Surgically Treated Symptomatic Prolapsed Lumbar and Sacral Intervertebral Discs in Females: A Comparative Study of Incidence and Causative Factors and Treatment

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ABSTRACT

Background and Objective: There are various postulated possible causes of surgically symptomatic prolapsed intervertebral discs in the lumbar and sacral regions. They may be acting singularly or collectively. Yet, these factors, which could vary in different environments, have not been satisfactorily confirmed. The intention of this study is to share the experience of the author in the occurrence, possible causative factors, and treatment of surgically symptomatic prolapsed lumbar and sacral intervertebral discs in females, and to compare this experience in Switzerland, Nigeria, and Jamaica using surgery records for a period of over 39 years.

Materials and Methods: Records of these cases were examined and analyzed with the intent of comparing the frequency of occurrence and possible causative factors of this lesion in some countries.

Results: There were 60 locations in 51 patients in Basel (Caucasian population only), 4 locations in 1 patient in Imo and Ebonyi States (African population only), and none in Jamaica (mixed population). The patients’ ages ranged from 19 to 71 years in Switzerland, and the only patient in Nigeria was 49 years old.

Conclusion: The study revealed that surgically treated symptomatic prolapsed lumbar and sacral intervertebral discs in females occurred more in Basel, Switzerland, than in Imo and Ebonyi States of Nigeria and none occurred in Jamaica, West Indies. Racial differences, certain sporting/recreational activities, smoking, and type of profession could have contributed to the development of this disease.

Keywords: Females, possible causes, prolapsed discs

INTRODUCTION

Sciatica is a relatively common condition with a lifetime incidence varying from 13 to 40%. The corresponding annual incidence of an episode of sciatica ranges from 1 to 5%. Intervertebral disc prolapse, protrusion, or extrusion account for less than 5% (though some reports put it between 5% and 10%) of all low back problems, but are the most common causes of nerve root pain and surgical interventions in the lumbar region.

Prolapsed disc could be due to wear and tear from certain jobs that require constant sitting, such as driving, and recreational activities including rowing, skiing, weight lifting, jogging, walking, etc. Genes, body height, age, and smoking may also influence the development of this lesion.

In the lumbar region, the clinical features of this disease include lower back pain (lumbago) and sometimes leg pains (radiation pains, sciatica), dysesthesia, paresthesias/paralyses, loss of urinary bladder and ano-rectal control. Plain radiographs of the spine, electromyograms (EMG), and Nerve Conduction Studies (NCS) could indicate this, but the diagnosis is usually confirmed through contrast myelography, CT/CT-scan, cauda-equinoigraphy, Computerized Tomography scan (CT scan), which may need coronal and sagittal views/reconstructions, as well as axial or Magnetic Resonance Imaging (MRI).

Treatment modalities include conservative measures with physiotherapy, rehabilitation, weight control, anti-inflammatory measures, epidural steroid injections, analgesia-assisted traction therapy (IVSAAT), lumbo-sacral back support, and stem cell therapy.

Surgical measures include discectomy/microdiscectomy, fenestration, laminectomy with or without discectomy, artificial disc replacement, and nucleoplasty.
The outcome of treatment depends on the location of the prolapse, clinical condition of the patient, and time of presentation and treatment.[41]

Management complications include worsening of pain and neurological status, dural tears, infections, nerve root injury, vascular injury, development of pseudo-aneurysms and arterio-venous fistulas, pulmonary embolism, retroperitoneal injuries, metabolic effects of steroids on the pituitary–adrenal axis, and epidural hematomas and abscesses.[1,2,3,4,6]

To be differentiated from this lesion are infections, abscesses, hematomas, tumors, aneurysms, arterio-venous malformations, endometriosis, spinum bifidum occultum, osteophytes, and spondylolisthesis.[1,4,44-56]

We now try to compare the occurrence of surgically treated symptomatic prolapsed lumbar and sacral intervertebral discs in females in Switzerland, Nigeria, and Jamaica, with reference to some of these possibly influencing factors.

Objective

Using data on the occurrence, possible causative factors, and treatment of surgically symptomatic prolapsed lumbar and sacral intervertebral discs in females, this paper compared the experience in Switzerland, Nigeria, and Jamaica over a cumulative period of 39 years.

