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Case Report

Ulnar Artery Perforator Adiposal Flap for Paraffinoma Treatment in a Patient With Leprosy: A Case Report

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Leprosy is a chronic infection in humans that mainly affects the peripheral nerves and skin. Paraffin filling has been previously used for muscle atrophy treatment. However, the formation of paraffin granulomas (paraffinomias) can occur over the long term. We encountered a patient with leprosy who had hypothenar muscle atrophy caused by ulnar neuropathy. The patient was treated with paraffin injection at the hypothenar site for cosmetic appearance 60 years ago. Consequently, the paraffin formed a paraffinoma and a recurrent infected skin ulcer. Thus, paraffinoma removal and transfer of ulnar artery perforator adiposal flap (140 × 20 mm) were performed. The ulnar artery perforator adiposal flap was used for infection control and filling the dead space after paraffin removal. The skin healed without complications. Ultrasound confirmed residual adipose tissue and blood flow at the last follow-up.

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Leprosy is a chronic infection in humans that primarily affects the peripheral nerves and skin. Peripheral neuropathy causes hand deformities because of muscle atrophy. Paraffin filling has previously been used for muscle atrophy and plasticity. In addition, paraffin injection is effective for esthetic volume supplementation. However, paraffin granulomas (paraffinomias) can develop over the long term.¹ This report describes a case in which a patient with leprosy had hypothenar muscle atrophy caused by ulnar neuropathy, and paraffin filling had been performed to improve cosmetic appearance. The paraffin formed a recurrent ulcer on the skin and subsequently caused an infection. Thus, an ulnar artery perforator (UAP) adiposal flap was used for the infection and filling of the dead space after paraffin removal.

Case Report

A 73-year-old man was diagnosed with leprosy 60 years ago. The patient had intrinsic muscle atrophy caused by ulnar

neuropathy at the time of diagnosis and was treated with paraffin injection at the hypothenar site for esthetic volume supplementation. Moreover, the patient had an ulcer on the skin that was repeatedly exacerbated and remitted at the same site for 5 years. Two ulcers (diameter, 10 mm) were formed.

The patient noted swelling and heat sensation at the same site after taking a bath in a hot spring 2 months before the consultation. Consequently, the patient was referred to the department of the current study.

The patient's left hand showed claw hand deformity due to ulnar neuropathy. An ulcer formed at the hypothenar site with purulent drainage (Fig. 1). Computed tomography showed the formation of granulomatous soft-tissue masses around the high-density lesion of foreign bodies, and magnetic resonance imaging showed multiple tumor-like lesions with heterogeneous low-intensity regions (Fig. 2). Based on his course, the patient was diagnosed with a skin disorder and infection caused by paraffinoma. Surgical paraffinoma excision was planned, and the UAP adiposal flap was used to fill the dead space and for infection control.

First, the flap using the UAP at the proximal of the wrist crease was planned. Moreover, the UAP was confirmed using preoperative ultrasound (Venue40, GE Japan) proximal to the wrist crease. A zig-zag skin incision was made in the patient's palm, and the paraffinoma was resected.

The paraffinoma was 50 × 15 mm and showed strong adhesion to the surrounding skin. Dead space was formed after paraffinoma

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Figure 1. An ulcer formed at the hypothenar site where pus was observed.

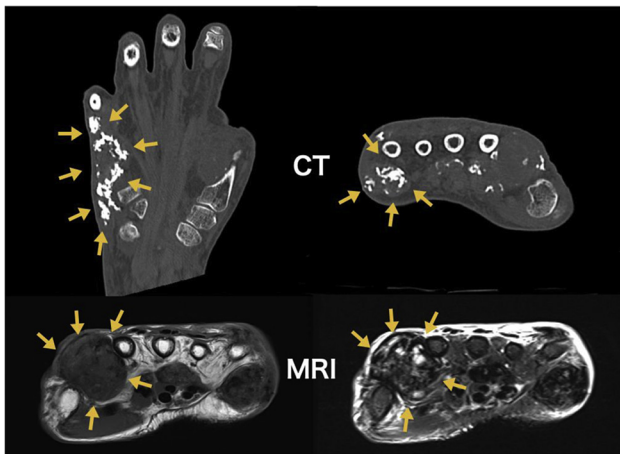


Figure 2. Preoperative computed tomography and magnetic resonance image showing the paraffinoma in the hypothenar region.

removal, and a thin skin layer was in contact with the paraffinoma. The incision was proximally extended, and the UAP adiposal flap (140 × 20 mm) was elevated from the forearm. The UAP adiposal flap was raised as the adipofascial flap. The incision of the radial edge of the flap was made along the ulnar side of the palmaris longus, and that of the ulnar edge of the flap was made along the ulnar side of the ulnar artery.

