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An open-label comparison of local anesthesia with or without sedation for minor hand surgery

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Abstract
Background The purpose of this study was to assess satisfaction and pain intensity in patients undergoing minor hand surgery under local anesthesia (LA) with or without sedation.
Methods Seventy-three adult patients presenting to two hand surgeons were enrolled in this prospective observational study in 2012. They completed questionnaires prior to surgery (current pain intensity, Patient Health Questionnaire-2 (PHQ-2) to measure symptoms of depression, Pain Self-Efficacy Questionnaire (PSEQ) to assess the effective coping strategy of pain self-efficacy) and within 48 h after surgery (satisfaction with surgery, satisfaction with anesthesia, pain during the injection, and pain during the procedure). Thirty-seven patients had carpal tunnel release (bilateral in 3), 22 had release of one or more trigger digits, and 12 had excision of a benign tumor, gouty tophus (1 patient), or foreign body (1 patient). Forty-six patients chose LA and 27 chose LA with sedation.
Results There was no difference in satisfaction with surgery or anesthesia by the type of anesthesia. Satisfaction with surgery was associated with older age alone. Satisfaction with anesthesia was associated with no prior surgery for the same condition. Pain during injection and during the procedure were significantly higher without sedation. Pain during injection was associated with younger age and LA. No factors were associated with pain during the procedure.
Conclusions Patients that had local anesthesia immediately prior to incision with tourniquet use during surgery had more pain during the procedure but were equally satisfied on average with surgery and with anesthesia compared to patients that had sedation.

Keywords Local anesthesia · Minor hand surgery · Pain · Satisfaction · Sedation

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Introduction

Minor hand surgical procedures are often performed in an ambulatory setting with local anesthesia (LA) with or without sedation. LA is safe, fast, and effective, but the injection is painful [1, 12, 13]. In one recent series, about 10 % of patients indicated that they would prefer another form of anesthesia [14]. Sedation can make the procedure more comfortable [23]. The trade-off is the need for a more thorough preoperative medical evaluation, the need for the patient to fast, added medical risks, the risk of orthostatic hypotension, respiratory depression, and nausea, and greater anxiety [5, 17, 23, 29].

The aim of this study was to assess satisfaction with the operative experience and pain intensity in patients undergoing minor hand surgery under LA with or without sedation. Our primary null hypothesis was that there is no difference in satisfaction with surgery between patients treated with and without sedation accounting for other factors. Secondary study questions addressed differences in satisfaction with the anesthesia, pain at enrollment, pain intensity during the operation, and pain with injection accounting for other factors.

Material and Methods

Study Design

The study was IRB-approved. Patients presenting to two hand surgeons were asked to enroll in this prospective observational

study. The inclusion criteria were English-speaking patients aged 18 years or older that requested minor hand surgery. Patients were allowed to choose between LA alone and LA with intravenous sedation.

One hundred and one consecutive patients were enrolled between July 2012 and December 2012 after informed consent was obtained. Immediately after enrollment, patients completed a preoperative online questionnaire which included demographic data, current pain intensity, the Patient Health Questionnaire-2 (PHQ-2), a validated two-question measure of depression [3, 15, 16, 19], and the effective coping strategy of pain self-efficacy (the sense that one can accomplish ones goals in spite of pain) with use of the 10-item Pain Self-Efficacy Questionnaire (PSEQ) [6, 21]. Sixteen patients canceled or rescheduled surgery, 8 patients had surgery but could not be contacted after three attempts, 3 patients withdrew from the study, and 1 patient had an axillary block instead of local anesthesia. The excluded patients were more often patients of surgeon A (p=0.030), but they were otherwise comparable to patients who completed the questionnaires. The final cohort consisted of 73 patients, 40 women and 33 men, with a mean age of 58 years (range 24–89). Thirty-seven patients had carpal tunnel release (bilateral in 3), 22 had release of one or more trigger digits, and 12 had excision of a benign tumor, gouty tophus (1 patient), or foreign

