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Fingertip Amputation Injury of Allen Type III Managed Conservatively with Moist Wound Dressings

Authors' Contribution:

Study Design A

Data Collection B

Statistical Analysis C

Data Interpretation D

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Literature Search F

Funds Collection G

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Patient: Female, 36-year-old
Final Diagnosis: Allen type III fingertip amputation injury
Symptoms: Cold intolerance • numbness • pain
Medication: —
Clinical Procedure: Conservative management with moist wound dressings
Specialty: Orthopedics and Traumatology • Plastic Surgery

Objective: Unusual setting of medical care

Background: Fingertip amputation injury is treated surgically or conservatively. Management strategies for these injuries vary depending on not only the site and the degree of tissue loss in the wound but also the country and region. Conservative management or revision amputation is common in the United States. On the other hand, operative management such as replantation or reconstruction is preferred in Japan; accordingly, a surgery is performed even in cases eligible for conservative management. Here, we report a case of fingertip amputation injury for which reconstructive surgery was recommended by a plastic surgeon, but the patient opted for conservative treatment, which was performed using moist wound dressings.

Case Report: A 36-year-old woman suffered an Allen type III fingertip amputation injury with her right middle finger crushed in a thick iron door. The amputated fingertip was not retrieved. The plastic surgeon in charge initially recommended reconstructive surgery to the patient. However, the patient opted for conservative management; therefore, she visited the Wound Care Department in our hospital. Conservative treatment using moist wound dressings (Plus moist™) was performed, and the wound healed after 12 weeks, with outstanding aesthetic and functional results.

Conclusions: Conservative management with moist wound dressings can be a successful treatment modality for Allen type III fingertip amputation injury. In cases where the fingertip amputation injury can be treated using either surgery or conservative treatment, it is better to prioritize the patient's wishes when selecting the treatment option.

Keywords: Amputation, Traumatic • Finger Injuries • Wound Healing • Wounds and Injuries

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/928950>



Background

Fingertip amputation injuries are common injuries often encountered in emergency departments. Fingertip amputations were classified by Allen from Type I to Type IV according to the degree of the injury [1]. Most Allen type III/IV fingertip amputations are treated surgically [2], but conservative management can also be a viable treatment option [3]. Management strategies for these injuries depend on the site and degree of tissue loss in the wounds, and they vary by country or region. Conservative management or revision amputation is common in the United States, and thus, replantation is performed in only 14% of fingertip amputation injuries [4-6]. In contrast, replantation or reconstruction is conventionally performed in Asian countries; replantation is performed in 29% of fingertip amputation injuries in Japan [5,6]. Although there are limited data regarding the appropriate indications for replantation, distal fingertip amputations without bone defects tend to be treated with replantation in Japan [6]. This poses a challenge due to the unresolved issues regarding cost and functional outcomes [6]. Thus, the management strategy for fingertip amputations may need to be reconsidered. Herein, we report a case of an Allen type III fingertip amputation injury that was initially recommended for reconstructive surgery by a plastic surgeon, but conservative management using moist wound dressings was finally selected according to the patient's preference.

Case Report

A 36-year-old woman suffered a fingertip amputation injury when her right third finger was crushed in a thick iron door while working. She worked in a restaurant and was in charge of serving customers and cooking. The amputated part of the finger was not retrieved. Her medical history was unremarkable, and she was a smoker. She first visited the emergency department of another general hospital, where the plastic surgeon in charge recommended surgical reconstruction. However, the patient opted for conservative management and visited our Wound Care Department. Upon the first visit, loss of the nail plate, damage to the nail bed, and exposure of the distal phalanx were observed, indicating that the fingertip injury was an Allen type III amputation (Figure 1A, 1B). Conservative management with moist wound dressings was provided. The moist wound dressings used in this case was Plus moist™ (ZUIKO MEDICAL, Osaka, Japan), which is made of polyethylene, polypropylene, and cellulose (Figure 2). Written informed consent was obtained from the patient for the publication of this case report. Ethics approval for this case report was obtained from the Ethics Review Board of Miyanomori Memorial Hospital.

