SCIENTIFIC ARTICLE

Randomized Controlled Trial Comparing Nylon and Chromic Gut Sutures After Minor Hand Surgery

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Purpose We sought to compare overall satisfaction with treatment and satisfaction with initial wound healing after closure of office hand and upper extremity surgery wounds using polyamide compared to Chromic gut sutures.

Methods We compared 62 patients randomized to polyamide suture closure of an office hand and upper extremity incision (mostly carpal tunnel release and trigger finger release) to 50 patients closed with Chromic gut suture. Patients rated overall treatment satisfaction, satisfaction with initial healing, pain intensity, and upper extremity–specific activity tolerance.

Results Accounting for potential confounding in multivariable linear and logistic regression analysis, we found the following: (1) overall satisfaction with care was unrelated to suture type; (2) satisfaction with initial wound healing and appearance was lower among people with no other comorbidities, but unrelated to suture type; (3) there were no factors independently associated with pain intensity; and (4) excisional biopsy was associated with greater activity tolerance.

Conclusions Our findings suggests that Chromic sutures are a viable alternative to polyamide sutures after office hand surgery, provided that the care team anticipates and develops strategies for concerns that may arise if the sutures take an extended period to fall off. *(J Hand Surg Am. 2022;47(8):795.e1-e13. Copyright © 2022 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic II.

Key words Chromic gut, hand surgery, nylon, satisfaction, sutures.

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Absorbable sutures can make a return visit unnecessary after office hand surgery. Patient convenience, bundled payments, and the coronavirus disease 2019 pandemic make a virtual or even optional in-person postoperative visit appealing.

Nonabsorbable sutures can be uncomfortable to remove. Absorbable sutures are associated with inflammation, as they degrade and might be more likely to become infected. There are several published comparisons of polyglactin 910 (Vicryl) sutures with polyamide (Nylon) sutures, many of which noted wound problems, mostly related to residual suture or scar inflammation.[1–3] The experience with

polyglactin 910 that is irradiated for rapid degradation is more favorable.[1,4–7]

Polyamide (Nylon)[8] is a nonabsorbable material widely used for general skin closure after common hand surgeries (eg, carpal tunnel release and trigger finger release).[9] Another suture option for closing the skin is an absorbable catgut suture composed of connective tissue, mostly collagen from the submucosal layer of sheep intestines or the serosal layer of beef intestines. Catgut is banned from Europe, the United Kingdom, and Japan because of concerns over bovine spongiform encephalopathy ("mad-cow disease"), although the herds from which gut is harvested are certified as free from bovine spongiform encephalopathy.[10] Chromic gut ("Chromic") is treated with a chromium salt solution to maintain strength for 14–21 days.[11,12] Plain gut degrades more rapidly, which makes it unsuitable for hand wounds. Chromic is commonly used to treat traumatic finger injuries where removal of nonabsorbable sutures would be difficult, such as in children and for complex wounds. Chromic is less expensive than irradiated polyglactin 910, and nonirradiated polyglactin 910 degrades too slowly for office hand surgery. After starting our study, we became aware of a retrospective comparison of Chromic sutures, polyamide, and poliglecaprone 25 (Monocryl) after minor hand surgery in 312 people that found closure with polyamide and Chromic were more prone to wound separation, infection, and additional in-person care compared with poliglecaprone 25.[13]

One step toward optional or video follow-up after office hand surgery is to study patient experiences (eg, satisfaction) among people having an office hand surgery between those that receive absorbable sutures (Chromic) and are not required to return and those receiving polyamide and having a routine, in-person visit. In this randomized trial comparing closure of office hand surgery wounds with polyamide or Chromic sutures, we compared overall treatment satisfaction and satisfaction with the initial wound healing/scar. We also assessed factors independently associated with overall treatment satisfaction; satisfaction with the initial wound healing/scar; pain intensity; and activity tolerance.

MATERIALS AND METHODS

Ethical committee approval

This study received approval from the institutional review board of the University of Texas at Austin. This study has been performed in accordance with the ethical standards in the 1964 Declaration of Helsinki. This study has been carried out in accordance with relevant regulations of the US Health Insurance Portability and Accountability Act.

