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ORIGINAL RESEARCH

Documentation of spinal anaesthesia technique and block level at caesarean section at a secondary-level obstetrics hospital in South Africa

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Background: The ease of administration and relative safety of spinal anaesthesia have made this the preferred technique for both elective and many emergency caesarean sections. Complications include incomplete sensory block, resulting in intraoperative breakthrough pain, which is commonly associated with a successful medicolegal claim. If documentation of the spinal anaesthesia technique was found to be inadequate during the course of the medicolegal proceedings, it is likely that the decision would be against the anaesthetist. The purpose of this study was to evaluate documentation by anaesthetists relating to the establishment of surgical anaesthesia utilising subarachnoid block.

Methods: A retrospective folder analysis was conducted at Mowbray Maternity Hospital in Cape Town, South Africa. One hundred consecutive spinal anaesthesia charts, each completed by a different anaesthetist, either a registrar or specialist, were analysed. Starting from 31 December 2018 and proceeding retrospectively in time, charts were included until the desired sample size was achieved.

Results: Of the 100 cases of spinal anaesthesia for caesarean section analysed, 68 were emergency and 32 were elective operations. Following a literature review, 12 variables were identified that required documentation so that adequate information would be available in the event of medicolegal action. Of these variables, 7 and 8 were recorded in 23% and 32% of the charts, respectively. Ninety per cent of the anaesthesia charts had inadequate documentation, defined as information on fewer than 10 of the specified variables.

Conclusion: The quality of documentation of both the procedure and block level during spinal anaesthesia for caesarean section was inadequate. National guidelines should be drafted and standardised to improve the quality of these records, both for quality of care and medicolegal purposes.

Keywords: spinal anaesthesia, caesarean section, documentation

Introduction

The ease of administration and relative safety of spinal anaesthesia (SA) have made it the preferred technique for both elective and most emergency caesarean sections (CS). Complications include incomplete sensory block, resulting in intraoperative breakthrough pain, which is commonly associated with successful medicolegal claims. It has been stated by Russell[1] that "if a block fails in mid-surgery, even with cold or pinprick level at or above T4, and there is no assessment indicating an adequate level of block to touch preoperatively, then difficulties for the anaesthetist lie ahead should litigation ensue".

In resource-limited environments, there is a paucity of published literature on assessment of the adequacy of spinal block, or litigation in this regard. In the UK, data from the National Health Service Litigation Authority (NHSLA) indicates that pain during CS under neuraxial anaesthesia is the most common negligence claim against obstetric anaesthetists. This represented 3.8% of all successful obstetric claims (anaesthesia and non-anaesthesia related) submitted to the NHSLA.[2] Furthermore, Szypula et al.[3] have reported that of the 366 claims related to regional anaesthesia and analgesia (both obstetric and non-obstetric), 63 (17%) were for inadequate block during CS and labour. This accounted for 31% of all obstetric anaesthesia-related claims.[3] Further analysis of the NHSLA database indicates that in 42% of cases, surgery was allowed to start before a satisfactory sensory block was established. Furthermore, in 15% of cases the patient denied that any testing of the sensory block was carried out prior to skin incision.[2]

From 1990–2003, claims for minor maternal complications like headache, back pain, pain during surgery and emotional stress represented 28% of the total number of claims for obstetric anaesthesia.[4] Unfortunately, data specifically regarding pain during CS were not reported. In the USA, data from the ASA Closed Claims Project during the 1980s and 1990s indicated that 17% of all obstetric neuraxial anaesthesia claims were due to inadequate analgesia. This included spinal and epidural anaesthesia during labour and CS.[5] The analysis by Chadwick[6] of the ASA Closed Claims Project database revealed that pain during anaesthesia for CS accounted for 11% of all the obstetric anaesthesia-related claims. The specific neuraxial technique was not specified. A central theme from these claims was the reluctance of the anaesthetist to accept block failure and convert to general anaesthesia.

The purpose of this study was to evaluate documentation relating to the establishment of surgical anaesthesia employing SA for CS. We hypothesised that documentation of SA for CS at

Mowbray Maternity Hospital (MMH), a secondary-level facility in Cape Town, South Africa, is inadequate.

