EARLY PARTIAL AMPUTATION, FLAP COVERAGE AND TIMELY THERAPY ARE THE CORNERSTONES OF GOOD OUTCOME IN CHRONIC DIABETIC HAND INFECTION: TWO SIMILAR CASES WITH DIFFERENT OUTCOME

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Abstract:

Diabetic patients are more susceptible to chronic hand infection. Due to mixed bacterial infection, poor wound healing capacity, associated neuropathy and angiopathy, they suffer mostly from deep hand infection, which necessitates multiple surgeries and reconstruction of the defect. Early partial amputation of the digit followed by coverage of the soft tissue defect by flap and timely physiotherapy can provide satisfactory functional outcome in chronic severe hand infection cases. We report and compare two similar cases of chronic severe diabetic hand infection where differences in timing of partial amputation, coverage of the defect by groin flap and adequate post-operative rehabilitation made a gross difference in the final functional outcome.

Keywords: Diabetic Hand Infection, Groin Flap, Hand Therapy, Partial Amputation

Introduction

Patients with diabetes mellitus (DM) are inherently more susceptible to hand infection, which could be superficial or deep (1, 2). Most of the superficial hand infections are often treated conservatively with antibiotics whereas deep infection necessitates surgical incision and drainage (I&D) along with antibiotic coverage (2). Diabetic patients usually develop a severe form of hand infection due to mixed bacterial infection, poor wound healing capacity and associated neuropathy and angiopathy (1, 2). They often encounter deep infections, for example tendon sheath infections, osteomyelitis, and septic arthritis, necrotizing fasciitis, which require multiple surgeries to eradicate the infection and to reconstruct the defect (3). These infections frequently result in amputation of part of the digit or even hand (4). Early partial amputation of the digit with severely infected tendon sheath, chronic osteomyelitis or necrosis, often prevent more unwanted complications.

The hand defect, created after debridement or even amputation, requires timely coverage. Small defects could be covered by split thickness skin grafts or local flaps. Large hand defects require free or distant flap coverage. Blood supply of the already injured hand could be further jeopardized during reconstruction by free flap as there is chance of vascular injury during end-to-side anastomosis. Moreover, free flaps demand high surgical expertise which is not available in every setting and require a longer operative time (5). Furthermore, it is not suitable for the patients with atherosclerotic vessels which are a common finding in diabetics. Three axial pattern distant flaps, based on known vascular patterns and commonly used to cover hand defects, are the hypogastric flap which is based on the superficial epigastric artery; the delto-pectoral flap which is mainly based on the second perforating branch of the internal mammary artery, and the groin flap which is based on the superficial circumflex iliac artery. The groin flap is more popular among surgeons due to reliability and ease to perform.

Proper postoperative rehabilitation plays a vital role in achieving good functional outcome in all hand surgery cases. Post-operative hand therapy is provided in three distinct phases; therapy for the immediate postoperative

period, for the period of mobilization and the specific rehabilitation. Regular wound care, management of pain and swelling by immobilization, proper positioning of the hand, and mobilization of elbow and shoulder- are important parts of early postoperative therapy. After healing of the wound and subsidence of swelling, the second phase, period of mobilization is practiced. It includes active mobilization of the injured hand and fingers with the help of resting and dynamic splints. Fingers gain their actual neurological function in the final stage by the process of increasing strength.

All these three interventions, early partial amputation, followed by flap coverage of the soft tissue defect and timely after care can provide a satisfactory functional outcome in severe form of chronic hand infection cases.

We report and compare two similar cases of chronic severe diabetic hand infection where differences in timing of partial amputation, coverage of the defect by groin flap and availability of adequate post-operative rehabilitation programme have made a gross difference in the final functional outcome.

Case report

Case 1

A 40-year-old male with uncontrolled type 2 DM, was referred to our centre with chronic infection of the dorsal and palmar surface of his right hand following a foreign body prick while gardening (Figure 1) one month back. Diabetes was controlled and wound debridement was done (Figure 2). Culture and sensitivity report showed mixed infection with gram positive and gram negative organisms, which were sensitive to piperacillin and tazobactam. After control of the infection, he was advised for ray amputation of the index finger. But he did not give consent for amputation. So wound coverage was performed with groin flap for the dorsum of the hand to cover the extensor tendons and split thickness skin graft (STSG) to cover the wound of the palmar area (Figure 3). After division of the flap, he developed depression and was referred for psychiatric consultation. Due to delay in wound healing, he later agreed for the ray amputation of the index finger. In the meantime, his psychiatric problem deteriorated. After ray amputation of index finger, he even attempted suicide. So, for better management of his mental illness, he was referred to a psychiatric hospital. And unfortunately, he missed the proper postoperative physiotherapy sessions. His infection was controlled but he was ended up with a stiff hand. He was advised for tenolysis and mobilization under anaesthesia, but he refused. After 6 months, at follow up (FU) clinic, functional status of his hand was evaluated according to the online DASH score and it was calculated as 68.2%. He was quite unhappy with the outcome as his hand was cosmetically satisfactory but not functionally (Figure 4).

