Case series

Case series of inguinal pedicle-flap to cover hand ulcers: Our experience from northern Tanzania

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ABSTRACT

Introduction and importance: The superficial circumflex iliac artery perforator flap is a widely used and acceptable option of free tissue transfer for small and large defects due to its ease of dissection and adjustable pedicle length.

Case presentation: Herein we present our experience with two similar cases of hand ulcers with differing aetiologies that were managed successfully at our tertiary centre by general surgeons to cover the defects in order to salvage the hand.

Clinical discussion: The pedicle groin flap was first described in 1972 and still indicated and used widely in hand resurfacing. It has shown to be reliable with minimal peri-operative complications.

Conclusion: Groin flap donor skin provides adequate skin for coverage with versatile skin, but come at a cost of specialize expertise, resources and risks.

1. Background

Inguinal pedicle flaps are currently accepted and used globally to cover defects of the hand and forearm with exposed bone or tendons [1]. Depending on the surgeon and the experience, patient condition and wound condition, free-flap or pedicle-flap can be used [1].

Herein we report of two cases of hand ulcers due to diabetes mellitus and extravasation of chemotherapy agent respectively and use of inguinal pedicle-flap to cover the defects successfully.

This work has been reported in line with the PROCESS 2020 criteria [2].

2. Case presentation

2.1. Case 1

A 69-years-old male, a known patient with multiple myeloma confirmed by biopsy who received 6 cycles of chemotherapy (cyclophosphamide, vincristine and prednisone) and was not on any maintenance. He presented to us with an ulcer on his right (dominant) hand on the dorsal aspect for one month after receiving his last course of chemotherapy on that site. Immediately he reported of swelling and pain of his hand to the level of mid forearm limiting movements of his finger and wrist. This was associated with low-grade fevers. He denied loss of sensation of the affected hand. He is also a known diabetic patient for more than 15 years on regular oral Metformin and Glibenclamide.

On initial examination he was fully alert, well-nourished man, not pale with no lower limb edema. He was in some pain. His vitals were within normal range with random blood sugar of 12.2 mmol/l.

On local examination his right hand was swollen to the level of mid forearm, tender to touch, warm, non-pitting. There was an ulcer on the dorsum of his hand measuring 6 × 5 cm that was oozing some thick serous fluid (non-foul smelling) (Fig. 1). Neurovascular status of the hand was intact. There were no axillary lymph nodes appreciated. Our working diagnosis was right hand diabetic ulcer with cellulitis and multiple myeloma on treatment.

The FBP upon admission revealed hemoglobin of 11.7 g/dl with normal leucocyte and platelet counts with urea of 2.87 mmol/l, serum creatinine of 52 μmol/l and cholesterol of 4.66 mmol/l. ECG and plain X-ray of the right hand was done and showed no abnormalities.

Patient was kept on oral multimodal analgesia, intravenous Ceftriaxone and Metronidazole as well as short acting insulin (Actrapid). One week later the patient was taken for surgical debridement whereby pus and dead tissue (eschar) where removed from the injured site, the

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Fig. 1. Ulcer on the dorsum of the hand.
Fig. 2. Post debridement, exposed extensor tendons.
Fig. 3. Inguinal pedicle flap covering the ulcer.
Fig. 4. Covered and healed defect.
tendons hence were exposed and the hand was supported using a volar slab. Within a period of one month the patient underwent another surgical debridement (Fig. 2). In the surgical wards, his hand was dressed daily and blood glucose levels were closely monitored.

The ulcer was clean enough hence was scheduled for an inguinal pedicle flap after thorough counseling. Right sided inguinal pedicle flap surgery was done under general anesthesia by the general surgeons (Fig. 3). Seven days post-operative the patient developed surgical site infection, culture and sensitivity revealed gram-negative bacilli (E. coli) hence was kept on sensitive antibiotics. The patient’s blood glucose was ranging between 4 mmol/l to 9 mmol/l.

Patient was dressed daily and five weeks later, flap was released off its pedicle and the hand was freed. Glucose was monitored and controlled with his regular oral hypoglycemics. Twenty days post flap release, the patient faired well, physiotherapy was on-going and the wounds were healing, hence was discharged and followed up at the surgical outpatient clinic.

He was reviewed two months later whereby he had no complaints and the hand wound had healed (Fig. 4). He was then discharged from the surgical unit to continue with his oncology management for the multiple myeloma.

2.2. Case 2

A 59-years-old female patient presented to us with an ulcer on her left hand that started two months prior to admission after she sustained a fall and landed on a nail with her out stretched hand. She used over-the-counter antibiotics and the wound did not heal hence presented with an ulcer to our tertiary centre. She is a known diabetic patient for seven years on oral Metformin and Glibenclamide. She reported some swelling of her left hand and pain that was exaggerated on moving her digits. This was associated with low-grade chills. On initial examination, she was nutritionally well and alert, not pale with stable vitals and axillary temperature of 36.5 °C and random blood glucose of 6.6 mmol/l.

On local examination her left hand was edematous with an ulcer on the palmar aspect measuring 4 cm by 2 cm with necrotic base with foul smelling minimal pus discharge. The ulcer was not bleeding but tender at the base. The skin surrounding the ulcer was dry and scaly. The range of motion of the digits was reduced and the patient was unable to fully extend at the wrist joint (Fig. 5).

