysts are highly dependent on their size and anatomical location. These cysts may produce both local and radicular pain and can compromise sensory and motor function due to compression of adjacent neural structures (5). Patients may report sacral pain exacerbated by prolonged standing, walking, or coughing, as well as neurological deficits such as numbness, bladder or bowel dysfunction, and, rarely, lower limb weakness (6). A history of trauma is also noted in some cases, suggesting possible etiological links (7). Because of their nonspecific presentation, Tarlov cysts are frequently considered in the differential diagnosis of radicular pain syndromes, including sacral radiculopathy (8).

Imaging plays a pivotal role in diagnosis. Magnetic resonance imaging (MRI) is regarded as the gold standard due to its superior soft-tissue contrast and multiplanar capability (9). Characteristic features include low signal intensity on T1-weighted images, high signal intensity on T2-weighted images, and no post-contrast enhancement (10–12). Advanced sequences such as STIR and diffusion-weighted imaging enhance visualization of pathological changes and help differentiate cysts from other spinal pathologies (10,11). Despite their frequent incidental discovery, accurate recognition of Tarlov cysts on MRI is critical to avoid misdiagnosis and inappropriate management. Therapeutic approaches vary from conservative management to surgical interventions such as sacral laminectomy in severe or refractory cases (8,13). Nevertheless, due to limited awareness among clinicians and patients alike, many symptomatic individuals do not receive timely treatment, increasing the risk of chronic pain and functional impairment. Given the rarity of the condition and its diverse presentation, there remains a paucity of comprehensive data on the clinical characteristics and complications associated with Tarlov cysts. This study aims to identify the diagnostic features of Tarlov cysts on MRI, describe the spectrum of neurological manifestations, and provide statistical insight into their clinical burden. The objective is to improve awareness within the medical community and highlight the importance of early and accurate diagnosis to prevent avoidable complications.

METHODS

This study was designed as a descriptive cross-sectional investigation conducted at Ghurki Trust and Teaching Hospital, Lahore. A total of 60 patients younger than 40 years of age were recruited. The inclusion criteria comprised individuals with a history of lower back pain, weight loss, and suspected tuberculosis, while patients with contraindications to magnetic resonance imaging (MRI), such as claustrophobia, metallic implants, pacemakers, or cochlear implants, were excluded. All participants were enrolled following informed consent, and the study protocol was reviewed and approved by the institutional ethical review committee ensuring compliance with ethical standards for human research. Data were collected using a structured questionnaire and a standardized proforma to document demographic details, clinical history, and relevant symptoms. MRI examinations were performed to assess the presence and characteristics of Tarlov cysts. The imaging protocol included standard spine sequences to ensure optimal visualization of perineural cysts and related spinal structures. The use of MRI was particularly valuable given its sensitivity and specificity in detecting soft-tissue lesions of the spine. A non-probability convenient sampling technique was adopted for patient recruitment, which may introduce selection bias and limit the generalizability of the findings. Data entry and statistical analysis were performed using the Statistical Package for Social Sciences (SPSS) version 25, with additional calculations and graphical representations managed in Microsoft Excel. Descriptive statistics were used to summarize baseline characteristics and imaging findings.

RESULTS

The study enrolled a total of 60 patients, of whom 40 (66.7%) were females and 20 (33.3%) were males. The most frequent clinical finding was numbness in the area extending below the neck, observed in 50 patients (83.3%). Loss of normal reflexes, including

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diminished pain sensation and reduced jerking response, was reported in 40 patients (66.7%). Localized symptoms due to aberrant positioning of the cyst within the spine and associated mass effect were noted in 20 patients (33.3%). Additionally, altered bowel function was documented in 10 patients (16.6%). The size of the cysts most commonly measured around 8.0 × 8.0 mm and 8.7 × 12 mm, predominantly located behind the sacral levels S1 and S2 as well as the lumbosacral junction. On MRI, Tarlov cysts were most frequently visualized in the sacral region, identified in 28 patients (46.7%). The lumbosacral region was affected in 24 patients (40%), followed by the cervical region in 14 patients (23.3%) and the lumbar region in 8 patients (13.3%).

Table 1: Frequency statistics according to gender and region of Tarlov Cyst

Gender	Frequency	Region	Frequency
Female	40 (66.6%)	Sacral region	28(46.7%)
Male	20(33.33%)	Lumbosacral region	24(16%)
-	-	Lumbar region	8 (13.3%)

