

AESTHETIC RECONSTRUCTION OF THE HAIRLINE WITH LOCAL TISSUE

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Abstract. Hairline is a crucial landmark in facial aesthetics. Its restoration in terms of position, continuity and hair growth is of a paramount importance in facial plastic aesthetic and reconstructive surgery. The purpose of the paper is to demonstrate the effectiveness of using local tissue only in the restoration of skin and soft tissue defects affecting the hairline. A brief retrospective analysis of clinical cases with defects engaging the hairline was made. The majority of the patients (20 out of 22) were operated because of skin lesions of different entities. In 7 of the cases the direct closure technique was applied as a surgical tool for hairline restoration and in 15 of them rotational flaps were the best reconstructive option. A special emphasis is put on the defect size in regards of choosing the right surgical technique for defect closure in order to achieve the best aesthetic outcome in the hairline restoration.

Key words: hairline, scalp, rotation flap, post-excisional defect

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INTRODUCTION

Scalp is an area which poses a unique challenge for the plastic surgeon because of its specific structure and low laxity. Hairline is a crucial landmark in human face and facial aesthetics [1]. Its restoration in terms of position, continuity and hair growth is of a paramount importance in facial plastic surgery [2-4]. Scalp defects affecting the hairline may result from trauma, thermal or electrical burns, resection of benign or malignant tumors, infections, osteoradionecrosis, or congenital lesions. Even small partial-thickness defects of the area may be left to heal by secondary intention, a significant contracture may result, and the scar may have limited or no hair growth with distortion of the hairline

[5]. Larger partial-thickness defects in aesthetically important areas such as the forehead and hairline in particular, usually require surgical repair [6].

The aim of the present study is to demonstrate the effectiveness of the hairline restoration with local scalp tissue and what technique could give best results regarding the defect size.

PATIENTS AND METHODS

A retrospective analysis based on the clinical records and photo-documentation was made recruiting patients of the authors' practices with anterior scalp defects affecting the hairline for a period of three years. Demographic and medical information on the patients was collected, including age, regular hab-

its, comorbidities, current and past medication, and family history, diagnosis and size of the defect to be reconstructed. As an exclusion criteria bone engagement and/or intracranial penetration of the defect were selected.

Both written and verbal consent were obtained from all the patients for the surgical procedure, possible risks and complications, and the utilization of the patients' personal data and photos.

The patients were operated under general anesthesia or local anesthesia with sedation. In all the cases a local infiltration solution containing 1% lidocaine and 1:100 000 epinephrine was applied. All the reconstructions were performed in one stage with local tissue only recruited from the scalp. For the surgical wound closure skin stapler and monofilament sutures were applied. The follow-up protocol was as follows: for the oncology patients a 6-months follow-up was established by the plastic surgeon who has performed the reconstruction; afterwards an oncologist or dermatologist has continued the follow-up process. For non-oncology patients a minimal follow-up of 1 month was made by the plastic surgeon.

RESULTS

A total of 22 patients with age range between 39 and 68 (mean age 54,95 y) (Figure 1) were operated for the selected period of the study. In 15 of them, a

skin cancer was the reason of the reconstruction and in the majority of cases it was histologically proven basal cell carcinoma (BCC) (n = 14); only one of the cases was intervened because of a low grade spinal cell carcinoma (SCC) (n = 1). The rest of the patients presented to the clinic with either benign (n = 5) or traumatic lesions (n = 2) as a reason for the hairline repair. In the series the post-excisional defects varied between 1.5 cm and 4.8 cm. All the defects were reconstructed in a single stage procedure by applying two main techniques: direct closure (n = 7) and local pivotal flaps (n = 15). Direct closure has shown to be the technique of choice where the defects were no more than 2 cm in diameter (Figure 2) and for the rest of the cases pivotal rotation flaps were applied (Figure 3). The postoperative period was uneventful and all of the patients were discharged from the hospital on the same day or on the day after the surgery. Surgical wound in all the cases healed by primary intention and the skin staples and stitches were removed between 6th and 11th postoperative day. Histology study of the malignant lesions confirmed the radicality of the tumor removal in all the 15 patients affected by skin malignancies.

In all of the cases full anatomic and aesthetic reconstruction of the hairline was achieved and 100% of the patients of the present study were satisfied by the final result.