The protocol for this management strategy was simple: the wound was covered with Plus moist™, and the patient washed the wound lightly with warm water in the shower once a day and changed the dressing at home. Disinfectants and prophylactic antibiotics were not used in this case according to the guidelines of our Wound Care Department. After conservative management began with the Plus moist™, the patient returned for a follow-up visit once every 1-2 weeks. Two weeks later, a new nail plate began to grow, and the fingertip was covered with granulation tissue (Figure 1C). After 4 weeks, the granulation tissue grew, and the fingertip regenerated into the original fingertip shape (Figure 1D). After 8 weeks, epithelialization was almost complete, but a slight granulation remained at the tip (Figure 1E). Epithelialization was completed in 12 weeks (Figure 1F). Follow-up frequency was decreased to once every 4 weeks after epithelialization. There were no local or systemic infections during the overall treatment period.

At the beginning of the treatment, the patient complained of mild pain at the fingertip when it was touched, but over time the pain reduced. We did not restrict the patient from performing any finger movements as long as the pain was tolerated by the patient. We advised the patient at the beginning of the treatment that she could return to work at any time during the treatment period. One week after treatment began, the patient was able to perform activities of daily living with few challenges due to the pain felt at the fingertip when it was touched. However, returning to work was significantly delayed due to the prolonged discussions between the workplace and the patient regarding workers' compensation, future work content, and job changes. The patient complained of numbness at the fingertip at 16 weeks and mild cold intolerance at 27 weeks, but these improved over time. Pregabalin 150 mg/day, mecobalamin 1500 µg/day, and loxoprofen sodium hydrate 180 mg/day were administered separately or simultaneously as needed to control the pain and numbness. For about 6 months after the injury, the patient occasionally found it slightly difficult to hold a pen or chopsticks due to pain or numbness, but she gradually regained the functional ability of her right hand. At the final follow-up at 39 weeks (Figure 3), discussions with her workplace were completed, and she returned to work. Overall, she was satisfied with the treatment outcome.

Discussion

We present a case of an Allen type III fingertip amputation injury which was managed conservatively with moist wound dressings. At 12 weeks, the wound epithelialized with excellent aesthetic and functional results. There are 2 management strategies for fingertip amputation injuries: operative and conservative. Management strategies vary not only depending on

