



# Risk factors for complications of open trigger finger release

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## Abstract

**Background** Open trigger finger release is generally considered a simple low-risk procedure. Reported complication rates vary widely from 1 to 43 %, mostly based on small studies. Our goal was to determine the incidence of complications in a large consecutive series, while also identifying potential risk factors.

**Methods** All open trigger finger releases performed from 2006 to 2009 by four fellowship-trained hand surgeons at a single institution were retrospectively reviewed. There were 795 digits released in 543 patients. Complications were defined as signs or symptoms requiring further treatment and/or considered unresolved by 1 month postoperatively. Complications requiring operative intervention were regarded as major. Multivariable analysis was performed to determine possible risk factors for complications.

**Results** There were 95 documented complications among 795 digits (12 %). The most common complications involved persistent pain, stiffness, or swelling, persistent or recurrent triggering, or superficial infection. Most were treated nonoperatively with observation, therapy, steroid injection, or oral antibiotics. There were 19 reoperations (2.4 %), mostly including revision release, tenosynovectomy, and irrigation and debridement. Male gender, sedation, and general anesthesia were independently associated with complications, while age, diabetes, hypothyroidism, recent injection, and concurrent procedures were not associated.

**Conclusions** Open trigger finger release is generally a low-risk procedure, although there is potential for complications, some requiring reoperation. Male gender, sedation, and general anesthesia may be associated with greater risk. Surgeons should be careful to thoroughly discuss the risk of both major and minor complications when counseling patients.

**Keywords** Trigger finger · Open release · Complications

## Introduction

Trigger finger is a common musculoskeletal condition, with a reported lifetime incidence of 2.6 % in the general population and up to 10 % in diabetics [4]. Treatment options include NSAIDs, splinting, steroid injection, percutaneous release, and open release. Open release is generally considered a simple low-risk procedure, although may result in complications such as persistence, recurrence, prolonged pain, infection, stiffness, flexion contracture, bowstringing, and digital nerve injury [7]. Incidence of such complications varies widely from 1 to 43 % [1–5, 8–11]. Most studies involve small numbers, which limit the ability to generalize findings and to identify risk factors. Our goal was to determine the incidence of complications of open trigger finger release in a large consecutive series of patients from our institution, while also identifying potential risk factors for their occurrence.

## Materials and Methods

We conducted a retrospective chart review of all patients treated with open trigger finger release from 2006 to 2009 by four fellowship-trained hand surgeons. Cases were identified by hospital billing data. Patients with less than 1 month of follow-up were excluded. The study group included 543 patients with an average age of 64 years (range, 14–92 years).

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Investigation performed at Lahey Clinic

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**Table 1** Demographics of study population ( $n=543$  patients)

Gender	F	309
	M	234
Age	<50	59
	50–70	313
	>70	171
IDDM	No	500
	Yes	43
NIDDM	No	455
	Yes	88
Hypothyroid	No	485
	Yes	58

Patient demographics were recorded (Table 1). Average length of follow-up was 9 months (range, 1–59 months).

Of the 795 digits released, the long finger was the most common, followed by the ring finger and thumb (Table 2). For 471 digits (59 %), one or more concurrent procedures were performed, including additional trigger digit release, carpal tunnel release, mucous cyst excision, ganglion excision, ulnar nerve release, first dorsal compartment release, palmar fasciectomy, thumb basal joint arthroplasty, wrist arthroscopy, shoulder arthroscopy, and steroid injection.

The majority of trigger finger releases (61 %) were performed under local anesthesia, while others were performed under sedation (34 %) or general anesthesia (5 %). Longitudinal, transverse, or oblique incisions were made according to surgeon preference. The A1 pulley was then exposed and released longitudinally. Conscious patients were asked to actively flex and extend the digit to confirm release. Wounds were closed with interrupted nylon sutures and covered with a soft dressing. Follow-up visits were scheduled at 7–10 days postoperatively for suture removal and at 1 month.

All documented complications in the electronic medical record system were recorded. Complications were defined as signs or symptoms requiring further treatment and/or considered unresolved by 1 month postoperatively. Complications requiring operative intervention were regarded as major. Potential risk factors for complications were identified by univariate analysis using chi-square test then verified by multivariable analysis. Significance level was set at  $p<0.05$ . Approval was obtained

**Table 2** Locations of trigger finger releases ( $n=795$  digits)

	Left	Right	Total (%)
Thumb	56	86	142 (18)
Index	41	54	95 (12)
Middle	111	182	293 (37)
Ring	83	117	200 (25)
Small	28	37	65 (8)
Total (%)	319 (40)	476 (60)	

**Table 3** Univariate analysis of risk factors for complications ( $n=795$  digits)

			<i>p</i>
Gender	F	452	0.03*
	M	343	
Age	<50	86	0.69
	50–70	437	
	>70	272	
IDDM	No	718	0.96
	Yes	77	
NIDDM	No	659	0.14
	Yes	136	
Any DM	No	582	0.25
	Yes	213	
Hypothyroid	No	714	0.26
	Yes	81	
Anesthesia	Local	483	0.02*
	Sedation	269	
	General	43	
Last injection	>3 months	522	0.10
	1–3 months	239	
	<1 month	25	
Other procedure	No	324	0.26
	Yes	471	

\* $p<0.05$ , statistically significant

from the institutional review board regarding procedures to ensure protection of human rights and informed consent.

