Original Article

Simple and Aesthetic Treatment for Pincer Nail

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ABSTRACT

Background: Many surgical techniques for the treatment of pincer nails have been reported. However, there are two mainly unsolved problems: the formation of dead space on each side of the distal phalanx, and the unnatural form of the nail bed after surgery. We easily solved these problems by inventing a skin incision design, and subcutaneous suturing.

Methods: We performed a new surgical method on 30 pincer nails in 25 patients. Incision lines were drawn 3 mm from the paronychium and the distal nail fold to preserve the natural form of the paronychium. To close the dead space made by disconnecting the connective tissue around the distal phalanx, the proximal dermis and periosteum of the distal phalanx were sutured together twice on each side.

Results: The subjects were evaluated using the curvature index. The mean curvature index was 2.20 (2SD, 0.95, SE, 0.10) before surgery, and 1.19 (2SD, 0.21, SE, 0.02) one year after surgery, which was significantly lower (p < 0.01, Wilcoxon signed rank test). The appearance of the postoperative nail was good in all cases, and there was no recurrence reported.

Conclusions: Our new method is simple and effective and can preserve favorable nail appearance postoperatively.

Key words: aesthetic outcome, curvature index, osteophyte, pincer nail, surgical operation

Introduction

A pincer nail is a deformity characterized by transverse overcurvature of the distal half of the nail plate, commonly of the great toe. Since the first report by Cornelius et al. in 19681, several studies have reported the pathology and treatment of pincer nails. In previous studies, two problems have not been solved. The first problem was the formation of dead space on each side of the distal phalanx during operation. Some methods to fill the dead space have been reported2-5; however, all of them involve complex maneuvers. The second problem was the unnatural form of the nail bed after surgery6. Here, we report a simple and effective procedure to treat the pathology of pincer nail deformity, which overcomes the above-mentioned problems.

Materials and methods

Patients

The study population comprised 25 patients who underwent surgery to treat a total of 30 pincer nails on their great toes. The surgery was performed by a single surgeon between April 2013 and March 2017. Among the 25 patients, five were males and 20 were females, and the mean age was 67.4 years.

Assessment methods

Still images and lateral radiographs of the affected toe were taken preoperatively (Fig. 1a, b, c) to confirm the indication for surgery, which was the presence of an osteophyte in the distal phalanx. The axial images of the great toe, taken before and after surgery, were analyzed using ImageJ, developed by Wayne Rasband, National Institutes of Health, Bethesda, MD; available at http://rsb.info.nih.gov/ij/index.html. Yabe et al. reported the curvature index (CI) as an evaluation tool for pincer nails. The CI is defined as the traced length of the nail tip (B) divided by the apparent width of the nail tip (A)7. The CI of stage I is below 1.6. The CI of stage II is more than 1.6, but below 2.5. The CI of stage III is more than 2.5. Typically, all patients with a diagnosis of stage III, and some patients with a diagnosis of stage II are indicated to undergo surgery for the treatment of pincer nail deformity8. It is easy to describe the severity of the pincer nail, and to compare the improvement before and after the treatment using CI. The CI of the patients were obtained to evaluate the effect of the treatment. Postoperative examination was performed one year after the
surgery or later, when the nail plate had grown sufficiently (Fig. 2a, b). Data were analyzed using Statmate III (ATMS, Chiba, Japan) and the Wilcoxon signed rank test was applied ($p < 0.05$).

**Surgical technique**

Surgery was performed under a digital block of the toe. Incision lines were drawn 3 mm from the paronychium and the distal nail fold (Fig. 3a, b). This was done to preserve the plump appearance of the paronychium after surgery. After removing the whole nail, an incision was made perpendicular to the skin along the drawn line. The incision was extended to the periosteum of the distal phalanx, at the tip of the toe distally, and the nail bed flap was completely lifted subperiosteally (Fig. 3c). Lifting the nail bed flap from the distal end prevented damage to the paronychium. The osteophyte was then shaven using a Luer bone rongeur to smoothen the upper part of the distal phalanx (Fig. 3d). Sharp dissections to the point above the periosteum were made along the lateral sides to the bottom of the distal phalanx, and the slightly proximal dermis and periosteum of the distal phalanx were sutured together twice on each side using a 4-0 PDS II suture (Fig. 3e, f, g) to close the dead space and to prevent hematoma, which also corrected the upward deviation of the distal phalanx. Therefore, this suturing technique was the most important factor in this operation. Next, the deformed wavy nail bed flap was stretched horizontally and the lump of the skin at the distal portion of the toe was trimmed (Fig. 3g shaded area); both surfaces were flattened and then sutured with 5-0 nylon (Fig. 3g, h). If the nail bed flap overlapped with the lateral normal skin, the overlapping part of the normal skin was denuded (Fig. 3g broken line area) and subcutaneously sutured. (Fig. 3i, j). This
procedure enabled easy fabrication of a flat nail bed with no dead space. Antibiotics (oral and topical) and oral analgesics were prescribed postoperatively. Patients could have a bath and were instructed to self-administer the ointment containing antibiotic starting from the first postoperative day. Sutures were removed two weeks after surgery.

**Results**

The osteophyte in the distal phalanx was confirmed on lateral radiographs of the great toe in all 30 cases.

