Joint Diseases and Related Surgery

Jt Dis Relat Surg
2025;36(1):78-84

ORIGINAL ARTICLE

Factors affecting prognosis in open A1 pulley release surgery for trigger finger

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Trigger finger results from a discrepancy between the diameter of the flexor tendon and the A1 pulley through which it passes. Trigger finger, causing prolonged pain, deformity in the finger, and disability, is a common condition in adults with a lifetime risk of around 2%.[1]

Conservative treatment is initially attempted, and when unsuccessful, surgical release of the A1 pulley is recommended for trigger finger patients. The overall success rate of A1 pulley release is up to 97%, and the literature is contentious regarding which surgical technique among open, percutaneous, and endoscopic approaches is superior.[2] Open A1 pulley release is highly successful; however, the time to recovery varies among patients despite its simplicity and usually satisfactory outcomes.[3]

Received: July 07, 2024
Accepted: August 20, 2024
Published online: December 10, 2024

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Citation: Bezirgan U, Bekar H, Dursun Savran M, Yoğun Y, Armangil M. Factors affecting prognosis in open A1 pulley release surgery for trigger finger. Jt Dis Relat Surg 2025;36(1):78-84. doi: 10.52312/jdrs.2024.1885.

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ABSTRACT

Objectives: This study aims to investigate the frequency of recurrence and prolonged postoperative symptoms in patients undergoing open A1 pulley release for trigger finger and to identify potential associated factors.

Patients and methods: Between October 2021 and December 2023, a total of 72 patients (30 males, 42 females; mean age: 58.0±11.6 years; range, 32 to 84 years) who underwent trigger finger surgery with at least six months of follow-up were retrospectively analyzed. Patients were followed prospectively and relevant data were collected from patient files retrospectively. Demographics, finger symptoms, associated pathologies, clinical grades, Quinnell scores, Disabilities of the Arm, Shoulder and Hand (DASH) scores, grip strength, and surgeon experience were evaluated. Prolonged symptoms lasting over eight weeks postoperatively were also assessed.

Results: Comorbidities included carpal tunnel syndrome (13.89%), De Quervain tenosynovitis (13.89%), diabetes (8.33%), Bouchard's node (2.78%), ganglion cyst (8.33%), and calcium deposition (2.86%). Fourteen patients (19.44%) had additional trigger fingers. Loupe was used in 32 surgeries, resulting in significantly fewer prolonged symptoms (12.50% *vs*. 35.00%, p=0.028). The mean DASH scores significantly improved after surgery (53.07±13.43 *vs*. 18.41±11.26, p=0.000), with a greater improvement in the loupe group (46.52±6.50 *vs*. 25.18±13.96, p=0.0000). The mean grip strength did not significantly differ between the surgical and control sides in the loupe group (27.29±7.58 *vs*. 26.36±7.85 lb, p=0.0887); however, it was weaker on the surgical side in the non-loupe group (23.87±7.81 *vs*. 25.28±6.96 lb, p=0.0067). Loupe usage was the sole significant factor which was absent in 77.78% of the patients with prolonged symptoms.

Conclusion: Trigger finger surgery, though typically simple and routine, may benefit from loupe-assisted procedures due to reduced postoperative symptoms and improved functional outcomes. Consideration of loupe use is warranted in such surgeries.

Keywords: A1 pulley release, functional outcomes. loupe surgery, prolonged symptoms, trigger finger.

Atthakomol et al.[4] reported permanent symptoms or recurrence of adult trigger finger in 2.39% of cases following open trigger finger release. In a

study assessing risk factors for long-term symptoms post-surgery, Baek et al.[5] found that 19% of patients experienced discomfort or limited range of motion (ROM) for more than eight weeks after the operation. Several reports have indicated that demographic characteristics and pathophysiological factors of the patient also influence the outcome post-A1 pulley release.[5-7]

In the present study, we aimed to examine the frequency of long-term postoperative symptoms such as pain or discomfort and ROM limitation, as well as factors determining prognosis following open A1 pulley release.

