

# A Good Option For Medial Canthal Region Defects: Purse String Closure

## Medial Kantal Bölge Defektleri İçin Uygun Bir Seçenek: Purse-String Kapama

Gaye TAYLAN FİLİNTE,<sup>a</sup>  
Serkan YILDIRIM,<sup>a</sup>  
Mehmet İker BİLGİÇ,<sup>a</sup>  
Deniz FİLİNTE<sup>b</sup>

<sup>a</sup>Clinic of Plastic, Reconstructive and Esthetic Surgery  
Dr. Lütfi Kırdar Kartal Training and Research Hospital,

<sup>b</sup>Department of Pathology,  
Marmara University Faculty of Medicine,  
İstanbul

Geliş Tarihi/Received: 26.01.2012  
Kabul Tarihi/Accepted: 29.08.2012

Yazışma Adresi/Correspondence:  
Gaye TAYLAN FİLİNTE  
Dr. Lütfi Kırdar Kartal Training and Research Hospital,  
Clinic of Plastic, Reconstructive and Esthetic Surgery, İstanbul,  
TÜRKİYE/TURKEY  
gayetaylan@yahoo.com

**ABSTRACT Objective:** Reconstruction of the defects in the medial canthal region are often challenging for the plastic surgeons because of the particular properties of the surrounding skin. Although there are several reconstructive options reported for this region, there is no single procedure that achieves the best result. In this paper we reported the use of the purse string closure method in medial canthal region defects. **Material and Methods:** Eight patients with lesions in the medial canthal region were operated in our clinic. All of the defects were closed with the purse string method. Sutures were removed after 3 weeks and patients were followed for 6 to 36 months (median:16.5 months). **Results:** All of the lesions were diagnosed as basal cell carcinomas. In the early postoperative period, 4 patients complained about skin tension and restriction of eyelid movements, one patient additionally had a minimal wound dehiscence. Eyelid movements and skin tension improved at the end of 1<sup>st</sup> week. The wound dehiscence healed after the 2<sup>nd</sup> week without any intervention. Rugae formation and skin distortion disappeared within 6 to 8 weeks. No tumor recurrences were observed. **Conclusion:** The convenience and the facility of the method to deal with complications offers a good choice for reconstruction of the defects in medial canthal region.

**Key Words:** Carcinoma, basal cell; skin neoplasms

**ÖZET Amaç:** Medial kantall bölge defektlerinin rekonstrüksiyonu çevre dokunun özelliklerinden dolayı plastik cerrahlar için genellikle zordur. Her ne kadar bu bölge için bildirilmiş birçok rekonstrüksiyon seçeneği olsa da en iyi sonuca ulaştıran tek bir metot yoktur. Bu makalede medial kantall bölge defektlerinde kullandığımız purse-string kapama yöntemini bildirmekteyiz. **Gereç ve Yöntemler:** Kliniğimizde medial kantall bölgede defekti olan 8 hasta ameliyat edildi. Tüm defektler purse-string yöntemiyle kapatıldı. Dikişler 3 hafta sonra alındı ve hastalar 6-36 (ortalama:16,5 ay) ay boyunca takip edildi. **Bulgular:** Tüm lezyonlar patolojik olarak bazal hücreli karsinom olarak teşhis edildi. Erken postoperatif dönemde 4 hasta cilt gerginliğinden ve gözkapığı hareketlerinde kısıtlılıktan şikayet etti. Ayrıca bir hastada az miktarda yara ayrışması oldu. Birinci haftanın sonunda göz hareketleri ve cilt gerginliği gerilerken, yara ayrılması 2. haftanın sonunda kendiliğinden iyileşti. Katlantı oluşumu ve cilt bozukluğu 6-8 hafta arasında düzeldi. Tümör nüksü gözlenmedi. **Sonuç:** Bu tekniğin uygunluğu ve komplikasyonlarla başedebilmesi, medial kantall bölgedefektlerinin rekonstrüksiyonunda iyi bir alternatif olarak karşımıza çıkmasına neden olur.

