Patients' Preferences for Treatment for Dupuytren's Disease: A Discrete Choice Experiment

Hester J. Kan, M.D., Ph.D.
Esther W. de Bekker-Grob, Ph.D.
Eva S. van Marion, M.D.
Guido W. van Oijen, M.D.
Christianne A. van Nieuwenhoven, M.D., Ph.D.
Chao Zhou, M.D.
Steven E. R. Hovius, M.D., Ph.D.
Ruud W. Selles, Ph.D.

Rotterdam and Hilversum, The Netherlands

Background: Although in modern medicine, patients' preferences are important, these have never been defined for characteristics of Dupuytren treatment. This study determines these patients' preferences using a discrete choice experiment.
Methods: A multicenter discrete choice experiment study was conducted among patients with Dupuytren's disease who had been treated previously. Patients were asked about their preferences for attributes of Dupuytren treatments using scenarios based on treatment method, major and minor complication rates, recurrence rates, convalescence, residual extension deficit after treatment, and aesthetic results. The relative importance of these attributes and the tradeoffs patients were willing to make between them were analyzed using a panel latent class logit model.
Results: Five-hundred six patients completed the questionnaire. All above-mentioned attributes proved to influence patients' preferences for Dupuytren treatment ($p < 0.05$). Preference heterogeneity was substantial. Men who stated they performed heavy labor made different tradeoffs than women or men who did not perform heavy labor. In general, recurrence rate (36 percent) and extension deficit (28 percent) were the most important attributes in making treatment choices, followed by minor complication rate (13 percent). Patients accepted an increase in recurrent disease of 11 percent if they could receive needle aponeurotomy treatment instead of limited fasciectomy.
Conclusions: This study confirms the importance of low recurrence rates and complete contracture corrections, but also emphasizes the significance of low complication rates. Convalescence was not an attribute, which scored high. The preference heterogeneity shows that patient consultations need to be targeted differently, which may result in different treatment decisions, depending on patient characteristics and preferences. (*Plast. Reconstr. Surg.* 137: 165, 2016.)

Although many surgeons may still consider limited fasciectomy as the gold standard for treating Dupuytren's disease, in recent years, minimally invasive techniques, especially needle aponeurotomy and collagenase, have become increasingly popular.[1–5] The most optimal of these techniques cannot easily be determined, because each technique has specific strengths and weaknesses. For example, collagenase is a minimally invasive strategy with a shorter recovery time but may have higher recurrence rates than the more invasive limited fasciectomy.[2,3,6] In addition, needle aponeurotomy also has a shorter recovery time than limited fasciectomy, but has much higher minor complication and recurrence rates.[2,7]

Because of these different pros and cons of present techniques, the decision regarding which treatment method is preferred for treating patients with Dupuytren's disease depends on the relative importance of these factors. Among others, degree of contracture, expertise of the surgeon, expected commitment of the patient to the

From the Departments of Plastic and Reconstructive Surgery and Hand Surgery, Public Health, and Rehabilitation Medicine and Physiotherapy, Erasmus University Medical Centre; and the Xpert Clinic.
Received for publication April 7, 2015; accepted August 20, 2015.

DOI: 10.1097/PRS.0000000000001878

Disclosure: *The authors have no financial interest to declare in relation to the content of this article.*

postoperative care and follow-up, and patients' expectations may all play important roles in this choice.[8,9] In addition, data on recurrence rates, surgical outcome, and complication rates play an important role in advice to patients and in clinical decision making.[10]

At present, it is unclear how a patient would weigh a better reduction in contracture correction compared with an increase in the major complication rate or to what extent patients are willing to accept an increase in recurrent disease for a reduction in duration of recovery. Insight into these preferences can contribute to patient-centered care and information for patients. Therefore, the aim of this study was to determine which treatment attributes are important for patients when choosing a Dupuytren's disease treatment option and to what extent patients are prepared to make tradeoffs between these attributes.

