Clinical and MRI evaluation of degenerative lumbar spine stenosis
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Abstract
A prospective study conducted on 50 patients with degenerative disease of lumbar spine complaining of lower back pain and/or sciatica, those evaluated by detailed history, physical and radiological examination with special emphasis placed upon MRI finding. The pattern of clinical presentation analyzed and correlated with the different MRI findings.

Age range between 27-72 years, the highest proportion of patients age was 50-59 years with predominance of males (our patients sample consists of 28 men and 22women). The most common clinical presentation was intermittent neurogenic claudication (in 52% of our patients) and more common among elderly patients or patients having multilevel stenosis, while radiculopathy symptom was more common among young patients or patients having single level stenosis. Chronic caudaequina syndrome was uncommon pattern of presentation with bladder function most seriously affected function.

Keywords: stenosis, lumbar spine, degenerative, stenosis

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1- Introduction

Lumbar spinal canal stenosis is an important cause of lower backache and/or sciatica, which result in significant disability. The main cause of the stenosis is a degenerative process of the spinal structures (including intervertebral disc, vertebral body, facet joints and ligamentous structures). Resulting in abnormal narrowing of the central canal, the lateral recess or the intervertebral foramina (it may be local, segmental or generalized) to a point where the neural elements compromised, resulting in a four main symptom complexes of presentation: neurogenic claudication, radiculopathy, chronic caudaequina syndrome and atypical leg pain.

MRI has become the most important imaging modality for spinal pathology; it has essentially replaced computed tomography (CT) and myelography for imaging degenerative disease of the spine. MRI is entirely noninvasive multiplanar imaging that provides important information about the soft tissue stenosis especially foramina. However, studies have indicated that abnormal finding may demonstrated in at least one third of all asymptomatic individuals, occurring with even higher prevalence as age increases. In this study, the main aim is to demonstrate the different patterns of clinical presentation of DLSS. Trying to correlate the different MRI findings with the clinical presentation.

2- Patients and methods

During the period February 2002- July 2003, total 50 patients selected at random attending the orthopedic department in Medical City, who were complaining of lower backache and/or sciatica, all patients with previous lumbar spine surgery were excluded.


3- Results and discussion

1. Demographic description

   a) Age distribution
   The study was performed on 50 patients with age ranged between (27- 72) years old; mean age 51 years, with highest proportion of patients were from 50 to 59 years age (42%), table (1).

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40 years</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>40-49 years</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>50-59 years</td>
<td>21</td>
<td>42</td>
</tr>
<tr>
<td>60-69 years</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>&gt; 70 years</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

   b) Sex distribution
   Males were 28 patients while females were 22 patients. The distribution of the patients by gender and age shown in table (2).

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age in years</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Max.</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>27</td>
<td>72</td>
<td>28</td>
</tr>
<tr>
<td>Female</td>
<td>38</td>
<td>62</td>
<td>22</td>
</tr>
</tbody>
</table>

   c) Occupation
   The majority of our patients (62%) were light workers; only (38%) gave history of heavy work in a period of their life, table (3).

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light worker</td>
<td>31</td>
<td>62</td>
</tr>
<tr>
<td>Heavy worker</td>
<td>19</td>
<td>38</td>
</tr>
</tbody>
</table>

1. Clinical presentation

Lower back pain was the most frequent symptom, it was present in (96%), with recurrent attacks of exacerbation in most patients, its duration ranged from 1 year to 22 years, table (4).

<table>
<thead>
<tr>
<th>Duration of lower back pain</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1 years</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>1-2 years</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>2-5 years</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>5-10 years</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>10-20 years</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>&gt;20 years</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

The second frequent symptom was lower extremity pain (94%); it was in 27 patients’ bilateral, left side 12 patients, right side 8 patients. According to the patients’ symptoms and signs our patients grouped into four main patterns of clinical presentation (table 5).
### Table (5): Distribution of the patients by clinical presentation

<table>
<thead>
<tr>
<th>Presenting Symptoms</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurogenic intermittent claudication</td>
<td>26</td>
<td>52</td>
</tr>
<tr>
<td>Radiculopathy</td>
<td>19</td>
<td>38</td>
</tr>
<tr>
<td>Chronic caudaequina syndrome</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Atypical leg pain</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

As shown in table (6) the proportion of patients presented with neurogenic intermittent claudication among those elderly age group was (72.7%), it is higher than in younger age groups (51.7%) for middle age, and (30%) for those younger than 40 years age, while radiculopathy was the commonest pattern among young age group.

### Table (6): Pattern of presentation in different age groups

<table>
<thead>
<tr>
<th>Clinical presentation</th>
<th>Age in years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;40 (n=10)</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Neurogenic intermittent claudication</td>
<td>3</td>
</tr>
<tr>
<td>Radiculopathy</td>
<td>6</td>
</tr>
<tr>
<td>C.C.E.S.</td>
<td>1</td>
</tr>
<tr>
<td>Atypical leg pain</td>
<td>0</td>
</tr>
</tbody>
</table>

N.I.C. was the most frequent presentation in patients having multiple stenosis, while radiculopathy was the most frequent pattern of presentation among patients having single level stenosis.

