

## Original Research Article

# Conservative treatment for patients with massive prolapsed lumbar intervertebral discs

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### ABSTRACT

**Background:** The natural history of Lumbar hernia of nucleus pulposus is not fully known and absolute indications for surgical intervention cannot be established. Several studies have shown that the most giant discs appear to have the greatest tendency to resolve with conservative treatment. The objective of this study is to investigate whether massive prolapsed discs can be safely managed conservatively once clinical improvement has occurred.

**Methods:** Thirty-five patients were studied by clinical assessments and serial magnetic imaging over 3 years. Patients present with intense sciatica but began to show clinical improvement despite massive disc prolapsed. Clinical assessment included the Lasegue test and neurological improvement. The Oswestry disability index was used to measure function and changes in function. Serial MRI studies allowed the measurement of volume changes of the prolapsed disc material over some time.

**Results:** Initial follow-up at an average of 13.2 months showed that 87% had complete and sustained recovery at the initial follow-up. Only four patients required surgery. The average Oswestry disability index improved from 63% to 20%. Volumetric analysis of serial MRI scans showed an average reduction of 69% in disc size.

**Conclusions:** A massive disc prolapsed can pursue a favourable course. If early progress is shown, the long-term prognosis is very good and even massive disc prolapses can be treated conservatively.

**Keywords:** Intervertebral disc, Discectomy, Magnetic resonance imaging, Natural history

### INTRODUCTION

Lumbar disc prolapse is a common condition that frequently affects the spine in young and middle-aged patients. The lumbar intervertebral disc is a complex structure composed of collagen, proteoglycans and fibrochondrocytic cells that serve to dissipate forces exerted on the spine.<sup>1</sup> As part of the normal ageing process, the disc fibro-chondrocytes can undergo senescence, and proteoglycan production is diminished, leading to loss of hydration and disc collapse, which increases strain on the annulus fibrosus surrounding the disc.<sup>2</sup> Tear and fissures in the annulus can facilitate

prolapsed disc material, causing nerve root and spinal cord compression followed by sciatica. There are many treatment options for lumbar disc prolapse, e.g. rest, reduction, epidural steroid injections, muscle-strengthening exercise, and chemo-nucleolysis.<sup>3</sup> With an acute attack, the patient should be kept in bed with hip and knees slightly flexed. Continuous bed rest and traction for two weeks may reduce the prolapsed.<sup>4</sup> If symptoms and signs do not improve during that period, epidural injection of a corticosteroid and local anaesthetic may help but needs expertise; otherwise, spinal cord injury or failure may occur.<sup>5</sup> Dissolution of the nucleus pulposus by percutaneous injection of a proteolytic

enzyme (chymopapain) is, in theory, an excellent way of reducing a disc prolapsed.<sup>6</sup> However, controlled studies have shown that it is less effective and potentially more dangerous than surgical removal of the disc material. Surgical options are laminotomy with discectomy, laminectomy with discectomy and microdiscectomy. Laminectomy is a destructive procedure with intra-operative bleeding, nerve root injury, and post-operative infection may result.<sup>7</sup> Microdiscectomy needs an operation microscope, intra-operative bleeding may be difficult to control, inexperienced operator risks injuring the dura, a stretched nerve root or missing essential pathology.<sup>8</sup> Most lumbar disc prolapse can be treated conservatively in the form of rest, anti-inflammatory drugs, local steroid injection and traction that avoids the potential complications of surgical intervention.<sup>9</sup> This study aims to evaluate the results of conservative treatment of massive prolapse lumbar discs.

## METHODS

This prospective study was carried out in Khulna medical college Hospital, Khulna, Bangladesh from January 2018 to December 2020. All patients between 20-60 years with severe sciatica in the L4, L5 or S1 dermatome with or without mild neurological deficit for more than six weeks, an MRI-proven massive disc prolapse (disc material occupying >50% of the spinal canal) and evidence of any improvement in their symptoms since onset were consecutively recruited into this study. Patients with spinal canal stenosis, cauda equina syndrome or severe paresis, degenerative or lytic spondylolisthesis, Pregnancy or a previous spinal operation were excluded. All patients underwent a full clinical assessment and MRI on presentation. They were then offered to follow-up clinical examination and a repeat MRI between 6 months and two years after the original scans. By convenient sampling, the sample size was selected patients were assessed by independent orthopaedic surgeons who were blinded to the MRI result. MRI scans were done on an IGE 0.5 Tesla Vectra machine. The protocol used was T1-weighted sagittal and axial scans with a gradient echo of 1000 and repetition and echo times (TR/TE) of 250/15. The T2 weighted sagittal and axial image parameters were FSE 4200 TR 110 TE. Volumes were measured using specific tissue volume measurement software in the sagittal plane. The scans were assessed by a consultant radiologist blinded to the clinical outcome. Statistical analysis was undertaken using Pearson's correlation coefficients, and regression lines were drawn. Mean and standard deviations or ranges are given. Significance was set at  $p < 0.05$ . All patients were assessed by structured questions about any further back complaints, persistent weakness or numbness following their massive disc prolapse. Patients were asked to grade their initial symptoms as resolved, continued providing occasional discomfort, continued providing frequent discomfort limiting activities; resolved and returned. Patients also graded their satisfaction with the treatment they received as satisfied,

uncertain, or not satisfied. The Fisher exact test was used to analyse outcomes at three years. Significance was set at  $p < 0.05$ . Informed written consent was taken individually from the patient.