PATIENTS AND METHODS

Discrete Choice Experiment

To quantify patients' preferences for health care interventions, discrete choice experiments are increasingly used.[11] Discrete choice experiments assume that health care interventions can be characterized by a combination of attributes (e.g., degree of contracture correction, complication rates) and attribute levels (e.g., major complication rates: 2 percent and 5 percent), and that this combination determines patient preferences.[12] In a discrete choice experiment, respondents are repetitively offered hypothetical choices between two or more alternative health care interventions, which are presented as different combinations of attribute levels.[13,14]

Attributes and Attribute Levels

To define possible attributes and their levels for this discrete choice experiment study, we conducted a literature study to evaluate which outcomes parameters are evaluated in clinical studies.[1–3,6,7,15–17] Furthermore, experiences from the Dupuytren Rotterdam trial and the expert opinion of two hand surgeons from the Erasmus University Medical Centre were used for establishing attributes. In total, seven relevant attributes with their levels were determined: (1) treatment method, (2) major complication rate, (3) minor complication rate, (4) convalescence, (5) recurrence rate, (6) degree of residual contracture after correction, and (7) aesthetic result (Table 1).

Table 1. Different Attributes and Levels Used in This Study*

Attributes and Levels
Treatment method
Limited fasciectomy
Needle aponeurotomy
Extensive percutaneous aponeurotomy and lipofilling
Collagenase injections
Major complication rate
2%
5%
10%
Minor complication rate
5%
20%
60%
Convalescence
5 days
30 days
60 days
Recurrence rate within 5 yr
30%
60%
90%
Residual extension deficit after treatment
0 degrees
20 degrees
40 degrees
60 degrees
Aesthetic result
Moderate
Good
Excellent

*Discrete choice experiments assume that health care interventions can be characterized by a combination of attributes and attribute levels.

Study Design and Questionnaire

The combination of five attributes with three levels and two attributes with four levels resulted in 3.888 hypothetical treatment alternatives. As it is not feasible to present a single patient with all alternatives, an efficient discrete choice experiment design by maximizing D-efficiency (using Ngene software, version 1.1.1; ChoiceMetrics, Sydney, New South Wales, Australia; http://www.choice-metrics.com/) was created with 24 choice sets to estimate all main effects. Because response reliability decreases with more than 16 choice sets per respondent,[18] we used a blocked design, dividing these 24 choices into two questionnaires.[19]

Each questionnaire consisted of 12 choice sets (Fig. 1). One choice set was repeated in all subjects to check for consistency. Each choice set consisted of two treatment options for Dupuytren's disease and a no-treatment option to allow an opt out. The questionnaire was specifically designed not to favor any type of treatment option using an unlabeled discrete choice experiment design.[20]

To evaluate whether patients were able to interpret the questions, three sample questions at the beginning of the questionnaire were asked. This was examined as a pilot in 26 patients.

