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Pediatric Wide-Awake Local Anesthesia No-Tourniquet Hand Surgery: A Scoping Review

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Abstract:

Background: Having the patient completely awake during the surgery like WALANT present numerous advantages. The same benefits of the patient's seeing active movement in an operation such as flexor tendon repair or a finger fracture holds true for children as for adults. The cornerstone for success is identifying the appropriate patient. The discussion with the patient and adequate preparation for maximum efficiency become a key for patient and surgeon comfort during the planned surgery.

Methods: A systematic literature search was conducted in online databases: PubMed, Google Scholar, Cochrane, Scopus, and Web of Science for all articles on the topic of WALANT hand surgery in pediatric patients.

Results: The medical literature search identified 85 articles. According to our inclusion criteria, of them, 6 articles and reports were eligible for inclusion in this scoping review.

Conclusion: WALANT technique should be considered for hand surgery in suitable pediatric patients, because of its prominent benefits. The patient's ability to comply during anesthesia and surgery is the key factor in the success of this technique.

Key Words: Hand Surgery, Wide-Awake Local Anesthesia No-Tourniquet Technique, WALANT,

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جراحة اليد بالتخدير الموضعي عند الأطفال: مراجعة ماسحة

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الملخص:

خلفية البحث: إن إبقاء المريض مستيقظًا تمامًا أثناء الجراحة كما في تقنية WALANT يقدم العديد من المزايا. تتطبق نفس فوائد رؤية حركات المريض كما في عمليات إصلاح الأوتار القابضة أو كسور الأصابع على الأطفال كما هو الحال بالنسبة للبالغين. حجر الأساس للنجاح هو تحديد المريض المناسب. تعتبر المناقشة مع المريض والتحضير الكافي لتحقيق أقصى قدر من الكفاءة مفتاحًا لراحة المريض والجراح أثناء الجراحة المخطط لها.

الطرق: تم إجراء بحث منهجي في الأدبيات في قواعد البيانات PubMed و Google Scholar و Cochraneو Scopus و Web of Scienceلجميع المقالات حول موضوع جراحة اليد WALANT في مرضى الأطفال.

النتائج: حدد البحث في الأدبيات الطبية 85 مقالاً. وفقًا لمعايير الإدراج الخاصة بنا، كان من بينها 6 مقالات وتقارير مؤهلة للإدراج في مراجعتنا المنهجية هذه.

الخلاصة: يجب تطبيق تقنية WALANT لجراحة اليد في المرضى الأطفال المناسبين، نظرًا لفوائدها البارزة كما و تعتبر قدرة المريض على الامتثال أثناء التخدير والجراحة هي العامل الرئيسي في نجاح هذه التقنية.

الكلمات المفتاحية: جراحة اليد، التخدير الموضعي الصاحي دون عاصبة، Walant

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1. Background:

Pediatric hand injuries are common and may require surgical management. General anesthesia is usually required for hand and upper-limb surgeries; however, having the patient completely awake during the surgery like WALANT present numerous advantages. The same benefits of the patient's seeing active movement in an operation such as flexor tendon repair or a finger fracture holds true for children as for adults [1,2,3]. Additionally, it eliminates the necessity of preoperative preparation for general anesthesia like overnight fasting which is indeed a stressing issue, especially pediatric patients. Besides, the postoperative hospitalization period can be reduced, thus decreasing the workload and the costs for both health services and parents, as these additional costs to the parents, such as travel, food, and parking fee expenses, can also be decreased. In addition, a shorter time of hospitalization would decrease the time away from the school, while the parents would also go back to work earlier [1,4,5].

2. Methods:

2.1. Literature search

A systematic literature search was conducted in online databases: PubMed, Google Scholar, Cochrane, Scopus, and Web of Science for all articles on the topic of WALANT hand surgery in pediatric patients published up to and including December, 2023 using the following terms: "WALANT," "Wide-awake local anesthesia no-tourniquet technique," "hand surgery," "pediatric patients". They were either searched individually or in combination. All relevant original research articles, of any study design were included and narratively discussed in this review. Studies not carried out in humans were excluded. English Language was included. Studies that met inclusion and exclusion criteria were separated for full reading, critical appraisal, and data collection. The bibliographic references of the captured articles were examined to search for additional relevant citations.

