

Periorbital Defect Reconstruction Following Malignant Tumor Resection

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ABSTRACT:

BACKGROUND:

Since the ocular adnexa contains almost every tissue type, any malignancy may occur in this area, however, the majority are carcinomas, from which basal cell carcinomas (BCC) are the most frequent, followed by; squamous cell carcinoma (SCC), sebaceous gland carcinoma, malignant melanoma. Reconstructing periorbital defects should aim at restoring functional as well as aesthetic improvement⁽¹⁾. Planning of the surgical reconstruction is tempered by several factors including; nature of the defect, integrity of the surrounding tissues, in some cases multiple choices of repair available making planning more complex, as in the medial canthal area⁽²⁾.

OBJECTIVE:

1. Analyze the most suitable methods of reconstruction of different periorbital defects of different sizes and in different sites.
2. Analyzing the incidence of recurrence and complications of tumors after surgical excision.

METHODS:

Thirty patients presented with 34 malignant lesion in the periorbital area. The lesions were excised surgically, and the post-excisional defects were classified into five zones in the periorbital area, and were reconstructed using different modalities of reconstruction.

RESULTS:

Out of the 34 lesions, basal-cell carcinoma formed the majority (52.9%), mainly nodular type. Squamous-cell lesions come next in frequency forming (23.5%). Baso-squamous (15%), other tumors (9%). The most presenting symptoms were: ulceration with or without infection (38.2%). Primary closure was done for (26.4%) of cases, same number was reconstructed by STSG. FTSGs formed (17.6%). Local flap used in (23.5%).

CONCLUSION:

In reconstructing periorbital defects; size of the defect, site and state of the surrounding tissues determine the mode of reconstruction. Flaps are superior to grafts in term of lower incidence of complications and aesthetic outcome, whereas grafts remain better to detect early recurrence.

KEYWORDS: Periorbital, eyelid tumors, basal-cell carcinoma, squamous-cell carcinoma.

INTRODUCTION:

Although the periorbital region form less than 1% of the body surface area, it usually require a detailed approach since it has a unique and complex anatomy. Besides their role in defining the facial appearance, eyelids play a very effective function in protecting the eye.^(3,4)

The incidence of malignancies in the periorbital region increases with the advancing age. About 5-10% of all malignancies reported to occur in the eyelids. Most common skin malignancies that occur in the eyelid skin are ; basal-cell carcinoma (BCC), followed in frequency by squamous-cell carcinoma (SCC), sebaceous gland carcinoma

(SGC), and lastly malignant melanoma (MM). Cutaneous malignancies of the eyelids carry a very significant morbidity, though the mortality is quite low.^(5,6,7)

Basal-cell carcinoma form about 90% of eyelid tumors. Occurring most frequently in the lower lids, followed by; the medial canthus, upper lid and lateral canthus, in consequence. Basal-cell carcinoma (BCC) is a slow-growing tumors that are locally invasive and destructive, meanwhile have low tendency to metastasize. About 1.6% of basal-cell lesions involve the orbit, leading to ‘‘ Exenteration ‘‘ (removing the whole contents of the orbit). The most common type of periorbital BCC lesion is the nodular type.^(8,9,10)

In this retrospective study we reviewed the types, site and outcome of peri-orbital tumor reconstruction.

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PATIENTS AND METHODS:

Thirty patients presented with 34 malignant lesions in the periorbital area. These lesions were diagnosed clinically and later on confirmed by histo-pathological examinations. The clinical record of these lesions included the followings;

Shape, size, site, number, recurrence, histopathological features and tumor extension both in lateral and deep margins of after excision. The post-excisional defects were classified according to their location in the periorbital region into five zones (*Table 1*);

Table 1 : Zones of the periorbital area.

Zone I	Upper lid
Zone II	Lower lid
Zone III	Medial Canthus
Zone IV	Lateral Canthus
Zone V	Outside the other zones but merge with them

The mean age of our patients was 37.5 years. Males represented 53.3% of cases, whereas females formed 46.6% of cases. Two thirds of cases were skin type II (very light brown) (according to Fitzpatrick scaling), and one third were type III (light brown). Urban areas represented 53.3% compared to 46.6% from the rural areas. Females formed the majority among the urban areas (68.7%), whereas males formed the majority among rural areas (71.4%). For those patients with suspicion of orbital involvement, magnetic resonance imaging MRI of the orbital area was done.

