IJMS
Vol 28, No.3, September 2003

Brief Report

Level-diagnosis of Lumbar Disc Herniation

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Abstract

Little information is at hand on the diagnostic values of the clinical symptoms and signs in the level diagnosis of patients with lower lumbar disc herniation.

We examined one hundred and thirty nine consecutive candidates for lower lumbar discectomy. Monoradicular pain with signs attributed to the fifth lumbar and first sacral root dysfunctions were evaluated independently in each patient. Intra-operatively, all patients were assessed by a single neurosurgeon for the level of disc herniation. We reached the conclusion that the diagnostic value of clinical features of the herniated fifth lumbar disc is higher than that of the fourth lumbar disc herniation. The value of clinical presentation in the level diagnosis of lower lumbar disc herniation is highly specific, but rather insensitive.

Iran J Med Sci 2003; 28(3):135-138.

Keywords • Physical examination • sciatica • lumbar disc disease

Introduction

Approximately 1.5% of patients suffering from low back pain endure symptoms of sciatica, and 2% undergo surgery.[1-3] It must be realized that herniated disc can also be found by imaging modalities in 36-50% of symptom-free persons.[4,5] Thus, despite modern neuroimaging techniques, the clinical picture of the patient is of utmost importance in order to avoid unnecessary surgical intervention.[6,7] While many studies have been published on the diagnostic potentials of neuroimaging methods, such is not the case for clinical examination. The purpose of this study was to determine the diagnostic value of monoradicular pain together with motor and reflex abnormalities as clinical features of the level diagnosis in lower lumbar intervertebral disc herniation.

Materials and Methods

One hundred and thirty one patients selected for lower lumbar discectomy were studied prospectively by an independent evaluator who was not informed of the level diagnoses. All the patients had a disc herniation demonstrated by MRI. Monoradicular pain was regarded as evidence of root compression. Preoperative clinical signs were divided into findings from muscle power, reflex change and straight leg rising (SLR) test. Evidence of the fifth lumbar root involvement was based on: a) weakness of dorsiflexion of the first toe, b) normal ankle reflex, and c) positive SLR test. Following signs were regarded as evidence of first sacral root involvement comprised: a) weakness of the plantar flexion of the first toe, b) impaired ankle reflex, c) positive SLR test.

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The SLR test was described as positive only if radicular pain was elicited. All patients underwent conventional open discectomy by a single neurosurgeon. Surgical findings were carefully recorded, considered as definite diagnoses and correlated with the preoperative clinical findings. Diagnostic values were calculated using 2&2 tables.

Results

Of 83 men and 56 women (mean age: 41.6; range: 18-75) enrolled in the study, 72 (51.8%) had L4-L5 and 67 (48.2%) had L5-S1 disc herniation alone. No significant difference was noted between the two levels. Among all patients, 30 (21%) presented with fifth lumbar root syndrome. Of these patients 27 (90%) had L4-L5 and 3 (10%) had L5-S1 disc herniation. The sensitivity and specificity of the above-mentioned four symptoms and signs for diagnosing the fourth lumbar disc herniation were 41.5% and 95.5%, respectively. The positive and negative predictive values of these symptom and signs for L4-L5 herniation were calculated as 90% and 62.7%, respectively, with p<0.000, sensitivity= 41.5%, specificity= 95.5%, positive predictive value= 90%, negative predictive value=62.7%, and % accuracy= 69%. Thirty-three patients had weakness of toe dorsiflexion associated with normal ankle reflex (sign of L5 root dysfunction). Of these, 30 (90.9%) had an L4-L5 and 3 (9.1%) had an L5-S1 disc herniation with p<0.000, sensitivity= 47.6%, specificity= 95.5%, positive predictive value= 90.9%, negative predictive value= 65.6%, and % accuracy= 72%. Sixty seven patients had L5-S1 disc herniation. The presence of all first sacral root symptoms (N=24) gave a sensitivity of 60.5%, specificity of 98.7%, positive and negative predictive values of 95.8% and 83.1%, respectively for the L5-S1 disc herniation with p<0.000, sensitivity= 60.5%, specificity= 98.6%, positive predictive value= 95.8%, negative predictive value= 83%, and % accuracy= 85.8%.

