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Case Report

The application of temporo-occipital fascial flap in the wound of medium scalp defect with bone exposure

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Abstract: We are aimed to observe the effect of applying the combined temporo-occipital fascial flap in the medium scalp defect with bone exposure. Three cases of moderate scalp defect with bone exposure were admitted by The 89th Hospital of PLA and China-Japan Friendship Hospital from October 2009 to March 2014, and the wounds were repaired by application of the temporo-occipital fascial flap with medium-thickness skin grafting. And then these 3 patients were followed up after the operation, and the wound repair was observed. These 3 cases of fascial flaps all survived well with good appearance and covered the wound completely. Fibrosarcoma of one case had a relapse 3 months after operation, and the other two cases were followed up from 6 months to 3 years. Meanwhile, the appearance and function were satisfactory. The communicating branches between superficial temporal artery and occipital artery are rich. Therefore we designed and utilized the long temporo-occipital fascial flap containing the ipsilateral occipital superficial fascia to repair the scalp defect with bone exposure, and the curative effect is satisfactory.

Keywords: Fascial flap, scalp defect, repair, wound

Introduction

Scalp defect with bone exposure caused by tumors, trauma and infection is not uncommon in clinics [1]. It is reported that there are a great many restorative procedures such as local skin flap grafting, skin soft tissue expansion technique [2, 3], greater omentum transplantation plus skin-grafting [4], skin tube [5] and various kinds of free skin flaps [6, 7], and so on. Each of them has their indications, advantages and disadvantages. But the clinical application of the temporo-occipital fascial flap has not been reported. From October 2009 to March 2014, we used the temporo-occipital fascial flap to restore the medium scalp defect with bone exposure of 3 cases, and they all recovered well. Now we report as follows.

Clinical data

General information

There were 3 cases in this group, and 2 cases were male, 1 case was female. The average age was 47 years old (37~65 years old). All of them have signed informed consent in accordance with the requirements of the Research Ethics Committee in The 89th Hospital of PLA and China-Japan Friendship Hospital. Among them, 1 case was basal cell carcinoma on top of the occiput, 1 case was tissue fibrosarcoma, and another one suffered from post-traumatic infection. The time from the scalp defect to operation is 0-8 days. The area of scalp defect was about 6 cm×5 cm~12 cm×11 cm, and they were accompanied by bone exposure or bone defect. And then the cutting area of temporo-occipital fascia flap was about 9 cm×7 cm~16 cm×12 cm.

Surgical methods

Wound management

Their hair was shaved before surgery. Tumors were removed completely at the distance of 2 cm~3 cm from the tumor edge, and the relapse tumors were cut off at the distance of 3 cm~5 cm from the tumor edge to extend the resection area. The patients were implemented the decortication of the outer table of skull eroded. Among them, the skull with full-thickness of 1 patient was eroded. Rapid pathological diagno-

sis was carried out during the operation. Tumor cells were not discovered around the wound and at the basal layer of the wound before wound hemostasis. The wound of Infection post traumatic was debrided radically and cleaned by aquae hydrogen dioxide, iodine iodophor solution and normal saline in turn.

Flaps design and cutting

First of all, the superficial temporal artery was detected by Doppler sonography at the front of antilobium, and the running direction through parietal branch of superficial temporal artery was marked by methylene blue. We designed a trapezoidal incision at temporal occipitoparietal, and the temporal vertical incision was located at the fascial side of parietal branch by 1 cm~2 cm, and then the transverse incision extended to the rear of occipital bone even across the midline. Next we carefully injected a little swelling fluid (100 ml normal saline + 10 ml 2% lidocaine hydrochloride) subcutaneously [8], and then separated the hair follicles and occipital fascia. According to the size of wound, we cut off the fascial flap at the occiput after its separation, and paid attention to protecting the occipital artery from bleeding. We did the blunt dissection between the fascia flap and pericranium from the distal to the proximal, and it formed long combined temporo-occipital fascia flap containing the ipsilateral occipital superficial fascia, which was pedicled with the superficial temporal artery. The combined fascia flap gradually narrowed from the distal to the pedicle, and the pedicle width should not be less than 3.5 cm in order to ensure that the blood can be supplied for the combined fascia flap. The pedicled fascia flap without tension was transferred to the wound, which was sewed to the wound surrounding. Subsequently, split-thickness skin graft was transplanted and fixed on the fascial flap by being packaged and pressurized.