Materials and Methods

This study relied on the author’s personal surgery records of patients who were treated in 60 locations (prolapses) in the lumbar and sacral regions in 51 females in Basel, Switzerland, for a period of about 3 years; four locations in one female in Imo and Ebonyi States, South East Nigeria, for a period of about 33 years; and none occurred in Jamaica, West Indies, for a period of about 3 years.

There was no selection of patients population-wise or socio-demographically. Also, there were no inclusion/exclusion criteria. Most of these cases were already diagnosed and referred by colleagues for surgery. The study did not find any indication or reason for non-surgical intervention.

The parameters looked into included the number of prolapsed discs and the number of treated patients. Both parameters were observed in three different countries – Jamaica, Switzerland, and Nigeria – over some number of years for each country. The relative frequency of occurrence for both the prolapses and treated patients was determined using the expression:

$$F_d/p = \frac{\text{No. of prolapses/Treated patients}}{\text{No. of years observed}} \times 100(\%)$$

The respective values of $F_d$ (frequency of disease) and $F_p$ (frequency of treated patients) are given in the last two columns of Table 4.

The incidence of occurrence and the possible causative factors of this lesion were also looked into.

Results

It was found that the patients’ ages ranged from 19 to 71 years. The clinical features of the patients were those of lower back pains, radiating pains, impaired sensation, and pareses in the affected lower limb/s. There was, however, one emergency case due to acute loss of urinary bladder and ano-rectal control.

All lesions were confirmed through cauda-equinograms [Figure 1]. There was no adverse reaction to either of the contrasts used [Amipaque (methylazamide) or Lopamiro 300 (iodo/trometamol/edetate calcium disodium/hydrochloric acid)].

All the operations were done under general anesthesia in the knee-chest position (MECCA position) [Figure 2]. A midline skin incision (from the spinous process immediately above to that immediately below the process of the vertebrae squeezing out the nucleus pulposus) was made. The paraspinal muscles were separated from the spinous processes and laminae of the adjacent vertebrae on
In Switzerland, there were no prolapses at Th12/L1, L1/2, L2/3, and L3/4 thereafter, but to return for follow-up checks about 7 days later. There were two prolapses in 41–50 years age range on the right and none thereafter in Switzerland, whereas there were 2 in 41–50 years age range in Nigeria.

Table 2 shows two prolapses on the right and one on the left at L3/4 in Switzerland and one on each side in Nigeria.

There were 10 prolapses on the right and 21 on the left at L4/5 in Switzerland, and 1 on each side in Nigeria.

At L5/S1, there were 11 on the right and 15 on the left in Switzerland and none in Nigeria. In total, there were 23 prolapses on the right and 37 on the left in Switzerland and 2 on each side in Nigeria.

Table 3 shows that there were no prolapses in 1–10 years, 2 in 21–30 years, 7 in 31–40 years, 10 in 41–50 years, 2 in 51–60 years, 2 in 61–70 years, and 1 in 71–80 years age range on the right and none thereafter in Switzerland, whereas there were 2 in 41–50 years age range in Nigeria.

In Switzerland, there were no prolapses in 1–10 years, 1 in 11–20 years, 2 in 21–30 years, 12 in 31–40 years, 13 in 41–50 years, 3 in 51–60 years, 5 in 61–70 years age range on the left and none thereafter. There were two prolapses in 41–50 years age range in Nigeria.

The totals were: 1 prolapse in 11–20 years, 4 in 21–30 years, 19 in 31–40 years, 23 in 41–50 years, 5 in 51–60 years, 7 in 61–70 years, and 1 in 71–80 years age range in Switzerland, and 4 in 41–50 years age range in Nigeria.

The patients with bilateral lesions were: one at L3/4 (49 years), three at L4/5 (35 years, 49 years, and 49 years), one at L5/S1 (46 years), totaling five patients in Switzerland and one each at L5/S1 and L4/5 in Nigeria.

Four patients had multiple lesions, viz. two at L3/4 and L4/5 (49 years, 65 years), two at L5/S1 and L5/S1 (49 years, 61 years) in Switzerland, and one each at L5/S1 and L4/5 in Nigeria.

One patient (49 years) had bilateral and multiple lesions at L3/4.