Study design

This study was performed at The Dell Medical School of The University of Texas. After institutional review board approval, over a period of 12 months we prospectively invited 171 patients from the separate practices of 3 hand surgeons (L.M.R., D.R., and G.A.V.) to enroll in the study. The trial was registered at ClinicalTrials.gov before enrollment started (Protocol ID 2017-11-0021; ClinicalTrials.gov ID NCT03407820).

All adult English- and Spanish-speaking patients scheduled for elective office hand surgery (including cubital tunnel release and Dupuytren fasciectomy, which are now often in-office procedures) were invited to participate in this study. Patients with medical problems affecting wound healing (eg, long-term corticosteroids users), revision procedures, or known allergies to suture materials were excluded. Two research assistants, who were not involved in patient care, called all eligible patients prior to their visit or invited them during their visit to enroll, and obtained informed consent if they agreed to participate. Patients were randomized 1:1 using a computer random number generator to wound closure with either Chromic or Nylon. Interrupted simple or horizontal mattress skin sutures were used for wound closure per surgeon preference. The surgeon also decided the size of the sutures, most commonly 4-0 Chromic or 5-0 Nylon in the hand and 3-0 at the elbow (cubital tunnel release). One of the research assistants registered the type of surgery, sutures used, type of wound closure, and the surgeon, and asked patients to complete a demographic questionnaire at follow-up (either by email, cell phone, or during their return visit).

Patients were advised that assignment to Chromic sutures meant that a return visit was optional. Standardized wound care instructions were given to all patients. Nylon sutures were removed in the office 10–14 days after surgery. We taught patients with Chromic sutures to gently start rubbing the scab and suture line, including using a washcloth to help encourage the suture ends to fall off starting approximately 10 days after surgery. Of the 3 surgeons, 1 (D.R.) allowed patients with Chromic sutures to decide whether they wanted to return in person or not, and this decision was not tracked. The other 2 surgeons (L.M.R. and G.A.V.) evaluated everyone in person.

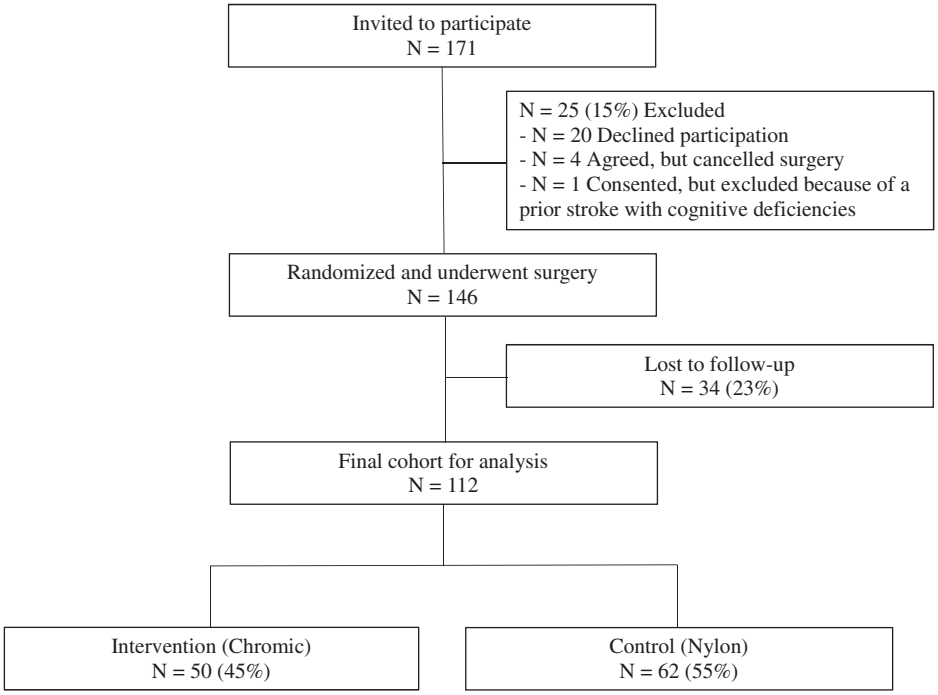

FIGURE 1: Randomization of patients and final study population.

Between 4 and 12 weeks after surgery (on average 9.1 weeks for Chromic and 8.5 weeks for polyamide sutures), patients were contacted via their preferred method (phone or email) by 1 of the research assistants. Patients completed measures of their overall treatment satisfaction, pain intensity, upper extremity–specific physical function, and initial satisfaction with wound healing/scar formation, and noted how many times they contacted their provider in case of concerns about healing of the wound or other problems. The questionnaires were completed on a web-based Health Insurance Portability and Accountability Act–compliant REDCap (Research Electronic Data Capture) survey on the patient's phone or computer. We also asked them to report any concerns, comments, or adverse events, return to the operating room for any problem, and prescribed antibiotics for their wound infections.