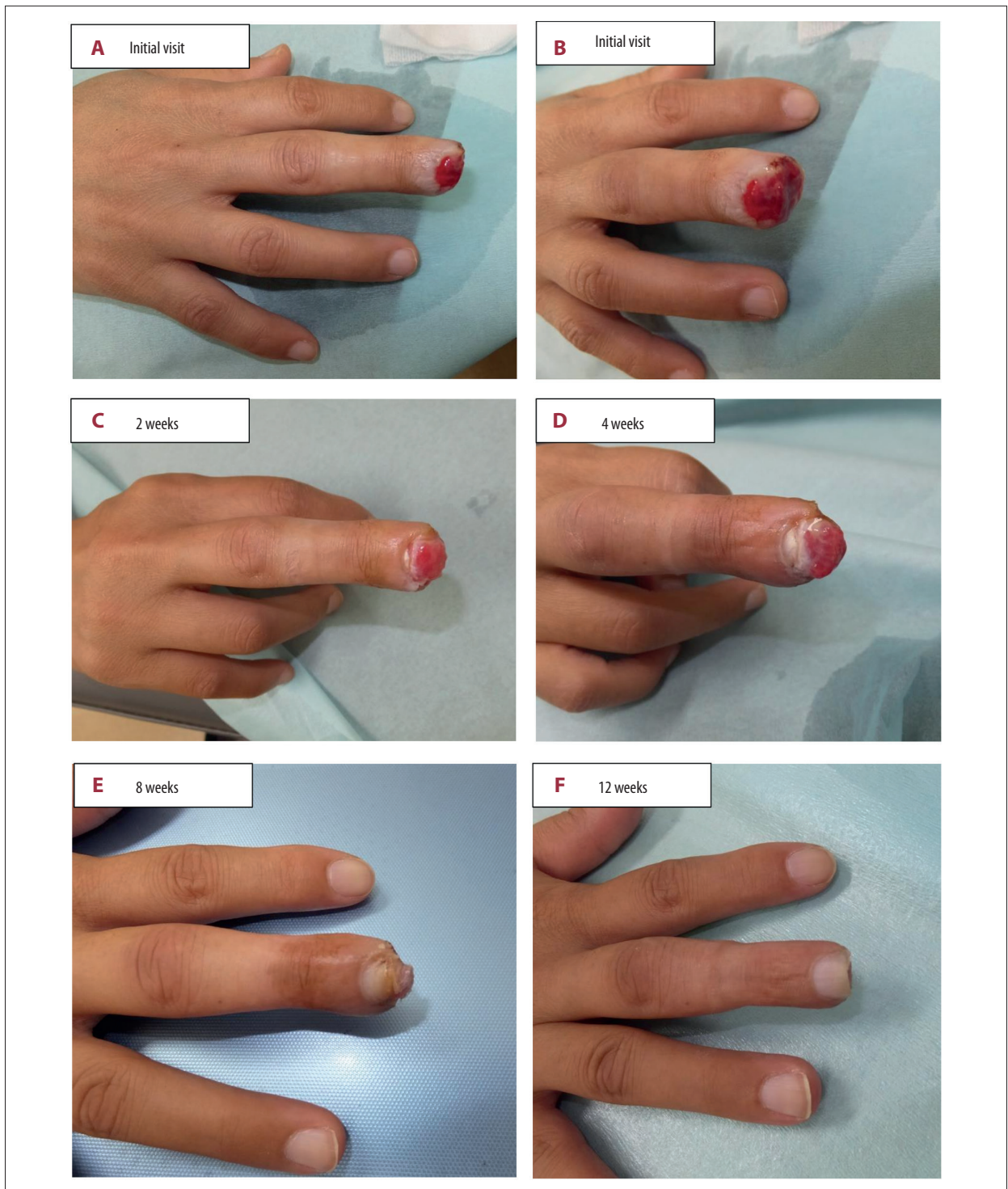


Figure 1. Wound healing process from initial visit to epithelialization Initial presentation of fingertip amputation injury on the third finger of the right hand. The distal phalanx of the finger is exposed during the initial visit (A, B). Granulation increased at 2 weeks (C). The tip regained a shape similar to that of the original finger at 4 weeks (D). Epithelialization was near completion at 8 weeks (E). Complete epithelialization at 12 weeks (F).