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Table 1: Symptomatic prolapsed intervertebral discs in females in Switzerland and Nigeria

<table>
<thead>
<tr>
<th>Level</th>
<th>1–10 years</th>
<th>11–20 years</th>
<th>21–30 years</th>
<th>31–40 years</th>
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<table>
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</tr>
<tr>
<td>S1/S2</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

| Nigeria |
|---------|-----------|-----------|-------|
| L1/4   | 1         | 1         | 2     |
| L1/5   | 1         | 1         | 2     |
| Total  | 2         | 2         | 4     |

both sides. This wound was kept open with self-retaining retractors. From the adjacent laminae on same side of the lesion, the lower part of the upper lamina and the upper part of the lower lamina, together with the in-between yellow ligament, were nibbled off. This gave a clear view and adequate space to remove the pathological process and enucleate the nucleus pulposus totally, through an incision in the annulus fibrosus. This small incision was left open. The rest of the wound was closed in layers after satisfactory hemostasis and removal of the retractors, without any drains.

All patients were mobilized out of bed the next day postoperatively, though physiotherapy, by manual massage and passive and active movements of the lower limbs, was started as soon as they were returned to the ward. The stitches were removed 9 days postoperatively. The patients were discharged home 2 days thereafter, but to return for follow-up checks about 7 days later. The cauda-equinograms revealed 60 prolapses in 51 patients in Switzerland and 4 prolapses in 1 patient in Nigeria.

In Switzerland, there were no prolapses at Th12/L1, L1/2, L2/3, and S1/2; 3 at L3/4, 30 at L4/5, and 27 at L5/S1, totaling 60, while in Nigeria, there were 2 each at L3/4 and L4/5 [Table 1].
and L4/5 totaling four prolapses in Switzerland and the same in Nigeria.

In Table 4, it is seen that in Jamaica, the number of prolapses was zero and the number of patients treated was also zero over the 3-year period observed, with $F_d$ (%) of zero in a year and $F_p$ (%) of zero as well.

In Switzerland, the number of prolapses was 60 and the number of treated patients was 51 over the 3-year period observed, with $F_d$ (%) of 2000 in a year and $F_p$ (%) of 1700.

In Nigeria, the number of prolapses was 4 and the number of treated patients was 1 over the 33-year period observed, with $F_d$ (%) of 12.12 and $F_p$ (%) of 3 in a year, respectively.

All the patients tolerated the procedure very well and recovered from the anesthesia without any additional gross neurological deficits. There were no complications following surgery. The patients were followed up for up to 12 months postoperatively. Their wounds healed by primary intention, and their pains and previous neurological deficits had all resolved when last seen.

**Discussion**

Our findings showed that there were no prolapses up to the age of 18 years and after the age of 71 years in both Switzerland and Nigeria.

The incidence of occurrence peaked at the age range 41–50 years in Switzerland and was the same in Nigeria. Before the age of 51 years, there were no prolapses at Th12/L1, L1/2, and L2/3 levels in both countries.

The majority of cases were at L4/5 in Switzerland, but were equal at L4/5 and L5/S1 in Nigeria. There were more lesions on the left (37 to 23) in Switzerland, but were equal, with 2 on each side in Nigeria. The peaking for both sides was in 41–50 years age range in both countries. The bilateral lesions were mostly at L4/5 in 31–50 years age range in Switzerland, and were equal at L4/5 and L5/S1 in 41–50 years age range in Nigeria.

The one emergency case was at L5/S1 bilaterally (46 years) in Switzerland, as a result of loss of urinary bladder and ano-rectal control.

The multiple lesions were 3 at L4/5 and L5/S1 and 2 at L4/5 and L5/S1, all in 41–70 years age range, 3 being on the left side in Switzerland. In Nigeria, the multiple lesions were in one patient at L4/5 and L5/S1 in 41–50 years age range and were equal on both sides. There were no lesions at L5/S1 in Nigeria.

Table 4 clearly indicates the predominant relative frequency of prolapses and relative frequency of treated patients in Switzerland (Caucasian population only) over those in Nigeria (African population only) and in Jamaica (mixed population). The only patient in Nigeria observed was after 33 years. Racial differences could have contributed to these observations.

Risk factors like genetics did not appear to be contributory, since this lesion did not occur in any twins or relations in our series, though there was a case at the tender age of 19 years in Switzerland.