**Anahtar Kelimeler:** Karsinom, bazal hücre; deri neoplazmları

Türkiye Klinikleri J Med Sci 2013;33(2):339-43

Defects of the medial canthal region frequently appear after tumor excision. In an effort to obtain good functional and aesthetic results considering delicate properties of this area, the characteristics of the skin must be preserved as much as possible. The skin of this region is thinner than the surrounding tissues and thicker than the eyelids. Also lack

of redundant tissue prevent primary closure in many patients.<sup>1</sup>

The reconstructive procedure which respects the esthetic boundaries of this region and favors closure under minimal tension is usually the most preferred option. Peled et al. were the first to describe the purse string closure in plastic surgery.<sup>2</sup> This type of closure is generally used for reconstructing circular or oval defects after removal of skin cancers. It allows use the tissues surrounding the defect, and provides total closure of the defect or at least reduces its size to enable secondary healing or grafting.

In this paper, we report the use of purse string closure for defects of medial canthal region of elderly patients operated for skin cancers.

## MATERIAL AND METHODS

Eight medial canthal defects were reconstructed with purse string closure method. All of these defects were due to skin cancer resection. After removal of the lesions, round or oval defects were left. The surrounding tissues were minimally (<0.5 cm) undermined. In most of the cases, we preferred 3/0 suture materials and 4/0 polypropylene for skin types with more laxity. Sutures were removed at the 3<sup>rd</sup> week. Details of tumor type, age, gender, defect size, results and complications were recorded (Table 1). Written informed consents were obtained from all patients.

**Case 1:** A 50-year-old female patient suffering from nonhealing ulcer in her right medial canthal region for 6 years was referred to our clinic. After initial examination, the lesion was prediagnosed as basal

cell carcinoma (BCC) and excised with safety margins of 0.3 cm under local anesthesia. After excision of the tumor, an oval defect of 2.2x1.7cm was left. The defect was totally closed with the purse string method. The patient complained from tension in suture lines and rugae formation. All of her complaints improved after 5 weeks. Histopathologic examination of the lesion demonstrated BCC. No recurrences were observed after 3 years (Figures 1-3).

**Case 5:** A 70-year-old female patient complained of nonhealing ulcers in her right medial canthal and right temporal regions. Both lesions were excised with 0.5 cm safety margins. Temporal defect (3.4x1.8 cm) was closed primarily and 2.1x1.5 cm sized medial canthal defect was closed with the purse string method, under local anesthesia. Sutures were removed at the 3<sup>rd</sup> week. Slight tissue distortion, which was demonstrated in the early postoperative period, resolved after 6 weeks. Pathological examination confirmed the prediagnosis of BCC. No recurrences were observed at the end of 2 years (Figures 4-6).

## RESULTS

The ages of the patients ranged between 50 and 82 years (median 67 years). All lesions were diagnosed as BCC after pathological investigation. The follow up time was 6-36 months (median 16.5 months). All defects were totally closed with the purse string closure technique. The sutures were left in place for 3 weeks and removed afterwards. No recurrence or major complications were seen in the follow-up period. One patient had minimal wound dehiscence which healed secondarily after 2 weeks with wound therapy. Four patients complained of

TABLE 1: The patients' data.

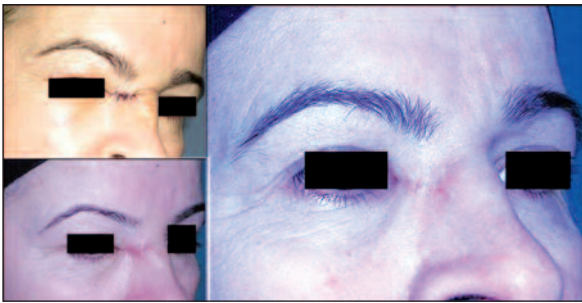
Patient	Age	Sex	Defect size (cm)	Tumor type	Complication	Results	Follow up period (months)
Patient 1	50	Female	2.2x1.7	BCC	No	Good	36
Patient 2	52	Female	1.8x2.1	BCC	No	Good	18
Patient 3	62	Male	1.6x1.0	BCC	No	Good	12
Patient 4	64	Male	1.4x0.9	BCC	No	Good	15
Patient 5	70	Female	2.1x1.5	BCC	No	Good	24
Patient 6	72	Female	0.9x1.3	BCC	Wound dehiscence	Good	6
Patient 7	76	Male	1.0x1.0	BCC	No	Good	12
Patient 8	82	Female	2.3x1.6	BCC	No	Acceptable	21



