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Results of the Mogensen's lateral wedge resection technique in the treatment of ingrown toenail

Ayak tırnak batmasının tedavisinde Mogensen'in lateral kama rezeksiyon tekniğinin sonuçları

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Objectives: There are many options for the treatment of ingrown toenail, ranging from simple conservative approaches to extensive surgical procedures, but stage 3 ingrown toenails are best treated surgically. The aim of this study was to evaluate the results of lateral wedge resection described by Mogensen in patients with ingrown toenail of the great toe.

Patients and methods: The study included 21 consecutive patients (11 females, 10 males; mean age 23±10 years; range 12 to 45 years) who were treated with the Mogensen's lateral wedge resection technique for stage 3 ingrown toenails. A total of 37 ingrown nail edges were treated and all were located at the lateral aspect of the toe. Infection was present in five patients and granulation tissue was present in all the patients. Eight patients underwent one or more unsuccessful surgical nail procedures at another center. Recurrences and satisfaction level of the patients were evaluated during a mean follow-up period of 34 months (range 14 to 58 months).

Results: No significant complications occurred. In 35 procedures (94.6%), no recurrences were recorded and 19 patients (90.5%) were satisfied with the treatment, with relief of their symptoms. Two lesions (5.4%) recurred in two patients (9.5%).

Conclusion: Lateral wedge resection technique is a successful surgical treatment of stage 3 ingrown toenails, with a relatively low recurrence rate and high levels of patient satisfaction.

Key words: Hallux/surgery; nails, ingrown/surgery; recurrence.

Amaç: Ayak tırnak batmalarında basit konservatif yaklaşımlardan, kapsamlı cerrahi girişimlere kadar birçok tedavi seçeneği olmakla birlikte, evre 3 tırnak batmaları en iyi cerrahi olarak tedavi edilmektedir. Bu çalışmada, ayak başparmağında tırnak batması olan bir grup hastada, Mogensen tarafından tarif edilen lateral kama rezeksiyon tekniğinin sonuçları değerlendirildi.

Hastalar ve yöntemler: Ayak başparmağında evre 3 tırnak batması nedeniyle 21 ardışık hasta (11 kadın, 10 erkek; ort. yaş 23±10; dağılım 12-45) Mogensen'in lateral kama rezeksiyon tekniği ile tedavi edildi. Hastalara 37 ayak parmağında cerrahi girişim uygulandı ve tırnak batmalarının hepsi başparmağın lateral yüzündeydi. Lezyon yerinde beş hastada enfeksiyon, tüm hastalarda granülasyon dokusu vardı. Sekiz hasta daha önce başka merkezlerde bir veya daha fazla cerrah girişim geçirmişti. Ortalama 34 aylık takip dönemi (dağılım 14-58 ay) sonunda tedavide nüks oranı ve hasta memnuniyeti değerlendirildi.

Bulgular: İşlemle ilgili önemli komplikasyon görülmedi. Takip dönemi sırasında 35 girişimde (94.6%) nüks olgusuna rastlanmadı. On dokuz hasta (%90.5), yakınmaların geçtiğini ve tedaviden memnun kaldığını belirtti. İki hastadaki (%9.5) iki lezyonda (%5.4) nüks görüldü.

Sonuç: Lateral kama rezeksiyon tekniği, evre 3 tırnak batmalarının tedavisinde düşük nüks oranları ve yüksek hasta memnuniyeti nedeniyle tercih edilebilir başarılı bir yöntemdir.

Anahtar sözcükler: Halluks/cerrahi; tırnak batması/cerrahi; nüks.

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Ingrown toenail, or onychocryptosis, is a common disorder. It usually affects the big toe, but may also affect the lesser toes.[1] It can be a source of great discomfort since the nerve supply of the nail bed is so rich and the pain is severe. Ingrown toenail appears to have the highest incidence among the young (aged 30 or less) with a male predominance.[2] Many possible causes of ingrown toenail have been proposed, including excessive external pressure, trauma, poor foot hygiene, ill-fitting footwear, hyperhidrosis, obesity, and improper nail-trimming techniques.[3] The ingrown nail plate penetrates into the skin in the nail fold, creating an entry for bacteria, which results in inflammation, infection, and hypertrophic granulation tissue formation.[4]

The aim of this study was to evaluate the results of lateral wedge resection described by Mogensen[5] in patients with ingrown toenail of the great toe.

PATIENTS AND METHODS

Between February 1999 and November 2002, 21 consecutive patients (11 females, 10 males; mean age 23±10 years; range 12 to 45 years) with stage 3 ingrown toenail were treated with the Mogensen's lateral wedge resection technique. All ingrown nails were located at the lateral aspect of the toe. Infection was present in five patients and granulation tissue was present in all the patients. There was a history of fitted (tight) footwear in all the patients. Before presenting to our institution, eight patients underwent one or more (range 1-3, mean 1.5) unsuccessful surgical nail procedures (total avulsion of the nail) for onychocryptosis at another center. All the patients were referred to the orthopedics clinic by the outpatient clinic of dermatology and were all treated by the first three authors. Patients having active infection at the site of ingrown toenail were treated with oral and topical antibiotics for one week for complete regression of infection. Before treatment, informed written consent was obtained from the patient or parents.

