Does surgical decompression alleviate neglected cauda equina syndromes attributed to lumbar disc herniation and/or degenerative canal stenosis?

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ABSTRACT

**Background:** Most studies recommend urgent decompression (e.g., within 48–72 h) of the symptomatic onset of a cauda equina syndrome. As patients in our area typically underwent >3 months delayed surgery for cauda equina syndromes due to disc disease/stenosis, we asked whether surgery was still worthwhile.

**Methods:** This was a retrospective analysis of 12 patients (2012–2018) who underwent delayed surgical decompression for cauda equina syndromes secondary to lumbar disc herniations and/or degenerative lumbar canal stenosis.

**Results:** After a mean postoperative duration of 8.22 months, nine patients experienced the complete restoration of bladder status; two patients required intermittent self-catheterization, while one patient had some residual symptoms (e.g., urgency but able to void with some difficulty).

**Conclusion:** For 12 patients who originally presented with cauda equina syndrome with complete incontinence, nine exhibited delayed full recovery of bladder function with average of 8.22 months postoperatively. We would, therefore, advise that delayed surgical decompression be offered to these patients, irrespective of the preoperative duration of cauda equina syndromes with complete incontinence.

**Keywords:** Bladder recovery, Cauda equina syndrome, Delayed presentation, Disc herniation, Lumbar canal stenosis, Neglected presentation

INTRODUCTION

Cauda equina syndrome most commonly occurs due to lumbar disc prolapse and/or degenerative lumbar canal stenosis.[1] Classical cauda equina syndrome is accompanied by complete loss of bowel and bladder function.[1] Most studies recommend urgent surgical decompression within 48–72 h of symptom onset to reap the maximal benefits of surgery.[16] However, lack of access to healthcare in the developing countries leads to marked delayed in diagnosis and surgery. Due to extremely late presentations of patients with cauda equina syndromes/sphincter incontinence in our country, we retrospectively analyzed the long-term outcomes for 12 patients with complete cauda equina syndromes and sphincter loss who underwent lumbar decompressions delayed by an average of 8.2 months.
MATERIALS AND METHODS
This was a retrospective study (2012–2018) of 12 patients undergoing delayed surgical decompression for cauda equina syndromes (e.g., >3 months/average 8.2 months) secondary to lumbar disc herniation/degenerative lumbar stenosis. Multiple variables were studied, but we predominantly focused on postoperative restitution of continence up to 2 years postoperatively [Tables 1 and 2].

All 12 patients were followed for a minimum period of 2 years and averaged 56.58 years of age. There were eight females and four males. Seven cases were due to prolapsed intervertebral discs; out of which two were recurrent, while five cases were secondary to lumbar canal stenosis, (two were multilevel lumbar canal stenosis, one of them associated with degenerative lumbar scoliosis). Preoperatively, six patients in our study had bladder retention and incontinence (cauda equina syndrome-retention [CES-R]), while six had incomplete bladder involvement (cauda equina syndrome – incomplete [CES-I]).

Bladder dysfunction histories
Duration of preoperative bladder symptoms ranged from 3 to 24 months (mean of 6.9 months). Patients with CES-I had relatively longer duration of symptoms before surgical intervention (mean of 8.250 months), while those with CES-R had relatively shorter duration of symptoms (mean of 5.500 months).

Surgery
Posterior decompression alone or with discectomy was performed in seven patients, while five had discectomy/decompression and transforaminal lumbar interbody fusion (TLIF), with one additionally undergoing deformity correction in TLIF group. Representative pre-operative and post-operative radiological images of 2 patients in Figures 1 - 6.

Statistical evaluation
Descriptive statistics for continuous variables were presented in Mean ± Standard deviation and for categorical variables in count (n) and percentages (%). Chi-square test/Fisher’s exact test was used to find association between two categorical variables. Pearson’s correlation was used to assess the correlation between the two continuous outcomes such as age, visual analog scale (VAS), and Oswestry disability index (ODI). T-test of two independent means and one-way analysis of variance was used to find significant difference between the two groups and more than 2 groups. Statistical analyses were performed using SPSS software (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp) and P-value is considered significant at 5% level.

