Patient Satisfaction with Treatment for Onychocryptosis: A Systematic Review

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Keywords

Ingrown nail · Onychocryptosis · Patient satisfaction · Systematic review · Conservative treatment · Matricectomy

Abstract

Onychocryptosis, or ingrown nail, is a common condition in which the nail plate penetrates the nail fold, often resulting in inflammation and pain. Nonsurgical and surgical treatments are utilized, but patient satisfaction with these therapies has not been well studied. The purpose of this study was to systematically review the available literature describing patient-reported outcomes of onychocryptosis treatments. We performed a search of the literature published prior to May 22, 2019. Articles were included in the review if primary data were presented, patient-reported outcome measures (PROMs) were used, and nail involvement was specifically examined. From the initial search, 18 studies were included in the final analysis. Patients receiving both nonsurgical and surgical interventions reported high levels of overall satisfaction; however, most studies used ad hoc measures rather than validated PROMs, providing little granular information

on the impact of treatment on quality of life (QoL). This review affirms that treatment for onychocryptosis results in satisfactory outcomes for patients; however, increased efforts are needed to understand the impact of therapy on patient QoL as assessed by validated outcome measure that accurately assess patients' cosmetic, physical, and social difficulties.

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Introduction

Onychocryptosis, or ingrown nail, occurs when the nail plate edge penetrates the periungual dermis. Ingrown nails are quite common, affecting 2.5–5% of the general population [1]. However, true prevalence is likely much higher, as many patients do not seek medical care for mild symptoms. Onychocryptosis may cause nail fold swelling, edema, erythema, and pain [2]. More severe cases may present with features of active infection, granulation tissue, and ulceration of the nail fold, sometimes progress-

Fig. 1. Study selection process. PROM, patient-reported outcome measure.

ing to a chronic inflammatory state with nail fold hypertrophy [2]. In addition to pain, ingrown nails may cause both functional and emotional impairment.

In a 2012 Cochrane systematic review, the authors recommended conservative treatments for mild to moderate ingrown nails and surgical approaches for moderate to severe cases to prevent recurrences [3]. A wide array of conservative and surgical treatments has been used for onychocryptosis therapy. With so many options, it is crucial to understand not only treatment efficacy but also the patient’s level of overall satisfaction with therapy. This review sought to evaluate the available literature of the quality of life (QoL) impact of onychocryptosis and patient-reported outcomes of nonsurgical and surgical treatment interventions for onychocryptosis.

Materials and Methods

A search of the English-language literature published prior to May 22, 2019, for studies reporting QoL impacts for nail conditions was performed. MEDLINE and Embase databases were examined with the search terms “nail” and “quality of life” (CFL). Abstracts were screened by 2 researchers (R.K. and L.A.) using the following exclusion criteria: not an original article, valid patient-reported outcome measure (PROM) not used, and outcomes not

reported in patient subgroup with nail involvement. Full-text articles were reviewed by 2 researchers (R.K. and L.A.) with discrepancies resolved by a third researcher (C.R.). References of articles were searched to identify additional articles that may have been missed, although no studies were added (CFL). Data were extracted and confirmed by 2 researchers (C.S. and L.A.). This study is part of a larger review on the use of PROMs with patients who have nail conditions. Only studies analyzing onychocryptosis were included in this review. Study design, population demographics, and patient satisfaction measures were extracted.

Results

A total of 430 full-text articles were assessed for eligibility with 18 studies included in the final analysis (Fig. 1) [4–21]. Four studies utilized validated PROMs in the analysis: the Dermatology Life Quality Index, the European Quality of Life Questionnaire, the Manchester-Oxford Foot Questionnaire, and the Borg CR10. All other studies analyzed patient-reported outcomes via an ad hoc questionnaire. Overall satisfaction was reported as a percentage of subjects satisfied or as a mean score and standard deviation based on a visual analog scale.

The demographics of study populations were varied. The mean age of subjects across studies was between 13.5