PATIENTS AND METHODS

This single-center, retrospective study was conducted at Ankara University Faculty of Medicine, Department of Orthopaedics Traumatology and Hand Surgery between October 2021 and December 2023. Patients who underwent surgery for the trigger finger and had a follow-up of at least six months at our clinic were included. Patients were identified through the hospital information system using the "trigger finger" International Classification of Diseases (ICD) (M65.3) and surgery (612050) code, resulting in 213 patients being reached. Of 84 eligible patients, only 72 (30 males, 42 females; mean age: 58.0±11.6 years; range, 32 to 84 years) who met the inclusion criteria and agreed to participate were recruited. The study flowchart is shown in Figure 1. A written informed consent was obtained from each patient. The study protocol was approved by the Ankara University Faculty of Medicine Ethics Committee (date: 21.05.2024, no: 2024000293). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Demographic data, symptomatic finger and number of fingers, additional pathologies such as carpal tunnel syndrome (CTS), De Quervain's tenosynovitis, Bouchard's node, ganglion cyst, clinical grade, Quinnell score, Disabilities of the Arm, Shoulder and Hand (DASH) score, and grip strength were evaluated. Prolonged postoperative symptoms were specifically investigated by querying and assessing patients during follow-up visits for symptoms such as pain and triggering over the A1 pulley. Recurrence of trigger finger was defined as the return of these symptoms after a symptom-free period of more than one month. Additionally, triggering, locking, pain, and motion restriction that persisted for more than eight weeks after surgery were considered prolonged postoperative symptoms. Additionally, the experience of the operating surgeon and its effects were investigated; the surgeon's experience was assessed according to Tang and Giddins's method.[8]

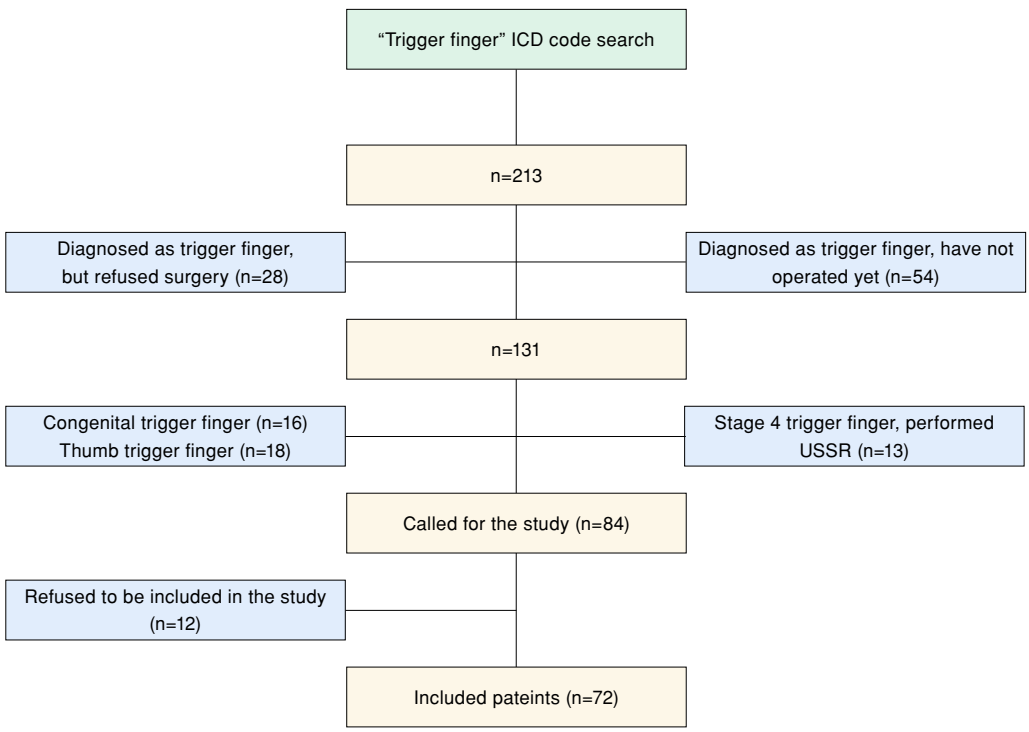


FIGURE 1. Study flowchart.
ICD: International Classification of Diseases; USSR: Ulnar superficialis slip resection.

The patients were separately evaluated in two groups as those receiving the loupe (n=32) and those who did not (n=40).

