The value of interhospital transfer and emergency MRI for suspected cauda equina syndrome: a 2-year retrospective study

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ABSTRACT

INTRODUCTION The timing of surgery in cauda equina syndrome due to prolapsed intervertebral disc remains controversial. Assessment of these patients requires magnetic resonance imaging (MRI), which is of limited availability outside normal working hours in the UK.

PATIENTS AND METHODS We reviewed radiological results in all patients undergoing emergency MRI within our unit for suspected cauda equina syndrome over a 2-year period, and all subjects undergoing emergency lumbar discectomy for cauda equina syndrome within the same period. Outcome measures were: proportion of positive findings in symptomatic patients and proportion of patients referred with diagnostic MRI scans undergoing emergency surgery. We also assessed outcomes of patients having surgery for cauda equina syndrome in terms of improvement of pain, sensory and sphincter disturbance.

RESULTS A total of 76 patients were transferred for assessment and 'on-call' MRI; 27 were subsequently operated upon. Only 5 proceeded to emergency discectomy that night (prior to next scheduled list). This may be due to delays in timing – from referral to acceptance, to arrival in the department, to diagnostic scan and to theatre. With the second group of patients, 43 had emergency discectomy for cauda equina syndrome during the study period. Of these, 6 patients had an out-of-hours MRI at our hospital for assessment (one patient living locally). Most surgically treated patients experienced improvement in their pain syndrome, with approximately two-thirds experiencing improvement in sensory and sphincter disturbance.

CONCLUSIONS These data support a policy of advising MRI scan for cauda equina syndrome at the earliest opportunity within the next 24 h in the referring hospital, rather than emergency transfer for diagnostic imaging which has a relatively low yield in terms of patients operated on as an emergency.

KEYWORDS

MRI scan – Cauda equina syndrome – Discectomy – Back pain

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The optimum management of cauda equina syndrome (CES) remains a controversial topic.^{1,2} There are a range of reported outcomes after treatment for CES, from generally good to almost universally poor.^{3,4} This is most probably the result of many different studies and reports that have differed in inclusion criteria, in delays in surgical treatment and in outcome assessments. The concept of partial CES has previously been proposed as a predictor of better outcome after surgery than complete CES.^{5,6}

The issues that can be agreed on are that the most common cause of CES is a prolapsed intervertebral disc and that CES is a cause of serious disability, which may result in high-cost litigation in cases of possible mismanagement.^{7,8}

Although CES is a clinical diagnosis, patients require magnetic resonance imaging (MRI) prior to surgery to assess the aetiology and level of pathology in the spinal canal. Some patients report symptoms of CES without radiological correlation and MRI is of crucial importance in guiding their treatment.

Patients with CES from disc prolapse are usually referred for an opinion to a regional neurosurgical unit in the UK. Due to the unpredictable nature of this condition, these patients may present to their local hospital outside of normal working hours, usually to an orthopaedic department. Most hospitals in the UK do not operate an MRI service out of normal working hours. The patients may then be

referred to neurosurgery on clinical grounds alone for MRI prior to intervention if appropriate. This may result in late-night emergency interhospital transfer unnecessarily.

We present retrospectively collected data from a regional unit spanning a 2-year period to assess the importance of emergency MRI in the management of patients with suspected and confirmed CES.

Patients and Methods

Two groups of patients were identified retrospectively.

GROUP 1: ALL PATIENTS UNDERGOING EMERGENCY (OUT OF NORMAL WORKING HOURS) MRI FOR A SUSPECTED DIAGNOSIS OF CES

These patients were identified from the radiology department database by searching for all patients undergoing MRI of the lumbar spine outside of 8 am to 5 pm. The clinical details regarding the request were evaluated to ensure that CES was the suspected diagnosis. The hospital records of these patients were then checked to establish the nature of presenting symptoms. The report of the MRI scan was obtained. The outcomes for each patient were assessed – whether that patient went on to have surgery and, if so, whether it was then performed immediately, on the next available list, or at an interval of more than 24 h. Where available, clinical details of the outcomes following immediate surgery post-MRI were obtained.

GROUP 2: ALL PATIENTS UNDERGOING EMERGENCY (UNSCHEDULED) DISCECTOMY FOR CES

All patients undergoing lumbar discectomy were identified from theatre records over the same 2-year period. The records of these patients were then examined to exclude those performed electively. Of those performed after emergency admission, only those diagnosed as having CES were included. As with group 1, the nature of the presenting symptoms was established. The location of the diagnostic MRI scan was checked, as well as the timing of the surgery (day-time versus out-of-hours), to establish the proportion of patients with CES that required transfer for an emergency diagnostic scan. The outcome of their surgery

was assessed retrospectively from follow-up clinic appointments in terms of improvement in pain syndrome, sensory loss and sphincter function.

Results

Group 1

Eighty-two patients underwent emergency MRI for suspected cauda equina syndrome. Most patients (90%) had back pain as a presenting symptom, 78% had sensory disturbance, 77% had sciatica and 41% of patients had sphincter disturbance (Table 1). Of these 82 patients, 55 (67%) of scans showed an abnormality mild enough to warrant non-surgical treatment, or no abnormality. Of the 27 (33%) patients requiring surgery, 15 were operated on at the next available (day-time) list. Six patients underwent surgery after more than 24 h, and only five patients went on to have surgery immediately after the MRI scan as an emergency.

