International Journal of Surgery Protocols 20 (2020) 8–12

Contents lists available at ScienceDirect

International Journal of Surgery Protocols

journal homepage: www.elsevier.com/locate/isjp

Use of Wide-Awake Local Anaesthetic No Tourniquet (WALANT) in upper limb and hand surgery: A systematic review protocol

Niamh O'Neill, Ali Abdall-Razak *, Emma Norton, Aneeta Kumar, Heer Shah, Harman Khatkar, Zaid Alsafi, Riaz Agha

Bart's and the London School of Medicine and Dentistry, London, UK
Imperial College School of Medicine, London, UK
St George's University of London, London, UK
University of Southampton, Southampton, UK
Southend Hospital, Southend-On-Sea, UK
Oxford University Hospital, Oxford, UK
University College London Medical School, London, UK
Royal London Hospital, London, UK

ARTICLE INFO

Article history:
Received 3 February 2020
Accepted 2 March 2020
Available online 13 March 2020

Keywords:
WALANT
Hand
Limb
Plastic
Orthopaedic
Surgery

ABSTRACT

Introduction: Wide Awake Local Anaesthetic No Tourniquet (WALANT) technique has been developed to eliminate tourniquet pain during upper limb and hand surgery whilst also improving utilisation of operating theatre time and inpatient stay, however inconclusive data still limits the techniques uptake. Here presents a protocol for a systematic review to collate findings to produce conclusive data on efficacy of WALANT.

Methods: This systematic review will be registered a priori. All study designs defined by the Oxford Centre for Evidence-Based Medicine will be included in the search. "WALANT" in "upper limb" and "hand" surgery will be investigated as per the devised search strategy. 18 electronic databases will be searched, including PubMed, Medline and Embase in addition to a Grey literature search. Two independent teams of 3 researchers will screen all relevant titles, abstracts and subsequent full texts for suitability. Data will be extrapolated and entered into a preformatted database for analysis.

Ethics and dissemination: This systematic review will be published in a peer-reviewed journal and presented at both national and international conferences within the field of plastic and orthopaedic surgery. This review aims to inform surgical practice and policy.

1. Introduction

Upper limb and hand surgeries are regular procedures in plastic and orthopaedic surgery. Various factors contribute to a successful surgery; Gunasagaran et al stating that a "bloodless surgical field" is essential to the surgeon performing successful surgery [1]. Traditionally, a tourniquet is used to prevent blood loss, and two well-established anaesthetic techniques are utilised in hand surgery; Intravenous Regional Anaesthesia (IVRA) and General Anaesthetic (GA). When comparing the above techniques, IVRA results in faster hospital discharge than GA; IVRA can often fail as an anaesthetic technique due to tourniquet-associated pain [2,3]. Gunasagaran et al showed, in the 72 patients undergoing hand surgery, the tourniquet was the primary cause of intraoperative pain. When Visual Analogue Score (VAS) – a straight line where each end defines the extremes of pain (no pain at all to worst pain imaginable) and the patient can mark his or her pain on the line – was compared between groups operated on with or without a tourniquet, VAS score was twice as high in patients with tourniquet [4,5]. When sedation is utilised alongside local anaesthetic and tourniquet, 93% of patients would be willing to have the procedure under the same conditions again. With new techniques – namely Wide Awake Local Anaesthetic No Tourniquet (WALANT) – these older techniques are becoming outdated. When compared to WALANT, patients can spend twice the length of time in hospital following the procedure, have nearly twice the preoperative tests and are noted to have greater preoperative anxiety [6].

WALANT has enabled wider access to minor hand surgery while utilising medical resources efficiently lending to significant financial advantages [7]. As the name suggests, WALANT involves the

* Corresponding author at: Imperial College School of Medicine, South Kensington, London SW7 2AZ, UK.
E-mail address: Ali.abdall-razak@outlook.com (A. Abdall-Razak).

https://doi.org/10.1016/j.isjp.2020.03.001
2468-3574/

patient wide awake (with no sedation), local anaesthetic, often combined with 1:1,000,000 adrenaline, and without tourniquet utilisation. The points of interest when comparing WALANT to other methods of minor hand surgery can be categorised into: Pain experienced by the patient, Perioperative benefits to patient and surgeon, and cost analysis.

