



Original Research

Comparison of the Cost and Efficacy of Axillary Anesthesia and Wide-Awake Anesthesia in Finger Surgeries

İbrahim Avşin Öztürk,¹ Kahraman Öztürk,² Osman Orman,² Mehmet Baydar,³ Serkan Aykut,² Ahmet Köse¹

¹Department of Orthopedics, University of Health Sciences, Erzurum Regional Training and Research Hospital, Erzurum, Turkey

²Department of Hand Surgery, University of Health Sciences, Metin Sabanci Bone and Joint Diseases Training and Research Hospital, İstanbul, Turkey

³Department of Hand Surgery, Adana Numune Training and Research Hospital, Adana, Turkey

Abstract

Objectives: Wide-awake anesthesia is a type of local anesthesia consisting of a combined application of lidocaine, epinephrine, and bicarbonate and has a wide potential in hand surgery as it offers the advantage of being applied without sedation and without using a tourniquet. In light of recent studies, its use has increased with the disappearance of the belief among surgeons that epinephrine can cause circulatory disturbance in fingers.

Methods: Patients with finger pathologies who were operated upon at the Baltalimani Bone Diseases Teaching and Research Hospital between January 2015 and February 2016 were divided into two groups according to anesthesia type: wide-awake anesthesia and axillary block anesthesia, with 52 patients in each group. Start time of surgery, length of hospital stay, anesthesia cost, and patient satisfaction were compared. For the evaluation of patient satisfaction, the patients were postoperatively asked whether they would accept the same anesthesia method if they had to have the same experience. Each group was further divided into two subgroups: bone interventions (phalangeal fracture, bone biopsy, implant removal, and interphalangeal joint arthrodesis) and soft tissue interventions (digital nerve repair, fingertip local skin flap, flap division, releasing stiff joint, ligament repair, and debridement). Each subgroup included 26 patients.

Results: Sufficient anesthesia to cover the whole duration of surgery was achieved in both the groups. Regarding the question "If you were experiencing the same experience, would you accept the same anesthesia again?" 26 and 33 patients responded positively, 16 and 7 patients responded negatively, and 10 and 12 patients remained neutral in the axillary block and wide-awake anesthesia groups, respectively. According to the Social Security Institution data, the average anesthesia cost was 316.1 TL in the axillary block anesthesia group and 25.3 TL in the wide-awake anesthesia group; the average length of hospital stay was 32.9 h in the former and 13.6 h in the latter. Start time of surgery was 34 minutes in axillary block anesthesia and 5.3 minutes in wide-awake anesthesia.

Conclusion: We found that compared with axillary block anesthesia, the length of hospital stay was 19.3 h less and anesthesia cost was 290.8 TL less with wide-awake anesthesia; furthermore, the start time of surgery decreased by 29.7 min with the latter. Moreover, patient satisfaction rate was better in the wide-awake anesthesia group. No bleeding, patient incompatibility, and other complications that might interfere with the surgery were detected.

Keywords: wide-awake patient, anesthesia, bleeding

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Address for correspondence: Ahmet Köse, MD. Department of Orthopedics, University of Health Sciences, Erzurum Regional Training and Research Hospital, Erzurum, Turkey

Phone: +90 506 633 05 20 **E-mail:** kose.ahmet.46@hotmail.com

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Wide-awake anesthesia is a type of local anesthesia in which an anesthetic combination consisting of lidocaine, epinephrine, and bicarbonate is used; it has a wide potential of use in hand surgery with the advantage of being applied without any need for sedation and a tourniquet.^[1] In the light of recent studies, its use has increased with the disappearance of the belief among surgeons that epinephrine may cause circulatory disturbance in fingers.^[2-6] Wide-awake anesthesia is being used in the field of hand surgery for the repair of tendons; fixation of open-close fractures; tenolysis; tendon transfers; carpal tunnel relaxation; trigger finger treatment; hand-wrist arthroscopy; and wrist, forearm, and elbow surgeries.^[7-11] Performing these surgeries under wide-awake anesthesia shortens the operative time and hospital stay; decreases treatment costs; and most importantly, helps gain instant information about the functional state of the finger during surgery.^[9]

In our study, hospital stays, medical costs, and satisfaction levels of 52 patients with conditions involving fingers who underwent surgeries under wide-awake anesthesia or axillary anesthesia between January 2015 and February 2016 were compared.