Surgical technique

All trigger finger release operations were performed using the wide-awake local anesthesia no tourniquet (WALANT) technique. The doses for WALANT were 1% lidocaine with 1:100,000 epinephrine and 8.4% bicarbonate mixed in 1 mL:10 mL. The skin was incised longitudinally, obliquely, or transversely at the level of the metacarpophalangeal joint. Subcutaneous tissue was bluntly dissected and only vertically, with a pair of retractors placed on each side. The boundaries of the A1 pulley were precisely identified and completely longitudinally incised, with no manipulation of the A2 pulley. Subsequently, an assessment of both the active and passive ROM of the affected finger was conducted to confirm smooth gliding of the flexor tendon without any catching. Finally, the incision was closed with 4-0 or 5-0 nylon sutures, followed by the application of a bulky bandage. Postoperatively, all patients were encouraged to perform exercises to maintain an active ROM of the affected finger. Sutures were removed from all patients within two weeks, followed by initiation of scar massage with Bepanthol® (Bayer AG, Leverkusen, Germany) cream.

Statistical analysis

Statistical analysis was performed using the Stata version StataMP13 software (Stata Corp., College Station, TX, USA). The Shapiro-Wilk test was employed to evaluate the normality of the data distribution. Continuous variables were expressed in mean ± standard deviation (SD) or median (min-max), while categorical variables were expressed in number and frequency. Categorical variables were analyzed using the chi-square and Fisher exact tests. Parametric data comparisons between the groups were performed using the t-test, while non-parametric data were assessed with the Mann-Whitney U test. The Wilcoxon signed-rank test was utilized for comparing dependent groups in pre-post assessments. A p value of <0.05 was considered statistically significant.

RESULTS

Baseline demographic, clinical, and functional characteristics of the patients are summarized in Table I. Prolonged symptoms were observed in 18 patients (25%), while recurrence was seen in four patients (5.56%). No major complications of open A1 pulley release for trigger finger were observed in any patient.

TABLE I
Demographic, clinical and functional data of the study population (n=72)

	n	%	Mean±SD
Age (year)			58.0±11.6
Sex			
Male	30	41.67	
Female	42	58.33	
Side			
Left	36	50.00	
Right	36	50.00	
Dominance	38	52.78	
Finger			
2	6	8.33	
3	36	50.00	
4	18	25.00	
5	12	16.67	
Height (m)			1.69±0.0.9
Weight (kg)			78.28±7.90
Body mass index (kg/m^2)			27.51±2.57
Other trigger finger	14	19.44	
Carpal tunnel syndrome	10	13.89	
De Quervain	10	13.89	
Diabetes mellitus	6	8.33	
Clinic			
2	4	5.56	
3	68	94.44	
Quinnell			
2	4	5.56	
3	68	94.44	
Bouchard	2	2.78	
Ganglion	6	8.33	
Calcium depot	2	2.86	
Preoperative flexion	10	13.89	
Recurrence	4	5.56	
Prolonged symptoms	18	25.00	
Follow-up (month)			10.75±3.14
DASH			
Preoperative			53.07±13.43
Postoperative			18.41±11.26
p			0.0000
Grip			
Operated			25.39±7.85
Non-operated			25.76±7.33
p			0.2419
Surgeon experience*			
1	20	27.78	
2	20	27.78	
3	8	11.11	
4	16	22.22	
5	8	11.11	

SD: Standard deviation; DASH: Disabilities of the Arm, Shoulder and Hand; * Surgeon experience was evaluated according to Tang and Giddins.[8]

TABLE II
Comparison of the study groups

	Loupe (+) (n=32)			Loupe (–) (n=40)			
	n	%	Mean±SD	n	%	Mean±SD	*p*
Age (year)			64.4±9.9			52.9±10.3	**0.0000**
Sex							0.748
Male	14	43.75		16	40.00		
Female	18	56.25		24	60.00		
Side							0.343
Left	14	43.75		22	55.00		
Right	18	56.25		18	45.00		
Dominance	20	50.00		18	56.25		0.598
Finger							0.930
2	2	6.25		4	10.00		
3	16	50.00		20	50.00		
4	8	25.00		10	25.00		
5	6	18.75		6	15.00		
Height (m)			1.70±0.09			1.68±0.09	0.1731
Weight (kg)			78.19±8.18			78.35±7.77	0.7498
Body mass index (kg/m^2)			27.01±2.07			27.93±2.87	0.1312
Other trigger finger	6	18.75		8	20.00		0.894
Carpal tunnel syndrome	2	6.25		8	20.00		0.094
De Quervain	4	12.50		6	15.00		0.761
Diabetes mellitus	0	0		6	15.00		**0.022**
Clinic							0.066
2	0	0		4	10.00		
3	32	100		36	90.00		
Quinnell							0.066
2	0	0		4	10.00		
3	32	100		36	90.00		
Bouchard	0	0		2	5.00		0.200
Ganglion	2	6.25		4	10.00		0.567
Calcium deposits	0	0		2	5.00		0.214
Preoperative flexion	4	12.50		6	15.00		0.761
Recurrence	2	6.25		2	5.00		0.818
Prolonged symptoms	4	12.50		14	35.00		**0.028**
Follow-up (month)			11.13±2.32			10.45±3.67	0.5829
DASH							
Preoperative			58.30±5.77			48.89±16.16	**0.0053**
Postoperative			11.78±4.13			23.71±12.34	**0.0000**
p			0.0000			0.0000	
Difference			46.52±6.50			25.18±13.96	**0.0000**
Grip							
Operated			27.29±7.58			23.87±7.81	0.1025
Non-operated			26.36±7.85			25.28±6.96	0.6502
p			0.0887			**0.0067**	
Surgeon experience*							0.0000
1	0	0		20	50.00		
2	0	0		20	50.00		
3	8	25.00		0	0		
4	16	50.00		0	0		
5	8	25.00		0	0		