Table 1 Demographics

		Anesthesia				
		LA		LA + sedation		p value
		n=46		n=27		
		n	%	n	%	
Sex	Female	26	57	14	52	0.70
	Male	20	43	13	48	
Age in years (mean, range, ±SD)		59, 24–89, ±16		58, 31–86, ±13		0.81
Marital status	Single	12	26	4	15	0.27
	Living with partner	0		1	3.7	
	Married	26	57	20	74	
	Separated/divorced	2	4.3	0		
	Widowed	6	13	2	7.4	
Work status	Working, full time	20	43	12	44	0.38
	Working, part time	6	13	3	11	
	Homemaker	1	2.2	2	7.4	
	Retired	12	26	5	19	
	Unemployed, able to work	2	4.3	2	7.4	
	Unemployed, unable to work	5	11	1	3.7	
	Currently on sick leave	0		2	7.4	
Weight in lbs (mean, range, ±SD)		171, 105–281, ±36		183, 108–316, ±51		0.29
Smoking		9	20	3	11	0.52
Pain #		4.0, 0–9, ±3.0		4.6, 0–10, ±2.9		0.40
PHQ-2		1.0, 0–6, ±1.5		1.3, 0–6, ±1.8		0.46
PSEQ		47, 9–60, ±15		42, 1–60, ±17		0.22
Treating doctor	Surgeon A	12	26	13	48	0.055
	Surgeon B	34	74	14	52	
Operation (n=76)	Carpal tunnel release	20	42	20	71	0.037
	Trigger digit release	17	35	5	18	
	Removal of limb/bump	10	21	2	7.1	
	Other	1	2.1	1	3.6	
Side (n=72)	Left	19	41	12	46	0.92
	Right	25	54	13	50	
	Both sides	2	4.3	1	3.8	
Prior surgery for same condition		9	20	7	26	0.53

LA, Local Anesthesia; *SD*, Standard Deviation # Scale 0 - 10; *PHQ2*, Patient Health Questionnaire (Depression Severity Measure), Scale 0 - 6; *PSEQ* Pain Self-Efficacy Questionnaire, scale 0–60

body (1 patient) (Table 1). Both hand surgeons used unbuffered 1 % lidocaine and 0.5 % bupivacaine 1:1 mixture with epinephrine injected with a 25-gauge needle straight into the surgical field immediately prior to incision. The anesthesiologists used midazolam, propofol, and fentanyl for sedation.

Within 48 h of surgery, patients were contacted by phone and asked to rate the following on an 11-point ordinal scale between 0 and 10: (1) satisfaction with the treating surgeon, (2) satisfaction with the surgery, (3) satisfaction with the anesthesia, (4) pain during the injection, and (5) pain during the procedure. In addition, we asked them who chose the type of anesthesia (reason for anesthesia: perceived doctor's or patient's choice). We also recorded time in the operating room, the duration of the operation, and the tourniquet time (Table 2). Thirteen patients did not use a tourniquet or the tourniquet time was not recorded.

Patients

The 46 patients that chose LA and the 27 that chose LA with sedation were comparable except that patients that had trigger digit release were more likely to have LA only and patients having carpal tunnel release were more likely to have sedation (Table 1). Time in the operating room, duration of the operation, and duration of the tourniquet were about 50 % longer in the group with sedation. Three patients complained about nausea, hypertension was recorded in 2 patients, and hypotension or bradycardia were monitored each in 1 patient during the anesthesia in the sedation group. No intraoperative adverse events were recorded in the LA group.

Statistical Analysis

The Pearson chi-square test was used to analyze differences between two categorical variables and the unpaired *t* test—or the Mann-Whitney *U* test if not normally distributed—for differences between a continuous (or ordinal) and a dichotomous variable. As a next step, factors associated with satisfaction with surgery and satisfaction with anesthesia (Table 3) as well as factors associated with pain at enrollment, pain during injection, and pain during operation (Table 4) were sought using bivariate analysis—Mann-Whitney *U* test, Kruskal-Wallis test, and Spearman's correlation. Finally, multivariable analysis (linear regression) was performed to assess the impact of significant and nearly significant ($p<0.1$) factors on satisfaction and pain (Table 5).