## RESULTS

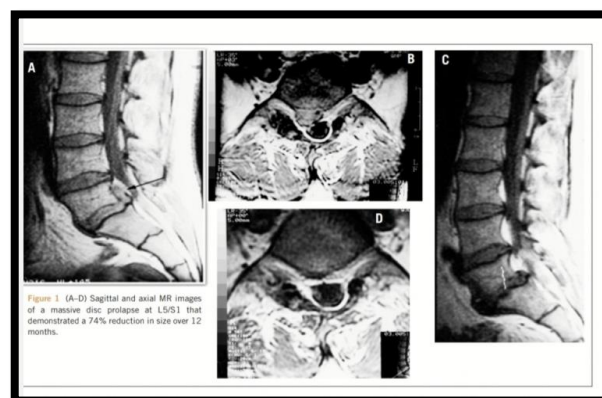
Thirty-five patients who satisfied the inclusion and exclusion criteria were recruited for the study. The initial follow-up period was 13.2 months (range, 6-21 months). The average age was 40 yrs. (range 20-60 years). The distribution of involved levels by gender is shown in (Table 1).

**Table 1: Distribution of prolapsed disc level by gender.**

Disc level	Male	Female	Total
L4/5	6	6	12
L5/S1	16	7	23
All	22	13	35

### Oswestry disability index

The index showed a general improvement over time. The initial mean index was 60% (34-96%). The mean of the final index was 15% (range, 0-68%), and the mean percentage reduction in indices (i.e. initial index final index/initial index  $\times 100$ ) was 72%. There was no statistical difference between the sexes. Four patients underwent microdiscectomy for persistent or recurrent symptoms at an average of 23 months after symptoms onset (range, 13-30 months).



**Figure 1: Early follow-up.**

Two patients had recurrent episodes of sciatica but no operations. Thus 29 (83%) had complete and sustained recovery at the initial follow-up. Ten patients (29%) complained of occasional or intermittent back pain. Five patients (14%) had occasional or intermittent leg pain. Only one patient had a persistently positive straight leg raise test and was one of the patients who underwent a discectomy. Four patients (11%) had a sensory loss, but none had a permanent motor loss. Three patients were

excluded from this analysis due to the low quality of MRI rescan; therefore, 32 patients' scans were analysed. The average time between scans was 12.2 months (range, 3-34 months). All discs were non-contained and showed a reduction in size on their second scan (Figure 1-2).

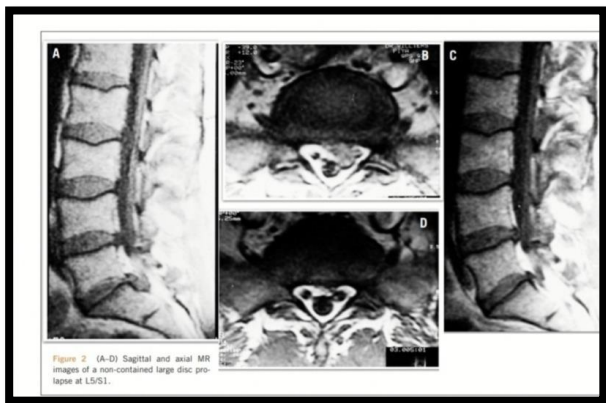


Figure 2: Clinical outcome.

The mean disc volume reduction (the percentage of shrinkage of the disc prolapse) was 64% (range, 31-78%). The mean volume reduction at the time of rescanning is shown in (Figure 3).

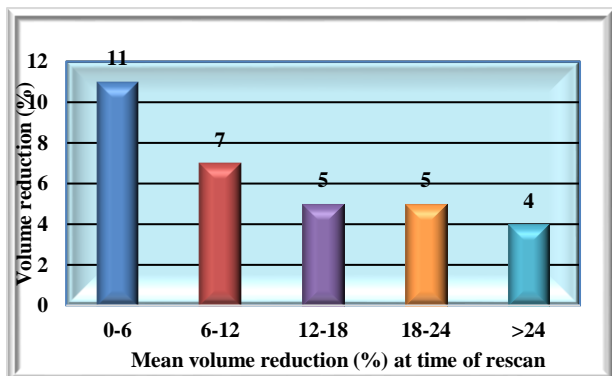


Figure 3: Long-term follows up.