Methods

A retrospective folder analysis was conducted at MMH. Women of all ages presenting for either elective, or urgent or emergency CS under SA were included, whether or not supplementation with intravenous agents or conversion to general anaesthesia were subsequently required. The only exclusion criterion was missing anaesthesia notes. After consulting the theatre records at MMH, 100 consecutive SA charts, each completed by a different anaesthetist, either a registrar or specialist, were analysed. Starting from 31 December 2018 and proceeding retrospectively in time, charts were included until the desired sample size was achieved.

After conducting a literature review, 12 variables that contribute to patient safety and comfort were identified that required documentation. In addition, should medicolegal action arise, all of the following information should be available:

1. Report of an aseptic technique
2. Needle type, gauge and length
3. Lumbar vertebral level at which the dura was punctured
4. Number of passes of the needle at each level attempted
5. Experience of paraesthesia
6. Clear cerebrospinal fluid (CSF) flow after dural puncture
7. Local anaesthetic and dose administered
8. Opioid and dose administered
9. Method used for testing the block
10. Dermatomal level of sensory block
11. Adequate surgical anaesthesia, or intervention if SA was inadequate, including unilateral block
12. Documentation in recovery area of ability to lift the legs, or dermatomal level of sensory block

In addition, the following information was also captured on the case report form:

- Degree of urgency of the CS
- Date and time of anaesthetic
- Level of experience of the anaesthesia provider
- Patient age
- Time intervals: SA to skin incision time, SA to uterine incision time, SA to skin closure

The primary outcome was the proportion of anaesthesia records demonstrating inadequate documentation of required information, defined as fewer than 10 of the 12 variables listed above. Secondary outcomes included a description of the proportion of records omitting a number of these factors. In addition, a comparison was made of the number of required variables documented by registrars and specialist anaesthetists.

Statistical analysis

Sample size calculation

The expected proportion of inadequate documentation of required information relating to the technique and block height during SA for CS, was estimated at 80%. A sample size of 100 patients was calculated with 95% confidence that the true proportion of inadequate documentation would lie between 72.5% and 87.5%.

Data analysis

The data analysis was conducted by the University of Cape Town Statistical Consulting Service using Stata/IC 16.1 software (StataCorp 2019; College Station, TX: StataCorp LLC). Descriptive statistics were used to analyse data. This is presented as mean (standard deviation), or median (interquartile range). Correlation was analysed using Pearson's chi-square test and, in some instances, Fisher's exact and 1-sided Fisher's exact tests.

Results

The anaesthesia charts of 100 patients receiving SA for CS were analysed. The subarachnoid space was identified in every case. There were 68 emergency and 32 elective operations. Daytime emergency cases (07h30–19h00) were more common than after-hours cases (19h00–07h30) with 40 and 28, respectively. Only one anaesthesia chart included information on all 12 variables required. Of the 12 variables, 7 or 8 variables were recorded in 23% and 32% of the charts, respectively (Figure 1), and 90% of the charts had inadequate documentation.

The bupivacaine dose was recorded in 98% of the cases (10 mg in 80%), and fentanyl in 97% (10 µg in 91%). The reporting of the use of an aseptic technique was omitted in 5% of cases. The needle type was reported in 78% of the cases (atraumatic in all cases), the needle gauge in 85%, and the length in 12%. The vertebral level was reported in 89% of the cases – 66% reported L3/4, 21% reported L4/5, and 2% reported L2/3. The number

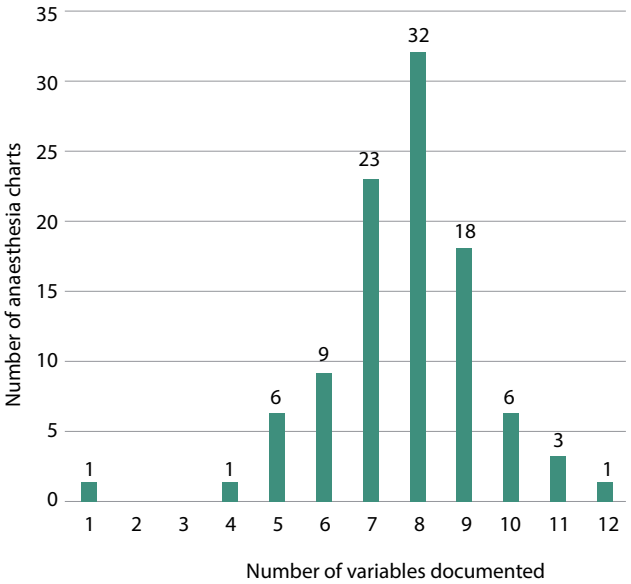

Figure 1: Quality of documentation on anaesthesia charts

Table I: Level of experience and documentation of the preoperative sensory block height

