



Qualitative aspects of patient pain during surgery with wide-awake local anesthesia ☆, ☆ ☆



A. Luke MacNeill^{a,*}, John Wright^b, D. Joshua Mayich^c

^a University of New Brunswick, 100 Tucker Park Road PO Box 5050, Saint John, NB, E2L 4L5, Canada

^b Dalhousie University, 100 Tucker Park Rd, PO Box 5050, Saint John, NB, E2L 4L5, Canada

^c Horizon Health Network, 560 Main Street, Building A, Suite 325, Saint John, NB, E2K 1J5, Canada

ARTICLE INFO

Keywords:

Wide-awake
Local anesthesia
Epinephrine
Pain
Foot and ankle

ABSTRACT

Purpose: Studies assessing intraoperative pain during surgery with wide-awake local anesthesia typically use a unidimensional pain scale, which provides a limited view of the pain experience. The present paper describes two studies that assessed qualitative aspects of intraoperative pain using a multidimensional pain measure.

Methods: The first study was a retrospective survey of 24 patients who received a variety of foot and ankle procedures under wide-awake local anesthesia. Patients completed a copy of the Short-Form McGill Pain Questionnaire (SF-MPQ) through the mail an average of six months following surgery. The second study was a prospective assessment of 40 patients receiving forefoot procedures under the same anesthesia. Patients completed a copy of the SF-MPQ directly after the surgery.

Results: Patients in the first study selected an average of 1.17 pain descriptors ($SD = 3.02$) on the SF-MPQ, whereas patients in the second study selected an average of 1.90 pain descriptors ($SD = 1.82$). In general, both studies found that sensory descriptors of pain (e.g., sharp, shooting, tender) were more common than affective descriptors. However, mean intensity ratings were low for all descriptors.

Conclusion: The results of these studies provide a more comprehensive understanding of the patient experience during surgery with wide-awake local anesthesia.

1. Introduction

Wide-awake local anesthesia is a novel method of surgical anesthesia that is used primarily in the domains of hand surgery^{1–4} and foot and ankle surgery.^{5,6} It involves the subcutaneous infiltration of local anesthetic and epinephrine into the operative area. The local anesthetic is used for patient anesthesia, whereas the epinephrine provides hemostasis in place of a painful or uncomfortable tourniquet. Patients receiving this form of anesthesia do not require sedation or general anesthesia for the procedure (i.e., they remain fully conscious or “wide-awake”). As a result, the anesthetic mixture is typically delivered by the surgeon and no anesthesiologist is needed for surgery.

Wide-awake local anesthesia has a number of cost and safety benefits over other forms of anesthesia.^{7–14} However, the patient experience during these surgeries is a potential area of concern, particularly with respect to intraoperative pain. Studies in this area generally ask

patients to rate the intensity of their intraoperative pain using a visual analog scale or numerical rating scale that varies from 0 to 10, with higher scores indicating greater pain. These collective studies have found that some degree of intraoperative pain is not uncommon, although pain levels tend to be quite mild. For instance, studies focusing on hand procedures have found mean intraoperative pain ratings to be less than 1 out of 10.^{15,16} Studies focusing on foot and ankle procedures have reported similar results.^{5,6}

Although ratings of pain intensity are useful, they are also unidimensional and ultimately provide a limited view of patient pain. Melzack noted that pain has a variety of sensory and affective qualities that can vary substantially depending on the nature of the pain.^{17,18} For instance, the quality of pain during a migraine likely differs considerably from the quality of pain due to a first-degree burn. Assessing qualitative aspects of pain during surgery with wide-awake local anesthesia would give patients and their healthcare providers a better idea

* The first author contributed to study design, data collection, data analysis, and manuscript writing and revision for Studies 1 and 2.

** The second and third authors contributed to study design, data collection, and manuscript writing and revision for Studies 1 and 2.

* Corresponding author. Department of Psychology, University of New Brunswick - Saint John, 100 Tucker Park Road, PO Box 5050, Saint John, NB, E2L 4L5, Canada.

E-mail addresses: luke.macneill@unb.ca (A.L. MacNeill), john.wright@dal.ca (J. Wright), djmayich@outlook.com (D.J. Mayich).