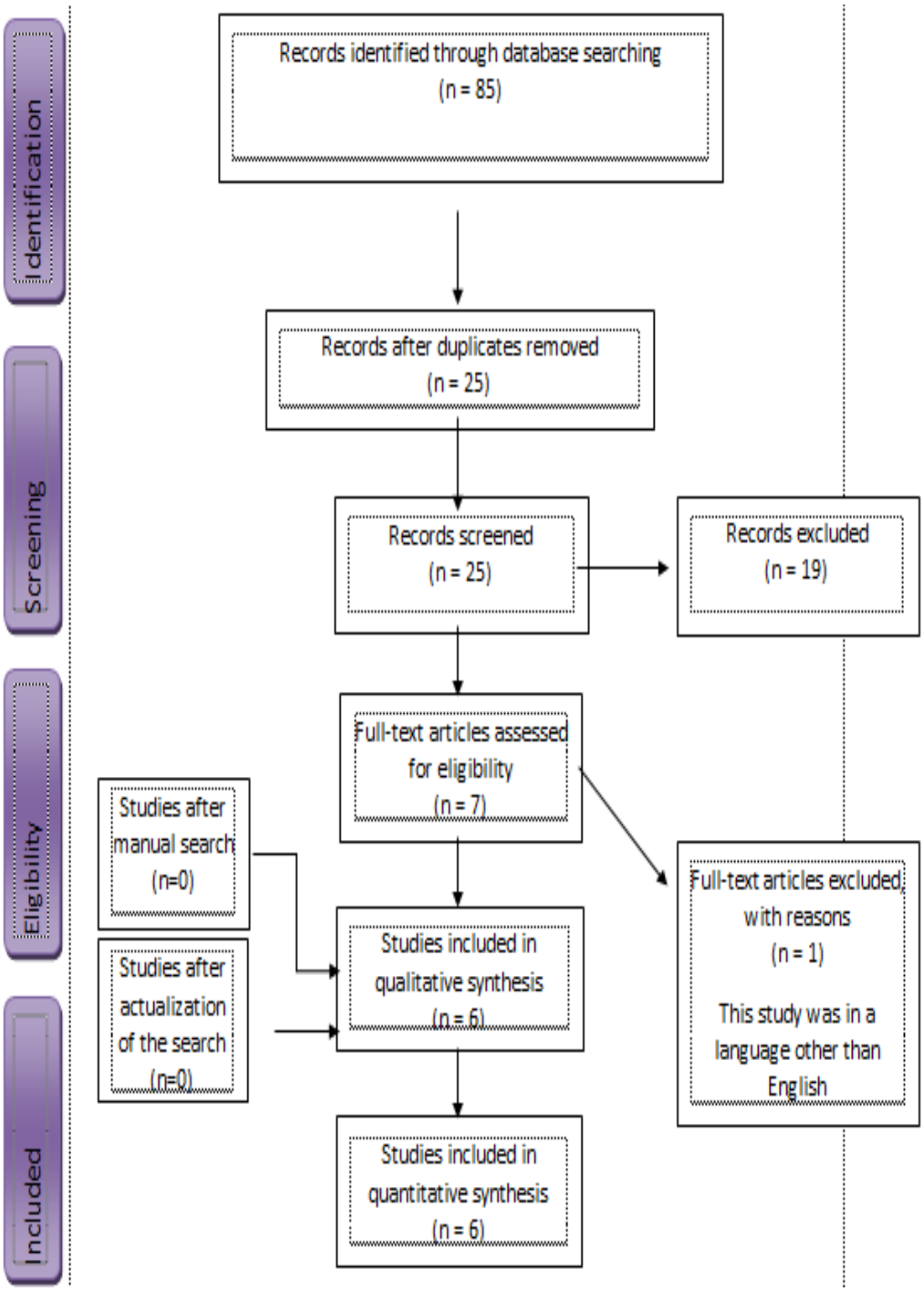
2.2. Scoops and criteria

The primary objective of this review is to show that WALANT technique should be considered for hand surgery in suitable pediatric patients. We also aimed to present practical considerations and recommendations in a systematic review for successfully performing this technique in pediatric patients.