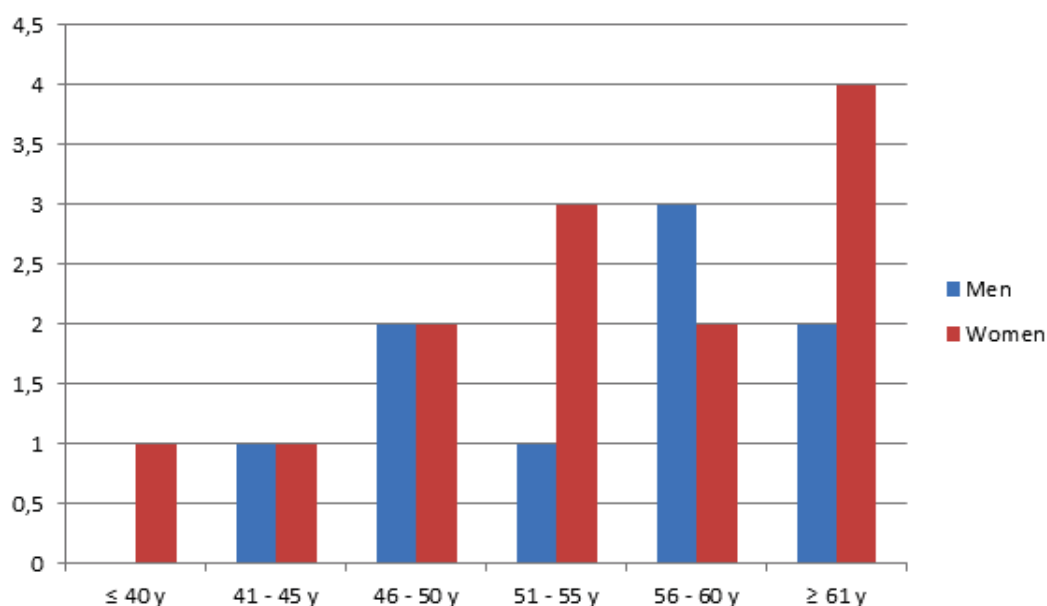


Fig. 1. Patients' distribution by age and sex at the time of the surgery

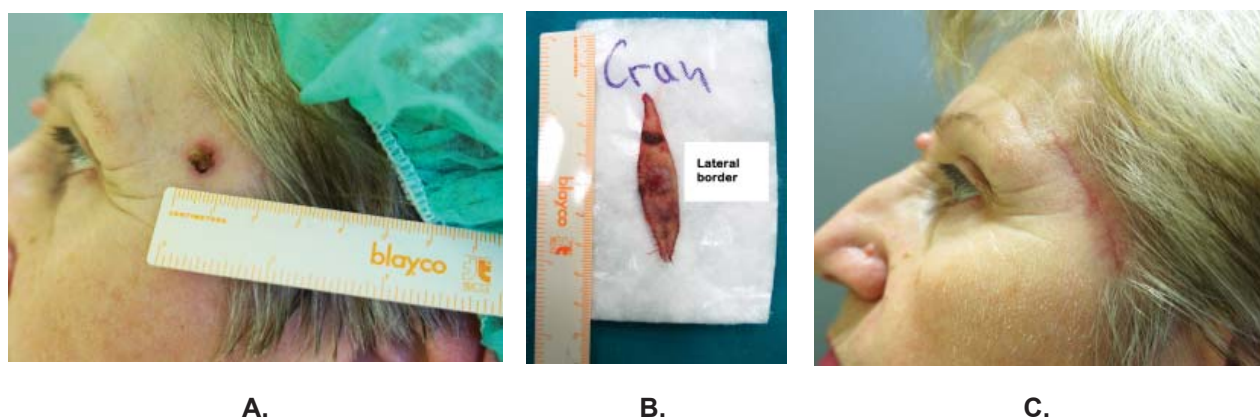


Fig. 2. Direct closure technique for hairline repair. **A.** A 55-year-old patient with BCC in the hairline area (part of the hair is removed in order to demonstrate the lesion). **B.** Excision sample: note how extensive is the long axis of the ellipse to permit direct closure without distortion of the area. **C.** Surgical outcome at 1 month: the scar is still red and visible but the hair is growing out of it