Methods

A 10 cc 1% lidocaine solution containing 1:100.000 adrenaline was mixed with 1 cc 8.4 % bicarbonate. A 2 cc solution containing this mixture was injected through midline into volar and dorsal aspects of the affected finger, in the mid-

dle of the metacarp, metacarpophalangeal (MF) joint, and proximal interphalangeal joint; 1 cc of this solution was injected into the distal interphalangeal joint, and the region was swelled with the solution and whitened. We proceeded with the surgery after the perception of pain disappeared. (Fig. 1). In case needed, half of this dose was reinjected. If surgery would last for more than 2 h, 6 cc bupivacaine was added to the solution.

Data of 52 patients who underwent surgeries at the Bal-talimani Bone Diseases Teaching and Research Hospital between January 2015 and December 2015 under wide-awake anesthesia or axillary anesthesia were obtained regarding their surgeries, hospital stays, amount of perioperative bleeding, severity of pain (visual analogue score), and hospital costs.

In each group comprising 26 patients, bone surgeries were performed for phalangeal fracture, bone biopsy, implant extraction, and interphalangeal (IP) joint prosthesis; furthermore, soft tissue interventions were performed that included digital nerve repair, finger tip flap, flap elevation, relaxation of joint contracture, tendon and ligament repair, and debridement. The median age of the patients who underwent interventions for soft tissue defects under wide-awake anesthesia (11 females and 15 males) was 39.7 (18–64) years. The median anesthesia cost [26.8 (18.5–48.5) TL], hospital stay [14.3 (6–33) h], and time to surgery after application of anesthesia [5.3 (3–8) min] were also determined and evaluated. The median age of the patients who underwent bone

