



## How to perform a biopsy for nail disorders? *Tırnak hastalıklarında biyopsi nasıl yapılır?*

Fatih Göktay, Güldehan Atış

University of Health Sciences, Haydarpaşa Numune Training and Research Hospital, Clinic of Dermatology, İstanbul, Turkey

Histopathological examination is the diagnostic gold standard for many nail disorders. Proper tissue sampling has a critical importance to make a correct diagnosis with a minor sequelae. Therefore it is essential to know the surgical anatomy of the nail unit, anesthesia technics and the types of nail unit biopsy methods according to suspected disorder. Nail unit is mainly composed of nail plate, nail bed, proximal and distal matrix, and proximal and lateral nail folds. There are some clues to perform a comfortable nail unit local anesthesia. Pain sensation during the needle prick may be reduced using topical anesthetic cream under occlusion, thin needles (30 G for fingers, 27 G for toes, 30 G for children at all areas) and applying vibration with a massage tool on the expected sites of injection preceding the anesthetic procedure. Heating the anesthetic solution at a body temperature, injecting very slowly, and buffering the acidic lidocaine with bicarbonate solution would be reduced the pain sensation that is felt during infusion. Generally, ropivacaine 2 mg/mL is preferred for nail surgery because of its specific features. It has a quick onset anesthesia (app. 2 minute), longer duration of action (up to 9 hours) and vasoconstrictive effect. But this agent is not available in our country. Quick onset anesthesia can be achieved using lidocaine with epinephrine solution. According to current knowledge the use of anesthetics admixed with epinephrine is not contraindicated for local anesthesia of acral body sides. Lidocaine plus epinephrine solution has a relatively shorter duration of action. So bupivacaine, an anesthetic solution with late onset but longer duration of

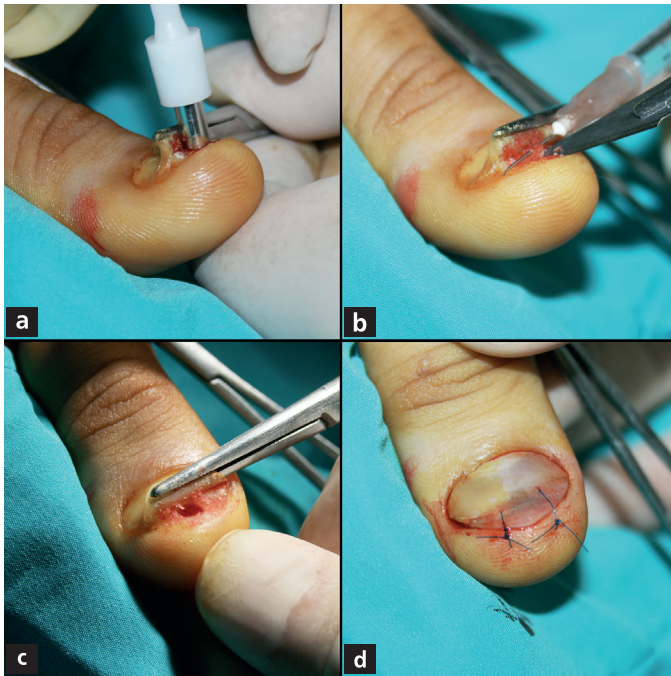
action, can be injected at the end of the surgical procedure to reduce the pain occurs after surgery<sup>1,2</sup>.

Proximal regional block anesthesia is a commonly used technique for nail surgery. But this technique has some challenges. Anesthetic effect starts approximately within 20 minutes, neurovascular bundles may be damaged during the process and it has longer postanesthetic pain. For these reasons, this technique no longer be recommended for the nail surgery. Currently distal wing block is a preferable method for nail surgery. In this method 0.3-0.5 mL anesthetic solution is injected from the point located 5-8 mm far from the proximal and lateral nail fold junction with a 45° angle. Then to complete the anesthesia, needle is bent at 120°, reinserted from the first prick point along with the lateral nail fold and the solution injected slowly with a backward motion. If needed, same method should be performed for the other side of the nail unit to achieve a total nail unit anesthesia<sup>1</sup>.

