Onychoclavus Due to Subungual Exostosis: Reconstruction of the Resulting Defect by Triple Volar Advancement Flap: Surgical Technique

Tırnak-Altı Egzostoza Bağlı Onikoklavus: Tabanda Üçlü İlerletme Flebi ile Oluşan Defektin Tamiri

Hasan Mete AKSOY, MD,[a,b]
Berna AKSOY, MD,[c]
Mahi BALCI, MD,[d]
Hüseyin ÜSTÜN, MD[e]

[a]Plastic and Reconstructive Surgery Clinic,
[d]Pathology Clinic,
Private TDV 29 Mayıs Hospital, Ankara
[b]Plastic and Reconstructive Surgery Clinic,
[c]Dermatology Clinic,
Private Konak Hospital, Kocaeli,

Geliş Tarihi/*Received:* 01.05.2010
Kabul Tarihi/*Accepted:* 01.12.2010

This case was e-poster presented in the "22. National Dermatology Congress, (14-18 October 2008, Konya, Turkey)".

Yazışma Adresi/*Correspondence:*
Berna AKSOY, MD
Private Konak Hospital,
Dermatology Clinic, Kocaeli,
TÜRKİYE/TURKEY
bmaksoy@mynet.com

ABSTRACT Onychoclavus is a hyperkeratotic corn tissue in the nail region. Subungual exostosis is an osteochondral tumor arising from the distal phalanx of the great toe. Dorsolateral defects of toes require special flap techniques. A 25-year-old male patient applied to outpatient clinic with the complaint of a tender mass under his left toe nail. Hyperkeratotic parts of skin and underlying exostosis were removed. The resulting defect was repaired by using the triple volar advancement flap technique. Patient satisfaction was very high and there was no recurrence after 12 months of follow up. The triple volar advancement flap technique is very suitable for dorsolateral toe tip defects because reconstruction is performed easily and a natural appearance is achieved. Treatment of onychoclavus due to underlying bony exostosis is an excellent indication for this flap technique because both excision and reconstruction are carried out easily with this special surgical technique.

Key Words: Nails; toes; callosities; exostoses

ÖZET Onikoklavus, tırnak bölgesindeki hiperkeratotik nasır dokusudur. Tırnak altı egzostoz ise ayak başparmağının distal falanksından beliren osteokondral bir tümördür. Ayak parmaklarının dorso-lateral defektlerinin tamiri için özel flep teknikleri gerekmektedir. Yirmi beş yaşında erkek hasta, sol ayak başparmak tırnağı altında yerleşik ağrılı kitle şikayetiyle polikliniğimize başvurdu. Derinin hiperkeratotik alanları ve altta yerleşik egzostoz uzaklaştırıldı. Oluşan defekt tabanda üçlü ilerletme flebi tekniği ile tamir edildir. Hasta memnuniyeti üst düzeyde gerçekleşti ve 12 aylık takip sonrasında rekürrens olmadı. Tamirin kolay gerçekleştirilmesi ve doğal görünüm sağlaması nedeniyle taban üçlü ilerletme flebi tekniği ayak parmak dorso-lateral uç defektlerinin tamiri için tamirin kolay olması, doğal görünümün elde edilebilmesi ve rekonstrüksiyonun kolayca yapılabilmesi nedeniyle oldukça uygun bir tekniktir. Bu özel cerrahi teknikle eksizyon ve tamirin kolayca gerçekleştirilmesi nedeniyle, altta yatan kemik egzostozuna bağlı onikoklavusun tedavisi için çok iyi bir endikasyondur.

Anahtar Kelimeler: Tırnaklar; ayak parmakları; kallozitiler; ekzostozlar

Turkiye Klinikleri J Med Sci 2011;31(2):496-9

Onychoclavus (subungual heloma) is a hyperkeratotic corn tissue in the nail region and it is mostly located under the distal nail margin.[1,2] Subungual exostosis is a benign osteochondral tumor that generally arises from the distal phalanx of the great toe and elevates the nail plate.[3,4] Treatment of these conditions results in dorsolateral soft tissue defect of the toe.