The mean CI was 2.20 (2SD, 0.95; SE, 0.10) before surgery, and 1.19 (2SD, 0.21; SE, 0.02) one year after surgery, which was significantly low (p < 0.01) (Fig. 4). The mean duration of the surgery was 35 min.

Early postoperative complications, such as bleeding and infections, occurred in only one patient who had been on oral steroids for several years prior to surgery. Nail plate thickening was observed in five cases during the follow-up examinations performed ≥ one year after the surgery (Fig. 5a, b); however, no obvious recurrence of the pincer nail was noted.

**Discussion**

**Indications for surgery**

There are several possible causes of pincer nail deformity,
including psoriasis, developmental abnormalities, β-blocker administration, epidermal cyst, exostosis, osteoarthritis, and ill-fitting shoes\(^{2}\). In addition, insufficient loading on the great toe is a recently suggested causative factor\(^{9}\). Among these possible causes, the most likely one is the formation of osteophytes\(^{10}\), which requires surgical treatment. The present study used the three-stage evaluation described by Yabe et al., wherein surgery was indicated for stage II or III pincer nails (CI ≥ 1.6)\(^{8}\). Thus, we defined the indications for surgery as follows: chief complaint of pincer nail, osteophytes proven by preoperative plain radiography, and preoperative CI ≥ 1.6. Surgery was indicated for all of the examined cases in the current study. Our approach was simple and easy to perform because it only required ordinary images and radiographs to determine whether the surgical criteria were met, and using complex imaging techniques, such as a CT scan, could be avoided\(^{13}\).

**Surgical maneuvers**

In patients with pincer nail deformity, the distal phalanx is adherent to the nail bed\(^{2}\) and curves with the nail plate\(^{12}\). This causes contracture of the tissue at the distal part of the toe\(^{11}\). Therefore, the aim of surgical treatment is to release (from the distal phalanx) and to flatten the nail bed. To achieve this aim, the following requirements should be met following the procedure: (1) correcting the upward deviation of the nail bed by shaving the osteophyte\(^{1,13}\), and (2) alleviating the apparent narrowing of the toe apex\(^{13,14}\).

To satisfy the first requirement, the osteophyte at the phalanx is simply shaved. However, even after shaving the bone, the position of the upper surface of the phalanx may be higher than the normal position of the nail bed in cases of upward deviation. To satisfy the second requirement, the reverse-U-shaped lump of tissue at the distal portion of the toe can be alleviated to a certain extent, by releasing the subcutaneous tissue from the distal phalanx\(^{3}\); however, it cannot be flattened surgically, leaving an apparent defect at the distal portion of the toe. To overcome this problem, some innovative designs have been reported\(^{13,14}\). In addition, the formation of dead space on each side of the distal phalanx, which can form a hematoma after surgery or cause infection and wound dehiscence, can undermine the surgical outcome. Various methods have been reported to solve this problem, such as dermal grafting\(^{2,4}\), hard-palate mucosal grafting\(^{3}\), and grafting of deepithelialized dermal flaps prepared from the paronychium\(^{5}\). All of these, however, involve complex maneuvers.

To overcome these problems, we completely disconnected the edge of the distal phalanx from the surrounding connective tissue, and lifted the skin flap around the distal phalanx with the subcutaneous tissue. The periosteum was fixed, underneath the distal phalanx, to the adjacent dermis using an absorbable suture, thereby filling the dead space on both sides of the distal phalanx without excessive bone shaving. The sutures compressing the dermis created a dimple immediately after surgery (Fig. 6); however, it eventually became inconspicuous. The above-mentioned procedure was not required in cases of pincer nails that did not involve osteophyte formation.

Fig. 4. Pre- and post-operative evaluation based on CI. The CI was significantly lower after operation than before operation. CI: curvature index, SD:

| Curvature Index |
|-----------------|
| 3.0             |
| 2.0             |
| 1.0             |
| 0.0             |

![Fig. 4](image)

* p < 0.01 Wilcoxon signed rank test

Fig. 5. A case of postoperative nail thickening, particularly at the nail tip.

(a) (b)
involved osteophytes. This suggests that the surgeons who treat pincer nails must learn the relevant surgical procedures.

A reverse-U-shaped lump of tissue at the distal portion of the toe should be resected; otherwise, it would prevent the flattening of the nail bed. As a result, the width of the skin at the site may become shorter than that at the distal end of the nail bed. To match the width in such cases, V-shaped incisions are made to denude the skin at the distal end of the paronychium, onto which the nail bed is sutured\(^{15}\).

The unnatural appearance of the nail bed is an issue after pincer nail surgery, possibly because of the loss of the natural plump appearance around the damaged paronychium\(^{6}\), the apparently freed nail plate at the distal end of the toe, and due to poor contact between the nail plate and the inserted skin flap. To overcome this aesthetic issue, we designed incision lines 2–3 mm from the lateral nail grooves, which potentially preserved the natural form of the paronychium.

We believe that our procedure can prevent pincer nail deformity recurrence and restore the natural nail form after pincer nail surgery.

**Conclusions**

We modified the conventional procedure for pincer nail surgery. Our new method is simple and effective and is able to preserve postoperative nail appearance.

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**Conflicts of interest**

The authors have no conflicts of interest directly relevant to the content of this article.

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