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Evaluation of patient-related factors and index treatment in recurrent ingrown toenail cases

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MAIN POINTS

- This study evaluates patient-related factors underlying high recurrence rates in patients with ingrown toenails.
- The research highlights the impact of patient hygiene, appropriate footwear, and nail trimming habits on recurrence.
- Orthonyxia was found to be the most commonly applied initial treatment method.
- Comorbidities, particularly obesity and diabetes, were identified as risk factors for ingrown toenail recurrence.
- Appropriate treatment methods and patient education are critical in reducing recurrence rates.

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ABSTRACT

Aim: This study aims to evaluate patient-related factors and previous treatments in patients with ingrown toenails that subsequently recurred. In this context, recommendations for clinical practice are proposed to contribute to the development of both effective treatment methods and preventive strategies.

Materials and Methods: This retrospective study included 42 patients previously treated for ingrown toenails who developed recurrences due to various reasons. Patients with post-treatment complications (e.g., infection and bleeding), pain associated with the treatment, or dissatisfaction with the treatment were not considered as a recurrence and were excluded from the study. All patients gave informed consent for participation in the study. The demographic characteristics such as age and gender, patient-related factors that might affect recurrence (foot hygiene, footwear usage, nail trimming, additional deformities, trauma history, comorbidities), the clinics where the initial treatment was performed, and the initial treatment methods were recorded.

Results: The mean age of the patients was 26.8±10.1 years, with the youngest being 12.0 years and the oldest 49.0 years. Of the patients, 33.3% (n=14) were female, and 66.7% (n=28) were male. Comorbidities included diabetes mellitus in 21.4% (n=9), obesity in 31.0% (n=13), peripheral arterial disease in 7.1% (n=3), and hyperhidrosis in 16.7% (n=7). No predisposing factors were identified in 11.9% (n=5) of the 42 patients. An evaluation of initial treatment methods revealed that 40.5% (n=17) of the patients underwent Orthonyxia, 21.4% (n=9) underwent Chemical Partial Matricectomy, 21.4% (n=9) underwent Spicule Excision, and 16.7% (n=7) underwent Partial Matricectomy.

Conclusion: Ingrown toenails are common in the general population and can significantly impair quality of life. When left untreated or improperly treated, they may result in unexpected and troublesome outcomes. Reducing risk factors and receiving appropriate treatment from an experienced clinician will help lower recurrence rates.

Keywords: Ingrown toenail, Recurrence, Index treatment, Partial matricectomy, Nail trimming

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INTRODUCTION

Ingrown toenail, also known as 'Onychocryptosis' or 'Unguis Incarnates' is a common nail condition caused by the nail plate embedding into the lateral nail folds, resulting in swelling, erythema, edema, pain, and, as the condition progresses, purulent discharge, ulceration, and granulation tissue. It accounts for approximately 20% of foot problems and is most commonly observed in the great toe [1]. It primarily affects young adults [2], leading to significant morbidity and loss of productivity. Patient-related factors such as improper nail trimming, inappropriate footwear and sock usage, poor foot hygiene, hyperhidrosis, trauma, obesity, diabetes, peripheral arterial disease, and intense physical activity increase the risk.

Patients presenting with ingrown toenails may seek care in dermatology, general surgery, orthopedics, or plastic surgery clinics. Various treatment methods are available. Conservative approaches are employed in early stages, whereas surgical interventions are preferred in advanced cases. Conservative treatments include techniques such as cotton-wick inser-

tion under the nail corner, dental floss technique, the gutter splint or sleeve technique, taping procedure, nail wiring, slit tape-strap procedure, acrylic nails, and nail braces. Surgical treatments include spicule excision and partial matricectomy, chemical partial matricectomy, wedge resection of the toenail and nail fold, excision of the affected nail and total matricectomy, soft-tissue nail fold excision technique, electrocautery, radiofrequency ablation, and carbon dioxide laser ablation [3]. Patient-specific treatment plans not only address the current condition but also effectively prevent recurrences in the long term. Inadequate or improper treatment may lead to recurrence. Current literature compares all available treatment methods, and recurrence has been reported across all studies and treatment methods [4]. However, the definition of recurrence varies between studies. Surgical interventions are generally more effective in preventing recurrences of ingrown toenails compared to non-surgical methods [5].

This study aims to evaluate patient-related factors and previous treatments of patients with ingrown toenails that subsequently recurred. In this context, clinical practice recommendations are proposed to contribute to the development of both effective treatment methods and preventive strategies.