<https://doi.org/10.1016/j.jor.2018.12.015>

Received 11 September 2018; Accepted 16 December 2018

Available online 04 January 2019

0972-978X/ © 2019 Prof. PK Surendran Memorial Education Foundation. Published by Elsevier, a division of RELX India, Pvt. Ltd. All rights reserved.

of what to expect during these operations.

The current paper describes two such studies. The first study was a retrospective survey of patients who received a variety of foot and ankle procedures under wide-awake local anesthesia. The second study was a prospective assessment of patients receiving various forefoot procedures under the same anesthesia. It was expected that many patients enrolled in these studies would report no intraoperative pain. It was also expected that, among those patients who did experience intraoperative pain, certain characteristics of pain would be more prevalent or prominent than others.

2. Study 1

2.1. Materials and methods

Ethics approval for this study was obtained from the Horizon Health Network research ethics board (file number: 2014–2008). The first 40 patients to receive surgery with wide-awake local anesthesia from the third author were considered for the study. Nine patients were excluded for medical reasons: five due to partial neuropathy of the feet, one due to dementia, and three due to complications with the anesthesia (see MacNeill and Mayich⁵ for more details). Of the 31 qualifying patients, 27 provided verbal consent to participate in the study via telephone. Of these, 24 patients (16 males, 8 females; M age = 56.79 years, SD = 12.79) successfully completed the study and constitute the final sample. The majority of patients received forefoot procedures (70.83%), but lower leg procedures (20.83%) and hindfoot procedures (8.33%) were also represented.

Patients were mailed a questionnaire package that included a copy of the Short-Form McGill Pain Questionnaire (SF-MPQ). This questionnaire consists of 15 pain descriptors, 11 of which describe sensory aspects of pain (e.g., “throbbing,” “sharp”) and four of which describe affective aspects of pain (e.g., “sickening,” “fearful”). Individuals rate each descriptor on a 4-point scale ranging from 0 (none) to 3 (severe). Patients in the current study were asked to complete the questionnaire with respect to their intraoperative experience. In addition to the SF-MPQ, patients were provided with a 0 to 10 numerical rating scale to assess global pain intensity. On average, the questionnaires were filled out approximately six months following surgery (M = 184.50 days, SD = 93.19). Data were entered into SPSS version 24.0 (IBM Corp., Armonk, N.Y., USA) for descriptive analysis.

2.2. Results

Overall, 25% of the sample endorsed one or more pain descriptors on the SF-MPQ. Whereas 25% of the sample selected one or more sensory descriptors, 8.33% of the sample selected one or more affective descriptors. Across the sample, patients chose an average of 1.17 pain descriptors (SD = 3.02). Note that the mean was inflated by one patient who selected 14 of the 15 descriptors. The most frequently selected descriptors were all sensory in nature: *throbbing*, *stabbing*, *shooting*, and *sharp*. Each of these descriptors was endorsed by 12.50%–16.67% of patients. The remaining descriptors were endorsed by less than 10% of the sample. Only one descriptor, *cramping*, was not endorsed by any patient. See Table 1 for the percentage of patients who endorsed each descriptor.

Numerical scores for the SF-MPQ descriptors were summed to provide sensory, affective, and total scale scores for each patient. Across the entire sample, the mean sensory score was 1.42 (SD = 3.61) out of a possible 33 points. The mean affective score was 0.42 (SD = 1.67) out of a possible 12 points. The mean score for the total scale was 1.83 (SD = 5.09) out of a possible 45 points. Among those patients who reported pain specifically, the mean sensory score (M = 5.67, SD = 5.57), affective score (M = 1.67, SD = 3.20), and total scale score (M = 7.33, SD = 8.40) were higher, but still relatively mild. These results are reflected in global pain intensity scores for the entire sample

(M = 0.75, SD = 0.85) and for those who reported pain specifically (M = 1.38, SD = 0.65).

