Outcome of spinal decompression in cauda equina syndrome presenting late in developing countries: case series of 50 cases

Sarvdeep Dhatt · Naveen Tahasildar ·
Sujit Kumar Tripathy · Raj Bahadur ·
Mandeep Dhillon

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Abstract The purpose of this study is to find the clinical outcome of decompression of Cauda Equina presenting late in the course of disease. There were 33 males and 17 females with average age of 48 years, ranging from 25 to 85 years. All patients presented to us with a fully developed Cauda Equina syndrome (CES). All of them presented late with mean delay of 12.2 days. Time interval between bladder and bowel dysfunction and admission to hospital varied from 1 to 35 days. The average follow-up was 34.5 months, ranging from 12 to 60 months. There was no statistically significant difference in time of delay in surgery between the recovered and non-recovered group as tested by Student's *t* test. But there was a statistically significant positive correlation between duration taken for total recovery and delay in surgery. Anal wink as a predictor of bladder and bowel recovery also showed statistical significance, as patients with an absence had a poorer prognosis for bladder recovery. The result of surgery in CES is not as dramatic and fast as seen after routine disc surgery. Some improvement can be expected with decompression even in those patients presenting late and results are not universally poor as previously thought. The treating physicians of such patients should be aware that the recovery in this group of patients can take an exceptionally long time and hence should involve in constant

reassurance and rehabilitation of the patient. Presence of anal wink is a very good predictor of bladder and bowel recovery.

Keywords Cauda Equina · Disc prolapse · Delayed presentation · Developing countries · Anal wink

Introduction

Cauda Equina syndrome (CES) is a severe neurological disorder first described by Mixter and Barr in 1934 [1]. The disorder can be caused by any entity exerting pressure upon the Cauda Equina including hematomas, tumors, infections, or fractures, with the most common being lumbar disc herniation. CES is relatively rare (3%) presenting symptom of prolapsed lumbar disc in the developed countries, but it is more common in the developing countries due to late presentation of patients to the hospitals [2]. This can be attributed to their poverty, ignorance, limited availability of the skilled spinal surgeon and more significant apprehension of the anticipated complication during spine surgery like neural injury, becoming permanently disabled. This classical syndrome presents with low back pain and bilateral sciatica, saddle anesthesia, lower extremity weakness, bowel and bladder involvement and impotence in males in some cases [3]. Some researchers [4] have reported a 2.2% incidence of CES following disc herniation in the lumbar spine. Others [5] have reported an incidence of 3.2%, although they believed that this represented an overestimate because it did not include the majority of patients with lumbar disc prolapse who had undergone nonsurgical treatment. A study of 50 cases of CES is presented. The aim of the study was to analyze the relationship between clinical presentation of the patients at

S. Dhatt (✉) · N. Tahasildar · S. K. Tripathy · M. Dhillon
Department of Orthopaedics, Postgraduate Institute of Medical
Education and Research, Sector-12, Chandigarh 160012, India
e-mail: sarvdeepdhatt_2008@yahoo.in

R. Bahadur
Department of Orthopaedics, Government Medical College,
Chandigarh, India

the time of admission to the hospital to the extent and pattern of recovery of the patients after surgery.

Materials and methods

In our institution we operated 584 patients of degenerative disc diseases from July 1998–December 2006. There were 541 patients of lumbar prolapsed discs. Of these 541 discs, 50 cases (11%) were of the classical CES. There were 33 males and 17 females with average age of 48 years, ranging from 25 to 85 years. All patients had classical features of CES. The delay in surgery from the onset of the perianal anesthesia and disturbances in micturition (which was arbitrarily considered as a starting point of CES) ranged from 1 to 35 days and the mean was 12.2 days. Detailed clinical examination was done at presentation and clinical findings were recorded. Anal wink was present in 44 patients and absent in the rest of the 6 cases. Bilateral saddle anesthesia was present in 45 patients and absent in rest of the 5 patients. Preoperative Magnetic Resonance Imaging (MRI) (Fig. 1) was done in all patients to quantify the extent of prolapse and also the type (posterocentral/posterolateral). Out of the 50 cases, 22(44%) had L4-5 prolapsed inter-vertebral disc (PIVD), 10(20%) had L5-S1 PIVD, 10(20%) had multilevel PIVD (most common combination being L4-5, L5-S1), 4(8%) had L3-4 PIVD and 4(8%) had L2-3 PIVD. All patients underwent wide laminectomy and discectomy (Fig. 2a, b). No fixation or fusion was done in any case except two cases of multilevel PIVD where instrumentation had to be done to prevent instability. The patients were followed every fortnightly for the first 3 months and every month thereafter. During each follow-up a detailed neurological examination was performed and recorded.