Many studies find that the use of a tourniquet causes "unnecessary pain" intraoperatively with little identifiable benefit when compared to the same surgery without the use of a tourniquet [8]. One method of quantification can be done by looking at opioid use post-operatively, where patients who received minor hand surgery by WALANT required lower opioid doses for fewer days than patients who underwent the same procedure by monitored anaesthetic care (MAC) [9]. In WALANT, the lack of tourniquet is often compensated by the addition of adrenaline with the local anaesthetic. Although historically the use of adrenaline in upper extremities has been disputed due to fear of ischaemic complications, modern anaesthetics provides overwhelming evidence to the contrary while highlighting clear benefits, including reduced arterial blood flow, thus reducing blood loss and increasing the duration of anaesthesia [10]. Removing the need for a tourniquet by the addition of adrenaline has been shown to be less painful for patients, with a lower VAS score, whilst also reducing the total blood loss by comparison [11].

The lack of sedation during WALANT has considerable advantages. Perioperatively, WALANT requires significantly less workup and assessment as well as reduced recovery time and care needed postoperatively due to the absence of sedation side effects. This ultimately leads to shorter inpatient time [12]. Intraoperatively in WALANT surgeries – such as K wire fixation of a fractured finger – where patients are wide awake, it allows the surgeon to test the stability of the K wire fixation under patient-initiated, active movement. This can facilitate protected movement earlier on in recovery, potentially at 3–5 days postoperatively [13]. Importantly, using WALANT for minor surgery produces as much as 99% patient satisfaction while reducing the number of non-attendees on the day of surgery [14].

There is limited but promising evidence on the cost effectiveness of WALANT procedures. The American Association of Hand Surgery has launched a "Lean and Green Hand Surgery" with other collaborators to minimise surgical waste and costs while maintaining patient safety and satisfaction – all of which have been achieved by introducing WALANT and minor field sterility [15]. Using WALANT in a procedure room has been shown to cost 11 times less than using MAC in an operating room for the same operation [16]. One UK review found the service saved the NHS £750,000 over 1000 cases of WALANT completed, summating to over £2,000,000 saved since the introduction of the service [14].

Evangelista's systematic review in 2019 compared WALANT to local or intravenous regional anaesthetic with tourniquet by evaluating: operative time, VAS score, patient satisfaction and complications. The results were mostly inconclusive due to insufficient evidence but found marginally longer operative times and significantly lower postoperative VAS score when using WALANT [17]. A plethora of studies have emerged comparing WALANT to other methods of upper limb surgery since October 2018 (Fig. 1). In a PubMed search for term "WALANT", 28 papers have been published in this field in 2019 alone. An up-to-date systematic review and meta-analysis is required to summarise this rapidly expanding research area.

2. Objectives

The primary objective is to complete an up-to-date, fully comprehensive systematic review and meta-analysis of WALANT for minor hand surgery to determine the safety, perioperative benefits and patient satisfaction.

2.1. Primary objectives

The primary objective is to determine outcomes of WALANT for minor hand surgery in patients with traumatic or atraumatic hand injuries along 5 dimensions:

(1) Pain
(2) Perioperative factors
(3) Complications
(4) Patient satisfaction
(5) Cost