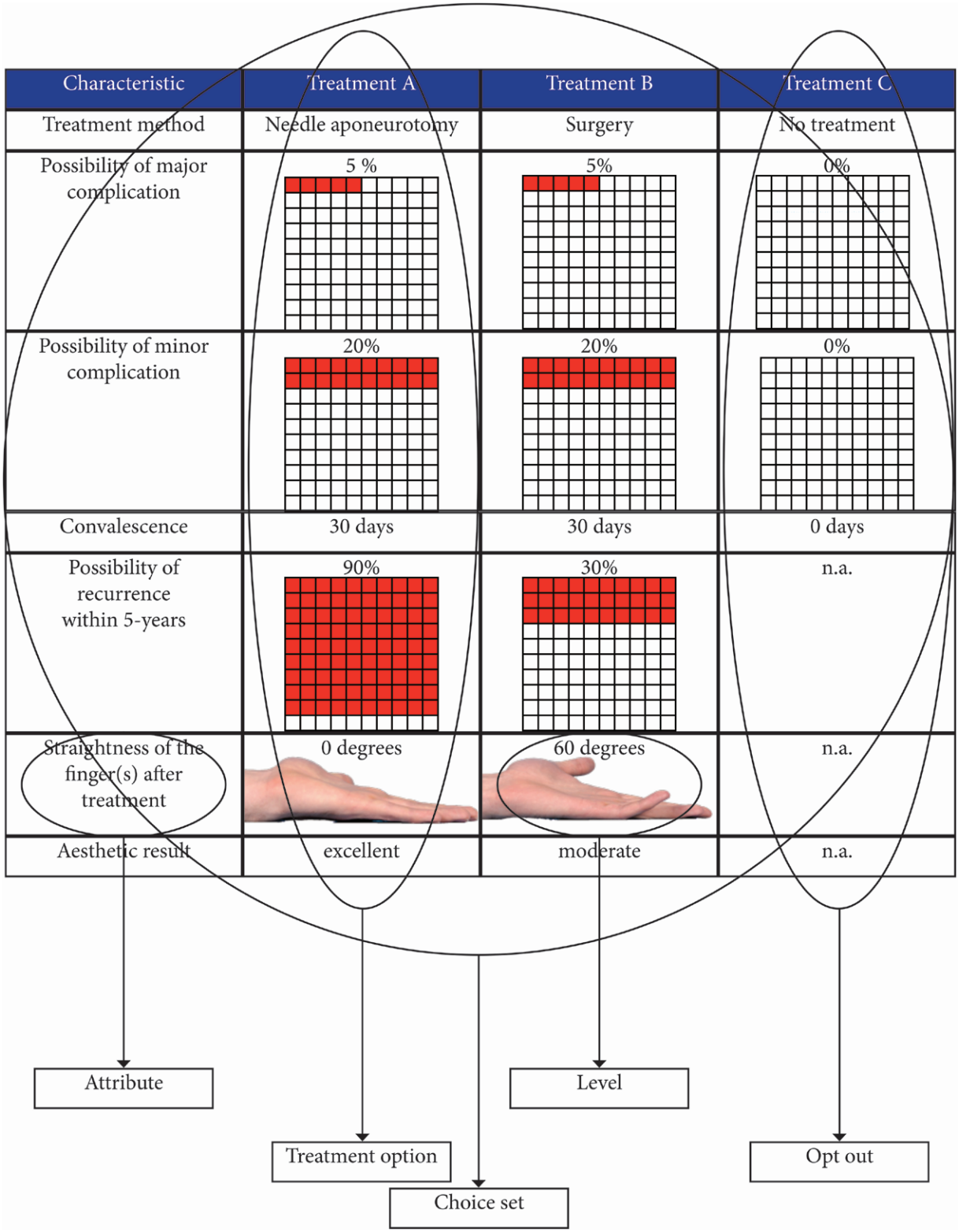

Fig. 1. Example of a choice set. Patients received 12 different choice sets to measure their preferences. It was explained that if opt out was chosen, it would indicate that the disease would progressively worsen.

Attached to the questionnaire was a detailed description of the attributes and their levels. Photographs were included to demonstrate a moderate aesthetic result, a good aesthetic result, and an excellent aesthetic result. We defined minor complications as hematoma, edema, and mild pain

complaints; major complications included tendon injury, nerve injury, arterial lesions, and complex regional pain syndrome. General questions about history of Dupuytren's disease, satisfaction with previous treatment, profession, and level of education were asked in an additional questionnaire.

Study Sample

This multicenter discrete choice experiment study was conducted at Erasmus University Medical Centre and Sint Franciscus Gasthuis and at seven locations of the Xpert Clinic in The Netherlands. Patients who received any type of treatment for Dupuytren's disease between January of 2009 and August of 2012 were included. These patients underwent either limited fasciectomy with or without skin grafting, extensive percutaneous aponeurotomy with lipografting, needle aponeurotomy, injection with collagenase, or a combination of these treatments.

Invitations were sent to all patients. Patients could either complete a Web-based version of the questionnaire or a paper copy. A reminder was sent after 6 weeks to all nonresponders.

This study received approval by the Medical Ethical Committee of Erasmus University Medical Centre in Rotterdam (MEC-2012–330). All patients gave their informed consent.

Statistical Analysis

We used a panel latent class logit model for the analysis of patients' choices.[21,22] This latent class logit model is a conditional logistic regression analysis that can identify whether different groups with similar preferences (class segments) exist in the population. The model is flexible in that the probability that sampled respondents belong to a particular class can be linked to covariates (e.g., sex, manual labor, and treatment history), thus allowing for some understanding as to the makeup of the various class segments.[22] The latent class logit model accounts for the panel nature of the data in which each respondent completed 12 choice tasks. To determine the number of classes, we selected the model with the best fit based on the Akaike information criterion. We tested a number of different specifications for the utility function (i.e., categorical or numerical attribute levels) and found that the optimal utility function was as follows:

