

Use of cervicopectoral flap as an access for radical neck dissection and reconstruction of facial defects

Balsam S. abdulhamed, B.D.S., F.I.C.M.S., H.D.L. (1)
Bassem T. Merry, B.D.S. (2)

ABSTRACT

Background: The problem of reconstruction after surgical extirpation of head and neck cancer remain a corner stone that produce unique challenges to surgeon; surface defects are often contiguous with oral cavity requiring both lining and covering.

Patients and methods: This study was conducted on 20 patients (13♂:7♀), age rang (28-80years), whom suffered from malignant tumors in different sits in oro-facial region and salivary gland, to evaluate the C.P.F. as an access for cervical lymphadenectomy during treatment of head/neck malignant tumor and its use as immediate reconstruction for closing the defect resulted from tumor resection at the same procedure.

Results and Conclusions: The C.P.F. was successfully covered the moderate and large size defect resulted from tumor ablation in the neck region with successful esthetic and function results.

Keywords: Cervicopectoral flap, radical neck dissection, head and neck malignant tumor. (J Bagh Coll Dentistry 2012; 24(4):71-76).

INTRODUCTION

The problem of reconstruction after surgical extirpation of head and neck cancer produces unique challenges to surgeon; surface defects are often contiguous with oral cavity requiring both lining and covering.

Neck dissection remain a corner stone with the surgical management of metastatic disease within the neck, many incisions have been described for neck dissection since Criles Land mark article in 1906. The facts that so many types of neck incision exist is strong testimony that there is hardly one incision that fits all contingencies. A modified single type for dissecting which had been described by Lakdasa ⁽¹⁾ is a further step in the evolution of previously described single flap for neck dissection.

The cervicopectoral flap (C.P.F.) is an axial rotation flap usually medially based, fed by the anterior thoracic perforators from the internal mammary artery, although a variant is a laterally based flap fed by the thoracoacromial perforators. It is considered a good method for covering large defects of the lower cheek below a line connecting the commissure of the mouth with the

tragus of the ear. This study was conducted to evaluate the cervicopectoral flap as an access for cervical lymphadenectomy during treatment of oro-facial and salivary gland malignant tumor and its use in the immediate reconstructive procedure for closing the defect resulted from tumor resection at the same procedure.

PATIENT AND METHODS

The different types of carcinoma involved the facial skin, parotid gland and lymph node tumor completely excised through local resection with radical neck dissection (classical or extended) by Lakdasa incision through the neck extending to the sub-mammary area for designing of the cervicopectoral flap for construction of the primary defect.

This study was carried out on 20 patients with primary malignant tumor of the cheek, parotid gland, lower jaw and variable sub-sites of the oral cavity with squamous cell carcinoma and sarcoma, regional lymph nodes metastasis were evaluated clinically, radiographically and histopathologically.



Figure 2: Patient with S.C.C.

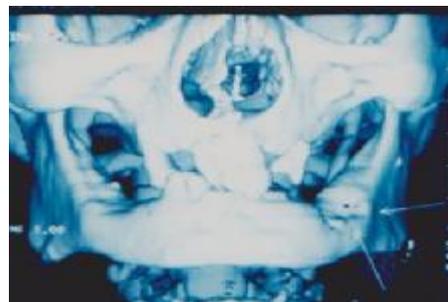


Figure 1: C.T. Scan reveals the tumor site. Treatment plan was adjusted according to these

(1)Maxillofacial specialist. Al-Kadhmyea Teaching Hospital.

(2)Maxillofacial practitioner. Al-Kadhmyea Teaching Hospital.

The patients sample composed of (13 males: 7 females) with age range (28-80 years). All were examined and treated in the department of Oral and Maxillofacial Surgery in Gaze Al-Harrery, Al-Hussien (in Kerbala), Al-Sader (in Al Najaf) and Al-kadhmyea Teaching Hospitals in the period 2001-2010.

Every patient was checked for medical evaluation including systemic disease, also for the purpose of this study, personal information sheet were recorded in specially designed sheet.

A Single cervicopectoral flap which had been used for the cases, had been modified that transverse limb run backward from sub-mental region at about (1-2 inches) below the mandible,

as the area either involved by the lesion (primary tumor ulcerative fixed lymph nodes or both) or affected by radiotherapy. The transverse limb extends to the posterior margin of the sternocleidomastoid muscle. At the tip of the mastoid process or slightly above it, the incision curves gently downward keeping about 2 cm behind the anterior margin of trapezius muscle. This vertical limb extends downward to involve the deltopectoral flap medially based on the second and third branches of internal mammary artery. The dissection is done under the platysma muscle and pectoral fascia as shown in Figure 3 and 4.



