EDITOR'S CHOICE

Prevalence of complications and association with patient-reported outcomes after trapeziectomy with a Weilby sling: A cohort study

Lisa Hoogendam, BSc,*†‡ Mark J. W. van der Oest, PhD,*†‡ Guus M. Vermeulen, MD PhD,‡ Reinier Feitz, MD PhD,‡§ Steven E. R. Hovius, MD PhD,‡§ J. Michiel Zuidam, MD PhD,* Harm P. Slijper, PhD,‡ Ruud W. Selles, PhD,*† The Hand-Wrist Study Group,|| Robbert M. Wouters, PT PhD*†

Purpose The primary aim of this study was to report complications during the first year after trapeziectomy with Weilby sling using a standardized tool designed by the International Consortium for Health Outcome Measures. The secondary aim was to determine the association of complications and patient-reported outcomes 12 months after surgery.

Methods We included patients who underwent trapeziectomy with Weilby sling between November 2013 and December 2018. All complications during the first year were scored using the International Consortium for Health Outcomes Measurement Complications in Hand and Wrist conditions (ICHAW) tool. Pain and hand function were measured before surgery and 12 months after surgery using the Michigan Hand Outcomes Questionnaire (MHQ). Minimally Important Change thresholds of 18.6 for MHQ pain and 9.4 for MHQ function were used to determine clinical importance.

Results Of 531 patients after trapeziectomy with Weilby sling, 65% had an uneventful recovery, 16% experienced ICHAW Grade 1 deviations only, and 19% experienced Grade 2 or 3 deviations, including requiring antibiotics, corticosteroid injections, or additional surgery. On average, patients improved in pain and hand function, even in the presence of ICHAW events. Although all ICHAW grades were associated with poorer patient-reported outcomes 12 months after surgery, Grade 2 and 3 exceeded the Minimally Important Change threshold for pain and/or function.

Conclusions In 531 patients, 65% had an uneventful recovery, 16% experienced ICHAW Grade 1 deviations only, and 19% experienced grade 2 or 3 deviations. We recommend describing Grade 1 as "adverse protocol deviations" and grade 2 and 3 as complications, because of clinically relevant poorer patient-reported outcomes 12 months after surgery. The ICHAW is a promising tool to evaluate systematically and compare complications in

*From the *Department of Plastic, Reconstructive and Hand Surgery, Erasmus MC, Rotterdam, The Netherlands; †Department of Rehabilitation Medicine, Erasmus MC, Rotterdam, The Netherlands; ‡Xpert Clinics, Hand and Wrist Center, Zeist, the Netherlands; and the §Department of Plastic, Reconstructive and Hand Surgery, Radboudumc University Hospital, Nijmegen, The Netherlands.*

Received for publication March 9, 2022; accepted in revised form January 18, 2023.

||Hand-Wrist Study Group collaborators: RAM Blomme, MD, BJR Sluijter, MD PhD, DJJC van der Avoort, MD, A Kroeze, MD, J Smit, MD PhD, J Debeij, MD PhD, ET Walbeehm, MD PhD, GM van Couwelaar, MD, JP de Schipper, MD, JFM Temming, MD, JH van Uchelen, MD PhD, JS Souer, MD PhD, HL de Boer, MD, KP de Haas, MD, K Harmsen, MD, OT Zöphel, MD PhD, R Koch, MD, TM Moojen, MD PhD, X Smit, MD PhD, R van Huis, PT, PY Pennehouat, PT, K Schoneveld, PT MSc, JJ Veltkamp, PT, YE van Kooij, PT MSc, A Fink, PT, WA de Ridder, PT MSc, PO Sun, MD, JS Teunissen, BSc, JE Koopman, MD, Jak Dekker, MSc, ML Jansen-Landheer, MD MSc, MHP ter Stege, MSc.

RF is a board member of Equipe Zorgbedrijven and Incision BV and owns stock in Equipe Zorgbedrijven and Incision BV. No benefits in any form have been received or will be received by the other authors related directly or indirectly to the subject of this article.

Corresponding author: Lisa Hoogendam, BSc, PhD student, Plastic, Reconstructive, and Hand Surgery & Rehabilitation Medicine,Erasmus Medical Center, Room EE-1589, PO Box 2040, 3000 CA, Rotterdam, The Netherlands; e-mail: l.hoogendam@erasmusmc.nl.

0363-5023/23/■ ■-0001
https://doi.org/10.1016/j.jhsa.2023.01.022

hand surgery, although we recommend further evaluation. *(J Hand Surg Am. 2023;■(■):■−■.*

Type of study/level of evidence Therapeutic IV.