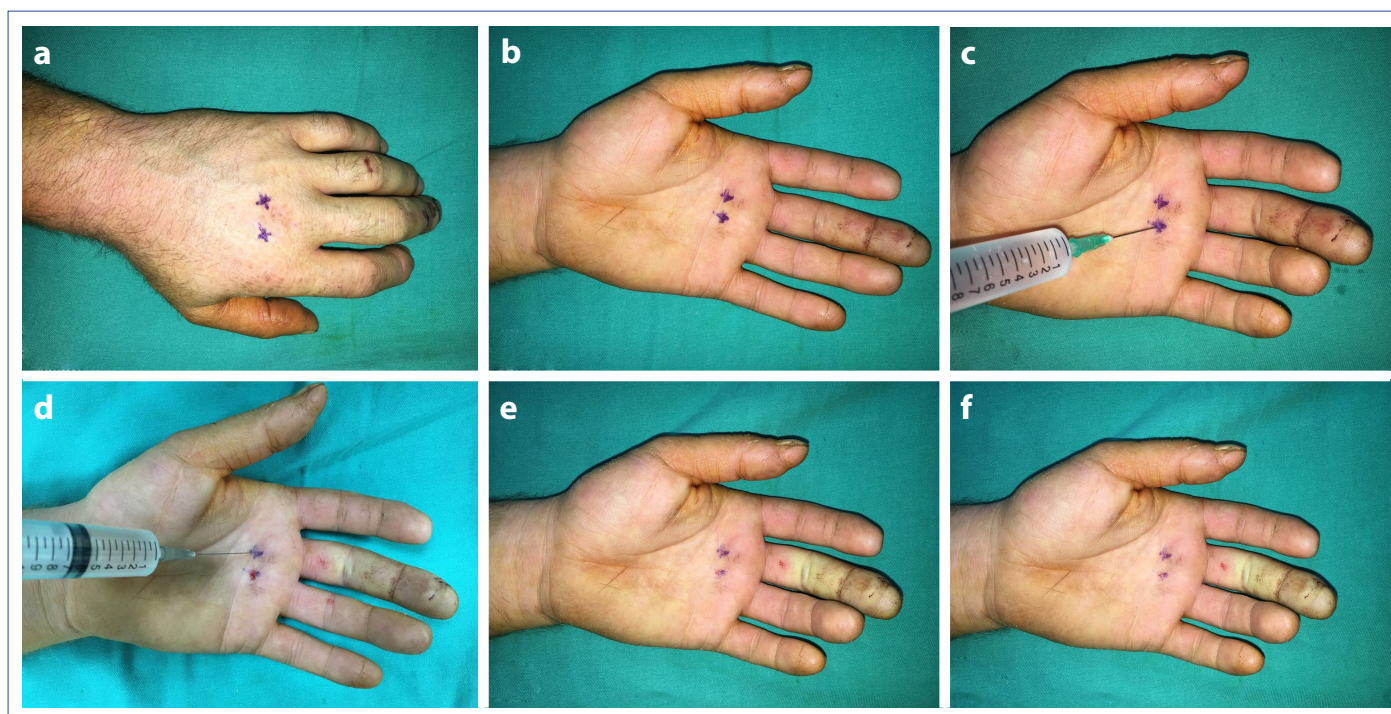


Figure 1 (a-f). Dorsal and volar views of a patient suffering from FPL tendon rupture of 3. finger (left hand) which planned to treat surgically (a, b), Incetion procedure (c, d) and pallor due to vasoconstriction in microvascular cerculation (e, f).

surgeries under wide-awake anesthesia (11 females and 15 males) was 38 (18–70) years; furthermore, the median anesthesia cost [24.9 (18.5–48.5) TL], hospital stay [14.3 (7–38) h], and time to surgery after application of anesthesia [5.1 (4–7) min] were determined and evaluated. The median age of the patients who underwent soft tissue interventions under axillary block (11 females and 15 males) was 40.6 (19–67) years; the median anesthesia cost [322.7 (280–343) TL], hospital stay [31.2 (18–46) h], and time to surgery after application of anesthesia [38.8 (20–45) min] were evaluated. The median age of the patients who underwent bone surgeries (10 females and 16 males) was 37.5 (18–76) years. The median anesthesia cost [309.4 (239–343) TL], hospital stay [34.5 (24–46) h], and time to surgery after application of anesthesia [33.2 (20–45) min] were also evaluated.

The length of hospital stay of the patients were calculated as the time elapsed from their hospital admission for surgery to their discharge. Surgical costs covered all expenses including preparation for surgery after making the decision to operate, disposable materials used, and hospitalization. Tourniquet application is allowed in procedures performed under axillary anesthesia, whereas it may cause pain in patients under wide-awake anesthesia. Therefore, the amount of bleeding was measured after postoperative hemostatic control was achieved. Postoperative quantification of bleeding was recorded in three categories as follows: “no bleeding,” “minimal bleeding,” and “bleeding requiring tourniquet application.” Postoperative quantification of bleeding was based on the amount of blood the sponges held. The data obtained were compared between the two groups. Postoperatively, the patients were asked whether they would accept the same method of anesthesia if they should undergo the same surgery, and their responses were recorded.

Results

The median anesthesia cost, excluding the costs of surgical interventions, analgesics, and antibiotherapies, according to Social Insurance Institution, was only 25.3 TL in the wide-awake anesthesia group, whereas it was 316.1 TL in the axillary block anesthesia group. The median length of hospital stay was 32.9 h in the axillary block anesthesia group, whereas it was only 13.6 h in the wide-awake anesthesia group; furthermore, the median time to surgery after application of anesthesia was 35 min in the former and only 5.3 min in the latter. In the axillary block anesthesia group, tourniquet application was a routine procedure; thus, no bleeding-related complication was observed. In the wide-awake local anesthesia group, minimal bleeding was observed in 10 patients, and after simple coagulation, we proceeded with the surgery. In two patients, bleeding did not stop with simple coagulation; thus, surgery was completed

Table 1. Comparison of wide-awake anesthesia, and axillary anesthesia regarding anesthesia cost, hospital stay, time to surgery (median, minimum, and maximum values)

	Wide-awake anesthesia	Axillary anesthesia
Anesthesia cost (TL)	25.3 (18.5-48.5)	316 (239-343)
Hospital stay (h)	13.6 (6-38)	32.9 (16-46)
Time to surgery (min)	5.3 (3-8)	34 (20-45)
Amount of bleeding	10 patients: minimum bleeding 2 patients: application of tourniquet 40 patients: no bleeding	No bleeding in all patients

with tourniquet application (Table 1).

Thirty-three patients in the wide-awake anesthesia group and 26 in the axillary block anesthesia group responded that they would again undergo the same procedure under the same anesthesia. Seven patients in the wide-awake and 16 in the axillary block anesthesia groups responded negatively to this question, or they were indecisive (12 vs 10 patients). Median visual analogue scale (VAS) scores at postoperative 6 h were 0.5 (0–2) and 3.1 (0–6) in the wide-awake and axillary block anesthesia groups, respectively; VAS scores were significantly lower in the former.