Figure 5: Cervicopectoral flap design

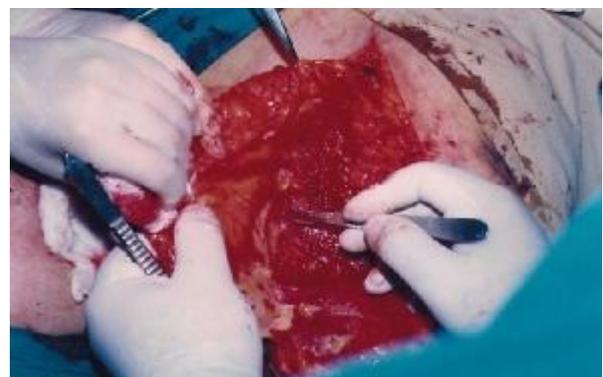


Figure 5: Dissection beneath the platysma and pectoral fascia

RESULTS

Twenty patients were collected in this prospective study, evaluated clinically, radiographically and underwent surgery with

reconstruction procedure. This data collected in 2001-2010, and the results were evaluated according to the following:

Table 1: Age and Sex Distribution

No	♂	Age Range	%	♀	Age Range	%	Total	Age Range
20	13	40-80	65%	7	28-60	35%	100%	28-80

Table 2: TNM Classification

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
T	4	X	3	4	4	4	4	4	4	4	4	3	4	4	3	3	3	4	4	4
N	0	3	1	2b	2b	2a	1a	0	2a	1a	2a	2a	2a	1	2a	1a	2a	2a	2b	2b
M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

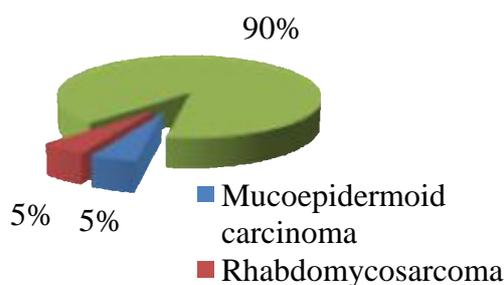


Figure 6: Hitopathological Diagnosis

Table 3: Site of Tumor

Primary site	No.	%
Cheek	7	35%
Parotid	3	15%
Lower jaw	6	30%
Unknown primary tumor	1	5%
Skin of zygomatic region	1	5%
Floor of mouth extended to cheek	2	10%

