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LOCAL FLAPS AND FULL-THICKNESS SKIN GRAFTS FOR MEDIAL CANTHAL REGION RECONSTRUCTION: A CLINICAL EXPERIENCE

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Abstract:

Introduction: The medial canthal region, above the medial canthal tendon, is where the upper and lower eyelids, eyebrows, and nose converge. Its skin varies in color, texture, and thickness, remaining thin, supple, and concave around the periorbital area. These anatomical complexities pose challenges for reconstruction after skin cancer excision.

Aim: This paper presents our five-year experience in reconstructing medial canthal defects using glabellar and nasal flaps, as well as full-thickness skin grafts (FTSG).

Material and methods: At our hospital, 32 patients underwent medial canthal reconstruction using a single flap: glabellar flap (85%), rhomboid flap (9%), or full-thickness skin graft (FTSG) (6%). Satisfactory outcomes were achieved, including favorable pathology findings (mostly basal cell carcinoma), no recurrence, and good aesthetic results.

Conclusion: Our findings highlight a clear preference for local flaps as the first choice in medial canthal reconstruction. As a one-stage procedure, they achieved satisfactory aesthetic results, with both the reconstructed and donor sites becoming acceptable to patients over time. When patient health or defect size posed limitations, full-thickness skin grafts (FTSG) served as a viable alternative**.**

Key words: medial cantal region, local flaps, glabellar flap, Limberg flap, full-thickness skin grafts

Introduction

The nose has a complex structure with three layers: skin, mucosa, and a supporting framework of bone and cartilage (1). For surgical purposes, Millard's classification—refined by Burget and Menick in 1985—divides the nose into eight aesthetic subunits: dorsum, side walls, tip, alar lobule, soft triangle, and columella (Picture 1.A) (2, 3). This division aids in precise reconstruction, helping surgeons plan procedures that preserve both function and appearance for optimal outcomes (Fig 1.A) (4).

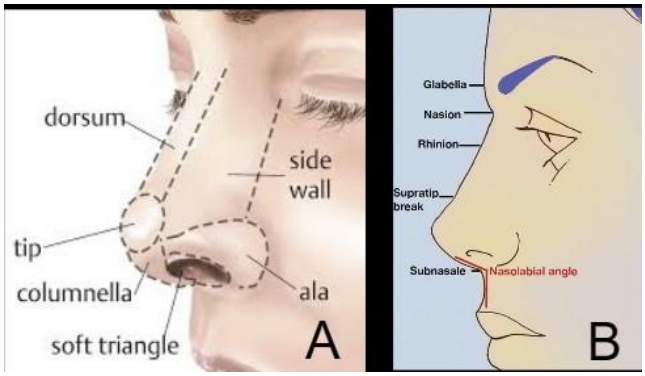

Figure 1. A. Nasal aesthetic subunits B. Nasion is the middle point of the nasofrontal suture; rhinion, nasal tip

Nasal subunit borders are ideal for scar placement, as incisions along these natural lines help conceal scars. Reconstructing a full subunit with uniform color and texture usually offers better aesthetic results. If over 50% of a subunit is lost, removing the remainder and reconstructing the entire subunit often improves outcomes (5, 6).

Jomah J et al. (2019) reported mean nasal skin thickness of 3.96 ± 1.08 mm at the nasion, 1.86 ± 0.62 mm at the rhinion, and 3.32 ± 0.78 mm at the nasal tip and columella (3.32 ± 0.79 mm). A significant difference was observed in columella thickness between men and women (Fig. 1.B) (7).

Medial Canthal Region (MCR): The medial canthal region, where the eyelids, eyebrows, and nose meet above the medial canthal tendon, has thin, supple skin with varied color, texture, and curvature. Its complex anatomy poses significant challenges for surgical reconstruction.

AIM: This paper presents our five-year experience in reconstructing medial canthal defects using glabellar and nasal flaps, as well as full-thickness skin grafts (FTSG)

Patients and methods

Over a five-year period (2015–2019), 32 patients underwent medial canthal reconstruction at the University Surgical Hospital in Skopje. A procedure used a single flap, either a glabellar flap, rhomboid flap or full-thickness skin grafts (FTSG). Satisfactory results were obtained including with pathology findings (mostly with basal cell carcinoma), no recurrence and aesthetic results.

Surgical technique

The medial canthal defect was shaped and measured based on the skin lesion and the planned reconstruction approach. The defect was typically oval when a glabellar flap or full-thickness skin graft (FTSG) was used, whereas a rhomboid flap was selected for rhomboid-shaped defects. The size and shape of the defect were carefully measured before reconstruction.

When a glabellar pivotal flap was utilized, preoperative markings were made on the glabella, ensuring that the width and length of the flap, after transposition, would adequately cover the defect. The procedure was performed under local anesthesia at the subcutaneous level, with the flap being transferred and sutured to the defect site while adjusting its shape to achieve optimal coverage (Fig. 2).

