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EVALUATION OF LOCAL AXIAL FLAPS IN SCALP DEFECTS RECONSTRUCTION

By

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ABSTRACT

Background: The scalp consists of specialized tissue composed of dense hair follicles and inelastic thick galea aponeurotica, unlike other tissues of the body. Reconstruction of the scalp can be challenging because of the convexity of the underlying skeleton, the inelasticity of the galea, and the paucity of the adjacent tissue, which make even small defects difficult to close.

Objective: To evaluate the local axial flaps used in reconstruction of the different scalp defects in terms of feeding vessels, arc of rotation, and flap dimensions.

Patients and Methods: Twenty patients between 5-68 years old who had medium to huge scalp defects caused by burn, trauma and malignancy were subjected to this study at Al-Azhar University Hospitals (Al-Hussein and Al-Sayed Galal) to evaluate the effect of local axial flaps in them in terms of stable coverage of the defects with similar hair-bearing tissue, re-creation of the hairline, matching skin thickness, color and minimal donor site morbidity.

Results: Non-expanded rotational and expanded advancement flap were the most used flaps, and the least used was the transposition flap. Minor complications included: seroma happened in 3 patients (25.0%) and graft loss in 2 patients (10%). Distal flap necrosis occurred in 3 patients (15%), TE Exposure in 2 patients (10%), wound dehiscence in 2 patients (10%), and ischemic necrosis of skin over the expander happened in 1 patient (5%).

Conclusion: Reconstruction of scalp defects with local flaps is a safe, relatively short and simple procedure unlikely to cause any major complications or demand special postoperative care. In cranial or dural defect, a local scalp flap is the reconstructive method of choice. Application of local axial flaps indicates that complications were quite rare and did not extensively affect the survival of the flaps.

Keywords: Local Axial Flaps - Scalp Defects Reconstruction.

INTRODUCTION

The scalp is the thickest skin in the human body which covers the pericranium and protects the intracranial structures. Scalp defects may be caused by various etiological factors such as tumor extirpation, infection, burns, trauma, or congenital lesions leading to significant surgical and aesthetic concern *(Srivastava and Gupta, 2020)*.

Scalp is an area which poses a unique challenge for the plastic surgeon because of its specific structure and low laxity *(Yordanov et al, 2018)*.

Although seemingly straightforward, the reconstruction of the scalp has

required creativity and innovation from surgeons throughout medical history. Creating a balance of appropriate coverage of underlying structures and maintaining cosmoses is oftentimes challenging. The scalp can be a limiting factor in reconstruction. It is difficult to match in terms of thickness, color, and density of hair follicles. As a result, the best tissue type for scalp reconstruction is the scalp itself *(Genden, 2012)*.

The goal of reconstruction for scalp and forehead defects is to achieve a stable coverage with acceptable aesthetic results. Donor site morbidity should be minimal. A stable coverage of the bone, or the brain in case of bone loss, is of utmost importance. Cosmetic considerations at the scalp include an adequate contour and hair growth. The latter cannot be achieved with free or distant pedicled flaps *(Lutz, 2010)*.

The reconstructive surgeon involved in scalp reconstruction has to pay particularly close attention to the location of the hairline and the use of flaps so the normal hairline is not disrupted. Successful scalp reconstruction often requires intraoperative use of the intrinsic viscoelastic properties of skin, specifically, stress relation and creep *(Fernandes, 2015)*.

The decision making process behind a successful outcome requires a solid knowledge of anatomy, a clear evaluation of the defect and the knowledge of a variety of reconstructive options available. Multiple reconstructive options exist that include: primary wound repair, healing by secondary intention, use of skin grafts, local flaps, regional myocutaneous flaps, and micro vascular free flaps, tissue expansion *(Islam et al, 2015)*.

Elderly patients with poor general condition and comorbid disorders or the patients with advanced malignancies are poor candidates for complicated, long lasting and staged surgical procedures. These patients require safe, reliable and durable defect covering a quick manner *(Egemen et al, 2012)*.