METHODS:

More than half of the procedures (61.7%) were done under local Anesthesia LA, (38.2%) of cases demanded general Anesthesia GA. The tumors were excised with safety margins according to the size and type of the lesion (5mm in basal-cell lesions, and 10mm in squamous-cell lesions), and sent for histo-pathological examinations.

Defects in zone I and II were classified into Partial- of Full-thickness defects, and also classified according to the percentage of the eyelid involved, into 4 sub groups; Less than 25%, 25-50%, 50-75% and 75-100%.

Defects in zones III, IV and V were further subdivided according to the absolute size of the resultant defect after excision of the tumor into 3 sub groups:

Defects of less than 2 cm², those of 2- 4 cm² and defects of more than 4 cm².

The treatment methods for defect reconstruction, included:

- Healing by secondary intention.
- Primary closure.
- Grafts (skin, mucosa, composite).
- Local flaps.

Regarding grafts; Split-thickness skin grafts (STSGs) harvested from the antero-lateral aspect

of the thigh, Full-thickness skin grafts (FTSGs) from the post-auricular, supra-clavicular and inner arm areas. Mucosal grafts taken from the buccal mucosa. Composite grafts (of skin and orbicularis oculi muscle) from the upper lid.

Local flaps used in the reconstructive procedures included: *V-to-Y advancement flap*, *Midline transposition flap (Glabellar flap)*, *forehead split-finger flap*, *cheek advancement flap*, and *Z-plasty flap*.

Mixed procedures were used in cases where resections resulted in defects that involved more than one zone, , ex.: resection of BCC in the medial canthus resulted in a defect that involved as well zones II and III after resection, reconstruction done using glabellar flap + cheek advancement flap + Z-plasty and mucosal graft. Lesions which involved the orbit required exenteration of the orbital contents with or without underlying bone resection (when the tumor found to be fixed to it). Lateral canthotomy was done as an ancillary procedure for 2 cases; one required primary closure of the eyelid defect, and the other used in combination with cheek advancement flap.

All of our patients were discharged the next day of surgery, keeping them on systemic antibiotics. For cases reconstructed with flaps, the dressings were changed the next day after examining the viability of the flap, whereas those reconstructed with grafts, the first COD done after one week.

All patients kept on regular follow-up period weekly for the first one month after operation, then monthly for 6 months to one year.

RESULTS:

The study included (30) patients who underwent periorbital defects reconstruction following tumor resection of (34) lesions. The mean age of patients was 37.5 years. Single lesions formed 86% of cases, whereas multiple lesions seen in 14%. Nine cases were Xeroderma pigmentosum

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(26.4%). The most presenting symptoms were: ulceration with or without infection (38.2%), followed by asymptomatic lesions in (34.9%), itching or itching + bleeding were the presenting symptoms in (23.5%) and (8.8%) respectively. The follow-up period was between 6 months to one year. We analyze our patients with regard to tumor histopathological type, multiplicity, presenting symptomatology, tumor site, defect size, type of the reconstructive procedure, tumor recurrence and complications according to the method of reconstruction.

Basal-cell carcinoma (BCC) represented 52.9% of all cases, among which *nodular* type formed

the highest percentage (61.1%), followed by *sclerosing* type (27.7%), *pigmented* type formed the rest. Squamous-cell carcinoma (SCC) formed up to 23.5% of all lesions, form which well-differentiated type formed 62.5%. Baso-squamous carcinomatous lesions represented 15% of all lesions, and other types of tumors formed 9% of the overall cases.

The highest percentage of lesions had been seen to be located in zone II, i.e. lower lid, (35.2%), 2/3rd of them were partial-thickness, and 1/3rd were full-thickness (of which half involved 25-50% of the horizontal length of the lower eyelid) . Zone III formed 29.4% of lesions. (Figure 1)

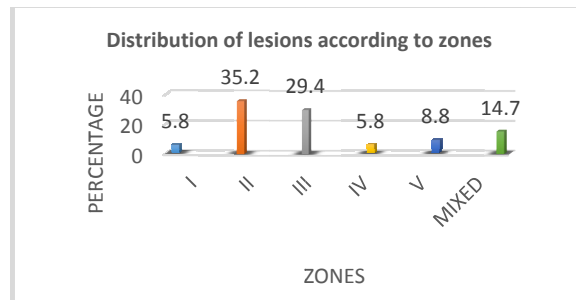


Figure 1: Distribution of lesions according to zones.

Two thirds of the lesions in zone III and all lesions in zone IV were less than 2 cm² in size. In five cases the lesion involved more than one area, of these, 3 involved both of zones II and III.