Key words Carpometacarpal joint, complications, osteoarthritis, patient-reported outcomes, surgery.

TRAPEZIECTOMY WITH LIGAMENT reconstruction and tendon interposition (LRTI) is a common surgical procedure, as it is the preferred surgical option for thumb base osteoarthritis for 72%−89% of surgeons.[1−3] Several LRTI techniques are available,[4] including a flexor carpi radialis (FCR) sling according to Weilby,[5] which is performed often.[6] In this procedure, an FCR strip is wrapped around the abductor pollicis longus in a figure-of-eight pattern to support the first metacarpal.

Although studies consistently show improvement in pain and hand function[4] after trapeziectomy with LRTI, a wide range of complication rates has been reported, ranging from 0.2%[7] to 53%.[8] and 18%[9]to 35%[10] specifically for trapeziectomy with Weilby sling. These differences in complication rates likely are due to the use of different definitions and follow-up periods.

To overcome this problem, the International Consortium for Health Outcome Measurement hand and wrist working group recently defined an international standard for reporting complications in hand surgery[11] based on the Clavien-Dindo complication classification system used in general surgery.[12] In the newly developed International Consortium for Health Outcome Measurement Complications in Hand and Wrist conditions (ICHAW) tool, all events related to the treatment that fall outside the expected recovery during the first 12 months after the initial surgery are considered a complication.

The ICHAW tool already has been used to classify complications after ulnar shortening osteotomy and trigger finger release.[13,14] Notably, it yields higher complication rates than reported previously. Although this is in part expected because of the inclusive definition and the follow-up period of 1 year, it also raises concerns about whether all events classified as complications by the ICHAW tool actually are relevant to patients and influence other outcomes. A change beyond the Minimally Important Change can be considered clinically relevant.

Therefore, the primary aim of the present study was to report complications during the first year after trapeziectomy with a Weilby sling, using the ICHAW tool.[11] As a secondary aim, we investigated how complications are associated with patient-reported pain and hand function during the first year after surgery.

METHODS

Study design and setting

We conducted a retrospective study using data of patients who elected trapeziectomy and ligament reconstruction according to Weilby for primary trapeziometacarpal joint osteoarthritis (TMC OA).[5] Patient-reported outcome data were collected prospectively, while complication data were collected by retrospective review of the patient records. We included patients treated between December 2011 and December 2018 at Xpert Clinics, comprising 26 locations and 23 European Board certified (Federation of European Societies for Surgery of the Hand) hand surgeons. The cohort and data collection[15] and their use in daily clinical care[16] were described previously in more detail.

As part of routine outcome measurements, all patients were invited to complete patient-reported outcome measurements (PROMs) at fixed time points, that is before surgery, and 3 and 12 months after surgery.[15] Data were collected between November 2013 and December 2019. All patients provided written informed consent. Institutional board review was obtained from the ethics committee of Erasmus Medical Center that approved our study protocol (MEC-2018-1088).

Participants

We included patients who completed the Michigan Hand Outcomes Questionnaire (MHQ) before surgery and 12 months after surgery. Patients with posttraumatic TMC OA, previous thumb base surgery, previous major hand or wrist surgery (eg,

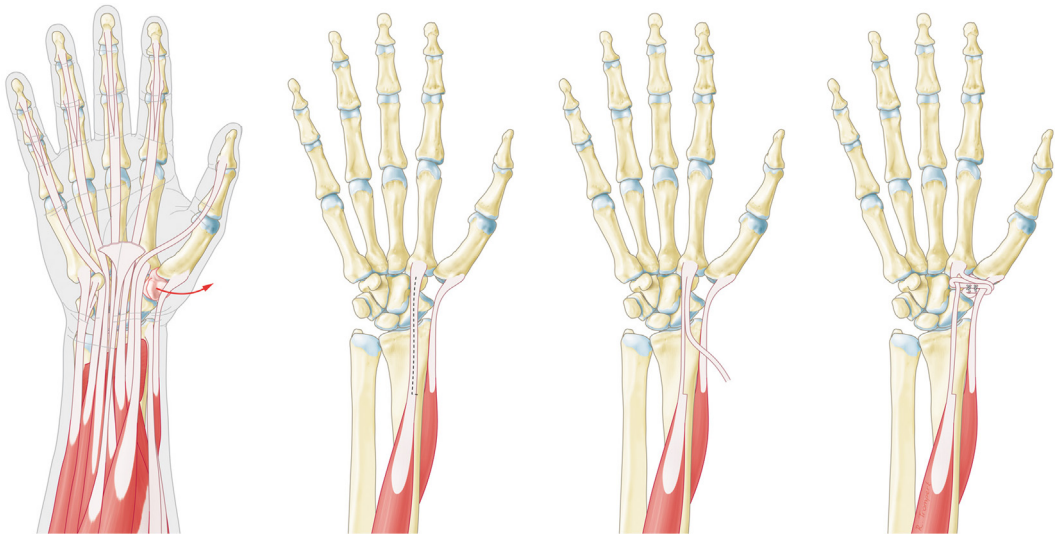

FIGURE 1: Surgical technique of the Weilby procedure. Reprinted with permission from Xpert Clinics[17]). Copyright by Xpert Clinics.