Local flaps have the advantage of good reliability, low donor site morbidity, good color match, hair-bearing skin, Adequate blood supply, can be used as ‘life boats 'for salvage surgery, Useful in the presence of infection, Bulky, good solution because of the decreasing occurrence of alopecia and a relatively short operative time *(Costa et al, 2016)*.

The present work aimed to evaluate the local axial flaps used in reconstruction of the different scalp defects in terms of feeding vessels, arc of rotation, and flap dimensions.

PATIENTS AND METHODS

This study was implemented based upon the approved ethics of the ethical research board (ERB) of the Faculty of Medicine, Al-Azhar University, Cairo, Egypt. Prior to study proceeding, all patients assigned informed consents after the obvious explanation of the possible adverse events, and the potential risks of the surgical intervention. The informed agreements were gained from the included participants.

This was a prospective non controlled randomized interventional study done and conducted at Plastic and Burn Surgery Department of Al-Azhar University

Hospitals (Al-Hussein and Al-Sayed Galal).

The study consisted of 20 patients at the age 5-68 y.o which had scalp defects and were evaluated for the effect of local axial flaps in them in terms of stable coverage of the defects with similar hair-bearing tissue, re-creation of the hairline, matching skin thickness, color and minimal donor site morbidity. This was to obtain the best possible results after the procedure in terms of aesthetic results, post procedure pain score, post procedure complications and time to return to normal activities.

Inclusion criteria:

- Patients with scalp defects either isolated or associated with other head and neck defects
- Age: Any age group was included.
- Sex: Both gender.
- Cause: Any cause providing not damaging the surrounding tissue that was used in reconstruction of the defect.
- Patient who can't tolerate for longtime free flap operation.

Exclusion criteria:

- Associated with life threating injury.
- Patients with 3 cm or less scalp defects that can be closed primary.
- Associated co-morbidities (Uncontrolled DM, heart diseases, renal failure, blood disease, end stage liver disease, end stage cancer and any patient who is incompatible with life).
- Patients taking anticoagulant as long-life therapy.
- Patients with pervious scalp flap, history of pervious irradiation therapy or any pathology affecting vascularity.
- Patients refusing participation in the study.
- Patient with 150 cm2 or more scalp defect beyond the capability of local axial flaps.

Approved patient was evaluated by:

Preoperative assessment:

A. History taking which included personal history, history of present illness, past history, and family history.

B. Examination:

- General examination: Fitness for surgery and base line assessment of the patient "vital data and over view on the body systems".
- Local examination of the donor site and defect area:
  1. Site of the defect.
  2. Size of the defect: the size of defect area was categorized as: a-small less the 20 cm2, b-medium from 20 up to 60 cm2, c- large from 60 up to 100 cm2 and d-huge for defects more than 100 cm2.
  3. Depth of the defect: lost stuctures as: Skin, galea, pericranium, bone and/or dura.
  4. Donor site morbidity.

C. Investigation:

•Routine laboratory: C.B.C, Coagulation profile, RBS, LFTs, RFTs as all patients underwent G.A.

•Brain CT scan with bony window was done for RTA and cancer patients, and Doppler and duplex were done for the feeding artery when needed.

D. Photography:

•Photos were taken pre, intra and postoperatively.

E. Consultation and consent:

- Presurgical consultation were done to all patients to clarify about the operation regarding: steps, single or multiple stages procedures and complications.
- Preoperative trauma consultations were made and done to all acute trauma patients.
- Preoperative oncological consultations were made for patients with cancer and there were no pre or postoperative chemo/radiotherapy recommendations.

Finally: Prophylactic antibiotics and good preparation and planning for reconstruction were done preoperatively.

Anesthetic evaluation was done by two anesthesiologists prior to surgery, whereby ASA score was calculated to detect the capability of patients to fit the surgery.