$V_{nsj} = \beta_{0|c} + \beta_{1|c}$ treatment_PALF$_{nsjc} + \beta_{2|c}$ treatment_needle$_{nsj|c} + \beta_{3|c}$ treatment_collagenase$_{nsj|c}$ $\beta_{4|c}$risk of major complications$_{nsj|c} + \beta_{5|c}$risk of minor complications$_{nsj|c} + \beta_{6|c}$convalescence (days)$_{nsj|c} + \beta_{7|c}$risk of recurrence within 5-years$_{nsj|c} + \beta_{8|c}$residual extension deficit after treatment$_{nsj|c} + \beta_{9|c}$aesthetic result_good$_{nsj|c} + \beta_{10|c}$aesthetic result_very good$_{nsj|c}$,

where $V_{nsj|c}$ represents the observable utility that respondent n belonging to class segment c has for alternative j in choice set s; $\beta_{0|c}$ represents an alternative-specific constant for a certain class; and $\beta_{1–10|c}$ are class-specific parameter weights (coefficients) associated with each attribute (level) of the discrete choice experiment. Thus, all attributes acted as linear attributes, except for the attributes treatment method and aesthetic results (both categorical variables). The reference levels for treatment method and aesthetic results were surgery and moderate, respectively. Interpretation of the coefficients was as follows:

1. The statistical significance of a coefficient ($p \leq 0.05$) indicated that, conditional on belonging to that class, respondents considered the attribute important when making stated choices.
2. In terms of the class assignment parameters (i.e., the covariates), statistically significant parameter estimates indicate that the covariate can be used to distinguish between the different classes. For example, if the covariate male sex is negatively and significantly associated with a particular class in the assignment model, it is indicative that men are less likely than women to belong to that particular class.
3. The sign of the coefficient reflects whether the attribute had a positive or negative effect on preference for a treatment.
4. The value of each coefficient represents the importance respondents assign to an attribute (level). However, different attributes use different units of measurement. For example, the coefficient "major complication rate" represented the importance per 1 percent complication rate. When looking at a treatment that generates a 5 percent protection rate, the coefficient must be multiplied five times (five times coefficient of major complication rate of a treatment of 1 percent = coefficient of major complication rate of a treatment of 5 percent).

We used NLogit 4.0 software (Econometric Software, Inc., Plainview, N.Y.; www.limdep.com) to estimate the latent class models and IBM SPSS Version 21.0 software (IBM Corp., Armonk, N.Y.; http://www-01.ibm.com/software/analytics/spss/) for all other analyses.

Importance Scores and Tradeoffs

We translated the preference coefficients of all attributes to importance scores and the clinically relevant tradeoffs. This will give us more information about which attribute was most important and the willingness to trade different attribute levels for recurrence rate and contracture correction. In more detail, we calculated class-specific importance scores to visualize the relative importance of a given attribute in that class by dividing the difference in utility between the highest and the lowest levels for a single attribute by the sum of the differences of all attributes for that class.[13] Thus, the importance scores are calculated rates, indicating how much one decision is based on a specific attribute (e.g., *x* percent of the decision for a specific treatment option is based on recurrence rate, and *y* percent of the decision is based on reduction of extension deficit; all rates together count up to 100 percent and counts as one decision for a specific treatment). In addition, we determined the ranking importance scores of each attribute. That is, an attribute with a ranking importance score of 1 represents the most important attribute, whereas an attribute with a ranking importance score of 7 represents the least important attribute. Furthermore, we also calculated overall importance scores by taking class probability into account.

In addition, we calculated the willingness to trade different attribute levels for recurrence rate and contracture correction by taking the ratio of the coefficients of the different attributes with recurrence rate or contracture correction as the dominator. An example is a value that represents how much change of recurrence or reduction of contracture correction a patient is willing to sacrifice for one unit change in the attribute of interest (e.g., major complications). Confidence intervals of this tradeoff were estimated using the Krinsky and Robb procedure.[22,23]

RESULTS

Participants

A total of 506 of 973 patients (59 percent) completed the questionnaire. One hundred thirty-three patients did not want to participate in the study. Furthermore, we were not able to contact eight patients because of wrong postal addresses. Sixty-seven patients either did not return or did not complete the questionnaire. Two hundred fifty-nine patients did not respond at all (26.6 percent). In total, 393 men and 113 women participated in this study. The mean age of the population was 64 years. This study population is comparable to patients suffering from Dupuytren's disease who visit the outpatient clinic (Table 2).

Discrete Choice Experiment Results

Three groups in the latent class model were identified (Table 3), indicating that three different choice patterns could be identified among the different patients. The probability of belonging to one of the three groups within the sampled population was 0.40, 0.11, and 0.49 for latent classes 1, 2, and 3, respectively.

The probability of belonging to a specific class was dependent on two sociodemographic variables: sex and conducting heavy manual labor. More specifically, men conducting manual labor more frequently belonged to class 2. Other sociodemographic variables did not significantly explain class assignment probabilities.