proximal row carpectomy), or isolated scaphotrapeziotrapezoid OA were excluded. We also excluded patients undergoing surgical treatment on the contralateral side within 12 months to avoid interference of treatment of other hand or wrist conditions on the PROM scores.

Surgical technique

Patient records were studied by the first investigator to confirm that the same modified Weilby technique (Fig. 1, reprinted with permission from Xpert Clinics[17]) was used in every patient. A description of the surgical technique is included in Supplement A (available online on the *Journal's* website at www.jhandsurg.org). During surgery, the scaphotrapeziotrapezoid joint was inspected. When indicated, partial resection of the scaphoid and/or trapezoid was performed, depending on surgeons' preference.

Rehabilitation

All hand therapists across all locations were instructed to follow the standard rehabilitation protocol (including immobilization and exercises) in our clinic. During the study period, the duration of wearing a cast was decreased, changing the immobilization regime. These 2 different immobilization regimens and the exercises have been described extensively by Tsehaie et al,[18] but have been shown to yield similar outcomes; there were no differences in complication rates and there was noninferiority in all PROMs. The current protocol (from October 2015 onward) is short immobilization, in which a plaster cast is applied for 3−5 days after surgery. Afterwards, a thumb spica splint that also provided immobilization of the wrist was applied until 4 weeks after surgery. From 4 to 8 weeks after surgery, patients received a thumb butterfly splint that was phased out from week 8 to week 10 after surgery. Routine check-up visits with the surgeon were scheduled at 3 and 12 months after surgery. Additional check-up visits were scheduled easily when the patient or treating hand therapist considered this beneficial.

Measurements

Medical history, Eaton-Glickel score,[19] complications, and reoperations within the first year after surgery were obtained from patient records by the first investigator (not involved in treatment). In accordance with the ICHAW tool, all deviations from the expected treatment course that are related to the treatment during the first year after surgery were considered complications. Treatments for preexisting conditions that followed another treatment were not considered complications (eg, treatment for Dupuytren's contracture of the fourth digit after surgery for thumb base OA). In addition to the rehabilitation protocol described above, we considered the following as part of the expected treatment course: routine prescription of analgesics (opioids or less strong analgesics for 5−10 days, ie, one prescription), sutures removed at 7−14 days, cast removed at 3−5 days, hand therapy phased out at 3 months, orthosis phased out at 3 months, and no additional treatment recommendations from the 3 months check-up visit onward.

In the ICHAW guidelines (Table S1, available online on the *Journal's* website at www.jhandsurg.org), the severity of a complication (ie, grade) is

based on the treatment it requires. When a complication was not sufficiently relieved with minimally invasive treatment and more invasive treatment was given, this was scored only as a complication once and the highest grade was reported.

Patient-reported outcomes

The MHQ[20] is a PROM with good reliability, validity, and responsiveness for TMC OA patients.[21] The MHQ consists of 6 domains (pain, hand function, aesthetics, work, activities of daily life, and satisfaction with hand function), each with a score ranging from 0−100 (0 = poorest function, 100 = ideal function). For this study, the MHQ subscales pain and hand function were used. We included the baseline and 12 months postoperative MHQ scores for the analyses. When patients also completed the MHQ 3 months after surgery, these data were included only in the figures. The Minimally Important Change thresholds of 18.6 for MHQ pain and 9.4 for MHQ function were used to determine clinical importance.[22]

Study size

The number of patients treated during the study period determined the sample size, making this a convenience sample. In our *post hoc* effect size calculation, we found that we could detect a small effect size of 0.12 (Cohen's d) with the number of available patients and 80% power to evaluate whether pain and hand function changed between pre- and postoperative assessments. Additionally, for the linear regression model that included complication grade, we could detect a medium effect size of 0.04 (Cohen's f2).[23]

To examine whether patients completing the MHQ before surgery and 12 months after surgery (responders) differed from patients who did not complete these PROMs (nonresponder), we performed a nonresponder analysis where we compared patient characteristics (ie, age, sex, symptom duration, hand dominance, affected side, and occupational intensity).