A 25-year-old male patient applied to outpatient clinic with the complaint of a tender mass under his left toe nail. His complaint was present for

doi:10.5336/medsci.2010-19078

six years and appeared during his military service. Dermatologic examination revealed a hyperkeratotic papule under the distal margin of the left great toe nail (Figure 1). A subungual exostosis was detected on the plain X-ray of the first toe (Figure 2).

SURGICAL TECHNIQUE

A special reconstruction technique named 'triple volar advancement flap' was planned for reconstruction of the defect that would result from resection of diseased soft tissue and bone from the tip of the first toe. Three flaps named as F1, F2, and F3 were designed on the skin covering distal part of the great toe (Figure 3). F1 was the central advancement flap, and F2 and F3 were medial and lateral rectangular nail fold skin flaps respectively (Figure 3). These side flaps were designed to increase the mobility of the central advancement flap (F1) and to obtain a better shape of the toe tip region after closure of the defect.

The patient was operated under local digital block anesthesia. The operation was conducted under Salem's digital tourniquet application. First, hyperkeratotic parts of the skin and sterile nail matrix were resected. Then all three skin flaps (F1, F2, and F3) were elevated to obtain complete exposure of the distal part of distal phalanx bone and exostosis. This bony lesion was removed by using a bone rongeur (Figure 4). Then the resulting soft tissue defect, involving skin and steri-

FIGURE 1: Clinical appearance of the hyperkeratotic papule under the distal margin of the left great toe nail plate.

FIGURE 2: A subungual exostosis was detected on the plain X-ray of the left great toe.

FIGURE 3: Design of the central volar pulpa advancement skin flap (F1), and medial (F2) and lateral (F3, not visible in this picture) rectangular nail fold flaps.

FIGURE 4: Appearance after resection of exostosis and preparation of the central volar pulpa advancement flap (F1), and medial (F2) and lateral (F3) rectangular nail fold flaps.

le nail matrix, was reconstructed by the central volar pulpa advancement skin flap (F1) prepared after elevation of medial and lateral rectangular nail fold flaps (F2 and F3) (Figure 5). These smaller flaps (F2 and F3) increased the mobility of the volar advancement flap and this was similar to excision of Burrow triangles in classic advancement skin flaps. Moreover, trimming and repositioning of these small flaps prior to suturing and coaptation with the central advancement flap resulted in a more natural curvature and anatomy of the toe tip region. Coaptation of the advancement flap with the cut edge of sterile nail bed was very satisfactory with good support to cover the nail plate (Figure 5).

Histopathological examination of the excised subungual bony lesion revealed a hyaline cartilage cap and subjacent mature fine bone trabeculae (Figure 6). These findings were compatible with a diagnosis of exostosis.

There was not any flap loss due to circulation compromise and all three flaps healed uneventfully. The shape of the distal part of the first toe was not disturbed following reconstruction with this flap technique and coaptation of the advancement flap with sterile nail bed was very satisfactory. Moreover a sufficient nail plate support was also achieved with the use of this advancement flap technique.

Patient satisfaction was very high with the result of the treatment and there was no recurrence after 12 months of follow up (Figure 7).

FIGURE 5: Appearance of the left great toe after suturing and coaptation of the skin flaps and the sterile nail bed.

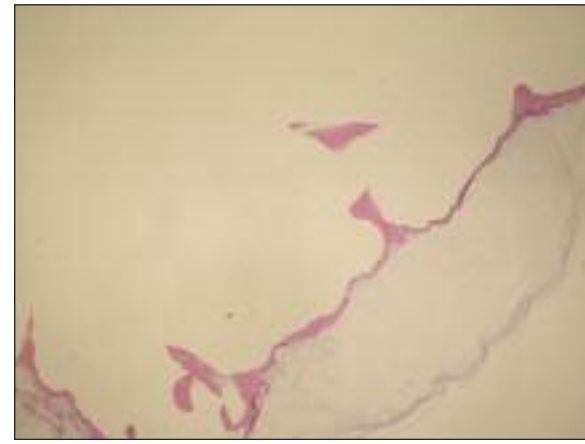

FIGURE 6: Histopathological examination of the excised subungual bony lesion revealed a hyaline cartilage cap and subjacent mature fine bone trabeculae (hematoxylin and eosin, x40).