Experience	Total cases (%)	Block height not specified	
Registrar	80	54/80 (67.5%)	
Specialist	20	15/20 (75%)	*p = 0.360
All providers	100	69/100 (69%)	

*p-value for comparison between registrars and specialists

Table II: Level of qualification and documentation of modality used for testing sensory block level by registrars and specialists

Qualification	Total cases (%)	Modality not specified	
Registrar	80	71/80 (88.75%)	
Specialist	20	17/20 (85%)	*p = 0.45
All providers	100	88/100 (88%)	

*p-value for comparison between registrars and specialists

of attempts was specified in 60% of cases. Failure to document sensory dermatomal block height at the start of surgery is shown in Table I. In four cases, the block height was tested on both sides and in one of these patients a difference in block height was documented.

In 31% of the cases, the block height was specified. Failure to document the testing modality occurred in 88 of the cases (Table II). Loss of sensation to cold, using ethyl chloride spray, was recorded in 6% of the cases.

The documentation of block height in the recovery area, usually by the attending nurse, was recorded in a significantly higher proportion of patients than in the operating theatre – 68% vs 31%, $p = < 0.001$. There was no difference in the proportion of documentation of block height in the recovery area for patients having either elective or emergency CS (75.8% vs 71.9%, $p = 0.45$).

Intraoperative supplementary analgesia was reported in six cases, all post-delivery, and general anaesthesia was required for one. Opioids were given post-delivery to all these patients; two received midazolam and one received ketamine. Supplementation was reported in 9.3% of the elective cases and in 5.9% of the emergency cases ($p = 0.4$).

In cases requiring intraoperative supplementation, five of the seven anaesthesia charts indicated the level of sensory block in the recovery area. In two of the five, the reported block height was above the T6 dermatome, and in three of the five, at or below the T7 dermatome. The lowest reported dermatomal level was T10, following a CS with a duration of 150 minutes.

Discussion

This retrospective analysis of the documentation of SA for CS showed that insufficient information was recorded on the majority of charts. Given that this study was conducted at a designated obstetrics hospital among a group of senior clinicians who probably perform better than the average medical officer, the findings may underestimate the extent of this problem. Such poor documentation could both impact upon patient safety and have medicolegal consequences in the event of litigation concerning complications relating to SA. The major issues are poorly managed pain during surgery, and neurological injury.[2,7,8] A large proportion of anaesthesia providers only reported on 8–9 of the 12 variables regarded as essential information by the authors. Most did not report the block height achieved prior to surgery or the modality of sensory testing. There was no mention of any sensory modality other than cold, and only a small proportion reported any details of motor block.

Pain during operative delivery under SA is the most common cause of successful litigation in obstetric anaesthesia in the United Kingdom. In 56 of 76 (74%) cases in 21 years, McCombe and Bogod[2] assessed anaesthesia practice as negligent. It is, therefore, of great importance that the anaesthetist records the block level accurately, as well as any associated breakthrough pain and its management. This is both to ascertain that the patient is comfortable, and to ensure there is adequate documentation should litigation ensue. Reliable prediction of surgical anaesthesia may be challenging. It is generally accepted that blockade of cold sensation to a level above the T5 dermatome is required, since this is the spinal cord level at which sensory afferent fibres exit the peritoneal cavity via the greater splanchnic nerve. By convention, three modalities are regularly used to test loss of sensation during SA for CS, namely cold, light touch and pain associated with pinprick. Most general and obstetric anaesthesia textbooks do not specify which sensory modality should be used when performing testing before skin incision.[9] This indicates that there is currently no single gold standard. Loss of sensation to light touch *appears* to be the best predictor of adequate surgical anaesthesia, but this has not been agreed upon by obstetric anaesthetists,[1,10-12] and assessment of block height using a single modality such as touch may erroneously indicate adequate anaesthesia for CS.[13] Therefore,