**FIGURE 1:** Preoperative (left), intraoperative (upper right) and early postoperative (lower right) views of patient 1.  
(See for colored form <http://tipbilimleri.turkiyeklinikleri.com/>)



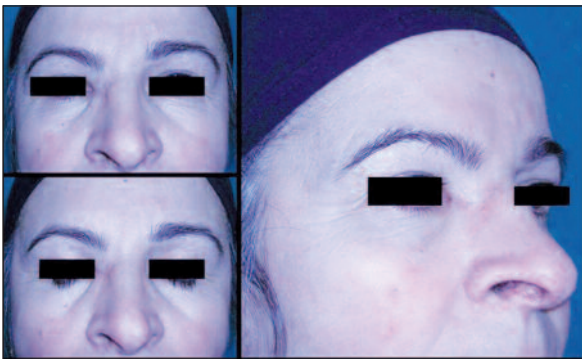
**FIGURE 4:** Preoperative view of patient 5 (left), early postoperative oblique and anterior views (upper right and lower right).  
(See for colored form <http://tipbilimleri.turkiyeklinikleri.com/>)



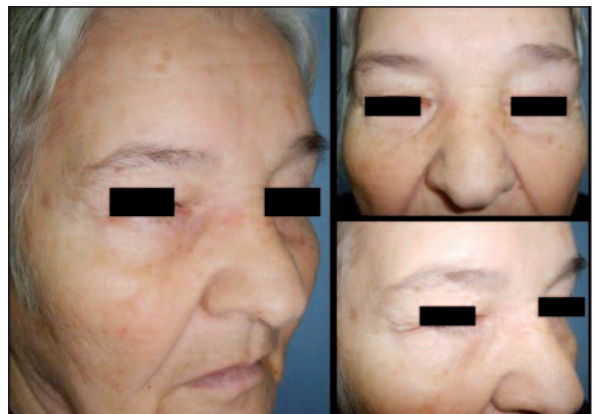
**FIGURE 2:** Postoperative 7<sup>th</sup> day (upper left), 3<sup>rd</sup> week (lower left) and 6<sup>th</sup> week (right) of patient.  
(See for colored form <http://tipbilimleri.turkiyeklinikleri.com/>)



**FIGURE 5:** Postoperative 6<sup>th</sup> week of patient 5; oblique view (left), anterior view (right).  
(See for colored form <http://tipbilimleri.turkiyeklinikleri.com/>)



**FIGURE 3:** Postoperative 6<sup>th</sup> month of the patient. Anterior view (upper and lower left) and oblique view (right).  
(See for colored form <http://tipbilimleri.turkiyeklinikleri.com/>)



**FIGURE 6:** Postoperative 6<sup>th</sup> month of the patient. Oblique view (left), anterior view (upper right). Postoperative 1<sup>st</sup> year (lower right).  
(See for colored form <http://tipbilimleri.turkiyeklinikleri.com/>)

the restriction of upper eyelid movement because of eyelid edema which resolved spontaneously at the end of the first week.

Edema seen in immediate postoperative period resolved after 4-6 weeks. Complete resolution of rugae formation was observed after 4 weeks, as well.

Patients were asked to rate the final aesthetic result after 6 months as “good”, “acceptable” or “bad”. Seven (87.5%) patients stated the final result as good, and 1 (12.5%) patient as acceptable.

