ORIGINAL RESEARCH

CERVICOFACIAL ROTATION ADVANCEMENT FLAP IN CHEEK RECONSTRUCTION

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ABSTRACT

Introduction: The Cervicofacial Rotation Advancement Flap (CRAF) is a random-pattern flap that provides an excellent match for cheek reconstruction. In this report, the authors review their experience with this flap and present their advantages in order to expand the awareness and promote the application.

Methods: A retrospective analysis of reconstruction of cheek defects using CRAF was performed in 12 patients. Data on patient demographics, diagnosis, defect type, and outcome were collected.

Results: These patients included 7 male and 5 female; they ranged in age from 56 to 88 years, with a mean age of 67 years. 05 patients used tobacco and one patient had a history of radiation. On histopathological examinations of the specimen, 03 patients had squamous cell carcinoma, and 09 patients had basal cell carcinoma. The mean defect size was 40 cm² [range 10 to 67 cm²]. The mean follow-up was 06 months [0 to 24 months]. One patient was lost to follow-up after suture removal. As complication 01 patient had flap necrosis. No facial nerve injury was observed. All patients were pleased with the Cosmetic results outcome.

Conclusion: Cervicofacial flap provides a technically simple, reliable, safe, efficient and cosmetic means to reconstruct defects of the cheek.

KEY WORDS: Cervicofacial flap - Cheek defects - Platysma muscle – Reconstruction.

INTRODUCTION

Since the first description of a local cheek rotation flap by Esser in 1918, several modifications have been described by, among others, Mustarde and Converse to overcome the problem of noticeable scars and donor sites. [1-2] the name cervicofacial flap was first used by Kaplan in 1978 in a report of the versatility of this flap for the coverage of defects following the removal of cancers of the head and neck. [3] Juri and Juri [4-5] combined the concept of cervical advancement as described by Stark and Kaplan [6] with a cheek rotation flap, converting their flap into an advancement rotation flap. Despite their advantages, such the ease of harvesting, minimal postoperative morbidity, versatility in flap design, great arc of rotation, and similar color and texture with the surrounding tissue. Cervicofacial rotation advancement flaps (CRAF) have received scarce attention in the literature. In this article, our aim is to expand the awareness and promote the application of this useful flap through our experience.

MATERIALS AND METHODS

A retrospective analysis of reconstruction of cheek defects using CRAF was performed in 12 patients, and treated at Mahomet Fifth Military Training Hospital between January 2014 and December 2002. Data on patient demographics, diagnosis, defect type, and outcome were collected.
All patients underwent a wide excision of the lesion followed by immediate reconstruction. The procedures were carried out under general anesthesia in all patients by the same surgeon in one session. The flap was elevated superficial to the superficial musculoaponeurotic system (SMAS) in the parotid region and deep to the platysma in the neck.

RESULTS
These patients included 07 male [58.3%] and 05 female [41.6%]; They ranged in age from 56 to 88 years, with a mean age of 67 years.05 patients used tobacco and one patient had a history of radiation. On histopathological examinations of the specimen, 03 patients had squamous cell carcinoma, and 09 patients had basal cell carcinoma. The mean defect size was 40cm² [range 10 to 67cm²].

The mean follow-up was 06 months [0 to 24 months]. One patient was lost to follow-up after suture removal. Only 02 patients developed wound complications: 01 patient had flap necrosis that required secondary reconstruction with thickness skin graft, and another one had wound dehiscence that required minor revision. No facial nerve injury was observed. The match of skin colour and texture was excellent. All patients were pleased with the Cosmetic results outcome.

Preoperative and postoperative photographs of representative patients are shown in Figures 1-2-3.

DISCUSSION
In cheek reconstruction, the most important element is uniformity of skin color and texture, not contour and outline. Therefore, cheek defects preferably are reconstructed with tissue from adjacent units, such as neck, submental area, or chest using local or regional flaps.

CRAF meet all of these criteria. This flap can be anteriorly based, supplied by the facial and submental arteries, or posteriorly based, supplied by the superficial temporal artery and preauricular vessels in the face. [7]

The dissection plane in the facial portion of the flap can be in either the subcutaneous or sub-SMAS levels. Inclusion of the platysma transforms the flap into a composite musculocutaneous flap vascularized by branches of the facial artery and augments the blood supply of anteriorly based flaps. The platysma may be sectioned transversely in the lower part of the flap to allow adequate flap transposition. [8]

The concept of additional blood supply by incorporation of the SMAS was challenged by Whetzel and Stevenson. They conclude that the flap can be elevated with or without the SMAS. [10]
The flap is elevated in the supra-SMAS plane in the parotid region and in the subplatysmal plane in the neck. For very large defects, the incision can be extended in the subplatysmal plane to the chest as a cervicopectoral flap with additional arterial supply arising from internal mammary perforators. [7]

When designing the flap, the position of the lower eyelid, the vermillion-cutaneous junction, and the nostril margin must be taken into account. [11]

The flap must be thinned if applied to the lower eyelid or nasal sidewall.