Table 1. QoL outcomes after no intervention or nonsurgical treatments

Reference	Country of origin	Study design	Inclusion criteria	Intervention	N	Mean age $\pm$ SD (range), years	% Female	PROM used & QoL outcomes
<i>No intervention</i>								
Borges et al. [4]	Brazil	Cross-sectional study	Patients with ingrown toenail	None	90	37.6 $\pm$ 17.6	54%	DLQI, total score: 8.3 $\pm$ 5.7
<i>Non-comparison studies</i>								
Gutierrez-Mendoza et al. [5]	Mexico	Prospective observational study	Patients with painful stage I or II onychocryptosis who were not candidates or refused surgery	"Cotton nail cast" for 2 months	10	NR (44–60)	90.0	<i>Ad hoc questionnaire</i> : improvement of pain, % yes: 100%
Arik et al. [6]	Turkey	Retrospective review	Patients with stage I, II, or III ingrown toenail who were treated conservatively with a KD device	KD device (a shape memory alloy device)	41	25.5 $\pm$ 6.9	58.5	<i>Ad hoc questionnaire</i> : pain, % yes: 14.6% satisfaction, % yes: 75.6%; cosmesis, % excellent: 75.6%
<i>Comparison studies</i>								
Kruijff et al. [12]	The Netherlands	RCT	Patients with ingrown toenail of the hallux	Partial nail extraction with partial matrix excision Orthonyxia/nail braces	Treatment groups		Orthonyxia (nail braces): Partial matrix excision:	
				58	All: 25.3 $\pm$ 14.2	All: 34.3	Pain	8.11 ^a 5.74
				51			Overall satisfaction	8.43 ^a 7.32
Ceren et al. [13]	Turkey	RCT	Patients with ingrown toenail, aged 11 to 65 years	Nail splinting with flexible tube Matricectomy with phenol	Treatment groups		<i>Ad hoc visual analog scale</i> : level of pain and cosmetic satisfaction	
				57	Median: 18	43.1		Postoperative pain scores were lower than preoperative scores in both groups. ^a Cosmetic scores were greater than preoperative scores in both groups. ^a Scores did not differ between groups
				63	Median: 20	46.4		
Guler et al. [14]	Turkey	Retrospective cohort study	Stage I, II, or III, one-sided ingrown toenail at the hallux according to the Heifetz classification	Nail braces Winograd resection	Treatment groups		<i>Ad hoc questionnaire</i> : overall satisfaction	
				74	29.5 $\pm$ 8.4	55.4		Nail braces: 94.6% ^a Winograd resection: 82.4% ^a
				85	26.9 $\pm$ 8.0	56.5		

Table 1 (continued)

Reference	Country of origin	Study design	Inclusion criteria	Intervention	N	Mean age $\pm$ SD (range), years	% Female	PROM used & QoL outcomes
Miao et al. [15]	China	Retrospective review	Patients with stage II or III, one-sided ingrown toenails at the great toe according to the Heifetz classification admitted due to pain, granulation and difficulty walking	B/S brace, a fiberglass spring that pulls both from the nail grove	28	48.5 $\pm$ 11.9	All: 40.0	Ad hoc questionnaire: overall satisfaction 96.4% ^a B/S brace: 96.4% ^a Nail extraction: 62.5% ^a
				Nail extraction	32	51.2 $\pm$ 14.1		

QoL, quality of life; DLQI, Dermatology Life Quality Index; SD, standard deviation; PROM, patient-reported outcome measure. ^a Authors report statistically significant value. ^b Winograd resection: partial matrix excision under a digital anesthesia block and a toe tourniquet.

and 51.2 years. Three studies analyzed interventions in children only. The composition of females in study samples also varied from 34.3 to 90.0%. The impact of onychocryptosis on patient QoL was reported in 4 studies: 2 studies reported a mean Dermatology Life Quality Index (8.3 and 12.4, respectively), 1 study reported baseline Manchester-Oxford Foot Questionnaire of 69.73 and BORG CR-10 of 8.69, and 1 study reported baseline European Quality of Life Questionnaire measures of 95% of patients experiencing pain and discomfort, 56% having issues with mobility, 46% having issues with usual activities, and 38% experiencing anxiety/depression secondary to their ingrown nail.

Seventeen studies investigated the use of various treatment modalities. Six studies analyzed nonsurgical options, including the cotton nail cast ($n = 1$), a shape memory device ($n = 1$), nail splinting ($n = 1$), and nail braces ($n = 3$) (Table 1). In 3 out of 4 comparison trials, subjects receiving the nonsurgical option, all of which were various forms of nail braces, reported higher overall satisfaction scores or had a greater overall satisfaction rate compared to the surgical option. These studies analyzed patients ranging in age from 11 to 71 and included stage I (mild: inflammatory swelling and redness), II (moderate: inflammatory secretion), and III (severe: granulation tissue formation, abscess formation, and chronic induration of the lateral nail fold) Heifetz classifications. In another study comparing nail splinting with a flexible tube to phenol matricectomy, patient-reported pain and overall cosmetic satisfaction were significantly improved from baseline but did not statistically differ between treatment groups.

Eleven studies investigated the use of surgical management for onychocryptosis (Table 2). Patients were relatively satisfied with all treatment options with 63.6 and 95% of subjects reporting satisfaction for wedge matrix resection and treatment with the Winograd method with electrocoagulation, respectively. The rates of subjects satisfied with the cosmetic outcome ranged from 52.7% for wedge matrix resection to 85.5% for nail matrix phenolization.

