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The outcome measure of wide awake hand surgery

Husnain Khan[1], Kamaluddin Khan[2], Nadeem Pasha[3], Muhammad Bilal[4], Naveed Arshad[5], Wajiha Shahid[6]

[1]Assistant Professor, Dept of Plastic Surgery, Rawalpindi Medical University, Rawalpindi
[2]Assistant Professor, Bolan University of Medical and Health Sciences, Quetta
[3]Assistant Professor, Wah Medical College, Wah Cantt
[4]PGT Orthopedic, PAEC Hospital Islamabad
[5]Assistant Professor, Rehabilitation Sciences, Islamabad Medical and Dental College, Islamabad
[6]Consultant, Rehabilitation Sciences, Central Park Teaching Hospital, Lahore

Author`s Contribution

[1,2]Conception, data acquisition, revision, and approval of the final draft, Designing and drafting of work,
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Address of Correspondent
Dr. Nadeem Pasha
Assistant Professor,
Wah Medical College, Wah Cantt
npasha7@yahoo.com

ABSTRACT

Objective: To measure the effects of WAHS intra-operatively with respect to the subject's well-being, pain and choice for wide awake surgery.

Methodology: A cross sectional study of seventy patients with age range from 15-65 years, who underwent hand surgery in Jinnah Burn and Reconstructive Surgery Center, Lahore, between January 2019 to August 2019. The effectiveness of anesthesia was measured by pain, well-being and patient preferences. Pain was rated using the visual analogue scale (VAS). Patient well-being was tested depending on how they felt concerning options on the Likert scale depicting in terms of extremely well, well, less well and extremely less well on VAS scoring. The preference of the subject was assessed by his experience in the surgery and the anesthesia they chose.

Results: The total number of patients was 70, whose age was 33.63±6.94 in the range of 15 to 65 years. The average pain score on the VAS was 0.51±1.38 and the duration of surgery was 1.43±0.35 hours. Pain was a variation in the outcome observed in operation during surgery. There were 84.3% of patients who did not experience any pain during their surgery. The remaining patients showed various levels of pain on VAS.

Conclusion: The benefits of WAHS are that short duration hand surgery procedures can be done using local anesthesia containing epinephrine. It is cost effective, avoids the side effects of general anesthesia, avoids the use of a tourniquet and reduces the burden of surgical patients requiring general or regional anesthesia procedure. It also avoids patient admission in to the hospital thus sparing hospital beds.

Keywords: Anesthesia, Hand surgery, Lidocaine, Visual analog scale, WAHS.

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Introduction

One of the key organs of the body is the hand and its digits. A professional is mainly dependent on these parts so they are also the most frequent parts of the body that sustain trauma. Every year millions of people are admitted in emergency departments of the USA with hand injuries and they account for 15% of all injuries treated in the emergency department.[1-3]

Hand problems can be treated under the procedure called wide awake hand surgery (WAHS) in which the patient comes to the hospital on the surgery day, gets local anesthesia on the area of the hand to be operated, undergoes surgery and returns home on the same day.[4] Epinephrine and lidocaine injected together to maintain homeostasis and avoid the use of painful tourniquet.[5-8]

Use of epinephrine or phenylephrine along with local anesthetic solution allows increasing the dose of local anesthesia.[9] There is an increase in the dose of lidocaine from 3.5 - 4.0 mg/kg to 7.0 mg/kg with the addition of epinephrine or phenylephrine. These vasoconstrictors lead to a decrease in plasma uptake and an increase in the duration of local anesthetic effect.[10,11]

The use of vasoconstrictor along with local anesthetic agents has avoided the use of tourniquet, resulting in more comfortable environment for the patient. In addition to that there is an advantage while repairing the tendons as there is full motor control of the hand during the surgery, which allows adjustments of tension in tendon repair with active movements. So, there is tension-free closure of tendon as well as skin in awake patients.[10,12]

WAHS has the benefit of avoiding hospital admission & sparing the beds for other more pressing emergencies. It also avoids the complications that may occur with general anesthesia which increases surgical revenue and thus it is cost effective. Koegst and colleagues found that pain at the time of injection was 2.86 on average and 0.88 during surgery on the visual analog scale (VAS). In 10% of patients (12 in number), a second dose of local anesthesia was required. The zero-level VAS was marked as extremely high or "well" by grades 1-3 on VAS while grade 4-7 on VAS was marked as "less well" and VAS of 8-10 was marked "extremely less well". 79.9% of patients reported zero-level VAS while 20.1% felt "less well" by grade 4-7 on VAS. None of the patients reported a score of 8-10 on VAS while going through the process. When given the option to choose the type of anesthesia if another procedure is needed, 83% of the patients opted for WAHS and only 9% for another type of anesthesia.[7]