3. Results:

In this review, we followed the checklist of the "The PRISMA 2020 statement: An updated guideline for reporting systematic reviews" [6]. The selection process is explained by the PRISMA flow diagram (see Figure. 1). The medical literature search identified 85 articles. According to our inclusion criteria, of them, 6 articles and reports were eligible for inclusion in this scoping review. Those studies were original articles, reviews and case reports.

Figure. (1): PRISMA 2020 flow diagram explains the selection process



4. Discussion:

Wide-awake local anesthesia no-tourniquet technique (WALANT), which was first described by Doctor Donald Lalonde, has been used in adults for several surgeries including: trigger finger release, open carpal tunnel release, tendon injuries, and more other complex reconstruction cases. In this technique, no tourniquet is used, given that prolonged use results in extremity discomfort and pain [1,2,3]. This technique has also been stated in detail in Doctor Lalonde's textbook with his personal approach to pediatric patients. General anesthesia for children requiring surgeries is accepted, but in children with complex medical problems, including heart conditions, general anesthesia may result in a higher risk. So avoiding all those risks and inconveniences of pediatric sedation and general anesthesia, and thus seeking for alternatives like WALANT technique is considered a demand. Pediatric WALANT hand surgery can be combined with distraction techniques like video content. Here, we are aiming via this review to provide a clinical guideline in WALANT hand surgery in pediatric patients, especially in children who can participate in the discussion. So far, there are only few reports and case series of WALANT hand surgery in children within the medical literature, including a case of congenital thumb flexion anomaly repair [4], a case of extensor indicis proprius transfer [5], and just only one clinical study published by the American Society for Surgery of the Hand (ASSH) describing their wide-awake hand surgery experience in patients 10 to 18 years of age [2].

4.1. Preoperative Examination, Indications, Contraindications:

As usual, every patient meeting should start with the history and hand examination. Additionally, here, it is essential to observe and evaluate the patient's personality and maturity from the moment you enter the room to decide whether he/she would be an appropriate candidate for the WALANT technique. After assessment, it is important to discuss the situation with parents [1,2,3]. If the patient and parents appear comfortable and confident, then the patient would be a candidate for WALANT technique. American society for surgery of the hand suggests based on the clinical practice lists of indications and contraindications that can be served as an initial guide [3]. Indications include: a compliant patient, typically aged above 10 years, a patient actively participating in a conversation, comfortable and confident patient and parents, congenital hand anomalies, finger fracture surgeries, flexor tendon surgeries, and complex tendon surgeries [3]. Concerning the suggested contraindications, they include: a fidgety or restless patient, an anxious patient or guardian, a history of "not doing well" with needles or vaccine administration, any indication of uncertainty from the patient or guardian, autistic spectrum, psychiatric diagnoses, a prolonged operation (>3 hours) [3].

Additionally, Tuna et al thought that the children would not tolerate a longer surgical procedure, as they can feel bored and become incompliant [2]. So, if the anticipated surgery duration is around two hours at maximum, offering WALANT technique to the patient and parent(s) is acceptable. The suggested examples of eligible diagnoses for WALANT usage, depending on the anticipated surgery duration, are: tendon repair, open reduction and fixation for phalangeal or metacarpal fracture, trigger finger, tenolysis, pulley reconstruction, ganglion cyst excision, foreign body excision, K-wire extraction, tendon cyst excision, tendon transfer, hemangioma excision, cubital tunnel release, digital nerve and artery repair [2].

4.2. Preoperative Discussion:

The preoperative discussion is the most important aspect for using the WALANT approach, with an emphasis on having clear communication with both the patient and parent. The most important factor in pediatric WALANT approach in gaining the patient's trust and cooperation is how you talk to the child before you inject the local anesthetic. Using a calm, soft-spoken voice with a gentle manner and engaging conversation is very helpful and recommended according to Doctor Donald [1,2,3].

