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SHORT REPORT

Nervous breakdown! A registry of nerve blocks from a South African emergency centre

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ABSTRACT

Introduction: Nerve blocks are commonplace in the operating theatre and have recently made their way into emergency centres as a viable alternative to traditional methods of analgesia. Their use and safety has been documented for a variety of pathologies and it has been shown that they spare opioids and shorten time to discharge. No data exists on their use in South Africa. The purpose of this study was to analyse data from an existing nerve block registry from an emergency centre in South Africa.
Methods: The study was a retrospective, descriptive analysis of a nerve block registry from an academic emergency centre in Johannesburg, South Africa from May 2016 to September 2017.
Results: There were 168 nerve blocks performed by 36 different operators of varying experience. The most common indication was for fracture management and the most frequently performed blocks were femoral 3-in-1 (44.6%), pop-sciatic (16.7%) and forearm-ultrasound nerve blocks (16.7%). Ultrasound guidance was used in 88.6% of the blocks. The average time taken to perform a nerve block was 10 min. The success rate was 91.8%. None of the variables analysed (i.e., operator experience, type of nerve block performed, time taken to perform the nerve block, ultrasound guidance, amount of anaesthetic used and time taken to evaluate outcome) had any effect on the success rate.
Conclusion: This study illustrates the use of nerve blocks as an effective, safe and timeous analgesic solution to a wide variety of musculoskeletal injuries in an academic emergency centre in South Africa.

African relevance

- Pain is a common and often neglected complaint in emergency centres.
- Nerve blocks are an effective alternative to traditional methods of analgesia, reducing time to discharge in often overcrowded emergency centres.
- The routine use of nerve blocks is not yet commonplace in African emergency centres.

Introduction

Regional anaesthesia in the form of peripheral nerve blockade provides an elegant answer to the frequent complaint of musculoskeletal pain in the emergency centre (EC).

Small studies have proven peripheral nerve blocks to be superior to opioids in the control of musculoskeletal pain in many respects; they achieve a greater level of analgesia with a longer duration of action and have also shown to reduce patient time spent in the EC [1,2].

Despite these advantages, the concept is still a relatively new one in developing countries. A review of the literature has revealed little data on the use of nerve blocks in the EC in Africa.

The aim of this study was to analyse the existing nerve block registry data from the EC of a tertiary academic hospital in Johannesburg, South Africa.

Methods

The study was a retrospective, observational and transverse analysis of a nerve block registry.

South Africa is classified as an upper- to middle-income country by the World Bank but due to inequalities within its health care system, the vast majority of state-run hospitals such as the study site, can be considered resource-constrained.

The registry was created in May 2016. All nerve blockades, excluding digital nerve blocks, performed subsequently were entered in the database.

Ethical clearance was obtained from the Human Research Ethics

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All consecutive adult (i.e., older than 18 years) patients that received nerve blocks in the EC during the period May 2016–September 2017 were included in the study.

The following data were available from the registry for analysis:

- Rank of doctor (i.e., intern, medical officer, registrar)
- Patient age
- Indication for the block
- Type of block performed
- Local anaesthetic agent used
- Ultrasound usage
- Time taken to perform the block
- Block success – the success (or failure) of the nerve blocks was not quantifiable but rather a subjective determination by the operator in conjunction with the patient.
- Immediate block complications

Descriptive statistical methods were used to describe the patient population receiving the block, including all aspects of the peripheral nerve block itself as well as the outcomes of the blocks. Continuous variables were presented as means, standard deviations, medians and interquartile ranges. Categorical data were presented as percentages of the total cohort. A comparison of the outcomes between variables (operator rank, type of nerve block performed, time taken to perform the nerve block, ultrasound guided or not, amount of anaesthetic used and time taken to evaluate outcome) was done using the X^2 test, the Fisher's exact test, independent sample t-tests and Wilcoxon ranked sum test where appropriate. A 5% significance level was used and analysis was performed using SAS version 9.4 for Windows.