Discussion

A prospective study was made to collate the preoperative clinical findings of the patients with sciatica and the location of herniated lower lumbar intervertebral disc verified at operation. When the clinician evaluates a patient, he/she does not rely on a single parameter alone, but summarizes elements from the medical history and physical examination into an imaginary likelihood of benefit from surgery.[7,8] Yet, in the current literature, the scientific foundation of most parameters is questionable.[9-17] The result of this study showed that if a patient was presented with fifth lumbar root syndrome it was possible to predict an accurate level in 41.5% of patients with a disc herniation at L4-L5. The presence of all three first sacral signs concomitant with monoradicular pain gave a 60.5% probability of the L5-S1disc herniation. This difference in level diagnostic sensitivity is similar to the findings of Knutsson and Lansch et al. and in contrast to those of Korteleainen et al.[12, 18, 19] The fourth disc herniation often compresses the first sacral root more than the amount the fifth disc lesion does so on the fourth lumbar root.[12] The difference in level diagnostic reliability is mainly due to more frequent double-root compression in the fourth disc herniation [12, 20-22] and/or a consequence of smaller cross sectional area of the spinal canal at 4th rather than 5th intervertebral space.[23] Another explanation for this difference is various anatomic innervations.[12] If the four symptoms and signs of fifth lumbar root were not present, 95% of patients would be affected at a site other than L4-L5. At the level of L5-S1, if all four symptom and signs were not presented together, 98.7% of the patients harbored a disc herniation at a location other than L5-S1. The high specificity of the symptom and signs indicate that the clinical presentations are also suitable for excluding the level diagnosis. According to the result of this study, if L4-L5 disc herniation was proved, then 90% of patients would present with the four symptom and signs of L5 root dysfunction (predictive value of positive tests) and if a disc was herniated at a site other than L4-L5, 62.7% of the patients hadn't concomitant above-mentioned clinical symptom and signs (predictive vale of negative tests). These differences are statistically significant (P <0.000). Patients with L4-L5 disc herniation had a 15-16 times more likelihood of exhibiting the clinical presentations mentioned above. Similar to the present study, several authors have noted that the most common neurologic sign in L4-L5 disc herniation is weakness of dorsiflexion of the toe.[12, 18, 20] This sign is specific for L4-L5 disc herniation.[20] In the present study, in order to evaluate muscle weakness as a sign of L4-L5 disc herniation, all patients who presented with toe weakness (as a sign of involvement of L5 root) concomitant with normal ankle reflex [as a sign of sparement of S1 root (ruling out of double-root compression)] were selected (N=33). Among these patients, 90.9% showed herniation at L4-L5 interspace, and only 34.4% who presented without these signs had a L4-L5 disc herniation. This difference was significant statistically (P<0.05). Weakness of dorsiflexion of toe was found to be specific (95.5%) but rather insensitive (47.6%) sign of L4-L5 disc herniation, confirming the view of Jensen.[20] According to the result of this study, L4-L5 herniated disc patients have a 90.9% probability of toe weakness and if the disc was herniated at a site other than L4-L5, a 65.6% probability of toe weakness is pre-

sent. These predictive values are parallel (but higher than) to those reported from other studies.[20,24] The current study shows that a patient with proven L4-L5 disc herniation is 19 times more likely to present with weakness of toe associated with normal ankle reflex.

Among the patients who had radicular pain concomitant with signs of first sacral root dysfunction (N=24), twenty three (95.8%) suffered from L5-S1 herniated disc and only one (4.2%) patient had an L4-L5 disc herniation. If these four symptoms and signs were not present simultaneously, then 16.9% of patients had L5-S1 disc herniation. This difference is significant statistically (P<0.000). Kortelainen et al. noted that if combined pain, impaired ankle reflex, and positive SLR test were considered, the level-diagnosis was reliable in 36% of cases.[12] In the current study, the presence of all four sacral clinical parameters gave a 60.5% probability of the L5-S1 disc herniation. These clinical features were highly specific (98.7%) for the level-diagnosis of L5-S1.

Now given a positive result, how likely is it to be a true positive finding?

The results of this study showed that a patient with proved L5-S1disc herniation presents with 95.8% probability with all clinical parameters of first sacral root involvement. In a corresponding way predictive value of a negative test was calculated as 83.1%. Patients with fifth lumbar herniated disc were 113.4 more likely to exhibit these four clinical features of S1 root dysfunction. Previous reports have not stressed the importance of the diagnostic value of the presence of combined clinical features of first sacral root involvement.[12, 20, 24, 25]

According to the results of the current study, the author concludes that the diagnostic value of clinical features of herniated L5-S1 disc is more reliable than that of L4-L5 herniation, due perhaps to more frequent double-root compression in the fourth lumbar disc herniation. Diagnostic values of clinical presentations in the lower lumbar disc herniation are highly specific, but rather insensitive.

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