Figure 1: Clinical picture of the patient's hand at presentation

Figure 2: Clinical picture of the hand after debridement

Figure 3: Clinical picture of the hand before and after groin flap

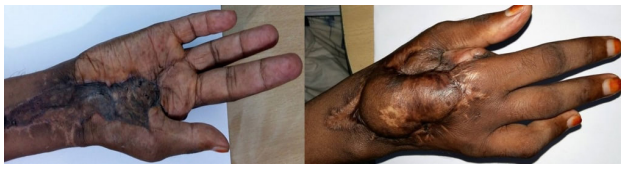

Figure 4: Functional outcome at 6 months

Case 2

A 50-year-old diabetic female was referred to our centre with chronic infection of the dorsal and palmar aspect of the right hand, dorsum of the forearm, along with partial necrosis of the tip of the middle finger following a fish bone prick (Figure 5). Her diabetes status was controlled. Wound debridement was done along with ray amputation of the middle finger. To cover the extensor tendons of the dorsum of the hand, groin flap was applied and forearm wound was covered with STSG (Figure 6). After the flap division she was referred for the physiotherapy. After 6 months, at the FU clinic, online DASH score was calculated as 13.6% (Figure 7). She was advised for the defatting of the flap. But as she was quite happy with the functional outcome, she refused further surgery.

Figure 5: Clinical picture of the hand at presentation

Figure 6: Before and after flap coverage

Figure 7: Functional outcome at 6 months after flap division

Discussion

Diabetic hand infection is a potentially devastating condition which requires prompt diagnosis and early aggressive management. If ignored, severe stiffness, contracture, partial or complete amputation of the digit or the hand are the dreadful consequences. In some severe cases, patient may succumb to death as a result of septicemia (3).

In their study, Ong and Levin and Gunther and Gunther found that diabetic patients with hand infections need repeated surgeries and have a higher rate of amputation (48%) in comparison to non-diabetics (5%) (1, 4). In both of our cases, multiple surgeries were performed to control the infection.

In hand infection, extensive debridement, regular dressing, secondary reconstruction of soft tissue defect by skin graft or flap and timely hand therapy are cornerstones of successful functional outcome (3). Ong and Levin showed that judicious early partial amputation of the part of the necrosed digit proves beneficial than repeated debridement. It removes the nidus of infection for example infected tendon, bones etc. which are otherwise difficult to treat by repeated debridement alone (4). Early partial amputation also saves resources and health facilities involved in repeated surgeries. In one of our cases, we did early partial amputation of the necrosed parts of the digit and obtained satisfactory outcome. Another patient refused early amputation and the outcome was unsatisfactory.

Groin flap is an easy and safe to raise, hence a popular technique to cover large soft tissue defect (maximum defect size of 10 × 25 cm) of hand and forearm. It has a reliable blood supply and donor site morbidity is less as donor site can be concealed. It is contraindicated in poly trauma patients presenting with concomitant life-threatening injuries, scars and vascular injury at the donor site, extremely poor vascularity at the recipient site (e.g., after radiation), noncompliant patients. In our cases, pedicled groin flap was favoured over the free flap as it is simple, safe and reliable procedure and end-to-side vascular anastomosis is not always reliable in diabetic patients at the level of wrist due to angiopathy at microvascular level.

Role of timely postoperative hand therapy is crucial in overall management of hand infections to achieve good functional outcome. In one of our cases, functional outcome of hand was satisfactory as the patient followed the proper physiotherapy protocol. In another case, postoperative rehabilitation programme was not followed strictly due to patient's psychiatric issue. Eventually his hand became stiff, though cosmetically acceptable but functionally not. Timely aftercare plays a key role for good functional recovery in hand infection cases.

Conclusion

Chronic hand infection with involvement of the tendon or bone or having necrosis of the tip of the digit is not uncommon among diabetic patients. We recommend judicious early partial amputation of the digit followed by appropriate soft tissue coverage by flap and proper timely therapy in cases of chronic diabetic hand infection to achieve the better functional outcome.

Competing interests

The authors declare that there is no conflict of interest.

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References

1. Gunther SF, Gunther SB. Diabetic hand infections. Hand Clin. 1998;14(4):647–56.
2. Osterman M, Draeger R, Stern P. Acute hand infections. J Hand Surg. 2014;39(8):1628–35.
3. Moni ASB, Hoque M, Mollah RA, Ivy RS, Mujib I. Diabetic hand infection: An emerging challenge. J Hand Surg Asian-Pac Vol. 2019;24(3):317–22.
4. Ong YS, Levin LS. Hand infections. Plast Reconstr Surg. 2009;124(4):225–33.
5. Goertz O, Kapalschinski N, Daigeler A, Hirsch T, Homann HH, Steinstraesser L, et al. The effectiveness of pedicled groin flaps in the treatment of hand defects: Results of 49 patients. J Hand Surg. 2012;37(10):2088–94.