

# DIAGNOSTIC ACCURACY OF DIAGNOSTIC IMAGING FOR LUMBAR DISK HERNIATION IN ADULTS WITH LOW BACKACHE – A PROSPECTIVE STUDY

## Radiology

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### Abstract:

**Introduction:** There are several studies which reveal evidence on diagnostic accuracy of imaging (index test) compared to surgery (reference test) for identifying lumbar disk herniation in adult patients. The diagnostic accuracy for CT and MRI indicating a large proportion of false positive and negative.

**Aims and Objectives:** This study is conducted to compare and evaluate the diagnostic accuracy of diagnostic imaging of lumbar disk herniation by CT scan and MRI with reference to surgery.

**Material and Methods:** 16 adults having low backache with radiating pain to lower limbs with positive SLR at 32 to 35 degree, 10 males and 6 females between the age group of 30 to 45 years were included in the study. 8 patients were subjected to MRI and another 8 patients were subjected to CT scan for identifying lumbar disk prolapse with low backache with surgery as reference standard. Out of 16 patients, 12 patients did not respond to conservative management. Hence they were selected for operation for lumbar disk herniation.

**Results:** 2 patients out of 7 patients operated for lumbar disk herniation diagnosed on basis of MRI findings did not show surgical evidence of disk prolapse intraoperatively, while 2 patients out of 5 patients operated for lumbar disk herniation diagnosed on basis of CT did not show any surgical evidence of disk herniation intraoperatively.

**Results** were assessed using the grading recommendations assessment, development and evaluation working group criteria. In computed tomography sensitivity and specificity ranged from 56 to 90% and from 45 to 100% respectively. In magnetic resonance imaging sensitivity and specificity ranged from 61 to 92% and from 52 to 100% respectively with wide confidence interval.

**Conclusion:** We find that in CT and MRI, there is no diagnostic accuracy to diagnose lumbar disk herniation with reference to surgery.

**Keywords:** Diagnostic accuracy, lumbar disk herniation, diagnostic imaging, low backache.

### Introduction:

Approximately 5-15% of patients with low backache suffer from lumbar disk herniation.<sup>1,2</sup> Lumbar disk herniation is the most common disorder requiring

surgical intervention.<sup>3,4</sup> Clinical guidelines recommended history taking and physical examination to rule out lumbar disk herniation diagnosis.<sup>4</sup> Diagnostic imaging in patient with back pain or leg pain is often used to assess nerve root compression

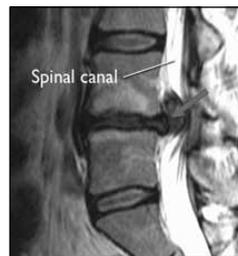
due to disk herniation or spinal stenosis and cauda equina syndrome.<sup>5-8</sup> Furthermore diagnostic imaging can also be used to identify the affected disk level before surgery.<sup>9</sup> Diagnostic imaging can be done by magnetic resonance imaging (MRI) and computed tomography (CT). Currently MRI is the imaging modality of choice, as it has the advantage of not using ionizing radiation and has good visualizing capacity especially of soft tissues.<sup>7-10</sup> CT is often used and available for detection of morphological changes and has a well recognized role in the diagnosis of herniated disk.<sup>11,12</sup> Compared to MRI, CT is cheaper, the total testing time is shorter and the availability of the CT scanners is larger in hospital setting, but has drawback of exposure to ionizing radiation.

### Aims and Objectives:

This study is conducted to compare and evaluate the diagnostic accuracy of diagnostic imaging of lumbar disk herniation by CT scan and MRI with reference to surgery.

### Material and Methods:

16 adults having low backache with radiating pain in lower limbs were incorporated in the study. This was a multi-centric study. 10 males and 6 females between the age group of 30 to 45 years having physical finding of positive SLR were advised CT scan and MRI for confirmative diagnosis of lumbar disk herniation. 8 patients were subjected to MRI and 8 patients were subjected to CT scan. All the patients showed lumbar disk herniation in imaging were given conservative treatment for 7 days. Out of 16 patients, 4 patients have got symptomatic relief and they were not taken for operative procedure. Rest of 12 patients were operated for lumbar disk herniation. 7 patients operated were investigated and diagnosed with lumbar disk herniation by MRI and 5 investigated and diagnosed with lumbar disk herniation by CT imaging were operated. Per operative findings for lumbar disk herniation were taken into consideration to decide the evidence of accuracy of diagnostic imaging. 2 patients out of 7 patients who were operated with detection of lumbar disk herniation on basis of MRI finding did not show surgical evidence of disk herniation. While 2 patients out of 5 patients who were operated with detection of lumbar disk herniation on basis of CT scan did not show surgical evidence of lumbar disk herniation.



**CT scan of lumbar disk herniation**



**MRI of lumbar disk herniation**

### Results:

2 patients out of 7 patients operated for lumbar disk herniation diagnosed on basis of MRI findings did not show surgical evidence of disk prolapse intraoperatively, while 2 patients out of 5 patients operated for lumbar disk herniation diagnosed on basis of CT did not show any surgical evidence of disk herniation intraoperatively.

Results were assessed using the grading recommendations assessment, development and evaluation working group criteria. In computed tomography sensitivity and specificity ranged from 56 to 90% and from 45 to 100% respectively. In magnetic resonance imaging sensitivity and specificity ranged from 61 to 92% and from 52 to 100% respectively with wide confidence interval.

### Discussion:

14 diagnostic accuracy studies have been conducted including 940 patients all evaluating old imaging techniques. Estimates of sensitivity and specificity in different imaging techniques varied between 76% and 81% with moderate to very low quality evidence. Furthermore CT and MRI show comparable accuracy in these studies. There is very low quality evidence for diagnostic accuracy of MRI. In most of the studies, sensitivity and specificity of the CT scan ranged from 50% to 93% and from 45% to 100% respectively. Sensitivity and specificity of MRI ranged from 63% to 93% and from 55% to 100% respectively. Even though MRI is more expensive, clinicians generally prefer MRI to CT as it does not carry the risk associated with ionizing radiation. MRI is noninvasive<sup>13</sup>. MRI may also be more useful when surgical treatment is considered as it can identify tissue properties as well as anatomical structures. These are most likely reasons for suggesting MRI as the most appropriate test to confirm the diagnosis of lumbar disk herniation in a recent guidelines regardless of

its disappointing diagnostic accuracy. In clinical practice, the diagnostic imaging are interpreted with knowledge of history and physical examination. Furthermore, clinicians frequently state that imaging does not play a crucial role in predicting prognosis or deciding on a management strategy even in patients with lumbar disk prolapse. This might be one of the reasons why there are no recent studies on the diagnostic accuracy of imaging techniques for detecting lumbar disk herniation. Evaluation of diagnostic accuracy of advanced diagnostic equipment is therefore needed. Our results also imply that imaging diagnostic techniques of MRI and CT scan do not produce evidence of imaging diagnostic accuracy with reference to surgery.

### **Conclusion:**

This study implies that CT scan and MRI have no imaging diagnostic accuracy in patients with suspected lumbar disk herniation with reference to surgery.

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