Results

The nerve block registry contained 188 entries over the study period. After patients less than 18 years of age were excluded, 168 entries were left for analysis. In nine of these entries, the indication for the nerve block was unclear, leaving a sample size of 159 for this field.

Nerve blocks were performed in similar numbers by medical officers (50.5%) and registrars (48.8%) and one block was done by an intern. In total, 36 different operators performed nerve blocks within the study period. The median age of the patients who received nerve blocks was 36 years (IQR 29-49y, range 19-93y).

The indications for the nerve blocks are shown in Fig. 1.

The types of nerve blocks are tabulated in Table 1.

The vast majority of blocks were ultrasound-guided (88.6%).

Bupivacaine 0.5% was the most commonly used local anaesthetic (86.8%). Other agents included bupivacaine 0.25% (7.2%), lignocaine 1% (4.8%), lignocaine 2% (0.6%) and lignocaine 0.5% (0.6%).

The median volume of bupivacaine 0.5% used was 20 ml (IQR 15–20 ml), for bupivacaine 0.25% it was 25 ml (IQR 20–40 ml). The median volume used of lignocaine 1% was 10 ml (IQR 7.5–16 ml). Lignocaine 1% and 0.5% were each only used once and 20 ml was used in both cases.

Table 1
Types of nerve blocks performed (N = 168).

	n (%)
Total upper limb	49 (29.2)
Forearm ultrasound-guided	28 (16.8)
Infraclavicular	8 (4.8)
Metacarpal	5 (2.0)
Wrist	3 (1.8)
Serratus anterior	2 (1.2)
Interscalene	1 (0.6)
Superficial cervical plexus	1 (0.6)
Supraclavicular	1 (0.6)
Total lower limb	116 (69.0)
Femoral 3-in-1	75 (44.6)
Pop-sciatic	28 (16.7)
Fascia iliaca	7 (4.2)
Anterior sciatic	3 (1.8)
Ankle	3 (1.8)
Total other	3 (1.8)
Penile	1 (0.6)
Mandibular	1 (0.6)
Infraorbital	1 (0.6)

The median time taken to perform a nerve block was 10 min (IQR 6–15 min) and the median time interval between completion of the block and it being assessed for outcome was 20 min (IQR 10–30 min).

Blocks were deemed successful by the performer 91.8% of the time. There was only one recorded complication: "pain at the site of injection". No other local complications or systemic complications were recorded.

There was no significant association between any of the variables and successful outcome of the nerve block: doctor rank (p = 0.25), type of block (p = 0.82), ultrasound guidance (p = 0.36), median volume of anaesthetic agent (p = 0.90), median time taken to perform block (p = 0.30) and assessment interval (p = 0.89).

Nerve block types with sample sizes less than five were excluded from the analysis.

Discussion

EC performed nerve blocks are gaining popularity worldwide. Despite this, little data exists with regards to their routine use in the EC. A survey of EC doctors from three teaching hospitals in Toronto revealed that 67–77% of those interviewed 'never' perform nerve blocks [3]. In another survey from an Ethiopian EC, 48.8% of doctors disclosed never having performed a nerve block prior to the study [4]. Both the aforementioned studies emphasize the underutilisation of nerve blocks,

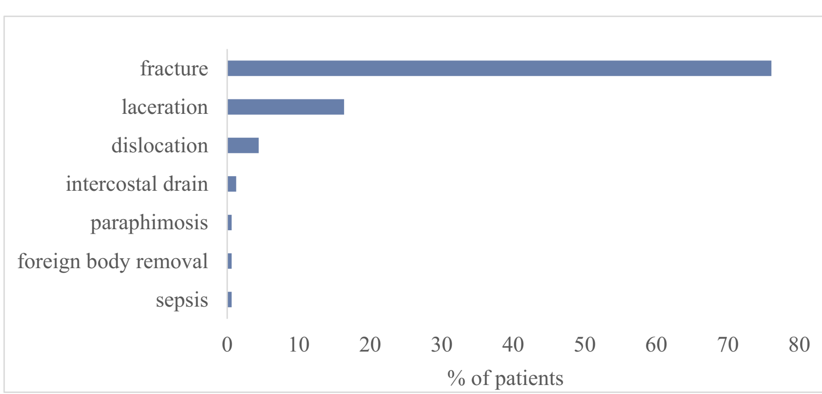

Fig. 1. Indications for nerve blocks (N = 159).

not only in the African context but worldwide. Meaningful comparisons with our data are thus limited.