Surgical technique

The patient was placed in the supine position, with the knees flexed and foot flat on the table. The toe was prepped with povidone-iodine solution. Using a 10-ml syringe and a 30-gauge needle, a standard digital block was performed with 4 ml physiological saline (0.9% NaCl) mixed with 4 ml bupivacaine 0.5%. About 3 ml of local anesthetic mixture was applied to each side of the toe for adequate anesthesia. A sterile rubber band was placed as a digital tourniquet around the base of the toe for a dry operative field. After five to ten minutes, lateral fourth of the nail plate was cut from the distal (free) end to the most proximal end of the nail root using straight scissors. A linear incision was made parallel to the lateral nail fold, extending from 1 cm proximal to the lunula to the hyponychium. This incision was carried out till to the bone. A second incision was started 2 to 3 mm lateral to the inner edge of the lateral nail fold and was curved obliquely at a 45-degree angle to the initial incision to reach the lateral most margin of the germinal matrix. This corner of the germinal matrix was exposed and removed. The periosteum on the matrix was removed, fat and subcutaneous tissues in the proximal corner were exposed to ensure removal of the germinal matrix. Once the wedge of the nail plate, matrix, and hypertrophic nail fold were removed, digital tourniquet was released and bleeding control was made. The incision was closed with 3-0 nylon mattress sutures and the wound was covered by an antibacterial ointment dressing followed by a sterile compression wrap (Fig. 1). A total of 37 ingrown nail edges were treated with this technique.

Analgesics and cefuroxime axetil were prescribed for the postoperative period. The first dressing was removed in the outpatient clinic after 24 hours. The wound was cleaned with normal saline and antibacterial ointment was applied. Patients were trained to change the dressing daily using the same technique. The sutures were removed two

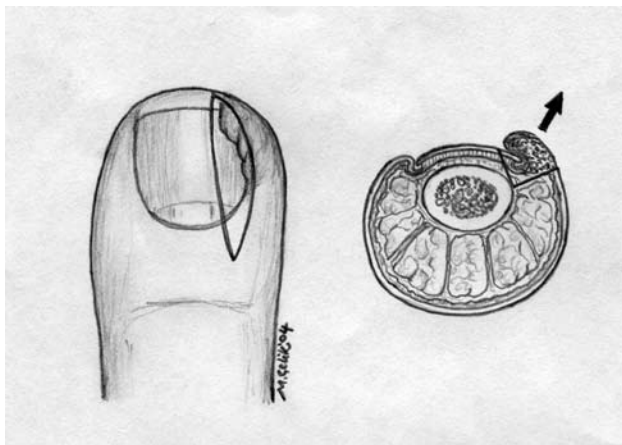

Fig. 1. Wedge resection of the nail, nail bed, and nail fold to include the nail matrix. The original illustration of Mogensen[5] was utilized for the production of this drawing.

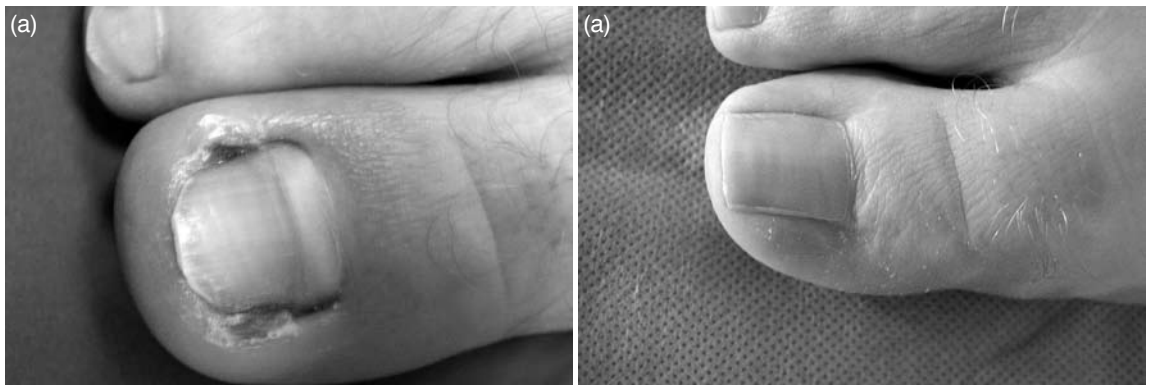

Fig. 2. (a) Preoperative and **(b)** 14-month follow-up views of the ingrowing toenail in the right foot.

weeks postoperatively. Patient visits were scheduled weekly within the first month, and at 3 and 6 months. After 12 months, we evaluated recurrences and satisfaction of the patients by means of telephone interviews. The follow-up period ranged from 14 to 58 months (mean 34±14 months).