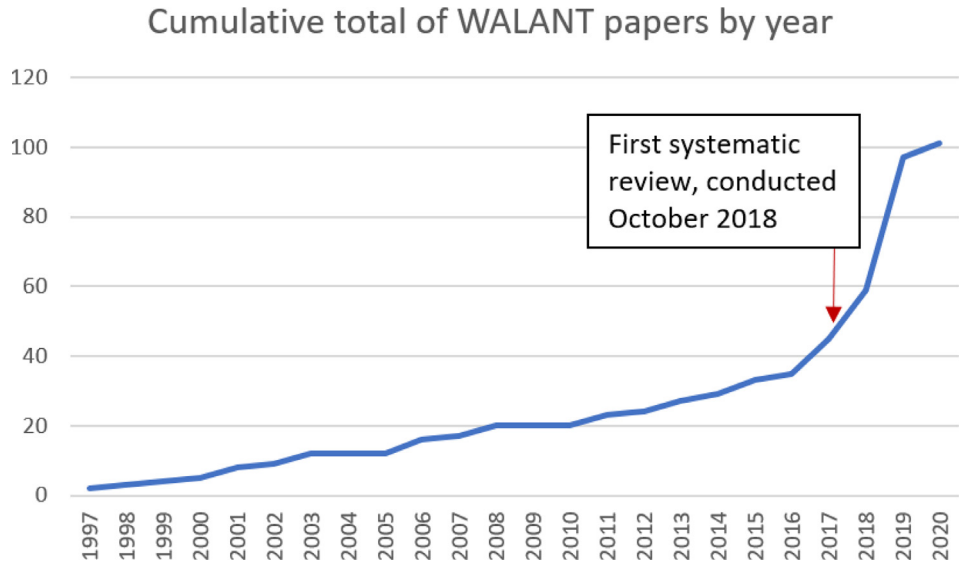

Fig. 1. The cumulative total of WALANT papers by year, showing the previous systematic review. Almost half of all papers have not been included in the most recent WALANT systematic review.

2.2. Secondary objectives

The secondary objectives include to:

(1) Determine optimal location to perform WALANT, either in operating rooms or procedure rooms.
(2) Determine WALANT contraindications.

3. Method

The Cochrane Handbook for Intervention Reviews V.5.1.0 specifies recommendations that will be used to conduct this systematic review and will comply with AMSTAR 2. It will be reported in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [18]. This protocol has been written a priori and has been registered on the Research Registry.

4. Criteria

The proceeding inclusion and exclusion criteria will be utilised for reduction of heterogeneity with previous reviews and will address the research question.

5. Types of studies included

All research studies defined by the Oxford Centre for Evidence-Based Medicine as randomised controlled trial (RCT), Cohort study, case-controlled, case series and case reports – level 1 to 5 respectively – will be included if investigating one or more outcomes of interest [19]. Unpublished data and reports will be considered if information regarding methods and results are able to be accessed. Duplicated studies, studies evaluating the use of WALANT in lower limb surgery, and studies not reporting the use of WALANT in upper limb surgery will be excluded.

6. Types of participants

The population of interest is all patients undergoing surgery for upper limb and hand traumatic injury or dysfunction. All adult cases – 18 years old and above – will be included. Patients under the age of 18 will be excluded.

7. Types of intervention

The intervention of interest includes all WALANT techniques used for all upper limb and hand surgeries. WALANT may either be used for first operation, or for reoperation, on an injury or pathology. Studies reporting outcomes of WALANT on lower limb injury or pathology will be excluded. Studies where a tourniquet has been used at any point in the operation will be excluded.

8. Types of comparators

Where comparative studies are included, WALANT may be compared to; wide awake local anaesthetic with a tourniquet, intravenous regional anaesthesia with tourniquet, sedation with local anaesthetic and tourniquet and general anaesthetic with or without tourniquet.

9. Outcomes of interest

There will be 5 domains of outcomes of interests, defined as follows:

(1) Pain: defined by a patient-completed VAS score.
(2) Perioperative factors: defined as the extent of preoperative assessment, intraoperative factors, namely blood loss and operative time, and postoperative factors including hospital stay.
(3) Complications: defined as the incidence of intra- and post-operative complications such as surgical site infection and need for reoperation. Complications can be graded using the Clavien-Dindo classification system to assess the therapeutic consequences of complications [20].
(4) Patient satisfaction: defined subjectively by patient experience including measurements by questionnaire.
(5) Cost effectiveness: defined as the total monetary value saved by performing an operation by WALANT versus any other established method. This could be broken down into staff costing, operating room costs, equipment and waste costs and cost of hospital inpatient days as a result of surgery.

