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ORIGINAL ARTICLE

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Incidental durotomy in lumbar spine surgery: incidence and management

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Abstract There is increasing awareness of the need to inform patients of common complications that occur during surgical procedures. During lumbar spine surgery, incidental tear of the dural sac and subsequent cerebrospinal fluid leak is possibly the most frequently occurring complication. There is no consensus in the literature about the rate of dural tears in spine surgery. We have undertaken this study to evaluate the incidence of dural tears among spine surgeons in the United Kingdom for commonly performed spinal procedures. Prospective data was gathered for 1,549 cases across 14 institutions in the United Kingdom. The results give us a baseline rate for the incidence of dural tears. The rate was 3.5% for primary discectomy, 8.5% for spinal stenosis surgery and 13.2% for revision discectomy. There was a wide variation in the actual and estimated rates of dural tears among the spine surgeons. The results confirm that prospective data collection by spine surgeons is the most efficient and accurate way to assess complication rates for spinal surgery.

Keywords Complication rates · Incidental durotomy · Lumbar spine surgery

Introduction

Incidental tear of the dural sac and subsequent cerebrospinal fluid leak is possibly the most frequent intraoperative complication of lumbar spine surgery. The current literature reports a wide variation in rates of dural tears in spine surgery. It is also well-known that the rate varies with surgical procedure, with revision procedures having the highest rates. The reported incidence varies from as low as 1% to as high as 17% in series ranging from 5 to 450 patients.

In one study looking into medicolegal aspects of spine surgery [4], 146 malpractice cases were reviewed and incidental durotomy was the second most frequent complication in such cases. They suggested that incidental durotomy cannot be considered an entirely benign event. Patients in this study reported alleged complications or sequelae secondary to dural tears. Previous studies have shown that potentially serious problems such as pseudomeningocele, CSF fistula formation, meningitis and arachnoiditis with subsequent chronic pain are all related to dural tears and CSF leakage after spinal surgery. Another study [1] looking at the long-term results of spine surgery complicated by unintended incidental durotomy found that if recognised and repaired intraoperatively there is no increase in peroperative morbidity and long-term results of surgery are not compromised.

The lack of consensus in the literature and the potentially serious nature of this complication prompted us to further evaluate its incidence and management among spine surgeons. The patient benefit of this study was to establish a baseline of incidence and allow some comparison of the relative risk of procedures for the purpose of improved informed consent.

Methods

Members of the British Association of Spine Surgeons were invited to submit figures for frequency of incidental durotomy during commonly carried out procedures. The study was questionnaire-based (see the ''Appendix''), and each spinal surgeon was also asked if the data were accurate or estimated and how they managed dural tears.

The data were then analysed, and the dural tear rate for the various procedures was calculated. It was then possible to undertake a comparison between accurate data and estimated data. The management of dural tears was also compared among the spine surgeons.

Results

We invited all 121 members of the British Association of Spine Surgeons to participate; 26 surgeons replied, which is a poor response rate. There were 4,542 index cases, as a result of voluntary returns by the 26 surgeons with practices across the United Kingdom. Accurate data were only available for 1,549 cases. This was because only 14 surgeons had prospectively acquired data. Eleven surgeons estimated their cases and complications, and one surgeon freely admitted to guessing. Table 1 shows the rate of dural tears for commonly performed spinal procedures with level 2 prospectively gathered data.

All surgeons were within two standard deviations of the mean.

Those surgeons who estimated or guessed their figures for the same case mix were optimistic. Their estimates for the rate of dural tears are summarised in Table 2.

Management of dural tears

The management of intraoperative incidental durotomy was also requested. Replies were received from 24 surgeons. A total of 58% used prolene to repair the defect, 30% used a different stitch and 12% did not repair the dura.

Table 1 Prospective results of 1,549 cases, showing rates of dural tears for common spinal operations

Operation	Index cases	Dural tears	Percentage
Primary discectomy	872	31	3.5
Revision discectomy	106	14	13.2
Spinal stenosis	571	48	8.5

Table 2 Estimated rates of dural tears for common spinal operations

Operation	Index cases	Dural tears	Percentage
Primary discectomy	1,574	15	0.95
Revision discectomy	136	8	5.9
Spinal stenosis	1,293	33	2.6

When asked if a drain was used, five always used a drain, three sometimes used a drain, and six never used a drain. Bed rest was advocated for between 2 and 5 days by 18 surgeons while only one surgeon did not advocate bed rest. Twelve always used antibiotics, one never did, and five varied their practice.