Surgical procedures:

All Procedures were done under general anesthesia with marking of the flap and local infiltration of saline adrenaline fluid into subcutaneous planes to decrease bleeding.

All flaps were elevated at the sub galeal level with limited use of the diathermy to avoid thermal injury of the hair follicles and consequent alopecia. Dissection was done carefully at the sub galeal level to avoid injury to the feeding blood vessels and avoid bleeding and post-operative hematoma collection. Irrigation with saline with antibiotics was done in all procedure to minimize the risk of infections. Suction drains were used to avoid any fluid collection. Split thickness skin grafts were used for defects in the donor sites with inset and closure of the flaps. Dressing was done to all patients with application of slight pressure to the flap, in order to avoid bleeding, hematoma formation, and flap ischemia. Drains were removed after 2-3 days. Stitches removed after 2 weeks.

In our study, we have 20 patients with scalp defects: 9 of our 20 patients with post burn alopecia scar, 4 of them caused by electric burn and 5 caused by scalded burn.

All patients having post burn scar and alopecia in at least two or more regions of the scalp causing defects in combined regions. Four patients having post burn scar and alopecia involving the occipito-parieto-temporal regions, the defects were on the right side in 2 patients, 1 of them was having moderate size defect measuring 6×9 cm, while the 2nd patient was having huge size defect measuring 7×11 cm plus 4×9 cm. On the left side in the other 2 patients, the 3rd patient having large defects measuring 6.5×10 cm, while the 4th patient having scar and alopecia on left temporo-parietal and bilateral occipital regions of huge size measuring 10×8 cm and 8×5.5 cm respectively.

Two patients having scar and alopecia at temporo-parieto-frontal regions: the 1st patient at the left temporo-parietal and bilateral frontal regions of large size defect measuring 13×7 cm, the 2nd patient

was having scar and alopecia at the left fronto-temporo-parietal regions of large size defect measuring 13×6 cm and 3×5 cm.

One patient having scar and alopecia in the vertex of large size defect measuring 6.5×10cm.

Two patients having scar and alopecia on the right fronto-parietal regions, the 1st was having large size defect measuring 7 ×10 cm, while the 2nd was having moderate size defect measuring 5×10 cm.

Tissue expander (TE) was used in all burn patients with the use of single device in eight patients, and 2 devices in one patient. Rectangular shaped TE were used in seven patients while crescent shaped T.E. were used in two patients. TE were having volume ranging between 250-320 ml.

The incisions were marginal in seven patients and remote in two patients. TE was put in the subgaleal plane after blunt dissection to create a pocket with irrigation of the pocket with saline and gentamycin. The ports were settled away from the shell to avoid perforation; drain insertion and TE were injected by saline about 10% of the volume of the used expander. Then the pockets incisions were closed in layers with absorbable vicryl sutures to the SC tissue and proline suture to the skin.

TE injection started after stitches removal in multiple sessions every week or twice weekly by about 10 % of the expander volume per session. The required volume was reached after 6-8 weeks nearly by reaching double the expander volume. Then, the patients underwent a second operation to explant the device, excision of the scar. Advancement local axial flaps were used in the 9 patients post TE explanation with drain insertion and incisional wound closure in layers as done in the implantation operations. Advancement flap was single in eight patients and double in one patient.

Seven of the 20 patients having scalp defect caused by trauma. One patient having left occipito-parietal regions of moderate size defect measuring 6×9cm. Four patients having post traumatic defects in temporo-parietal regions at the left in two patients, the 1st having defect on the left side with large size defect measuring 11 ×7 cm, while the 2nd having moderate size defect measuring 3.5 ×10 cm with lost outer tablet of the skull. The other two patients having at the right side, the 3rd was having large size defect measuring 7×12 cm, the 4th patient was having of moderate size defect measuring 6×7 cm. One of the patients having defect in the vertex region of moderate size measuring 4×7cm. One patient having parieto-occipital defects on the left occipital and right parietal regions of large size measuring 7×8 cm and 5×5 cm respectively. Five patients of the 7 were admitted in the acute trauma stage at the same day of trauma from the emergency room, and were managed by debridement of the nonviable tissue and flap to cover the defect after stabilization of the patient general condition and exclusion of other systems affection by the trauma.

