Scientific Article

Application of WALANT in Diaphyseal Plating of Forearm Fractures: An Observational Study

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Purpose: Wide-Awake Local Anesthesia No Tourniquet (WALANT) is a novel anesthesia technique in distal radius and ankle fracture fixation. However, to date, there are limited studies in diaphyseal plating of forearm fractures under WALANT. This research is to study the feasibility of the use of WALANT technique in plating of diaphyseal fractures of the forearm as well as peri-operative outcomes.

Methods: Sixty-one adult patients who underwent diaphyseal plating of the forearm under WALANT between the period of January 2019 and January 2021. It consists of 31 radius fractures, 15 ulna fractures and 15 ipsilateral radius and ulna fractures. Outcomes evaluated were duration of stay, peri-operative outcomes, manipulation and 12 (16%) patients reported pain during bone drilling. There was no significant difference in pain score between radius and ulna bones (P > .05). There was a significant change in blood pressure after LA infiltration (P < .01). The mean estimated blood loss was 27.39 ml (SD = 11.44) and the mean duration of post-surgery hospital stay was 1 day (SD = 1.026). Fifty-six patients (92%) recommended diaphyseal plating of the forearm under WALANT. None of the patients required conversion to general anesthesia and had no adverse events or infection during 6 months follow up.

Conclusions: Diaphyseal plating of the forearm under WALANT is a feasible alternative anesthesia technique and is well tolerated by patients.

Type of study/level of evidence: Therapeutic III.
WALANT may not require fasting and can also be performed as a "day-care" procedure. Flexible and shorter waiting times for in- or outpatient surgery, as well as turnover times for GA cases, also make this technique more convenient and efficient. The transition time between cases is also shorter, as there is no weaning off and recovery time of patients after GA. Wide-awake local anesthesia no tourniquet can also minimize the usage of postoperative opioid analgesia due to the extended effects of local anesthesia (LA), which can last longer after surgery. In addition, range-of-motion exercises can be initiated immediately after the surgery due to the wide-awake state and extended effects of LA. To date, there is only 1 published case report of diaphyseal ulna platting under WALANT, in which the patient did not complain of pain and no adverse effects were encountered.8 There were several similar studies related to the plating of the distal radius under WALANT, wherein the authors concluded that the fixation of distal radius fractures resulted in a shorter waiting time for surgery, shorter hospital stay, cost effectiveness, good hemostatic control, and similar clinical outcomes compared to use of GA.7,9,10 We hypothesize that fixation of diaphyseal fractures of the forearm under WALANT will have a high local anesthetic success rate, provide good pain relief, and serve as a feasible alternative to other modes of anesthesia.

