

Reconstruction of the scalp using a pinwheel flap. A Case Report

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Case Report

Plastic Surgery



Background

Scalp abnormalities constitute a big problem when it comes to reconstructive surgery because they are typically the result of oncological resection, trauma, burns, or infections. Depending on the patient's age, the extent of the defect, and where the defect is located, the surgeon has access to a wide variety of reconstructive procedures that can be used to treat these concerns. Primary closure, free flap, and non-free flap approaches, as well as healing by secondary intention are all included in these methods. The pinwheel flap method entails the lifting of four small rotation flaps that are spaced at an angle of ninety degrees from one another and converge into a flaw in the middle of the flaps. It is thought that this method can be used effectively to close circular flaws that are found on the scalp.

Keywords: Scalp reconstruction, Scalp defects, Scalp flaps

The head and neck region is the area of the body most commonly affected by skin tumors, particularly the scalp and the top part of the face. When it comes to sealing postoncological circular skin defects in these areas, there are a few different local flap choices that can be utilized; the majority of them are fitted to the defect by employing either rotation, transposition, or advancement techniques. It is possible for local flaps to induce distortion of the surrounding tissues, most notably in the temporal hairline and the eyebrow. Additionally, the technical specifics of flap design can be problematic at times. The local flap techniques can be roughly divided into single and multiple categories. Multiple flaps include, but are not limited to, the double rotation flap, triple rotation (pinwheel) flap, and V-Y-S plasty. Single flaps include advancement, rotation, and transposition flaps, among others; multiple flaps include rhomboidal, double rotation, and triple rotation flaps. The reconstruction of scalp abnormalities that range in size from medium to large is intrinsically challenging. The shape of the skull is generally convex, but this can vary depending on the patient and the region. Even though the layers of the scalp are extremely vascular, the galea aponeurosis is inelastic and the layers of the scalp are thick, which limits closure in specific locations. In addition, the unique difficulty of maintaining the integrity of a patient's hairline while saving the hair-bearing scalp presents itself as a problem in terms of cosmetics. Due to the weak flexibility of the scalp, even relatively tiny abnormalities can be difficult to close. This is in contrast to other parts of the head and neck region,

which can have local flaps applied to them in order to close larger defects. The design of the pinwheel flap incorporates rotation as well as advancing movements of several dermal skin flaps. Since its debut in 1978, when it was first presented by Vecchione and Griffith.

Pinwheel flap

Pinwheel flaps, a variant of the O-Z rotational flap, can include anywhere from three to four limbs, allowing for deeper undermining and further advancement to achieve tension-free closure. The limbs are created to be between 1 and 1.5 times the diameter of the defect in order to successfully close circular flaws. Because of the dense underlying galeal aponeurosis in the vertex region, this flap is ideal. Monopedicled advancement or simple rotation flaps are not possible.

Anatomy

Several anatomy textbooks and new review articles describe the structure of the scalp in detail. The mnemonic SCALP makes it easy to remember the layers of the scalp: S is for skin, C is for subcutaneous tissue, A is for the aponeurotic layer, L is for soft areolar tissue, and P is for the pericranium. The blood vessels, lymphatics, and nerves all run through the layer of skin just below the galea. The galeal aponeurosis, which is the strongest part of the head, is connected to the two pairs of frontalis muscles, the two pairs of occipitalis muscles, and the temporoparietal fascia. The subgaleal fascia, the

From the Plastic Surgery Service at Hospital Central Norte PEMEX, Mexico City, Mexico. Received on July 5, 2023. Accepted on July 10, 2023. Published on July 11, 2023.