10. Search methods for identification of studies

Electronic databases will be searched from inception of WALANT to 1 February 2020. Inception was chosen as the start date to collate data on important factors such as cost effectiveness and complication rates which was not included or was inconclusive in the previously published systematic review/meta-analysis [16]. The following databases will be searched: PubMed, MEDLINE, EMBASE, SCOPUS, CINAHL, PsychINFO, SciELO, The Cochrane Library including the Cochrane Central Register of Controlled Trials (CENTRAL), Database of Abstracts of Review of Effect (DARE), the Cochrane Methodology Register, Health Technology Assessment Database, the NHS Economic Evaluation Databases and Cochrane Groups, ClinicalTrials.gov, Current Controlled Trials Data-base, The World Health Organisation (WHO) International Clinical Trials Registry Platform, UpToDate.com, NHS evidence and the York Centre for Reviews and Dissemination.

11. Search terms and keywords

The search strategy has been designed with expert consultation to identify articles focused on "WALANT and upper limb surgery". A search will be conducted using appropriate keywords in English combined with Boolean logical operators as follows:

WALANT OR "wide awake local anaesthetic no tourniquet" OR "wide awake" OR awake OR "local anaesthetic" OR "local anaesthetic no tourniquet" OR "local anaesthetic without tourniquet" [Title/Abstract] OR "local anaesthetic with adrenaline" OR "local anaesthetic with epinephrine" OR "local anaesthetic without adrenaline" OR "local anaesthetic without epinephrine" [MeSH terms] AND "upper limb" OR arm OR forearm OR wrist OR hand [Title/Abstract] OR radius OR ulnar OR "carpal tunnel" OR "carpal tunnel syndrome" OR carpal OR metacarpal OR phalanx OR tendon OR fracture [MeSH terms] AND surgery OR "minor surgery" OR operation OR procedure [Title/Abstract] OR "outpatient" OR "outpatient surgery" OR "outpatient procedure" [MeSH terms].

Exclusion of articles will not be based on publication status. Articles in all languages will be screened and if an article is not written in English the abstract will be screened (as abstracts will be in English) and if a full text is required to assess eligibility the study's authors will be contacted for an English translation, failing that a native speaker will translate, if not possible then Google translate will be used as an approved method to eliminate language bias.

12. Searching other resources

The search will also include grey literature. Open Grey http://www.opengrey.eu will be used to do this. References from all papers included and previous systematic reviews will also be searched to look for any studies relevant to this systematic review that have not already been discovered with our search. The conference proceedings from Son Llatzer WALANT Course 2020 will be searched to the most recent but unpublished studies. Researchers proactively contributing to this field will be identified from published articles 'author of correspondence' and will be contacted directly to ask about further published or unpublished studies. The link to the PROSPERO record for the protocol will be advertised on the first authors social media accounts to call for unpublished work made.

13. Identification and selection of studies

Articles found through electronic and manual searches will be documented into a Microsoft Excel spreadsheet with any duplicates excluded. The spreadsheet will include citation, title and abstract.

Two trained teams – each with 3 researchers – will screen these articles for inclusion in the study in two defined stages:

(1) Titles and abstract.
(2) Full text.

Any discrepancies at any stage will be resolved by consensus to define a final agreed selection of articles. If consensus is not possible the senior author will make the final decision. Full text articles will be reviewed in the case of an articles inclusion in the study being questioned following review of title and abstract. Reports of the same study will be collated. Authors will be contacted for clarification of study eligibility, results or article access. Data extraction for articles that meet predefined inclusion criteria will ensue.