Measures

Overall satisfaction and satisfaction with early wound healing and appearance were rated on an 11-point ordinal scale from 0 (not at all satisfied) to 10 (completely satisfied). Pain intensity was also measured on an 11-point ordinal scale from 0 (no pain) to 10 (the worst pain imaginable). Upper extremity–specific activity tolerance was measured using the Patient-Reported Outcomes Measurement Information System Physical Function Upper Extremity Computer Adaptive Test, with higher scores representing better activity tolerance.[14]

Study sample

We approached 171 patients to participate: 20 patients declined, 4 patients initially agreed but cancelled the surgery or did not show up, and 1 consented but was later excluded because of cognitive deficiencies from a prior stroke that was identified when completing questionnaires. Among the final 146 patients randomized and operated on by 1 of 3 surgeons, 34 could not be reached for evaluation after surgery (Fig. 1). The remaining 112 patients were analyzed (Tables 1 and 2).

Among the 17 patients with more than 1 surgery (15%), we studied the more common surgical site. For instance, 3 patients had release of the first dorsal compartment, but each of them had a more common procedure (more common in our cohort; 1 each carpal tunnel release, trigger release, or excision of a ganglion or benign tumor) and we tracked the more common surgical site. Of 69 people having carpal tunnel release, 13 had both sides released (19%). Of 28 trigger releases, 5 involved more than 1 finger (18%), and 1 of the Dupuytren fasciectomies also involved more than 1 finger. For concomitant procedures (eg, multiple trigger digits), the same sutures were used for all wounds and we asked patients to base their answers on the worst wound.

TABLE 1. Surgical Characteristics*

Variables	n = 112
Operated by	
Surgeon 1	65 (58)
Surgeon 2	27 (24)
Surgeon 3	20 (18)
Number of procedures per patient	
1	95 (85)
2	17 (15)
Type of procedure†	
Carpal tunnel release‡	69 (62)
Trigger finger release§	28 (25)
Excisional biopsy finger/hand/arm	13 (12)
Cubital tunnel release	5 (4.5)
De Quervain release	3 (2.7)
Dupuytren release‖	3 (2.7)
Other	7 (6.3)
Type of sutures used	
Nylon nonabsorbable	62 (55)
Chromic absorbable	50 (45)
Suture sizes used	
3-0	9 (8.0)
4-0	47 (42)
5-0	56 (50)
Type of wound closures used	
Simple interrupted sutures	66 (59)
Horizontal mattress sutures	46 (41)
Patients who contacted provider for concerns	26 (23)
Number of times contacted	0 (0–0); range, 0–8
Complications¶	
Wound infection, treated with antibiotics	8 (7.1)
Wound separation, applied with dressings	3 (2.7)
Wound separation, returned to operating room	1 (0.89)

*Continuous variables are shown as medians (interquartile ranges); discrete variables are shown as numbers (percentages).
†Multiple procedures per patient possible.
‡Of which 13 are bilateral.
§Of which 5 are on multiple fingers.
‖Of which 2 are on multiple fingers.
¶One patient had both a wound infection and wound separation.

TABLE 2. Patient and Clinical Characteristics at Follow-Up*

Variables	n = 112
Days until follow-up	52 (34–78)
Age, y	56 ± 14 (21–85)
Men	42 (38)
Language	
Native English speaking	101 (90)
Native Spanish speaking	11 (9.8)
Marital status	
Married/unmarried couple	73 (65)
Divorced/separated/widowed	24 (21)
Single	15 (13)
Level of education	
High school or less	34 (30)
2-year college	17 (15)
4-year college	38 (34)
Postcollege graduate degree	23 (21)
Work status	
Employed	54 (48)
Retired	30 (27)
Unemployed/unable to work	17 (15)
Other (student, homemaker, etc)	11 (9.8)
Insurance	
Private	61 (54)
Other	51 (46)
Smoking	4 (3.6)
No other comorbidities	33 (29)
Other comorbidities†	
Cardiovascular	47 (42)
Musculoskeletal	49 (44)
Mental	17 (15)
Other	17 (15)
PROMIS PF UE	44 ± 9.6 (24–61)
Pain intensity	2.0 (1.0–4.0)
Overall satisfaction with treatment	9.0 (8.0–10)
Score 1–8	36 (32)
Score 9–10	76 (68)
Satisfaction with initial wound healing/scar	9.5 (8.0–10)

PROMIS PF UE, Patient-Reported Outcomes Measurement Information System Physical Function Upper Extremity.
*Continuous variables are shown as means ± standard deviations (ranges) or as medians (interquartile ranges); discrete variables are shown as numbers (percentages).
†Multiple comorbidities per patient are possible.