After raising the UAP-A flap, the air tourniquet was released to confirm that the flap had sufficient blood circulation. We confirmed that the ulnar artery was not macroscopically damaged.

The adiposal flap was inverted and folded to fill the dead space (Fig. 3). The ulcer was excised in a spindle shape from the surrounding skin, and the incision was primarily closed. No drains were placed under the flap. The site where the folded adiposal flap was inverted was sutured with the V-Y technique to avoid skin tightness (Fig. 4). The skin healed without complications after surgery.

Streptococcus anginosus was detected in the culture after the operation. Therefore, cefotaxime sodium was administered for 18 days because *S. anginosus* is susceptible to it.

Consequently, no signs of recurrent infection were noted, and the skin color was good 1 year after surgery (Fig. 5). Additionally, it was possible to confirm the residual adipose tissue and blood flow using ultrasound at the site where the adiposal flap was filled (Fig. 6). The patient was satisfied with the results of the surgery.

Discussion

Leprosy is a chronic inflammatory disease caused by the acid-fast bacterium *Mycobacterium leprae*. In humans, leprosy mainly affects the peripheral nerves and skin but may also affect other sites (eg, eyes, mucous membranes, bones, and testes) and produces a spectrum of clinical phenotypes.²

Currently, the infection can be treated using multidrug therapy. However, without treatment, it causes physical deformation, especially hand deformities. Disorders are likely to occur in the nerves under the skin surface because the optimum growth temperature of *M. leprae* is approximately 31 °C. The great auricular, ulnar, and peroneal nerves are easily affected. Moreover, symptoms appear as multiple mononeuropathies.³

Atrophy of the hypothenar and dorsal interosseous muscles, claw hand deformity, and functional disorders are caused when the ulnar nerve is damaged. Our patient had muscle atrophy due to ulnar neuropathy and was previously treated with paraffin injection at the hypothenar site for cosmetic appearance.

Reichenbach discovered paraffin in the 1830s.⁴ Liquid paraffin is injected into body parts for esthetic volume supplementation. One of the complications following paraffin injection is the formation of colonic granulomas, called paraffinomas, as a foreign body reaction in the surrounding tissues over the long term. It is clinically notable because it can infiltrate the surrounding structures and initiate many clinical symptoms (eg, pain, palpable mass, and skin ulceration), which can cause skin defects, perforation, or fistula formation leading to suppuration, lymphadenopathy, and, although rare, malignant tumors. Furthermore, spinal cord paralysis due to paraffinoma after pleural plompage for tuberculosis and paraffinoma occurring on the face after an esthetic paraffin injection have been reported.^{5,6}

In the present case, paraffin filling had been performed at the hypothenar site that was atrophied because of ulnar nerve neuropathy, leading to granuloma formation, recurrent ulcers, and infections due to skin irritation. The patient did not want functional reconstruction for ulnar nerve neuropathy, and removing the paraffinoma and filling the dead space with a perforator adiposal flap for infection control and conditioning were planned.

The perforator adiposal flap is a pedicled flap that does not require the neurovascular bundles to be dissected, and surgical procedures can be performed safely and relatively easily compared with free flaps. In addition, it can be used as a cushion and has the advantage of being used even if it is folded back, rotated, or turned over.⁷ Moreover, the perforator adiposal flap provided sufficient blood flow to the transfer site.⁸ Thus, performing a split-thickness skin graft after covering the defect with a perforator adiposal flap is possible.