Lab Investigations on admission revealed hemoglobin of 10.8 g/dl with a hematocrit of 34.7 % with normal differentials and platelet count. Electrolytes, BUN and serum creatinine were within normal range. X-ray of the left hand ruled out boney lesions and Doppler ultrasound was unremarkable. She underwent three serial surgical debridements whereby the necrotic tissues were excised and ulcer margins were refreshed, tendons were exposed and the hand was immobilized using a volar slab. Continuous dressing was done in the wards. Her blood sugar was controlled with diabetic diet and insulin and was also on intravenous antibiotics.

She was then planned for inguinal pedicle flap surgery to cover the defect on her hand after thorough counseling by the general surgeons (Fig. 6). Three-days post flap surgery, she developed surgical site infection and was kept on intravenous Ciprofloxacin based on pus culture results and daily wound dressing. She faired well in the wards and after three weeks flap was released. Her blood sugars were well

Fig. 5. Infected ulcer on the palmer aspect.
maintained with insulin.

Post flap release surgery, her hand developed recurrent infections whereby three serial surgical debridement were done in theatre whereby desiccated tendons were excised and was kept on oral co-trimoxazole after culture and sensitivity results for three weeks until infection subsided.

She was then discharged on oral Metformin, Co-amoxiclav and Mupirocin gel for her hand. She was followed up at the outpatient clinic for two months where her flap gradually healed covering the defect completely (Fig. 7). She was then discharged and was then seen at the orthopaedic clinics for her lower back pain.

3. Discussion

Tissue loss of the hands is common and the etiologies can be many, including burns, burn scar release, trauma, tumor excision or infections [3]. In our cases, infection was one cause in a poorly controlled diabetic and other cause was iatrogenic whereby there was extravasation of chemotherapy agent in a patient with multiple myeloma who was under treatment. These conditions can lead to functional impairment especially when tendons, nerves of vessels are exposed and damaged [3]. Microsurgery has taken an important role in the reconstruction and salvage surgery of such conditions. On the contrary, in many low- and middle-income countries microsurgery is uncommonly practiced due to the lack of training and experience hence pedicle flap can be of only choice [3].

The pedicle groin flap was first described by McGregor and Jackson in 1972. It is one procedure still indicated and used widely in hand resurfacing, and has shown to be reliable with minimal peri-operative complications [3]. The advantage of groin flaps is that they are easily harvested (can be done under local anesthesia in critically ill patients), and in obese patients, the groin is much thinner donor site than the flaps of other areas [4]. On the other side, free-flaps require high surgical standards and longer primary operative time which was not suitable for
both the index cases due to limitation of resources and personnel [4].

From our experience both patients developed surgical site infection hence delayed wound healing. This can be attributed to their age and underlying diabetes mellitus, with similar findings by Goertz et al. [4]. Infection and flap necrosis were also found to be a common complication in a study by Gupta et al. and was managed by regular dressing and antibiotics as similar technique used in the index cases [5]. Slight modification variation can be also done to the groin flap to cover the dorsal and palmer aspects together by dividing the flap into bilobes hence covering both surfaces of the hand avoiding usage of combined flaps and multiple surgeries showing versatility of the groin pedicle flap [6]. A similar technique was used by Choi et al. to cover both surfaces of the hand by combination groin flap and pedicled superficial inferior Epigastric artery flap designed in a ‘double-leaf’ (Y) manner [7]. The authors mention in their article that older patients are at risk of shoulder joint stiffness from the immobility but in the presented cases this was not an issue as they received adequate physiotherapy post operatively to maintain maximum arm function. They also continue to state that groin flaps have minimal donor site morbidity as they are primarily closed and including short operative time as experienced in our cases [7].

Our experience showed groin flap is an excellent option available in a resource-limited setting and when there is a doubt of the donor site vascularity for free flap. Despite the long hospital stay, multiple surgeries and uncomfortable arm position, results obtained were assuring and satisfactory. Perhaps in the cases of bone infection such techniques can be questionable in limb salvage attempt [8].

4. Conclusion

The defects created on the hand by skin-loss require early coverage, in many cases by distant flap sufficiently large to provide total coverage to allow early movements of joints of the hand to maintain adequate functionality. Considering the number of secondary surgeries, long hospital stay and immobilization of the arm, groin flaps should only be
used when free flaps are either not indicated or feasible.

**Consent**

Written informed consent was obtained from the patients' for publication for this case series; additionally, accompanying images have been censored to ensure that the patients cannot be identified. A copy of the consent is available on record.

**Ethical approval**

Ethical approval obtained from the Department of General surgery, Kilimanjaro Christian Medical Centre.

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**Authors’ contributions**

Jay Lodhia – surgeon, conceptualization and writing of the script
Mubashir Jusabani – surgeon and writing of the script
Ellyagape Urassa – reviewed medical records
Prisca Lyimo – reviewed medical records
David Msuya – supervising surgeon and review of medical records

**Guarantor**

Jay Lodhia – Corresponding author.

**Research registration**

N/A.

**Declaration of competing interest**

The authors declare they have no competing interests.

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