Materials and Methods

This study only involved adult patients who underwent platting of diaphyseal radius and/or ulna fractures (The Arbeitsgemeinschaft für Osteosynthesefragen foundation/Orthopaedic Trauma Association [AO/OTA] 22 type A and B) under WALANT between the period of January 2019 and January 2021 in a tertiary center. All adult subjects who sustained diaphyseal forearm fractures and were able to understand instructions and obey commands were counseled for participation in the study and gave written consent (Table 1). Complex fractures (AO/OTA 22 type C) of the radius or ulna or any concomitant injuries that would affect the study variables were excluded from the study. Information on age, gender, perioperative pain scores, perioperative blood pressure (BP) and heart rate, blood loss, length of surgery, postoperative hospital stay, and patient satisfaction were collected. There was no control group involved in this study, and all cases were subjected to ethical committee approval (NMR-R-20-301-52862 IIR). This study was self-funded, with no conflicts of interest from any author. Prior to surgery, patients were counseled regarding the choices of anesthesia and the adverse effects or complications, the benefits of the study, the technique and procedure of LA infiltration, the numbness effect of lignocaine, instrument noises and the surgeon’s (H.M.H., B.L.J.K., A.A.A.) voice during surgery, pain score, and the absence of sedation during surgery. We also informed the patient that in the event they were unable to tolerate pain or stress during the surgery, the surgery would be converted to GA. Preoperative basic blood investigations were still required in our institute, while preanesthetic assessments were done for patients with certain comorbidities (eg, ischemic heart disease, chronic lung disease, hyperthyroidism) where intraoperative pain could invoke a pathological response from their underlying disease. All diaphyseal platting of the forearm under WALANT were performed by 1 of the 3 orthopedic surgeons (H.M.H., B.L.J.K., A.A.A.) with less than 5 years of working experience. The maximum dose of lignocaine (or lidocaine) in the presence of adrenaline in WALANT was 7 mg/kg according to body weight, as described in previous studies.11–12 The mixture of LA was 25 ml of lignocaine (or lidocaine) 2%, 65 ml of normal saline 0.9%, 10 ml of sodium bicarbonate 8.4%, and 1 ml of adrenaline 1:1,000, resulting in a total solution of 101 ml with concentrations of lignocaine at 0.5% and adrenaline at 1:100,000. Around 50–70 ml of the mixture was required for a single bone fixation, and it is advisable to keep an extra 10–20 ml of the mixture on standby during the surgery as a top-up or rescue dose; hence, the preparation of 100 ml of solution is recommended. If a higher volume of solution is needed, more normal saline 0.9% can be added, rendering a lower total concentration of lignocaine and adrenaline that would not compromise either the efficacy of the anesthesia nor patient’s comfort.13 After surgical site marking, 10 ml of LA is administered at the fracture site (hematoma block) using a 23-gauge needle, followed by LA infiltration subperiosteally at 5 cm proximal and 5 cm distal away from the fracture site with 10 ml of LA, respectively. The technique to achieve effective subperiosteal block is to inject 2 ml of LA at the lateral cortex, 4 ml of LA at the anterior cortex, and 4 ml of LA at the posterior cortex by angulating the needle from the same entry point. Subsequently, 10–20 ml of LA is infiltrated subcutaneously along the incision site according to the size of the forearm. The administration technique of WALANT is described in Figures 1 and 2 while pre and post-operative plain radiographs are shown in Figure 3. After administration of LA, the patient was asked to perform pronation and supination of the forearm and pressure was applied along the fracture site by the surgeon (H.M.H., B.L.J.K., A.A.A.) prior to the procedure. The surgical block is considered successful when the pain score is 0. The pain score, BP, and heart rate were documented at baseline, upon skin incision, upon deep tissue dissection, upon bone manipulation, upon drilling of the bone, and during skin closure. We compared the pain scores upon skin incision, upon deep tissue dissection, upon bone manipulation, upon drilling of the bone, and during skin closure between radius and ulna fixations using the Mann-Whitney U test to study any differences in pain intensity between radius and ulna fixations. Blood pressure measurements were categorized as normal, high, and very high. The categorization range was based on an elevation of 20 mmHg in systolic BP and 10 mmHg in diastolic BP to look for a temporary elevation of BP due to the adrenaline effect or anxiety. When there was a discrepancy between systolic and diastolic BP categories, we would use the highest category between the 2 (Fig. 4). We compared the baseline BP to the measurements taken upon skin incision and during skin closure using a marginal homogeneity test for categorical variables (normal, high, very high) to study any elevation of the BP after LA infiltration. Estimated blood loss was calculated based on the percentage of blood stain
surface area on a 10 × 10 cm gauze (25% = 3 ml; 50% = 6 ml; 75% = 9 ml; or 100% = 12 ml of total surface area) without the use of suction. Scores on the visual analog scale for anxiety were documented before, during, and after the surgery. The surgery duration was the time measured from the start of the skin incision until the end of skin closure. In addition, postoperative pain score, BP, and heart rate values were taken at the first, second, fourth, and sixth hours. At the first hour postsurgery, all patients were given oral analgesia; they received tramadol at 50 mg every 8 hours and paracetamol at 1 g every 6 hours as per the standard of protocol in
our center. Patients were monitored overnight for postoperative pain score data collection, forearm swelling observation, and any LA adverse effect. Prior to discharge, patient satisfaction surveys were measured using the parameters of recommend, probably will recommend, probably will not recommend, and do not recommend having surgery under WALANT. A 6-month clinic follow-up visit assessed any infection, numbness, weakness, swelling, and wound breakdown after the surgery. Based on the information in the study, we propose a scoring system to select suitable candidates for the WALANT technique in diaphyseal plating of the forearm.

The study was approved by the ethical committee in Malaysia (NMRR-20-301-52862 IIR) and was conducted in Hospital Tuanku Jaafar, Seremban, Malaysia.

Results

Sample population

There were 67 patients who underwent diaphyseal radius and/or ulna plating surgery in our center between January 1, 2019, and January 1, 2021. Six patients were excluded from the study: 2 patients with segmental radius fractures, 2 patients with ipsilateral forearm and carpal fractures, 1 patient with ipsilateral forearm and phalanx fractures, and 1 patient who was below the age group of this study. Out of the 61 patients in this study, there were 31 patients with an isolated radius fracture, 15 patients with an isolated ulna fracture, and 15 patients with ipsilateral radius and ulna fractures. Also included in the study were 4 patients with grade 1 open fractures and 7 patients with fractures that were between 2 and 4 weeks old.

