**Why are neurosurgeons sued? A single-centre, half-decade review.**

Yagmur Esemen a\*, Abteen Mostofi a , Matthew J. N. Crocker a, Erlick A. C. Pereira a,

aDepartment of Neurosurgery, Atkinson Morley Wing, St George’s Hospital, London, SW17 0QT, UK.

Correspondence to: Yagmur Esemen\*, Neurosurgery ST1, Department of Neurosurgery, Atkinson Morley Wing, St George’s Hospital, London, SW17 0QT, UK. E-mail: [yagmur.esemen@nhs.net](mailto:yagmur.esemen@nhs.net). Mobile: 08923417055.

Abteen Mostofi, Neurosurgery Registrar, Department of Neurosurgery, Atkinson Morley Wing, St George’s Hospital, London, SW17 0QT, UK. E-mail: [a.mostofi@nhs.net](mailto:a.mostofi@nhs.net).

Matthew J. N. Crocker, Neurosurgery Consultant, Department of Neurosurgery, Atkinson Morley Wing, St George’s Hospital, London, SW17 0QT, UK. E-mail: [mjncrocker@googlemail.com](mailto:mjncrocker@googlemail.com).

Erlick A. C. Pereira, Neurosurgery Consultant, Department of Neurosurgery, Atkinson Morley Wing, St George’s Hospital, London, SW17 0QT, UK. E-mail: [dr.eacp@gmail.com](mailto:dr.eacp@gmail.com).

Why are neurosurgeons sued? A single-centre, half-decade review.

The burden of medicolegal claims in neurosurgery is increasing in the UK. Trepidation associated with malpractice claims has the potential to negatively impact surgical practice and patient safety. What are the causes of these claims and can we address them? The aim of this study was to identify the incidence and total burden of litigation claims related to neurosurgery in a London tertiary centre.

We retrospectively reviewed all consecutive cases of claims in neurosurgery that were reported to NHSR between March 2013 and April 2018 by St George’s Hospital legal department. This was an extension of previous study by Mukherjee et al., who studied the medicolegal claims in our institution in the preceding nine-year period (2004-2013). There were 18 litigation claims against neurosurgery. Claims were reviewed for clinical event, cause, likelihood of pay-out and legal outcome.

Eleven claims were settled in court and seven were settled without court proceeding. All claims were spinal cases, 56% emergency admissions. Causes included faulty surgical technique (39%), delayed treatment (33%), delayed diagnosis/misdiagnosis (17%) and lack of information (11%) with a likelihood of financial success of 43%, 67%, 33% and 100% respectively. The highest median pay-outs were for lack of information (£2.8 million) and faulty surgical technique (£1 million).

When compared to the preceding nine-year period, there a modest reduction in claims per year, despite an increase in workload. Distribution of litigation causes remained similar but overall financial burden was higher.

Spinal surgery has the highest malpractice claim risk in neurosurgical practice. Our review shows that faulty surgical technique is the leading cause of neurosurgical claims. Claims against lack of information, although less frequent, resulted in highest median pay-out. This study reinforces previously published data that good surgical technique and thorough process of informed consent may reduce litigation in neurosurgery.

Keywords: litigation; neurosurgery; payout; legal outcome; malpractice claims

**Introduction:**

Litigation is a significant and increasing burden on the National Health Service (NHS) where estimated medical claim inflation is currently running at 10% per year (1). Neurosurgery is no exception. National Health Service Resolution (NHSR) data shows that neurosurgery claim frequency is increasing. Between 2018 and 2019, there were 200 neurosurgical claims costing £133 million (2).

Rising medicolegal claims are not only a national economic toll but also impose a psychological burden upon surgeons. With increasing frequency and cost of negligence claims, fear of litigation has become a constant companion to all medical professionals. Personal consequences of malpractice lawsuits on surgeons’ mental health are detrimental and associated with increased suicidal ideation, depression and reduced job satisfaction (3).

Fear of litigation may affect practice negatively in the hope of lessening medicolegal risk. This leads to defensive medicine and potentially avoidance of high-risk procedures (4). Neurosurgeons are at high risk for allegations of malpractice (5). This is not surprising given the acuity of neurosurgical patients presenting with debilitating and complex pathologies. Neurosurgical procedures often carry high risk of mortality and morbidity including long-term neurological and functional disability. Despite these risks, there is limited published data regarding litigation in neurosurgery. Such information is important to identify areas with highest risk and reduce litigation burden.

Analysis and distribution of claims data is essential for good medical practice and ensures that patients receive the right care the first time. It is a recommendation of the NHS “Getting It Right First Time” (GIRFT) programme that hospitals review negligence claims frequently to improve patient care (6). The aim of this study was to identify the incidence and total burden of litigation claims related to neurosurgery in a tertiary centre in London.