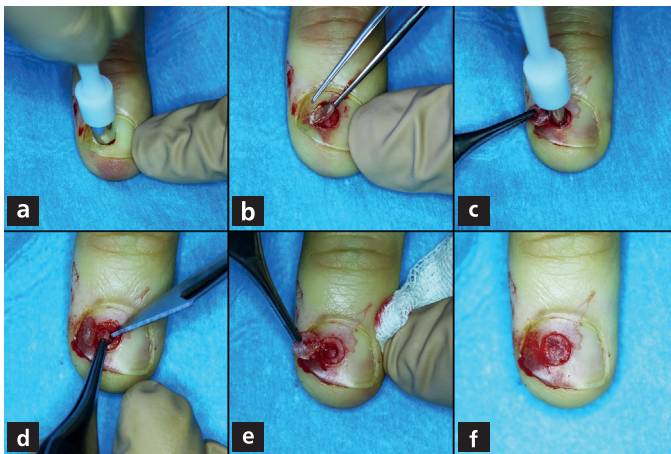
Nail plate biopsy can be performed to determine whether the nail dystrophy originates from fungal infection or not. Additionally the origin of the nail plate pigmentation (melanin or hemosiderin) can be identified by the histochemical evaluation of the nail plate sample obtained by this biopsy method. Histopathologic examination of the nail plate can also give some diagnostic information in patient with nail psoriasis. Nail plate biopsy can be done with a nail nipper and does not require anesthesia. In the presence of suspicious proximal subungual onychomycosis, nail plate sample can be taken by a punch biopsy tool under local anesthesia<sup>3</sup>.

**Address for Correspondence/Yazışma Adresi:** Fatih Göktay MD, University of Health Sciences, Haydarpaşa Numune Training and Research Hospital, Clinic of Dermatology, İstanbul, Turkey Phone: +90 505 267 13 99 E-mail: fatihgoktay@yahoo.com **Received/Geliş Tarihi:** 24.04.2017 **Accepted/Kabul Tarihi:** 12.05.2017

Nail bed biopsy is a diagnostic method to evaluate the etiology of onycholysis, to identify the inflammatory nail disorders and tumoral lesions involving the nail bed. Nail bed epithelium is attached tightly to the nail plate. Because the nail bed epithelium can be damaged during the procedure, it is better to take the biopsy together with nail plate and nail bed (without nail plate avulsion) for nail disorders involving the nail bed epithelium. In case of distal onycholysis, after the nail plate is lifted up by the aid of a forceps, nail bed is biopsied by a punch biopsy tool (Figure 1). In general, it is not recommended that to take a punch biopsy from the nail bed, greater than 4 mm in diameter because the risk of permanent onycholysis. Two punch set biopsy is another



**Figure 1.** a) After the nail plate is lifted up by the aid of a forceps, nail bed is biopsied by a punch biopsy tool. b) The biopsy material is removed by the aid of a needle/forceps and scapel. c) The biopsy area. d) Nail plate is sutured to hyponychium



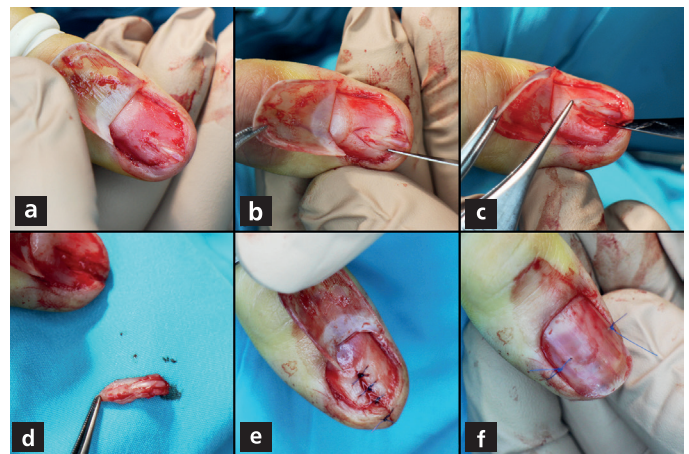
**Figure 2.** a) Nail plate located over the lesional area is cut with a 5 mm punch biopsy tool. b) The nail plate is removed by the aid of a forceps. c) Nail bed is biopsied with a 3 mm punch biopsy tool. d) The biopsy material is removed by the aid of scapel and a forceps. e, f) The removed piece of the nail plate is replaced on its original side

option for nail bed biopsy. At first, nail plate is removed with a 5-6 mm punch biopsy tool. Then nail bed was biopsied with a smaller (3 mm) one. Removed piece of nail plate can be replaced on its original side (Figure 2). If an incisional biopsy is needed, axis of the fusiform biopsy specimen should be parallel to the longitudinal axis of the distal phalanx. As a natural wound dressing, it is recommended that put the avulsed nail plate on its' original place (Figure 3)<sup>1,4</sup>.