Demographic factors

The age of the patients ranged between 18 and 68 years, with a mean age of 31.7 years old and the highest incidence among 18-year-old patients (n = 7). Fifty-four (88.5%) of these patients were male, and the remaining 7 (11.5%) of the patients were female (Table 2).

Numerical pain rating scale

Out of 61 patients, 38 were totally pain free throughout the surgery. After the administration of the LA, all patients had a pain score of 0 prior to skin incision, during skin incision, and during skin closure (Tables 3–6). Intraoperatively, pain intensified only during muscle dissection and bone manipulation in some patients; 2 subjects reported a pain score of 5 during bone manipulation, which included 1 patient with both radius and ulna fractures and another subject with an isolated radius fracture. One subject reported a pain score of 4 during muscle dissection in an isolated radius fracture. The pain score had reduced to 0 after an additional 5–10 ml LA infiltration into the surrounding muscle. The remaining subjects did not report any pain. Although 11 patients required additional infiltration of about 5–10 ml of LA intraoperatively during muscle dissection and bone manipulation, this was to ensure that the patient had no pain at all before continuing with surgery. A comparison of pain scores upon skin incision, muscle dissection, bone manipulation, and drilling using the Mann-Whitney U test showed similar pain scores between the fixation of radius and ulna bones (P > .05; Tables 3–6).

Duration of surgery and estimated blood loss

The mean duration of surgery for 76 bones was 70 minutes, ranging from 45 to 120 minutes per bone fixation. The mean estimated blood loss (EBL) for 76 bones was 27.39 ml, ranging from 12 to 48 ml (Tables 3–6).

Blood pressure and heart rate

The mean heart rates at each step of surgery and at the first, second, third, and sixth postsurgery hours ranged between 80 and 92. The baseline BP revealed that 57 subjects had normal BP. 18 subjects had high BP, and 1 subject had very high BP. Upon skin incision, the numbers of subjects with raised BP had escalated to 31 subjects with high BP and 10 subjects with very high BP (Fig. 4). A comparison of the baseline BP to the skin incision BP and skin closure BP in 76 bones using the marginal homogeneity test showed elevation in BP after LA infiltration (P < .01; Tables 7 and 8).

Visual analog scale for anxiety

In 61 patients, 11 (18.0%) were very anxious and 19 (31.1%) were moderately anxious before surgery; during surgery the numbers of very anxious and moderately anxious patients had fallen to 5 (8.2%) and 14 (23%), respectively (Fig. 5).
Postoperatively, only 14 patients (23%) had mild anxiety and the remaining patients were not anxious. However, no patients experienced enough anxiety to warrant cancellation of surgery.
Clinical outcomes

Most of the patients were discharged home on the next day (Tables 9 and 10). There were no reported cases of LA toxicity or adverse effects during or after the surgery. In addition, no patients had severe swelling or wound healing disturbances after the surgery. During the 6-month clinic follow-up visit, there were no infections, delays in wound healing, or neurological deficits in any of the patients.

Patient’s satisfaction

Among the 61 patients, 56 recommended the surgery be done under WALANT (Tables 9 and 10). They were satisfied because of the efficiency and effectiveness of the LA, shorter waiting time, and early discharge. However, there was a patient with ipsilateral radius and ulna fractures who did not recommend it due to painful experience with femur plating under GA that involved long fasting during the surgery under WALANT despite having brief pain at his elbow during positioning. In contrast, another patient who had a proximal third radius fracture recommended surgery under WALANT despite having brief pain at his elbow during the surgery (but not at the surgical site), as he had a negative experience with femur plating under GA that involved long fasting and severe postoperative pain, as well as postoperative nausea and vomiting.