## DISCUSSION

Traditional methods of medial canthal region reconstruction includes primary closure, local flaps and skin grafting.<sup>1</sup> Because of the lack of adequate surrounding tissues, the primary closure of the defect can be performed rarely without distortion of the surrounding esthetic units. The anatomic features of the medial canthal region necessitate special attention. The skin and the subcutaneous tissues are different in thickness from the surrounding skin. The skin of the medial canthal region is thinner than the normal skin and thicker than the eyelids. The concavity of the medial canthal region usually hides the scar formation. When underlying structures, especially the bone is exposed, regional flaps are the excellent choices for reconstruction. Vascularized portion of the skin covers the defect effectively and facilitates healing. Superior defects of the inferior canthal region can be covered by transposition flaps elevated from the upper or lower eyelid. In addition, sliding flaps can be planned from both eyelids. All of these flaps can be used for covering smaller defects. Unfortunately, these techniques involve incisions crossing the concavity formed by the junction of eyelids and lateral nose, with a risk of webbing if scar contracture develops.<sup>1</sup> The mid forehead and glabellar flaps also effectively cover the defects in canthal region. Yildirim et al. offered the combined use of glabellar and nasolabial V-Y advancement flaps for large medial canthal defects.<sup>3</sup> Although their combination is useful for large defects of medial canthal region, these methods have more donor site morbidity when compared to the single flap closure methods. When performing a local flap in these defects, it must be noted that, thicker tissues that are used for the closure can obscure recurrences in deeper structures and can cause progression of the disease.

Reali et al. reported the use of a myocutaneous flap elevated from the upper lid, which they combined with the Mustarde’s rotational flap from the

lower lid and cheek. They advocated that no complications such as ectropion, lymphedema or lid lag were observed in a follow-up period of 6 months.<sup>4</sup> Shotton has reported the use of a rhomboid shaped flap in medial canthal area.<sup>5</sup> Taylan et al. have reported the use of sliding orbicularis oculi myocutaneous flap after medial canthal tumor excision with optimum esthetic results as well.<sup>6</sup>

Another reconstructive option is skin grafting of this area. Because of poor cosmetic appearance and the risk of contracture, split thickness grafting should be avoided. Although most of the results of full thickness grafting are excellent in medial canthal region, color mismatches may deteriorate these results. In addition, contractures can cause webbing around the canthal angle. Despite its disadvantages, grafting should be preferred in patients with higher risk of recurrence.

Gibson and Kenedi were the ones that first described the viscoelastic properties of the skin in 1967.<sup>7</sup> They described two main properties of the skin as mechanical creep and stress relaxation. Mechanical creep is the property of the skin, that when a constant force is applied for a time, the skin stretches beyond its limits. The result of the creep is stress relaxation. When skin is stretched for an adequate time, the force applied for the stretching decreases. Depending on this knowledge, Peled et al. first described the use of purse string method in plastic surgery.<sup>2</sup>

Several authors reported the use of this method in various anatomic locations with different suturing techniques. Patel et al. have used the “round block” modification of purse string method effectively in 75 patients with skin cancer in the head and neck region.<sup>8</sup> Kilic reported that the pre-suturing and suturing of two different levels in dermal layer can be used in closure of larger defects.<sup>9</sup> Mulliken et al. used the purse-string closure technique in 25 patients of hemangioma excision to obtain the smallest possible scar.<sup>10</sup> Ciatti and Greenbaum notified a modification with bilateral advancement and circumferential tissue recruitment in addition to extensive undermining of the wound edges.<sup>11</sup> In editorial commentary of this ar-



ticle, Grabski and Farley criticized the need for extensive undermining of the wound edges.<sup>12</sup> Weisberg and Greenbaum reported new modifications after this critique, including reduction in defect size by purse-string method without any undermining.<sup>13</sup> They closed the final defect with half buried and horizontal mattress sutures. Bartsich and Schwartz have used the purse-string method for immediate umbilical reconstruction after urachal cyst resection.<sup>14</sup> Dang and Greenbaum introduced the star-shaped modification of this method by excising triangles from the four opposite sides of the round shaped defect.<sup>15</sup>