Overall, almost all coefficients of the linear attributes were significant. Preference for a certain treatment decreased (indicated by a negative coefficient) with increasing major and minor complication rates, longer convalescence, higher recurrence rate, and larger postsurgical extension deficit. The coefficients of the categorical attributes (i.e., treatment method and aesthetic results) showed that (1) in latent classes 1 and 3, the effect of preferring needle aponeurotomy was significantly higher than surgery

Table 2. Patient Characteristics

Characteristics	No. (%)
Total no. of respondents	506
Mean age ± SD, yr	64 ± 9
Sex	
Male	393 (78)
Female	113 (22)
Education level	
Low	63 (12)
Intermediate	218 (43)
High	225 (45)
Civil class	
Married/living with partner	433 (86)
Partner, living apart	12 (2)
Single/divorced	44 (9)
Widow(er)	17 (3)
Heavy manual labor	
Yes	142 (28)
No	364 (72)
Family with Dupuytren's disease	
First/second degree	248 (49)
Third/fourth degree	16 (3)
No family member with Dupuytren's disease	147 (29)
Not clear	95 (19)
Ectopic disease	
Ledderhose disease	79 (16)
Peyronie disease	16 (3)
Ledderhose and Peyronie disease	8 (1.5)
No ectopic disease	403 (80)
Previous treatment	
Surgery*	273 (54)
Minimally invasive technique†	123 (24)
Surgery and minimally invasive technique	110 (22)

*Limited fasciectomy and dermofasciectomy.
†Needle aponeurotomy, extensive percutaneous aponeurotomy with lipografting, collagenase.

Table 3. Results of the Panel Latent Class Model*

Attributes	Latent Class 1		Latent Class 2		Latent Class 3		Overall
	Coefficient	IS % (Rank)	Coefficient	IS % (Rank)	Coefficient	IS % (Rank)	IS % (Rank)
Constant	−5.578		−1.808		−7.585		
Treatment characteristics							
Treatment method							
Surgery	−0.005†		0.951‡		−0.106†		
PALF	−0.070	4.4 (5)	−0.948‡	27.7 (2)	−0.280‡	8.4 (4)	9 (4)
NA	0.171‡		0.014		0.444‡		
Collagenase injection	−0.097		−0.018		−0.058		
Major complication rate, %	−0.029‡	3.8 (6)	−0.048‡	5.6 (5)	−0.077‡	8.4 (4)	6 (5)
Minor complication rate, %	−0.004‡	5.9 (4)	−0.008‡	9.4 (4)	−0.020‡	7.2 (5)	12 (3)
Convalescence, days	−0.003‡	3.1 (7)	−0.004	3.4 (7)	−0.009‡	18.9 (2)	5 (6)
Recurrence rate, %	−0.017‡	27.2 (2)	−0.020‡	28.7 (1)	−0.038‡	6.1 (6)	36 (1)
Extension deficit, degrees	−0.051‡	49.3 (1)	−0.025‡	21.6 (3)	−0.019‡	43.9 (1)	28 (2)
Aesthetic result						12.8 (3)	
Moderate	−0.206†		−0.143†		−0.124†		
Good	0.031	6 (3)	0.038	3.6 (6)	0.020	2.6 (7)	4 (7)
Excellent	0.175‡		0.106		0.103‡		
Class probabilities	0.396		0.111		0.493		
Constant	−0.316		−2.678‡				
Sex	0.240		1.098‡				
Heavy labor	−0.340		0.757‡		—		

IS, importance score; PALF, extensive percutaneous aponeurotomy with lipofilling; NA, needle aponeurotomy.
*The coefficients indicating the increase (positive values) or decrease (negative sign) in preference for a certain treatment when all other attribute levels remain the same. For example, the coefficient of −0.029 for major complication rate indicates that the preference for a specific operation decreases by 0.029 when the complication rate increases by 1%.
†Reference group.
‡Statistically significant.

(0.171 versus −0.005, and 0.444 versus −0.106, for latent classes 1 and 3, respectively); (2) in latent class 2, the effect of preferring surgery was significantly higher than extensive percutaneous aponeurotomy with lipografting (0.951 versus −0.948); and (3) in all latent classes, a very good aesthetic result was preferred over a moderate aesthetic result.