**Methods**:

Our study was carried out as an extension of a previously published study by Mukherjee et al., where neurosurgery claims between 1 March 2004 and 1 March 2013 at St. George’s Hospital were reviewed (7). Our methods and parameters were kept consistent to allow comparison.

We reviewed all consecutive cases of claims in neurosurgery that were reported to NHSR between March 2013 and April 2018 by St George’s Hospital legal department. These included closed and open cases. Case details were provided by our legal department and reviewed with appropriate permission.

Cases were retrospectively reviewed to collect data on clinical event and reason for claim (delayed diagnosis/misdiagnosis, delayed treatment, faulty surgical technique, lack of information, surgical site infection, inadequate follow-up). Faulty surgical technique was defined as avoidable surgical error that failed to meet accepted standard of care. Legal outcome was categorised as settled following court proceedings, settled without court proceedings and currently in-court. Successful claims were further analysed for their cost.

**Results**:

Between March 2013 and April 2018, there were a total of 18 neurosurgery claims. All these claims were in spinal surgery and there were no claims in cranial or peripheral nerve surgery. 56% (10) of these claims were emergency cases.

The majority of the claims were settled in court (11) whereas seven of them were withdrawn or repudiated without court proceedings (Figure 1). Only one claim is still open awaiting court proceedings. Almost all cases taken to court were settled with payment (10).

Figure 1: Legal outcome of all cases of neurosurgery claims (N=18) between March 2013 and April 2018.

Leading causes of claims were faulty surgical technique (39%) and delayed treatment (33%). There were two claims for lack of information (11%) and three claims for delayed diagnosis/misdiagnosis (17%). There were no claims against inadequate follow-up or surgical site infections.

Likelihood of pay-out was the highest for the two claims based on lack of information (100%), followed by the three for delayed treatment (67%). 43% of faulty surgical claims were settled with payment and 33% of claims against misdiagnosis/delayed diagnosis received a pay-out. These results are summarised in Figure 2.

Figure 2: Distribution of successful and unsuccessful neurosurgical claims by cause (N=18). All claims are for spinal cases.

Total pay-out to 10 successful cases was £16 million, with a median pay-out of £191,500. Two claims against lack of information received the highest median pay-out of £2,782,000. The next highest pay-out was for faulty surgical technique with median pay-out of £1,030,000. Lowest median pay-out was for delayed treatment (£173,000) and one successful case for delayed diagnosis was settled for £210,000. Results are summarised in Figure 3.

Figure 3: Median payout and likelihood of success for the causes of litigation.

Faulty surgical technique was claimed in seven cases and main causes were misplaced pedicle screw during spinal fixation causing permanent paraplegia, failure to use spinal cord monitoring during spinal surgery resulting in paraplegia, sinkage of intervertebral cage causing additional pain and dural tear leading to cerebrospinal fluid (CSF) leak. The largest settlement was £8.5 million for inadequate intra-operative monitoring during spinal surgery.

There were two claims against lack of information during the consent process: inadequate disclosure of risks and inadequate discussion of the treatment plan where the patient was consented for a biopsy but underwent intramedullary tumour resection resulting in complications. This case received the second highest settlement with £5.45 million pay-out. There were six claims against delayed treatment: delayed lumbar laminectomy despite progressive cauda equina symptoms, delayed transfer of patient with spinal extradural haematoma from their local hospital, delayed treatment of cauda equina syndrome(3) and delayed treatment of patient with traumatic spinal injury. There were three delayed diagnosis/misdiagnosis related claims: delayed diagnosis of pulmonary embolism (PE) following spinal surgery leading to mortality, misinterpretation of imaging leading to misdiagnosis of cauda equina syndrome and failure to diagnose spinal infection resulting in tetraplegia.

**Discussion**:

Analysis of neurosurgical litigation claims over a 5-year period in the United States of America concluded that neurosurgeons’ risk of being sued is not related to the medical complexity of the case but rather the type of cases the surgeon is involved in. They identified that highest neurosurgical claims were against elective spinal operations (8). This is consistent with the high litigation burden seen in the United Kingdom. Between April 2012 and April 2017, 978 spinal negligence claims were submitted to NHS Resolutions, costing £535.5 million (1). Our study suggests that spinal surgery, specifically in non-elective emergency care, has the highest litigation risk in neurosurgery. Indeed, over a period of five years, all of the neurosurgical litigation claims in our hospital were related to spinal surgery.

