

Case report

Medial plantar fasciocutaneous flap as a suitable option in repairing heel ulcer defects even in the elderly: A case report and literature review

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Abstract

Heel defects can occur for a variety of reasons, such as trauma and tumor resection, and a skin flap should be used to repair the tissue defect, which may include expose of Achilles tendon or bone. It does not seem appropriate to use a graft in this case, because it causes chronic wounds due to contact with shoes. In such cases, the gastrocnemius flap or sural flap and the plantar medial flap can be used. The advantage of the medial flap is that sensible and the volume of the flap is small. Outcome of medial plantar flap in elderly people are less studied. At this article, the results of using and repairing the heel defect by flap in an elderly woman is explained. According to the results, the use of this type of flap is recommended as an effective method in heel reconstruction, especially after melanoma excision, even in the elderly age.

Keywords: Acral melanoma heel, Fasciocutaneous medial plantar flap, Ulcer, Elderly

Introduction

One of the most important organs in the body is the lower limb, which has various functions such as support, balance, movement and the ability to receive sensation. Among these, the heel plays an important role in the above functions, especially carrying body weight while walking, so any injury to the heel will disrupt the functions of this organ and disable the patient [1].

Since the role of the heel in walking is undeniable and we know that the heel in standing position bears 80% of the body weight, repairing of its defects is very important [2].

An important cause of heel defect is the presence of melanoma in this area. Clinical evaluation and management of skin lesions is always challenging and surgeons have an essential role in the treatment of these lesions. In addition, the prevalence of malignant skin lesions has increased dramatically from the past. Approximately 1.2 million cases of non-melanoma skin cancer diagnosed each year and nearly 80,000 cases diagnosed with melanoma annually. Therefore, it is essential for surgeons to be aware of the recognition and management of these lesions. Cure tumor surgery requires complete resection of the tumor and repair by an appropriate covering of the

affected area [3]. In 2017, a study reported 87,110 cases of malignant melanoma, resulting in 9730 deaths [4].

Melanoma originates primarily from melanocytes at the epidermis-dermis junction, which undergoes dysplastic changes. The most important risk factor for melanoma is exposure to UV. Other factors include: previous family history, sunburn in childhood and being close to the equator. Dysplastic nevus, immunodeficiency and fair skin, higher socioeconomic status, and xeroderma pigmentosum are other causes of melanoma. The prevalence of melanoma is higher in men and the average age of patients is 50 years [5].

The most common subgroup includes: A: Melanoma with superficial spread. This type forms 50 to 70% of melanoma and can be seen everywhere except the hands and feet. B; nodular melanoma, which grows vertically and forms 15 to 30%. C: Lentigo melanoma is seen in the elderly and mostly in the head and neck and D; Acral melanoma is seen in the palmar, plantar and sublingual surfaces [3].

It is estimated that the prevalence of acral melanoma is 1 to 7% in the white population [6] but its prevalence is reported up to 11.5% [7].

This disease has unique clinical and pathological features, including the anatomical location of the involvement (hands and foot). Other unique features

include insidious onset, rapid growth, rapid lymphatic involvement, and systemic metastasis with a poor prognosis [8] Most affected areas are the palms of the hands, the soles of the feet, the heels, the toes, the intercostal space, and other areas that are rarely exposed to the sun and show that UVA radiation has nothing to do with it [9].

The most common manifestation of melanoma is a lesion with asymmetric margins, discoloration, larger than 6 mm in diameter, and prominent margins. Other key features of melanoma are a pigmented and enlarged skin lesion, injured lesion with bleeding.

The disease is divided into stage 1 and 2: localized melanoma according to AJCC, stage 3: regional disease and stage 4: disease with distant metastasis. The most important diagnostic factors are tumor thickness, ulcer, and mitotic rate. The site of metastasis is strongly associated with the prognosis of stage 4 [4].

High-risk melanoma, especially in the lower extremities, usually requires CT, and patients with clinically palpable melanoma may need CT imaging, brain MRI or PET-CT, abdomen and pelvis, or the whole body. SLNB recommended for 1 to 4 mm melanoma if clinically not palpable [4].

In the surgical treatment of melanoma and lymph node tumors, excision of the lesion with a free margin is the basic of treatment, so that if the tumor thickness is less than 1 mm, a margin of 1 cm is needed, and in a tumor thickness of 1 to 2 mm, a free margin of 1 to 2 cm, and in a thickness of 2 to 4 mm, a margin of 2 cm and in a tumor thickness of more than 4 mm, a free margin of 3 cm is required [4]. Because of large defect at excision of the lesion in heel according to its stage, we need enough knowledge about multiple method to reconstruction.

The method of heel reconstruction varies depending on the extent of the lesion, the type of injury, the condition of the adjacent tissue, occupation, age, and general health of the patient. Melanoma reconstruction methods include: primary repair, skin graft, and local or regional flaps, or free flap [10].

Among the common reconstruction methods, especially in the case of heel melanoma, medial plantar flap or skin graft is recommended [11]. The medial plantar flap is designed in the area of weight intolerance of the sole and rises on the medial plantar artery, which is the distal branch of the posterior tibial artery. This flap is a sensory flap [12]. In this study, a

case of successful application of this flap in a patient with heel melanoma in old age is introduced.