The five acute trauma patients having lost pericranium and exposed skull bone, while the remaining two patients were presented following trauma; one of them presented 4 months after trauma by scar

and the other patient presented by alopecia 5 years after the trauma. The 2 patients were prepared for excision of scar tissue and alopecia and flap coverage after routine investigation and consultations using TE. In the 5 acute trauma patients, single rotational flaps were used alone in three patients, double rotational flap was used in one patient, and transposition flap was used in one patient. In the two patients with old trauma, rectangular shaped TE of 300 ml volume was used in reconstruction. TE with external port was used in one patient. Rotational advancement flaps were used in the two patient post tissue expander explanations.

Four of the 20 patients having scalp cancer, three of them having Basal cell carcinoma (BCC) and one having Squamous cell carcinoma (SCC). Two of the patient with carcinoma having invasion of outer table of the calvarial bone of the skull, while the other 2 having invasion of the skin and galea only. The three patients of the BCC were having carcinoma at combined regions, one patient having large size defect in the left temporo-parietal region measuring 9×8 cm post debridement, two patients were having large and huge defects post excision of the carcinoma in the fronto-parietal regions, one of them was in the left side while the other one was in the bilateral sides measuring 10×9 cm and 10.5×11 cm respectively. The SCC patient having carcinoma at right parietal region, the defect was of moderate size measuring 6×6 cm after debridement. The four malignancy patients were managed in the plastic & reconstructive surgery department after the patients were diagnosed carcinoma by pre-excisional 4 quadrants biopsy, then they were admitted and prepared for excision and coverage.

Tumor excision with safety margin occurred, with excision of periosteum in the two patients with invasion of the skin and galea only, excision of the tumor with outer tablet of the skull in the two BCC patients with invasions of the outer tablet. The resulting defects post excision were covered by single rotational flap in three patients, and double rotational flap with back cut to increase the arc of rotation of the flap in one patient.

Postoperative follow up: Early postoperative follow up and late was done every week for the first month, then every 2 weeks for the second month, and then at the end of the 3rd month.

Statistical Analysis:

Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 20. The qualitative data were presented as number and percentages while quantitative data were as mean, standard deviations and ranges.

RESULTS

The study group consisted of 20 patients, 11 males and 9 females. The mean age of the patient was 51.8 years (youngest patient was of 5 years and eldest of 68 years), 4 patients (20%) had a malignant tumour of the scalp, 9 patients (45.0%) had a history of electric and scald burn to the scalp, and remaining 7 patients had traumatic scalp defect **(Table 1)**.

Table (1): Distribution of the studied cases according to Age, Sex and Cause

		No. = 20
Age	Mean ± SD	51.80 ± 15.04
	Range	5 – 68
Sex	Male	11 (55.0%)
	Female	9 (45.0%)
Cause	Burn	9 (45.0%)
	Trauma	7 (35.0%)
	Scalp malignancy	4 (20.0%)

After wide local excision and thorough debridement, 7 patients had medium-size defects (20-60 cm2), 10 patients had large defects (60-100 cm2), and 3 patients had Huge (100-150 cm2). Regarding the depth of the wound, pericranium involvement seen in 5 patients (25%), 12 patients (60%) had Skin and galea only, and 3 patients (15%) Bony defect **(Table 2)**.