MATERIALS AND METHODS

The study was conducted between 2021 and 2024 in the Orthopedics and Traumatology Clinic of a tertiary hospital and was designed as a descriptive study. The study included 42 patients previously treated for ingrown toenails who developed recurrences due to various reasons. Post-treatment symptomatic regrowth of the nail (nail spicules/nail spikes) was considered a recurrence. Patients with post-treatment complications (e.g., infection and bleeding), pain associated with the treatment, or dissatisfaction with the treatment were not considered recurrences and were excluded from the study [4]. Approval for the study was obtained from the Clinical Research Ethics Committee of Kafkas University Faculty of Medicine with decision number 19 on 30.04.2024. Both verbal and written (informed consent) approval was obtained from the participants. The study was conducted in accordance with the Declaration of Helsinki. After obtaining informed consent, demographic characteristics such as age and gender, patient-related factors that might affect recurrence (foot hygiene, footwear usage, nail trimming, additional deformities, trauma history, comorbidities), the clinics where the initial treatment was performed, and the initial treatment methods were recorded.

Statistical analysis

For the study, frequency (n) and percentage (%) were provided for nominal data, while mean and standard deviation, median, first and third quartiles, and minimum and maximum values were presented for numerical data. In the study, the age variable was taken as quantitative data. Gender, patient characteristics (foot hygiene, nail cutting, shoe use, additional deformity or trauma history, presence of additional disease), treatment of the index clinic, first treatment method are nominal data. For age, which is numerical data, the Shapiro-Wilk test was used to assess normality. The age data were found to follow a normal distribution. Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 21 (IBM SPSS Corp.; Armonk, NY, USA).

RESULTS

A total of 42 patients with recurrent ingrown toenails were included in the study. Of the patients, 33.3% (n=14) were female, and 66.7% (n=28) were male. the test of normality of the distribution of the ages of the patients using the Shapiro-Wilk test, and the ages were found to follow a normal distribution (p=0.126).The mean age of the patients was 26.8 ± 10.1 years, with the youngest being 12.0 years and the oldest 49.0 years (Table 1).

Among the patients, 81.0% (n=34) had good foot hygiene, while 19.0% (n=8) had poor hygiene. Correct nail trimming was observed in 35.7% (n=15) of the patients, whereas 64.3% (n=27) had incorrect nail trimming practices. Proper footwear usage was noted in 57.1% (n=24) of the patients, while 42.9% (n=18) used improper footwear. A history of additional foot deformities or trauma was present in 26.2% (n=11) of the patients and absent in 73.8% (n=31). Comorbidities were identified in 47.6% (n=20) of the patients, while 52.4% (n=22) had no associated conditions. Among the patients, 21.4% (n=9) had diabetes mellitus, 31.0% (n=13) had obesity, 7.1% (n=3) had peripheral arterial disease, and 16.7% (n=7) had hyperhidrosis (Table 2). No predisposing factors were identified in 11.9% (n=5) of the 42 patients.

An analysis of the clinics where the initial treatments were performed revealed that 38.1% (n=16) of the patients were treated in the general surgery clinic, 28.6% (n=12) in the dermatology clinic, 19.0% (n=8) in the plastic and reconstructive

Table 1. Demographic characteristics of patients with recurrent ingrown toenails.

Variables	n (%)
Gender	
Female	14 (33.3)
Male	28 (66.7)
Age (years)	
Mean ± Standard Deviation	26.8±10.1
Median (1st quartile-3rd quartile)	25.5 (18.7-35.0)
Minimum - Maximum	12.0-49.0
Total	42 (100.0)

A total of 42 patients with recurrent ingrown toenails were included in the study. Of the patients, 33.3% (n=14) were female, and 66.7% (n=28) were male. The age distribution of the cases was tested for normality using the Shapiro-Wilk test, and the ages were found to follow a normal distribution. (p=0.126) The mean age of the patients was 26.8 ± 10.1 years, with the youngest being 12.0 years and the oldest 49.0 years.

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Table 2. Characteristics of patients with recurrent ingrown toenails.