Statistical analysis

We used *t*-tests to compare normally distributed continuous outcomes. Wilcoxon tests were used to compare nonnormally distributed continuous outcomes and X^2 tests were used for categorical outcomes.

Multivariable linear regression was used to estimate the association between complications and patient-reported outcomes 12 months after surgery, corrected for patient characteristics, treatment characteristics, and preoperative pain and hand function scores. We checked that the regression analyses complied with the model's assumptions. The adjusted explained variance (R^2), which accounts for the number of variables in the model, was calculated. Additionally, we fitted linear mixed models to again assess clustering within location and we found intraclass correlation coefficients of 0.000 and 0.011 for pain and hand function, respectively. This indicates that the variance in outcome mainly exists within locations (caused by patient variation) and not between locations; therefore, we used the multivariable linear regression models.

We considered $P<.05$ as statistically significant. As multiple testing correction was not performed, the results of the analyses on the secondary outcomes should be interpreted as exploratory.[24]

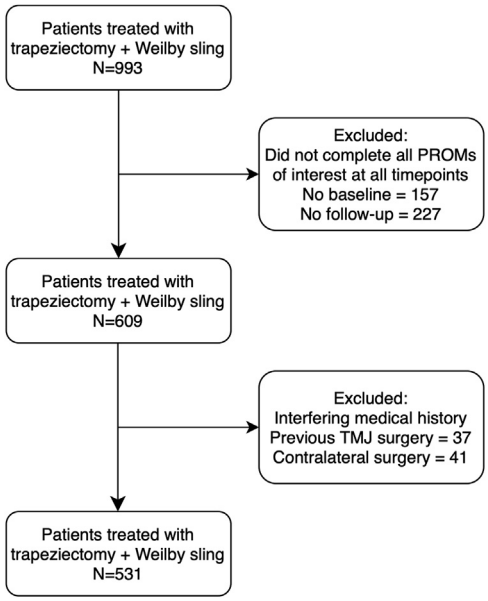

FIGURE 2: Flowchart of included patients.

RESULTS

We included 531 patients (Fig. 2) for analysis. Most patients were female (78%), and the mean age was 61 years (SD 8; Table 1). We excluded 384 patients because of nonresponse on the PROMs of interest. We found no differences in patient characteristics in the nonresponder analysis (Table S2, available online on the *Journal's* website at www.jhandsurg.org). In 13%, a concomitant partial resection of the ST joint was performed. Concomitant surgery was performed in 11% of the patients, most frequently a carpal tunnel release (38%; Table S3, available online on the *Journal's* website at www.jhandsurg.org).

Primary outcome

In 65% of all patients, no deviations from the expected course within 1 year were reported, according to the ICHAW tool (Fig. 3). Thirty-five percent of all patients

TABLE 1. Patient Characteristics and Patient-Reported Outcomes before Surgery of the Included Patients

	All (N = 531)	Patients With an ICHAW Event (N = 187)	Patients Without an ICHAW Event (N = 344)
Age (y)	61 (8)	60 (9)	62 (8)
Sex (%)			
Female	78	82	76
Duration of symptoms (mo) (median ± IQR)	24 (12–48)	24 (12–48)	24 (12–50)
Hand dominance (%)			
Right	84	83	85
Left	10	9	10
Both	6	8	5
Affected side (%)			
Right	49	54	46
Occupational intensity (%)			
Not employed	47	47	48
Light (eg, working in an office)	18	15	19
Moderate (eg, working in a shop)	22	21	23
Severe (eg, working in construction)	13	17	10
BMI (in kg/m^2)	26 (4)	27 (4)	26 (4)
Diabetes (%)			
Yes	6	7	6
Smoking (%)			
Yes	13	16	11
Eaton-Glickel grade (%)			
1	1	1	0
2	6	7	6
3	23	23	23
4	43	41	44
Not available	27	28	27
Concomitant partial resection of trapezoid, scaphoid, or both (%)			
Yes	13	11	13
Partial scaphoid resection	1		
Partial trapezoid resection	7		
Partial scaphotrapezoid resection	5		
Concomitant minor surgery (%)			
Yes	11	15	9
MHQ pain	34 (14)	32 (13)	36 (14)
MHQ hand function	49 (18)	49 (18)	50 (17)

Additionally, patient characteristics and patient reported outcomes before surgery are shown for patients with and without an event according to the ICHAW tool in the first year after trapeziectomy and Weilby sling. Values are reported as mean (SD) unless stated otherwise.