Faulty surgical technique was the leading cause of the neurosurgery claims (39%). Although only 43% of these claims led to financial pay-out, cost of settlement was significant with a median pay-out of around £1 million. This is in line with the preceding decade in our centre where faulty surgical technique was the leading cause of spinal claims and led to highest median payment (7).

The highest pay-out in our study was due to failure of using intra-operative neurophysiological monitoring (IONM) during a complex spinal surgery (C7-T2 laminectomy). This is an interesting topic as there is a lack of high-level evidence to validate the efficacy of IONM in spinal surgery (9). Multiple non-prospective studies suggested that IONM use in spinal tumour surgery is associated with significantly better neurological outcomes (10,11). However, this evidence is weaker for cervical decompression surgery. A retrospective study concluded that cervical decompression and reconstruction surgeries can be safely performed without utilizing IONM (12). Lack of evidence-based protocols in the role of IONM in spinal surgery may be leaving the surgeons vulnerable to medicolegal claims.

There were six litigation claims against delayed treatment, four of which were settled with financial payment with a median value of £173,000. Three of these claims were related to management of cauda equina syndrome and one was due to delayed transfer from another hospital. It is clear that neurosurgical practice involves high volume of emergency spinal operations and delay in treatment is an area of high litigation risk.

There were two claims due to lack of information. Interestingly, both of these claims were successful and led to highest median payment. Both cases were related to poor consent process. The largest financial settlement in this category was for a case where the surgical plan was not adequately discussed with the patient. The patient was consented for a biopsy of intramedullary spinal tumour and risks of tumour debulking were not appropriately explained. During the operation, surgeons proceeded to excise the tumour leading to paraplegia. Other studies support that lack of informed consent plays a major role in medical malpractice claims in spinal surgery (1) In a study looking at litigations in cervical spine surgery, lack of consent was the basis for lawsuits in more than half of the claims (13). Analysis of processes of informed consent and in-depth pre-operative discussion are clear targets for intervention to reduce litigation claims in neurosurgery. This is an area of progressive practice where the landmark ruling in the case of Montgomery vs Lanarkshire Health NHS trust cannot be overemphasised in changing the manner in which informed consent may be considered valid.

Diagnosis related claims were multi-factorial. Two cases were due to misdiagnosis of cauda equina syndrome and spinal infection secondary to misinterpretation of imaging. None of these cases ended up with financial settlement. The only successful claim in this category was related to delayed diagnosis of a PE. This was for a patient with co-morbidities who became haemodynamically unstable during an emergency spinal fixation. Surgery itself was otherwise uncomplicated and the patient was taken to intensive care following the operation. Despite clinical suspicion, investigations for PE were delayed overnight. Unfortunately, the patient suffered cardiac arrest and died prior to investigations taking place. Cause of death was confirmed to be PE on post-mortem examination. This case could be reviewed from different perspectives. Delaying diagnostic investigations was likely a multi-disciplinary decision based on risks and benefits of transferring a critically ill patient to a radiology department out-of-hours. The other important consideration for the neurosurgeons is whether the patient could have been investigated more thoroughly preoperatively. If the pulmonary embolism was detected in the pre-operative period, neurosurgical intervention may have been delayed.

**Table 1:** Distribution of litigation claims in neurosurgery in our organisation over a period of 14 years. Current study findings are compared with that of Mukherjee at al., 2014. Causes of claims shown with likelihood of success of each claim in parantheses.

|  |  |  |
| --- | --- | --- |
|  | Mukherjee et al. | Current Study |
| Time Period | 2004-2013 | 2013-2018 |
| Cases | 42 (28 spine, 13 cranial, 1 peripheral nerve) | 18 (all spinal) |
| Mean cases per year | 4.2 cases/year | 3.6 cases/year |
| Faulty Surgical Technique | 43 % (39%) | 39% (43%) |
| Delayed Diagnosis /Misdiagnosis | 17% (29%) | 17% (33%) |
| Lack of Information | 14% (17%) | 11% (100%) |
| Delayed Treatment | 12% (20%) | 33% (67%) |
| Highest Pay-out | £230,000 | £2.78 million |