FIGURE 7: Late postoperative appearance of the left great toe six months after the operation.

Onychoclavus results from localized pressure on the nail bed and may be associated with an underlying bony deformity such as subungual exostosis, spur and chondroma or abnormal foot function.[1,2] Management of onychoclavus includes debridement of the lesion and removal of any external or internal pressure.[2] Removal of hyperkeratotic tissue and involved nail region should be combined with excision of any existing bony changes.[1,2] Modified footwear, protective pads and tube foam should be used to prevent recurrence following treatment.[1] We also advised our patient to modify foot wear and protect his foot from trauma.

Subungual exostosis can cause nail deformity and develops mainly in the great toe.[3,4] It is belie-

ved that there is a relationship between sportive activity and repetitive microtrauma with development of subungual exostosis.[3] The appropriate treatment of exostosis is surgical excision.[3] Recurrences are related to incomplete removal of the lesion and may be as high as 50%.[3] Surgical excision of exostosis in our patient was performed with complete surgical exposure of the lesion, and the lesion did not recur in 12 months of follow up. Triple volar advancement flap technique allows excellent exposure of the distal part of the distal phalanx bone so that complete excision of exostosis is possible. Moreover, unrestricted resection of hyperkeratotic soft tissue to gain more exposure of exostosis and anatomic reconstruction of soft tissue defect are also possible with our flap technique. This also helps to perform a complete resection of exostosis.

Reconstruction of skin and soft tissue of distal dorsal part of the great toe with viable skin of appropriate thickness was possible by the use of this triple volar advancement flap technique. Tension-free closure of the defect was also possible. Coaptation of the advancement flap with nail bed was very satisfactory. Therefore, contour and shape of the toe tip region was preserved with this technique. Patient satisfaction after treatment was very high. Primary closure of this kind of defect following some separation of the skin from subjacent tissues was an alternative method to close this defect. If this method had been used for defect closure, it would have resulted in some tension on closed wound. Primary wound closure with undermining the skin results in increased wound tension. This tension increase disturbs wound healing and adversely affects the shape of the toe tip region. Another alternative is the Atasoy-Kleinert V-Y advancement flap.[5] Mobility of this flap is limited because it is vascularized from its attachments to underlying structures. Thus, mobilization of this flap into dorsolateral defects and coaptation of the flap with cut edge of nail matrix are difficult. However, triple volar advancement flap technique is very suitable for dorsolateral toe tip defects and a natural appearance is achieved following reconstruction with this technique.

In conclusion, the triple volar advancement flap technique is very suitable for dorsolateral toe tip soft tissue defects because reconstruction is performed easily and a natural appearance is achieved following reconstruction. Treatment of onychoclavus due to underlying exostosis of distal phalanx bone is an excellent indication for this flap technique because both excision and reconstruction are performed easily with this special surgical technique.

REFERENCES

1. Singh G, Haneef NS, Uday A. Nail changes and disorders among the elderly. Indian J Dermatol Venereol Leprol 2005;71(6):386-92.
2. Helfand AE. Nail and hyperkeratotic problems in the elderly foot. Am Fam Physician 1989;39(2):101-10.
3. Lokiec F, Ezra E, Krasin E, Keret D, Wientroub S. A simple and efficient surgical technique for subungual exostosis. J Pediatr Orthop 2001;21(1):76-9.
4. Aktaş A, Geçer E. [Nail changes in elderly]. Turkiye Klinikleri J Dermatol-Special Topics 2009;2(2):69-71.
5. Atasoy E, Ioakimidis E, Kasdan ML, Kutz JE, Kleinert HE. Reconstruction of the amputated finger tip with a triangular volar flap. A new surgical procedure. J Bone Joint Surg Am 1970;52(5):921-6.