RESULTS

There were no significant complications during a mean healing period of three weeks. In 35 procedures (94.6%) no recurrences were recorded and 19 patients (90.5%) were satisfied with the treatment with regard to cosmetic aspects (Fig. 2, 3). These patients also reported improvement in their symptoms. Two lesions (5.4%) recurred in two patients (9.5%). They reported dissatisfaction.

DISCUSSION

A three-stage classification has been proposed for ingrown toenails.[6,7] Stage 1 (inflammatory stage) is characterized by erythema, swelling, and pain with pressure to the lateral nail fold. Stage 2 (abscess stage) is characterized by increased symptoms, drainage, and infection. In stage 3 (granulation stage), there are symptoms of severe intensity, granulation tissue, and lateral nail-fold hypertrophy. While conservative management is advocated for stage 1 and stage 2 lesions, stage 3 ingrown toenails are treated surgically.

Stage 3 ingrown toenails can develop from a laterally pointing spicule of nail beneath the nail fold. Excision of the lateral nail plate combined with lateral matricectomy is believed to provide the best option for eradication. In the treatment of stage 3 toenails, the associated granulation tissue and lateral wall hypertrophy should also be removed. Among procedures commonly used are debridement of the lateral nail groove or trimming of the lateral edge of the nail plate, incision and drainage of abscesses of the lateral nail fold, nail plate removal (partial or complete), wedge excision of the lateral nail fold, partial nail matricectomy, complete matricectomy, and radical excision (Syme procedure).[8,9]

Despite very high recurrence rates, simple avulsion is a popular procedure among general surgeons and general practitioners in our country. High recurrence rates (32% to 73%) of ingrown toenail after partial or total nail removal have been

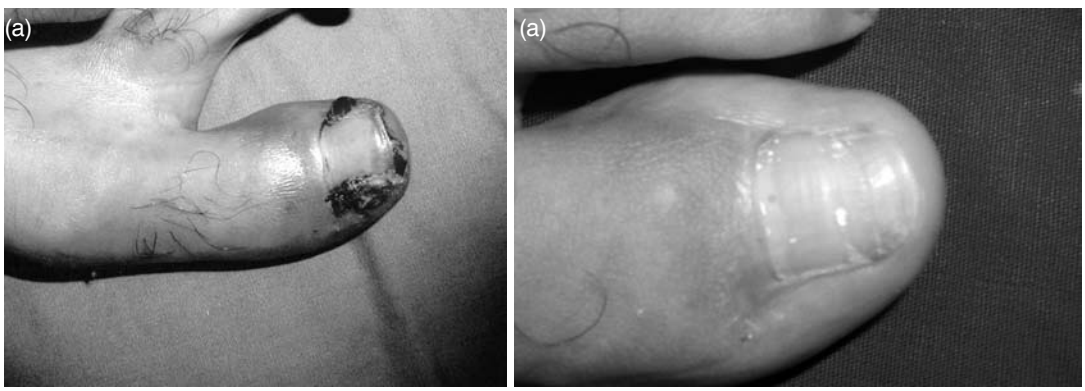

Fig. 3. (a) Preoperative and **(b)** 30-month follow-up views of the ingrowing toenail in the left foot.

reported.[3,10] Eight of our patients were previously treated with one or more unsuccessful surgical nail procedures including total avulsion of the nail. Partial or total nail plate-germinal matrix removals described by Winograd as an alternative surgical method for ingrowing toenail may be useful in late stage 2 or stage 3 disorders, especially after a previous, unsuccessful partial or complete nail removal.[9] Pettine et al.[11] reported the recurrence rate as 6% (mean follow-up, 9.7 years) after the treatment with the Winograd technique. Yosunkaya et al.[12] did not observe recurrences (mean follow-up, 20 months) after combined treatment with the Winograd and Bartlette methods. Pehlivan and Bilgic[13] performed segmental matrix resection in their patients with ingrowing toenail, and encountered no recurrences, but growth of onychoma in two toes during a mean follow-up of 6.5 months.