(95% confidence interval [CI], 31%; 39%) experienced a deviation, with 16% of the patients (95% CI, 13%; 19%) only experiencing a grade 1 event and 19% (95% CI, 16%; 23%) experiencing at least a grade 2 or 3 event. We recorded 275 separate ICHAW events in 187 patients (Table 2; Fig. S1 available online on the *Journal's* website at www.jhandsurg.org).

A grade 1 event occurred in 24% of all patients (eg, pain requiring additional hand therapy, splinting, or analgesics), and 14% experienced a grade 2 event

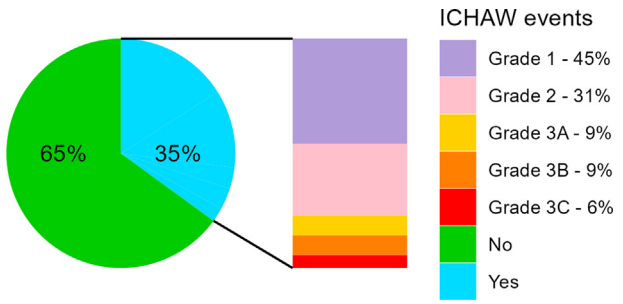

FIGURE 3: Distribution of ICHAW events during the first year after trapeziectomy with a Weilby sling. The pie chart depicts the proportion of patients with a complication. The bar chart shows the distribution of complication severity for patients with a complication. Because a small number of patients experienced multiple events, we report the most severe ICHAW grade per patient.

(eg, FCR tendinitis requiring corticosteroid injections; Table 2). Thirty-six patients (7%) required surgical intervention under local (grade 3A) or regional/general (grade 3B) anesthesia.

Grade 3A events mostly comprised surgical treatment of De Quervain's tenosynovitis (DQ) or surgical treatment of trigger thumb. Grade 3B events predominantly comprised revisions within a year (3%), mainly consisting of releases of the Weilby sling due to pain and tendinitis ($n = 8$) and (partial) resections of the scaphoid, the trapezoid, or both ($n = 6$). The median time to revision surgery was 39 weeks (interquartile range, 31−45 weeks). Grade 3C (complex regional pain syndrome [CRPS]) was present in 11 patients (2%). Because the timing of events was an important determinant of whether the event fell outside of the expected recovery, we provide an overview of the number of complications per week per grade (Fig. S2, available online on the *Journal's* website at www.jhandsurg.org) and the number of grade 1, 2, and 3 complications per week in more detail (Figs. S3A−C, available online on the *Journal's* website at www.jhandsurg.org).

As a sensitivity analysis, we excluded treatment for DQ and trigger thumb as ICHAW events. This resulted in 30% of all patients experiencing a deviation and 12% experiencing grade 2 or 3 events.

Secondary outcomes

Between before surgery and 12 months after surgery, MHQ pain scores improved on average by 29 (95% CI, 26, 31) from 34 (95% CI, 33, 36) to 63 (95% CI, 61, 65; Fig. 4A). The MHQ hand function improved, on average, by 15 points (95% CI, 13, 17) from 49 (95% CI, 48, 51) to 64 (95% CI, 63, 66; Fig. 5A). The distributions of MHQ pain and hand function scores before and after surgery are shown in Figures S4A and 4B, respectively (available online on the *Journal's* website at www.jhandsurg.org).

To evaluate the impact of complications on recovery, we assessed improvement in MHQ pain and hand function during the first year after surgery separately for patients with and without complications (Figs. 4A and 5A, respectively). Patients with and without ICHAW events experienced significant improvement in pain and hand function ($P<.05$). After correction for baseline characteristics, we found that patients with an ICHAW event scored 14 points worse (95% CI, 10, 17) on MHQ pain, and 11 points worse (95% CI, 8, 14) on hand function 12 months after surgery compared with patients without complications.

Additionally, ICHAW grade was associated significantly with pain and hand function 12 months after surgery. Figures 4B and 5B demonstrate how ICHAW grade affected MHQ pain scores and hand function scores, respectively. After correction for baseline characteristics, MHQ pain scores at 12 months were 10 points worse (95% CI, −5, −15) for patients with a grade 1 event increasing up to 28 points worse (95% CI, −16, −41) for patients with a grade 3C complication compared with patients without complications (Table 3). The impact of ICHAW grade on hand function score was similar (Table 3). From grade 2 onward, there was a clinically relevant worsening in pain and/or hand function.