Variables	n (%)
Foot Hygiene	
Good	34 (81.0)
Bad	8 (19.0)
Nail Trimming	
True	15 (35.7)
False	27 (64.3)
Footwear Usage	
True	24 (57.1)
False	18(42.9)
History of Additional Deformity or Trauma	
Present	11 (26.2)
Absent	31 (73.8)
Presence of Comorbidities	
Present (DM*, Obesity, Peripheral Vascular Disease, Hyperhidrosis)	20 (47.6)
Absent	22 (52.4)
Total	42 (100.0)

*DM: Diabetes Mellitus. Among the patients, 81.0% (n=34) had good foot hygiene, while 19.0% (n=8) had poor hygiene. Correct nail trimming was observed in 35.7% (n=15) of the patients, whereas 64.3% (n=27) had incorrect nail trimming practices. Proper footwear usage was noted in 57.1% (n=24) of the patients, while 42.9% (n=18) used improper footwear. A history of additional foot deformities or trauma was present in 26.2% (n=11) of the patients and absent in 73.8% (n=31). Comorbidities were identified in 47.6% (n=20) of the patients, while 52.4% (n=22) had no associated conditions. Among the comorbidities, 21.4% (n=9) of the patients had Diabetes Mellitus, 31.0% (n=13) had obesity, 7.1% (n=3) had peripheral vascular disease, and 16.7% (n=7) had hyperhidrosis Of the total 42 patients, 5 (11.9%) had no identifiable predisposing factors.

Table 3. Initial clinic visits and treatment methods for patients with recurrent ingrown toenails.

Variables	n (%)
Initial Clinic Visited	
General Surgery	16 (38.1)
Dermatology	12 (28.6)
Plastic and Reconstructive Surgery	8 (19.0)
Orthopedics and Traumatology	6 (14.3)
Initial Treatment Method	
Orthonyxia	17(40.5)
Chemical Partial Matricectomy	9 (21.4)
Spicule Excision	9 (21.4)
Partial Matricectomy	7 (16.7)
Total	42 (100.0)

An analysis of the clinics initially visited by the patients revealed that 38.1% (n=16) presented to the general surgery clinic, 28.6% (n=12) to the dermatology clinic, 19.0% (n=8) to the plastic and reconstructive surgery clinic, and 14.3% (n=6) to the orthopedics and traumatology. An evaluation of the initial treatment methods showed that 40.5% (n=17) of the patients underwent Orthonyxia, 21.4% (n=9) received Chemical Partial Matricectomy, 21.4% (n=9) underwent Spicule Excision, and 16.7% (n=7) underwent Partial Matricectomy.

surgery clinic, and 14.3% (n=6) in the orthopedics and traumatology clinic (Table 3).

An evaluation of the initial treatment methods indicated that 40.5% (n=17) of the patients underwent Orthonyxia, 21.4% (n=9) underwent Chemical Partial Matricectomy, 21.4% (n=9) underwent Spicule Excision, and 16.7% (n=7) underwent Partial Matricectomy (Table 3).

DISCUSSION

Ingrown toenails are a common and painful condition that can significantly impair function. In addition to external factors like mechanical trauma, incorrect nail cutting, and ill-fitting footwear, individual predisposing factors play a crucial role in their development. These include excessive nail plate curvature (pincer nail deformity), excessive sweating (hyperhidrosis), obesity, genetic predisposition, and structural foot deformities like hallux valgus. A more active lifestyle in younger people and recurrent microtraumas are also known risk factors [6]. The aim of this study is to evaluate the clinical and sociodemographic characteristics of patients with recurrent ingrown toenails and the effectiveness of previous treatments on recurrence. Thorough investigation of the clinical and sociodemographic features of ingrown toenails and the contributing factors, followed by appropriate treatment planning, can help eliminate these factors, prevent the disease, and reduce recurrence rates. The high recurrence rates, despite various treatments, underscore the importance of addressing both these individual predispositions and post-treatment care. Effective management requires not only symptom relief but also the identification and, if possible, elimination of underlying predisposing factors. This study provides a comprehensive overview of the demographic, hygienic, and treatment practices of patients with recurrent ingrown toenails. A significant portion of patients exhibited poor nail care, which may have contributed to their recurrence. The presence of comorbidities highlights the need for a multidisciplinary approach to patient management. The varied treatment methods and their distribution across clinics indicate a broad spectrum of management strategies for this condition.

The primary aim of this study is to evaluate the clinical and sociodemographic characteristics of patients with recurrent ingrown toenails and the effectiveness of their previous treatments in preventing recurrence. A thorough investigation into these features and contributing factors can help clinicians develop appropriate treatment plans to prevent the disease and reduce recurrence rates.

Ingrown toenails significantly impair a patient's quality of life due to pain, deformity, and the inability to wear comfortable footwear. The condition negatively affects daily life, sports, and work activities, potentially impacting emotional and mental well-being [7]. While studies on the epidemiology of ingrown toenails are limited, most focus on treatment approaches [2]. Inadequate data repositories, particularly in developing countries, make it challenging to accurately evaluate prevalence and recurrence rates.

Several studies have shown that primary ingrown toenails are more common in females compared to males [2]. However, there are also studies reporting higher prevalence in males [8].