Importance Scores

The relative importance of the different attributes, as described by the importance scores in Table 3, were different between the subjects belonging to the different latent classes. Subjects in class 1 predominantly made their choice based on extension deficit (50 percent) and recurrence rate (27 percent). In class 2, subjects chose primarily based on recurrence (29 percent), treatment method (28 percent), and residual contracture (22 percent). In class 3, subjects made their choice predominantly on recurrence (44 percent) and minor complication (19 percent). Overall, recurrence rate (36 percent) and residual contracture (28 percent) were the most important attributes determining treatment choice.

Tradeoffs

In Table 4, tradeoffs are presented that patients were willing to make for recurrence of disease and contracture correction. Among others, patients

Table 4. Results of the Tradeoffs Patients Were Willing to Make*

Attribute	Willingness to Trade Recurrence (%) (95% CI)	Willingness to Trade Extension Deficit (degrees) (95% CI)	With
	−9.8 (−12.5 to −7.4)*	−8.45 (−11.1 to −6.2)*	PALF instead of surgery
	10.5 (8.0 to 13.2)*	9.0 (6.7 to 11.8)*	NA instead of surgery
Treatment method	−2.5 (−4.6 to 0.4)	2.2 (0.4 to 4.0)*	Collagenase instead of surgery
Major complication rate	2.0 (1.7 to 2.3)*	1.7 (1.4 to 2.0)*	1% less risk of major complications
Minor complication rate	0.5 (0.4 to 0.5)*	0.4 (0.3 to 0.5)*	1% less risk of minor complications
Convalescence	0.2 (0.3 to 0.3)*	0.2 (0.1 to 0.2)*	1 day faster recovery
Recurrence rate	n.a.	0.9 (0.8 to 0.9)*	1% less risk of recurrence
Extension deficit	1.2 (1.1 to 1.3)*	n.a.	1% less residual extension deficit
Aesthetic results	1.0 (−0.7 to 2.6)	0.8 (−0.7 to 2.2)	Good instead of a moderate result
	4.8 (3.1 to 6.5)*	4.1 (2.7 to 5.7)*	Excellent instead of a moderate result

PALF, extensive percutaneous aponeurotomy with lipofilling; NA, needle aponeurectomy; n.a., not applicable.
*For example, patients were willing to accept an increase of 2% for disease recurrence for a reduction of 1% of major complications.

accepted an increase in recurrent disease of 10.5 percent if they could receive needle aponeurotomy treatment instead of limited fasciectomy. Furthermore, patients were willing to accept an increased risk for recurrent disease of 2 percent for a reduction of 1 percent of major complications; this means they accepted an increase of 10 percent of recurrent disease for a reduction of 5 percent in major complications. In addition, for every 9 degrees' increase of residual contracture after treatment, patients were willing to trade 10 percent less risk of recurrent disease.

DISCUSSION

The aim of this study was to determine which attributes are important for a patient when choosing a Dupuytren's disease treatment option and to what extent a patient is willing to make tradeoffs between characteristics of treatment options. We found that treatment method, major complication rate, minor complication rate, convalescence, recurrence rate, degree of residual contracture after treatment, and aesthetic result all proved to influence patients' preferences for Dupuytren treatment. Preference heterogeneity was substantial. Men who stated they performed heavy labor made different tradeoffs than women or men who did not perform heavy labor. Overall, recurrence rate (36 percent) and extensive deficit (28 percent) were the most important attributes in making treatment choices, followed by minor complication rate (13 percent). Patients accepted an increase in the risk of recurrent disease of 11 percent if they could receive needle aponeurotomy treatment instead of limited fasciectomy.

Our study has a number of specific strengths and limitations. The main strengths of this study are the large study population (506 analyzed questionnaires) and the thorough and state-of-the-art design and analysis of the discrete choice experiment. Furthermore, in this study, we included patients already treated for Dupuytren's disease because they are familiar with the disease and the impact of a surgical or minimally invasive procedure. However, this strength is also a limitation. Because patients were treated previously, they may have "defended" their own treatment (i.e., cognitive discordance), or they may have had previous positive or negative treatment experiences. This may have biased our results. In contrast, they represent the general population that visits the outpatient clinic. However, when comparing patients that received different treatments previously, we found no specific choice pattern based on the prior operations. This indicates that patients previously treated by an invasive operation made no other choices than patients treated with a minimally invasive technique. In other words, we believe these study outcomes are valid and therefore relevant for future practice and further understanding of patients' preferences. In addition, although we did not find evidence for cognitive discordance, we recommend repeating the study for patients not having been treated for Dupuytren's disease to determine the robustness of our results. A second limitation is inherent in discrete choice experiments where a larger number of attributes are important, namely, that discrete choice questionnaires can be difficult to understand for patients. Because of the high number of attributes, patients may have difficulty overseeing all attributes and their levels when asked to select a specific treatment. Therefore, to evaluate task understanding, we repeated one of the questions in the questionnaire at the end. This consistency test showed that 19 percent of the patients did not answer the question consistently. However, we found that these participants had patient characteristics (e.g., sex, age) and similar preferences compared with the group that correctly answered the consistency question. Therefore, we did not exclude this group from the study population.

