



Cauda Equina Syndrome secondary to lumbar disc herniation

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The authors conducted a retrospective study of 8 cases of cauda equina syndrome (CES) due to a herniated lumbar intervertebral disc, in order to highlight the clinical presentation and outcome after urgent surgical decompression. Between 1995 and 1999, 8 patients (4 men and 4 women) with ages ranging from 43 to 64 years (mean 53 years) presented with CES. There were two modes of presentation : acute to subacute (4 patients) and insidious (4 patients). In 3 patients the precipitating factor was stooping, with or without heavy lifting. One patient gave a history of stooping and heavy lifting, followed by manipulation therapy. Urinary bladder involvement was present in all patients (100%). Perianal sensory involvement was present in four cases, bilateral in two and unilateral in the other two. Seven patients had complete recovery of bladder function. One patient had residual urinary symptoms, though she was continent ; she had been operated upon within 33 hours, within the classical 48 hours suggested by larger series. Residual weakness of lower limb muscles was present in three cases. In this small series there was no distinct correlation between timing of operation and results. Conclusion : The classical presentation of CES is not obvious. Surgery as an emergency is recommended : within 48 hours, according to the old rule. Even if surgery is done late due to delayed presentation, significant improvement in the bladder function can still be expected.

Keywords : spine ; cauda equina syndrome ; herniated disc.

INTRODUCTION

Herniation of the lumbar intervertebral disc can cause severe compression of the cauda equina (1-8). A precise understanding of this syndrome is important because any delay in diagnosis and treatment may result in poor outcome (1,2,4,6-8). Potentially serious legal implications exist. The aim of this study was to highlight the clinical presentation and the outcome after surgical decompression.

MATERIALS AND METHODS

A retrospective study was conducted of 8 patients who presented with CES, due to a herniated lumbar intervertebral disc, between January 1995 and January 1999 (table I, II). There were 4 men and 4 women, with ages ranging from 43 to 64 years (mean age 53 years). Five patients had a previous history of back pain. Unilateral leg pain (5 patients) was a more common presentation than bilateral leg pain (3 patients). Sensory

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Table I. — Clinical presentation

Case number	Age/Gender	Back pain	Leg pain	Urinary symptoms	Bowel symptoms	Precipitating factors	Previous back pain
1	48 female	14 days	left	urgency, dribbling for 24 h	none	none	34 years
2	45 female	4 days	bilateral	retention for 24 h	constipation for 96 hours	stooping	8 years
3	43 female	30 h	bilateral	retention for 30 hours	constipation for 24 hours	stooping and heavy lifting	none
4	61 female	20 days	right	retention for 6 days	incontinent for 6 days	stooping and lifting + chiropraxis	none
5	49 male	3 wks	bilateral	frequency + poor stream for 3 wks	constipation for 2 weeks	none	none
6	64 male	4 mo	left	frequency, dribbling, poor control for 3 months	none	none	40 years
7	55 male	3 mo	right	urgency, frequency for 6 weeks	none	heavy lifting	30 years
8	60 male	3 mo	right	frequency 4 weeks	incontinent 6 days	none	1 year
	Average 53 y						

involvement was present in 6 cases. Perianal sensory involvement was present in 4 cases : two patients had bilateral and two had unilateral involvement. Bladder involvement was present in all 8 cases (100%). The preoperative bladder symptoms were urgency, frequency, poor stream, dribbling and retention of urine.

There were two modes of presentation : acute to sub-acute and insidious. Four patients (all women) were in the first group (cases 1-4). Their ages ranged from 43 to 61 years (average 49 years). Two of these patients had a previous history of back pain. Two patients developed symptoms after stooping with or without heavy lifting. Another patient (case 4) developed back and leg pain after stooping and heavy lifting. She consulted a chiropractor and had two sessions of manipulation. After the first manipulation therapy, she complained of difficulty in passing urine. In spite of the urinary symptoms, the chiropractor did a second session of manipulation therapy. She developed retention of urine and faecal incontinence. At this stage she called her general practitioner, who referred her to the orthopaedic unit. Two patients presented at 24 hours ; the third patient presented after 30 hours and the fourth 6 days after the onset of bladder symptoms. Two patients presented with constipation and one patient presented with faecal incontinence. All patients had sensory involvement ; three had bilateral

anaesthesia in the perianal region. These patients were operated upon, from 27 hours to 6 days after the onset of urinary bladder symptoms.

A second mode of presentation was insidious (cases 5-8). There were four patients, all men. Their ages ranged from 49 to 64 years (average 57). Three patients had a history of recurrent back pain. The recent episode of back pain was present over periods ranging from a few weeks to months, with a variable amount of motor and sensory involvement and urinary symptoms developing over a time interval ranging from two weeks to three months. One patient did not have any past history of back pain. Heavy lifting was a precipitating factor in one case. No precipitating factor could be found in the other cases. Sensory involvement was present in two cases ; one had unilateral perianal hypoaesthesia. These patients were operated upon between 15 days to 3 months after the onset of bladder symptoms.