Discussion

The WALANT technique has gained popularity and has been rapidly evolving in the past decade, especially in hand surgery. Many surgeons advocate its effectiveness in surgery, low cost, no post-GA recovery period, lower systemic risk compared to GA, shorter durations of waiting time and hospital stay, and good hemostatic effect without tourniquet application. Indeed, fixation in more proximal regions, such as the diaphyseal radius and ulna, remains doubtful and uncertain because of the wider and deeper soft tissue coverage. In this study, we measured pain experienced in patients at every essential step of the surgery: upon skin incision, muscle dissection, bone manipulation, and drilling and during skin closure. Although all patients had a pain score of 0 during skin incision and skin closure, we noticed that some of the patients felt a certain amount of pain during muscle dissection, bone manipulation, and drilling, with the highest pain score of 5 reported during bone manipulation. However, the pain was brief and temporary, and it resolved immediately after additional LA was infiltrated. In fact, on further questioning, patients described the pain sensation as due to the vibration during drilling or to numbness discomfort rather than true pain. Nevertheless, more than 80% of the patients did not feel pain at all throughout the surgery. In this sample size, none of the patients required conversion to GA, as compared to ultrasound-guided brachial plexus block’s success rate of 82.8%–99% in more than 160 patients. In another similar study by Liew Mei Yi et al in plating distal radius fracture using WALANT, half of the patients (n = 20) experienced mild pain (Numeric Pain Rating Scale 1–4) during fracture fixation, bone manipulation, drilling of the bones, and screw insertion. In addition, Tahir et al reported that among 55 patients who underwent the WALANT technique during distal end radius fixation, the mean highest intraoperative visual analog scale score was 3.5 (SD, 0.78), compared with a score of 4.4 (SD, 1.04) for the group of patients who underwent the same procedure under Bier block.

In our study, we noted 6 patients had nonspecific elbow pain during surgery: 2 patients sustained proximal third radius fractures and the other 4 patients were possibly due to immobilization of the elbow with casting for more than 2 weeks. These patients experienced pain while extending or flexing the elbow on positioning, and this is perhaps due to concomitant soft tissue injury of the elbow from the mechanism of trauma or referred pain. Nevertheless, the pain was tolerable with minimal manipulation of the elbow joint and did not result in any difficulty in fracture fixation or require conversion to GA. If there was a complaint, it was commonly in distal radioulnar joint or common flexor origin at the medial epicondyle of the humerus. Occasionally, infiltration of the

| Characteristic | Variation | Measurement |
|----------------|-----------|-------------|
| Age            | Mean, years | 31.69 (SD, 13.564) |
|                | Range, years | 18–68 |
| Gender, n (%)  | Male | 54 (88.5) |
|                | Female | 7 (11.5) |

Table 2

Demographic Data (n = 61)

| Steps          | Pain Scores |
|----------------|-------------|
|                | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Skin incision  | R | U | R | U | R | U | R | U | R | U | R |
| Bone manipulation | 35 | 27 | 2 | 0 | 1 | 1 | 5 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Drilling       | 39 | 25 | 5 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Skin closure   | 46 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Radius bone (n = 46) and ulna bone (n = 30). R, radius bone; U, ulna bone.

Table 3

Perioperative Pain Scores Reported by Patients in All Radius and Ulna Bones

| Bone | Before Skin Incision | Skin Incision | Muscle Dissection | Bone Manipulation | Drilling | Skin Closure |
|------|----------------------|---------------|-------------------|-------------------|----------|--------------|
| Radius (n = 46) | 0 | 0 | 0.46 (0, 0)† | 0.72 (0.25)† | 0.2 (0, 0)† | 0 |
| Ulna (n = 30)  | 0 | 0 | 0.17 (0, 0)† | 0.33 (0, 0)† | 0.23 (0, 0)† | 0 |
| P value†       | - | - | .178 | .137 | .841 | - |

† Median (25th percentile, 75th percentile).
† Mann-Whitney U test.
Table 5
Duration of Operation From Skin Incision Until Skin Closure and Estimated Blood Loss (n = 76)

| Variable                  | Mean (SD)  | Range  |
|---------------------------|------------|--------|
| Operation time, minutes   | 70 (13.36)  | 45–120 |
| Blood loss, ml            | 27.39 (11.44) | 12–48  |

Table 6
Postoperative Pain Score (n = 61)

| Postoperative Pain Score | First Hour | Second Hour | Fourth Hour | Sixth Hour |
|--------------------------|------------|-------------|-------------|------------|
| Mean                     | 2.08       | 3.3         | 3.25        | 2.05       |
| SD                       | 2.044      | 1.773       | 1.35        | 1.443      |

distal radioulnar joint, ulna styloid, or medial condyle of the humerus was necessary to prevent pain during fracture fixation.

