

## SURGICAL RECONSTRUCTION IN SCALP DEFECTS

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**SURGICAL RECONSTRUCTION IN SCALP DEFECTS (Abstract):** In scalp injuries the choice between use of a transposition flap, a rotation flap or other types of plasty is most often influenced by the size and nature of the defect. The study refers to 14 patients with scalp defects operated between 1997-2003, most of them (83%) after tumour excision. 6 patients needed more than two operations because of tumour relapse. We used for reconstruction: rotation flaps in 8 cases, transposition flaps in 5 cases, trapezius musculocutaneous flap in 3 situations and free omentum transfer in 3 patients. Tumoral relapse occurred in 5 cases, although the initial excision was correct, including bone whenever necessary and radiotherapy added. Scalp reconstruction may be difficult in wide defects and need a complex medical team when tumours are involved.

**KEY WORDS:** SCALP RECONSTRUCTION, SCALP DEFECTS, ROTATION FLAPS, TRANSPOSITION FLAPS

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### INTRODUCTION

The scalp is unique as structure and shape: anatomically, it is described as an organ based on a rigid, flat aponeurosis and consisting in thick skin, penetrated by hair, nourished by a rich vascular network, situated in the subcutaneous tissue [1].

*Frontalis* and *occipitalis* muscles activate the scalp through a tendinous apparatus, called *galea aponeurotica*. The arteries of the scalp originate peripherally and ascend to the vertex. Thus, the main flaps used in scalp reconstruction have the base peripherally. This rich vascular network offers the possibility of free flap transfer or scalp replantation.

The size and shape of a scalp defect decides the type of reconstruction flap. Another important element in pre-op planning is the nature of the defect. If the initial lesion is a tumour, the wide and deep excision, including bone sometimes, dictates a complex reconstructive technique. The integrity of the remaining scalp and its area are very important in choosing the type of the flap for covering the defect.

A large variety of reconstruction techniques has been described as the rich vascularization of the scalp and its vicinity with wide areas of well-nourished skin (cervical or back regions) made this possible.

### MATERIAL AND METHOD

The paper analyses a number of 14 patients (3 females and 11 males), aged between 37 and 85 years, operated within a period of 6 years (1997-2003). 9 patients were operated for scalp tumours and 5 cases presented post-injury defects.

We performed pathological examination and CT for all patients, arteriography for 3 patients and MRI in 2 cases.

In 6 cases we had to perform several reconstructions due to tumoral relapse. 1 female patient presenting a basal cell carcinoma of the scalp needed a number of 8 operations during 12 years.

All tumoral excisions were performed by the neurosurgeon and respected the safety limits, regarding both the lateral borders and the anatomical layers. Whenever it was necessary, the bone was also excised and radiotherapy was added.

In 2 cases the tumor involved *dura mater*; we replaced this structure with a *fascia lata* graft.

As a reconstruction technique we used local flaps whenever the remaining scalp permitted (8 *rotation flaps* and 5 *transposition flaps*) or miocutaneous distant flaps (3 *trapezius flaps*) when scalp resources were extremely reduced. 3 patients (2 males and 1 female) with several scalp reconstructions for post-tumoral defects needed microsurgery techniques; in these cases we chose to perform *free omentum flaps* due to its qualities [2].

All operations were performed under general anaesthesia and the patient's position on the operating bed was lateral or prone.



**Fig. 1: A 78 yo male with a squamous cell carcinoma**



**Fig. 2: Omentum flap**

## DISCUSSIONS

Scalp defects may be very complex and difficult to reconstruct, especially in post-tumoral status.

Regarding our cases with post-injury defects, usually the remaining scalp was wide enough and its vascular network allowed a good reconstruction using local flaps.

One special case needs to be mentioned: a 78 year old male (Fig. 1), who suffered repeated trauma of the scalp (vertex region) and developed a squamous cell carcinoma within 5 years after the last trauma. Another problem of this patient was the quality of the remaining scalp: balled and very poor vascularized; we performed an arteriography which indicated a high level of atherosclerosis, so local flaps were not safe enough. Therefore we used a free omentum flap transferred (Fig. 2) on external carotid artery (termino-lateral anastomosis), as temporal artery was not useful [2].

Regarding the patients who presented tumours, the therapy was complex in most of the cases.