TABLE 3. Comparing Chromic to Nylon*

Variables	Nylon	Chromic	*P* Value
Complications†			
Wound infection, treated with antibiotics	3 (4.8)	5 (10)	.46
Wound separation, applied with dressings	0 (0)	3 (6.0)	.09
Wound separation, returned to operating room	0 (0)	1 (2.0)	.45
Total wound issues (1 patient had 2 issues)	3 (4.8)	8 (16)	.06
PROMIS PF UE	45 ± 10	43 ± 8.8	.23
Pain intensity	2 (1–3)	2.5 (1–4)	.71
Overall satisfaction with treatment			
Score 1–8	16 (26)	20 (40)	.15
Score 9–10	46 (74)	30 (60)	
Overall satisfaction with treatment as continuous	9 (8–10)	9 (8–10)	.12
Satisfaction with initial wound healing/scar			
Score 1–8	16 (26)	15 (30)	.67
Score 9–10	46 (74)	35 (70)	

PROMIS PF UE, Patient-Reported Outcomes Measurement Information System Physical Function Upper Extremity.
*Continuous variables are shown as means ± standard deviations or as medians (interquartile ranges); discrete variables are shown as numbers (percentages).
†One patient had both a wound infection and wound separation.

Among people receiving polyamide, 38 (61%) received simple interrupted sutures and 24 (39%) received horizontal mattress sutures. Among people receiving Chromic, 28 (56%) received simple interrupted sutures and 22 (44%) received horizontal mattress sutures.

Statistical analysis

The distributions of continuous variables and assumptions concerning normality were assessed to determine the appropriateness of the statistical tests. Continuous variables are presented as means ± standard deviations or medians (interquartile ranges) and discrete data are presented as proportions. We used Pearson and Spearman correlation tests for the relationships between continuous variables, 1-way analysis of variance and Kruskal-Wallis tests for differences among group means, *t* tests and Mann-Whitney U tests for differences between 2 means, and Fisher exact tests for discrete variables. We dichotomized the 2 continuous satisfaction scales to an unsatisfied group (scores 0–8) and a satisfied group (scores 9–10) because (as in our results) patient satisfaction and other experience measures have high ceiling effects (maximum score ratings).[15,16] We created 2 multivariable logistic and 2 multivariable linear regression models to assess factors independently associated with all outcomes (overall treatment satisfaction; satisfaction with initial wound healing/scar; pain intensity; and activity intolerance). We included suture type and all additional variables with a P value $< .10$ on bivariate analysis in the final models (Tables E1 to E3, available online on the *Journal*'s website at www.jhandsurg.org). We considered P values of $<.05$ significant.

An *a priori* power calculation indicated that to find a difference in overall treatment satisfaction of 1 point, with an estimated standard deviation of 1.75 and power at 80%, we would need 100 patients divided into 2 groups. To account for a significant loss to follow-up, we aimed to enroll between 140 and 150 patients.

RESULTS

Twenty-six patients (23%) reported calling the surgeon with concerns. There were 8 (7.1%) wound infections treated with oral antibiotics (3 polyamide, 5 Chromic) and 4 (3.6%) wound separations (all Chromic; 1 also treated for infection, and a second treated with a second surgery for repeat wound closure). In other words, there were 3 complications in patients that received polyamide (all infections) and 8 in patients that received Chromic ($P = .06$). All of these adverse events were associated with a call to the surgeon. In addition, 1 patient with Chromic sutures did not have a complication, but returned to the office and requested that the sutures be removed.