### 2. MRI finding

The most frequently involved spinal level was L4-L5 (86%) followed by L3-L4 (70%). Regarding the number of spinal levels affected majority of our patients (70%) showed multilevel stenosis, while only (30%) showed single level stenosis. In most of our patients, the cause of stenosis was combination of disc lesion, facet hypertrophy, osteophytes formation and/or ligament hypertrophy. Spondylolisthesis was found in only 3 patients.

Degenerative process of the spine is a disease affecting the intervertebral disc, facet joints and all bony and ligamentous structures of the lumbar spine by a process of degeneration. It affects all people but to a varying degree and it is a common cause of backache and sciatica. If not treated, this disease may cause an irreversible neurological deficit. However, in majority of cases the disease has, a benign natural history with the spine tends to stabilize itself and patients improve gradually in spite of the extensive radiological findings.

Our patient’s age ranged from 27-72 years with an average of 51 years. We agree with Torgerson and Dottei who stated that spondylosis and mainly disc degeneration is age related increased in older age group.(51-61)

1. **Sex**

Males slightly more affected than females in our study. There are two national studies and many other (abroad) studies showed that males slightly more affected than females.

2. **Occupation**

Most of our patients (62%) were light workers and gave no history of physical stress and sport exercises. This finding goes with that of Epstein, et al. This is possibly explained by the fact that degenerative spine diseases is a chronic disease that modify the patient’s life style.

3. **Clinical presentation**

Lower back pain was the main symptom in 96% of our patients. The source of pain may be stimulation of nerve fibers in the annulus from Sino vertebral nerve or due to biochemical changes in the disc creating an acidic medium that stimulates nerve fibers. Back pain can also originate from the apophyseal joints changed from non-weight bearing to weight bearing joints, and lastly stretched ligaments and muscle spasm maybe the source of pain.

The symptoms tend to be chronic and the patient have symptoms of back pain for a long period of time before radiating root pain and will not come to surgical treatment until relatively late. The duration of symptoms range
from 1 year to about 22 years, the pain is usually aggravated by activity and relieved by rest, this finding goes with the finding of other studies. Boutin stated that low back pain encountered in 87% of patients with DLSCS. Paine found in his study that low back pain usually precedes leg pain in patients with LSCS while in patients with IV disc herniation the back pain and leg pain begin simultaneously.

Lower extremity pain was the second frequent symptom encountered in 94% of our patients. Boutin reported leg pain in 82%, while other author stated that leg pain encountered in one third of patients with LSCS. Leg pain was bilateral in 27 patients and unilateral in 20 patients. Left side was more frequently involved. Paine found in his study bilateral leg pain was encountered in more than one third of patients with DLSCS and only less than one fifth of patients with IV disc herniation. The leg symptoms in our patients usually involved more than single root distribution and in some patients symptoms changed dramatically after walking or exercises.

We identified 4 types of clinical presentation (symptom complexes) attributable to spinal stenosis: NIC, radiculopathy, chronic cauda equina syndrome and atypical leg pain. NIC was the most frequent pattern encountered in 52% followed by radiculopathy in 38%. NIC was the most frequent pattern of presentation among patients having multi-level stenosis, while radiculopathy among patients having single level stenosis. Only 3% of our patients presented with chronic cauda equina syndrome.

4. MRI finding
A controversy still exists over the distinction between developmental and degenerative (spondylotic) stenosis. We simply assumed that stenosis of the lumbar spinal canal, as demonstrated on MRI in the presence of severe osteoarthritis of the spine, is caused by this degenerative process. This assumption allows us to choose a well-defined patient group for further study. The most frequently involved level was L4-5 and then L5-S1 and this is in agreement with most of studies on DLSCS.

The cause of stenosis in the majority of our patients was combination of disc degeneration, facet hypertrophy, ligamentous hypertrophy, osteophytes and in some patients, spondylolisthesis, these changes seen in different proportions but the most frequent one encountered was the intervertebral disc degeneration, it was present in 94% of our patients.

Conclusion
1. Degenerative disease of lumbar spine is a disease of middle and old age people although degenerative process started at younger age.
2. We observed that males affected by the disease, slightly more than females.
3. Degenerative spine disease is a chronic process that it is a form of generalized polyarticular arthritis.
4. We found neurogenic claudication was the main symptom complex of presentation of degenerative spine disease and usually occur in elderly patients or patients having multi-level stenosis.
5. Chronic cauda equina syndrome is uncommon symptom complex of presentation, accounting for approximately 6% of patients of spondylarthrits.
6. MRI is an excellent noninvasive method to evaluate all form of degenerative spinal stenosis and supplies more information about tissue components of the spine.

References

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