Unfortunately, few comparative studies are available with which to compare the attribute levels of different treatments within the same population and with the same measurement protocol. We showed that patients are willing to trade an 11 percent increase in recurrence rate within 5 years to undergo needle aponeurotomy instead of limited fasciectomy. This may be in line with findings from a recent randomized controlled trial. This trial reported similar patient satisfaction early after surgery. However, at 5 years, an almost 50 percent higher recurrence rate for needle aponeurotomy (84 percent) compared with limited fasciectomy (32 percent) was reported, resulting in less patient satisfaction after 5 years in the needle aponeurotomy group.[2] However, van Rijssen et al. reported that patients with a contracture recurrence after needle aponeurotomy would prefer needle aponeurotomy again because of the better convalescence, which is not in line with our finding that patients find convalescence less important than recurrence rate.[2]

Furthermore, contractures are more likely to be completely released after open surgery, whereas some minimally invasive techniques lack the ability to release the joint contracture and/or lateral or spiral cord completely after one intervention.[1,3] We showed that this attribute was of high importance (28 percent). However, patients were willing to trade 9 degrees of residual contracture for undergoing needle aponeurotomy instead of limited fasciectomy. In addition, they were willing to trade 2 degrees of residual contracture for

receiving collagenase instead of limited fasciectomy, indicating that patients are willing to trade joint contracture for a less invasive technique.

CONCLUSIONS

Lately, minimally invasive interventions for Dupuytren's contracture have received increased attention because of their associated rapid convalescence and lower complication risk.[1–3] However, this study shows that patients find low recurrence rates and complete contracture correction the most important attributes when selecting a specific treatment. Convalescence, which is often mentioned as an important advantage of minimally invasive techniques, was found to be less important for treatment selection in our study.[1,7] This study may give surgeons awareness of the patients' preferences toward certain treatment attributes. They can use this information when consulting patients by focusing more on the most relevant attributes. In that way, the surgeon and patient can decide together which treatment is best for that specific patient by shared decision making.

Hester J. Kan, M.D.
Department of Plastic and Reconstructive Surgery and Hand Surgery
Erasmus University Medical Centre
P.O. 2040
3000 CA Rotterdam, The Netherlands
eh.kan@erasmusmc.nl

CODING PERSPECTIVE

cpt

This coding perspective provided by Dr. Raymund Janevicius is intended to provide coding guidance.

20527	Injection, enzyme (e.g., collagenase), palmar fascial cord (i.e., Dupuytren's contracture)
26341-58	Manipulation, palmar fascial cord (i.e., Dupuytren's cord), following enzyme injection, single cord
26121	Fasciectomy, palm only, with or without Z-plasty, other local tissue rearrangement, or skin grafting
26123	Fasciectomy, partial palmar with release of single digit, with or without Z-plasty, other local tissue rearrangement, or skin grafting
26125	Fasciectomy, partial palmar with release of single digit, with or without Z-plasty, other local tissue rearrangement, or skin grafting; each additional digit

- Code 20527 is reported for collagenase injection of a Dupuytren's cord.
- Subsequent manipulation, following injection, is described with code 26341. Because this occurs during the global period of code 20527, append the staged procedure modifier, 58.
- Excision of Dupuytren's involving the palm only is reported with code 26121.
- Excision of Dupuytren's involving the palm and a single digit is reported with code 26123. This includes palmar excision, so code 26121 is not used in addition to code 26123.
- Excision or Dupuytren's involving each additional digit is reported with code 26125 in addition to code 26123. Code 23125 is an add-on code and does not take the multiple procedure modifier, 51.
- Thus, palmar fasciectomy involving the right middle, ring, and small fingers is reported as follows:

  23123, Right middle finger.
  25125, Right ring finger.
  26125, Right small finger.

- Some payers, including Medicare, require the digit modifiers:

  23123-F7, Right middle finger.
  25125-F8, Right ring finger.
  26125-F9, Right small finger.