Table (2): Distribution of the studied cases according to Defect size and Defect depth

		No.	**%**
Defect size	Medium	7	35.0%
	Large	10	50.0%
	Huge	3	15.0%
Defect depth	Pericranium involved	7	35 %
	Skin and galea	11	55 %
	Bony defect	2	10 %

Depending upon the anatomical location of the defect and flap utilized they divided into: single region affection in 3 patients (1 parietal, 2 vertex), and combined regions affection in 17 patients (5 temporo-parietal, 4 temporo-parieto-occipital, 4fronto-parietal, 2 fronto-temporo-parietal, 2 occipito-parietal), transposition flap used in 1 patient (5.0%), rotation advancement flap in 2 patients (10.0%), double rotational flap in 2 patients (10.0%), and single rotational flap in 6 patients (30.0%), and advancement flap were utilized in 9 patients (45%) **(Table 3)**.

Table (3): Distribution of the studied cases according to location and flap utilized

		No.	**%**
Location	Parietal	1	5.0%
	Combined	17	85.0%
	Vertex	2	10.0%
Flap utilized	Transposition flap	1	5.0%
	Rotation advancement flap	2	10.0%
	Double rotational Flap	2	10.0%
	Single rotational flap	6	30.0%
	Advancement flap	9	45.0%

Minor complications included seroma occurred in 3 patients (25.0%), hematoma in 1 patient and partial graft loss in 2 patients (10%). Distal flap necrosis occurred in 3 patients (15%), T.E Exposure in 2 patients (10%), wound dehiscence in 2 patients (10%), and ischemic necrosis of skin over the expander happened in 1 patient (5%).

Seroma occurred few days postoperatively and treated by repeated aseptic aspiration and semi tight dressing, hematoma developed in the 2nd day post-operatively and treated by cold fomentation then hot fomentations and anti-edematous drugs, distal flap necrosis was treated by frequent dressing with local antibiotic cream sliver sulfadiazine and enzymatic debridement ointment (Iruxol ointment) and left to heal by secondary intention, partial graft loss was (treated with daily dressing with hydrogel and healed by secondary intention, skin necrosis and exposure of TE was operated urgently by deflation and explanation of the expander and irrigation of the pocket with saline and antibiotics and re-implantation of the TE and direct wound closure in one patient, and was complicated after 6 weeks in another patient when the expander was one and half the volume of the implanted expander, the patient was admitted and the expander was explanted and the expanded scalp flap advanced to close the defect after excision of the alopecia, and wound dehiscence was treated by daily dressing using enzymatic debridement ointment and secondary intension in one patient, and secondary sutures in the other patient **(Table 4** and **Figures 1, 2, 3 &4)**.

Table (4): Distribution of the studied cases according to Complications

Complications	No.	%
Wound dehiscence	2	10 %
Distal flap necrosis	3	15.0 %
Partial graft loss	2	10 %
Hematoma	1	5 %
Seroma	3	15 %
Exposure of T.E	2	10 %
Skin necrosis over expander	1	5 %

Figure (1): A) Male patient 63 years with scalp BCC, B) Intra-operative tumour excision with rotational flap coverage, C) Partial graft loss, D) One week after conservative treatment, E) Three weeks post-operative and wound healing by 2ry intention.

Figure (2): A) Male patient 26 year with extenal port TE for temporo-parieto-occipital scalp alopecia, B) Post explantation wound dehiscence, C&D) Two weeks after consevative treatment and wound healing by 2ry intention.

Figure (3): A) Female patient 12 years with exposed TE of the scalp, B) Explantation of the expander and advancement flap after excision of the alopecia, C) Two weeks post-operative.

Figure (4): A) Female patient 8 years with TE for frontal and forehead alopecia, B) Post explantation hematoma, C) Hematoma resolved.

DISCUSSION

The repair of scalp defects is dependent upon their location, size and depth. Unlike in other head and neck areas where local flaps are used to repair large defects, in the region of the scalp the repair of even small defects is complicated *(Makboul and Abdel-Rahim, 2013)*.

Multiple reconstructive options exist that include primary closure, skin grafts, trephination, local tissue flaps with or without tissue expansion, regional myocutaneous flap and micro vascular free flap. Tissue expansion is one of the most important armamentaria for aesthetic scalp reconstruction *(Lakshmi et al, 2017)*.

