

**ORIGINAL RESEARCH**

# **CERVICOFACIAL ROTATION ADVANCEMENT FLAP IN CHEEK RECONSTRUCTION**

Dr Jalal HAMAMA <sup>1</sup>, MD  ; Dr Lahcen KHALFI <sup>1</sup>, MD ; Dr Abdelhafid ACHBOUK <sup>1</sup>, MD ;  
Dr Kamal FIQHI <sup>2</sup>, MD ; Pr Karim EL KHATIB <sup>3</sup>, MD.

Faculty of Medicine and Pharmacy, University Mohammed V, Rabat 6203, Morocco. 

## **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 07 male and 05 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 40cm<sup>2</sup> [range 10 to 67cm<sup>2</sup>]. 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.

**Corresponding author:** Jalal Hamama, Department of oral and facial surgery .Mohammed v teaching armed forces hospital. FAR street .HAY RIAD .Po Box 1018- 10100 Rabat - Morocco.  
Email: [hamamajalal76@hotmail.com](mailto:hamamajalal76@hotmail.com) Phone : +212664907927

**Copyright © 2018 Dr Hamama Jalal et al.**

This is an open access article distributed under the [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

## **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.

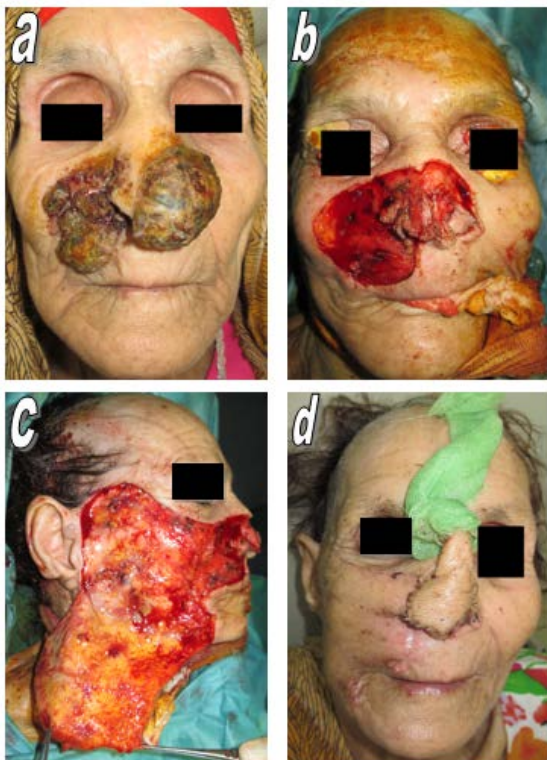
All patients underwent a wide excision of the lesion followed by immediate reconstruction. The procedures were carried out under general anesthesia in all patients by the same surgeon in one session. The flap was elevated superficial to the superficial musculoaponeurotic system (SMAS) in the parotid 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 40cm<sup>2</sup> [range 10 to 67cm<sup>2</sup>].

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.



**Figure 1 :** a: preoperative view showing 74 year old woman, with giant basal cell carcinoma in her right infraorbital area of cheek and lower half of nose. b: anterior cheek defect, the size measuring 05cm. c: Intraoperative situation after elevation of cervicofacial flap showing its mobility. Note that only the borders of the aesthetic cheek unit were incised. d: Clinical situation 3 weeks after surgery showing satisfactory wound healing and aesthetic results. Note the absence of downward pull of the flap and ectropion of the lower eyelid.

## DISCUSSION

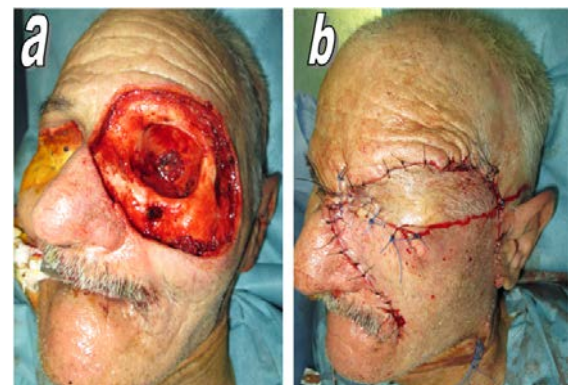
In cheek reconstruction, the most important element is uniformity of skin color and texture, not contour and

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]



**Figure 2:** distal tip necrosis



**Figure 3:** a: frontal view of the orbital defect following tumour resection including orbital exenteration. b: Primary closure of the orbital exenteration, by rotation of the cervicofacial flap.

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 vermilion-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 serie 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 1991 [13]	14	51	Smoker : 35% Radiation : 29% 3	14%	0
Moore 2005 [24]	33	65,9	Smoker : 5% Radiation : 17%	23% superficial 10% full thickness	0
Tan ST 2006 [25]	18	76,7	Smoker : 5% Radiation : 17%	5%	0
Austen 2009 [26]	32	71	Smoker : 16% Radiation : 9%	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% Radiation : 0,84%	0,28%	0
Hamama	12	67	Smoker : 2%	3,6%	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.