2.3. Discussion

This initial study retrospectively assessed qualitative aspects of pain during foot and ankle surgery with wide-awake local anesthesia. Within this sample, most patients reported no pain during their surgeries. Of those patients who did report pain, their descriptors tended to reflect sensory aspects of pain consisting of *throbbing*, *stabbing*, *shooting*, or *sharp* sensations. Pain levels tended to be mild, and although the duration of pain was not explicitly requested, there was some evidence that this pain was infrequent. More specifically, two of the six patients who reported pain wrote on their surveys that pain was brief and typically accompanied a specific part of the surgery. Note that affective descriptors of pain were relatively uncommon in the sample, which suggests that patients did not find their surgeries to be particularly unpleasant or traumatic.

One limitation with these results is that patients were assessed an average of six months after their surgeries. Although past research has shown that patients’ memory for global pain intensity is fairly stable over time, memory for qualitative aspects of pain appears to be less consistent.^{19,20} Therefore, it is possible that patients were misremembering and misreporting the characteristics of any pain that they experienced on the day of their respective surgeries. This outcome would be particularly concerning if patients were underreporting their actual pain. Study 2 addressed these concerns by assessing patients directly after their surgeries.

3. Study 2

3.1. Materials and methods

Ethics approval for this study was obtained from the Horizon Health Network research ethics board (file number: 2014–2010). Forty patients (30 females, 10 males; M age = 61.82 years, SD = 9.02) receiving surgery from the third author were recruited for the study. Given that the majority of participants in Study 1 were forefoot patients, this follow-up study focused on forefoot patients exclusively. Note that patients were recruited in a consecutive manner. Those under the age of 19 and those with significant comorbidities (e.g., diabetes) were excluded from participation.

Patients provided written consent during a preoperative consultation with their surgeon. On the day of surgery, wide-awake local anesthesia was delivered by the surgeon and the surgery progressed as normal. The SF-MPQ was administered to patients approximately 10–15 min following their surgery. They were told to complete this questionnaire with regard to the pain that they experienced during surgery. Once again, global pain intensity was assessed with a 0 to 10 numerical rating scale. Data were entered into SPSS version 24.0 (IBM Corp., Armonk, N.Y., USA) for descriptive analysis.

3.2. Results

Overall, 70% of the sample endorsed one or more pain descriptors on the SF-MPQ. Whereas 67.50% of the sample selected one or more sensory descriptors, 32.50% of the sample selected one or more affective descriptors. Across the sample, patients chose an average of 1.90 pain descriptors (SD = 1.82). The most frequently selected descriptors were *tender*, a sensory descriptor, and *fearful*, an affective descriptor. These were followed by *shooting* and *sharp*. Each of these descriptors was endorsed by 22.50%–27.50% of patients. Note that *gnawing* and *heavy* were also selected by a relatively high number of patients (17.50% each). The remaining descriptors were endorsed by 15% of the sample or less. Three descriptors, *cramping*, *sickening*, and *punishing-cruel*, were not endorsed by any patient. See Table 1 for the percentage

Table 1
Ratings of sensory and affective descriptors of pain (0–3 scale).

Item Description	Study 1				Study 2			
	% of Patients	Sample <i>M</i>	Sample <i>SD</i>	Sample Min-Max	% of Patients	Sample <i>M</i>	Sample <i>SD</i>	Sample Min-Max
Sensory Descriptors								
Throbbing	16.67	0.29	0.72	0–3	7.50	0.08	0.27	0–1
Shooting	12.50	0.14	0.35	0–1	22.50	0.28	0.55	0–2
Stabbing	16.67	0.32	0.78	0–3	12.50	0.18	0.55	0–3
Sharp	12.50	0.18	0.50	0–2	22.50	0.35	0.74	0–3
Cramping	0.00	0.00	0.00	0–0	0.00	0.00	0.00	0–0
Gnawing	4.17	0.08	0.41	0–2	17.50	0.20	0.46	0–2
Hot-Burning	4.17	0.12	0.61	0–3	7.50	0.10	0.38	0–2
Aching	8.33	0.12	0.45	0–2	15.00	0.18	0.45	0–2
Heavy	8.33	0.12	0.45	0–2	17.50	0.20	0.46	0–2
Tender	8.33	0.08	0.28	0–1	27.50	0.30	0.52	0–2
Splitting	4.17	0.04	0.20	0–1	5.00	0.08	0.35	0–2
Affective Descriptors								
Tiring-Exhausting	4.17	0.12	0.61	0–3	10.00	0.20	0.65	0–3
Sickening	4.17	0.12	0.61	0–3	0.00	0.00	0.00	0–0
Fearful	8.33	0.12	0.45	0–2	25.00	0.38	0.74	0–3
Punishing-Cruel	4.17	0.04	0.20	0–1	0.00	0.00	0.00	0–0

of patients who endorsed each descriptor.