Interesting comparisons shown in Table 1 can be made between our study and that of Mukherjee et al., who studied the medicolegal claims in our institution in the preceding nine-year period from 2004-2013 (7). Between March 2004 and March 2013, they identified 42 claims against neurosurgery: 28 spinal, 13 cranial and one peripheral nerve related. Most common causes of litigation were faulty surgical technique (43%), delayed diagnosis/misdiagnosis (17%), lack of information (14%) and delayed treatment (12%), with a likelihood of success of 39%, 29%, 17% and 20% respectively (7). In comparison, between March 2013 and April 2018, there were 18 claims and all of them were in spinal surgery. There is a modest reduction in claims per year, 4.2 vs 3.6, despite an increase in workload over this fourteen year period. Interestingly, the distribution of litigation causes remained similar; faulty surgical technique (39%), delayed diagnosis/misdiagnosis (17%), lack of information (11%) and delayed treatment (33%), with a likelihood of success of 43%, 33%, 100% and 67% respectively. We observed increased frequency of claims related to delayed treatment. In the current cohort, claims against lack of information and delayed treatment were more likely to lead to financial pay-out compared to years previously. Finally, highest median pay-out was significantly higher in our cohort (£2.78 million) compared to previous years (£230,000) (7) reflecting a 12-fold increase in just seven years. Decrease in the overall number of claims especially in cranial and peripheral nerve surgery might be due to increased awareness created from to the initial publication. The median pay-out far outperforms inflation rates and suggests a culture of higher values attributes to settlements, but also may be due to severity of the claim causes. Although the number of claims were smaller, the overall financial burden was higher.

One important limitation of our study is the small number of claims recorded in our institution. Although our neurosurgical department is a comprehensive one offering all subspecialties including paediatrics, part of a level-1 major trauma centre and a metastatic spinal cord compression spinal hub, the findings of this study may not represent the distribution of cases in other neurosurgical units. In the future, it would be desirable to carry out a multi-centre review of all neurosurgical claims across the UK.

**Conclusion**:

Surgeons must learn from previous clinical negligence claims in order to improve safety and quality of patient care. This requires an open communication and frequent review of these claims. Our study shows that faulty surgical technique is the leading cause of neurosurgical claims. Claims against lack of information, although less frequent, can result in high financial settlement. This study reinforces previously published data that good surgical technique and thorough process of informed consent can reduce litigation claims in neurosurgery (7).

Funding Details: There is no external funding involved in this study.

Disclosure of Interest: The authors report no conflict of interests to declare.

**References**:

1. Machin JT, Hardman J, Harrison W, Briggs TWR, Hutton M. Can spinal surgery in England be saved from litigation: a review of 978 clinical negligence claims against the NHS. European Spine Journal. 2018 Nov 27;27(11).

2. Great Britain. National Health Service. Litigation Authority. NHS Resolution Annual report and accounts 2019/20.

3. Balch CM, Oreskovich MR, Dyrbye LN, Colaiano JM, Satele D v., Sloan JA, et al. Personal Consequences of Malpractice Lawsuits on American Surgeons. Journal of the American College of Surgeons. 2011 Nov;213(5).

4. Nahed B v., Babu MA, Smith TR, Heary RF. Malpractice Liability and Defensive Medicine: A National Survey of Neurosurgeons. PLoS ONE. 2012 Jun 22;7(6).

5. Jena AB, Seabury S, Lakdawalla D, Chandra A. Malpractice Risk According to Physician Specialty.

6. Mike Hutton. GIRFT Programme National Specialty Report. 2019 Jan.

7. Mukherjee S, Pringle C, Crocker M. A nine-year review of medicolegal claims in neurosurgery. Annals of the Royal College of Surgeons of England. 2014;96(4):266–70.

8. Rovit RL, Simon AS, Drew J, Murali R, Robb J. Neurosurgical experience with malpractice litigation: an analysis of closed claims against neurosurgeons in New York State, 1999 through 2003. Journal of Neurosurgery. 2007 Jun;106(6).

9. Charalampidis A, Jiang F, Wilson JRF, Badhiwala JH, Brodke DS, Fehlings MG. The Use of Intraoperative Neurophysiological Monitoring in Spine Surgery. Global Spine Journal. 2020 Jan 6;10(1\_suppl).

10. Harel R, Schleifer D, Appel S, Attia M, Cohen ZR, Knoller N. Spinal intradural extramedullary tumors: the value of intraoperative neurophysiologic monitoring on surgical outcome. Neurosurgical Review. 2017 Oct 27;40(4).

11. Sala F, Palandri G, Basso E, Lanteri P, Deletis V, Faccioli F, et al. Motor Evoked Potential Monitoring Improves Outcome after Surgery for Intramedullary Spinal Cord Tumors: A Historical Control Study. Neurosurgery. 2006 Jun 1;58(6).

12. Traynelis VC, Abode-Iyamah KO, Leick KM, Bender SM, Greenlee JDW. Cervical decompression and reconstruction without intraoperative neurophysiological monitoring. Journal of Neurosurgery: Spine. 2012 Feb;16(2).

13. Epstein NE. A Review of Medicolegal Malpractice Suits Involving Cervical Spine. Journal of Spinal Disorders & Techniques. 2011 Feb;24(1).