Delay in presentation

One case was delayed by six days as she was undergoing chiropractic treatment. Another patient was admitted to the urology unit and was being investigated for prostate pathology. He was referred after two weeks of bladder involvement. Another case was admitted to the

Table II. — Neurological signs

Case number	Muscle power	Knee jerk	Ankle jerk	Sensory signs	Anal tone
1	ext.hall.long left 4	normal	normal	L5S1 left hypo	normal
2	normal	normal	normal	S234 bilateral anaesth. L5S1 left hypo	reduced
3	normal	normal	absent bilaterally	S234 bilateral an.	reduced
4	ext.hall.long right 4 tib.ant right 3 gastroc right 3	normal	absent right	S234 right anaesthesia S1 right hypo	reduced
5	normal	normal	absent right	normal	normal
6	ext.hall.long left 4 tib.ant left 4	normal	normal	L5 left hypo	reduced
7	ext.hall.long right 4	normal	brisk (right)	normal	normal
8	ext.hall.long right 3 gastroc right 3	sluggish bilaterally	both absent	S234 right hypo L5S1 right hypo reduced	

ext.hall.long = extensor hallucis longus / tib.ant = tibialis anterior / gastroc = gastrocnemius-soleus complex.

medical ward. A provisional diagnosis of disc prolapse was made by the physician. He was referred to the orthopaedic out-patient clinic after ten days. The other patients were referred to the orthopaedic unit by the family doctor or by the accident and emergency department.

Radiological findings

An MRI or CT scan was performed in all patients. Four patients had a massive central disc prolapse that occupied more than one third of the canal diameter. The other four patients had a smaller sized central disc prolapse that occupied less than one third of the canal diameter. In these 4 cases, there was preexisting lumbar stenosis. All patients with lumbar stenosis were more than 54 years old. The disc herniation was situated at the L4-L5 level in 4 patients, and in 3 patients at the L5-S1 level. In one patient there was a disc herniation at the L4-L5 level and a sequestered disc at the L5-S1 level.

Surgical procedure

Hemilaminectomy was done in all the cases to ensure adequate exposure. Compression of the dura and its contents were avoided during surgery. All disc herniations were removed by the usual extradural technique. In cases

of associated spinal stenosis, adequate decompression was achieved.

RESULTS

Follow-up (table III) ranged from 34 to 46 months (average 38 months). There was only one complication: a dural tear which was recognized and repaired at the time of surgery. At the last follow-up, two patients had back pain; two had leg pain and one patient had back and leg pain. All patients were ambulatory. One patient complained of hypoaesthesia in the perianal region and in the leg, while 3 others had hypoaesthesia in the leg only. Residual weakness in the lower limbs was present in three cases. All patients were continent. Only one patient had urinary symptoms. This 43-year-old lady (case 3) had no previous history of back or leg pain. She was operated upon within 33 hours after the onset of symptoms. Post-operatively cystometry showed a hypotonic bladder. Thirty-four months postoperatively, she still had urgency and frequency of micturition, though she was completely continent.

Table III. — Results of treatment

Case	Follow-up (months)	back pain	leg pain	muscle power	knee jerk	Ankle jerk	sensation	Urinary/ bowel function
1	46	none	none	normal	normal	normal	hypo L5 left	normal
2	34	yes	none	normal	normal	normal	hypo L5S1left	normal
3	34	none	none	normal	normal	both absent	normal	continent, frequency, hypotonic bladder/bowel normal
4	34	none	yes	gastroc right 4	normal	absent right	hypo S1234 right	normal
5	40	none	none	normal	normal	absent right	normal	normal
6	38	yes	yes	ext.hall.long left 4 tib.ant left 4	normal	normal	normal	normal
7	42	yes	none	normal	normal	normal	normal	normal
8	36	none	yes	ext.hall.long right 4	normal	both absent	hypo S1 right	normal

ext.hall. long = extensor hallucis longus / gastroc = gastrocnemius / tib.ant. = tibialis anterior.

DISCUSSION

The full-blown picture of CES is a well recognized, though infrequently encountered entity (5). In the majority of these typical cases, the diagnosis is quick and accurate because the clinical picture is acute and characteristic. However, cases with an insidious onset may confuse the clinician. In this study, there were four cases of each type.

One out of 8 patients had manipulation as a precipitating factor. Estimates of the incidence of serious complications, including CES, range from 1 in 400,000 to 1 in 2 million manipulations. Given the popularity of spinal manipulation, its safety requires rigorous investigation (9).