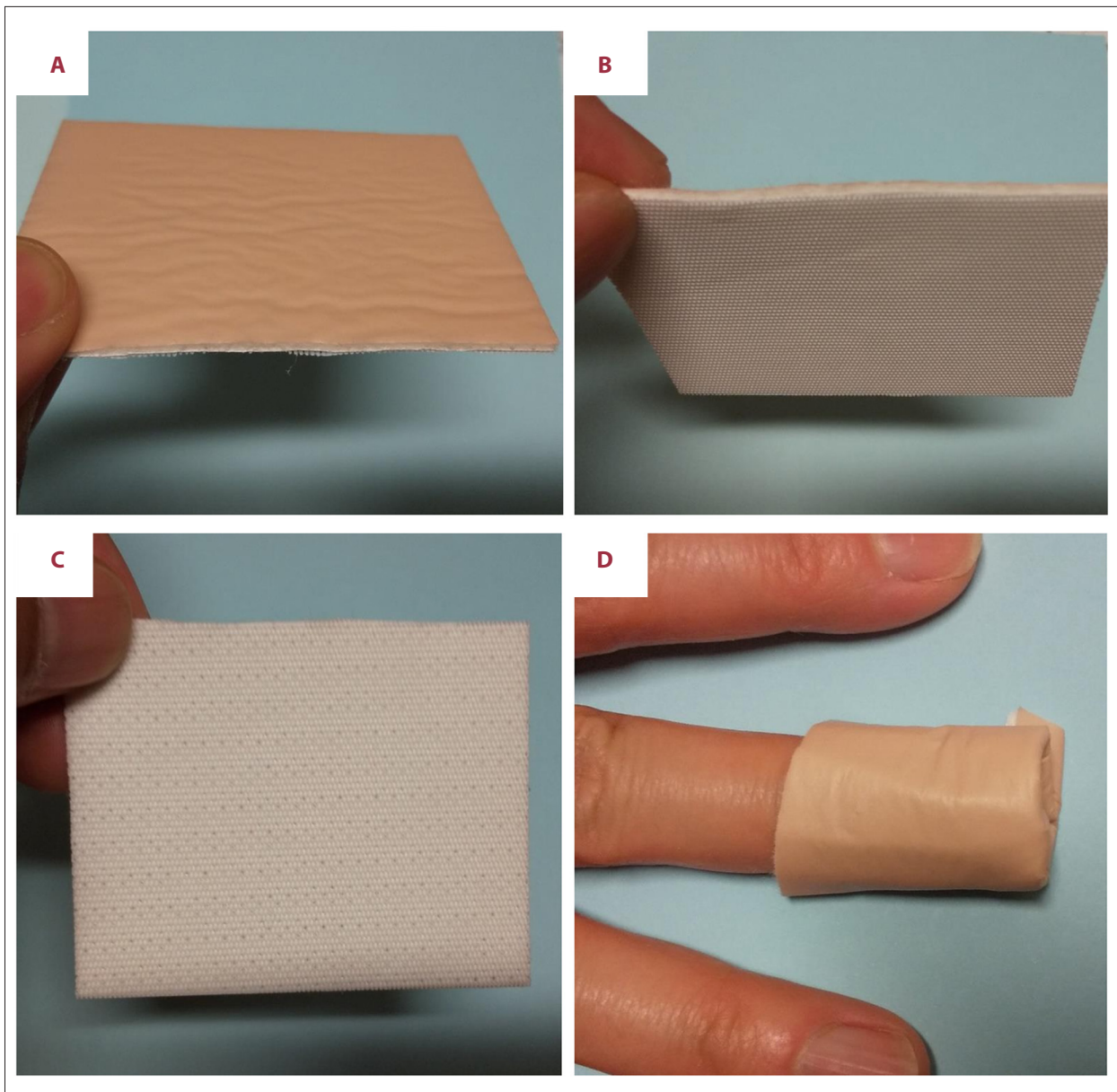


Figure 2. The moist wound dressing (Plus moist™) used in this case Plus moist™ consists of 3 layers. The outer leak-proof layer that prevents the exudate from leaking (A), the middle absorbent layer that absorbs the exudate (B), and the inner permeable layer that comes in contact with the wound (C). Plus moist™ after application (D).

the site and degree of tissue loss in the wound but also the country or region.

Conservative management or revision amputation is common in the United States [4-6]. On the other hand, replantation or reconstruction is preferred in Asian countries [5-7]. This difference is attributed to cultural differences such as moral values and the significance of body integrity [5,6,8]. Differences in health care systems, such as insurance reimbursement, may also influence the management choices [8]. In Japan, replantation or reconstruction is widely used for fingertip amputations [9-11].

Due to the various factors mentioned above, operative management strategies may have been used excessively for fingertip amputations in Japan [6]. On the other hand, conservative management using moist wound dressings has become common and widely accepted among the general public in recent years [12]. In this case, she scrutinized medical articles on the treatment of fingertip amputations on the internet [13] and opted for conservative management because she considered that conservative management would provide better outcomes than surgery.