RESULTS
Outcomes
ODI and VAS preoperatively versus postoperatively [Graph 1]
Mean ODI of our patients before surgery was 72.08 while at 2 years, it was 25. The VAS for back pain before surgery was 4.4 but at final follow-up was 1.75, while the mean VAS for leg pain before surgery was 7.9 and at final follow-up was 0.67 [Tables 1 and 2].

Motor function preoperatively versus postoperatively
Preoperatively, motor power was affected in nine patients, three of them had bilateral involvement of affected myotomes (among patients with bilateral involvement, one had complete motor loss), while six had unilateral involvement (among patients with unilateral involvement, one had complete motor power loss). The remaining three patients were normal. At final follow-up, motor power was normal in seven patients and affected in rest five patients (even among five affected patients, functional motor power was restored in three patients while two still had nonfunctional motor power).

Preoperative peri-anal Sensation)/voluntary anal contraction (PAS/VAC) versus postoperative
Preoperative PAS was normal in three patients, decreased in eight patients, and absent in one patient while PAS at final follow-up was normal in four patients, decreased in seven patients, and absent in one patient. Preoperative VAC was absent in four patients, decreased in eight patients while VAC at final follow-up was normal in four patients, decreased in five patients, and absent in three patients.

Restoration of bladder status [Graph 2]
Complete restoration of bladder status was experienced in nine patients after a mean duration of 8.22 months postsurgery.
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Table 1: Demographic and preoperative clinical and surgical details of patients.

| Age | Sex | Diagnosis                  | ODI (back pain) | VAS (leg pain) | Motor power | Type of surgery                  | PAS/VAC                  | Duration of bladder symptoms before surgery |
|-----|-----|----------------------------|----------------|----------------|-------------|--------------------------------|-------------------------|---------------------------------------------|
| 38  | F   | L5-S1 recurrent disc prolapse | 66             | 7              | 8           | Right S1-1/5                   | TLIF L5-S1              | PAS -50%, VAC - decreased                   | 3 months                                   |
| 72  | F   | LCS L4-L5, L5-S1           | 61             | 0              | 5           | Bilateral L5-3/5               | Posterior decompression | PAS normal, VAC - absent                    | 4.5 months                                 |
| 35  | M   | L4-L5 sequestered disc     | 58             | 4              | 8           | Left L4, L5 2/5                | TLIF L4-L5              | PAS -decreased 50%, VAC - decreased         | 3.5 months                                 |
| 68  | F   | LCS L4-L5, L4-L5, L5-S1 PIVD | 72             | 2              | 7           | Left L5 2/5                    | Posterior decompression | PAS-50%, VAC -decreased                     | 5 months                                   |
| 57  | F   | L4-L5, L5-S1 PIVD          | 80             | 5              | 9           | Bilateral L4-0/5               | Discectomy with decompression | PAS-60%, VAC -absent                        | 6 months                                   |
| 50  | M   | Multilevel LCS             | 76             | 4              | 8           | Left -L4, L5-0/5               | Posterior decompression | PAS-30%, VAC - reduced                      | 7 months                                   |
| 47  | F   | L4-L5 recurrent disc prolapse | 88             | 8              | 5           | Bilateral L5-2/5 and S1-3/5   | TLIF L4-L5              | PAS-NoRMAL, VAC - decreased                 | 3 months                                   |
| 61  | M   | L5-S1 disc prolapse        | 81             | 6              | 9           | Right S1-2/5                   | TLIF L5-S1              | PAS-50%, VAC -decreased                     | 3.5 months                                 |
| 71  | F   | LCS L4-L5                 | 62             | 3              | 8           | Normal                        | Posterior decompression | PAS-absent, VAC -absent                    | 12 months (1 year)                         |
| 41  | F   | L4-L5 disc prolapse       | 62             | 6              | 9           | Normal                        | Discectomy with decompression | PAS-60%, VAC -absent                       | 5 months                                   |
| 65  | M   | L3-L4 PIVD                | 78             | 3              | 9           | Left L4-2/5                   | Discectomy with decompression | PAS-50%, VAC -decreased                     | 6 months                                   |
| 74  | F   | Degenerative scoliosis with multilevel LCS | 81             | 5              | 10          | Normal                        | Deformity correction with decompression and multilevel tlif | PAS-normal, VAC-reduced                  | 24 months (2 years)                        |
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Table 2: Complications and follow-up clinical details of patients.