Ahn *et al* (1) conducted a meta-analysis of surgical outcomes of CES secondary to lumbar disc herniation to determine the relationship between time to decompression after onset and clinical outcome, and to identify preoperative variables that were associated with outcomes. One hundred and four references were reviewed, and 42 met the inclusion criteria. Length of time to surgery was broken down into five groups: less than 24 hours, 24-48 hours, 2-10 days, 11 days to 1 month, and more than 1 month. Logistic regression was used to determine

the association between preoperative variables and postoperative outcomes. Outcomes were analyzed in 322 patients. Preoperative chronic back pain was associated with poorer outcomes in urinary and rectal function, and preoperative rectal dysfunction was associated with worsened outcome in urinary continence. In addition, increasing age was associated with poorer postoperative sexual function. There was a significant advantage to treating patients within 48 hours versus more than 48 hours after the onset of cauda equina syndrome: a significant improvement in sensory and motor deficits as well as urinary and rectal function occurred in patients who underwent decompression within 48 hours versus after 48 hours. This meta-analysis confirms the old rule that surgery should be performed within 48 hours.

Busse *et al* (2) reported an outcome in 14 patients who underwent surgical decompression for CES. They concluded that the patients who underwent delayed decompression for CES had increased pain and impaired social and physical function. Longer delays correlated with worse functional outcomes. Beyond 24 hours, decompression delay might be associated with a poorer quality of life but, because of the rarity of CES, the sample size in their study



Fig. 1. — MRI scan (T2 image) showing lumbar disc prolapse at L4-L5 level.

was too small to provide definitive conclusions. Since no patients underwent surgery within 38.4 hours of symptoms, it was not possible to comment on the importance of emergent decompression in early presenters.

Qureshi and Sell (8) conducted a prospective longitudinal inception cohort study of 33 patients undergoing surgery for cauda equina syndrome (CES) due to a herniated lumbar disc. Their data suggested that the severity of bladder dysfunction at the time of surgery was the dominant factor in recovery of bladder function. They concluded that the duration of symptoms prior to surgery did not appear to influence the outcome, in sharp contrast with the findings of Ahn *et al* (1). At first sight these data might have significant implications for the medicolegal sequelae of CES; but it should be stressed that only 36% of their 33 patients were operated upon within 48 hours. Furthermore, the one patient with bladder dysfunction and the three patients with residual weakness were operated upon at 33 hours, 6 days, 4 weeks and three months respectively, which pleads again for early intervention.

In the current series, one (case 3) out of 8 patients had residual urinary symptoms, though

she was continent. Seven out of eight patients had normal bladder function. Residual weakness was present in three cases (table III). Three patients were operated upon within 33 hours (average 32.6 hours). One of these three patients had residual urinary symptoms, though she was continent. Five patients were operated upon between 6 days and 3 months. Three had residual weakness. None had urinary symptoms. The small number of cases is a weakness of this study, which excluded statistical computation.

CONCLUSION

CES is an uncommon entity. An atypical onset is frequent. It is therefore extremely important that physicians be aware of this condition so that an orthopaedic surgeon or a neurosurgeon is consulted before the neurological damage becomes permanent.

Chiropractic manipulation may precipitate CES. In patients with spinal stenosis, even a small disc herniation may lead to CES. The authors recommend urgent surgery, within 48 hours, according to the old rule. Even if surgery is done late, significant improvement in bladder function can still be expected.

REFERENCES

1. Ahn UM, Ahn NU, Buchowski JM, Garrett ES, Sieber AN, Kostuik JP. Cauda equina syndrome secondary to lumbar disc herniation: a meta-analysis of surgical outcomes. *Spine* 2000; 25: 1515-1522.
2. Busse JW, Bhandari M, Schnittker JB, Reddy K, Dunlop RB. Delayed presentation of cauda equina syndrome secondary to lumbar disc herniation: functional outcomes and health-related quality of life. *CJEM* 2001; 3: 285-291.
3. Gleave JR, Macfarlane R. Cauda equina syndrome: what is the relationship between timing of surgery and outcome? *Br J Neurosurg* 2002; 16: 325-328.
4. Hussain SA, Gullan RW, Chitnavis BP. Cauda equina syndrome: outcome and implications for management. *Br J Neurosurg* 2003; 17: 164-167.
5. Jalloh I, Minhas P. Delays in the treatment of cauda equina syndrome due to its variable clinical features in patients presenting to the emergency department. *Emerg Med J* 2007; 24: 33-34.

6. **Kennedy JG, Soffe KE, McGrath A, Stephens MM, Walsh MG, McManus F.** Predictors of outcome in cauda equina syndrome. *Eur Spine J* 1999 ; 8 : 317-322.
7. **McCarthy MJ, Aylott CE, Grevitt MP, Hegarty J.** Cauda equina syndrome : factors affecting long-term functional and sphincteric outcome. *Spine* 2007 ; 32 : 207-216.
8. **Qureshi A, Sell P.** Cauda equina syndrome treated by surgical decompression : the influence of timing on surgical outcome. *Eur Spine J* 2007 ; 16 : 2143-2151.
9. **Stevinson C, Ernst E.** Risks associated with spinal manipulation. *Am J Med* 2002 ; 112 : 566-571.