REFERENCES

1. Hovius SE, Kan HJ, Smit X, Selles RW, Cardoso E, Khouri RK. Extensive percutaneous aponeurotomy and lipografting: A new treatment for Dupuytren disease. *Plast Reconstr Surg.* 2011;128:221–228.
2. van Rijssen AL, Ter Linden H, Werker PM. 5-year results of randomized clinical trial on treatment in Dupuytren's disease: Percutaneous needle fasciotomy versus limited fasciectomy. *Plast Reconstr Surg.* 2012;129:469–477.
3. Hurst LC, Badalamente MA, Hentz VR, et al. Injectable collagenase clostridium histolyticum for Dupuytren's contracture. *N Engl J Med.* 2009;361:968–979.
4. Henry M. Dupuytren's disease: Current state of the art. *Hand (N Y)* 2014;9:1–8.

5. Zhou C, Hovius SE, Slijper HP, et al. Collagenase clostridium histolyticum versus limited fasciectomy for Dupuytren's contracture: Outcomes from a multicenter propensity-score matched study. *Plast Reconstr Surg.* 2015;136:87–97.
6. Watt AJ, Curtin CM, Hentz VR. Collagenase injection as nonsurgical treatment of Dupuytren's disease: 8-year follow-up. *J Hand Surg Am.* 2010;35:534–539, 539.e1.
7. van Rijssen AL, Gerbrandy FS, Ter Linden H, Klip H, Werker PM. A comparison of the direct outcomes of percutaneous needle fasciotomy and limited fasciectomy for Dupuytren's disease: A 6-week follow-up study. *J Hand Surg Am.* 2006;31:717–725.
8. Desai SS, Hentz VR. The treatment of Dupuytren disease. *J Hand Surg Am.* 2011;36:936–942.
9. Benson LS, Williams CS, Kahle M. Dupuytren's contracture. *J Am Acad Orthop Surg.* 1998;6:24–35.
10. Kan HJ, Hovius SE. Long-term follow-up of flaps for extensive Dupuytren's and Ledderhose disease in one family. *J Plast Reconstr Aesthet Surg.* 2012;65:1741–1745.
11. de Bekker-Grob EW, Ryan M, Gerard K. Discrete choice experiments in health economics: A review of the literature. *Health Econ.* 2012;21:145–172.
12. Ryan M, Gerard K. Using discrete choice experiments to value health care programmes: Current practice and future research reflections. *Appl Health Econ Health Policy* 2003;2:55–64.
13. Louviere J, Hensher DA, Swait JD. *Stated Choice Methods: Analysis in Applications.* Cambridge: Cambridge University Press; 2000.
14. Ryan M, Farrar S. Using conjoint analysis to elicit preferences for health care. *BMJ* 2000;320:1530–1533.
15. Skoff HD. The surgical treatment of Dupuytren's contracture: A synthesis of techniques. *Plast Reconstr Surg.* 2004;113:540–544.
16. Ullah AS, Dias JJ, Bhowal B. Does a 'firebreak' full-thickness skin graft prevent recurrence after surgery for Dupuytren's contracture?: A prospective, randomised trial. *J Bone Joint Surg Br.* 2009;91:374–378.
17. Rahr L, Søndergaard P, Bisgaard T, Baad-Hansen T. Percutaneous needle fasciotomy for primary Dupuytren's contracture. *J Hand Surg Eur Vol.* 2011;36:548–552.
18. Hall J, Fiebig DG, King MT, Hossain I, Louviere JJ. What influences participation in genetic carrier testing? Results from a discrete choice experiment. *J Health Econ.* 2006;25:520–537.
19. Hensher DA, Rose JM, Green WH. *Applied Choice Analysis: A Primer.* Cambridge: Cambridge University Press; 2005.
20. de Bekker-Grob EW, Hol L, Donkers B, et al. Labeled versus unlabeled discrete choice experiments in health economics: An application to colorectal cancer screening. *Value Health* 2010;13:315–323.
21. Swait J. A structural equation model of latent segmentation and product choice for cross sectional revealed preference choice data. *J Retail Consum Serv.* 1994;1:77–89.
22. de Bekker-Grob EW, Rose JM, Donkers B, Essink-Bot ML, Bangma CH, Steyerberg EW. Men's preferences for prostate cancer screening: A discrete choice experiment. *Br J Cancer* 2013;108:533–541.
23. Krinsky I, Robb AL. On approximating the statistical properties of elasticities. *Rev Econ Stat.* 1986;68:715–719.