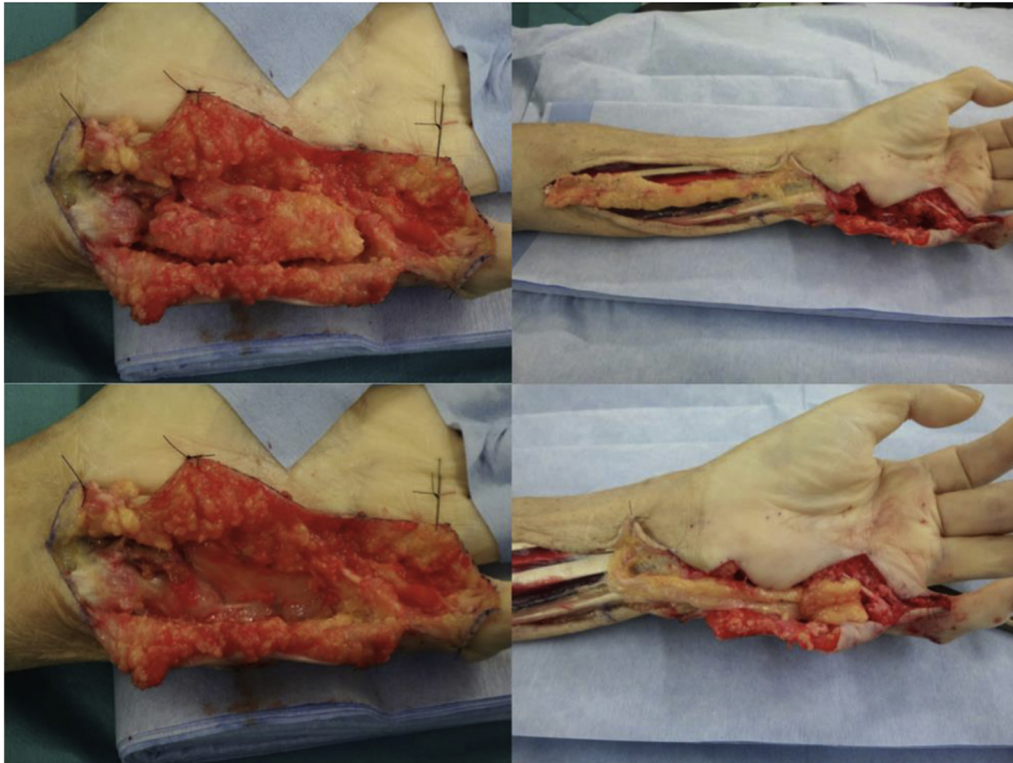


Figure 3. The paraffinoma (arrow) was removed, and an elevated UAP adiposal flap was transferred to the dead space after paraffinoma removal.

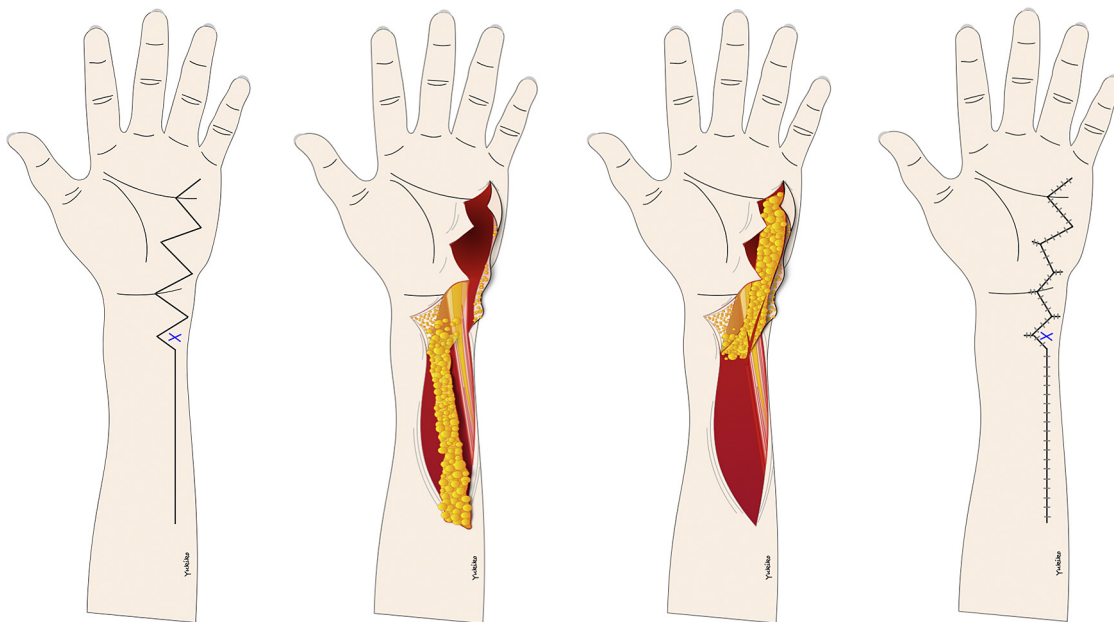


Figure 4. Zig-zag skin incision, transfer of the UAP adiposal flap, and V-Y skin closure (X marks the UAP location)

Other options that were considered are the radial artery perforator (RAP) or dorsal metacarpal artery perforator adiposal flaps. However, the RAP flap would cross over the flexor tendons and the median nerve, and the dorsal metacarpal artery perforator adiposal flap did not provide sufficient volume. For these reasons, we selected the UAP adiposal flap for this defect.