In another study 91.0% of patients reported mild pain (VAS 4-7) during procedure while 86% would choose wide-awake procedure if they had to go through hand surgery ever again. 90% of the patients said they would be recommending WAHS to other people as well.[13]

Having in view, the guaranteed benefits of WAHS in a variety of disciplines, its use is widely accepted worldwide and we decided to adopt WAHS in various procedures using this method. The purpose of this study was to assess the efficacy of WAHS in hand surgery in terms of patient well-being, pain and preference for wide awake surgery.

Methodology

A cross sectional study was done at the Jinnah Burn and Reconstruction Surgery Center, Lahore from January to August 2019. A sample size of 70 patients was gathered from the Winpepi software: ver 11.15 with a confidence level of 95% and accepted difference of 0.1%. Subjects having age of 15-65 years (requiring) requiring hand surgery done of no more two hours' duration were included in the study. Subjects having diabetes mellitus, high blood pressure and a history of lower blood pressure were not included in the study.

After obtaining approval from the Ethical Review Committee of the hospital, patients who met the inclusion criteria were included in the study. After informed consent, patients were given Lidocaine 2% with adrenaline as tumescent procedure. Local anesthesia infiltration & surgery was done by a single surgeon (Table I). All the procedures were done by the same surgeon. The techniques were executed following the general principles of hand surgery. As epinephrine is proven safe in digital block, so WAHS was also used in digits.[14-16] The subjects were told to rate their pain and feeling of well-being during procedure until surgery ends and they were evaluated every 15 minutes till the end of the procedure. The effect of anesthesia was calculated by pain, well-being, and preferences. Pain was rated with the VAS. Subjective assessment was done. Subject well-being was assessed depending on how they felt on the Lickert scale.

After the operation, subjects were asked regarding WAHS preference if they required it to be given in the future in case of hand surgery. Data was recorded in the Proforma and was analyzed using SPSS version 17.0.

Table-I: Lidocaine dosage and concentration with epinephrine tumescent fluid to be injected in forearm, hand and finger.

Concentration and dosage of epinephrine with lidocaine tumescent fluid to be injected in upper extremity.	
Volume required to tumescent the Area of Dissection	Lidocaine and Epinephrine concentration
Less than 50 cc	1% Lidocaine with 1:100,000 Epinephrine
Between 50cc and 100cc	½ % Lidocaine with 1:200,000 epinephrine
Between 100 and 200cc	¼% Lidocaine with 1:400,000 Epinephrine

Results

Descriptive statistics for ages (years) are calculated in means and standard deviation. Mean Age was 33.63±6.94 ranging from 15 to 65 years. The average pain score was 0.51±1.38 on the VAS, and the mean duration of surgery was 1.43±0.35 hours. Gender distribution was measured according to frequency and percentage. The gender distribution was male 62 (88.6%) and female 8 (11.4%), respectively.

Pain was a variation in the outcome observed in operation during surgery. 84.3% of patients did not experience any

pain during surgery while the remaining 15.7% of patients showed different pain levels (mild to moderate) according visual analogue scale (VAS). Well-being of patients in terms of how well they felt was recorded on a Likert scale. We found that 66 patients felt extremely well or well 59 (84.3%) and 7 (10%) respectively, only 4 patients (5.7%) felt less well and not a single patient felt extremely less well. Patient selection of future anesthesia options revealed 63 patients (90%) would like to go through wide awake hand surgery in the future and 7 (10%) patients did not choose future WAHS (Table II).

Table II: Statistics of VAS, patient well-being and future WAHS (n = 70)

		N	%
VAS pain scale	No pain	59	84.3
	Mild to moderate pain	11	15.7
Patient well-being	Extremely well	59	84.3
	Well	7	10
	Less well	4	5.7
Future WAHS	Yes	63	90
	No	7	10

The association of gender distribution with WAHS patient preferences was recorded. The majority of male patients preferred WAHS as compared to the female patient (Figure-I).