## Results

There were 95 documented complications in 795 digits (12 %). The most common complications involved persistent pain, swelling, or stiffness (39 digits, 4.9 %). Other complications included persistent or recurrent triggering (21 digits, 2.6 %), contracture (20 digits, 2.5 %), superficial infection (8 digits, 1.0 %), deep infection (4 digits, 0.5 %), neurapraxia (2 digits, 0.3 %), and bowstringing (1 digit, 0.1 %).

The minor complication rate was 9.6 % (76 of 795). Patients with persistent pain, swelling, or stiffness were treated with observation, therapy, or steroid injections, with eventual resolution. Patients with superficial infections were treated with oral antibiotics, with eventual resolution. All cases

**Table 4** Multivariable analysis of risk factors for complications

	Odds ratio	Confidence interval	<i>p</i>
Male gender	2.15	1.30–3.53	0.003*
Sedation	2.39	1.41–4.04	0.001*
General anesthesia	2.95	1.28–6.78	0.011*

\* $p<0.05$ , statistically significant

**Table 5** Prior studies of complications of open trigger finger release

Study	Year	Digits	Complications (%)	Major (%)	Reoperations (number)
Thorpe [8]	1988	53	23 (43)	2 (3.8)	Digital nerve repair (1), tenolysis (1)
Turowski [9]	1997	59	6 (10)	1 (1.7)	Revision release (1)
Vaes [10]	1998	55	10 (18)	0 (0)	
Finsen [3]	2003	84	16 (19)	2 (2.4)	Revision release (1), tenolysis (1)
Lim [5]	2007	483	7 (1)	0 (0)	
Lange-Reiss [4]	2009	305	9 (3)	0 (0)	
Will [11]	2010	78	24 (31)	2 (2.6)	Fistula excision (1)
Cakmak [2]	2012	101	6 (6)	3 (3.0)	Revision release (1), I&D (2)
Bruijnzeel [1]	2012	1598	84 (5)	14 (0.9)	Revision release (5)
Current study	2014	795	95 (12)	19 (2.4)	Revision release (8), I&D (4), other (7)

managed nonoperatively regained satisfactory function. The major complication rate was 2.4 % (19 of 795). These were treated operatively with revision release (8 digits), tenosynovectomy (4 digits), irrigation and debridement (4 digits), A2 pulley reconstruction (1 digit), neurolysis (1 digit), and tenolysis (1 digit).

In the univariate analysis, gender and type of anesthesia were found to be associated with complications, while age, diabetes, hypothyroidism, recent injection, and concurrent procedures were not associated (Table 3). Multivariable analysis found that male gender, sedation, and general anesthesia were independently associated with complications (Table 4).

## Discussion

In our large series of open trigger finger releases, we found an overall complication rate of 12 % and a major complication rate of 2.4 % requiring reoperation. These rates fall within the range of previously reported studies focused on open trigger finger release (complications 1–43 %, major 0–3.8 %) [1–5, 8–11] (Table 5). Consistent with the literature, most of our complications were minor (such as persistent pain, stiffness, or swelling) and were treated nonoperatively, while revision release was the most common reoperation.

An early study of 53 digits by Thorpe et al. [8] found a complication rate of 43 %, while a more recent study of 78 digits by Will and Lubahn [11] demonstrated a complication rate of 31 %. In contrast, Lim et al. [5] reported on 483 digits with a very low complication rate of 1.4 % with no major complications or reoperations. The largest study of 1598 digits by Bruijnzeel et al. [1] found a complication rate of 5.3 % and a major complication rate of 0.9 % (14 patients with persistent or recurrent symptoms, of which 5 had reoperation). Variability is likely due to sample size, as well as differing follow-up periods and definitions of complications. We used a large sample and a consistent, inclusive, and patient-centered

definition that we feel is clinically relevant to physician-patient discussions both preoperatively and postoperatively.

We identified three potential risk factors for complications, including male gender, sedation, and general anesthesia. A possible explanation may be that patients under local anesthesia are better able to perform active flexion intraoperatively to ensure that triggering has been eliminated. Male gender as a risk factor may suggest hormonal factors, such as those found in recent studies relating trigger finger to aromatase inhibitors [6]. We did not find that age, diabetes, hypothyroidism, recent injection, or concurrent procedures were risk factors for complications. This is in contrast to the aforementioned study by Bruijnzeel [1], which found that diabetes, depression, and concurrent carpal tunnel release were risk factors.

Strengths of our study include the large number of patients (the second largest existing series), the small number of fellowship-trained hand surgeons (which limits variation compared to other studies of up to 12 surgeons), its consecutive nature, and our inclusive definition of complications. Weaknesses of our study include the retrospective design and use of chart reviews for data collection, which allow for reporting bias and possible underestimation of complication rates.

Although open trigger release is a relatively benign procedure, complications do occur. Most are minor and resolve without further surgery, but others are more serious. Our study helps to further quantify these complications with a large sample size, while also identifying possible risk factors. It is important for practitioners to be aware of these concerns and for patients to be adequately informed prior to shared decision-making and possible surgery, no matter how simple and expedient this procedure may be.

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**Conflict of Interest** Nathan G. Everding declares that he has no conflict of interest.

Gavin B. Bishop declares that he has no conflict of interest.

Christopher M. Belyea declares that he has no conflict of interest.

Maximillian C. Soong declares that he has no conflict of interest.

**Statement of Human and Animal Rights** Approval was obtained from the institutional review board regarding procedures to ensure protection of human rights and informed consent.

**Statement of Informed Consent** 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.

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