The distance of the scalp from the clavicle and axilla limits the use of the pedicled pectoralis and latissimus flaps *(Shonka et al, 2011)*.

Local flaps from the adjacent regions provide the best method for functional and aesthetic reconstruction as they provide the best color and tissue quality match, and permit not only the restoration of continuous hair covering but also effective protection for the skull and its contents *(Srivastava and Gupta, 2020)*.

Rotation, advancement and Trans positioning scalp flaps are the reference for reconstructing these defects *(Vishwanath et al, 2017)*.

In our study, 20 patients with scalp defects caused by burn, trauma, and neoplasm subjected to local axial flap to evaluate its effect. These cases outline simple procedures for repairing scalp defects, by means of expanded or non-expanded local axial flaps. The shortening of surgical time compared with other techniques, the simplicity of the surgical procedures, minimum morbidity in the skin graft donor zone, and the satisfactory esthetic outcomes make these techniques adequate options for repairing defects of this kind.

Pediatric patients with acute scalp defects caused by electrical burn reconstructed using different modalities according to the size and location of the defect using either transposition flap, rotation flap, or V-Y-S flap *(Makboul and Abdel-Rahim, 2013)*.

In reconstruction scalp defects with exposed bone caused by high voltage electric burn, single rotation flap was the

most common procedure performed, and bipedicle flap was the 2nd commonest procedure performed *(Hossain et al, 2012)*.

Regarding the risk of deforming the cranio-facial skeleton for which it is advised to employ a semi-rigid tissue expander and to delay expansion until the infant is 6 to 9 months of age. However, it has been noticed that cases remain without a permanent damage of said deformity *(Monroy et al, 2018)*.

Remote injection ports can be used, with mini- or low-profile ports available that place less pressure on overlying skin. Remote ports can be internally or externally located. The advantage of internal versus external ports has been disputed *(Braun et al, 2016)*.

There are many advantages to having external ports during tissue expansion include the reduced dissection and requirement for soft tissue coverage, quicker expansion, reduced risk of rupture or puncture, and reduced pain and emotional stress to patient. These offer a great benefit particularly in paediatric tissue expansion where pain may be less tolerated. However, there are concerns regarding a higher infection risk for external ports versus internal ports *(Marques et al, 2017)*.

Internal ports have the downside of requiring injection through the skin, but this experience can be made less unpleasant for the child with the use of an anesthetizing cutaneous cream *(Braun et al, 2016)*.

The literature results contradict this by obtaining infection rates from 5 to 6.5% with the use of internal ports compared to the 6 to 8.8% when using external ports *(Azadgoli et al, 2018)*.

Rectangular expanders give more abundant tissue than any other rounded or crescent expanders *(Samir and Aboul Fotouh, 2019)*.

Rectangular expanders gain 38% in tissue area of the calculated surface increase of the expander, whereas round expanders gain 25% and crescent expanders gain 32% of calculated surface increase *(Tan, 2011)*.

In our study, TE was used to reconstruct all patients with post burn alopecia, the defect measured up to 40 % of the total scalp size, with restoration of the hair bearing character of the scalp and recreation of the normal hair line. Rectangular shaped TE is the commonest used shape (9 patients, 45%) which gave more flap size than the crescent shaped (2 patients, 10%), the gain in tissue area of the calculated surface increase of the expander was (37%) and (30%) in rectangular and crescent shaped TE respectively. We used Semi rigid, low profile TE in pediatric patients at the age of 5 and 6 years old with minimal complication. No complication occurred when external port T.E was used in comparison to the those with internal port, and there is no significant difference in using tissue expander with external port compared with internal port in terms of symptom rate and patient's' satisfaction this may be due to the number of the used external to internal port. In addition, the pain feeling in injection for external port is less than that for internal port. All burn patients reconstructed using expanded advancement flap.

The three most common causes for the scalp defects were SCC, BCC, and trauma. the cohort of patients was relatively advanced in age (mean age: 71 years) *Costa et al, (2016)*.

