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# Lumbar arachnoiditis: Does imaging associate with clinical features?

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### Abstract

#### Objectives

Lumbar arachnoiditis is a rare and debilitating neurologic disorder with multiple etiologies and a spectrum of imaging and clinical characteristics. Prior reports have anecdotally claimed that no association exists between findings of arachnoiditis observed on magnetic resonance imaging (MRI) and those assessed clinically. The purpose of this study was to determine if MRI features of lumbar arachnoiditis associate with the clinical findings of the disorder.

#### Patients and methods

Twenty eight patients with lumbar arachnoiditis reported on MRI between 2012 and 2018 were retrospectively identified. A variety of MRI and clinical features of lumbar arachnoiditis were cataloged for these patients based on common findings discovered through literature review. Imaging findings included cauda equina nerve root contour and thickening, adhesion location, level of involvement, enhancement, and Delamarter group. Clinical findings included demographics, etiology, symptom dynamics, and signs/symptoms. Fisher's exact tests were used to determine associations between the imaging and clinical features of lumbar arachnoiditis.

## Results

In general, MRI findings did not associate with the clinical features of lumbar arachnoiditis with a few exceptions. Most notably, confounding lumbar pathology was associated with symptom dynamics ( $p = 0.004$ ) and nerve root contour was associated with motor and sensory symptoms ( $p = 0.01$ ). The suspected arachnoiditis etiology of the majority of patients was either post-operative or post-infectious in nature.

## Conclusion

MRI findings in lumbar arachnoiditis offer limited insight into the clinical presentation of the disorder.

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## Introduction

Lumbar arachnoiditis is a rare and debilitating neurologic disorder with a complex and incompletely understood pathophysiology. The disorder was first described by Victor Horsley in 1909 and has been further characterized by multiple observational reports and a variety of smaller studies [1]. At a histopathologic level, an insult leads to non-specific inflammation of the arachnoid mater and subsequent fibrosis progressing to nerve root adhesions, clumping, and destruction of the subarachnoid space [2]. The etiology of lumbar arachnoiditis is quite variable and includes those of post-procedural, post-operative, and post-infectious causes among many others [3]. Historically, spinal arachnoiditis most often affected the cervical and thoracic spinal segments when infectious causes (mainly tuberculous) predominated [4,5]. However, more recently, arachnoiditis in the lumbar spine has been most common given the increased frequency of low back procedures and surgeries [5]. The clinical presentation and time course of lumbar arachnoiditis is heterogeneous with patients reporting a range of lower extremity neurological symptoms with varying levels of severity. Despite surgical and medical advancements, therapeutic options are limited and mainly include microsurgical lysis of adhesions, corticosteroid therapy, and chronic pain control [6,7].

Currently, lumbar arachnoiditis is diagnosed with magnetic resonance imaging (MRI), oftentimes utilizing contrast to elucidate inflammation [8]. The disorder has historically been

myelography, although this method has fallen out of favor given that intrathecal iodinated contrast has been implicated in the precipitation of arachnoiditis [4,7,9,10]. The imaging features of lumbar arachnoiditis were first categorized by Jorgensen in 1975 who sorted the disorder into two types: (1) nerve root adhesions within the meninges and (2) filling defects within the cerebral spinal fluid resulting in partial obstruction [11,12]. In 1976, Delamarter and colleagues introduced another classification scheme dividing the imaging characteristics of lumbar arachnoiditis into three groups: (1) a centrally located adherent mass of nerve roots in the thecal sac, (2) peripherally adherent nerve roots with an empty thecal sac, and (3) a soft tissue signal mass replacing or obliterating the subarachnoid space [13]. Fig. 1 shows examples of the three Delamarter groups sourced from this study's patient population.

The extensive array of clinical and imaging findings exhibited in lumbar arachnoiditis have been purported to lack association by multiple authors [3,7,14]. To the best of this author's knowledge, no study has been produced which has verified or refuted this claim. In this investigation, we aimed to evaluate if MRI features of lumbar arachnoiditis are associated with clinical findings. In doing so, we planned to ascertain whether or not any of these associations would have implications for patient management decisions.

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## Section snippets

### Patients and methods

This retrospective observational study was Institutional Review Board approved. Initially, the electronic medical record was searched from 2012 to 2018 for lumbar spine MRI reports of patients over 18 years of age containing the search term "arachnoiditis". The imaging reports were reviewed in order to eliminate reports in which language indicating the absence of arachnoiditis appeared. Only cases representing a high likelihood of lumbar arachnoiditis were considered, which resulted in 30...

### Results

The average age of the study population was  $61.8 \pm 15.1$  with a range from 37 to 85 years of age. The patient male/female ratio was 10/18. Additionally, the patient population was ethnically mixed with 39.3 % of the patients identifying as Caucasian, 53.6 % as black or African American, and 7.1 % as from Asian or Pacific Islander descent. The majority of the patients, 64.3 %, had MRI scans both with and without contrast.

The MRI findings of our study population are provided in Table 2. The...

## Association of imaging and clinical findings

This study is the first to evaluate whether a relationship exists between imaging and the clinical presentation of lumbar arachnoiditis. As previously mentioned, although no definitive study has ever been conducted, numerous authors have purported that no association exists [3,7,14]. While we report only a few associations between MRI and clinical parameters, these associations may influence clinical management decisions. For example, in the grouped association evaluation, confounding co-morbid ...

## Conclusion

In this study, we evaluated and tested the claim that MRI and clinical features of lumbar arachnoiditis are not associated. The findings of the study suggest that in fact, as a whole, MRI and clinical findings in lumbar arachnoiditis do not associate. There are a few positive associations which are significant, but these represent the exception not the rule. Clinicians caring for lumbar arachnoiditis patients should make management decisions based on their clinical history and exam, and not...

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