SD: Standard deviation; DASH: Disabilities of the Arm, Shoulder and Hand; * Surgeon experience was evaluated according to Tang and Giddins.[8]

TABLE III
Comparison of the patients with and without the prolonged symptomss

	Delayed symptoms + (n=18)			No delayed symptoms – (n=54)			
	n	%	Mean±SD	n	%	Mean±SD	*p*
Age (year)			54.7±10.3			59.2±11.9	0.1569
Sex							0.168
Male	10	33.33		20	66.67		
Female	8	10.05		34	80.95		
Side							0.586
Left	8	22.22		28	77.78		
Right	10	27.78		26	72.22		
Dominance							0.173
Dominant hand	12	31.58		26	68.42		
Other hand	6	17.65		28	82.35		
Finger							0.687
2	2	33.33		4	66.67		
3	8	22.22		28	77.78		
4	6	33.33		12	66.67		
5	2	16.67		10	83.33		
Height (m)			1.69±0.8			1.69±0.09	0.8146
Weight (kg)			78.44±7.16			78.22±8.19	0.5831
Body mass index (kg/m^2)			27.43±3.08			27.55±2.41	0.7091
Other trigger finger							0.086
Yes	6	42.86		8	57.14		
No	12	20.69		56	79.31		
Carpal tunnel syndrome							0.520
Yes	2	20.00		8	80.00		
No	16	25.81		46	74.19		
De Quervain							0.520
Yes	2	20.00		8	80.00		
No	16	25.81		46	7419		
Diabetes mellitus							0.470
Yes	2	33.33		4	66.67		
No	16	24.24		50	75.76		
Clinic							0.235
2	0	0		4	100		
3	18	26.47		50	73.53		
Quinnell							0.235
2	0	0		4	100		
3	18	26.47		50	73.53		
Preoperative flexion			0.22±0.43			0.11±0.32	0.2411
DASH							
Preoperative			44.85±13.85			55.81±12.22	0.0004
Postoperative			20.27±7.47			17.76±12.26	0.0450
p			**0.0003**			**0.0000**	
Grip							
Operated			24.50±7.97			25.69±7.86	0.5323
Non-operated			27.82±7.24			25.07±7.31	0.1248
p			**0.0002**			0.2895	
Loupe +	4	12.50		28	87.50		**0.028**
Loupe –	14	35.00		26	65.00		
Surgeon experience*							0.155
1	8	44.44		12	22.22		
2	6	33.33		14	25.93		
3	0	0		6	11.11		
4	2	11.11		14	25.93		
5	2	11.11		8	14.81		

SD: Standard deviation; DASH: Disabilities of the Arm, Shoulder and Hand; * Surgeon experience was evaluated according to Tang and Giddins.[8]