The terminal Syme procedure is recommended for adults who have had recurrent bouts of infected ingrown toenails that are unrelieved by less extensive procedures, and for the patients with various bone or soft tissue tumors about the nail and distal phalanx. In this technique, the distal half of the distal phalanx is amputated including the nail plate, matrix, nail folds, and underlying bone on which these structures rest.[9] Thompson and Terwilliger[14] reported 34 procedures, 14 of which were performed for ingrown toenail. Pettine et al.[11] stated that the recurrence rate was 12%, with only one nail requiring additional surgical treatment after the Lapidus/Thompson-Terwilliger procedure. After the terminal Syme procedure, some complications like osteomyelitis of the distal phalanx, epidermal inclusion cysts along the suture line, and nail spicules may develop. Nevertheless, this procedure has excellent functional and acceptable cosmetic results in most patients.[9]

Phenol ablation of nail matrix of ingrown toenails is widely used by dermatologists. Grieg et al.[10] stated that, of 67 ingrowing nail edges treated with nail edge excision and phenolization, only six (9%) recurred at a minimum follow-up of one year. Pettine et al.[11] reported that, after removal of 61 nail edges and phenolization of the adjacent matrix, 12 recurrences (20%) were noted, eight of which required further surgical treatment to remove the nail completely. Greenstein and Kaplan[15] found the recurrence rates as 13% and 19.4% in patients with stage 2 and 3 ingrown nails, respectively, after surgical treatment and ablation of the germinal matrix using phenol solution. They stressed that, for good results, ingrowing toenail should be staged and treatment tailored according to the algorithm.

Another surgical treatment method is partial removal of the nail fold and nail matrix. The procedure involves wedge resection of the nail, nail bed and nail fold. The recurrence rate was reported as 5% after 60 wedge resections.[9] The chief complication of wedge resection is the recurrence of nail spicules. The crucial factor in preventing spicules is, of course, removal of the germinal matrix. With this technique, Mogensen[5] reported 116 procedures in 66 patients followed-up for 4 to 45 months (mean 22 months) and found recurrences in six patients (9%). These recurrences were complete nail re-growth, with associated symptoms of ingrown toenail. In addition, small nail spikes that were symptomatic occurred in another 5% of the patients. However, 86% had relief of symptoms without clinically significant nail re-growth and were pleased with the result. In our study, wedge resection of nail, nail bed, and nail fold including the nail matrix was carried out in 21 patients and 19 patients (90.5%) were satisfied with the outcome. Our results were similar to those of Mogensen.

As observed in the literature, the results of surgical treatment of ingrown toenails show great diversity. Surgical technique is an important factor in the success of treatment methods. We believe that the results will be satisfactory when surgical interventions are conducted by experienced surgeons and with appropriate indications. Based on the results of this study with limited number of cases, lateral wedge resection technique for the treatment of stage 3 ingrown toenails is efficient, with a relatively low recurrence rate and high levels of patient satisfaction. Therefore, we advocate this procedure as the treatment of choice for stage 3 ingrown toenails.

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REFERENCES

1. DeLauro TM. Onychocryptosis. Clin Podiatr Med Surg 1995;12:201-13.
2. Johnson KA. Ingrown toenails. In: Surgery of the foot

and ankle. New York: Raven Press; 1989. p. 83-100.
3. Lloyd-Davies RW, Brill GC. The aetiology and outpatient management of ingrowing toenails. Br J Surg 1963;50:592-7.
4. Murray WR. Onychocryptosis: principles of nonoperative and operative care. Clin Orthop Relat Res 1979;(142):96-102.
5. Mogensen P. Ingrowing toenail. Follow-up on 64 patients treated by labiomatricectomy. Acta Orthop Scand 1971;42:94-101.
6. Siegle RJ, Stewart R. Recalcitrant ingrowing nails. Surgical approaches. J Dermatol Surg Oncol 1992;18:744-52.
7. Zuber TJ, Pfenninger JL. Management of ingrown toenails. Am Fam Physician 1995;52:181-90.
8. Ceilley RI, Collison DW. Matricectomy. J Dermatol Surg Oncol 1992;18:728-34.
9. Richardson EG, Hendrix CL. Disorders of nails and skin. In: Canale ST, editor. Campbell's operative orthopaedics. Philadelphia: Mosby; 2003. p. 4171-87.
10. Grieg JD, Anderson JH, Ireland AJ, Anderson JR. The surgical treatment of ingrowing toenails. J Bone Joint Surg [Br] 1991;73:131-3.
11. Pettine KA, Cofield RH, Johnson KA, Bussey RM. Ingrown toenail: results of surgical treatment. Foot Ankle 1988;9:130-4.
12. Yosunkaya M, Gülsen M, Tan I, Bayram H, Baytok G. Tırnak batması ve cerrahi tedavisi. Acta Orthop Traum Turc 1991;25:156-7.
13. Pehlivan Ö, Bilgiç E. Ayak tırnak batmasının segmenter matriks rezeksiyonu ile tedavisi. Artroplasti-Artroskopik Cerrahi 2001;12:178-82.
14. Thompson TC, Terwilliger C. The terminal Syme operation for ingrown toenail. Surg Clin North Am 1950;31:575-84.
15. Greenstein A, Kaplan O. Ingrowing toenails: a treatment algorithm. Ambul Surg 1997;5:161-5.