DISCUSSION

In our cohort of 531 patients with primary TMC OA treated with trapeziectomy and Weilby sling, we found that, according to the ICHAW, no deviations occurred in 65% of the patients, 16% experienced an ICHAW grade 1 deviation and 19% experienced an ICHAW grade 2 or 3 deviation from expected recovery. Although we found that patients improved in pain and hand function after trapeziectomy and Weilby sling, having an ICHAW event was associated with poorer patient-reported outcomes 12 months after surgery, with higher ICHAW grades being associated with worse patient-reported outcomes. From grade 2 onward, the difference in patient-reported outcomes exceeds the Minimally Important Change, indicating a clinically relevant difference.

Considering previously reported complication rates of 0.2%−53% for trapeziectomy with LRTI,[7,8]

TABLE 2. Overview of the Number of ICHAW Events and the Number of Patients Who Experienced that Event, According to the ICHAW Tool, During the First Year After Trapeziectomy and Weilby Sling

	ICHAW events (N)
Grade 1	140 events in 125 patients (ie, 23.5% [95% CI, 20.0; 27.3] of all patients had a grade 1 event)
Pain requiring hand therapy, splinting or analgesia, additional to the normal rehabilitation protocol	86
Instability[a]	26
Prolonged or excessive swelling[b]	11
Sensory change[c]	6
Scar tenderness[d]	5
Tendon rupture (no intervention required)	4
Stenosing tenosynovitis of the thumb requiring hand therapy or splinting	2
Grade 2	81 events in 72 patients (ie, 13.6% [95% CI, 10.8; 16.8] of all patients had a grade 2 event)
FCR tendinitis requiring corticosteroid injection	26
De Quervain's tenosynovitis requiring corticosteroid injection	25
Stenosing tenosynovitis of the thumb requiring corticosteroid injection	15
Infections requiring antibiotics	8
Pain requiring corticosteroid injection[e]	7
Grade 3	54 events in 43 patients (ie, 8.1% [95% CI, 5.9; 10.8] of all patients had a grade 3 event)
Grade 3A	25 events in 25 patients (ie, 4.7% [95% CI, 3.1; 6.9] of all patients had a grade 3A event)
Surgical treatment of De Quervain's tenosynovitis	11
Surgical treatment of stenosing tenosynovitis of the thumb	11
Pain requiring pain rehabilitation or second opinion	3
Grade 3B	18 events in 17 patients (ie, 3.2% [95% CI 1.9; 5.1] of all patients had a grade 3B event)
Revision surgery	17
Neuroma treatment	1
Grade 3C	11 events in 11 patients (ie, 2.1% [95% CI, 1.0; 3.7] of all patients had a grade 3C event)
Complex regional pain syndrome	11
Overall	275 events, 187 patients (ie, 35.2% [95% CI, 31.2; 39.5] of all patients had an event)

Because a selection of patients experienced multiple events, the number of complications does not equal the number of patients.
[a]Instability including first metacarpophalangeal joint collapse, first metacarpophalangeal hyperextension, Z-deformity, or trapezoidal collapse requiring a (permanent) splint and/or additional hand therapy.
[b]Excessive postoperative swelling requiring early removal of the plaster cast or prolonged swelling requiring bandaging.
[c]Persistent sensory change (such as numbness and tingling) not related to carpal, cubital, or radial tunnel syndrome.
[d]Scar tenderness for which silicone gel sheets were prescribed.
[e]Persistent pain requiring corticosteroid injections at the base of the first metacarpal or in the scaphotrapezial joint.

and 18%–35%[9,10] for the Weilby sling specifically, the overall ICHAW event rate of 35% we found appears substantial, but not unexpected. This high rate is explained possibly by a large number of grade 1 deviations, ie, events requiring additional hand therapy or analgesics, which may be reported less frequently in other studies. Grade 1 deviations may be seen and treated more often by hand therapists or