We were initially concerned that muscle contracture elicited by pain could hinder the fracture reduction and fixation under WALANT. However, in patients who experienced this type of pain, it was brief and insufficient to cause muscle contraction that would lead to difficulty in maintaining the fracture reduction or compromising fixation quality. We did not encounter any difficulty in the direct reduction maneuver; however, to minimize aggressive bone manipulation that may aggravate pain or cause discomfort to patients, an indirect bone reduction technique is recommended. Perhaps supplementary targeted peripheral nerve blocks at the radial, median, and ulna nerves could help to alleviate the deep structural pain, but this was not used in our center.

Postoperatively, 3 patients in the first hour and 2 patients in the second hour complained of severe pain (Numeric Pain Score [NPS], 7–9), whereas no severe pain was reported at the sixth hour, with a second hour complained of severe pain (NPS, 7–9). Of the remaining 41 patients (67.2%) started to feel pain at the second hour. Therefore, the recommended effective time for diaphyseal forearm plating under the 0.5% lignocaine WALANT solution is around 2–3 hours. In cases that are anticipated to be longer than 3 hours, an additional 10 ml of 0.5% bupivacaine can be added into the total solution, as suggested by Lalonde and Wong,13 but the patient might experience a more pronounced effect of the disturbing numbness. Moreover, the effectiveness of a low concentration of bupivacaine in a large volume of tumescent solution, due to its unchanged maximum dose with or without adrenaline, remains unknown, and a higher risk of cardiac toxicity has been reported with bupivacaine as compared to lignocaine.23,24 In a proximal third radius fracture, an additional 10 ml of solution was needed to infiltrate along the muscle fascia because of the nerve innervation on top of the muscle. Alternatively, you can shower the solution on top of the muscle just after fascia release intraoperatively, but this requires an additional 5 minutes of waiting time for the LA to work. In 2 bone fractures, initial infiltration is preferably given at the radius fracture site, followed by the ulna fracture site, to prevent pain during positioning of the forearm. In ipsilateral radius and ulna fractures, after radius plating, we noticed that patients started complaining of pain over the radius bone during ulna fracture fixation, as the LA solution was washed out before wound closure. An additional 10 ml of solution can be poured into the surgical site before wound closure to replenish the depleted LA, thus preventing pain over the radius bone during ulna plating. The key to success is always to infiltrate a generous volume of LA. Concerns regarding the LA toxicity risk are low, as the volume drains out during the surgery.

Daniel E. Mckee et al25 measured the quantity of blood loss using microcippettes after use of 1% lignocaine with a 1:100,000 epinephrine injection in carpal tunnel release: there was a near 3-fold reduction of mean blood loss in 30 minutes of waiting time compared to 7 minutes of waiting time between the injection and skin incision. Liew Mei Yi et al9 reported there was no statistical significance of the mean EBL between a WALANT group (mean, 49 ml) and GA with tourniquet group (mean, 63 ml) in distal radius fixations. Indeed, our estimated blood-loss-quantifying method was less precise as compared to that of Daniel E. Mckee et al.25 In our study, using the same method as Liew Mei Yi et al9 the mean EBL was 27.39 ml with a 30-minute interval between LA infiltration and skin incision; the EBL was minimal, thus providing a relatively clear surgical visual field without a tourniquet. In forearm fracture fixation, soft tissue dissection and intramuscular plane identification without injuring the neurovascular bundle is imperative. As such, the hemostatic effect from adrenaline works especially well on soft tissue. Moreover, without a tourniquet, distal pulse and

Table 7
Marginal Homogeneity Test for Blood Pressure Between Baseline BP and Skin Incision BP (n = 76)

| Blood Pressure | Skin Incision BP |
|----------------|------------------|
|                | Normal n (%)     | High n (%)    | Very High n (%) |
| Baseline BP    | 33 (43.4%)       | 22 (28.9%)    | 2 (2.6%)        |
|                | 2 (2.6%)         | 9 (11.8%)     | 7 (9.2%)        |
|                | 0 (0%)           | 0 (0%)        | 1 (1.3%)        |

* Marginal homogeneity test.

Table 8
Marginal Homogeneity Test for Blood Pressure Between Baseline BP and Skin Closure BP (n = 76)

| Blood Pressure | Skin Closure BP |
|----------------|-----------------|
|                | Normal n (%)    | High n (%)    | Very High n (%) |
| Baseline BP    | 43 (56.6%)      | 12 (15.8%)    | 2 (2.6%)        |
|                | 5 (6.6%)        | 6 (7.9%)      | 7 (9.2%)        |
|                | 0 (0%)          | 0 (0%)        | 1 (1.3%)        |

* Marginal homogeneity test.
capillary perfusion are easily accessible and heat injury to surrounding structures due to the use of diathermy is greatly reduced.