Discussion

This study shows the rates of dural tears for commonly performed spinal operations were 3.5% for primary discectomy, 8.5% for spinal stenosis surgery and 13.2% for revision discectomy. These figures are comparable to those in the literature, where reported rates of incidental durotomy range from 3.1% after decompression for stenosis in one study [3] to 13% in another study [10]. The incidence for postdiscectomy dural tears also varies from as low as 1% [10] to 7.1% [9]. For revision spine surgery the rates are higher, ranging from 8.1% [3] to 17.4% [9].

Standard textbooks on spinal surgery have anecdotal references to the complication of dural tear, giving no baseline data on prevalence [6, 8].

The rates of incidental durotomy reported in the literature vary considerably, and this study has results that give a general guideline to data on the general spinal specialist in the United Kingdom. By collating prospective data from 14 spine surgeons we were able to submit figures for 1,549 cases. This study has highlighted a potential pitfall when analysing evidence to gain a complication rate for a particular spinal procedure. The results for prospectively gathered data (level 2 evidence [7]) as reported in this study (Table 1) are much closer to figures reported in the literature. They give us a baseline rate of dural tears among spinal surgeons which can be used for comparing complication rates and benchmarking. There is also useful information that can be incorporated in informed consent for patient benefit. The inaccuracy of the estimated figures (Table 2) for dural tears is self-evident from our results. The figures obtained in such a way do not correlate at all with figures reported in the literature and highlight the danger of anecdotal reporting.

The method of repair and subsequent management of patients with incidental durotomy has also been reported extensively in the literature. Various methods

have been suggested but the main aim is to expose and visualise the tear and then repair it with a nonabsorbable suture. The use of drains is controversial, and there seems to be no clear consensus in the literature, with some authors suggesting a drain is unnecessary [2] and others reporting the use of a drain in all cases of dural tear [10]. Camissa et al. [3] report their use of subfascial drains is dependent on the procedure performed as well as the degree of intraoperative blood loss. They suggested that size of the durotomy, quality of repair and tissue quality are all factors they used in decisions regarding the use of drains.

The use of postoperative bed rest, which was advocated by 18 out of 26 surgeons in this study, has been evaluated previously by one study [5]. The authors found that mandatory bed rest was not necessary for patients who had repair of a dural tear intraoperatively. They found that 75% of those treated without bed rest were asymptomatic postoperatively. The remainder were instructed to rest if they were symptomatic. By allowing the patients to ambulate postoperatively after repair of the durotomy, the authors argued that a substantial saving in terms of hospital stay could be achieved. The main limitation of this study was that it was a retrospective review of only 20 cases.

This study has also highlighted the difficulties encountered when surgeons do not keep accurate data with regard to complication rates. With clinical governance now becoming a significant part of everyday surgical practice, it is essential for spine surgeons to keep accurate data regarding complication rates. This will allow comparisons between surgeons and will improve management of patients by highlighting any significant discrepancies.

Limitations of the present study were that the time frame was not defined; it is possible that some surgeons deliberately selected a time interval with no tears occurring. These figures should also be interpreted cautiously as no independent validation has been undertaken.

Conclusion

This study has shown that prospectively gathering data is the most efficient and accurate way to assess complication rates for spinal surgery. Estimating rates can result in inaccurate figures, therefore unless data is prospectively gathered a true complication rate for spinal procedures cannot be known. The prospective data in this study can be used as a baseline for the rate of dural tears in commonly performed spinal procedures.

Appendix

BRITISH ASSOCIATION OF SPINE SURGEONS

AUDIT OF DURAL TEARS 2002

Discectomy - Revision Discectomy - Spinal Stenosis

Please complete this audit sheet to the best of your ability. The accuracy of data is important but we recognise that not everyone has a database for easy recall. A dural tear is where there is free CSF seen, or a dural leak is subsequently apparent. Comments would be helpful and the way you deal with them would also be of interest.

NAME ..... HOSPITAL .....

Neurosurgeon/Orthopaedic surgeon *(delete as applicable)*

Primary discectomy

Number of index cases ..... No. of dural tears .....

Do you use a microscope for these? YES/NO

Revision discectomy

Number of index cases ..... No. of dural tears .....

Spinal stenosis

Number of index cases ..... No. of dural tears .....

These figures are accurate as I keep a prospective database YES/NO

These figures are estimates of numbers of cases carried out YES/NO

I have guessed as I have no way of recording what occurs YES/NO

My method of dealing with a dural tear is as follows: (please include type of suture material, drain or not, bedrest or not, antibiotics and mobilisation plan)

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