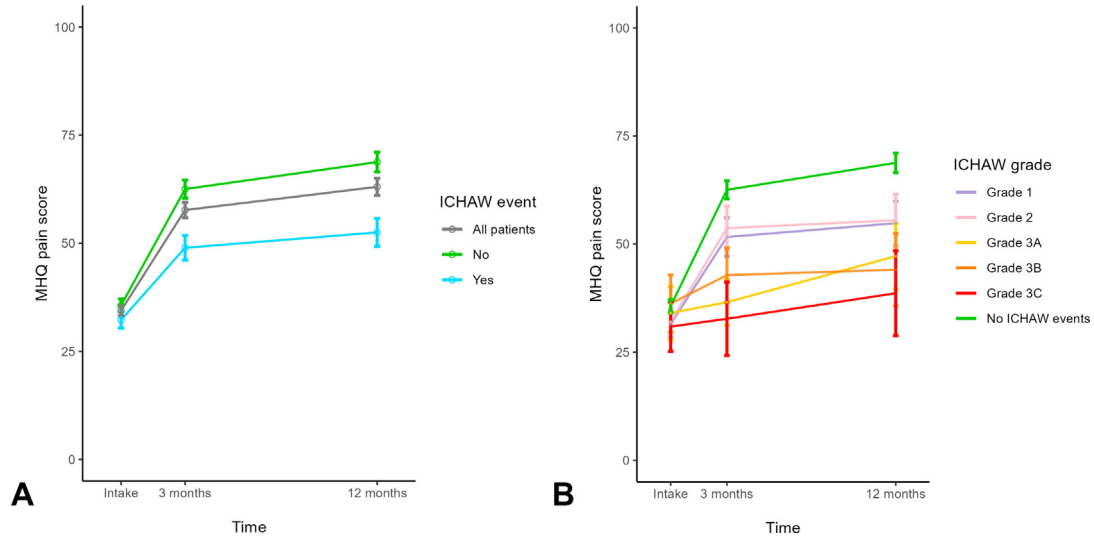

FIGURE 4: A Mean MHQ pain during the first year after trapeziectomy with a Weilby sling, categorized by the occurrence of an ICHAW event. The error bars represent the 95% confidence interval. **B** Mean MHQ pain during the first year after trapeziectomy with a Weilby sling, categorized by ICHAW grade. The error bars represent the 95% confidence interval.

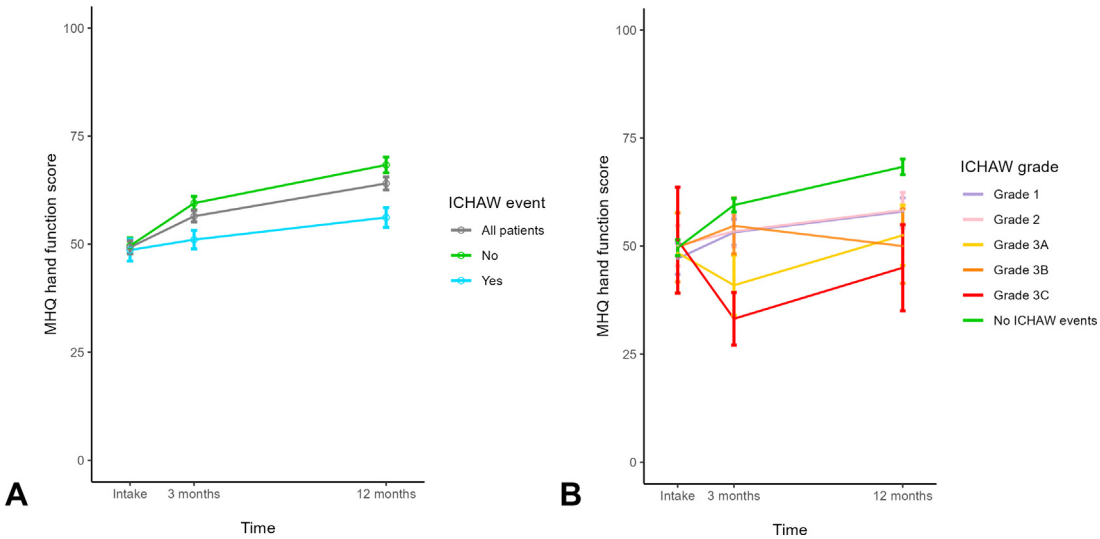

FIGURE 5: A Mean MHQ hand function during the first year after trapeziectomy with a Weilby sling, categorized by the occurrence of an ICHAW event. The error bars represent the 95% confidence interval. **B** Mean MHQ hand function during the first year after trapeziectomy with a Weilby sling, categorized by ICHAW grade. The error bars represent the 95% confidence interval.

primary care physicians, and therefore, could be less in the scope of hand surgeons.

On applying the ICHAW guidelines, we found grade 1 deviations particularly difficult to ascertain. The treatments that fall under grade 1 deviations (eg, additional hand therapy or silicone gel sheets), are prescribed easily, making it difficult to determine whether these additional treatments were prescribed because they were potentially beneficial. We found that grade 1 deviations were associated with worse patient-reported outcomes, but it is debatable whether this difference is clinically relevant. We recommend that ICHAW grade 1 deviations continue to be registered and reported to provide more insight into recovery after hand surgery procedures, but that these may not be considered a complication. Rather, we propose the term "adverse protocol deviation" to classify grade 1 deviations.