Matricial biopsy is required especially for the diagnosis of longitudinal melanonychia. If the lesion originates from the distal matrix, the biopsy taken from this part of the matrix leaves almost no surgical sequel on the nail plate. The risk of surgical sequelae is higher for the biopsies taken from the lesions originating from the proximal matrix. A punch biopsy is a proper method, if the thickness of longitudinal melanonychia smaller than 3 mm. In such lesions, proximal nail fold (PNF) is pulled back to expose origin on the matrix. The biopsy is performed with a punch biopsy tool. After that, nail plate on the matrix is avulsed to see if there is any residual lesion. If the residual lesion is present, it should be excised (Figure 4). It is recommended to perform tangential excision for the lesions thicker than 3 millimeters. In the same way, PNF is pulled back and total or proximal part of the nail plate is avulsed. The origin of the lesion leading longitudinal melanonychia is excised tangentially with a 15 no scalpel. The visibility of the grayish color of scalpel through the excising tissue is defined as a helpful method to determine the optimum thickness of excised tissue. After excision, avulsed nail plate is put back and sutured to lateral nail folds (Figure 5). Sequelae on the nail plate will be minimal with tangential biopsy. Permanent sequelae due to unnecessary aggressive surgery will be prevented in benign lesions<sup>1,2,4</sup>.

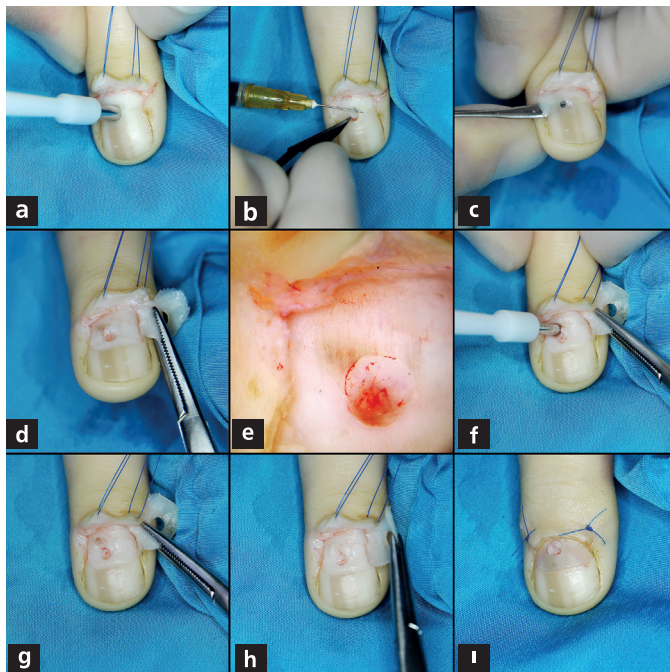
Punch biopsy, shave biopsy or a crescent-shaped excision for diagnosis of collagen diseases can be performed from the PNF. Because of thinness of the nail plate under the PNF, during the procedure insertion of a septum elevator between PNF and nail plate will prevent the matrix from being damaged (Figure 6)<sup>1,4</sup>.

Lateral longitudinal biopsy allows to evaluate PNF, nail matrix, nail bed, nail plate and hyponychium in the same histopathological section (Figure 7). For example, it will be possible to observe histopathological matrix changes which lead to pitting in lateral longitudinal biopsy

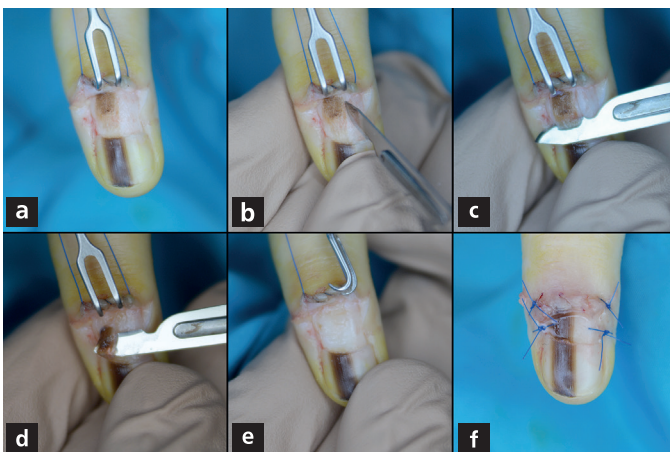


**Figure 3.** a) The nail bed lesion is exposed after a trapdoor nail plate avulsion. b, c, d) In the nail bed incisional or excisional biopsies should be oriented longitudinally as seen in this case. e) Surgical defect is sutured with 5/0 or 6/0 absorbable suture material. f) The nail plate is replaced on its original position and sutured to lateral nail folds