Table III: Documentation of specific aspects of spinal anaesthesia in published audits

Authors	Sensory dermatome level blocked (%)	Testing modality (%)	Laterality (%)	Intraoperative comfort (%)
Miu & Paech[23]	72	71	57	20
Karuppudayar & Sharih[24]	87	58	NR	12
Kurup et al.[25]	87	54	NR	33
Gorton et al.[26]	85	NR	NR	63
Uppugonduri et al.[27]	75	53	45	3

Numbers indicate percentage of charts documenting the individual aspect of the practice of spinal anaesthesia; NR – not recorded

though controversial, many authors have suggested that more than one modality should be tested during SA for CS. In a UK national survey of the practice of obstetric anaesthetists, the majority of providers tested more than one modality, with cold being the most commonly tested.[14] In general, providers were satisfied if the sensory block to cold and pinprick was to T4, and touch to T5. Interestingly, the proportion of anaesthesia providers that did not test the block height decreased significantly in the 2010 survey compared to the previous survey done in 2004. This could be a reflection of the medicolegal climate in the UK, and the high incidence of successful litigation for pain during CS.[2,3]

There are many challenges and discrepancies in the testing of block height. For example, the blockade of a testing modality is not 100% at one dermatome and 0% at the adjacent dermatome – a transitional zone exists.[15] There are also differences in interpretation of block height dependent on individual practitioners.[12,14] Additional challenges include the finding that after injection of local anaesthetic into the subarachnoid space, sensory blockade of touch, cold and pinprick, develops at different levels. The dermatomal level of sensory blockade to light touch is lower than that of cold and pinprick. Furthermore, the sensory blockade to touch is the last to be established and the first to regress after a single injection of local anaesthetic.[16] The average difference between dermatomal levels blocked for the modalities of cold, pinprick and light touch sensation is only one or two, but because of inter-individual variability in patients and practitioners, this difference can be up to ten dermatomes.[12,17-21]

Despite the above difficulties in the exact interpretation of dermatomal block height, it was concerning that this aspect of practice was so poorly documented in this study. In a descriptive, observational cross-sectional study done in KwaZulu-Natal in 2016, overall only 56% of anaesthesia providers, and only 59% of specialists, reported routine testing of the level of SA, with considerable variation in the modality tested.[22] The data, however, were derived from self-reported questionnaires completed by correspondents, and does not reflect actual documentation of adequacy of block as in our study, in which only 31% of anaesthesia providers document sensory block height.

Literature on the documentation of an adequate spinal block level is sparse. Most hospitals in the UK use specific anaesthesia charts designed for a particular hospital. Audits on the quality of documentation during regional anaesthesia for CS are listed in Table III.[23-27] A guideline by Plaat et al.[28] published in 2022, largely based upon UK experience, outlines an approach to the prevention and management of intraoperative pain during CS under neuraxial anaesthesia. Recommended documentation is also described in detail, and the guideline includes a brief description of potential context-sensitive differences in requirements for documentation in low- and middle-income countries.[28]

It is clear that there were many aspects of our audit in which the documentation was poor in comparison to these international audits. This may reflect time constraints in the pressurised environment of a high turnover obstetrics unit. In an audit of obstetric anaesthesia records by Olateju et al.[29] performed in Nigeria in 2012, the block height and quality of spinal block were evaluated before and after a lecture on obstetric anaesthesia record-keeping. Block height was poorly recorded both before and after the lecture (0% vs 69%). The documentation of the quality of the block, however, was better recorded after the lecture (52% vs 99%). No mention was made of the modality used to test the efficacy of SA. Such educational endeavours may be of value in the improvement of overall knowledge and documentation of SA for CS in South Africa. Context-specific guidelines are required providing the minimum standards of practice with respect to documentation during this procedure.

Conclusion

The quality of documentation of both the technique and block level during SA for CS was inadequate in this audit of practice at MMH, a secondary-level dedicated obstetrics hospital in Cape Town, South Africa. National guidelines should be drafted and standardised to improve the quality of these records, in order to improve patient care and for medicolegal purposes.

Conflict of interest

The authors declare no conflict of interest.

Ethical approval

Ethics approval was obtained from the Human Research Ethics Committee of the Faculty of Health Sciences of the University of Cape Town (HREC 409/2018).

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Appendix available online.