The discussion should start similarly to all other patients, with a description of the etiology of their underlying diagnosis, followed by the proposed surgical intervention. Specifically for WALANT patients, it is crucial for the patient to comprehend the injury and surgery. Therefore, you may have to

use adjunctive methods, such as free hand sketches, online images, simplified terminology, during your discussion [1,2,3].
At this point, the surgeon should already have assessed whether the patient is a good candidate for WALANT hand surgery, which will determine how you proceed with the discussion. Framing the discussion about the anesthesia type becomes an important step: for example, beginning the discussion that we have two options, the first one is the general anesthesia, where the patient is fully asleep while performing the surgery [1,2,3].
Whereas, the second option is the local anesthesia where we numb up only a part of the hand, where the patient will not feel anything during the surgery, and will not be watching the surgery steps. During WALANT technique, many options are available for the child: participating and explaining simply each step, watching a show or a movie; or listening to music. This allows the patient autonomy to choose how he/she would prefer to spend the surgical time. Here, most pediatric patients would select to watch something [1,2,3].

4.3. Surgical Anatomy for Pediatric Patients:
The WALANT technique remains the same in children as in adults, except that a lower local anesthetic volume may be needed in a pediatric patient [1,2,3].

4.4. Local anesthetic with tips and tricks while application:
According to the American Society for Surgery of the Hand (ASSH), the most common local anesthetics that are used are lidocaine and bupivacaine, with or without epinephrine [3]. It is important to keep in mind the maximum weight-based dosage in the pediatric population. The maximum doses are 5 mg/kg for lidocaine and 2 mg/kg for bupivacaine, and are slightly higher when used with epinephrine. Bupivacaine is added to prolong the duration of pain relief after the surgical procedure, as it is one of the most common long-acting anesthetic agents [3]. Typically, the recommendation is a 1:1 mix of 1% lidocaine with 1:100,000 epinephrine and 0.5% bupivacaine and dilute as needed if exceeding the weight-based dose. The traditional WALANT approach includes only lidocaine and undiluted 1:100,000 epinephrine, with adding sodium bicarbonate for further patient comfort (1 ml, mixed with 9 ml of local anesthetic for a total of 10 ml) [1,2,3].
The key is to provide good local anesthesia with a skillful injection, so that all patients feel is only the first sting of a 30-gauge needle. Here, Doctor Donald suggested in his textbook a scenario for the first sting as follows [1]:
-"Do you believe in magic?" Most children will say "No."
-"Neither do I, but today I am going to show you some real magic. I am going to put some magic medicine underneath your skin. After I put it there, I will be able to fix your finger and it will not hurt at all. I promise you. The only problem with putting in the magic medicine is that you have to feel one tiny needle stick to get the medicine in there. All you need to do is hold still and not move. I will help you by holding your hand. If you pull your hand away before the medicine goes in, the needle will come out and I will have to stick it back in. If you hold still, you will only feel one little sting. If you move, you will feel two stings." [1]
You need to keep your promise by making certain that all the child feel is only the first sting. Be sure that you have more than enough volume of anesthetic to avoid any additional stings. Applying simple firm pressure on the skin proximal to where you will insert the needle can create sensory input "noise" that decreases the pain felt by the patient. Talking to the patient during the first insertion, stabilizing the syringe with two hands, injecting enough volume of tumescent local anesthetic in an antegrade fashion to plump up the skin, make the preoperative anesthesia injection easier [1,2,3].
For cases in newborns like accessory finger nubbins, according to Doctor Donald, the mother can start to feed the infant for a minute before gently pinching the skin and inserting the 30-gauge needle under the finger nubbin at the same time. The needle pain momentarily distracts the baby from drinking milk, but he or she usually just carries on feeding quickly because the discomfort is brief and minor [1]

4.5. Technique for show preparing and watching:

The patient is offered "the opportunity" to watch their favorite streaming show while they undergo the procedure. A smartphone (larger-screen model preferred), or a tablet is placed on a flexible tripod stand that can be attached to an overhead lamp or intravenous pole. Overhead operating room screens connected to a computer can also be used [3].