14. Data extraction, collection and management

Data extraction will be completed by two independent teams with any discrepancies resolved by consensus or, failing this, senior author arbitration. Data will be put into a Microsoft Excel template under predefined fields of extraction to enable simple and consistent entry of data. The following data will be recorded:

(1) Demographics: name, country and year of publication.
(2) Study design and level of evidence as defined by the Oxford Centre for Evidence-based medicine.
(3) Conflicts of interest and funding.
(4) Number of participants.
(5) Number of WALANT procedures performed.
(6) Types of procedures performed under WALANT.
(7) Age of participants.
(8) Pain defined by VAS score both intra- and post-operatively.
(9) Any preoperative assessment or tests performed
(10) Any recorded blood loss, expressed as a mean or median with ranges, where reported.
(11) Length of operation
(12) Length of hospital stay
(13) Any postoperative complications, where recorded.
(14) Patient satisfaction
(15) Cost of the operation

15. Data analysis

Outcomes of interest will be tabulated. Statistics describing means, ranges and standard deviations of the mean will be used to produce a summary of the collated data. The heterogeneity of comparative studies will be assessed using Review Manager V.5 (RevMan) [21]. If the inconsistency index defines the heterogeneity as greater than 75%, the meta-analysis shall not be conducted [22]. Results of the selected studies will be analysed alongside the results from the previous systematic review [17].

16. Assessment of bias

To analyse the quality of the studies included, the Grading of Recommendation Assessment, Development and Evaluation (GRADE) system will be consulted as per recommendations by Prisma-P group [18]. The levels of evidence are as follows: very low, low, moderate and high. The quality of evidence is decreased if there is an indication of: (1) Limitations in study design or implementation; (2) Result inconsistencies; (3) Indirectness of evidence; (4) Imprecise estimates; and (5) Publication bias. The quality of evidence is increased if there is evidence of: (1) Magnitude of effect is large; (2) dose-response gradient (3) All possible biases would decrease the procedure effect. For all studies it will be recorded: (1) whether any relevant clinical outcomes are included; (2) whether the results corroborate that of protocols and other publications where available. Any missing outcomes such as cost effectiveness and perioperative factors will be recorded and assessed.

17. Dissemination

This systematic review will provide a comprehensive evaluation of the use of WALANT for upper limb and hand surgery. Results of this study have the potential to influence the conclusions and recommendations made to clinicians, researchers and policy makers.

Funding

No funding received.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] J. Gunasagaran, E. Sean, S. Shivdas, S. Amir, T. Ahmad, Perceived comfort during minor hand surgeries with wide awake local anaesthesia no tourniquet (WALANT) versus local anaesthesia (LA)/tourniquet, J. Orthopaedic Surgery (Hong Kong) 25 (3) (2017).
[2] R. Arunakul, S. Niempoog, Clinical experience in forearm tourniquet use, J. Med. Assoc. Thailand Chotmaihet Thangphaet 94 (Suppl) (2011) 7.
[3] V. Chan, P. Peng, Z. Kaszas, W. Middleton, R. Muni, D. Anastakis, et al., A Comparative study of general anesthesia, intravenous regional anesthesia, and axillary block for outpatient hand surgery, Clin. Outcome Cost Anal. Anesthesia Analgesia 93 (5) (2001).
[4] J. Gunasagaran, E.S. Sean, S. Shivdas, S. Amir, T.S. Ahmad. Perceived comfort during minor hand surgeries with wide awake local anaesthesia no tourniquet (WALANT) versus local anaesthesia (LA)/tourniquet. https://doiorg/101177/2309499017739499. 2017
[5] M. Haefeli, A. Elfering, Pain assessment, Eur. Spine J. 15 (S1) (2006) S17–S24, https://doi.org/10.1007/s00586-005-1044-x.
[6] P.G. Davison, T. Cobb, D.H. Lalonde, The patient's perspective on carpal tunnel surgery related to the type of anesthesia: a prospective cohort study, Hand (New York, N,Y.) 8 (1) (2013) 47–53, https://doi.org/10.1007/s11552-012-9474-5.