Coincidentally, the coronavirus disease 2019 pandemic occurred in the middle of this study, making this technique appealing to reduce aerosol-generating procedures, prolonged exposure to patients or health care workers, and long waiting time for elective slots due to limited resources. Many wards were used as part of isolating patients during the coronavirus disease 2019 pandemic; therefore, using the WALANT technique for these fracture fixations provided us with the opportunity to discharge patients earlier, thus reducing the ward occupancy rate. In this study, 72% of our patients with fracture fixations were discharged on the day after surgery, and 95% were discharged on day 2. If the soft tissue condition is permissible, we can perform the surgery under WALANT within a few hours after the injury. However, we did not arrange the surgery as a day procedure due to the need to monitor patients for the possibility of postoperative soft tissue swelling.

Diaphyseal plating of the forearm under WALANT is an alternative anesthetic option, especially in patients whose comorbidities pose a higher risk under GA. Nevertheless, patient selection review was mandatory on a case-to-case basis to avoid inadequate pain relief during the surgery and surgical morbidity. In our experience, the level of difficulty and learning curve of surgery under WALANT were increased when there were 2 bone fractures, large muscle bulk, a proximal third radius fracture, an open fracture, and more than 2 weeks of fracture immobilization. With this information, we propose a scoring system to select suitable candidates for the WALANT technique in diaphyseal plating of the forearm (Tables 11 and 12). While this has not been validated or studied, we found it to be an useful adjunct to our clinical decision-making.

There were several limitations to this study. Firstly, we did not have a comparison group using other LA drugs or other modes of anesthesia. Furthermore, the sample size was relatively small and had an unequal gender distribution. In the future we would like to expand our study to examine the transitional time between WALANT and other modes of anesthesia, as well as the effects of lignocaine versus long-acting LA and together with supplementary targeted nerve block. Despite these limitations, we conclude that diaphyseal plating of the forearm under WALANT is a feasible alternative anesthetic technique with a high LA success rate, as well as good patient satisfaction.

| Table 9 | Postoperative Hospital Stay (n = 61) |
|---------|-----------------------------------|
| Duration of Hospital Stay | 1 Day | 2 Days | 3 Days | 5 Days |
| Number of patients, n (%) | 44 (72) | 8 (13) | 6 (10) | 3 (5) |

| Table 10 | Patient's Satisfaction (n = 61) |
|-----------|--------------------------------|
| Patient's Satisfaction | Recommend | Probably Will Recommend | Probably Will Not Recommend | Not Recommend |
| Number of patients, n (%) | 56 (92) | 2 (3) | 2 (3) | 1 (1) |
Table 11
Candidate Selection for WALANT Technique in Diaphyseal Plating of Forearm: Contraindications

| Contraindications                                                                 | Score |
|-----------------------------------------------------------------------------------|-------|
| Uncooperative patient                                                             |       |
| Unable to flex or extend the elbow                                               |       |
| Humerous or elbow soft tissue injury or fracture                                  |       |
| Unable to lie flat                                                                 |       |
| Open fracture grade 2–3                                                           |       |
| LA hypersensitivity                                                               |       |
| Needle phobia                                                                     |       |
| Peripheral vascular disease                                                       |       |
| Long surgery time (>3 hours)                                                      |       |
| Extensive abrasion wound                                                           |       |

Consideration factors: deep laceration wound of forearm, carpal bone, or phalanges bone fracture; uncontrolled hypertension; ischemic heart disease; language barrier; very anxious patient; and surgeon factor.

Table 12
Candidate Selection for WALANT Technique in Diaphyseal Plating of Forearm: Criteria

| Criteria                                                                 | Score |
|------------------------------------------------------------------------|-------|
| Radius or ulna bone                                                   | 1     |
| Radius and ulna bone                                                  | 2     |
| Less than 10-cm abrasion wound able to local anestha                      | 1     |
| at forearm or elbow                                                   |       |
| Obese or large forearm                                                | 2     |
| Open fracture grade 1                                                 | 2     |
| Proximal third radius fracture                                        | 3     |
| More than 2 weeks of fracture                                         | 3     |
| Total                                                                  | 12    |

* Scores of 1 to 3 indicate a good candidate for WALANT; a score of 4 indicates GA should be considered; and a score of 5 or above indicates GA should be used.

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