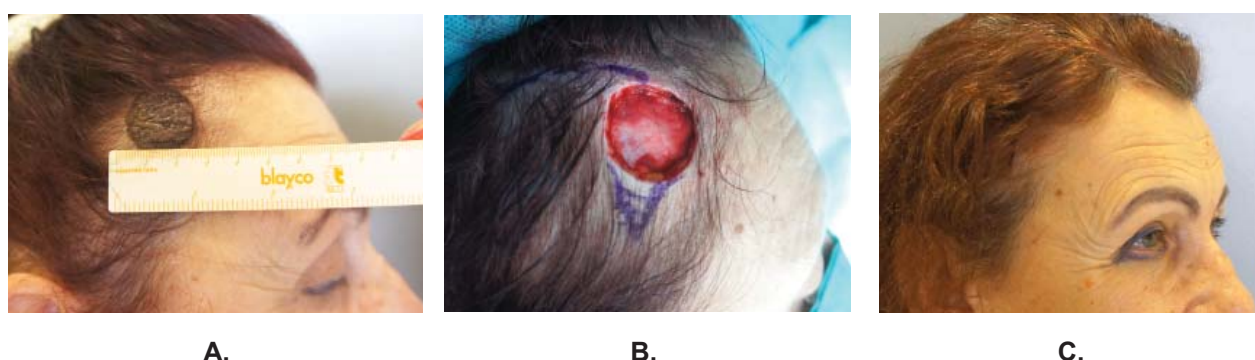


Fig. 3. Rotation flap for hairline restoration. **A.** A 59-year-old patient presented with skin lesion suspicious for malignant degeneration; **B.** Post-excisional defect and planning of the rotation flap to be used for repair; **C.** Postoperative outcome at 6 weeks: hairline is completely restored and the scar is hidden in the hair bearing scalp

DISCUSSION

The scalp has the thickest skin on the human body. Its thickness not only varies across the surface of the head but also may change throughout the life [7]. If the hair thins, as in male-pattern baldness or pathological alopecia, scalp thickness significantly decreases. From the other hand, the scalp mobility is different in the different areas, which fact is of great importance in choosing the right surgical technique for defect closure especially when the hairline is affected. Because the flaps are more distensible in the relatively loose regions like the forehead area, flaps can often be designed over the underlying musculature to repair certain defects. For defects of up to 3 cm in diameter in the scalp direct closure could be a good option as stated by other authors [6-8]. In our study the maximum defect size that has been reconstructed by direct closure was of 2 cm in diameter. We attribute this to the main focus of our work: the reconstruction of the hairline which was not the main one of Mueller et al and Hoffmann in their studies. When dealing with de-

fects affecting the hairline, the main goal is to limit the extension of the final scar. Having in mind that in order to close directly a circular defect of 2 cm, one should first convert it to an elliptical one with the long axis being at least 6 cm (ratio 1:3) [9], it is obvious why in our study the maximum defect size for direct closure was 2 cm and not more, as opposed to the studies cited above. From the other hand, when using pivotal flaps in hairline reconstruction, the operative planning is the most important moment prior to the surgery and rotation flaps give an excellent opportunity for that aim [5-7, 10, 11]. One important fact which makes the planning easier is that the relaxed skin tension lines (RSTLs), that are always taken into account in order to achieve minimal scarring and good aesthetic outcome, are missing on the scalp [7, 10, 12]. This allows the surgeon to make the right design in order to have a smooth and straight hairline with no hair loss because of the surgery and scarring process (Figure 3).

Speaking of defect size in oncology cases, one should always be aware that the defect size per se is not the most important issue but the radicality

of the excision. In our study the selected clinical cases were of early skin cancer, basically BCC, which means that post-excisional defects would not be too deep or too extensive. Reconstruction of those complex defects in particular were the main focus of other previous studies of ours [9, 10]. It makes impression that only two of the cases in our study were traumatic; all of the rest were malignant skin lesions or benign skin lesions with suspicion of being malignant. That is because, as reconstructive surgeons and dermatologist respectively, the main focus of author's daily work is particularly this type of pathology. Logically, in respect to that, the mean age of the patients in the present study is nearly 55 y.

CONCLUSION

The hairline is an important landmark of the human face. When affected by tumors or trauma effort should be made to restore its continuity and position. For defects not larger than 2 cm in diameter direct closure could be a good surgical solution. In larger defects or in difficult cases rotation flaps are the best option for achieving good aesthetic and functional outcome recruiting hair-bearing scalp tissue from the non-affected neighboring area.

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