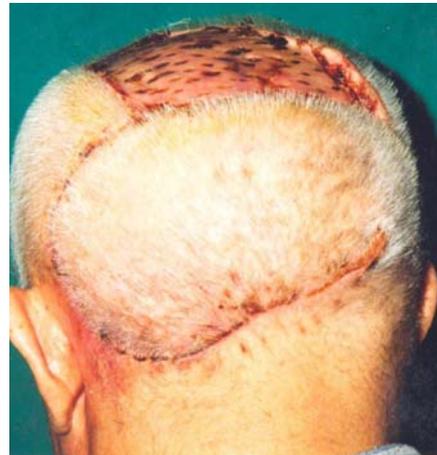
There were 9 cases with scalp tumours: 2 basal cell carcinomas (females), 1 sarcoma (male, 85 yo) (Fig. 3, 4) and 6 squamous cell carcinomas (males, 45-82 yo). 2 patients developed carcinoma on a post-burning scar and 3 developed this lesion after a severe or repeated trauma of the scalp.

In only one case with scalp tumours (squamous cell carcinoma) bone was not involved.

All patients presented late for examination and therapy, years after the first macroscopic lesion was noticed on the scalp; usually the tumour was very big (diameters between 6 - 12 cm) and therefore it was difficult to excise the tumour respecting oncological principles.



**Fig. 3: A 85 yo male with scalp sarcoma**



**Fig. 4: A 85 yo male with scalp sarcoma after scalp reconstruction**

In one case (male, 64 yo) the patient developed a squamous cell carcinoma on a wide post-burning scar localized in his left temporal region. The tumour penetrated the zygomatic fossa (Fig. 5) and went through the base of the skull; finally, it reached the brain. We performed a wide excision, including bone and a segment of *dura mater* and we replaced them by *fascia lata* graft and great omentum free flap. The patient died one month post-op due to a cerebral embolism.

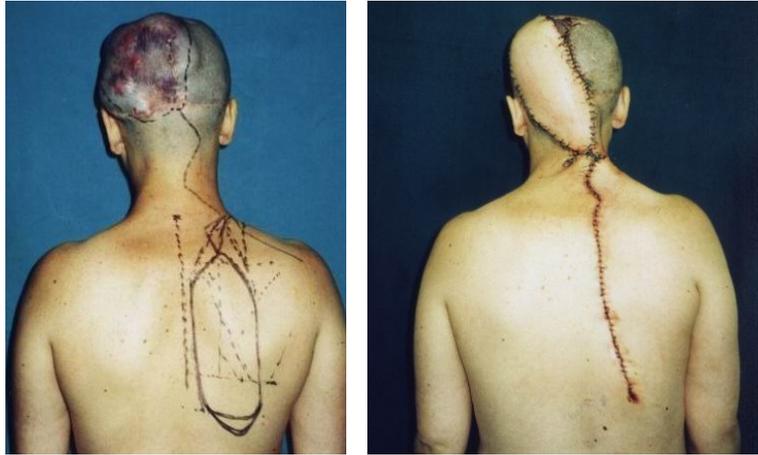


**Fig 5: Squamous cell carcinoma on a wide post-burning scar localized in the left temporal region. Reconstruction after wide resection by fascia lata graft and great omentum free flap**

Another special case is that of a young woman (37 yo when the tumour was first noticed) who was operated three times in other services. She developed a basal cell carcinoma in the occipital region. We performed 7 operations during 11 years of evolution because of the relapses.

The tumoral excision, always performed by the neurosurgeon, respected the safety margins and included bone during the last four operations. We reconstructed the soft tissues

using: local rotation flaps (the fourth operation) as the tumour was bigger and thicker, pedicled myocutaneous (trapezius) flap [3] (Fig. 6) (for the fifth and the sixth operations) and, finally, free omentum flap. The patient is still alive and during all this time she maintained her professional activity in the same place. The last relapse penetrated over the *dura mater*, covering the superior longitudinal sinus and determined some visual disturbances, which settled down after the operation. We managed to conserve *dura mater* and protected this structure with a *fascia lata* graft and great omentum flap.



**Fig. 6: Reconstruction with pedicled myocutaneous (trapezius) flap**

We noted one small skin necrosis in the case of the second trapezius flap performed for the reconstruction of the scalp defect (the 37 year old female with occipital basal cell carcinoma); we managed it with a small skin graft.

The major complication noted was the relapse of the tumour, although we performed the correct therapy.

### CONCLUSIONS

1. Scalp reconstruction depends on the nature and the area of the defect
2. Various reconstruction techniques have been described: local flaps, banana-peel technique [4], distant myocutaneous flaps, free flaps.
3. The quality of the remaining scalp is decisive for performing a local flap.
4. For tumoral defects the relapses are frequent due to their aggressivity or late presentation of the patients
5. Scalp reconstruction may be difficult in wide defects and need a complex medical team when tumours are involved.

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