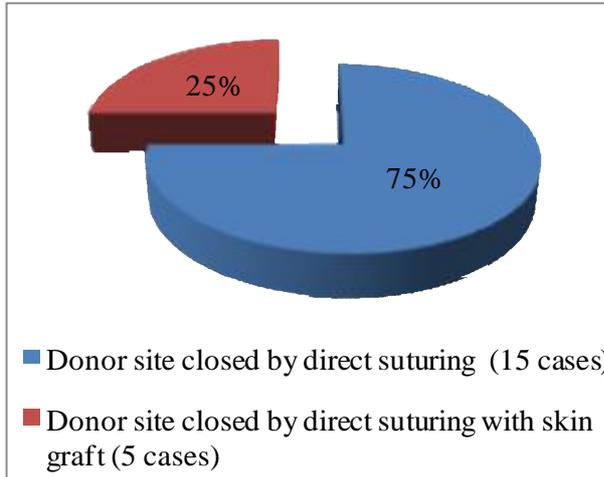


Figure 8: Morbidity of donor site



Figure 8: Donor site closed by direct suturing



Figure 10: Donor site closed by skin graft

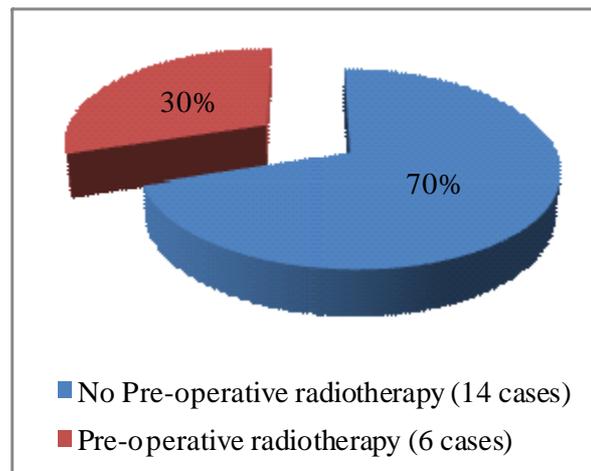


Figure 10: Viability of the flap in related to preoperative use of radiotherapy

DISCUSSION

Successful reconstructive surgery is measured in terms of safe defect coverage with simultaneous restoration of form and function and avoidance of donor site deformity. To achieve the optimal result the surgeon must complete three important reconstructive phases:

1. Defect analysis with subsequent definition of reconstructive requirements.

2. Evaluation of potential sources of flap in regard to suitability for defect coverage or reconstruction.
3. Utilization of anatomic and technical data to reconstruct the defect successfully.

The policy of the department is that the surgical treatment of the malignant tumor should be an aggressive procedure. Among the current therapeutic modalities of surgery, radiotherapy, chemotherapy and others, surgery with wide resection seems to offer the best chance of a cure.

Classical radical neck dissection remains the corner stone in the surgical management of metastatic tumor in the neck and many incisions have been described when Criles first introduced radical neck dissection.

In attempting to reconstruct the types of defect presented in the study, three principles guide the surgeon, they are:

1. Restriction to sound oncologic principles of resection.
2. Preservation of function.
3. Attention to aesthetic to its best permitted limit. The cervicopectoral flap permits adherence to these principles.

The C.P.F. has a robust nature due to its rich blood supply. The skin of the neck is supplied by the branches of five arteries, superiorly by the sternocleidomastoid branch of the occipital, cutaneous branch of facial, cutaneous branch of submental artery, inferiorly by the cutaneous branches of transverse cervical and by the suprascapular arteries.

The skin of the anterior chest wall is supplied primarily by perforating branches of the internal mammary artery. Study of the design of the C.P.F. showed that all of above mentioned cervical vessels were in the ipsilateral side are divided in the elevation of the flap, so the excellent viability of the flap is insured by two sources, the rich anastomosis of cutaneous vessels across the midline in the cervical skin, and preservation of internal mammary branches especial the widely based pedicle of the flap. The flap then is essentially a mixed-axial and random-patterned flap.

The distal part is considered as a musculocutaneous flap which contains platysma muscle with the skin covering it and nourishment of this part is randomly by collateral circulation of blood from other side of the neck. The proximal portion of the flap is considered as fasciocutaneous flap, as the deep fascia involved with the flap which is highly vascular by internal mammary perforator arteries.

The C.P.F. is analogous to the family of the deltopectoral flap of Bakamjian⁽¹⁶⁾.

There is no controversy on the blood supply of the C.P.F. in all literature review.

Although radiotherapy may be used as sole modality, it is frequently used in combination with surgery and/or chemotherapy.

Radiotherapy was advocated in cases of large tumors in an attempt to shrink it prior to surgery, and sterilize of majority of viable malignant cells, so that the risk of tumor cells dissemination during surgery should be reduced.

The effects of radiation divided to immediate, intermediate and late reaction (3): in our patient with tumors of the face and oral cavity, who received preoperative radiotherapy, followed (4 weeks later) by surgical intervention including malignant tumor excision with or without RND and reconstruction of primary defect by C.P.F.

In those six cases the dissection and removal of the tumor was not very much affected and the healing of the C.P.F. used for the reconstruction, showed no necrosis, delay of healing, or even infection.

The result does not coincident with that of Becker⁽⁴⁾ and Wallis and Donald⁽²⁾, who found that there was simple necrosis of the tip of the flap and left to be healed by secondary intention.

Two cases (about 80 years) were presented with lump in the submandibular area with skin tethering of unknown primary tumor site, surgery was done and C.P.F. utilized for reconstruction of the primary defect, simple epidermolysis and dehiscence of the flap tip which was treated by local measurement and left for secondary intention. It is believed that the necrosis in the tip of the flap in these patients was due to general vascular condition of the patient. This finding is agreed with Math and Nahai⁽⁵⁾ regarding aging process including the changes in vascular system.