Grade 3 events, including CRPS, revision surgery, or surgical treatment of DQ or trigger thumb, occurred in 8% of all patients in our study. Previously, a CRPS rate of 5% and a revision rate because

TABLE 3. Regression Coefficients and 95% CI for the Association Between ICHAW Grade and MHQ Pain Score and MHQ Hand Function Score 12 Months After surgery, Respectively

	Outcome			
	MHQ pain 12 mo after surgery		MHQ hand function 12 mo after surgery	
ICHAW grade (Ref = no event)	B (95% CI)	*P* value	B (95% CI)	*P* value
Grade 1 event	−10.4 (−5.3, −15.5)	<.001	−8.7 (−4.8, −12.7)	<.001
Grade 2 event	−11.6 (−5.8, −17.5)	<.001	−10.5 (−6.0, −15.1)	<.001
Grade 3A event	−19.2 (−8.6, −29.8)	<.001	−15.4 (−7.2, −23.6)	<.001
Grade 3B event	−23.5 (−13.0, −34.0)	<.001	−18.0 (−9.8, −26.2)	<.001
Grade 3C event	−28.2 (−15.6, −40.9)	<.001	−23.7 (−13.9, −33.6)	<.001
Adjusted R^2	0.22		0.18	

CI, confidence interval. In the regression analysis, we corrected for patient characteristics and preoperative MHQ pain score and MHQ hand function score, respectively. These regression coefficients can be interpreted as the mean difference in MHQ pain or MHQ hand function 12 months after surgery for patients with an ICHAW event of a specific grade compared with a patient without ICHAW event when all other variables (patient characteristics and preoperative MHQ score) remain the same.

of scapho-first metacarpal impingement of 1.5% has been reported in patients who underwent trapeziectomy with LRTI.[25] We found a slightly lower CRPS rate of 2%, but a higher revision rate of 3%. Although there is no conclusive evidence that DQ and trigger thumb are related causally to trapeziectomy with LRTI, they have been reported previously in literature.[5,26] Hypothetically, the FCR suspension with the abductor pollicis longus may evoke friction and edema and subsequent tenovaginitis at the first extensor compartment (ie, DQ). Similarly, the increase zigzag deformity in the thumb after surgery[27,28] combined with postoperative edema may evoke a flexor pollicis longus tenovaginitis (ie, trigger thumb). Future studies may investigate whether the development of DQ and trigger thumb are truly related to the surgery and, therefore, whether treatment should be considered a complication after trapeziectomy and LRTI.

Our study has several limitations, including the amount of nonresponse because of the observational setting of this study. However, in the nonresponder analysis, we found no differences in patient characteristics between responders and nonresponders, suggesting that the patients included in this study are similar to patients who did not complete all PROMs. Our observational setting also may be considered a strength because it may better reflect daily clinical hand surgery practice.

In contrast to the prospective collection of PROMs, complications were scored retrospectively based on electronic patient records because the ICHAW tool has been developed only recently. Despite our standardized procedures, collecting data retrospectively is more sensitive to bias than prospective data collection. To obtain more reliable complication estimates, we recommend recording complications prospectively, preferably by clinicians. Still, as the ICHAW tool uses the administered treatment to determine complication grade, this will likely be reasonably well-reported in patient records, particularly for Grades 2 and 3. The interrater reliability of the ICHAW requires further study.

Finally, we included a single surgical treatment option for TMC OA in our study because most surgeons in our clinic prefer this technique. This is in line with recent survey studies, showing that most surgeons (72%−89%) prefer to treat TMC OA with trapeziectomy and LRTI[1,2,6] despite that current evidence suggests no benefit from LRTI in addition to trapeziectomy.[4,29] Because the ICHAW tool has not yet been applied to other surgical techniques for treating TMC OA, comparing our complication rate to, for example, isolated trapeziectomy or implants, is challenging. Future comparative studies using the ICHAW tool are needed to assess this.

In conclusion, this study reports complications using the ICHAW tool, after trapeziectomy with a Weilby sling. Of 531 patients, 65% had an uneventful recovery, 16% experienced ICHAW grade 1 deviations only, and 19% experienced grade 2 or 3 deviations. Considering that grade 2 and 3 deviations were associated with poorer patient-reported outcomes 12 months after surgery, we propose to classify grade 1 deviations as "adverse protocol deviations" instead of complications and grade 2 and 3 as complications in future studies. Although the ICHAW tool has promise to systematically evaluate

and compare complications in hand surgery, we recommend psychometric evaluation of the ICHAW tool and possibly further refining of the guidelines to optimally define, register, and compare complications in hand surgery.

ACKNOWLEDGMENTS

The authors thank all patients who participated and allowed their data to be used anonymously for the present study.

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