Once again, numerical scores for the SF-MPQ descriptors were summed to provide sensory, affective, and total scale scores for each patient. Across the entire sample, the mean sensory score was 1.92 ($SD = 2.23$) out of a possible 33 points. The mean affective score was 0.58 ($SD = 0.98$) out of a possible 12 points. The mean score for the total scale was 2.50 ($SD = 2.67$) out of a possible 45 points. Among those patients who reported pain specifically, the mean sensory score ($M = 2.75$, $SD = 2.20$), affective score ($M = 0.82$, $SD = 1.09$), and total scale score ($M = 3.57$, $SD = 2.52$) were higher but still relatively mild. These results are reflected in global pain intensity scores for the entire sample ($M = 0.98$, $SD = 1.04$) and for those who reported pain specifically ($M = 1.56$, $SD = 0.90$).

3.3. Discussion

The results of this second study only partially replicated the results from the first study. Reports of intraoperative pain were more common among this second group of patients, and patients tended to use a wider range of pain descriptors. The frequent use of the *tender*, *heavy*, and *gnawing* descriptors is particularly interesting, although potentially misleading. Many patients noted that they could occasionally feel movement or pressure in the operative area during the surgery, but they were hesitant to characterize these sensations as painful *per se*. It is possible that the use of the aforementioned descriptors was not reflecting pain so much as the unpleasant sensations that were associated with this pressure or movement. Future studies should assess this possibility further.

The data on affective aspects of pain also bear mentioning. Similar to the first study, the use of affective descriptors was less frequent than the use of sensory descriptors. Furthermore, two of the more concerning affective descriptors, *sickening* and *punishing/cruel*, were not endorsed by any patients. Once again, these results suggest that patients do not find their surgeries to be particularly unpleasant. At the same time, a quarter of the sample selected the *fearful* descriptor. Given that patient pain was typically quite mild, it is likely that general feelings of anxiety regarding the surgery were inflating these reports. Past studies have found that anxiety during these surgeries is common, but it tends to decline steadily as the perioperative period progresses and patients become more comfortable with the surgical setting.^{5,6,15,16,21}

4. General discussion

Taken together, the present studies contribute to our understanding

of the patient experience during surgery with wide-awake local anesthesia. Many patients who receive surgery with this anesthesia report no pain during their surgeries, although some mild pain is not uncommon. Sensory aspects of pain appear to be more prevalent than affective aspects of pain. Importantly, there is little evidence to suggest that patients find their surgeries to be particularly unpleasant or traumatic. These findings are consistent with past studies in which patients reported high levels of satisfaction with their operative experience.^{5,6,15,16,21}

There was some variation in the results of the two studies. Patients in first study seemed to recall more stereotypical aspects of pain, such as *throbbing*, *stabbing*, and *sharp* pain. By comparison, those in the second study were more likely to report a wider range of painful sensations, including more ambiguous sensations such as *heavy* and *gnawing*. It is possible that the discrepancy in these results is linked to poor recall of qualitative aspects of pain.^{19,20} In other words, individuals in the first study may have forgotten some of the less typical or memorable aspects of their intraoperative pain over time. In future studies, researchers may want to track memory for different characteristics of intraoperative pain to see how this memory changes in the months following surgery.

Although the present studies have added to our understanding of the patient experience during these types of surgeries, our knowledge of this experience is still somewhat limited. The results of the second study, in particular, indicate that patients experience a wide range of intraoperative sensations and emotions that may not be fully captured by questionnaires and survey instruments. A future study should seek patients' unstructured qualitative feedback on these operations in an effort to better understand the more nuanced aspects of this experience. Moreover, future studies should explicitly assess the frequency and duration of any unpleasant intraoperative sensations. Anecdotal evidence suggests that such sensations are both infrequent and brief, although a more rigorous assessment of this topic is required.