4.6. Before/ During Surgery:

Immediately before surgery, it is optional to consider keeping the patient nothing by mouth if possible and reasonable. Although aspiration is unlikely, it is safer to keep the patients with nothing in their stomach when lying flat for a prolonged period of time during the procedure [1,2,3].

Prepare the local anesthesia and prefill the syringes before the surgery and before the patient enters the operating or procedure room. Avoid showing the patient the needle or syringes if possible. Always have a sign outside the procedure or operating room door that states "Wide-Awake Surgery " [1,2,3].

Begin the show or movie for distraction. Use the drape to block the patient from seeing the injection and procedure. Always tell the truth that the initial pinch from the needle will hurt. Have an assistant hold the hand during the injection for safety and to ensure that you only place a single needle stick if possible when performing the local injection. Have the child take a deep breath in and out when the local anesthetic is initially going in. Let the local anesthetic set in before starting the surgery (15-20 minutes). The goal is not to inject again. Always check to ensure that the operative area is adequately numb with an Adson forceps, and ask the patient whether they feel that area being tested [1,2,3].

While performing the surgery, make sure to engage the patients as they are aware that you are going to be manipulating their hand, especially where they may still be sensate. Avoid the use of sharp or pain trigger words, such as "needle," "knife," "scalpel," or "scissors." Remember during casting and dressing application that the patient can hold up their arm if you ask them to [1,2,3].

The children are also educated on how to take care of their hand during the procedure. This will, for example, involve instructions suggesting the importance of the orthosis and dressing, the weight bearing status of their hand, safe ranges of movements, instructions regarding pain medication, and/or future plans for hand therapy or recovery [1,2,3] .

4.7. Postoperative Management:

Patients usually have no pain after the surgery and can be easily discharged home after the surgery. The patient can bypass the post anesthesia care unit and be transferred straight to the recovery room, which may be another advantage to this technique for the patient and the family. Patients are supervised for two hours in the hospital after the end of the surgery for any potential complications [1,2,3].

5. Conclusion:

Consequently, WALANT technique should be considered for hand surgery in suitable pediatric patients, because of its prominent benefits. The patient's ability to comply during anesthesia and surgery is the key factor in the success of this technique, and this can be reached through gaining the patient's trust and cooperation via discussion before surgery with both patients and parents.

Provenance and peer review

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Conflicts of interest

None.

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None.

Ethical approval

Not applicable, no human subjects or research participants' data were utilized or collected.

Consent

Not applicable, no human subjects or research participants' data were utilized or collected.

Registration of research studies

Not applicable, no human subjects or research participants' data were utilized or collected.

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References:

1. Donald LaLonde. (2016). Wide Awake Hand Surgery. First edition. Chapter 9: WALANT Hand Surgery In Infants and Children, Thieme Publishing Group.
2. Tuna, Z., & Ayhan, E. (2022). Wide-Awake Hand Surgery Experience in Patients 10 to 18 Years of Age. *Journal of hand surgery global online*, *4*(6), 389–393. https://doi.org/10.1016/j.jhsg.2022.02.003.
3. Kapadia, K., Shah, S., & Galvez, M. G. (2022). Pediatric Wide-Awake Local Anesthesia No-Tourniquet Hand Surgery: A Practical Approach. *Journal of hand surgery global online*, *4*(6), 426–431. https://doi.org/10.1016/j.jhsg.2022.05.002
4. Zukawa, M., Osada, R., Inagaki, M., Hirokawa, T., & Kwaguchi, Y. (2021). Wide-awake Surgery for Congenital Thumb Flexion Anomaly in a Child. *Plastic and reconstructive surgery. Global open*, *9*(4), e3504. https://doi.org/10.1097/GOX.0000000000003504
5. Patel, H. A., Lee, M. C., & Chaudhry, S. (2020). Extensor Pollicis Longus Tendon Rupture After a Pediatric Distal Radius Fracture: A Case Report and Literature Review. *JBJS case connector*, *10*(3), e2000022. https://doi.org/10.2106/JBJS.CC.20.00022
6. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71; Published 2021 Mar 29.