TABLE 4. Multivariable Logistic Regression Analyses of Factors Associated With Satisfaction

Dependent Variables	Retained Variables	Odds Ratio (95% Confidence Interval)	Standard Error	*P* Value	C Statistic*
Overall satisfaction with treatment	Type of sutures used				0.58
	Nylon nonabsorbable	Reference value			
	Chromic absorbable	0.52 (0.23 to 1.2)	0.21	.11	
Satisfaction with initial wound healing/scar	No other comorbidities	0.31 (0.12 to 0.80)	0.15	<.05†	0.68
	Operated by				
	Surgeon 1	Reference value			
	Surgeon 2	0.55 (0.16 to 2.0)	0.36	.36	
	Surgeon 3	0.99 (0.27 to 3.6)	0.65	.98	
	Type of sutures used				
	Nylon nonabsorbable	Reference value			
	Chromic absorbable	0.97 (0.40 to 2.4)	0.44	.95	

*The C statistic is a measure of model fit and is the area under the receiver operating characteristics curve.
†Statistically significant difference.

In a bivariate analysis, we found no difference in overall satisfaction with treatment, satisfaction with initial wound healing/scar, pain intensity, or activity intolerance between Chromic and polyamide (Table 3).

Accounting for potential confounding in multivariable linear and logistic regression analyses, suture type was also not independently associated with any of the studied outcomes (Tables 4 and 5). Patients with no comorbidities had less satisfaction with the initial wound healing/scar (Table 4) and patients who underwent excisional biopsy had greater activity tolerance (Table 5).

Among the comments we received at the final evaluation, 12 patients that received Chromic sutures provided text comments that the sutures were bothersome or took too long to fall off, which was the most common reason for a phone call.

DISCUSSION

Absorbable sutures may be more convenient for some patients. Many surgeons make routine use of absorbable sutures in adults.[1,2,4,6,7,13,17] We tested widely available, relatively inexpensive Chromic sutures, which hand surgeons have experience with in caring for children and hand trauma. We found that Chromic sutures have acceptable satisfaction, but they lead to more phone calls, largely because they may take longer than expected to fall off.

Limitations of this study include the use of satisfaction with overall care and satisfaction with the wound as the primary outcome measures. Satisfaction measures tend to have high ceiling effect—people give the highest scores[15,16]—and that was observed in this study as well, leading us to dichotomize satisfaction, which can result in a loss of information. The inconvenience of having to wait for the Chromic sutures to fall off, or the need to work to help them come off, was frequently mentioned but did not have a measurable influence on the satisfaction scores. It is possible that scales with such a strong ceiling effect are not able to discern the influence of suture type. The practical study design allowed the surgeons to use these sutures in their preferred style and according to their routine. Therefore, there was no attempt to standardize wound assessments, prescription of antibiotics, or other factors. This was intentional and these data are best interpreted as documenting the results of introducing a different suture to a hand surgeon's practice. The results may therefore apply best to the 3 surgeons and our specific setting but, in our opinion, our experience is likely to match that of the average hand surgeon.

The finding of 8 patients (7.1%) having a wound infection or small wound separation may seem high. From prior research, it is known that many small wound separations and suture infections are not brought to the attention of the surgeon.[18] A study of 1,464 medical records of patients undergoing outpatient surgical procedures using a trigger tool (using claims data such as prescription of antibiotics or an urgent care visit) to identify adverse events found an overall rate of 90-day adverse events of 1 in every 10 patients, with the most common adverse event being infection, most often a suture abscess. Among patients having hand surgery, the rate of wound

TABLE 5. Multivariable Linear Regression Analyses of Factors Associated With Pain and Activity Intolerance

Dependent Variables	Retained Variables	Regression Coefficient (95% Confidence Interval)	Standard Error	*P* Value	Semipartial R^2	Adjusted R^2
Pain intensity	Type of sutures used					
	Nylon nonabsorbable	Reference value				
	Chromic absorbable	0.10 (−0.69 to 0.90)	0.40	.80		
PROMIS PF UE	Other than married	−3.1 (−6.8 to 0.54)	1.8	.09		0.23
	4-year college or more	2.3 (−1.1 to 5.7)	1.7	.18		
	Other than private insurance	1.0 (−4.6 to 2.6)	1.8	.58		
	No other comorbidities	3.0 (−0.92 to 6.9)	2.0	.13		
	Type of procedure					
	Carpal tunnel release	Reference value				
	Trigger finger release	−0.30 (−4.7 to 4.1)	2.2	.89		
	Excisional biopsy	11 (5.0 to 16)	2.8	<.05*	0.06	
	Cubital tunnel release	−6.8 (−19 to 5.6)	6.3	.28		
	Dupuytren release	−7.1 (−17 to 3.1)	5.1	.17		
	Other	−2.4 (−9.2 to 4.5)	3.5	.50		
	Type of sutures used					
	Nylon nonabsorbable	Reference value				
	Chromic absorbable	−3.1 (−6.3 to 0.17)	1.6	.06		
	Horizontal mattress vs simple interrupted sutures	−1.4 (−4.9 to 2.2)	1.8	.45		