## REFERENCES

- [1] Mustardé JC. Repair and reconstruction in the orbital region. A practical guide. Edinburgh (UK): E & S Livingstone; 1966. p. 117.
- [2] Converse JM. Reconstructive plastic surgery. Philadelphia: WB Saunders; 1977. p. 1586.
- [3] Kaplan I, Goldwyn RM: The versatility of the laterally based cervicofacial flap for cheek repairs. *Plast Reconstr Surg* 1978, 61:390-393.
- [4] Juri J, Juri C. Advancement and rotation of a large cervicofacial flap for cheek repairs. *Plast Reconstr Surg* 1979; 64(5):692–6.
- [5] Juri J, Juri C. Cheek reconstruction with advancement-rotation flaps. *Clin Plast Surg* 1981; 8(2):223–6.
- [6] Stark RB, Kaplan JM. Rotation flaps, neck to cheek. *Plast Reconstr Surg* 1972; 50(3):230–3.
- [7] Mureau MA, Hofer SO: Maximizing results in reconstruction of cheek defects. *Clin Plast Surg* 36:461, 2009
- [8] Delay E, Lucas R, Jorquera F, et al. Composite cervicofacial flap for reconstruction of complex cheek defects. *Ann Plast Surg* 1999; 43(4):347–53.
- [9] Menick FJ. Reconstruction of the cheek. *Plast Reconstr Surg* 2001; 108(2):496–505.
- [10] Whetzel TP, Stevenson TR. The contribution of the SMAS to the blood supply in the lateral face lift flap. *Plast Reconstr Surg* 1997; 100:1011–8.
- [11] Pepper JP, Baker SR: Local flaps: Cheek and lip reconstruction. *JAMA Facial Plast Surg* 15:374, 2013.
- [12] Boutros S, Zide BM. Cheek and eyelid reconstruction: the resurrection of the angle rotation flap. *Plast Reconstr Surg* 2005; 116(5):1425–30.
- [13] Cook TA, Israel JM, Wang TD, Murakami CS, and Brownrigg PJ: Cervical rotation flaps for midface resurfacing. *Arch Otolaryngology Head Neck Surg* 1991, 117:77-82.
- [14] Sakellariou A, Salama A. The Use of Cervicofacial Flap in Maxillofacial Reconstruction. *Oral Maxillofac Surg Clin North Am.* 2014 Aug; 26(3):389-400. PMID:24980990
- [15] Belmahi A, Oufkir A, Bron T, et al. Reconstruction of cheek skin defects by the ‘Yin-Yang’ rotation of the Mustarde´ flap and the temporoparietal scalp. *J Plast Reconstr Aesthet Surg* 2009; 62(4):506–9.
- [16] D’Arpa S, Cordova A, Pirrello R, et al. The face lift SMAS plication flap for reconstruction of large temporofrontal defects: reconstructive surgery meets cosmetic surgery. *Plast Reconstr Surg* 2011; 127(5):2068–75.
- [17] Rabey N, Abood A, Gillespie P, et al. Reconstruction of complex orbital exenteration defects. *Ann Plast Surg* 2013.
- [18] Cuesta-Gil M, Concejo C, Acero J, et al. Repair of large orbito-cutaneous defects by combining two classical flaps. *J Craniomaxillofac Surg* 2004;32(1):
- [19] Helman JI. The cervicofacial flap in facial reconstruction. *Oral Maxillofac Surg Clin North Am* 2003; 15(4):551–7.
- [20] Bianchi B, Ferri A, Ferrari S, et al. Free and locoregional flap associations in the reconstruction of extensive head and neck defects. *Int J Oral Maxillofac Surg* 2008; 37(8):723–9.
- [21] Liu et al.: The versatile application of cervicofacial and cervicothoracic rotation flaps in head and neck surgery. *World Journal of Surgical Oncology* 2011 9:135.
- [22] Rapstine ED, Knaus WJ, Thornton JF. Simplifying cheek reconstruction. *Plast Reconstr Surg* 2012; 129(6):1291–9.
- [23] Jacono AA, Rousso JJ, Lavin TJ. Comparing rates of distal edge necrosis in deep-plane vs subcutaneous cervicofacial rotation-advancement flaps for facial cutaneous Mohs defects. *JAMA Facial Plast Surg* 2014;16(1):31.
- [24] Moore BA, Wine T, Netterville JL. Cervicofacial and cervicothoracic rotation flaps in head and neck reconstruction. *Head Neck* 2005;27(12):1092–101.
- [25] Tan ST, Mackinnon CA. Deep plane cervicofacial flap: a useful and versatile technique in head and neck surgery. *Head Neck* 2006;28(1):46–55.
- [26] Austen WG, Parrett BM, Taghinia A, et al. The subcutaneous cervicofacial flap revisited. *Ann Plast Surg* 2009;62(2):149–53.
- [27] AlShetawi AH, Quimby A, Fernandes R. The Cervicofacial Flap in Cheek Reconstruction: A Guide for Flap Design. *J Oral Maxillofac Surg.* 2017 Dec;75(12):2708.e1-2708.e6.