Smoking cigarette also affects the viability of the flap. It acts on blood supply by stimulation of sympathetic ganglia and adrenal medulla by nicotine, causes vasoconstriction of the blood vessels⁽⁶⁾, decreasing oxygen carrying capacity⁽⁷⁾, endothelial changes of the blood vessels wall⁽⁸⁾, increase in the platelets adhesion⁽⁹⁾, and affects blood vessels diameter and erythrocyte velocity⁽¹⁰⁾. This effect presented in case no. 4, 53 years old male, presented with squamous cell carcinoma of lower jaw and buccal mucosa tethering to the skin, patient was heavy smoker (about 30 cigarette / day), when underwent surgery for excision of primary tumor enblock with RND and mobilized C.P.F. for external coverage, after 3 days the flap appeared congested and began to show marginal necrosis which was treated by local debridement and left to heal by secondary intention. This is in agreement with Becker⁽⁴⁾ and Wallis and Donald⁽²⁾. Also there are another four patients who smoked cigarette and have simple necrosis of the skin graft and marginal necrosis of the flap in others.

Flap design determined initially by recipient site requirements and secondary by donor site states.

Reconstruction of soft tissue of facial defects should provides a good color match, texture and hair bearing characteristics, adequately restore

facial contour, place scar in a favorable location and ideally accomplish these goals in single stage with minimal donor site morbidity. The cervicopectoral rotational-advancement flap is reliable to achieve these goals for the reconstruction of facial defects, as it composed from part of remnant of facial skin, cervical, neck and pectoral skin.

The flap require rotation or advancement of lower facial preauricular loose skin, which becomes more abundant with aging, also the neck is another useful region outside the face, neck skin is plentiful, has good color and texture, and easy to move, this fact was also identified by Wallis and Donald ⁽²⁾ by the use of C.P.F. in reconstruction of facial defects.

The forehead flap, time honored in external reconstruction of the face, has occasionally adapted for intra-oral, facial and cheek lining replacements ⁽¹¹⁻¹³⁾, and advocated for use as soft tissue covering the primary mandibular bone graft ⁽¹⁴⁾. This most useful flap however has certain disadvantages which are not present in the C.P.F.

The laterally based deltopectoral flap was introduced by Conley ⁽¹⁵⁾, for the resurfacing of the defect of the head and neck, but it was used as a skin flap only. Its advantages were that it furnished a large surface area and it may be elevated without a previous delay. Its disadvantages were that it must have a wide base at the shoulder, and it was too short to travel any region higher than the neck.

The medially based deltopectoral flap which developed by Bakamjian ⁽¹⁶⁾, is used for reconstruction of defect in the head and neck region below the orbit, zygomatic region, and for ensuring of viability of the elevated flap, it needs delaying procedure of 10 days–2 weeks, then 3 weeks for pedicle transfer, so this flap for complete transfer to area which needs reconstruction requires about 2 months to complete the treatment, and the area of donor sites requires skin grafting to close it. Another disadvantage of deltopectoral flap is long hospitalization of the patient with multiple operations, and uncomfortable position of the patient during pedicle transfer, as specific position of the neck for holding the pedicle to avoid tension and/or kinking of the pedicle to prevent trauma to the nutrient vessels of the flap.

The C.P.F. is easy to manipulated, gave good esthetic results in reconstruction of facial defects, required short time hospitalization and no need for multiple operations to transfer, mobilized of the skin from adjacent area to the face which is already exposed to outer environments as sun light and change in color that in face, and same

characteristic of the hair growth like in face. Also the C.P.F. similar in thickness and no need for debulking like in deltopectoral flap which needs debulking in many instances in separate procedure to recounting with facial layer.

The design of the flap in this study shares the neck incision of Lakdasa ⁽¹⁾ for neck dissection, which it provides excellent view for cervical content and wide surgical field exposure. The view involves the entire cervical area extending from mandible superiorly to the clavicle inferiorly and from cervical midline medially to the trapezius muscle laterally. It is easy to reach and deal with the cervical contents without needs for excessive traction and unnecessary trauma that may caused accordingly.

Also the advantages of using this design of neck incision for an access to the neck dissection for patient received radiotherapy before surgery, as the incision line does not very much affected by the radiotherapy. The horizontal limb of the incision done 2 cm below the mandible extended posteriorly reaching the mastoid tip, this gives good access to the submandibular area and extends 2 cm posterior to the anterior border of trapezius muscle vertically downward reaching the acroamioclavicular joint area, so horizontal incision provides excellent approach for mandibular resection if needed and also excision of intraoral tumor. The vertical limb will heal without contraction and webbing of the neck for location of incision line on the trapezius muscle and away from the underlying vital structures.