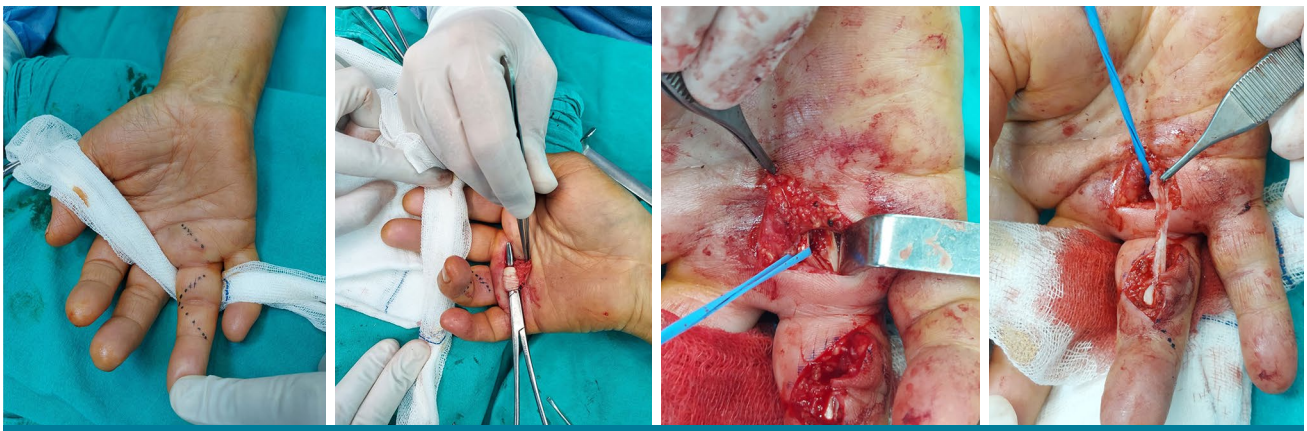


FIGURE 2. An example case of ulnar superficialis slip resection.

Loupe was used in the surgery of 32 patients, while it was not used in 40 patients. Prolonged symptoms were significantly less and DASH score improvement was significantly more in the loupe group. The mean DASH scores significantly improved after surgery (53.07±13.43 *vs.* 18.41±11.26, p<0.001), with a greater improvement in the loupe group (46.52±6.50 *vs.* 25.18±13.96, p<0.001). The mean grip strength did not significantly differ between the surgical and control sides in the loupe group (27.29±7.58 *vs.* 26.36±7.85 lb, p=0.0887); however, it was weaker on the surgical side in the non-loupe group (23.87±7.81 *vs.* 25.28±6.96 lb, p=0.0067). Loupe usage was the sole significant factor which was absent in 77.78% of the patients with prolonged symptoms. The use of loupe was more common among senior surgeons (p<0.001).

The mean time from surgery until complete resolution of symptoms was 4.185±1.167 weeks. However, in 25% of the patients with prolonged symptoms, the mean time to recovery was longer (13.611±4.146 weeks). No significant factors were identified while comparing demographic factors, additional pathologies, preoperative flexion contracture, symptom duration, or surgeon experience between the groups with and without prolonged symptoms, except for loupe usage. Among 18 patients with prolonged symptoms, loupe was not used in 14 patients (77.78%).

DISCUSSION

In the present study, we investigated the frequency of recurrence and prolonged postoperative symptoms in patients undergoing open A1 pulley release for trigger finger and identified potential associated factors. The sole determinant of postoperative prolonged symptoms was the surgeon's experience and the use of loupe.[9] Our study findings revealed relatively high rates of prolonged postoperative symptoms and recurrence following A1 pulley release. In comparison with a similar study involving 723 patients, which reported a recurrence rate of 2.39%,[4] our results highlight the prevalence of the recurrent symptoms associated with multiple steroid injections and manual labor. Among our patients with recurrence, several received multiple steroid injections, with two being homemakers and one diagnosed with type 2 diabetes mellitus. Notably, the ulnar superficialis slip resection (USSR) procedure was performed at the six-month follow-up in recurrence cases. Although USSR procedure was warranted, the initial surgery involved A1 pulley release.

In a study involving 136 patients, the severity of various flexor tendon degenerations affected the outcome of open trigger finger release surgery at one month, but did not affect the outcome at three and six months postoperatively.[10] In our routine practice, we usually proceed to the USSR procedure in case of strong evidence of flexor digitorum superficialis (FDS) degeneration during surgery. Figure 2 demonstrates a USSR case.

Strigelli et al.[11] found that isolated A1 pulley release did not always ensure complete tendon mobility, emphasizing the benefit of simultaneous A1-A2 pulley release. While the debate continues on whether sacrificing one leg of the FDS tendon or the A2 pulley itself is preferable, we believe that sacrificing one leg of the degenerated tendon reduces sheath volumwe while largely preserving the A2 pulley, which may not be entirely pathological.

In the current study, the mean time from surgery until complete resolution of symptoms was 4.185±1.167 weeks. However, in 25% of the patients with prolonged symptoms, recovery took longer. This finding indicates that complete recovery within one month is not always achieved with A1 pulley release alone, highlighting the potential benefit of postoperative splinting or other interventions to expedite recovery. A significant contribution of the study is the identification of surgical loupe dissection as an effective factor on prolonged postoperative symptoms. Microdissection with loupes improved visualization, reduced tissue damage, and expedited recovery. This technique enhanced outcomes by minimizing complications and supporting faster rehabilitation.