Although the purse string closure method had been used in different anatomical locations, we could not find any report about this type of closure in medial canthal region. We know that, this method has many advantages; it is simple, inexpensive, and can be performed by unexperienced surgeons. Depending on the skin laxity, final cosmetic results are quite good. When the technique fails, it allows the other reconstructive options to be performed. There is no donor site morbidity. In case of a recurrence of the tumor, if traditional flap closure or grafting was used in the management of defects, removal of graft or flap tissue becomes necessary. However in purse string closure, there is no need for a local flap or graft sacrifice. Despite these advantages, purse string closure can only be applied on circular and oval defects, its convenience de-

pends on the skin laxity. It can distort the surrounding structures with rugae formation in the early postoperative follow up. According to biological properties of the skin, the rugae formation and distortion usually resolves after 3 weeks. Four of our patients complained from restriction of eyelid movements and tension in medial canthal skin and one patient had a minimal wound dehiscence that healed secondarily. All complaints improved at the end of the 6<sup>th</sup> week of the follow up period.

We performed this closure technique in elderly patients because they have more skin laxity than those younger patients do. All defects were totally closed with minimal undermining. Because of the same type of tissue has been used, esthetically, the results are accepted as satisfying by both surgeons and patients. It is not unsound if one comments that defects greater than 2.5 cm-wide may result in less than optimal results. Not only the defect size but the patient's skin characteristics also effect the final cosmesis. Therefore, it is better to prefer this technique in defects less than 2,5 cm in width and in old patients with loose skin. We do not recommend this technique in young patients with tight skin quality.

When it is applicable, the purse-string suture closure offers a low complication rate, and good cosmetic results. The surgeon may use the technique as an alternative treatment option for closure of medial canthal region defects in selected cases.

## REFERENCES

1. Custer PL. Trans-nasal flap for medial canthal reconstruction. *Ophthalmic Surg* 1994;25(9):601-3.
2. Peled IJ, Zagher U, Wexler MR. Purse-string suture for reduction and closure of skin defects. *Ann Plast Surg* 1985;14(5):465-9.
3. Yildirim S, Aköz T, Akan M, Cakir B. The use of combined nasolabial V-Y advancement and glabellar flaps for large medial canthal defects. *Dermatol Surg* 2001;27(2):215-8.
4. Reali UM, Chiarugi C, Borgognoni L. Reconstruction of a medial canthus defect with a myocutaneous flap. *Ann Plast Surg* 1993;30(2):159-62.
5. Shotton FT. Optimal closure of medial canthal surgical defects with rhomboid flaps: "rules of thumb" for flap and rhomboid defect orientations. *Ophthalmic Surg* 1983;14(1):46-52.
6. Taylan G, Akan M, Avci G, Aköz T. [Optimum aesthetic results with sliding orbicularis oculi myocutaneous flap after medial canthal tumor excision]. *Turkiye Klinikleri J Dermatol* 2005;15(1): 6-10.
7. Gibson T, Kenedi RM. Biomechanical properties of skin. *Surg Clin North Am* 1967;47(2):279-94.
8. Patel KK, Telfer MR, Southee R. A "round block" purse-string suture in facial reconstruction after operations for skin cancer surgery. *Br J Oral Maxillofac Surg* 2003;41(3):151-6.
9. Kiliç A. Presutured purse-string suture and second purse-string suture for both reduction and closure of skin defects. *Plast Reconstr Surg* 2002;109(5):1758-60.
10. Mulliken JB, Rogers GF, Marler JJ. Circular excision of hemangioma and purse-string closure: the smallest possible scar. *Plast Reconstr Surg* 2002;109(5):1544-54; discussion 1555.
11. Ciatti S, Greenbaum SS. Modified purse-string closure for reconstruction of moderate/large surgical defects of the face. *Dermatol Surg* 1999;25(3):215-9; discussion 219-20.
12. Ciatti S, Greenbaum SS. Modified purse-string closure for reconstruction of moderate/large surgical defects of the face. *Dermatol Surg* 1999;25(3):215-9; discussion 219-20.
13. Weisberg NK, Greenbaum SS. Revisiting the purse-string closure: some new methods and modifications. *Dermatol Surg* 2003;29(6):672-6.
14. Bartsich SA, Schwartz MH. Purse-string method for immediate umbilical reconstruction. *Plast Reconstr Surg* 2003;112(6):1652-5.
15. Dang M, Greenbaum SS. Stellate purse-string closure. *Dermatol Surg* 2000;26(5):495-6.