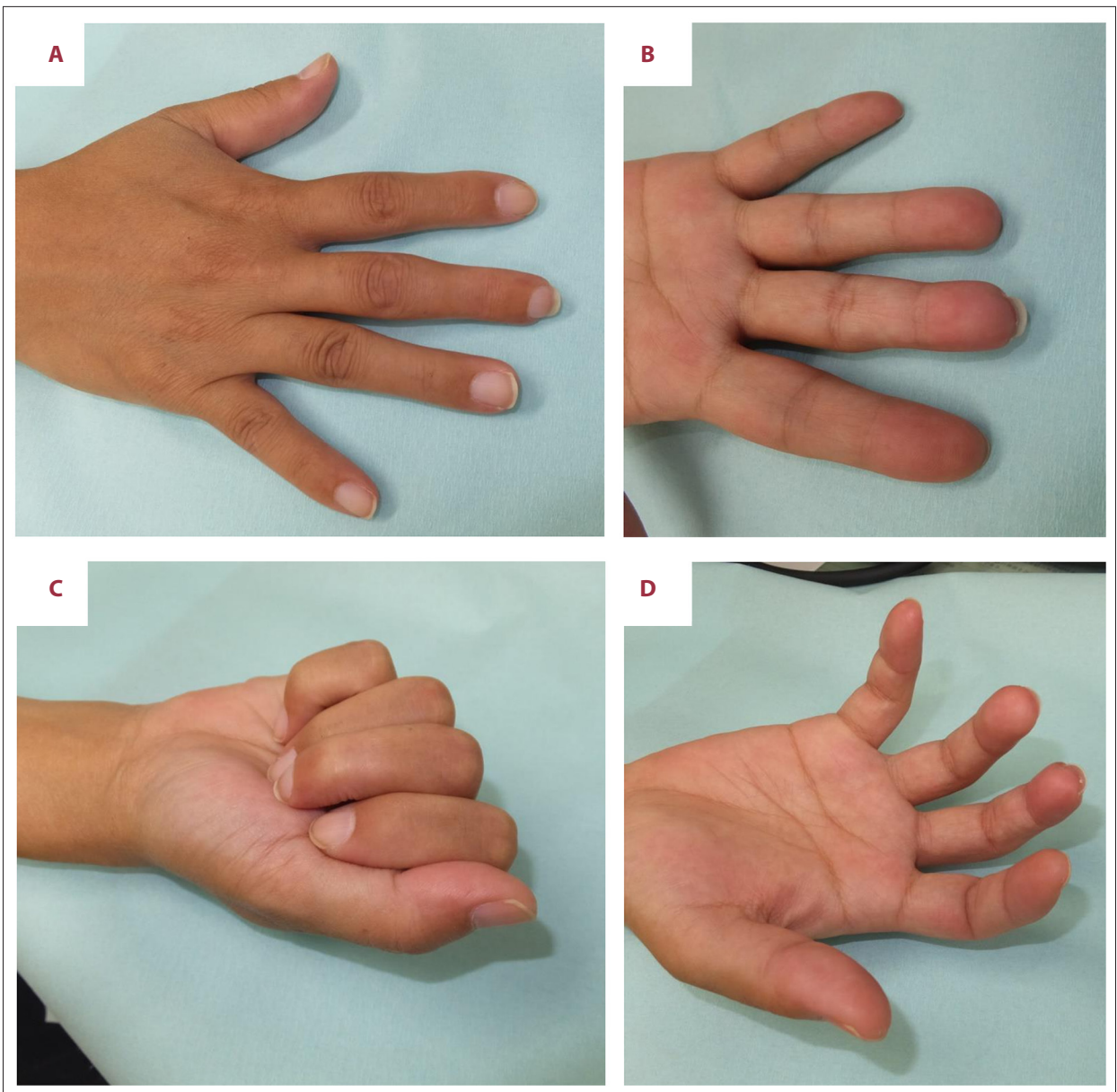


Figure 3. Appearance and range of motion after 39 weeks Fingertip on the palmar and dorsal surfaces at 39 weeks (A, B). Range of motion of the fingertip is normal (C, D).

Moist wound dressings are commonly used in the conservative management of fingertip amputations [13]. For example, self-adhesive elastic bandages with Vaseline [13], UrgoTul [14], and film dressings [15] can be used. In this case, Plus moist™, one of the popular wound dressings in Japan, was used [12]. Plus moist™ is a multi-layered wound dressing with a non-adherent ability and can self-regulate the absorption of the exudate. It can be bought by patients from drugstores or online stores, and it can be used by patients to cover the wound and replace the dressing once a day. Therefore, Plus moist™ is widely accepted by patients due to its ease of use. However, since the available wound dressings vary by country or region, there is

currently no established wound dressing for fingertip amputations that is considered the most suitable. Therefore, individual hospitals need to consider what is appropriate and accessible for their facility when selecting dressings.