PROMIS PF UE, Patient-Reported Outcomes Measurement Information System Physical Function Upper Extremity.
*Statistically significant difference. Only the semipartial R^2 value of the significant variable is displayed.

infection was 14 of 295 patients (4.7%), and the overall rate of complications was 7.1%.[18] We only studied problems sufficient that the patient reported contacting their surgeon on the final survey. Self-report contact may differ from actual contact and was used for practical reasons, so we did not have to access the medical record, which affects institutional review board approval in our institution. There may have been other problems of which we were unaware. Another consideration is that people with a scheduled visit might wait to voice their concerns in person, while people with no scheduled visit would need to call the office. Initially, we wanted to test differences and factors associated with contacting the surgeon with wound concerns. Due to the setup of the study, with polyamide patients having an extra office visit and patients receiving Chromic having the option not to return, the infeasibility of keeping track of all patients' number of contacts, and no access to medical records, this comparison was not reliable and was omitted from the study. The setup of this study aimed to track the more common surgical site in cases of multiple surgeries and patient outcomes for the worst wound in cases of concomitant procedures (eg, multiple trigger digits). An alternative approach would be to choose 1 surgical site and wound prior to randomization; however, this was not logistically feasible. An additional concern might be that we did not limit the study to hand surgeries traditionally considered minor, choosing instead to include any surgery considered suitable for the office, which included cubital tunnel release and Dupuytren fasciectomy. The study should be interpreted with this in mind. We had insufficient power to account for the different wounds, incision sizes, and surgical sites; however, randomization should address those concerns. Finally, there were more wound issues diagnosed among people receiving Chromic suture (8 of 50 vs 3 of 62; $P = .06$), and a larger study might find that to be a statistically significant difference.

The finding that overall satisfaction and satisfaction with wound appearance were not associated with suture type is consistent with evidence that adverse events and inconveniences may not affect satisfaction, provided there is a good relationship between the clinician and the patient.[19,20] Current satisfaction measures have a notably high ceiling effect that may be hindering our ability to measure differences in patient experience by suture.[15] A systematic review in 2018 tried to assess the effects of absorbable versus nonabsorbable sutures for skin closure after elective carpal tunnel decompression surgery in adults and found no clear superiority or inferiority of either on postoperative pain, hand function, scar satisfaction, wound inflammation, or adverse events, though the quality of evidence was limited.[17]

We found no difference in complication rates between the 2 suture types, and they were not independently associated with any of the outcomes. The text comments indicated that Chromic sutures are more bothersome—primarily because they take so long to fall off—and the rate of wound issues in our study was not significant. If a larger trial found a significant difference, patients and surgeons could factor the magnitude of that difference into decision making. Chromic sutures maintain strength for 14−21 days, and therefore often need a little help to fall out. We advise people to scrub the wound starting 10 days after surgery to help the sutures to break and fall off. They can also trim them. This can be difficult for some people. Surgeons that decide to use Chromic sutures after office hand surgery might develop a strategy of planned text, email, phone, or video check-ins after surgery to address any concerns or spend some extra time in advance to inform patients about the process by which Chromic sutures fall off.

The finding that none of our measured factors were associated with pain intensity and only excisional biopsy was associated with capability is consistent with evidence that mental and social health account for most of the variations in symptoms and limitations.[21] This may be similar to the issues with measuring satisfaction. Patient-reported outcome and experience measures—at least as currently constructed—may be influenced by nontechnical factors (trust in the specialist, effective accommodation) sufficiently that the influence of technical issues, such as discomfort with sutures and small wound problems, do not register. It is unclear what to make of the difference by diagnosis, but it may be possible that excisional biopsy is somehow associated with more adaptive circumstances.