We performed a power analysis after enrolling 20 patients. We calculated that 72 patients would provide 80 % power to detect a difference in satisfaction with surgery between patients treated with and without sedation given an effect size of 0.68 (calculated by the difference of the mean satisfaction and

Table 2 Perioperative data

		Anesthesia				
		LA		LA + sedation		*p* value
		n=46		*n*=27		
		n	%	*n*	%	
Reason for anesthesia (*n*=72)	Patient's choice	25	56	16	59	0.76
	Doctor's choice	20	44	11	41	
ASA (*n*=60)	1	5	15	4	15	0.76
	2	26	77	19	70	
	3	3	9	4	15	
Time in the operating room[a]		18, 9–31, ±5.1		27, 9–53, ±12		<0.001
Duration operation[a]		7.8, 2–17, ±2.9		10, 4–20, ±4.5		0.031
Duration tourniquet[a] (*n*=60)		3.8, 1–9, ±1.8		6.3, 2–14, ±2.9		<0.001
Pain during injection[b]		5.8, 0–10, ±3.3		1.9, 0–9, ±2.8		<0.001
Pain during operation[b]		1.1, 0–9, ±2.1		0.4, 0–10, ±1.9		0.01
Satisfaction with doctor[b]		9.9, 8–10, ±0.4		9.9, 9–10, ±0.3		0.92
Satisfaction with surgery[b]		9.7, 8–10, ±0.7		9.6, 5–10, ±0.9		0.29
Satisfaction with anesthesia[b]		9.6, 5–10, ±1.0		9.9, 8–10, ±0.4		0.062
Less than 7 points on the "Satisfaction with Anesthesia" scale		2	4.3	0		

ASA American Society of Anesthesiologists Score, *LA* local anesthesia, *SD* standard deviation

[a] In minutes (mean, range, ±SD)

[b] Scale 0–10

Table 3 Bivariate analysis, satisfaction

	Satisfaction with surgery		Satisfaction with anesthesia	
	p value	Correlation (*r*)	*p* value	Correlation (*r*)
Dependent variables				
Sex	0.44		0.79	
Age	*0.010*	0.30	0.83	0.03
Marital status	0.80		0.61	
Work status	0.13		0.30	
Weight	0.36	−0.11	0.27	−0.13
Smoking	0.46		0.78	
PHQ-2 at enrollment	0.28	0.13	0.60	0.06
PSEQ at enrollment	0.79	0.033	0.61	−0.06
Treating doctor	0.15		0.33	
Operation (diagnosis)	0.84		0.71	
Side	0.62		0.73	
Prior surgery for same condition	0.34		*0.02*	
Anesthesia (LA vs. LA + sedation)	0.29		*0.06*	
Reason for anesthesia	*0.028*		0.47	
ASA	0.65		0.31	
Time in the operating room	*0.019*	0.28	0.20	0.15
Duration operation	0.15	0.17	0.89	0.016
Duration tourniquet	*0.038*	0.27	0.23	0.16
Explanatory variables				
Satisfaction with doctor	0.01	0.31	0.42	−0.10
Satisfaction with surgery			0.002	0.37
Satisfaction with anesthesia	0.002	0.37		
Pain at enrollment	0.27	−0.13	0.60	−0.06
Pain during injection	0.63	−0.058	0.004	−0.33
Pain during operation	0.31	−0.12	0.006	−0.32

Data in italics are entered in multivariable models

PHQ-2, Patient Health Questionnaire (Depression Severity Measure), scale 0–6; *PSEQ* Pain Self-Efficacy Questionnaire, scale 0–60; *LA* local anesthesia; *ASA* American Society of Anesthesiologists Score

standard deviation of the enrolled patients and an assumed clinically relevant difference of 1.5 points on an 11-ordinal scale).

The data was collected using Research Electronic Data Capture (REDCap), a free, secure, web-based electronic data capture tool for research studies [9]. Only complete questionnaires could be saved; therefore, we had no missing items.

Results

There was no difference in satisfaction with surgery by the type of anesthesia (Table 2). Greater satisfaction with surgery was associated with older age, reason for anesthesia (perceived doctor's choice), longer time in the operating room, and longer tourniquet time (Table 3). There was a significant positive correlation between satisfaction with surgery and satisfaction with anesthesia. Satisfaction with surgery was not related to PHQ-2 (depression), PSEQ (pain self-efficacy), the treating doctor, the procedure type, pain during injection, or pain during the procedure. The best multivariable model for satisfaction with surgery included age alone and accounted for 6 % of the variation (Table 5).