Fourteen patients (44%) had a percentage reduction of greater than 70%. A further 14 had a percentage reduction of 50-70%. Four patients had a reduction of less than 50%. The patient underwent a reduction of 47% (range, 31-62%). There was no significant difference in volume reduction between the involved levels and sexes (Table 2). There was no correlation between the initial disc volume and the Oswestry disability index and between the initial or subsequent disc volume and percentage change in the Oswestry disability index. Thirty-five patients were followed up by telephone enquiry at a mean of 2 years 11 months (range, 13-35 months). The conservatively treated group recorded a 90% satisfaction rate compared with 50% in the operated group. This is not statistically significant. The patient's clinical outcome at three years is shown in (Table 3). There was statistical significance between the groups.

Table 2: Mean volume measurements 37 genders and disc level.

Variables	The volume of the initial scan (cm <sup>3</sup> )	The volume of repeat scan (cm <sup>3</sup> )	% change
Male	3.6±0.7	1.3±0.5	-60.7
Female	3.4±1.2	1.2±0.3	-63.2
L4/5	4.0±0.3	1.4±0.6	-62.1
L5/S1	3.2±0.8	1.2±0.4	-62.7
All	3.4±1.0	1.3±0.4	-62.2

Table 3: Results of 3 years of clinical outcome and satisfaction rating.

Symptomatic outcome	Conservative treatment (n=30)	Operative treatment (n=4)	P value
Resolved	17	0	0.028
Occasional symptoms	10	2	
Frequent symptoms	1	1	
Late occurrence	2	2	
Overall satisfaction	27 (90)	2 (50)	0.09

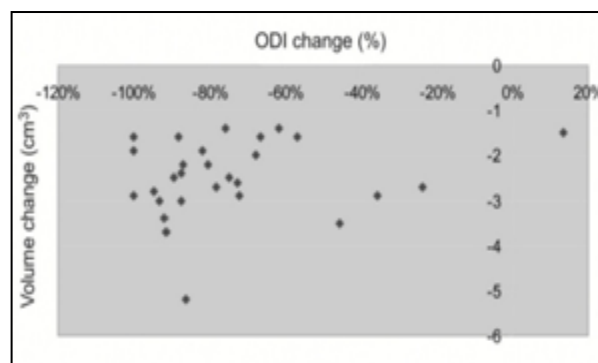


Figure 4: Percentage change of Oswestry disability Index and volume change of the disc between initial and follow-up MRI in the non-operative patients.

DISCUSSION

Spontaneous reduction of prolapsed nucleus pulposus was first demonstrated by Guinto et al. in 1984.<sup>10</sup> Treplick and Haskins reported 11 patients with unequivocal reduction or disappearance of a prolapsed lumbar disc on a follow-up CT scan treated conservatively. Busk et al. studied 165 patients with sciatica thought to be due to lumbosacral nerve root compromise.<sup>11</sup> They were treated with serial epidurals. 14% underwent surgical decompression, and the rest made a satisfactory clinical recovery. Maigne et al. examined 48 patients with acute sciatica treated conservatively and showed that nine of the prolapsed had

decreased by at least 25%, eight decreased between 50-75% and 51 decreased between 75-100%. Cribb et al studied 15 massive discs prolapsed treated non-operatively and found, on repeat MRI after a mean of 24 months, a dramatic resolution of the prolapse in 14 with a mean reduction of size 80% (range, 68-100%).<sup>12,13</sup> In our study, all the analysed discs showed a reduction in volume. We found that 87% had a reduction of 50% or more. Our results are in keeping with findings from other studies. reported 82%, and Maigne et al found an 81% reduction of 50% or more in CT within two years. Bazzao et al showed 48% had a reduction of 70% or more on MRI, while our study showed 44% of cases with this degree of resolution.<sup>14</sup> Both radiological and histological studies support the fact that massive discs have the most significant potential to reduce naturally. Ahn et al studied 30 patients with symptomatic disc prolapse treated conservatively.

### Limitations

Current study has several limitations like; the software used has not been validated, single radiologist, who was blinded to the clinical status of the patients, did not use fixed repeat scan intervals. We did not rescan before six months.

### CONCLUSION

A massive disc prolapsed can pursue a favourable course. If early progress is shown, the long-term prognosis is very good and even massive disc prolapses can be treated conservatively.

### Recommendations

Patients with sciatica should be encouraged to be patient and submit to conservative treatment methods initially. In the presence of clinical progress, even every large disc prolapse can be left to resolve naturally. Early access to the surgeon and diagnostic imaging may result in unnecessary operative treatment.

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