The reconstructive procedures done are shown in table 2 below;

Table 2

ZONE (S)	RECONSTRUCTIVE PROCEDURE					
	SECONDARY INTENTION	PRIMARY CLOSURE	COMPOSITE GRAFT	STSG	FTSG	LOCAL FLAP(S)
I	0	2	0	0	0	0
II	0	6	1	1	3	1
III	1	0	0	2	2	5
IV	0	1	0	0	1	0
V	0	0	0	3	0	0
II and III	0	0	0	2	0	1
II and IV	0	0	0	1	0	0
I, II and III	0	0	0	0	0	1
TOTAL	1	9	1	9	6	8
%	2.9	26.4	2.9	26.4	17.6	23.5

Primary closure was done for Nine defects (26.4%). Same number of defects was reconstructed by STSG. Eight defects closed by local flap (23.5%). FTSGs were used to reconstruct 6 defects (17.6%). Two defects were reconstructed by combined procedures, one of them by local flap (finger split forehead) together with buccal mucosal graft in zone I, II and III, the other defect was reconstructed by multiple

flaps (Glabellar, cheek advancement and Z-plasty flaps), together with mucosal graft in zones II and III.

Complications occurred mostly with Skin grafts in the form of partial loss, mainly STSG, and to a lesser incidence with local flaps. Partial dehiscence occurred in 3 flaps.

Recurrent lesions were 6 out of 34 (17.6%). Four lesions were basal-cell carcinoma, form which 2

were sclerosing type. Four of the recurrent lesions (2/3rd) were treated originally by

surgical excision, 1/3rd by radiotherapy. Two lesions were Xeroderma pigmentosum cases.



A case of BCC in the medial canthus. An example of healing by Secondary intention
 a) Before b) After



A case of pigmented BCC in the medial canthus. An example of reconstruction by FTSG.
 a) Before b) After

DISCUSSION:

Still, reconstruction of the periorbital region presents one of the major challenges in plastic surgery, since it required special construction and a complete understanding of its special and unique anatomy. The first step in reconstruction is; defect analysis, to determine the specific anatomical missed part, followed by, a reconstructive plan according to patient's need. (11, 12, 13)

In our study, the most common lesion was BCC, forming (52.9%), squamous lesions SCC formed (23.5%). Among the BCC lesions, the highest percentage was of the nodular type (61.1%), this result was consistent with a study by Spinelli et al (14), who reported 62.5% of his 90 cases study were basal-cell carcinomas. While in Somen M. et al study, basal-cell carcinoma reported in 17.3% of the 92 cases studied (15) (Table 3).

Table 3

BASAL-CELL CARCINOMA	OUR STUDY	SOMEN et al	SPINELLI et al
	52.9%	17.3%	62.5%

We reported no case of malignant melanoma in our study, this is consistent with other studies which confirmed that the malignant melanoma is a rare lesion, though it carries a considerable morbidity and mortality (16). Histological positive margins (deep and/or lateral) reported in 10 lesions (29.4%), which is a relatively reasonable percentage taken into consideration the absence

of frozen section control during surgical resection. Among these positive biopsies, 3 were SCC, 3 baso-squamous, and 4 were BCC, this is probably due to more conservative approach for excision of BCCs.

Our surgical excision was done depending on the presumptive clinical diagnosis and possible safety margins, beside the experience of

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the surgeon. The highest percentage of lesions occurred in zone II (35.2%), this finding is consistent with other studies which showed that the lower lid (zone II) is the most frequent area to be involved by malignant tumors.

FTSGs used mainly for zone II and III. For zone III flaps were the main procedure used. Flap reconstruction gives better aesthetic results in zone III than that of grafts, the rapidity with which the malignant tumor spread into the deep

orbital structures makes the graft (specially STSG) superior in order to detect early recurrence which may be obscured by using thick and bulky flap.

In a study conducted by Yuce et al ⁽¹⁾, they reviewed 177 periorbital region defects, the treatment options were; 43% of patients primary closure, 22% had grafts, and 35% of cases had flaps. (comparison with our study shown in table 4).

Table 4

Type of Procedure	Our Study	YUCE et al ⁽¹⁾
Primary Closure	26.4%	43%
Grafts	46.9%	22%
Flaps	23.5%	35%

CONCLUSION:

In reconstructing periorbital defects, choice of the procedure must be tailored according to the defect size, site and status of surrounding tissues. Flaps generally are superior to grafts being lower in complications, and better in aesthetic outcome, while grafts are better in detecting early tumor recurrence.

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