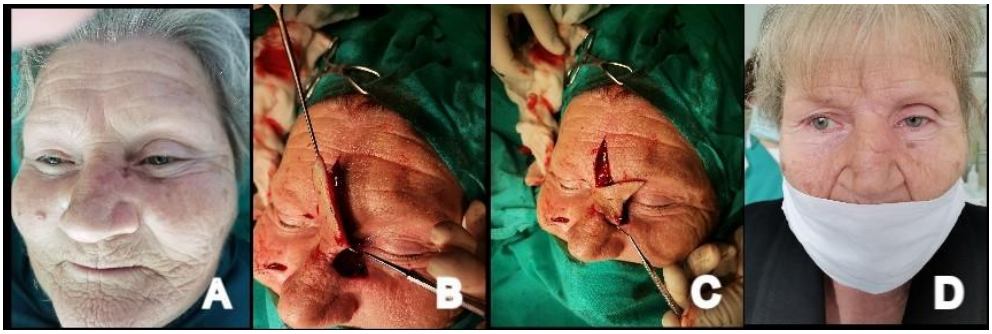

Figure 2. A 75-year-old patient with basal cell carcinoma in the medial canthal region (A) underwent reconstruction using a glabellar flap: (B) – raised flap; C) – flap placed at the defect site. Two-year postoperative results are shown (D).

RhomboidLimbergflap:

Excision of the lesion is performed using a symmetrical rhomboid shape. The rhomboid consists of two angles measuring 120° and two measuring 60°. The flap is designed along one diagonal of the rhomboid, with the second incision made parallel to one of its sides, extending from the adjacent nasal tissues (Fig.3). The lengths of the sides of the rhomboid and the flap are equal. The elevated flap, raised at the subcutaneous level, is then positioned over the defect and sutured into place (Fig.3,4)

Figure 3. Diagram of Limberg Flap: Diagram showing the markings for a rhomboid flap: The rhomboid has two 120° angles and two 60° angles. The flap is designed along one diagonal, with the second incision made parallel to one of its sides.

Case A: A 72-year-old patient with skin carcinoma at MCR (1), reconstruction with rhomboid flap (2).

Case B: A 59-year-old patient with basal cell carcinoma at MCR (1) and reconstruction with a rhomboid Limberg flap (2). Results after 2 years (3).

Figure 4. Case C: A 76-year-old patient with skin carcinoma in the medial canthal region (1). The procedure involved marking the area, applying local anesthesia, and excising the lesion (2). Next, a flap was elevated (3) and placed over the defect (4). The flap was then sutured in place (5), and a follow-up appointment was scheduled for one month later (6, 7).

Full-Thickness Skin Graft (FTSG): Indications for the use of a full-thickness skin graft (FTSG) include medium to large, more superficial defects. Following the creation of a defect template, a full-thickness skin graft is harvested from a donor site in the supraclavicular region on the same side. After defatting, the graft is carefully sutured into place using single sutures. The graft is then covered with Vaseline gauze and a small piece of polyurethane foam to minimize dead space beneath the graft. The dressing and sutures are typically removed after seven days (Fig.5)

Figure 5. A 78-year-old patient with a nodular basal cell carcinoma in the medial canthal region (A) underwent reconstruction of the defect using a full-thickness skin graft (FTSG) (B).

All procedures in this study were conducted as single-stage, inpatient procedures under sedation. Samples were sent for pathology examination, and patients were monitored postoperatively for 24 to 48 hours before discharge. Sutures were removed 7 to 14 days after surgery.

Results

There were 32 patients with a mean age of 75 years. There were 22 males and 10 females. All cases were performed under local anaesthesia with sedation. (Table 1). Single stage closure of the defect was achieved in all case. In 85% we used glabellar pivotal flap, and the rest were rhomboid flap and FTSC. One case with wound dehiscence and one case for reoperation for trimming the flap. In all cases the cosmetic appearance was satisfactory to the surgeons and patients. There were no intraoperative complications. Pathology findings were almost in all cases except one, with Basel Cell Carcinoma, and there was no recurrence.

Table 1.

Number of patients for nasal skin carcinoma (2015 to 2019)	(179)
Patients with carcinoma of the cutis at the medial canthal region	32 (32) 17.87%
Mean age	**75 (52-80)**
Male:female	22:10 (**68.75%**% : **31.25**%)
LA:GA	32:0
Glabelar Pivotal flap alone Rhomboid flap Limberg Full-thickness skin grafts (FTSG)	27 (84.36 %) 3 (9.37 %) 2 (6.37%)
Complications	Intraoperative 0 Postoperative major 0 minor 2 (6.25%)
Pathology findings	Basal cell carcinoma 31(96.78%)

	Bengin tumor 1(3.12%)
Reoperation	1 (trimming of the flap)

Discusion

Due to its anatomy and skin characteristics, the reconstruction of defects in the medial canthal region is challenging. Most procedures for reconstructing these defects can be performed under local anesthesia, which offers several advantages. According to Bordianu et al., (8) facial skin cancer surgery under local anesthesia significantly reduces health care costs compared to general anesthesia.

