



Retrospective Cohort Study Evaluating the Anterolateral Tight Free Flap Donor Site Morbidity

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Abstract

Functional outcomes and patient satisfaction related to the donor site of free flaps are increasingly playing a decisive role in flap selection. One of the main advantages of ALT flap is its minimal donor site morbidity. The aim of this study is to analyze healing evolution related to the donor site of ALT flaps depending on the closure technique: Direct closure versus skin grafting. 65 patients were totally included. They were categorized into two cohorts depending on the type of donor site closure technique performed. No statistically significant differences were found between the two cohorts regarding age at surgery, sex and risk factors for wound healing (smoking habit, obesity, diabetes mellitus, cardiovascular disease). Complete donor site wound healing time was 22.41 days (\pm 9.94) in the primary closure group (51 patients) whereas in the skin grafting group it was 54.57 days (14 patients). Statistically significant differences were found ($p < 0.05$).

When skin grafting is needed to close ALT donor site, wound related morbidity increases considerably. In those cases, we propose technical alternatives to achieve direct closure and therefore, sparing wound healing time, enhancing cosmetic results and donor site functional outcomes.

Keywords: ALT flap; Donor site morbidity; Direct closure; Skin graft

Introduction

Free Anterolateral Tight Flap (ALT) is a workhorse flap in reconstructive surgery [1]. Currently, functional outcomes, quality of life and patient satisfaction related to donor site is increasingly playing a decisive role in reconstructive surgery planning and flap selection. One of the main advantages of ALT flap is the minimal donor site morbidity with presumed low rate of complications [2]. However, data regarding donor site complications is mainly related with those cases where the donor site is primarily closed. Thus, when large skin paddles are needed, direct closure may not be possible and skin grafting becomes necessary.

The aim of the present study is to evaluate healing evolution related to ALT free flap donor site depending on the closure technique: direct closure versus skin grafting.

Patients and Methods

Study design

This study was approved by the Research Ethics Board in La Fe Hospital (Valencia). It consisted on a retrospective cohort study which included all the patients who underwent a reconstructive procedure using an anterolateral tight free flap in our institution between the years 2014 and 2020.

In total, 65 patients were included. Cases where a portion of vastus lateralis muscle was harvested within the flap were also included. Patients were classified in two different groups: Group 1 (direct donor site closure) and group 2 (donor site closure with split thickness skin graft).

Data collected included patient's demographics, risk factors for wound healing (smoking habit, obesity, diabetes mellitus, and cardiovascular disease), time until complete wound healing and complications related to the wound and skin graft donor site. We considered the donor site healed when wound care and dressings were no longer needed. Minor wound dehiscence was defined as minimal wound edge separation that healed with local wound care, while major wound dehiscence implied wound separation requiring surgical approximation. Hematoma or seroma were considered complications when they necessitated percutaneous or open drainage. Total skin graft failure was defined as loss of more than 50% of the grafted area with the consequent need of new surgery for re-grafting. Partial skin graft failure was classified as loss of less than 50% of the skin graft which

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could be managed with wound dressings. We considered delayed healing of the split thickness skin graft donor site when complete epithelialization of the wounds lasted more than 21 days.

A satisfaction survey was conducted in order to evaluate functional repercussion, aesthetic outcomes and overall satisfaction with the scar.

Operative procedure and postoperative care

Primary closure: When the donor site was primarily closed, a suction drain was inserted beneath the undermined skin. The defect of the thigh was closed using 2-0 and 3-0 absorbable braided suture for the subcutaneous tissue. Intradermal suturing was performed with reabsorbable monofilament 3/0 suture.

Suction drain was usually maintained for 2 to 3 days. The lower limb rested immobilized for one week. Wound care was made every 48 h. If wound evolution was satisfactory, stitches were removed between days 14 to 21.

Skin graft: One the other hand, when the donor site was partially closed, suction drain was inserted and the edges of the wound were approximated with 2-0 and 3-0 absorbable braided suture. The defect in the middle third of the wound was covered with Split Thickness Skin Grafting (STSG) harvested from the same thigh. For the graft dressing, we used low adherent sterile paraffin tulle grass (Jelonet®) and moist gauze. The skin graft donor site was cared with silver foam pad (Mepilex® Ag).

As in direct closure, the suction drain was maintained for 2 to 3 days and the lower limb rests immobilized for one week. Paraffin tulle grass in the skin graft area was changed every 4 to 5 days whereas silver foam pad in the graft donor site was changed every 7 days until the wounds were epithelialized.

Statistical analysis

IBM SPSS Statistics version 25 was employed. T test was used to contrast quantitative variables, chi square and Fisher exact test for categorical variables and Mann-Whitney U-test for ordinal variables. P-values <0.05 were considered to indicate statistical significance.

Results

Sixty-five free ALT flaps were performed in 65 patients. The recipient sites were located in the lower limbs (46%), head and neck (32%), upper limbs (15%) and the trunk (6%). In 51 patients (78%) the donor site was primary closed whereas in 14 patients (22%), a skin graft was needed for wound closure.

No statistically significant differences were observed between the two groups in terms of sex, age, diabetes mellitus, smoking habit, cardiovascular disease and obesity.

Regarding complications related to primary wound closure, 5 patients suffered minimal wound dehiscence which closed by second intention, 3 patients had wound seroma, and 2 patients suffered minimal hematoma. None of them required surgical re-intervention.

In the latter group, the most common complication was partial loss of skin graft (79% of the patients). Skin graft loss was less than 50% and did not precise re-grafting. Another common complication was delayed healing in the STSG donor site (50% of the patients).