Four patients in this group had ‘unexpected’, non-degenerative diagnoses from the imaging – two tumours, one discitis, and one spinal epidural haematoma.

Group 2

Forty-three patients underwent lumbar discectomy for cauda equina syndrome. Their presenting symptoms were similar in frequency to those in group 1 (Table 2). Of these 43 patients, 32 (74%) were referred to our unit with diagnostic imaging from another hospital. Eleven patients had their MRI scan at our unit: of these 11 patients, 5 were performed the morning after transfer, and 6 were performed out of normal working hours.

Of these 43 patients, 26 had surgery during working hours, 14 had out-of-hours surgery and three surgical records were untraceable.

Of the 43 patients having surgery, 41 experienced improvement in back pain, one no improvement, and one was lost to follow-up. Of 21 patients with sphincter disturbance, 14 experienced improvement, and 23 of 35 patients with sensory loss improved subsequently. Follow-up data were insufficient to assess improvement in sciatica.

Table 1 Patient group 1 – presenting symptoms all patients having out-of-hours MRI (n = 82)

	Back pain	Sphincter distension	Numbness	Sciatica
Positive	74 (90)	34 (41)	64 (78)	63 (77)
Negative	5 (6)	45 (55)	15 (18)	16 (20)
Unknown	3 (4)	3 (4)	3 (4)	3 (4)

Percentages are given in parentheses.

Table 2 Patient group 2 – presenting symptoms and outcomes of all patients having emergency surgery for cauda equina syndrome (*n* = 43)

	Back pain	Sphincter distension.	Numbness	Sciatica
Positive	43 (100)	21 (49)	35 (81)	43 (100)
Negative	0	22 (51)	8 (19)	0
Unknown	0	0	0	0
Number improving after surgery	41 (95)	14 (67)	23 (66)	Not applicable

Percentages are given in parentheses.

Discussion

We have presented two groups of patients with similar clinical findings; the second group, with a diagnosis of partial or complete CES and radiological correlation, and the first with a suspected diagnosis of CES, but no diagnostic imaging.

We acknowledge the imperfections in our data collection. A prospective data collection would be preferable. It would also allow a third group of patients to be evaluated: those referred for transfer and MRI scan that were not accepted, who undergo MRI scan at the next available opportunity in the referring hospital. The diagnoses and outcomes for these patients would be most valuable. We were unable to gather information regarding pre-operative duration of symptoms and outcome, and also regarding the exact timing of referrals and patient transfers.

Our outcome data for the second group are of very limited value. It shows good improvement in pain outcomes, with approximately two-thirds of patients showing improvement in sphincter function and sensory disturbance. However, there is no rigorous assessment of outcomes here and we are unable to differentiate outcomes between patients operated on early and late. Our outcomes are more favourable than those reported by our own unit in previous studies solely of outcome after CES,⁴ and comparable to others. There are clearly some patients included in this study that had back pain without sphincter disturbance or sensory loss; despite the finding of a large central disc prolapse on MRI, they cannot be classed as true CES patients, and are more likely to have a good outcome. Many of our patients with sphincter disturbance will have had hesitancy rather than full painless retention with overflow and, as such, will again probably have a better outcome according to previous arguments.^{5,6}

Some recent studies and meta-analyses have suggested that early decompressive surgery is likely to be of benefit in CES.^{1,2} This debate will probably never be fully resolved. However, the practicalities of making an early diagnosis in

these patients and the availability of surgical provision means that there is commonly an appreciable delay between onset of symptoms and surgery, some of which will be a consequence of healthcare logistics within the UK and some which will relate to delayed patient presentation to either general practice or the emergency department. Once these patients present, a decision on the emergent nature of the problem needs to be made.

Our data show that, within a neurosurgical unit with a large catchment, very few patients undergo interhospital transfer for diagnosis and treatment within the same out-of-hours period. There are a greater number of patients that undergo emergency surgery after being referred with a diagnostic MRI scan, and a similar group that undergo emergency MRI with a positive finding that then have their surgery delayed until the next available list; these are probably a group without true cauda equina syndrome. The principle of delaying surgery until day-light hours probably reflects the growing adherence to The National Confidential Enquiry into Perioperative Deaths' guidelines relating to avoiding 'on-call' surgery unless delay would result in severe harm, coupled with the uncertainty over the true value of immediate decompression in CES patients.⁹

Conclusions

The present data attempt to offer guidance to the appropriate management of the patient referred to the UK neurosurgery unit without diagnostic MRI, out of normal working hours. Assuming MRI will be required, it may be appropriate to advise the referring department to perform the scan themselves early the next morning, with a view to expeditious transfer for surgery depending on the outcome, given the knowledge that these patients are most unlikely to undergo MRI and surgery the same night of their transfer. Alternatively, patients may be transferred with a view to scanning the next morning prior to the start of a theatre list. Only those patients with a very short history of symptoms,

perhaps less than 12 h, should be considered for same-night transfer with a view to MRI and immediate surgery, as this group of patients would otherwise undergo an avoidable delay out of proportion to the delay in their presentation. Those patients with a more delayed presentation may perhaps be considered for an 'in-hours' approach to diagnosis and management.

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