All data were collected and placed upon a spreadsheet. SPSS version 14 (Chicago, Illinois, USA) software was utilized for statistical analysis. Descriptive and frequency statistics were performed of various data parameters. Student's *t* test and logistic regression analysis were used to analyze quantitative data between two groups. ANOVA was used to analyze quantitative data between multiple groups. Chi-square and Fisher's exact test were utilized for categorical data assessment. Pearson's correlation coefficient was used to find correlation between quantitative parameters. Statistical significance was established if $p < 0.05$.

Results

This retrospective study analyzes the follow-up results of 50 patients who underwent discectomy following a

Fig. 1 Pre-operative MRI showing a huge L4-5 disc prolapsed with significant canal compromise in a 45-year-old male presenting with classical features of Cauda Equina syndrome 10 days following the onset of symptoms

diagnosis of CES due to prolapsed intervertebral lumbar discs. The follow-up period varied from 12 to 60 months, the average follow-up time was 34.5 months. None of our patients were lost to follow-up. The patients were arbitrarily divided into three groups as total recovery (who had complete recovery of motor, sensory, perianal anesthesia and bowel bladder function), near total recovery (complete motor and sensory recovery, minor bladder and bowel dysfunction, persistence of perianal anesthesia) and partial (incomplete motor and sensory recovery/major bladder and bowel disturbance). Postoperatively, 5 patients had total recovery, 39 patients had near total recovery and six patients had partial recovery. Sexual dysfunction was seen in 18 patients. Perianal anesthesia persisted among 45 of 50 patients (90%) despite adequate decompression, which was a disturbing symptom for the patient.

The pattern of recovery was quite varied in our group of patients with the most common pattern being motor followed by bowel and bladder followed by sensory recovery. The duration of recovery (for patients with total and near total) ranged from 4 to 32 months with a mean of 13.5 months.

Fig. 2 **a** Disc material displayed following successful removal. **b** Disc material regrouped to simulate a complete disc

The mean delay in surgery in patients with total and near total recovery (which we perceive is the actually recovered group) was 10.52 days and the mean delay in surgery in patients with partial recovery (which we perceive as not recovered) was 13.67 days. But this difference did not reach a statistical significance by Students *t* test (p value = 0.236).

Also on logistic regression analysis of the delay in surgery among the recovered (total & near total) and non-recovered (partial) did not show any significant difference (Wald value = 1.392, p value = 0.238).

The delay in surgery (days) showed a very strong positive correlation with duration taken for total recovery (Pearson correlation coefficient = 0.661, p value = 0.001).

The mean delay in surgery in the three groups, total recovery (best outcome) was 1.60, near total recovery (intermediate outcome) was 11.67 and partial recovery (worst outcome) was 13.67. All the three means among the groups were compared by ANOVA test, which showed a significant statistical difference between the groups (p value = 0.001).

Presence of anal wink as a predictor of bladder and bowel recovery was tested statistically with chi square test which showed a significant p value (p value = 0.001).

Discussion

The majority of lumbar disc herniations can be managed conservatively. Surgery is usually reserved as a last resort for patients who experience increasing neurological deficits or who experience no clinical improvement following appropriate conservative measures [6]. CES, on the other hand, is generally treated as a true surgical emergency. As Ahn notes, ‘It [CES] is thought to be the primary absolute indication for the acute surgical treatment of lumbar disc

herniation” [7]. A published comment following Shapiro’s article noted: “The reader should not be left with the impression that it is acceptable to wait up to 48 h before surgery. The sooner the Cauda Equina is decompressed after the onset of symptoms the more likely it is that the patient will not be left with residual neurological deficits” [8].

Shapiro noted that in 70% of patients presenting with CES, bilateral sciatica heralded the impending Cauda Equina compression, while the other 30% of patients presented with the fully developed syndrome. In addition, he noted that urinary retention always preceded urinary incontinence and that “it is important to recognize these patients and to not treat them conservatively.” Such a failure would or could be classified under the failure to diagnose CES or the failure to recognize the syndrome even in the face of positive clinical signs and symptoms [9].

The role of urgent surgery in improving the outcome of Cauda Equina compression following lumbar central disc prolapse remains controversial. Some series claim improved outcome from emergency decompression while others have found no benefit. Resolution of this issue is important because the opportunity to reverse neurological impairment may already have been lost by the time of hospital admission. Removal of a large central disc prolapse can be considerably more difficult than routine disectomy, and may require an extensive exposure. When performed under less than optimal conditions, as often exists in the emergency setting, surgery may even add to rather than alleviate morbidity [5]. According to Kostuik et al. [3] and O’Laioire et al. [9], there was no correlation between the length of time between the onset of symptoms and surgery, and the extent of recovery. Despite this lack of correlation, authors [3] still recommend that surgery be carried out early, since a partial cauda-equina lesion should

not be allowed to progress to complete loss of sphincter, motor, and sensory function.

