

# Changes in Clinical Practice Patterns in Flexor Tendon Laceration Repair: A 15-Year Analysis of Maintenance of Certification Tracer Data from the American Board of Plastic Surgery

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## Introduction

The American Board of Plastic Surgery (ABPS) has collected data on cosmetic surgery tracers as part of the Continuous Certification (CC) process since 2005. The present study was performed to analyze evolving trends in flexor tendon laceration repair in the ABPS cosmetic module and to compare changes in practice patterns to publications in Evidence-Based Medicine (EBM) over this timeframe.

## Methods

- Cumulative tracer data for flexor tendon lacerations were grouped into practice patterns from 2006 through 2014 and 2015 through December 2020.
- Fisher's exact tests and two-sample t-tests compared **patient demographics, common techniques, and complication rates** between tracer data from 2006-2014 and 2015-2020.
- Tracer data results were compared EBM articles published in Plastic and Reconstructive Surgery. Topics were placed into categories based on their presence in EBM articles.

Table 1. Choice of Anesthesia

Preoperative Assessment	2006-2015 (n=460)	2015-2021 (n=320)	P value
Local anesthetic only injected in affected area without sedation	20 (4%)	40 (13%)	<.001
Local anesthetic only injected in affected area with sedation	31 (7%)	24 (8%)	.683
Regional anesthesia (brachial plexus block)	5 (1%)	10 (3%)	.041
Regional anesthesia (Bier Block)	1 (0%)	12 (4%)	<.001
General Anesthesia	403 (88%)	237 (74%)	<.001
Use of epinephrine in finger and/or hand for hemostasis	1 (0%)	8 (3%)	.008

Table 2: Intraoperative Techniques

Surgical Techniques	2006-2015 (n=460)	2015-2020 (n=320)	P value
<b>Tourniquet Used</b>	432 (94%)	285 (89%)	.007
<b>Pulley Preserved</b>			
A1	92 (20%)	92 (29%)	.005
A2	244 (53%)	150 (47%)	.090
A3	81 (18%)	58 (18%)	.853
A4	188 (41%)	138 (43%)	.530
A5	90 (20%)	74 (23%)	.230
<b>Type of Tendon Repaired</b>			
2 strand	69 (15%)	41 (13%)	
4 strand	257 (56%)	189 (59%)	
6 strand	86 (19%)	44 (14%)	
<b>Type of Suture Material</b>			
Braided	204 (44%)	157 (49%)	.194
Smooth	203 (44%)	112 (35%)	.011
<b>Epitendinous Repair</b>	291 (63%)	193 (60%)	.703
<b>Therapy Prescribed</b>			
• None	31 (7%)	25 (8%)	0.568
• Passive mobilization (Duran and Houser)	178 (39%)	103 (32%)	0.063
• Dynamic flexion/active extension (Kleinert)	137 (30%)	76 (24%)	0.063
• Tendon excursion by wrist movement (Indiana)	6 (1%)	19 (6%)	<.001
• Active movement protocol (Becker)	101 (22%)	87 (27%)	0.093
• Other	32 (7%)	30 (9%)	0.219
<b>Perioperative Antibiotics</b>			.105
No doses	17 (4%)	18 (6%)	
One dose	317 (69%)	214 (67%)	
More than one dose	114 (25%)	86 (27%)	
More than one day of antibiotics	310 (67%)	194 (61%)	.139

Table 3: Postoperative Outcomes

	2006-2015 (n=460)	2015-2020 (n=320)	P value
<b>Number of Nights in Hospital</b>	1 (Standard Error Mean: 0.12)	1 (Standard Error Mean: 0.06)	
<b>Time Out of Work (weeks)</b>	8 (Standard Error Mean: 0.40)	8 (Standard Error Mean: 0.50)	
<b>Adverse Events</b>			
None	125 (27%)	67 (21%)	<.001
Tendon repair rupture	391 (8%)	282 (7%)	.004
Chronic Regional Pain Syndrome	57 (1%)	66 (2%)	.172
Tendon adhesions giving suboptimal results	28 (1%)	28 (1%)	.690
Infection requiring oral antibiotics only	50 (1%)	50 (1%)	.615
Infection requiring IV antibiotics	15 (0%)	10 (0%)	0.550
Dehiscence	13 (0%)	10 (0%)	0.835
Tendon suture exposure and removal	61 (1%)	48 (1%)	0.501
<b>Range of Motion</b>			
Almost full range of motion	37 (1%)	31 (1%)	0.808
Good range of motion	175 (38%)	111 (35%)	.339
Poor range of motion	140 (30%)	120 (38%)	.040
	46 (10%)	35 (11%)	.673
<b>Satisfaction</b>			
Patient	Yes, satisfied with result 350 (76%)	Yes, satisfied with result 256 (80%)	.426
Physician	333 (72%)	320 (72%)	.824

## Results

Cumulative data included 460 cases from 2006 to 2014 and 320 cases from 2015 to 2020. 94% of participating surgeons were in private practice, and 6% were in academic practice. 72% of procedures were preformed in an outpatient setting. Only 26% of patients engaged in heavy work with their arms and hands daily. The mean duration between injury and tendon repair was 12 days.

### Preoperative Assessment

- The average patient age was 38 years, and 76% were male. Only 26% of patients engaged in heavy work with their arms and hands daily. The mean duration between injury and tendon repair was 12 days. Most common associated injuries in addition to tendon laceration were damage to the nerve (59%), artery (28%), and severe skin loss (23%). The most frequent laceration type was clean cut (58%) followed by frayed (28%). Upon physical examination, the most affected digit was the index finger (24%), with zone II damage comprising most injuries across both cohorts (57%).

### Intraoperative Measures

- In terms of anesthesia, significant decreases were observed in the use of general anesthesia (88% vs. 74%,  $p < 0.001$ ) with significant increases in the use of local anesthesia without sedation, brachial plexus block, and Bier block. A significant decrease was also seen in tourniquet usage (94% vs. 89%,  $p = 0.007$ ).
- Preservation of the A2 pulley remains the most common (51%) among flexor tendon laceration repairs; however, significant increases were seen in the preservation of the A1 pulley (20% vs. 29%,  $p = 0.005$ ).
- Four strand tendon repair comprises the majority of operations (57%). Epitendinous repair occurred in 62% of cases. Suture material has seen substantial changes with increases in braided types and significant decreases in the use of smooth/monofilament sutures.

## Conclusions

A review of our tracer data suggests the following trends: a decline in the use of general anesthesia, an increase in the four-strand repair technique, and an increase in the use of braided sutures. Despite substantial evidence supporting the efficacy of active movement postoperative therapy, tracer data indicates it still lags behind passive mobilization and dynamic extension postoperative rehabilitation regimens. These data provide insight into national practice patterns and the evolution of presentation, diagnosis, and surgical techniques to manage flexor tendon lacerations. Plastic and orthopedic surgeons may use these results to reflect on their current surgical practices in the context of national statistics.