[7] P. Rhee, M. Fischer, L. Rhee, H. McMillan, A. Johnson, Cost savings and patient experiences of a clinic-based, wide-awake hand surgery program at a Military Medical Center: a critical analysis of the first 100 procedures, J Hand Surgery. 42 (3) (2017).
[8] H.J. Iqbal, A. Doorgakant, N.N.T. Rehmatullah, A.L. Ramavath, P. Pidikiti, S. Lipscombe, Pain and outcomes of carpal tunnel release under local anaesthetic with or without a tourniquet: a randomized controlled trial, J. Hand Surg. Eur. 43 (8) (2018) 808–812, https://doi.org/10.1177/1753193418778999.
[9] A. Miller, N. Kim, A.M. Ilyas, Prospective evaluation of opioid consumption following hand surgery performed wide awake versus with sedation, Hand (New York, N,Y.) 12 (6) (2017) 606–609, https://doi.org/10.1177/1558944716677536.
[10] W. van Rijt, R. de Wildt, M. Tellier, Local anaesthetics containing epinephrine for use in the hand and fingers, Ned. Tijdschr. Geneeskd. 158 (2014).
[11] S. Ruxasagulwong, J. Kraisarin, K. Sananpanich, Wide awake technique versus local anesthesia with tourniquet application for minor orthopedic hand surgery: a prospective clinical trial, J. Med. Assoc. Thailand = Chotmaihet Thangphaet 98 (1) (2015).
[12] Y. Huang, C. Hsu, J. Renn, K. Lin, S. Yang, Y. Tarng, et al., WALANT for distal radius fracture: open reduction with plating fixation via wide-awake local anesthesia with no tourniquet, J. Orthopaedic Surgery Res. 13 (1) (2018).
[13] D. Lalonde, Latest advances in wide awake hand surgery, Hand Clin. 35 (1) (2019).
[14] M. Bismil, Q. Bismil, D. Harding, P. Harris, E. Lamyman, L. Sansby. Transition to total one-stop wide-awake hand surgery service-audit: a retrospective review. JRSM Short Rep. 32012.
[15] R. Van Demark, V. Smith, A. Fiegen, Lean and green hand surgery, J. Hand Surgery 43 (2) (2018).
[16] N.H. Kazmers, A. Presson, Y. Xu, A. Howenstein, A.R. Tyser, Cost implications of varying the surgical technique, surgical setting, and anesthesia type for carpal tunnel release surgery, J. Hand Surg. Am. 43 (11) (2018), 971-7 e1.
[17] T.M.P. Evangelista, J.H.C. Pua, M.T.P. Evangelista-Huber, Wide-awake local anesthesia no tourniquet (WALANT) versus local or intravenous regional anesthesia with tourniquet in atraumatic hand cases in orthopedics: a systematic review and meta-analysis, J. Hand Surg. Asian-Pac. Vol. 24 (04) (2019) 469–476, https://doi.org/10.1142/S2424835519500619.
[18] D. Moher, Preferred reporting items for systematic review and meta-analyses: the PRISMA statement, Ann. Intern. Med. 151 (4) (2009) 264–269.
[19] OLoEW. The Oxford 2011 Levels of Evidence, Centre for Evidence-Based Medicine, Oxford, 2011 2011 [Available from: https://www.cebm.net/wp-content/uploads/2014/06/CEBM-Levels-of-Evidence-2.1.pdf.
[20] D. Dindo, N. Demartines, P. Clavien, Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey, Ann. Surg. 240 (2) (2004) 205–213.
[21] Collaboration C. Review Manager (RevMan). HEALTH PSYCHOLOGY REVIEW. V5.2.3 ed. The Nordic Cochrane Centre, Copenhagen, 20122014.
[22] J. Higgins, S. Thompson, Quantifying heterogeneity in a meta-analysis, Stat. Med. 21 (2) (2002) 1539–1558.