Discussion

This review affirms that treatment of toenail onychocryptosis results in relatively high levels of patient satisfaction, irrespective of treatment modality. Conservative treatment options, despite requiring more time and active participation from the patient in many cases, have similar rates of overall patient satisfaction compared to the surgical approaches analyzed here.

Table 2. QoL outcomes after surgical treatments

Reference	Country of origin	Study design	Inclusion criteria	Intervention	N	Mean age $\pm$ SD (range), years	% Female	PROM used and QoL outcomes
<i>Non-comparison studies</i>								
Kuru et al. [7]	Turkey	Retrospective review	Patients who had marginal toenail ablation (wedge resection) who were able to be contacted by telephone for follow-up questions	Wedge resection	84	29.0 (8–70)	40.5	<i>Ad hoc questionnaire</i> : % satisfied: 89.3%
Shaikh et al. [8]	Ireland	Retrospective review	Patients who underwent wedge resection with phenolization for the treatment of ingrown toenail	Wedge resection with phenolization	100	Median: 43 (8–78)	45.0	<i>Ad hoc telephone interview</i> : % satisfied: 93.3%
Hariharan et al. [9]	Canada	Retrospective review	Patients less than 18 years of age who underwent a nail fold excision technique for symptomatic ingrown toenail	Nail fold excision	50	14 (9–18)	40.0	<i>Ad hoc questionnaire</i> : satisfaction score, mean $\pm$ SD (range): 9.9 $\pm$ 0.3 (8–10)
Livingston et al. [10]	Canada	Observational study	Children and adolescents who underwent the Vandenbos procedure for 1 or more ingrown toenails	Not applicable, all patients underwent the Vandenbos procedure ^b	39	13.5 $\pm$ 3.0 (4–20)	43.5	<i>EuroQoL</i> (percent reporting any problems 1 month postoperatively): Mobility: 56 $\rightarrow$ 32% ^a Self-care: 13 $\rightarrow$ 12% Usual activities: 46 $\rightarrow$ 32% ^a Pain/discomfort: 95 $\rightarrow$ 38% ^a Anxiety/depression: 38 $\rightarrow$ 15% ^a
Becerro de Bengoa Vallejo et al. [11]	Spain	Pretest and posttest design with prospective serial cases	Patients older than 65 years with ingrown nail who underwent surgery with chemical matricectomy with phenol for ingrown toenail	Not applicable, all patients underwent chemical matricectomy with phenol	52	74.0 $\pm$ 5.0	50.0	Baseline $\rightarrow$ 3 months-postop <i>MOXFQ</i> , overall score: 69.73 $\pm$ 9.88 $\rightarrow$ 16.92 $\pm$ 14.13 ^a <i>Borg CR-10</i> total score: 8.69 $\pm$ 1.01 $\rightarrow$ 0.76 $\pm$ 1.38 ^a
<i>Comparison studies</i>								
Herold et al. [16]	Denmark	RCT	Patients with ingrown toenails referred to orthopedic surgery	Treatment groups		<i>Ad hoc questionnaire</i> : Wedge matrix resection: Symptom satisfaction 63.6% Cosmesis satisfaction 52.7%		
				Wedge matrix resection	329	33.8 $\pm$ 20.9	59.4	Nail matrix phenolization: 92.7% ^a 85.5% ^a
				Nail matrix phenolization	191	40.3 $\pm$ 19.9	59.7	
Gerritsma-Bleeker et al. [17]	The Netherlands	RCT	Patients with ingrown toenail of the hallux with pain, ulceration, and/or inflammation	Treatment groups		<i>Ad hoc visual analog scale 1 month postoperatively</i> : Daytime pain 1.2 $\pm$ 0.6 Presence of symptoms 1.0 $\pm$ 2.1 Cosmetic appearance 1.4 $\pm$ 2.7		
				Partial nail extraction with matrix phenolization	74	29.5 $\pm$ 8.4	55.4	Partial matrix excision: 1.6 $\pm$ 1.6 1.8 $\pm$ 2.8 1.1 $\pm$ 2.1
				Partial nail extraction with partial matrix excision	85	26.9 $\pm$ 8.0	56.5	

Table 2 (continued)