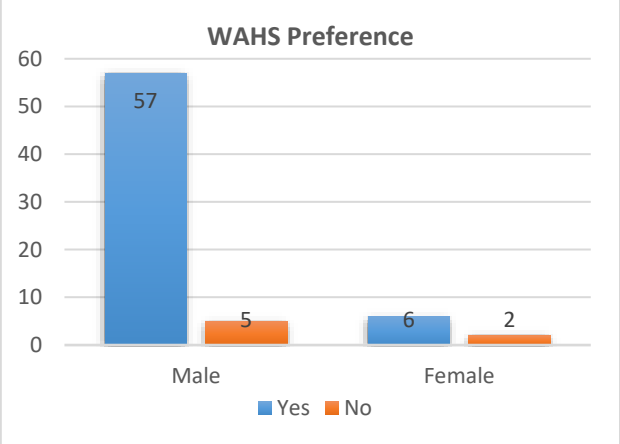

Figure I. Association of patient choice of wide awake hand anesthesia with genders

Different hand surgery procedures performed, along with their percentages is given below (Table III).

Discussion

Infiltration of local anesthesia with epinephrine without the use of a tourniquet on the upper extremity is known as wide-awake approach. This technique allows surgeons to provide advanced hand care in a daycare facility, without the need for prior hospital admissions, laboratory tests and general or regional anesthetics and postoperative care.

We have used the wide-awake anesthesia for hand surgery in 70 patients. In this study it is estimated that the age (years) of patients reporting hand injury was 33.63±6.94 in the range of (15 to 65 years). A study was conducted in the department of orthopedics at the university of Ioannina,[13] 211 complex hand injuries were treated with 190 patients who were 35 years of age (range 25-73) and the majority of patients were also male (89%). Most importantly, the ages of these patients indicated young patients undergoing hand surgery.

Table III: Statistic of WAHS procedures, frequencies and percentages, n = 70

Procedure	N	%
Flexor tendon repair	15	21.5
Extensor tendon repair	5	7.1
Phalangeal fracture	5	7.1
Metacarpal fracture	3	4.3
DIPJ orthodesis	5	7.1
PIPJ orthodesis	5	7.1
MCPJ orthodesis	2	2.9
Trigger thumb	3	4.3
Trigger fingers	5	7.1
Carpal tunnel release	20	28.6
Ulnar nerve compression at elbow	2	2.9
Post burn single finger contracture	5	7.1
Total	**70**	**100**

Males make up the largest patient population at 88.6% or 62 of 70 patients, while 8 female patients comprising 11.4% were present in our study. This is in line with research conducted in the department of orthopedics of the University of Ioannina.[13]

Men have greater responsibility for bread earning in our society than women. And mostly, aggressive men in the family indulge in more. This leads to more hand injuries in men than in women.

In this study we considered the patient's comfort during surgery, patient well-being, and patient preference. No serious side effects have been reported and 90% of patients prefer WAHS in the future if necessary. Similarly, a study by Donald Lalonde and Alison Martin[9] gave a view that most of the subjects were satisfied with the anesthesia where 90% of them were very happy with the procedure outcome. In another study, Donald H. Lalonde reported 100% subject satisfaction and wellbeing.[5]

The pain experienced during surgery was calculated with VAS scale and was 0.51 (0-10) on average. Koegst and

Wolfe O,[7] showed 0.88 (0-10) pain score on VAS which is similar to this study.

The well-being of the subject was assessed by Likert scale and VAS scoring and we found that 66 of our patients (94.3%) felt "extremely well" or "well" ", 4 (5.7%) felt" "less well" during surgery and 90% of subjects would choose this anesthesia if further surgery is required.

The advantages of wide awake hand surgery procedure are: active tendon gliding can be adjusted during surgery, patient comfort, no need for the patient to fast before surgery, cost-effectiveness, and less hospital stay. There was a myth about the use of epinephrine in digits now which has been proven to be false for various studies and can be used safely.[14-16]

However, our study has a limitation of small number of patients. The large size of the sample would allow us to have more reliable results.

Conclusion

By recognizing the benefits of WAHS, it can be concluded that short duration hand surgery procedures may be done with local anesthesia and epinephrine. It is cost effective and lessens the complications of long-term anesthesia, the use of a tourniquet and the reduction of the burden on bed demand & reduced work load on anesthetic department due to surgical patients requiring general anesthesia or regional anesthesia procedure.

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