5. Conclusion

As expected, many patients receiving foot and ankle procedures with wide-awake local anesthesia felt no pain during the operation. The remaining patients reported a limited pain experience that was characterized by a variety of sensations and emotions. These results are informative for surgeons who use wide-awake local anesthesia in the operating room and for patients receiving procedures with this type of anesthesia.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

- Farhangkhoe H, Lalonde J, Lalonde DH. Wide-awake trapeziectomy: video detailing local anesthetic injection and surgery. *Hand*. 2011;6:466–467.
- Gregory S, Lalonde DH, Fung Leung LT. Minimally invasive finger fracture management: wide-awake closed reduction, K-wire fixation, and early protected movement. *Hand Clin*. 2014;30:7–15.
- Higgins A, Lalonde DH, Bell M, et al. Avoiding flexor tendon repair rupture with intraoperative total active movement examination. *Plast Reconstr Surg*. 2010;126:941–945.
- Lalonde DH, Martin AL. Wide-awake flexor tendon repair and early tendon mobilization in zones 1 and 2. *Hand Clin*. 2013;29:207–213.
- MacNeill AL, Mayich DJ. Wide-awake foot and ankle surgery: a retrospective analysis. *Foot Ankle Surg*. 2017;23:307–310.
- Wright J, MacNeill AL, Mayich DJ. A Prospective Comparison of Wide-Awake Local Anesthesia and General Anesthesia for Forefoot Surgery. *Foot Ankle Surg*. Advance online publication; 2017.
- Bismil MSK, Bismil QMK, Harding D, et al. Transition to total one-stop wide-awake hand surgery service-audit: a retrospective review. *J Roy Soc Med*. 2012;3:23.
- Lalonde DH. Wide-awake flexor tendon repair. *Plast Reconstr Surg*. 2009;123:623–625.
- Lalonde DH. “Hole-in-One” local anesthesia for wide-awake carpal tunnel surgery. *Plast Reconstr Surg*. 2010;126:1642–1644.
- Lalonde DH. Reconstruction of the hand with wide-awake surgery. *Clin Plast Surg*. 2011;38:761–769.
- Lalonde DH. How the wide-awake approach is changing hand surgery and hand therapy: inaugural AAHS sponsored lecture at the ASHT meeting, San Diego, 2012. *J Hand Ther*. 2013;26:175–178.
- Lalonde DH. Minimally invasive anesthesia in wide-awake hand surgery. *Hand Clin*. 2014;30:1–6.
- Leblanc MR, Lalonde J, Lalonde DH. A detailed cost and efficiency analysis of performing carpal tunnel surgery in the main operating room versus the ambulatory setting in Canada. *Hand*. 2007;2:173–178.
- Nelson R, Higgins A, Doumit J, et al. The wide-awake approach to Dupuytren's Disease: fasciectomy under local anesthetic with epinephrine. *Hand*. 2010;5:117–124.
- Koegst WHH, Wölfle O, Thoele K, et al. Der „Wide-awake Approach“ in der Handchirurgie – ein komfortables Anästhesieverfahren ohne Blutleere [The “Wide-awake Approach” in hand surgery - a comfortable anaesthesia method without a tourniquet]. *Handchir Mikrochir P*. 2011;43:175–180.
- Teo I, Lam W, Muthayya P, et al. Patients' perspective of wide-awake hand surgery – 100 consecutive cases. *J Hand Surg-Eur*. 2013;38:992–999.
- Melzack R. The McGill Pain Questionnaire: major properties and scoring methods. *Pain*. 1975;1:277–299.
- Melzack R. The short-form McGill pain questionnaire. *Pain*. 1987;30:191–197.
- Terry R, Gijsbers K. Memory for the quantitative and qualitative aspects of labor pain: a preliminary study. *J Reprod Infant Psychol*. 2000;18:143–152.
- Terry R, Niven C, Brodie E, et al. An exploration of the relationship between anxiety, expectations and memory for postoperative pain. *Acute Pain*. 2007;9:135–143.
- Davison PG, Cobb T, Lalonde DH. The patient's perspective on carpal tunnel surgery related to the type of anesthesia: a prospective cohort study. *Hand*. 2013;8:47–53.