Postoperative management

The patients were conventionally given drugs to improve microcirculation after surgery, and given anti-infection treatment if necessary.

Results

These 3 cases of combined temporo-occipital fascia flaps and split-thickness skin graft all survived without infection, and the wound healed well. The patients were followed up for 6 months to 3 years, and the mean time was 15 months. All flaps survived completely with satisfactory cosmetic results. The touch and temperature sense recovered to different degrees, and the scalp defects were not sunken and the scars were not obvious. Among them, the tumor of one fibrosarcoma patient invaded the whole layer of skull, and the sarcoma recurred 3 months after operation.

The typical case

A 43-year-old male patient with scalp neoplasm was carried out the resection of scalp neoplasm in neurosurgery department, and it was diagnosed as scalp fibrosarcoma after operation. The sarcoma recurred 3 months after operation. The patient continued the treatment in neurosurgery department, and then he was implemented the resection of scalp neoplasm again which was at the edge of sarcoma by 0.5 cm. Unfortunately, he suffered a relapse 4 months after operation again. Therefore, the patient was seen for visit at our department, and we carried out the radical resection of neoplasm at the edge of neoplasm for 3.5 cm, and the outer table of skull was partly removed, and the exposed wound area was 11 cm×11 cm. We transplanted the combined temporo-occipital fascia flap and split-thickness skin graft to restore the wound, and the combined fascial flap survived well. The patient was follow-up for 3 years, and there is no recurrence up to now (**Figure 1**).

Discussion

The flap anatomy

The blood supply of head is rich, and its blood supply is mainly from 5 pairs of arteries, the front blood supply comes from the supraorbital artery and supratrochlear artery, which are from ophthalmic artery. The lateral blood supply comes from superficial temporal artery and posterior auricular artery, which are from external carotid artery. And the rear blood supply comes from occipital artery attached to external carotid artery. There are rich branches among these 5 pairs of arteries, and the collateral circulation is very abundant. Marty [9] et al. measured the blood supply of arteries on the fresh corpses and living bodies, and they