The mean time for wound healing was 22.41 days (± 9.94) in group 1 (primary closure) whereas in group 2 (skin graft) the mean time was 54.57 days (± 21.59). Statistically significant differences were



Figure 1: Patient diagnosed with hypopharynx squamous cell carcinoma. After aggressive tumoral resection, an ALT free flap was employed for pharyngoesophageal reconstruction. A rectangular skin paddle was designed, leaving a 10 cm width defect. In order to achieve direct closure, the two triangle flaps in the edges of the defect were approximated to the medial border, creating a medial advanced rotational flap through an incision from the wound until the distal edge of the proximal triangle. 18 days after the surgery, the wound was completely healed.

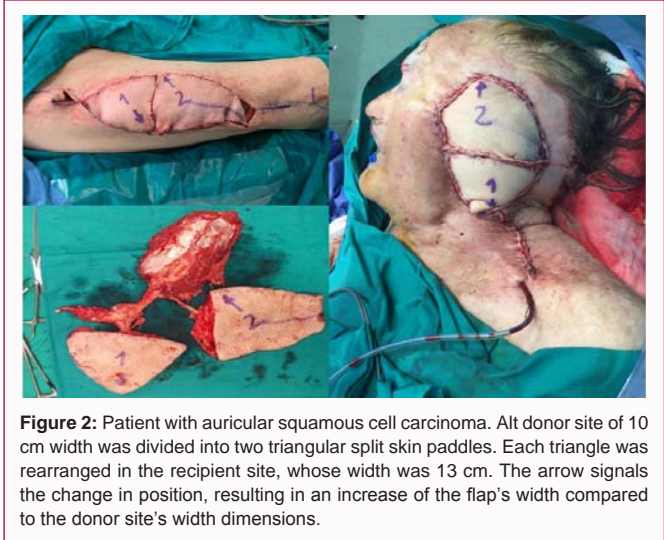


Figure 2: Patient with auricular squamous cell carcinoma. Alt donor site of 10 cm width was divided into two triangular split skin paddles. Each triangle was rearranged in the recipient site, whose width was 13 cm. The arrow signals the change in position, resulting in an increase of the flap's width compared to the donor site's width dimensions.

found (p<0.05).

Forty-four of the patients answered the satisfaction survey. They were asked to indicate any functional limitation or tightness in the donor site and to evaluate from 0 to 10 the aesthetic outcomes of their scars and overall satisfaction with the surgery. No statistically significant differences were found in the survey between both groups.

Discussion

We should pay attention and strive to improve outcomes not only in the recipient site of free flaps but also in the donor site, as it affects

patient's quality of life. ALT donor site causes minimal morbidity in the patient when it is closed directly [3]. The maximum flap width that enables direct closure is 9 cm or 16% of the thighs' circumference [4]. It also depends on factors such as the pinch test (subcutaneous tissue laxity and thickness) [5].

Defects exceeding these values are susceptible for partial closure and skin grafting. Nonetheless, as we have outlined in the present study, donor site wound healing time is significantly higher when skin grafting is performed. It also entails second donor site morbidity, contour deformity, hypertrophic scarring and relative limitation in hip and knee motion because of strict adhesions between the skin graft and the underlying fascia [6]. All these factors notably increase ALT donor site morbidity. Hence, alternatives for ALT donor site skin grafting should be sought in order to enable direct closure [7]. When skin grafting is unavoidable, other flaps with less donor site morbidity may be considered.

Multiple strategies have been described in order to avoid skin grafting in the donor site [8-10]. In our institution we try to perform various technical tips when direct closure is not possible. For instance, in cases of rectangular skin paddles (commonly used for pharyngoesophageal reconstruction), two lateral base triangular flaps can be found in the proximal and distal borders of the donor site [11]. So as to take advantage of these two triangles and avoid skin grafting, we approximate them as much as possible to the wound edges and create a medial advanced rotational flap (through an incision from the wound until the distal edge of the superior triangle) (Figure 1).

In addition, another technique to minimize the need for skin grafting is to divide the ALT flap into two separate triangular skin paddles, with the aim of reducing the effective donor site width. Each skin paddle acts as a perforator-based subunit. The two skin paddles are rearranged and adapted to the width of the defect. The result is a flap width in the recipient site greater than the donor site width. Hence, the effective surface of the ALT flap is increased thanks to the rearrangement of the two triangle subunits (Figure 2).

Another alternative for achieving direct closure when the flap width-to-tight circumference ratio is between 16% to 18% is to design either an antegrade or retrograde V-Y advancement flap or a propeller anteromedial thigh flap [4,12]. With these techniques, a skin paddle is advanced towards the central portion of the donor site.

Study Limitations

Limitations of the present study should be taken into account. It is a retrospective cohort study, with all the limitations that it implies, among other, changes in diagnostic and therapeutic criteria over time. The number of patients recruited was not major, but it may be large enough to draw conclusions. Nevertheless, it might have been a limitation to obtain significative data in the satisfaction

survey. Another detail to take into account is that we did not make distinction between subfascial and suprafascial ALT dissection. Generally, for wider defects, subfascial dissection was made. This technical difference may affect skin grafts taking process.

Conclusion

When ALT donor site requires closure using skin grafting technique, time for wound healing increases noticeably. Furthermore, morbidity rises due to a second donor site and cosmetic sequela. Hence, in cases where direct closure is not possible, it is advisable to employ alternatives for wound closure before leaning towards skin grafting, or even, consider another flap in order to diminish donor site morbidity.

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