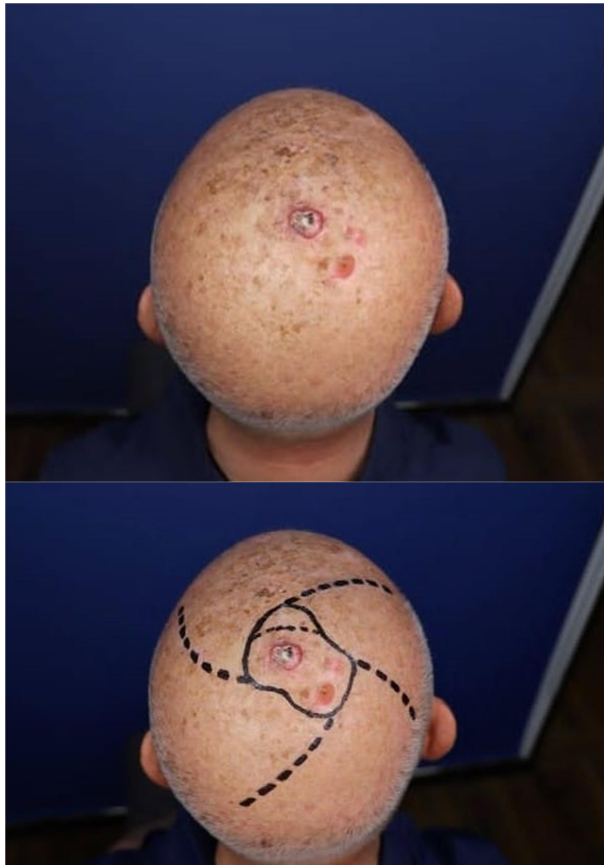


Figure 1. Basocellular Carcinoma and Preoperative Marking for Pinwheel flap.

innominate fascia, and the subaponeurotic plane are all names for the open areolar tissue plane. This plane has loose areolar tissue that lets the head move. The pericranium is tightly attached to the skull, so it should be kept in place during reconstruction of the scalp. This will allow for "back-grafting" of the donor site or alternative reconstruction if a local tissue transfer fails. The scalp gets its blood from the internal and external carotid systems through arterial branches and vena comitantes in four different vascular regions. With extensive collateralization of these vascular regions, a single vascular anastomosis can be used to replant the



Figure 2. Basocellular carcinoma.



Figure 3. Transoperative resection.

whole scalp. The supraorbital and supratrochlear arteries are the last branches of the internal carotid system that go to the anterior region. The supraorbital comes out of the supraorbital notch, which is right in the middle of the limbus. Most of the time, the supratrochlear arteries start in the same plane as the medial canthus. The superficial temporal artery, which is the last branch of the external carotid system, brings blood to the lateral territory. This is the biggest of the vascular territories. The blood flow to the back of the head changes depending on where the nuchal line is. The occipital arteries supply blood to the back of the head from the head to the nuchal line. The perforating branches of the trapezius and splenius capitis muscles bring blood to the back of the head below the nuchal line. The posterior auricular artery, which is part of the external carotid system, gives blood to the posterolateral area, which is the smallest.

Case report

In this article, we detail the case of a male patient who was 71 years old and had basocellular skin cancer when he presented to our reconstructive



Figure 4. Surgical tissue excision.



Figure 5. Surgery outcome.

surgery clinic. The patient had no history of past medical conditions and, other than that, was in excellent health. During our inspection, we discovered a lesion in the occipital scalp region that measured 4 centimeters and had satellite lesions. Following the removal of the lesion, a repair using the pinwheel flap was performed.

Discussion

Closing moderately large circular skin defects on the scalp has been documented using a broad variety of local flaps, the vast majority of which are advancement, rotation, and transposition flaps, the employment of which necessitates wide-field dissection of the surrounding normal tissues and hence imposes some degree of distortion on the anatomical subunits. Damage to uninvolved tissues and anatomical components is kept to a minimum because of the pinwheel flap's ability to efficiently mobilize all of the tissue surrounding the defect. Pinwheel flaps designed by Vecchione and Griffith have diameters twice as large as the flaw to prevent tethering while in motion. They also noted that the inelastic nature of the scalp necessitates full mobilization of the flaps in order to achieve successful closure of the defect. To protect the supragaleal vascularization, this method necessitates a subgaleal plane of incision on the scalp.



Figure 6. Final surgical outcome three months after surgery,

To address scalp defects in general and those in the central area in particular, we think this form of flap is excellent due to the mixed movement component and the considerable coverage that reconstruction with this type of flap may offer. As an added bonus, this method provides more stable coverage and reduces the number of days a patient must spend in the hospital (especially helpful for the elderly), while also simplifying postoperative follow-up and outpatient wound care.

Conclusion

Because of the structure's severe lack of elasticity, treating defects of the scalp can be just as difficult as treating defects located anywhere else in the head and neck region. When the faults are larger, the challenges that need to be solved during reconstruction become much more difficult. The pinwheel flap was able to close the defect in our case, and it is a viable alternative for reconstructing larger scalp defects using a local flap, as it produces outstanding cosmetic outcomes. In addition, the pinwheel flap is a local flap option.

Acknowledgements

I would like to take a moment to express my gratitude to everyone on this team for the excellent work that they all contributed in order to develop such an impressive case report.

Conflicts of interest

There are no conflicts of interest declared by the authors.

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