Regarding the healing time, revision amputation may provide faster healing than other management methods [5,6,8]. Although the healing time depends on the degree of injury, the average healing time in conservative management has been reported as 2-12 weeks [13]. Fingertip amputation with exposed bone takes the longest to heal [16,17]. In our case, it took 12 weeks for complete healing to occur, which may have

been associated with the size of the defect and exposed bone. Furthermore, the patient's smoking history may have also affected the healing time [5,18]. Since conservative management requires a relatively long healing time, revision amputation may be favorable in patients who cannot tolerate an open wound for a long time and desire faster healing [5,16,17]. The average time to return to work is reported to be 1.5 months after revision amputation and 3.2-4.0 months after replantation [5]. In contrast, patients treated with conservative management can often return to work within the first week, and most patients return to work after an average of 1 month. However, in food service jobs such as this case, returning to work may be significantly delayed due to the nature of the work [13].

Studies on fingertip amputation with an exposed bone recommend surgical bone-shortening before conservative treatment to facilitate healing [13,19]. In contrast, other studies reported that the protruding bone should not be resected unless it has sharp bone spicules. This is because bone trimming causes the fingertip to lose bony support and can cause a hook nail deformity [17]. In this case, exposed bone trimming was deemed unnecessary and not performed. As a result, there was no nail deformity. With conservative treatment, the soft-tissue thickness of the fingertip has been reported to regenerate up to 85% in the palmar direction and 93% in the distal direction [19]. The thickness of the regenerated soft tissue of the fingertip in this case was consistent with previous studies. Interestingly, as the granulation tissue gradually grew, the fingertip regenerated into a natural finger shape 4 weeks after the injury. Moreover, the nail bed regenerated almost normally, showing excellent aesthetic results. Although surgical repair has been reported to be essential in any nail bed injury [20], this case indicated that the nail bed can be regenerated by conservative treatment.

A common challenge with sensation which is associated with conservative treatment is cold intolerance [5,13,16]; however, it gradually improves and resolves by 1 year [13]. Cold intolerance is also commonly reported after operative treatment, especially in revision amputation [5,16]. However, cold intolerance is assumed to be due to vascular insufficiency and peripheral nerve injury at the time of the fingertip injury, regardless of the treatment method [21]. The incidence of changes in sensitivity are low but more common in proximal injuries, which can contribute to dissatisfaction with the outcome of treatment in patients receiving conservative treatment [1,5,19]. In the present case, cold intolerance and numbness adversely affected the patient's activities of daily living. However, both issues improved and resolved over time. It is important to explain to the patients in advance before starting conservative treatment that although sensory abnormalities can occur and continue for a while, they also frequently improve over time.

This approach will lead to an improvement in the acceptance of conservative treatment by patients.

Each treatment for fingertip amputation injuries has its advantages and disadvantages. While revision amputation provides faster healing, it does not restore the original finger length and is associated with frequent occurrences of cold intolerance [5,16]. Replantation can help restore the original finger; however, the amputation mechanism must be sharp, the amputated digit must be properly retrieved, and immediate replantation must be performed. Due to these factors, indications for replantation are limited [5,17]. Replantation also requires long-term rehabilitation and risks the development of persistent finger stiffness [6]. Reconstruction using local flaps has the advantage of being able to handle various types of fingertip amputations and preserve the finger length; however, it also requires a prolonged immobilization and risks flap failure [5,7,22,23]. Although the healing time for conservative management of fingertip amputations may be longer, conservative management has several advantages over operative management: good aesthetic and functional results with almost normal sensitivity, no need for hospitalization and immobilization, and no postoperative complications. Thus, conservative management may be more effective than operative management overall [13,16]. When selecting the treatment strategy for fingertip amputation injury, it is recommended that doctors fully explain to the patient the advantages and disadvantages of both operative management and conservative management and consider the patient's preference.

Conclusions

Conservative management with moist wound dressings for fingertip amputation injury is simple, and the overall treatment outcomes are satisfactory for patients. Therefore, conservative management may be a preferable strategy for fingertip amputation injuries, depending on the nature and degree of the injury. However, it should be noted that because conservative management requires a longer healing time, the nature of the patient's work and the expected recovery time should be taken into account when considering management strategies.

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Conflict of Interest

None.

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