Recreational activities like skiing might have played a role, since the Swiss, as observed by the author, liked/like this sport, which is practically absent in Nigeria and Jamaica. Skiing has a lot to do with movements in the lumbar and lumbo-sacral regions.

Physical activities associated with occupations like driving cause

### Table 3: Country, side and age ranges in years

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<th>Side</th>
<th>1–10 years</th>
<th>11–20 years</th>
<th>21–30 years</th>
<th>31–40 years</th>
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### Table 4: Relative frequency of disc prolapses and treated patients

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<tr>
<th>Country</th>
<th>No. of prolapses</th>
<th>No. of treated patients</th>
<th>Period observed in years</th>
<th>Relative frequency of prolapses $F_d$ (%) in a year</th>
<th>Relative frequency of treated patients $F_p$ (%) in a year</th>
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<tr>
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<td>0</td>
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exposure to vibration at around 4–5 Hz, which may coincide with resonant frequency of the spine in the seated position, and therefore lead to a direct mechanical effect on the lumbar disc.[1,58] By their standard of living, the Swiss owned more cars and did a lot more driving than Nigerians and/or Jamaicans, though statistical evidence is required to confirm this. However, with Nigeria’s growing population and sophistication, especially in Imo and Ebonyi States, we might experience an upsurge in the occurrence of this disease in Nigeria through this factor.

Tobacco, from smoking, disturbs the metabolic balance of intervertebral discs. It induces coughing, thereby causing marked elevations of intra-disc pressures. There is the possibility of fibrinolytic effect of tobacco.[1,58] The Swiss, like other Caucasians, smoked/smoke a lot, while this habit is just beginning to grow in Nigeria and Jamaica.

The majority of herniated discs will heal themselves in about 6 weeks and do not require surgery.[1,58] However, the presence of neurological deficits requires one type of surgical intervention or the other, even if minimally invasive.

Cauda-equiongrams are still very useful, especially where CT and/or MRI are not available or affordable.

The knee-chest position stretches the inter-spinous spaces and also keeps the intra-abdominal contents farther away from the operation site to avoid injuring them while the operation lasts.

**Conclusion**

From our personal experience, it was observed that surgically treated symptomatic prolapsed lumbar and sacral intervertebral discs in females occurred predominantly in Basel, Switzerland. Most cases were in 31–50 years age range in Switzerland, while it was 41–50 years in Nigeria. There were more prolapses on the left in Switzerland, but were equal on both sides and none at L5/S1 in Nigeria.

Racial differences, certain sporting/recreational activities, smoking, and type of profession could have contributed to the development of this disease in the lumbar and sacral regions.

Other risk factors, like environmental pollution and poor sanitation, as well as body height and age, together with the earlier mentioned ones, should be further closely looked into to reduce, if not completely eradicate, the occurrence of this seriously incapacitating disease, particularly in populations like Nigeria and Jamaica, where it is still not much known.

In view of the fact that the study is from the personal surgery records of the author, it is necessary to share the experience of others in this field so as to change the profile of this lesion, particularly in Switzerland, Nigeria, and Jamaica. Prospective studies should, therefore, be encouraged.

Though there are no data for comparison, we believe that surgical intervention should be carried out for most cases, if not all, with neurological deficit/s. Since we have had very good results, we strongly recommend the method of fenestration with total discoectomy used by many neurosurgeons worldwide.

**Acknowledgments**

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**References**

Ozone therapy, a critical evaluation. Doordrecht: 30.
signal intensity of the nucleus pulposus on magnetic resonance imaging as indicators of lumbar disc degeneration. Spine (Phil 17:2010; 2000;11:680-6.
Moyer D. Chiropractic manipulation shown to cause herniated discs. Rebuild Your Back 2006.


58. Ibe MO. Comparative studies of the incidence of surgically treated symptomatic prolapsed lumbar and sacral intervertebral discs in males in Basel (Switzerland), Jamaica (West Indies) and Imo and Ebonyi States (South East Nigeria). NJS 2011;17:19-24.

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- Example of a correct style

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- Add up to a maximum of 15 references at a time.
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- If any of the bibliographic elements are missing, incorrect or extra (such as issue number), it will be shown as INCORRECT and link to possible articles in PubMed will be given.