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In our study, 33.3% (n=14) of the patients were female, while 66.7% (n=28) were male. Contrary to primary ingrown toenails, recurrent cases in our study showed a higher prevalence in males than females.

Several studies report that primary ingrown toenails are more common in females than males [2], though others report a higher prevalence in males [8]. In our study, 33.3% (n=14) of patients were female and 66.7% (n=28) were male. Contrary to primary cases, recurrent ingrown toenails in our study were more prevalent in males.

The incidence of ingrown toenails typically follows a bimodal age distribution, with peaks around 15 and 50 years [9]. In our study, the mean age was 26.8 ± 10.1 years, ranging from 12 to 49 years. This is consistent with the mean ages reported in the literature [2,10].

The etiology of ingrown toenails involves various risk factors, including improper nail trimming, inappropriate footwear, poor foot hygiene, obesity, hyperhidrosis, foot/toe deformities, onychomycosis (fungal nail infection), diabetes mellitus, and peripheral arterial diseases [11]. However, the specific influence of these factors on recurrence is unclear. This study evaluated the frequency of these variables in patients with recurrent cases.

The prevalence of poor foot hygiene as a predisposing factor varies widely in recent studies (0.97%-58.5%) [2, 11]. In our study, the rate was 19%. This suggests that while poor hygiene may predispose patients to infections that negatively affect treatment success, its impact on recurrence might be less significant than other factors. Proper nail trimming—cutting nails straight across—is crucial. Trimming nails with rounded or V-shaped cuts, or cutting them too deep, can cause the nail to grow into the surrounding soft tissue, increasing the risk of ingrown toenails [12]. In our study, 64.3% of patients trimmed their nails improperly, and many believed these methods would correct the condition. This was the most frequent risk factor among recurrence cases.

Inappropriate footwear and socks are also major contributors. Tight or pointed shoes cause repetitive trauma and are among the leading causes of ingrown toenails [13]. In our study, 42.9% of patients used inappropriate footwear. Trauma is another factor [14]. A case-control study by Cho et al. concluded that foot and toe deformities are significant risk factors [15]. In our study, 26.2% of patients had a history of trauma and/or additional deformities.

Obesity is a well-known factor in the pathogenesis of ingrown toenails, with a reported prevalence ranging from 34.1% to 69.5% [2,16]. It is believed to increase pressure on the nail and contribute to hypertrophy of the lateral nail fold. Diabetes mellitus is a significant risk factor, particularly due to its long-term vascular and neurological complications, which can impair wound healing and predispose patients to infections [17,18]. Hyperhidrosis creates a risk for ingrown toenails through skin maceration [19]. In our study, 47.6% of patients had comorbidities. Of these, 21.4% had diabetes mellitus, 31.0% had obesity, 7.1% had peripheral arterial disease, and 16.7% had hyperhidrosis.

Several clinical specialties, including general surgery, dermatology, plastic and reconstructive surgery, and orthopedics, manage the treatment of ingrown toenails. We investigated the clinics where patients received initial treatment and the specific treatments administered. Both conservative and surgical options are available. While conservative treatments are effective for mild cases, surgical procedures are more effective for severe ones. The most suitable procedure depends on the condition's severity, patient history, and associated risk factors [1].

In our study, the initial treatments for recurrent cases were predominantly Orthonyxia, followed by Chemical Partial Matricectomy, Spicule Excision, and Partial Matricectomy. A comprehensive literature review reported no significant difference in recurrence rates among different treatment methods [4,20], although some studies noted higher recurrence rates with Spicule Excision and lower rates with Partial Matricectomy, Chemical Partial Matricectomy, and Orthonyxia. Regardless of the technique, proper application and minimizing risk factors are critical for reducing recurrence rates.

Limitations

This study has several limitations. It is a descriptive, single-center study with a limited sample size, and its findings can only be generalized to the included patients. The lack of a control group further restricts the study's scope. Despite these limitations, it provides valuable information about the characteristics of patients with recurrent ingrown toenails and their treatment practices. Future research with larger samples, multiple centers, and a prospective design is recommended.

CONCLUSION

We believe that predisposing factors play a significant role in the recurrence of ingrown toenails. In the current literature, recurrent cases are generally evaluated from the perspective of treatment. However, greater emphasis should be on the risk factors, which are overseen. Preventive methods should be part of all treatment strategies. Furthermore, recurrences can occur even in the absence of any predisposing factors. This highlights the necessity of thoroughly understanding treatment techniques and applying them correctly.

Ethics Committee Approval: This study was approved by the Ethics Committee of Kafkas University Faculty of Medicine with the Approval No: 19 and Date: 30/04/2024.

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