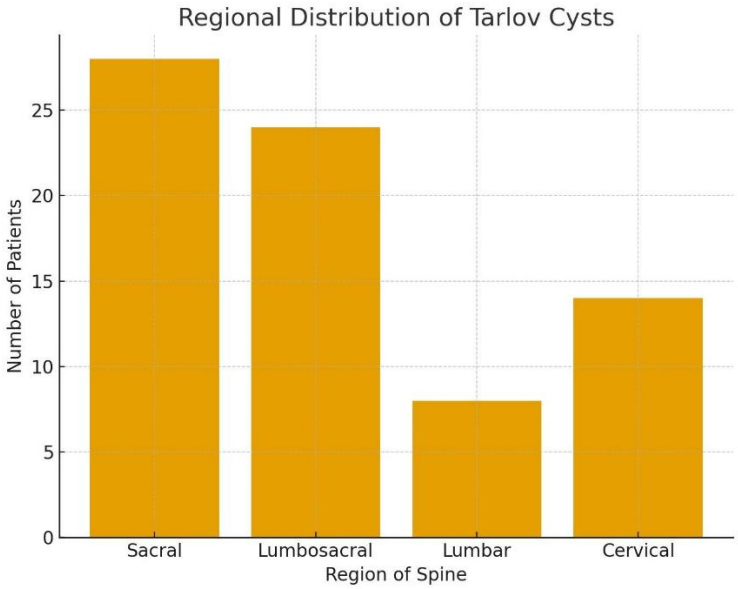

Figure 2 Regional Distribution of Tarlov Cysts

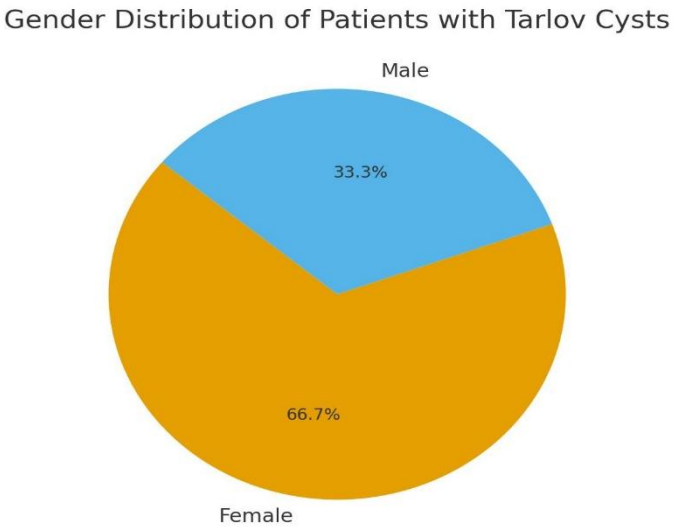

Figure 2 Gender Distribution of Patients with Tarlov Cysts

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Representing the aberrant location of Tarlov cyst in the lumbosacral region

DISCUSSION

Tarlov cysts are recognized as fluid-filled sacs that occur in both genders, with a greater predilection for females. In the present study, two-thirds of the patients were female, which is consistent with existing literature that also highlights the predominance of the disease in women (14,15). The sacral and lumbosacral regions were the most frequent anatomical sites of involvement, followed by the cervical and lumbar regions. These findings parallel earlier research which demonstrated that sacral and lumbar levels, particularly S1 and S2, are the most commonly affected areas. The clinical spectrum observed in this study included numbness, diminished reflexes, localized pain due to mass effect, and bowel dysfunction. Numbness was the most frequently reported symptom, present in over 80% of patients, while loss of normal reflexes was reported in nearly two-thirds. These manifestations support prior findings that neurological deficits are a hallmark of symptomatic Tarlov cysts and align with studies that have reported radiculopathy, radiating pain, and bowel or bladder changes as frequent complaints (16-18). The presence of bowel dysfunction in a subset of patients underscores the potential of these cysts to significantly impair quality of life when they exert compressive effects on sacral nerve roots.

The size of cysts observed in this study, ranging around 8.0 × 8.0 mm to 8.7 × 12 mm, reflects dimensions that are often reported to become symptomatic, particularly when associated with pressure on adjacent neural structures. MRI findings, with T2-weighted images demonstrating high signal intensity, confirmed the role of advanced imaging as the gold standard for diagnosis (19,20). The predominance of sacral and lumbosacral involvement further highlights the importance of targeted imaging in these regions to avoid misdiagnosis with other cystic or degenerative spinal conditions. Comparative analysis with previously published literature shows similarities in clinical manifestations, particularly regarding chronic pain, neurological deficits, and female predominance. However, differences in the proportion of affected spinal regions suggest variability that may depend on population characteristics, sample size, and diagnostic thresholds (21-23). While retrospective surgical series have demonstrated significant symptom burden and the need for invasive interventions, the present study emphasized radiological and clinical associations in a cross-sectional cohort, adding value to the growing body of descriptive data on the condition.

The strengths of this study include its focus on a younger cohort of patients under 40 years of age, use of MRI as a diagnostic tool, and systematic documentation of both clinical and radiological findings. Nevertheless, limitations must be acknowledged. The use of non-probability convenient sampling introduces the possibility of selection bias, which reduces the generalizability of the results. Furthermore, the absence of correlation analysis between cyst size, anatomical location, and symptom severity limits the ability to draw stronger clinical inferences. The lack of long-term follow-up data also prevents assessment of disease progression or treatment outcomes. Future research should focus on larger, multicenter cohorts to improve generalizability and should include prospective designs to track symptom evolution and treatment efficacy. Incorporating objective neurological assessments and quality-of-life measures would provide a more comprehensive understanding of disease burden. Additionally, further studies comparing conservative and surgical management approaches in symptomatic patients could help refine treatment protocols. In summary, the findings of this study reaffirm that Tarlov

cysts are more frequent in females, commonly involve the sacral and lumbosacral spine, and present with significant neurological symptoms. While the study contributes important descriptive insights, methodological refinements and broader scope in future research are essential to enhance clinical understanding and optimize patient care.

CONCLUSION

The study concluded that Tarlov cysts predominantly affect females and are most frequently located in the lower lumbar and lumbosacral regions, where they often produce significant neurological symptoms. The most common clinical manifestations included numbness, loss of reflex activity, bowel disturbances, and localized effects due to mass compression. These findings highlight the importance of early recognition and accurate imaging-based diagnosis, as timely identification of Tarlov cysts may help guide appropriate management strategies and prevent long-term complications. The results emphasize the need for increased clinical awareness of this underrecognized condition to improve patient outcomes and quality of life.

AUTHOR CONTRIBUTION

Author	Contribution
Rimsha Iftikhar*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Sidra Naeem	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Kamran Ashraf	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Fatima Mahrukh	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

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