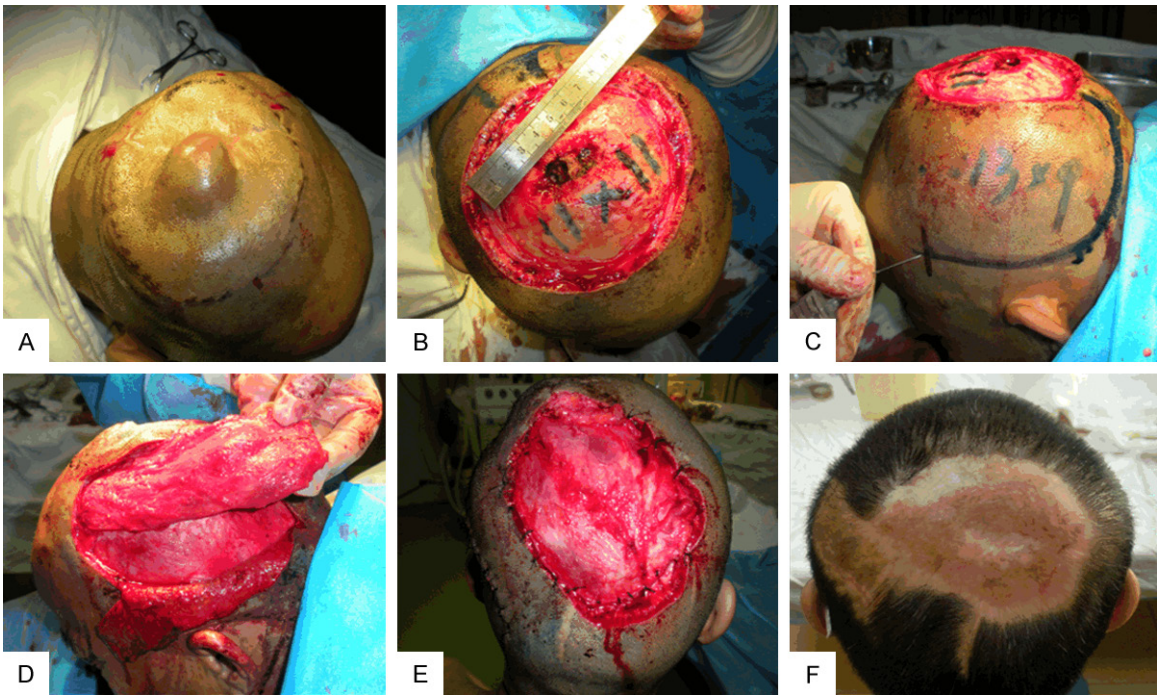

Figure 1. A 43-year-old man with the relapse of scalp fibrosarcoma was repaired with the temporo-occipital fascia flap. A. Preoperation. B. The removal of sarcoma. C. The design of temporo-occipital fascia flap. D. The resection of fascia flap. E. The application of fascia flap to cover the wound. F. The appearance of the wound 11 months after operation.

believed that there were rich rami anastomotic among these ipsilateral and contralateral arteries, among which superficial temporal artery provided the widest range. There are abundant rami anastomotic between superficial temporal artery and the ipsilateral occipital artery, and the majority of vessel diameters are larger than 0.3 mm [10].

Advantages and disadvantages of this surgical procedure

Advantages are as follows: First, this surgical procedure is in conformity with the basic principle of plastic surgery, namely it is making use of minor tissues to repair important tissues, pedicled flap transposition before vascular anastomosis, first simple and then complex, first near and then distant, pay emphasis on beauty and function preservation [10]. Second, this fascia flap and skin grafting restores the wound. After that the quality, color and thickness of the flap are similar to normal scalp as well as good appearance. Third, this operation needs smaller donor site, and it does not leave new defect and deformity. Fourth, this operation is relatively simple, low risk and less injury. Unlike free flaps, it does not need higher microscopic technique and sophisticated surgical instruments, and it is suitable for basic hospitals. Fifth, there are the bilateral fascial flaps on head to use. When necessary, we could strip the bilateral fascial flaps simultaneously to cover larger scalp defect, and it is more flexible to transfer flaps with occipital artery as pedicle. Sixth, unlike bulky free flaps, the thickness of the skin flap is moderate. Therefore, it is easy to be early detected and treated for the relapsed tumors, and it is appropriate that tumors resection before using flaps to cover scalp defects. Disadvantages are as follows: First, it needs stripping flaps patiently, and it may lead to donor-site alopecia if peeling too shallow. Second, there is no hair after fascial flaps transplantation, and it needs restoring scalp appearance by hair transplantation, dilators and other means.

Attention

First, the occipital and temporal fascial flaps could be utilized for those cases whose superficial temporal artery is not damaged. However, please do not use the ipsilateral flap if the scalp

defect areas are too large around the parietal tuberosities, and be careful to make use of this flap for chronic smokers and diabetics. Second, if the wound is far from the occipital and temporal fascial flap, we can make a subcutaneous tunnel between the fascial flap and the wound, in order that the pedicle is protected from being squeezed. Third, the separation of scalp and fascial flap should be careful. It is easy to damage the hair bulbs if the separation is too shallow, which may result in alopecia. On the other hand, deep separation is easy to harm vessels in flaps, which results in disorders of distal blood supply. Fourth, the pedicle should not be too narrow in order to facilitate the venous reflux in flaps.

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Disclosure of conflict of interest

None.

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