Satisfaction with anesthesia was not related to choice of anesthesia, but was associated with no prior surgery for the same condition (Table 3). Higher satisfaction with anesthesia was significantly correlated with less pain during injection as well as less pain during the procedure. The best multivariable model for satisfaction with anesthesia included no prior surgery and accounted for 15 % of the variation (Table 5).

Table 4 Bivariate analysis, pain

	Pain at enrollment		Pain during injection		Pain during operation	
	p value	Correlation (*r*)	*p* value	Correlation (*r*)	*p* value	Correlation (*r*)
Dependent variables						
Sex	0.37		0.23		0.99	
Age	0.12	−0.18	*0.056*	−0.26	0.89	−0.016
Marital status	0.33		0.44		0.53	
Work status	0.14		0.70		0.17	
Weight	0.38	−0.10	0.52	0.078	0.10	0.20
Smoking	0.11		*0.09*		0.88	
PHQ-2 at enrollment	*0.006*	0.32	0.69	0.046	0.57	−0.067
PSEQ at enrollment	*<0.001*	−0.45	0.60	−0.062	0.71	−0.044
Treating doctor	0.71		0.34		0.51	
Operation (diagnosis)	*0.033*		0.90		0.51	
Side	0.11		0.25		0.40	
Prior surgery for same condition	0.55		0.75		0.10	
Anesthesia (LA vs. LA + sedation)			*<0.001*		*0.010*	
Reason for anesthesia			0.34		0.052	
ASA			0.089[a]		0.22	
Explanatory variables						
Satisfaction with doctor	0.44	−0.09	0.98	−0.003	0.30	0.12
Satisfaction with surgery	0.27	−0.13	0.63	−0.058	0.31	−0.12
Satisfaction with anesthesia	0.60	−0.06	0.004	−0.33	0.006	−0.32
Pain at enrollment			0.25	0.14	0.67	−0.05
Pain during injection	0.25	0.14			0.002	0.36
Pain during operation	0.67	−0.05	0.002	0.36		

Data in italics are entered in multivariable models

PHQ-2 Patient Health Questionnaire (Depression Severity Measure), Scale 0–6; *PSEQ* Pain Self-Efficacy Questionnaire, scale 0–60; *LA* local anesthesia; *ASA* American Society of Anesthesiologists Score

[a] Removed ASA from the regression model b/o of 12 missing ASA classifications in the LA group

In bivariate analysis, pain during injection was associated with the type of anesthesia, patients that chose LA only had more pain during injection (Table 4). The best multivariable model for pain with injection included anesthesia (LA) and younger age, and accounted for 33 % of the variation (Table 5).

Pain intensity during surgery was associated with anesthesia choice (LA) (Table 4). There were no predictors in the best multivariable model (Table 5).

In bivariate analysis, greater pain intensity at enrollment was associated with more symptoms of depression (higher PHQ-2), less pain self-efficacy (lower PSEQ-2), and the diagnosis (Table 4). There was no correlation between pain intensity at enrollment and pain during injection as well as pain during the procedure. The best multivariable model for greater pain intensity at enrollment included lower PSEQ as well as a carpal tunnel syndrome (vs. benign mass), and accounted for 23 % of the variation (Table 5).

Discussion

Patients that had local anesthesia immediately prior to incision with tourniquet use during surgery had more pain during the procedure, but were equally satisfied with surgery and with anesthesia on average compared to patients that had sedation. In addition, surgery was clearly shorter without sedation.

The reader must be aware that the patients in the current study had relatively rapid injection of local anesthesia immediately prior to incision using a 25-gauge needle. There is some evidence that using a 27-gauge needle, buffered and warmed local anesthesia with epinephrine, no tourniquet, injecting perpendicularly to the skin and subdermally while distracting the patients (talking, pinching), with a slow rate of injection and adequate time to let the local take effect, might have different results [7, 8, 28].