To prevent lower eyelid ectropion, the lateral superior border of an anterior-based rotation advancement flap should be planned above the lateral canthal-helical root plane, suspending the flap higher than the eyelid margin. It is mandatory to minimise distortion of the eye and upper lip. [9-12-13-3]

Versatility in flap design and a great arc of rotation allow CRAF to cover large areas of defect. Small to moderate anterior cheek defects are reconstructed with posterior-based rotation-advancement flaps. Posterior or large anterior cheek defects are covered with anterior-based rotation advancement flaps. [9-14]

In addition, in combination with other techniques CRAF flap allow to restore, [15-16] defects after orbital exenteration, [17-18] and through-and-through cheek defects. [19-20-21]

CRAF can provide excellent skin colour, thickness and texture match, with cosmetically acceptable scars and minimal morbidity as no need to skin graft the donor site, particularly in certain high-risk patients, such as the very old, those with many systemic diseases, or who for any reason cannot tolerate a long operative time. Specific complications related to the CRAF are distal tip necrosis DTN. Based on the publisher literature, DTN rate is between 27% and 2, 4%. [Table N°1] Rapstine reported the largest series while 69 patients had 27% wound complication as distal tip necrosis. [22]

Table 1:

| Series           | Patients | Age | Risk Factor | distal tip necrosis | Facial Nerve Paralysis |
|------------------|----------|-----|-------------|---------------------|------------------------|
| Cook TA 1901 [13]| 14       | 51  | Smoker : 35%| 14%                 | 0                      |
|                  |          |     | Radiation : 29%|                     |                        |
| Moor 2005 [24]   | 33       | 65,9| Smoker : 5% | 23% superficial     | 0                      |
|                  |          |     | Radiation : 17%|                     |                        |
| Taa ST 2006 [25] | 18       | 76,7| Smoker : 5% | 5%                  | 0                      |
|                  |          |     | Radiation : 17%|                     |                        |
| Austin 2009 [36] | 32       | 71  | Smoker : 16%| 9%                  |                        |
|                  |          |     | Radiation : 9%|                      |                        |
| Liu FY 2011 [21] | 21       | 64,5| ————       | 14,3 superficial    | ————                  |
|                  |          |     |             | 9,5 full thickness   |                        |
| Rapstine 2012 [22]| 82      | 60  | Smoker : 25%| 2,4%                | 0                      |
| Jacono 2014 [23]| 88       | 65  | Smoker : 20%| 27%                 | 0                      |
| Al Shetawi 2017 [27]| 28      | 57  | Smoker : 3,08%| 0,28%               | 0                      |
|                  |          |     | Radiation : 0,84%|                     |                        |
| Hamama          | 12       | 67  | Smoker : 2% | 3,9%               | 0                      |

Care should be taken to include the external jugular vein with the flap, helps to decrease the risk of venous congestion and ischemic necrosis. Incorporating the SMAS for patients with risk factors smoking or irradiated histories reduce the risk of DTN, as demonstrated in the study by Jacono and colleagues. [23]

In addition, no significant association between the DTN complication rate and hypertension or diabetes mellitus [21].

Published studies have found relatively low incidence rates of facial injury. Otherwise, Surgeries performed in these studies are usually conducted by experienced surgeons, which may lead to a more favorable outcome and when it occurs, it is usually transient. [9] To reduce risk for facial nerve injury, the use of a fine hemostat or McCabe dissector for blunt dissection and bipolar diathermy is recommended.

CONCLUSION

CRAF is an excellent source of pliable skin with perfect color match and a similar texture to the surrounding tissues. Local flaps are always advantageous compared with microsurgical reconstruction techniques or distant flaps as they are simple and fast to harvest. Cervicofacial flap may be a good alternative for the surgeons in the treatment of patients with cheek cancer where comorbid conditions preclude lengthy operations since a single incision is adequate for excision, neck dissection and reconstruction of the defect.

AUTHORS’ CONTRIBUTIONS

The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. Indeed, all the authors have actively participated in the redaction, the revision of the manuscript and provided approval for this final revised version.

PATIENTS’ CONSENT

Written informed consent was obtained from each patient for publication of this study.

COMPETING INTERESTS

The authors declare no competing interests.
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