Onychogryphosis

Reconstruction of Total Matricectomy Defect with Subcutaneous Flap

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Background: Onychogryphosis is a nail disorder that can damage nail plates, usually caused by repeated minor trauma to the foot. Onychogryphosis of the toe is commonly seen in clinical practice; however, optimal treatment of the condition is still the subject of debate. The purpose of this study was to evaluate clinical outcomes of patients with toe onychogryphosis treated by subcutaneous flap coverage after total matricectomy.

Methods: In this article, we describe 12 patients who had onychogryphosis on the great toe treated by subcutaneous flap coverage after total matricectomy. There were eight men and four women, with a mean age of 63.8 years (range, 56–74 years).

Results: The follow-up period ranged from 4 to 108 months, with an average of 25.2 months. All of the flap reconstructions ultimately survived.

Conclusions: The advantage of the described technique is the avoidance of tight closure of the skin and preservation of toe length. The possible limitation of the technique is poor blood circulation to the feet. (J Am Podiatr Med Assoc 110(4): 1-5, 2020)

Onychogryphosis is a nail disorder that is characterized by symptoms of thickening, curving, discoloration, and debris beneath the nail. This is sometimes referred to as a "ram's horn nail" because of the severely thickened and distorted nail shape.[1,2] Congenital and acquired types of onychogryphosis have been reported.[2,3] Onset of the congenital type, which is of autosomal dominant inheritance, occurs at puberty.[3,4] The acquired type is caused by trauma or peripheral vascular diseases, fungal infection, psoriasis, and failure to cut the nails for extended periods. Although it can affect the fingernails and toenails, it is more common in the great toe.[1,5] It is commonly seen in older adults and patients with poor personal hygiene. Onychogryphosis may also be seen as a part of a syndrome, such as Haim-Munk syndrome.[6]

Conservative treatment of onychogryphosis varies from simple approaches such as regular trimming and smoothing of the toenails and avoidance of tight-fitting shoes to much more elaborate methods of nonsurgical nail removal.[1,7,8] Although subsequent trimming of the affected nail may help the nail to become asymptomatic, a healthy nail will never grow.

The most radical treatment for total matricectomy is the Syme method,[9] which involves the surgical removal of the entire nail, nail wall, and matrix, with closure of the defect by a plantar skin flap fashioned from the end of the toe after the toe has been shortened by resection of the distal half of the distal phalanx. This procedure is unacceptable cosmetically and is unnecessary because of more effective matricectomies that are available. The entire nail matrix is surgically resected in a Zadik procedure.[10] The purpose of the operation is to remove the nail-forming part of the nail bed and to provide adequate skin cover without shortening the distal phalanx. Zadik[10] reported 16 cases with good cosmetic results and no regrowths. Gürbüz et al[11] used a total matricectomy with V-Y advancement flap coverage. They claimed the preservation of sensation and toe length, and good soft-tissue coverage are the advantages of the procedure. They reported no complications in 15 toes with this technique.

Treatment of the condition is subject to debate. There is no treatment method that restores the

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Figure 1. The nail before the procedure.

nails. The aim of treatment in onychogryphosis includes the treatment of nail bed deformity complications. Surgical removal of the nail without matricectomy always ends with recurrence.[12,13]

Materials and Methods

We reviewed the records of 18 patients who had an onychogryphosis on the great toe treated by total matricectomy and subcutaneous flap coverage. Two patients lost at the final follow-up and four patients with diabetes and vascular diseases were excluded from the study. The remaining 12 patients formed the basis of the study. There were eight men and four women, with a mean age of 63.8 years (range, 56–74 years). The main complaints of the patients were pain, socks tearing, and spontaneous nail removal during shoe wearing. A nail clipping with histopathology was negative for fungal hyphae in all cases. Radiographic evaluation of the toes showed no subungual exostosis. The patients underwent surgery with the diagnosis of onychogryphosis.