Patient presentation

The patient was a 78-years old housewife who was referred to our surgical ward with a complaint of a sore, bulge, and discoloration at the heel of her right foot. But after that, she had occasional bleeding and increased in size, scaling, and discoloration. It was not painful to the touch, leading to pain in the wound area as the patient walked. She had no history of smoking, surgery but she had past history of coronary heart disease and stenting. Its diagnosis at biopsy suspected of malignancy and final reported was malignant acral melanoma with 3mm thickness (Clark 3). During the medical examination, the abdomen, pelvis, thorax and brain underwent CT scan, but no pathological signs were found. Imaging of an inguinal lymph node by sonography was mentioned, which underwent excision at operation time and was reported reactive node in pathology. The pulse of the dorsalis pedis and posterior tibialis arteries was normal.

In the surgical technique, the lower limb is placed in a supine position, while the hip joint is flexed and pulled out, the knee is flexed, and the leg is at maximum supination. The patient undergoes wide local excision surgery with a margin of 2 cm from the lateral, medial, upper and lower margin even deep margin and the margins were reported to be free-frozen. Based on the dimensions of the defect, the maximum length of which was 5 cm and the maximum width was 5 cm, a flap was designed at the plantar weight intolerance level. The origin of the plantar medial artery is determined in the proximal border of the hallucis abductor. The medial flap margin is removed, then the fascia is lifted with the flap when its vessels were saved and the flap is carefully rotated to prevent the pedicle from flexion. The skin defect site was covered with a skin graft. In repeated postoperative visits, the patient was able to place weight on the limb without any movement restrictions or sensory problems in the area (Figure 1).

Discussion

Reconstruction of the distal and proximal thirds of the foot is still a problem for surgeons. Unique anatomical features, including soft tissue defect and thin skin, lead to major problems in the treatment of soft tissue lesions at this site [13].



Figure 1. Pre operation (A); Operation excision of lesion (B); Reconstruction (C); One year post operation (D)

Various factors such as injuries caused by accidents, infections, burns, frostbite, tumor resection, melanoma, etc. are effective in causing soft tissue and heel bone defects. Heel defects that result from the removal of soft tissue after tumor surgery, including melanoma, have always been discussed.

In the diagnostic examination of melanoma the whole skin should be examined for associated lesions, inflammatory lesions and clinical metastasis. Suspicious clinical lesions should be subjected to excisional biopsy with a margin of 1 to 2 mm. However, if the lesion is large or the appearance of the excision is problematic, an incisional biopsy or puncture biopsy will be performed and FNA done for all suspected lymph node [4].

In this study, we evaluated the efficacy of a plantar medial flap in covering a heel defect in an elderly person. This patient refused to be amputated despite his advanced age. Fortunately, she had both dorsal pedis and a tibial posterior pulse, which due to possible complications in the course of operation there is no problem. So far, no comprehensive research has been done on the effectiveness of this flap in the elderly. In a study conducted by Jefferson et al. in Brazil among patients with heel trauma, twenty-two patients with a

mean age of 56 between 2001 and 2013 were studied and all were treated with plantar medial flap [14].

In a study conducted by Scaglioni et al. in Switzerland from 2003 to 2016. 28 patients with a mean age of 54 years with heel deformity due to trauma and pressure ulcers and tumors were examined and all were treated with plantar medial flap [15]. The important point is that in all these studies, young people who are usually injured due to trauma were examined compared to these studies, our patient was older.

The medial flap of the sole of the foot was originally described by Harrison and Morgan. The blood supply to this flap is based on the internal plantar artery and is actually a cutaneous flap that uses the skin of the sole of the foot. This flap is ideal for covering defects in the heel and other areas of the foot due to its structural similarity [2, 16].

Foot soft tissue defects are a major problem in reconstructive surgery. The plantar medial is an ideal flap for heel cover. Indication of this flap for covering is the heel area [17].

Among the techniques used to cover tissue defects in the heel, we can mention the use of pedicular flaps or free flaps. Pedicular flaps include the sural flap, the

saphenous flap, the medial plantar flap, the dorsal of the neurocutaneous flap, and the free flaps include the anterior-lateral femoral flap, the groin flap, and the lateral arm flap [18].

Reconstruction method in this study was the use of medial plantar flap in an elderly patient that the sensitivity and the small volume of this flap compared to other flaps are among its important advantages. Age is an important factor to create and the progression of atherosclerosis and the precise technique of performing surgery and preserving the flap vessels important [19].

Elderly people can develop heel ulcers for a variety of reasons, such as a pressure ulcer tumor diabetic foot trauma. In the elderly, due to comorbidities, there is usually no planning to repair the defects, and most people plan on initial amputation. Choosing an appropriate surgical plan is more important given the patient's age, sex, and occupation, as well as the size and location of the tissue loss.

Considering the successful results in old age, the use of this type of flap can be considered as an efficient method in heel reconstruction, especially after melanoma excision.

Authors Contribution

All authors contributed equally and approved the final version of the manuscript.

Ethical declarations

This study was performed in accordance with the declaration of Helsinki.

Consent for publication

Written informed consent was obtained from the patients for publication of this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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Conflict of Interests

The authors declare no competing interests.

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