Nonetheless, this study has some limitations. First, it has a single-center, retrospective design with a relatively small sample size. Due to the low number of recurrences and the absence of major complications, statistical analysis was constrained. Second, the heterogeneity of the patient population, including variations in age, sex, and comorbid conditions, may limit the generalizability of the findings. Third, the relatively short follow-up period of 10.75 months might be insufficient to assess long-term outcomes comprehensively. Additionally, the evaluation of certain symptoms relied on patient self-reporting, which could introduce recall bias or inaccuracies. Further large-scale, long-term, prospective studies are needed to confirm these findings.

In conclusion, trigger finger surgery benefits significantly from the use of loupes which facilitate atraumatic surgery, leading to fewer prolonged symptoms and improved functional outcomes. Based on these findings, we recommend their use to reduce postoperative complications and enhance recovery in these patients.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Idea/concept: U.B., H.B.; Design, materials, literature review: Y.Y., H.B.; Control/supervision: M.A.; Data collection and/or processing: M.D.S., H.B.; Analysis and/or interpretation: M.D.S.; Writing the article: M.D.S., U.B.; Critical review: U.B., M.A.; References and fundings: Y.Y.

Conflict of Interest: The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding: The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. Makkouk AH, Oetgen ME, Swigart CR, Dodds SD. Trigger finger: Etiology, evaluation, and treatment. Curr Rev Musculoskelet Med 2008;1:92-6. doi: 10.1007/s12178-007-9012-1.
2. Brown AM, Tanabe KL, DellaMaggiora RJ, Tsai EY, Kuschner SH, Kulber DA. Nonpalmar endoscopic versus open trigger finger release: Results from a prospective trial. Plast Reconstr Surg Glob Open 2022;10:e4603. doi: 10.1097/GOX.0000000000004603.
3. Koopman JE, Zweedijk BE, Hundepool CA, Duraku LS, Smit J, Wouters RM, et al. Prevalence and risk factors for postoperative complications following open A1 pulley release for a trigger finger or thumb. J Hand Surg Am 2022;47:823-33. doi: 10.1016/j.jhsa.2022.04.017.
4. Atthakomol P, Manosroi W, Sathiraleela K, Thaiprasit N, Duangsan T, Tapaman A, et al. Prognostic factors related to recurrence of trigger finger after open surgical release in adults. J Plast Reconstr Aesthet Surg 2023;83:352-7. doi: 10.1016/j.bjps.2023.05.008.
5. Baek JH, Chung DW, Lee JH. Factors causing prolonged postoperative symptoms despite absence of complications after A1 pulley release for trigger finger. J Hand Surg Am 2019;44:338.e1-6. doi: 10.1016/j.jhsa.2018.06.023.
6. Cakmak F, Wolf MB, Bruckner T, Hahn P, Unglaub F. Follow-up investigation of open trigger digit release. Arch Orthop Trauma Surg 2012;132:685-91. doi: 10.1007/s00402-011-1440-0.
7. Bruijnzeel H, Neuhaus V, Fostvedt S, Jupiter JB, Mudgal CS, Ring DC. Adverse events of open A1 pulley release for idiopathic trigger finger. J Hand Surg Am 2012;37:1650-6. doi: 10.1016/j.jhsa.2012.05.014.
8. Tang JB, Giddins G. Why and how to report surgeons' levels of expertise. J Hand Surg Eur Vol 2016;41:365-6. doi: 10.1177/1753193416641590.
9. Atik OŞ. Writing for Joint Diseases and Related Surgery (JDRS): There is something new and interesting in this article! Jt Dis Relat Surg 2023;34:533. doi: 10.52312/jdrs.2023.57916.
10. Abdul Nasir M, Ahmad TS, Low TH, Devarajooh C, Gunasagaran J. Flexor tendon degeneration affects short-term outcomes of open trigger digit release. PLoS One 2023;18:e0286301. doi: 10.1371/journal.pone.0286301.
11. Strigelli V, Mingarelli L, Fioravanti G, Merendi G, Merolli A, Fanfani F, et al. Open surgery for trigger finger required combined a1-a2 pulley release. A retrospective study on 1305 case. Tech Hand Up Extrem Surg 2019;23:115-21. doi: 10.1097/BTH.0000000000000231.