| Postsurgery final vas (back pain) | Postsurgery final vas (leg pain) | Postsurgery ODI | Restoration of bladder function (time) after surgery | PAS/VAC at final follow-up | Bladder status final | Motor power final | Complications |
|-----------------------------------|----------------------------------|----------------|-----------------------------------------------------|---------------------------|---------------------|-----------------|---------------|
| 3                                 | 2                                | 25             | Restored at 7 months                                 | PAS-90%, VAC-normal       | Self-voiding        | 5/5 Power       | None          |
| 0                                 | 0                                | 22             | Restored at 12 months                                | PAS-normal, VAC-absent    | Self-voiding with high PVR | 5/5 Power       | None          |
| 2                                 | 2                                | 18             | Restored at 9 months                                 | PAS -80%, VAC-decreased  | Self-voiding        | 3/5 Power left  | Dural tear    |
| 0                                 | 1                                | 31             | Restored at 13 months                                | PAS -80%, VAC-decreased  | Self-voiding        | 3/5 Power left  | None          |
| 4                                 | 0                                | 29             | Restored at 15 months                                | PAS -80%, VAC-reduced    | Self-voiding with high PVR | Bilateral-0/5  | None          |
| 2                                 | 1                                | 26             | Not restored at final follow-up                      | PAS-40%, VAC-reduced     | Not able to self-void, persistent incontinence | 1/5 Power left  | Superficial wound infection | None          |
| 1                                 | 0                                | 34             | Restored at 2 months                                 | PAS-normal, VAC-normal   | Self-voiding        | 5/5 Power       | None          |
| 0                                 | 1                                | 14             | Restored at 6 months                                 | PAS-normal, VAC-normal   | Self-voiding        | 5/5 Power       | None          |
| 1                                 | 0                                | 24             | Not restored at final follow-up                      | PAS-absent, VAC-absent   | Not able to self-void  | Normal          | None          |
| 3                                 | 1                                | 32             | Partially restored, even at 2 years follow-up        | PAS -80%, VAC-absent     | Self-void with some residual symptoms like urgency | Normal          | None          |
| 1                                 | 0                                | 12             | Restored at 4 months                                 | PAS-90%, VAC-normal      | Self-voiding        | 4/5 Power left l4 | None          |
| 4                                 | 0                                | 33             | Restored at 6 months                                 | PAS-normal, VAC-reduced  | Self-voiding        | Normal          | None          |
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Graph 2: Final bladder status with one representing completely recovered nine patients, two representing patients who failed to recover while three representing recovered patient with residual difficulty in relation to preoperative affected bladder in the form of cauda equina syndrome – incomplete and cauda equina syndrome-retention.

Figure 1: Preoperative sagittal and axial magnetic resonance imaging sections of patient with recurrent L4-L5 disc prolapse of patient 1.

Figure 2: Postoperative anteroposterior and lateral X-rays on follow-up showing interbody cage, rods, and pedicle screws between L4-L5 (TLIF L4-L5) of patient 1.

Figure 3: Preoperative lateral and anteroposterior whole spine X-rays of patient 2 showing degenerative scoliosis.

Figure 4: Preoperative coronal and sagittal magnetic resonance imaging sections of patient 2 showing degenerative scoliosis with lumbar canal stenosis.

Graph 2: Final bladder status with one representing completely recovered nine patients, two representing patients who failed to recover while three representing recovered patient with residual difficulty in relation to preoperative affected bladder in the form of cauda equina syndrome – incomplete and cauda equina syndrome-retention.

DISCUSSION

The presence of cauda equina syndromes with bladder and bowel symptoms in patients with lumbar disc herniation/canal stenosis typically requires emergent surgical intervention (e.g., within 48 h to achieve the better surgical outcomes). Bydon et al. did discrete analysis of patients at 12, 24, 36, 48, 60, and 72 h, operated for cauda equina syndrome, and found no specific advantages of earlier surgery. Chau et al. concluded that both early and late surgery beyond 48 h may result in improved surgical outcomes. In addition, Kostuik et al.
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CONCLUSION

We conclude that although all patients with symptoms of cauda equina syndrome should ideally be surgically decompressed within 48–72 h, as our study showed statistically significant recovery of bladder symptoms in more than 80% of patients with surgery delayed for an average of 8.2 months, delayed decompression should not be withheld.

Declaration of patient consent

Patient’s consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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