Surgical Procedure

Under local anesthesia, the patients were placed supine. Finger tourniquet was used during the procedure. The surgical area was disinfected with iodine (Fig. 1). The nail plate was totally released from the lateral and proximal nail folds and removed. The nail matrix, including the germinative matrix, was curetted as far as the distal phalanx (Fig. 2). A T-shaped skin incision was then made to



Figure 2. After total matricectomy.

raise two skin flaps on the dorsolateral aspect of the distal phalanx. Subdermal dissection was performed for preparation of the subcutaneous flap. A quadrangular flap of subcutaneous tissue, which has a hinge to allow rotation on the proximal base, was raised on the dorsolateral aspect of the distal phalanx (Fig. 3). The flap was rotated to cover the defect that was created after the matricectomy (Fig. 4). A full-thickness skin graft that was taken from the dorsum of the foot was used to cover the



Figure 3. Elevation of the subcutaneous flap.



Figure 4. The transposed flap through the defect.

subcutaneous flap (Fig. 5). The donor site was sutured primarily.

The patients received outpatient treatment, and were monitored at 3-day intervals. Soft dressing was used postoperatively. Stitches were removed 15 days after the surgical procedure. Shoe wearing was allowed on the fourth week after surgery.



Figure 5. The coverage of the subcutaneous flap with a full-thickness skin graft.



Figure 6. Nine years after reconstruction of the nail matrix with the technique in a 74-year-old male patient.

Results

The follow-up period ranged from 4 to 108 months, with an average of 25.2 months. All of the flap reconstructions ultimately survived (Figs. 6 and 7). Complications such as infection, recurrence, and



Figure 7. A 38-year-old woman. Reconstruction of a total matricectomy defect 4 years after the operation.

ingrowth of the nail were not seen during the follow-up period. None of the patients has required further surgical intervention.

Discussion

Deformed nails of onychogryphosis can be difficult to manage. The massive growth of the nail plate with increased curvature and elongation overlies the dorsal surface of the toe. The nail plate initially grows upward and thereafter deviates laterally toward the other toes.[14,15] The condition does not appear to have any relationship to a tinea infection. The pathology is attributed to the result of a congenital or repeated trauma to the nail matrix along with the poor hygiene.[3,16] As the germinative nail matrix is destroyed by the pathology, there is no treatment method that restores the nails.[1,4] The goal of treatment is to prevent complications and provide good cosmesis.

In the surgical treatment of onychogryphosis, matricectomy is the essential part, which seems to reduce the high recurrence rate. Chemical matricectomy has been used successfully for a long time.[17,18] This method of treatment has been proven for incurved or ingrown nails and hypertrophied or painful nail borders after partial nail avulsion. Because the whole nail matrix is affected by the pathology in onychogryphosis, total matricectomy must be the mainstay of treatment.

Both the Zadik and the V-Y flap techniques use advancement flaps for coverage of the defect that was created after total matricectomy. These flaps may lead to a tight closure. Gürbüz et al[11] stated that tension was the primary problem encountered with the V-Y advancement flap. Although coverage is ensured by subcutaneous flap and skin grafting, tight skin closure was not required with our technique. If the flap is raised and transposed in a well-designed fashion, soft-tissue–related problems would not be expected.

Many times, even after complete resection of the entire nail apparatus, the wound can be left for secondary intention wound healing. Furthermore, full-thickness skin grafts placed over the resected matrix and nail bed area tend to be viable even without an underlying subcutaneous tissue flap. However, skin graft reconstruction directly over the distal phalanx may be vulnerable to minor trauma within shoes. The purpose of our technique is restoration of flap volume before skin graft resurfacing. Use of a vascular bed between the skin graft and the distal phalanx provides a nail-like appearance with good cosmesis and prevents a wound related to repetitive trauma, which may occur during shoe wearing.

Conclusions

In our small series of onychogryphosis, subcutaneous flaps ultimately survived. Nail spicules caused by incomplete removal were not encountered. The main advantage of this technique is the avoidance of tight closure. A possible limitation for the technique is poor blood circulation in the feet. The procedure may also be useful in abnormalities other than onychogryphosis, where a total matricectomy is necessary, whereas patients with vascular diseases and diabetes may not be candidates for the procedure.

Financial Disclosure: None reported.
Conflict of Interest: None reported.

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