Our study significantly differs from the various studies reported in the literature because majority of the patients who presented to the health care facilities in our study reported very late (mean delay in surgery was 12.2 days). We believe that this scenario gave us a unique opportunity to study the outcome of this group of patients who present late. According to the literature, the outcome of surgical decompression in cases presenting late is universally poor, but we found no statistically significant difference in the mean surgical delay of the poor outcome group and better outcome group. This is in concordance with three studies by Kostuik et al. [3], O'Laoire et al. [9] and McCarthy et al. [10]. An interesting study by Qureshi et al. [11] found that there was no statistically significant difference in outcome between three groups of patients with respect to length of time from symptom onset to surgery (<24 h, between 24 and 48 h and >48 h). But, we found a very strong positive correlation between the delay in surgery and the duration of recovery. This suggests that those groups of patients who present late would be definitely benefitted by the decompression but the recovery time will be significantly delayed. McCarthy et al. [10] and Delamarter et al. [12] also found that the duration of compression resulted in an increased delay in recovery, but the final recovery did not significantly differ between groups compressed for different time periods. The treating physician should patiently follow the patient for a slow and gradual recovery. But the authors appreciate the fact that even in this study, there was a significant statistical difference in the delay of surgery of the groups with total recovery (best outcome), near total recovery (intermediate outcome) and partial (worst outcome). In other words, the best outcome of the decompression of CES is seen in those patients who are operated at the earliest. This leads us to some important message that though the best outcome of the decompression of Cauda Equina is obtained by operating at the earliest, still decompression in patients presenting late gives some meaningful improvement at a period considerably longer than the counterpart. Anal wink was a good predictor of recovery of the bladder and bowel function. Most of the patients with an intact anal wink at the presentation will eventually have satisfactory recovery of the bladder and bowel function. Perianal anesthesia persisted among 45 of 50 patients (90%) despite adequate decompression, which was a disturbing symptom for the patient. McCarthy et al. [10] also found that perianal sensation shows the least improvement. Similarly, Dinning et al. [13] found that sensory recovery was worse than motor recovery after decompression in patients with CES.

Even if short-term recovery of bladder function is poor after lumbar disc surgery for CES, the long-term outcome is not necessarily so. Robinson [14] noted that even the size of the lesion found at surgery may not be related to the extent of recovery of bladder function. We should follow-up on these patients with such measures as intermittent self-catheterization and drug therapy, while expecting slow but steady recovery of bladder and sphincter function. Due to these reasons there is “a need for ongoing education to encourage clinical colleagues in all disciplines to recognize the early signs and the need for urgent referral in suspected cases of CES”. After an accurate diagnosis and adequate operative treatment, postoperative results of CES appear satisfactory. Previous reports of lesions of the Cauda Equina caused by prolapse of a lumbar disc have relied on questioning the patient for the assessment of recovery of bladder function, assuming that patients who could pass urine voluntarily had recovered normal bladder function [3]. A study by Scott et al. [15] showed, however, that the patient's satisfaction with the function of the bladder is not a true indication of recovery. True recovery of function can be confirmed only by cystometry, which they believed had great value both as a diagnostic and as a prognostic tool.

Prior to 1986 and the more recent studies detailing CES, most authorities recommended that surgical treatment be performed within 6 h after onset of an acute CES [8]. Recently, however, most authors [4, 7, 8, 16] advocate that patients with acute CES undergo surgical treatment as early as possible, but no later than 48 h after the onset of symptoms. In fact, most studies demonstrate that patients who underwent surgery more than 48 h after onset of symptoms had a much poorer outcome than those patients who underwent surgery within 48 h. There was a significant advantage to treating patients within 48 h versus more than 48 h after the onset of CES. A significant improvement in sensory and motor deficits as well as urinary and rectal function occurred in patients who underwent decompression within 48 h versus after 48 h [4]. Emergency decompressive surgery did not significantly improve outcome in CES compared with a delayed approach [11, 17].

Conclusions

Considering the significant financial and social burden this condition places on the society of a developing country like India, primary care physicians at all levels have to be trained in identifying CES early among a whole lot of non specific backaches. The authors stress the importance of performing the decompression in all patients irrespective of the delay in surgery because this study proves that the results of operating on patients presenting late, are not universally poor and

we can expect a fair degree of improvement in this group of patients, if not the best. In other words, the benefits of decompression in patients presenting late certainly outweigh the risk. This, we authors feel, may also have a positive medico legal implication in our professional field. Our study showed that recovery of neurological functions, particularly the autonomic functions, takes a longer time in patients presenting late in the course of disease.

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Conflict of interest None.

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