The overall number of nerve blocks performed in this study, nine per month by 36 different providers, is far less than those done in a prospective study in the low-resource setting of the Democratic Republic of Congo. That study was designed to test the feasibility of teaching ultrasound-guided nerve blocks and eight participants performed 204 nerve blocks in the month following training [5]. Although long term follow-up is necessary to determine the sustainability of those numbers, it does suggest what the utilisation potential could be.

Nerve blocks in this study were most frequently indicated for fracture pain management and the most commonly performed blocks were femoral and forearm ultrasound-guided nerve blocks. Although far less routine, more technical blocks such as interscalene, superficial cervical plexus and supraclavicular blocks did add to the nerve block repertoire. This differs from a prospective observational study at a trauma centre in India, where the most frequent blocks were done on the brachial plexus, demonstrating that once taught appropriately, technical blocks can be used with confidence [6].

Ultrasound was used in the majority of nerve blocks performed in this study. Although it is not a fixed departmental policy, the use of ultrasound is strongly encouraged as there is much evidence that it is associated with better outcomes [7].

The time taken to perform a nerve block has been suggested as a perceived barrier to utilisation [8]. In this study, the median time taken to perform a nerve block was 10 min. Self-reporting in this regard is an acknowledged weakness and real times are likely to have been longer. However, our times were similar to the Indian study, where the median time to perform a nerve block was 9 min [IQR 3–9 min] [6]. While this procedure is likely to take longer than the time taken to administer intravenous analgesia, nerve blocks result in a shorter length of stay in the EC overall, when compared to procedural sedation and analgesia [2,9].

The success rate of 91.8% is comparable to that achieved in a prospective study of nerve blocks done in an American EC over the course of a year [10]. In the American study, 1/104 failed completely while 8% required additional analgesia. Similarly, both studies highlight the exceedingly rare rate of nerve block complications, with no major complications recorded. This emphasizes the need for larger, collaborative registries in order to reveal the true incidence of potential complications.

Operator bias has the potential to exist in the assessment of block success, as the doctor who administered the block performed this evaluation – an objective pain score was not used. Operator integrity was relied upon in this regard and failures were likely to be underreported. Reasons for nerve block failure were not part of the registry database but could have potentially ranged from misplacement and/or inadequate volume of the local anaesthetic agent to operator inexperience.

Limitations also exist in the assessment of complications as permanent nerve damage can only be evaluated once the nerve block has worn off. Patients are often admitted to the hospital prior to this happening and follow-up by the EC staff is not routine. Long term follow-up for permanent nerve damage was not assessed in this study.

Selection bias may have occurred if operators, for whatever reason, did not fill in the nerve block record sheet after performing a block or in the case of a lost or damaged sheet.

This study illustrates that the use of nerve blocks is feasible even in a resource-constrained EC. They are an effective, safe and timeous analgesic solution to a wide variety of musculoskeletal injuries. It emphasizes the importance of registries in order to monitor all aspects of procedures and encourages the use of nerve blocks for appropriate indications in the EC.

Dissemination of results

The results of this study will be presented to the Emergency Medicine Department at the University of Witwatersrand through an informal presentation.

Authors' contributions

Authors contributed as follows to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: JS and LNG contributed equally to this work. Both authors approved the version to be published and agreed to be accountable for all aspects of the work.

Declaration of Competing Interest

Prof Lara Goldstein is an editor of the African Journal of Emergency Medicine. Prof Goldstein was not involved in the editorial workflow for this manuscript. The African Journal of Emergency Medicine applies a double blinded process for all manuscript peer reviews. The authors declared no further conflict of interest.

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