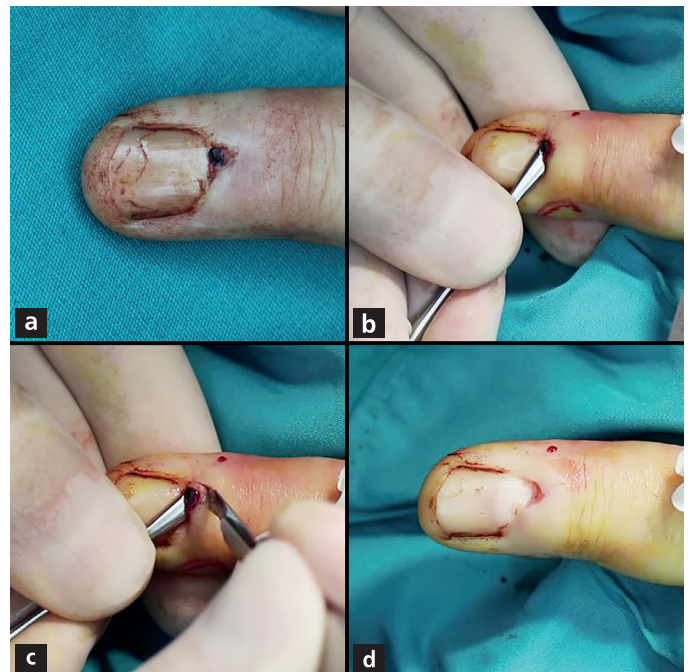


**Figure 4.** a) Nail matrix punch biopsy together with nail plate. b) The biopsy material is removed by the aid of scalpel and a fine needle. c, d) Proximal part of the the nail plate is avulsed to check for remaining part of the lesion. e) Intraoperative dermoscopic image of the surgical site. f) Remaining part of the lesion is excised. In this case excision was performed by punch biopsy tool. g, h) The avulsed nail plate replaces on its original side. i) Surgical defect of proximal nail fold is repaired

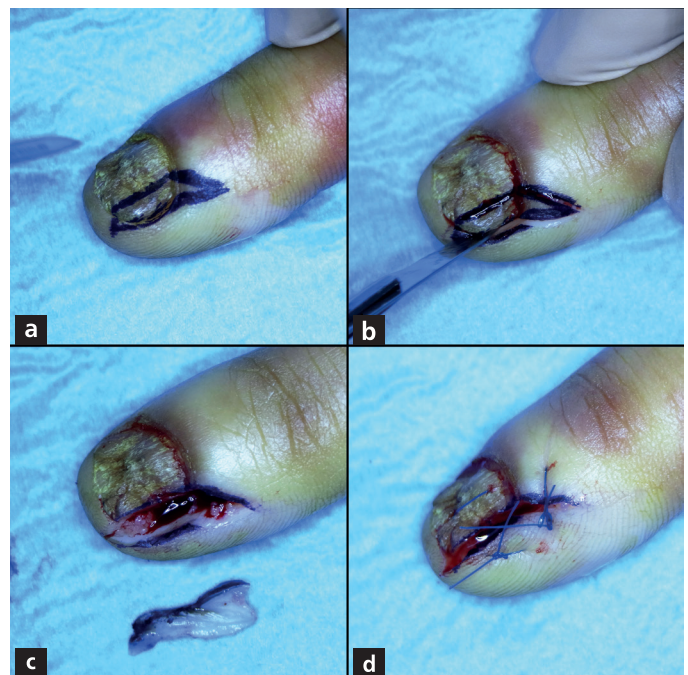


**Figure 5.** a) Proximal nail fold is pulled back. b, c, d) The origin of the lesion leading longitudinal melanonychia is excised tangentially with a 15 no scalpel after avulsion of proksimal nail plate. e) Shows the surgical area after tangential excision. f) The nail plate is replaced on its original side, and sutured to lateral nail folds

which was taken with a prediagnosis of psoriasis. The patients must be informed that the nail plate will narrow permanently after this procedure. The same method can also be used for excision of the lesions located on the lateral side of the nail unit such as longitudinal melanonychia. In clinical practice, it is possible to encounter delayed diagnosis of squamous cell carcinoma or melanoma of the nail unit mainly because of clinical misdiagnosis, or performing a biopsy from incorrect area. In addition, the patients with traumatic dystrophy or nail



**Figure 6.** a) The papular lesion located on the proximal nail fold. b) To protect the nail matrix from surgical trauma, a septum elevator is placed between the nail plate and the ventral surface of the proximal nail fold. c) The lesion is excised by the aid of a scalpel. d) Postoperative appearance of the surgical site



**Figure 7.** a) The biopsy area is marked. b) Proximal nail fold, lateral nail fold, nail plate, lateral matrix horn and nail bed are cut all together by the aid of scalpel. c) The biopsy material is removed. d) Repair of the surgical defect

psoriasis with unnecessary antimycotic usage for months may be seen in clinical practice<sup>1</sup>.

We must keep in mind diagnostic gold standart biopsy method in cases which we can not explain the reason or it does not respond to ampicric

treatment in order to avoid all these unfortunate conditions and we should not refrain to apply it in practice. We also should keep in mind that a duly and correctly performed nail unit biopsy can be life saver with early diagnosis.

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