Consistent with our findings, a recent study of patient satisfaction with carpal tunnel decompression under local

Table 5 Significant predictors

	B	95 %CI B		Sig.	Durbin-Watson	R^2
		Lower	Upper			
Satisfaction with surgery						
Age	0.017	0.001	0.034	0.040	2.2	0.06
Satisfaction with anesthesia						
Prior surgery for same condition	−0.79	−1.2	−0.33	0.001	2.2	0.15
Pain at enrollment						
PSEQ	−0.067	−0.106	−0.028	0.001	2.2	0.23
Lump/bump (vs. carpal tunnel syndrome)	−2.5	−4.2	−0.90	0.003		
Pain during injection						
Age	−0.068	−0.116	−0.019	0.007	1.6	0.33
Anesthesia (LA)	4.0	2.5	5.4	<0.001		
Pain during operation						
No significant predictors						

PSEQ Pain Self-Efficacy Questionnaire, scale 0–60; *LA* local anesthesia; *PHQ-2* Patient Health Questionnaire (Depression Severity Measure), scale 0–6

anesthesia found no relationship between pain with local anesthesia and satisfaction with the surgical hand procedure [2]. Age was the only factor retained in the best multivariable model: Older patients were more satisfied with surgery. This is also consistent with prior studies [11, 24–26]. Also consistent with prior studies, our model explained only 6 % of the variation in satisfaction. Patient satisfaction is complex and poorly understood. Perhaps it is related to overall health status, education level, and participati on in the decision-making process that were not accounted for in our model [11, 25].

Depression (measured with the PHQ-2) and the coping strategy of pain self-efficacy (the sense that one can accomplish ones goals in spite of pain, measured with the PSEQ) had a high impact on pain at enrollment; a prior study about minor hand surgery also found a significant correlation between pain intensity at the time of suture removal and depression [30]. However, depression and the coping strategy of pain self-efficacy did not affect satisfaction with surgery or anesthesia and pain during the injection or the procedure in our study.

Longer surgeries and especially longer tourniquet time might be associated with more pain [10]. We found, however, the opposite—longer operation in sedation were less painful. The explanation may be found in the overall very short procedure times of less than 20 min in our study, since one study showed a well tolerance of tourniquet use up to 20 min [22].

There are several potential shortcomings to take into account when interpreting this study: The small sample size limits generalizability. In spite of the fact that the decision for anesthesia was meant to be the patients, there was a difference in the use of sedation, suggesting that the two surgeons may have presented the options differently. We did not monitor the depth of sedation. We did not study whether the choice of anesthesia affected the long-term outcome. And last, this was not a randomized trial, so we can only comment on the experiences of patients that were given a choice of whether or not to have sedation with their local anesthesia.

In summary, patients having minor hand surgery can be offered the choice of local anesthesia with or without sedation with a high and comparable rate of satisfaction and a low and similar rate of pain. Research to date has demonstrated some benefits of specific technical aspects of local anesthesia, but that is an area that might benefit from additional investigation [13, 18, 20, 28]. We would also consider studies of decision aids to help patients prepare for minor surgery choose a type of anesthesia, screening measures to identify patients likely to be unhappy with local anesthesia alone, and the value of preoperative training and preparation in reducing the unpleasantness of local anesthesia [4, 27].

Conflict of Interest Marta Rozanski declares no conflict of interest with the work under consideration for publication.

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Statement of Human and Animal Rights All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent Informed consent was obtained from all patients for being included in the study.