Additionally, using local and loco-regional flaps allows for optimal shape and volume during facial reconstruction, minimizing operative time and, consequently, hospitalization.

In our study, all procedures were conducted as inpatient surgeries. The primary reasons for this approach include the location of the lesions near the eye, the size of the lesions, and occasionally the presence of comorbidities in the patients. All reconstructions were performed under local anesthesia with sedation.

Various methods are employed for nasal reconstruction, primarily utilizing skin from the nose, the dorsum or sidewalls, the glabella, or the frontal region. According to Lohuis et al.(9), the goal of reconstructive nasal surgery is not only to restore all or part of the nose but also to integrate the new and existing tissues to achieve the best possible aesthetic outcome. While numerous reconstructive options are available, local or regional skin flaps stand out as one of the most effective tools for addressing cutaneous nasal defects.

Skin from the dorsum of the nose is most commonly utilized for reconstruction, as it is thinner and more flexible, allowing it to adapt more effectively to the concavity of the canthal region. Additionally, the skin thickness from the dorsum is closer to that of the medial canthal region, making it a suitable choice for this type of repair (10).

Among the reconstruction techniques, transposition flaps, such as the Limberg flap (or rhomboid flap) (11), are frequently employed.

Leatherbarrow et al. (12) conclude that the rhomboid flap is a simple and effective technique for medial canthal reconstruction across various defects. It is minimally invasive, quick to perform, and can be done under local anesthesia with minimal complications and can be combined with other medial canthal and periocular procedures. The donor site is closed over the bridge of the nose, resulting in a scar that becomes inconspicuous within weeks.

Skin from the sidewalls of the nose can also be used for reconstruction, as it is thin and more mobile. Some authors recommend using bilobed flaps for covering defects, as they provide a versatile option for achieving good aesthetic results (13).

Skin from the glabella region is thicker, which can lead to bulkiness at the roof of the nose—an aspect some patients initially dislike (14). However, over time, most patients become accustomed to it and no longer notice the difference.

For large defects, full-thickness skin grafts (FTSG) can be utilized. In a study by Lee MH et al. (15), which compared local flaps and skin grafts for reconstruction in the medial canthal region, it was concluded that there were no statistically significant differences in outcomes between the two methods when local flaps were not feasible. This indicates that neither approach is inherently more effective for medial canthal reconstruction.

Furthermore, Kesiktas E et al.(16) highlighted the challenges in reconstructing medial canthal defects following tumor excision due to the thin skin of the area and the concavity of anatomical landmarks that encase complex structures such as the medial canthal ligament and the lacrimal system. Among various reconstruction methods discussed, secondary healing was noted as a possible approach to local reconstruction. In our study, patients who experienced wound margin dehiscence were allowed to heal by

secondary intention, demonstrating one option for managing such complications in this delicate region. In addition to this, full-thickness skin grafts and skin flaps from the frontal, transnasal, glabellar, and upper eyelid regions, or a combination of two local flaps, are also valuable techniques for addressing wide defects in the medial canthal region.

In our study, a vast percentage of the reconstructions were performed using local flaps, as we deemed this the most appropriate surgical method for reconstructing defects in the medial canthal region, taking into account various factors including the patient's overall health, the size and depth of the defect, and the degree of involvement of surrounding structures. FTSGs are more suitable for superficial lesions. Most of the patients admitted to our hospital had presented several months after their initial tumor excision, resulting in more advanced defects.

In our cohort, 84% of the reconstructions were glabellar pivotal flaps, 9% were Limberg rhomboid flaps, and 6% involved FTSGs in two cases. There were no significant complications, although two minor cases experienced marginal necrosis that healed by secondary intention. Pathology findings indicated that 97% of the cases were basal cell carcinoma. Additionally, there was one reoperation due to the bulkiness of the glabellar flap, highlighting the need for ongoing assessment of reconstructive outcomes in this complex anatomical area.

Conclusion

Selecting the right surgical technique for reconstructing defects in the medial canthal region involves multiple considerations, including the size and depth of the defect as well as the patient's overall health. Our findings indicate a clear preference and greater confidence in using local flaps for this type of reconstruction. In cases where the patient's health or the defect's size were limiting factors, full-thickness skin grafts (FTSG) served as a viable alternative. Local flaps, offered as a one-stage procedure, produced satisfactory aesthetic results. Over time, both the reconstructed site and the donor site of the flap became acceptable to the patients.

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