Our study suggests that Chromic sutures are a viable alternative to polyamide sutures after office hand surgery, provided that the care team anticipates and develops strategies for concerns that may arise if the sutures take an extended period to fall off. Patient convenience and alternative payment models, such as bundles, make absorbable sutures and no postoperative in-person visit appealing. During the coronavirus disease 2019 pandemic, we are aware that many of our colleagues are either switching to absorbable sutures or teaching patients and their family how to remove sutures in order to limit the potential exposure associated with a return visit. Additional investigation of absorbable sutures and alternatives to return to in-person visits seems merited.

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TABLE E1. Bivariate Analyses of Factors Associated With Overall Satisfaction With Treatment*

Variables	Overall Satisfaction With Treatment		*P* Value
	Score 1–8	Score 9–10	
Patient variables			
Age, y	55 ± 14	56 ± 14	.59
Sex			
Women	19 (27)	51 (73)	.15
Men	17 (40)	25 (60)	
Marital status			
Married/unmarried couple	19 (26)	54 (74)	.14
Divorced/separated/widowed	11 (46)	13 (54)	
Single	6 (40)	9 (60)	
Level of education			
High school or less	13 (38)	21 (62)	.81
2-year college	5 (29)	12 (71)	
4-year college	12 (32)	26 (68)	
Postcollege graduate degree	6 (26)	17 (74)	
Work status			
Employed	18 (33)	36 (67)	.34
Retired	8 (27)	22 (73)	
Unemployed/unable to work	4 (24)	13 (76)	
Other (student, homemaker, etc)	6 (55)	5 (45)	
Insurance			
Private	21 (34)	40 (66)	.69
Other	15 (29)	36 (71)	
Smoking			
No	35 (32)	73 (68)	1.00
Yes	1 (25)	3 (75)	
Other comorbidities			
No	13 (39)	20 (61)	.38
Yes	23 (29)	56 (71)	
Surgical variables			
Operated by			
Surgeon 1	19 (29)	46 (71)	.62
Surgeon 2	9 (33)	18 (67)	
Surgeon 3	8 (40)	12 (60)	
Number of procedures			
1	32 (34)	63 (66)	.58
2	4 (24)	13 (76)	
Type of procedure 1			
Carpal tunnel release	21 (30)	48 (70)	.13
Trigger finger release	6 (32)	13 (68)	
Excisional biopsy	2 (17)	10 (83)	
Cubital tunnel release	1 (50)	1 (50)	
Dupuytren release	3 (100)	0 (0)	
Other	3 (43)	4 (57)	

(Continued)

TABLE E1. Bivariate Analyses of Factors Associated With Overall Satisfaction With Treatment* (Continued)

Variables	Overall Satisfaction With Treatment		*P* Value
	Score 1–8	Score 9–10	
Type of procedure 2			
Carpal + cubital tunnel syndrome	22 (31)	49 (69)	.83
Other surgeries	14 (34)	27 (66)	
Suture sizes used			
3-0	3 (33)	6 (67)	.12
4-0	20 (43)	27 (57)	
5-0	13 (23)	43 (77)	
Wound closure			
Simple interrupted sutures	19 (29)	47 (71)	.41
Horizontal mattress sutures	17 (37)	29 (63)	
Complications			
No	32 (32)	69 (68)	.74
Yes	4 (36)	7 (64)	

*Continuous variables are shown as means ± standard deviations or as medians ± interquartile ranges; discrete variables are shown as numbers (percentages).

TABLE E2. Bivariate Analyses of Patient Factors Associated With Various Outcomes*