References

1. Baguneid MS, Sochart DH, Dunlop D, et al. Carpal tunnel decompression under local anaesthetic and tourniquet control. J Hand Surg (Br). 1997;22:322–4.
2. Bidwai AS, Benjamin-Laing HE, Shaw DA, et al. Patient satisfaction with tourniquet application and local anaesthesia infiltration in carpal tunnel decompression and the relationship with overall satisfaction. J Plast Surg Hand Surg. 2013;47:481–3.
3. Bot AG, Nota SP, Ring D. The creation of an abbreviated version of the PSEQ: the PSEQ-2. Psychosomatics. 2014;55:381–5.
4. Dahlquist LM, Busby SM, Slifer KJ, et al. Distraction for children of different ages who undergo repeated needle sticks. J Pediatr Oncol Nurs. 2002;19:22–34.
5. Davison PG, Cobb T, Lalonde DH. The patient's perspective on carpal tunnel surgery related to the type of anesthesia: a prospective cohort study. Hand (N Y). 2013;8:47–53.
6. Estlander AM, Vanharanta H, Moneta GB, et al. Anthropometric variables, self-efficacy beliefs, and pain and disability ratings on the isokinetic performance of low back pain patients. Spine. 1994;19:941–7.
7. Farhangkhoee H, Lalonde J, Lalonde DH. Teaching medical students and residents how to inject local anesthesia almost painlessly. Can J Plast Surg. 2012;20:169–72.
8. Hamelin ND, St-Amand H, Lalonde DH, et al. Decreasing the pain of finger block injection: level II evidence. Hand (N Y). 2013;8:67–70.
9. Harris PA, Taylor R, Thielke R, et al. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform. 2009;42:377–81.
10. Hutchinson DT, McClinton MA. Upper extremity tourniquet tolerance. J Hand Surg [Am]. 1993;18:206–10.
11. Jaipaul CK, Rosenthal GE. Are older patients more satisfied with hospital care than younger patients? J Gen Intern Med. 2003;18:23–30.
12. Katz RD, LaPorte DM. Use of short-acting local anesthetics in hand surgery patients. J Hand Surg [Am]. 2009;34:1902–5.
13. Koay J, Orengo I. Application of local anesthetics in dermatologic surgery. Dermatol Surg. 2002;28:143–8.
14. Koegst WH, Wolfle O, Thoele K, et al. The "Wide Awake Approach" in hand surgery: a comfortable anaesthesia method without a tourniquet. Handchir Mikrochir Plast Chir. 2011;43:175–80.
15. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med. 2001;16:606–13.
16. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Med Care. 2003;41:1284–92.
17. Laporte DM, Vallera C. Sedation for hand surgery in adults. J Hand Surg [Am]. 2011;36:1231–3. quiz 1234.
18. Lee HJ, Cho YJ, Gong HS, et al. The effect of buffered lidocaine in local anesthesia: a prospective, randomized, double-blind study. J Hand Surg [Am]. 2013;38:971–5.
19. Lowe B, Kroenke K, Grafe K. Detecting and monitoring depression with a two-item questionnaire (PHQ-2). J Psychosom Res. 2005;58:163–71.
20. Mustoe TA, Buck DW, 2nd, Lalonde DH. The safe management of anesthesia, sedation, and pain in plastic surgery. Plast Reconstr Surg 2010;126:165e-176e
21. Nicholas MK. The pain self-efficacy questionnaire: taking pain into account. Eur J Pain. 2007;11:153–63.
22. Ogufere WE, Giddins GE, Thom JS. Upper arm tourniquet pain in local anaesthetic surgery. J Hand Surg (Br). 1995;20:413–4.
23. Pollock H, Forman S, Pollock T, et al. Conscious sedation/local anesthesia in the office-based surgical and procedural facility. Clin Plast Surg. 2013;40:383–8.
24. Rahmqvist M. Patient satisfaction in relation to age, health status and other background factors: a model for comparisons of care units. Int J Qual Health Care. 2001;13:385–90.
25. Rahmqvist M, Bara AC. Patient characteristics and quality dimensions related to patient satisfaction. Int J Qual Health Care. 2010;22:86–92.
26. Rogers F, Horst M, To T, et al. Factors associated with patient satisfaction scores for physician care in trauma patients. J Trauma Acute Care Surg. 2013;75:110–4. discussion 114–115.
27. Slifer KJ, Hankinson JC, Zettler MA, et al. Distraction, exposure therapy, counterconditioning, and topical anesthetic for acute pain management during needle sticks in children with intellectual and developmental disabilities. Clin Pediatr. 2011;50:688–97.
28. Strazar AR, Leynes PG, Lalonde DH. Minimizing the pain of local anesthesia injection. Plast Reconstr Surg. 2013;132:675–84.
29. Vallera C, Laporte DM. Monitored anesthesia care for hand surgery in adults. J Hand Surg [Am]. 2011;36:1235–6.
30. Vranceanu AM, Jupiter JB, Mudgal CS, et al. Predictors of pain intensity and disability after minor hand surgery. J Hand Surg [Am]. 2010;35:956–60.