Discussion

Upper extremity surgeries, especially hand surgery, have become popular in recent years. As a necessity, this type of surgery can be performed on an ambulatory basis in order to decrease exposure to the hospital environment and hospital costs.^[12] In the United States and most European countries, nearly 70% of the orthopedic procedures and hand surgeries are performed as day care procedures.^[12] Regarding anesthetic procedures used in hand surgeries, general anesthesia, peripheral regional block, and local anesthesia along with sedation are being used. In recent years, wide-awake anesthesia has been included in this armamentarium. Thanks to ambulatory patient treatment provided by wide-awake anesthesia, costs of preoperative blood tests, imaging methods, and consultations are eliminated; furthermore, daily hospitalization costs and bed occupancy rates decrease. We also detected nearly 59% decrease in hospital stay with wide-awake anesthesia. Besides, hospital expenditures decreased at a rate of 93%.

The safety of intradigital injection of epinephrine, which enables the realization of wide-awake anesthesia has already been proved. Recent studies have invalidated the widespread information asserting that epinephrine impairs

blood circulation of the finger, leading to tissue necrosis.^[13] Use of epinephrine obviates the need for tourniquet application. Disappearance of pain caused by tourniquet application means no need for anesthesia and sedation. Muscle, nerve, and skin injuries; compartment syndrome and other systemic side effects, which are considered complications of tourniquet application; and post-tourniquet syndrome characterized by weakness, rigidity, edema, dysesthesia, and pain in the affected region do not develop in patients operated under wide-awake anesthesia.^[14] In addition, operative time limiting effect of the tourniquet is relieved. In our study, pain scores at postoperative 6 h were significantly lower in the wide-awake anesthesia group. However, intraoperative amount of bleeding did not differ between the groups. In only two patients, bleeding requiring tourniquet application occurred.

As a component of the anesthetic agent used in wide-awake anesthesia, bicarbonate decreases the burning pain caused by acidic lidocaine; thus, it enables the administration of high doses of anesthesia into multiple sites without causing patient discomfort.^[13] In questionnaire surveys administered during axillary anesthesia and following wide-awake anesthesia, 7 patients who received the latter and 16 patients who received the former gave negative responses. The most important advantage of wide-awake anesthesia is that the patient can obey and fulfill our commands. In an article, Lalonde^[9] indicated that this method is advantageous because during repair of the tendon identification and relief of the impingement of repair site under the pulleys, testing of the repair line after each suturing by active movements of the finger may be achieved. In addition, the degree of active flexion following the repair procedure can be seen, which will guide tendon rehabilitation. Thanks to these superior aspects, the probable risks of tendon adhesions and ruptures have decreased.^[9] Bezuhyt et al.^[10] indicated the advantages of patients being wide awake during adjustment of the length of the tendon for the proper reconstruction of the extensor pollicis longus and extensor indicis brevis. We also observed the advantages of patient's obedience to and fulfillment of our commands during tendon repairs, reconstructions, and transfers in our cases. In addition, we could determine malrotation following fixation of the fractured bone.

Although our study compares axillary and wide-awake anesthetics, the superior aspects of the latter compared with those of digital nerve block should also be mentioned. Digital nerve block is applied on digital nerves of the fingers, and it is a prevalently used block type in finger surgeries.^[14-16] Because it is applied directly on the nerve, local anesthetics devoid of epinephrine are used and hemostasis

is ensured frequently with finger tourniquets. Besides, the mechanical compression of digital anesthetic agent on the artery should not be forgotten. Epinephrine used in wide-awake anesthesia method provides hemostasis and decreases the need for tourniquet application. Compared with the digital block, the ease of application, use of epinephrine-containing agents, lack of need for tourniquet application, and absence of related complications are the advantageous aspects of wide-awake anesthesia. We investigated surgery-related bleedings in 52 patients who received wide-awake anesthesia; bleeding did not occur in 40 patients, and in 10 patients, complete hemostasis was achieved using bipolar cautery, while 2 patients required tourniquet application.

Conclusion

Using wide-awake anesthesia in hand surgery, especially in finger surgeries, decreases anesthesia cost, shortens hospital stay, and increases patient satisfaction. During surgery, the patients can obey and fulfill surgeon's commands, which ensures confirmation of the functionality of interventional procedures, especially repair of tendons. The patients who had undergone procedures under axillary anesthesia at our clinic were found to be suitable for undergoing surgery under wide-awake anesthesia after this study.

Disclosures

Ethics Committee Approval: The study was approved by the Local Ethics Committee.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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