Reference	Country of origin	Study design	Inclusion criteria	Intervention	N	Mean age $\pm$ SD (range), years	% Female	PROM used and QoL outcomes
Islam et al. [18]	USA	Retrospective cohort study	Children who underwent treatment of 1 or more ingrown toenails	Excision alone Excision + phenol	50 52	All: NR (0–19)	40.0 38.0	<i>Ad hoc parental questionnaire:</i> cosmetically satisfying (% agreeing or strongly agreeing) Excision alone: 70.3% Excision + phenol: 69.6%
Romero-Perez et al. [19]	Spain	Retrospective cohort study	Patients referred to surgery for ingrown toenail	Surgical matricectomy Matricectomy with phenol	329 191	33.8 $\pm$ 20.9 40.3 $\pm$ 19.9	59.4 59.7	<i>Ad hoc scale</i> (0, not satisfied; 10 very satisfied): Pain 5.7 $\pm$ 3.0 ^a Cosmesis 7.3 $\pm$ 2.9 ^a Overall satisfaction 8.5 $\pm$ 2.5 Surgical matricectomy: 5.7 $\pm$ 3.0 ^a 8.0 $\pm$ 2.7 ^a 8.4 $\pm$ 2.5 Matricectomy with phenol: 3.6 $\pm$ 3.0 ^a 8.0 $\pm$ 2.7 ^a 8.4 $\pm$ 2.5
Acar [20]	Turkey	Retrospective cohort study	Patients who had undergone surgery for a single ingrown toenail for Heifetz stage II or III nails that had not responded to conservative management	Winograd method Winograd method + electrocoagulation	50 52	37 (20–68) 35 (18–71)	40.0 38.0	<i>Ad hoc questionnaire</i> Overall satisfaction: % method: 92% Very satisfied + satisfied 95% Winograd method + electrocoagulation: 95%
Akkus et al. [21]	Turkey	RCT	Patients aged 18 to 60 years with Heifetz stage I, II, or III ingrown toenails	Wedge resection Matricectomy with NaOH	30 30	30.0 $\pm$ 14.5 31.7 $\pm$ 11.8	43.5 56.5	<i>DLQI:</i> Baseline $\rightarrow$ 1 month postoperatively Wedge resection: Matricectomy: 12.37 $\pm$ 6.66 $\rightarrow$ 12.43 $\pm$ 5.95 $\rightarrow$ 1.41 $\pm$ 4.58 0.52 $\pm$ 1.78

QoL, quality of life; DLQI, Dermatology Life Quality Index, EuroQoL, European Quality of Life Questionnaire; SD, standard deviation; PROM, patient-reported outcome measure; MOXFQ, Manchester-Oxford Foot questionnaire. ^a Authors report statistically significant value. ^b Vandenbos procedure: excision of the surrounding skinfold and allowing the wound to heal by secondary intention.

This review also highlights the difficulty in comparing patient-reported outcomes between treatments when ad hoc measures are used. Ad hoc measures, while allowing for a quick, rudimentary understanding of patient satisfaction, do not allow for a nuanced understanding of the impact of a condition or treatment modality on the patient's QoL. The concept of "overall satisfaction" that was measured by most ad hoc measures can mean different things to patients. While to one individual it may mean satisfaction with their physician, to another it may mean satisfaction with their appearance, time to recovery, or healing process. This ambiguity makes it difficult to know what construct is truly being captured by an ad hoc measure, limiting both its validity and reliability. On the other hand, validated PROMs have been tested for content validity, comprehensibility, and reliability, allowing them to provide more meaningful data. The studies that used validated PROMs were able to capture a broader range of issues, including pain, discomfort, mobility, anxiety, and depression. This information is lacking from many of the published studies, despite its clear utility in developing a comprehensive understanding of a treatment's impact on the patient. Future studies should make use of validated, nail-specific PROMs with relevant content validity to measure the outcomes most important to patients with onychocryptosis.

There are several limitations to this study. No studies reported on onychocryptosis of the fingernails. Additionally, only 4 studies included patients older than 65 in their sample, despite this population having among the highest prevalence of onychocryptosis. Many of the studies were retrospective in nature. While some types of the treatments examined are difficult to blind, more extensive randomized trials are needed. Randomized control trials with large sample sizes are especially lacking among the studies that compare the use of conservative and surgical options among patients with stage II and III ingrown nails.

In conclusion, the treatment of ingrown nail with both nonsurgical and surgical modalities is associated with high levels of overall patient satisfaction. However, the lack of widespread use of validated PROMs in the clinical research on onychocryptosis makes developing recommendations for specific patients challenging. Further studies should incorporate the patient perspective of the social, emotional, and functional impact of onychocryptosis in ways that allow for cross-study comparison, thereby enabling physicians and patients to make informed decisions regarding treatment plans.

Statement of Ethics

Ethical approval was not needed as this is a systematic review of the literature.

Conflict of Interest Statement

The authors have no conflicts of interest.

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Author Contributions

Claire Stewart was responsible for data extraction, writing of the manuscript, and figure creation. Leah Algu screened abstract and full-text articles and conducted data extraction. Rakhshan Kamran screened abstract and full-text articles. Cameron Leveille conducted publication search and organized search results. Khizar Abid found and organized full-text articles. Charlene Rae oversaw coordination and created the data extraction sheet. Shari Lipner is the senior author who conceived the study and wrote the manuscript. All authors reviewed the manuscript.

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