Digital artery adiposal flaps have been used for osteomyelitis of the fingers. A penetrating branch adiposal flap was previously inserted into the dead space after skin grafting for treatment. Digital artery adiposal flap is a treatment option for chronic osteomyelitis in this paper.⁹ The UAP adiposal flap was similarly considered effective for infection control.



Figure 5. There were no signs of recurrent infection at 1-year follow-up, and the skin color was good.

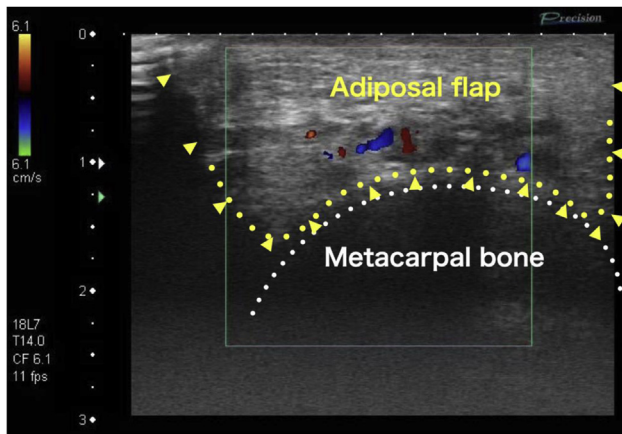


Figure 6. Adiposal tissue over the metacarpal bone and blood flow were observed.

There are fewer reports on UAP than on RAP because UAP is suspected of having more variation than RAP. However, UAP variations can be evaluated with color Doppler ultrasound preoperatively. The preoperative ultrasound was used in this case to seek for the perforator.^{8,10}

In the treatment of the present patient, filling the dead space with tissue with sufficient blood flow was necessary for infection control and conditioning. The UAP adiposal flap was considered as it had reliable blood flow and enough tissue volume to fill the defect. Furthermore, it could be used without sacrificing the neurovascular bundle, and the perforators could be evaluated preoperatively. The disadvantages of using a UAP adiposal flap are that

preoperative ultrasound is required and that the fat may not be sufficient.

Conclusion

In this case, paraffinoma excision resulted in a dead space with poor blood circulation. The use of a UAP adiposal flap was considered to improve blood circulation in the dissection site, avoid skin disorders, and prevent infection recurrence. In addition, the use of a folder perforator adiposal flap filled the dead space after paraffinoma resection and reduced the depression on the side of the hypothenar region.

References

1. David BF. Paraffinoma and wax cancer. *JAMA*. 1920;75:1709–1711.
2. White C, Franco-Paredes C. Leprosy in the 21st century. *Clin Microbiol Rev*. 2015;28:80–94.
3. Scollard DM, Truman RW, Ebenezer GJ. Mechanisms of nerve injury in leprosy. *Clin Dermatol*. 2015;33:46–54.
4. Goldwyn RM. The paraffin story. *Plast Reconstr Surg*. 1980;65:517–524.
5. Arai W, Ohkawa M, Takahashi Y, et al. Paraffinoma with spinal paralysis 40 years after pleural plumbage for tuberculosis. *Kyobu Geka*. 2019;72:344–347.
6. Heo JW, Kim BK. Paraffinoma induced bilateral preauricular cheek skin defects. *Arch Craniofac Surg*. 2018;19:227–230.
7. Koshima I, Moriguchi T, Etoh H, Tsuda K, Tanaka H. The radial artery perforator-based adipofascial flap for dorsal hand coverage. *Ann Plast Surg*. 1995;35:474–479.
8. Ishiko M, Yano K, Onode E, Takamatsu K. Identification of ulnar artery perforators using color Doppler ultrasonography. *J Reconstr Microsurg*. 2020;36:667–672.
9. Okada M, Kamano M, Uemura T, Ikeda M, Nakamura H. Pedicled adipose tissue for treatment of chronic digital osteomyelitis. *J Hand Surg Am*. 2015;40:677–684.
10. Liu DX, Wang H, Li XD, Du SX. Three kinds of forearm flaps for hand skin defects: experience of 65 cases. *Arch Orthop Trauma Surg*. 2011;131:675–680.