Variables	Pain Intensity	*P* Value	PROMIS PF UE	*P* Value	Satisfaction With Initial Wound Healing/Scar		*P* Value
					Score 1–8	Score 9–10	
Age, y	ρ 0.05	.57	r -0.11	.26	53 ± 10	57 ± 16	.26
Sex							
Women	3 (1–4)	.99	43 ± 9.6	.29	19 (27)	51 (73)	1.00
Men	2 (1–4)		45 ± 9.7		12 (29)	30 (71)	
Marital status							
Married/unmarried couple	2 (0–3)	.11	46 ± 9.9	<.05†	18 (25)	55 (75)	.52
Divorced/separated/widowed	3 (2–5)		40 ± 7.5		9 (38)	15 (63)	
Single	3 (2–4)		42 ± 9.7		4 (27)	11 (73)	
Level of education							
High school or less	2 (1–3)	.19	43 ± 8.5	<.05†	10 (29)	24 (71)	.77
2-year college	3 (2–4)		38 ± 7.0		3 (18)	14 (82)	
4-year college	2.5 (1–4)		45 ± 11		12 (32)	26 (68)	
Postcollege graduate degree	2 (1–3)		47 ± 9.5		6 (26)	17 (74)	
Work status							
Employed	2.5 (1–3)	.11	46 ± 10	.11	18 (33)	36 (67)	.35
Retired	3 (2–4)		42 ± 7.1		5 (17)	25 (83)	
Unemployed/unable to work	1 (0–3)		41 ± 10		4 (24)	13 (76)	
Other (student, homemaker, etc)	2 (1–6)		45 ± 11		4 (36)	7 (64)	
Insurance							
Private	3 (1–4)	.75	46 ± 10	<.05†	18 (30)	43 (70)	.68
Other	2 (1–4)		42 ± 8.2		13 (25)	38 (75)	
Smoking							
No	2 (1–4)	.48	44 ± 9.5	.10	30 (28)	78 (72)	1.00
Yes	2.5 (2–5)		36 ± 10		1 (25)	3 (75)	
Other comorbidities							
No	2 (1–3)	.33	42 ± 9.2	<.05†	14 (42)	19 (58)	<.05†
Yes	3 (1–4)		47 ± 9.8		17 (22)	62 (78)	

PROMIS PF UE, Patient-Reported Outcomes Measurement Information System Physical Function Upper Extremity.

*Pearson and Spearman correlation are indicated by r and ρ, respectively. Continuous variables are shown as means ± standard deviations or as medians ± interquartile ranges; discrete variables are shown as numbers (percentages).

†Statistically significant difference.

TABLE E3. Bivariate Analyses of Surgical Factors Associated With Various Outcomes*

Variables	Pain Intensity	*P* Value	PROMIS PF UE	*P* Value	Satisfaction With Initial Wound Healing/Scar		*P* Value
					Score 1–8	Score 9–10	
Operated by							
Surgeon 1	2 (1–4)	.62	45 ± 10	.28	15 (23)	50 (77)	.10
Surgeon 2	2 (1–4)		42 ± 9.1		12 (44)	15 (56)	
Surgeon 3	3 (2–4)		42 ± 8.2		4 (20)	16 (80)	
Number of procedures							
1	2 (1–4)	.91	44 ± 10	.53	25 (26)	70 (74)	.56
2	3 (0–4)		43 ± 7.5		6 (35)	11 (65)	
Type of procedure 1							
Carpal tunnel release	3 (1–4)	.17	43 ± 8.7	<.05†	18 (26)	51 (74)	.29
Trigger finger release	3 (1–5)		43 ± 9.2		3 (16)	16 (84)	
Excisional biopsy	1 (0–2.5)		55 ± 7.6		4 (33)	8 (67)	
Cubital tunnel release	1 (0–2)		36 ± 17		1 (50)	1 (50)	
Dupuytren release	1 (1–3)		38 ± 2.1		1 (33)	2 (67)	
Other	3 (2–5)		42 ± 11		4 (57)	3 (43)	
Type of procedure 2							
Carpal + cubital tunnel syndrome	3 (1–4)	.42	43 ± 8.9	.09	19 (27)	52 (73)	.83
Other surgeries	2 (1–3)		46 ± 11		12 (29)	29 (71)	
Suture sizes used							
3-0	2 (1–4)	.88	44 ± 7.6	.46	2 (22)	7 (78)	.73
4-0	3 (1–4)		43 ± 9.0		15 (32)	32 (68)	
5-0	2 (1–3.5)		45 ± 10		14 (25)	42 (75)	
Wound closure							
Simple interrupted sutures	2 (1–4)	.67	45 ± 10	.09	15 (23)	51 (77)	.20
Horizontal mattress sutures	2.5 (1–4)		42 ± 8.7		16 (35)	30 (65)	
Complications							
No	2 (1–4)	.38	44 ± 9.8	.20	27 (27)	74 (73)	.49
Yes	2 (2–5)		40 ± 6.9		4 (36)	7 (64)	

PROMIS PF UE, Patient-Reported Outcomes Measurement Information System Physical Function Upper Extremity.

*Continuous variables are shown as means ± standard deviations or as medians ± interquartile ranges; discrete variables are shown as numbers (percentages).

†Statistically significant difference.