After excision of the primary tumor enblock with radical neck dissection, the vertical limb is extended over the anterior chest wall to involve the third or fourth intercostals space terminating at 2 cm laterally to the sternum to preserve the blood supply of the flap for mobilization of C.P.F.

This finding is in agreement with opinion of Wallis and Donald ⁽²⁾, who considered that the oncologic principles are not violated with this flap on excisional margins of primary tumor, not compromised for fear of creating too large surgical defect. They stated that the surgeon will have plentiful tissue with which to perform the reconstruction and the elevation of the flap in the neck is identical to that used in radical neck dissection operations and adequate access is gained to the whole of the neck dissection field. Also this finding is in agreement with Strauch et al. ⁽¹⁷⁾.

As a conclusion:

- 1- The flap gave a good access for radical neck dissection enblock with excision of the primary tumor, and at the same time mobilized it for reconstruction of the resulted defect.

- 2- The flap has provided to be highly reliable and has significant benefits as a rapid, simple and effective method for reconstruction of moderate to large size defects.
- 3- The design of the flap provides adequate covering and protection to the underlying structures.
- 4- The flap gives good cosmetic results on color matching with facial skin, texture and hair bearing area, with minimal complications.
- 5- The flap can tolerate the preoperative radiotherapy and adjuvant therapy.
- 6- Donor site of the flap can be closed primarily by direct suturing, and in limited cases are may need grafting of the donor area.

REFERENCES

1. Lakdasa D. A modified single flap for neck dissection in oral cancer. *Head & Neck* 1990; 12(1): 74-6.
2. Wallis A, Donald P. Lateral face construction with the medially based cervicopectoral flap. *Arch otolaryngol Head Neck Surgery* 1988; 114: 729-33.
3. Georgiate G, Riefkohl R, Levin L. *Georgiate plastic, Maxillofacial and Reconstruction surgery*. 3rd ed. Baltimore: William and Wilkins; 1997.
4. Becker DW. A cervicopectoral rotation flap for cheek coverage. *J Plastic Reconstruction Surgery* 1978; 61: 868.
5. Math S, Nahai F. *Reconstructive Surgery: Principles, Anatomy, and Technique* New York: Churchill Livingstone; 1997.
6. Reus W, Robson MC, Zachary L. Acute effects of tobacco smoking on blood flow in cutaneous micro-circulation. *Br J Plast Surg* 1984; 37: 213.
7. Astrup P, Kjeldsen K. Carbon monoxide, smoking and atherosclerosis. *Med Clin North Am* 1974; 58: 323.
8. Ress TD, Liverett DM, Guy CL. the effect of cigarette smoking on skin flap survival in the face lift patient. *Plast Reconstr Surg* 1984; 73: 911.
9. Tusr H, Daniller A, Straunch B. Neovascularization of skine flaps: route and timing. *Plast Reconstr Surg* 1980; 71: 597.
10. Fisher J, Wood MB. Late necrosis of a latissimus dorsi free flap. *J Plastic Reconstruction Surgery* 1984; 74: 274.
11. McGregor IA. The temporal flap in intra oral cancer: its use in repairing the post. excisional defect. *British hornal of Plastic surgery* 1963; 16: 318-35.
12. McGregor, I.A. The temporal flap in facial cancer. In ; 1964; Amsterdam: Expectra Medica. p. 1096-103.
13. McGregor IA, Reid WH. The user of temporal flap in the primary repair of full thickness defect in cheek. *J Plastic Reconstructive Surgery* 1966; 38: 1-9.
14. Milliard DR. Immediate reconstruction of lower jaw. *J Plastic and Reconstructive Surgery* 1965; 35: 60-75.
15. Conley JJ. the prevention of carotid artery haemorrhage by the use of rotation tissue flaps. *Ann Surgery* 1953; 54:186.
16. Bakamjian VY. At two stages methods for pharyngoesophageal reconstruction with a primary pectoral skin flap. *J Plastic Reconstructive Surgery* 1965; 36:173.
17. Strauch B, Vasconez L, Hall-Findlay E. *Grabb's encyclopedia of flaps* Philadelphia: Lippincott Williams & Wilkins; 1990.