The most common cause of scalp defect was excision of malignant tumor *(Srivastava and Gupta, 2020)*.

In our prospective study, the most common cause was burn (45%) then trauma (35 %) and lastly carcinoma (20%), and the Mean age ± SD (51.80 ± 15.04). rotational flap was used in 6 patients; double rotational flap was used in 2 patients; transposition flap in 1 patient, and expanded rotational advancement flap in 2 patients.

Scalp reconstruction with local flaps was done for a large sized defect (40–90 cm2), and huge sized defect (90–150 cm2). Transposition flap was the most (66.7%), followed by rotation advancement flap (20.4%). Depending upon the anatomical location of the defect, they were divided into as frontal (5.6%), temporal (16.7%), parietal (22.2%), occipital (3.7%) and combined (51.9%) *(Srivastava and Gupta, 2020)*.

Depending on the size of the defects, they were classified into three groups as follows: large, 20 to 50 cm2 (38.46%), very large, 50 to 100 cm2 (23.07%); extremely large, 100 cm2 (30.76%) and subtotal scalp defects (7.69%). The location was defined as peripheral (frontal, temporal, occipital), central, or combined *(Zayakova et al, 2013)*.

In our study, the wound size was classified as: small (less than 20 cm2), medium (from 20-60 cm2) (35%), large (60-100 cm2) (50%) and huge (from 100-150 cm2) (15%). Regarding the anatomical site of the defects, they were divided into: Single region affection: (parietal, vertex) (15%) and combined regions affection (85%). Expanded advancement flap was the commonest used flap (45%), followed by non-expanded single rotation flap (30%).

Regarding the patients gender and depth of the scalp defect: (55.6%) of the patients were males while (44.4%) were females, all of them Caucasians, (45.19%) with soft tissue defect, (12%) with all soft tissue but intact pericranium, (33%) with all soft tissue and bone defects, and (10 %) with all soft tissue and bone and dura defects *(Stojicic et al, 2017)*.

In our study, out of 20 patients, 11 (55%) were males and 9 (45%) were females. Pericranium involvement seen in 5 patients (25%), 12 patients (60%) had Skin and galea with intact pericranium, and bony defect seen in 3 patients (15%).

While planning the flap, not only the size of the defect but its anatomical location, and pliability of surrounding tissue are of prime importance. A medium-sized defect located in the frontal or vertex area can be closed with a rotation advancement flap, without the need for a STSG *(Costa et al, 2016)*.

Advancement flaps or multiple flaps (double hatchet or O - Z flap) with primary closure may be applied in patients with elastic scalp tissue, a moderately sized defect, and a location in the central or parietal area of the scalp *(Cecchi et al, 2016)*.

Rotation advancement flap and double hatchet flap was done for medium-size defects located in frontal, parietal and

vertex regions. When the defect is located in the periphery or involves more than one zone (large and extra-large defects), transposition flaps or double transposition flaps were used. However, the donor area was covered with a split-thickness skin graft *(Srivastava and Gupta, 2020)*.

Double advancement flap used to reconstruct defect in parietal region, unipedicled transposition flap used to reconstruct defects of moderate-large size in the (temporal, occipital, frontal, fronto-parietal and parieto-occipital regions), and bipedicle transposition flap used to reconstruct defect of extremely large size in the fronto-parieto-occipital region *(Zayakova et al, 2013)*.

In our study we used expanded advancement/rotational advancement flap to reconstruct defects in different region of the scalp. Non expanded single rotational flap used to reconstruct defects in the (parietal, fronto-parietal, occipito-parietal, temporo-parietal), double rotational flap used to reconstruct defects in the vertex region of moderate size and fronto-parietal region of huge size, and transposition flap used to reconstruct moderate size defect in the temporo-parietal. Due to the size of the defects in the study, all donor sites of non-expanded flap covered by STSG. Rotational flap was the most commonly applicable type of flap in reconstructing moderate and large defect in different scalp regions while double rotational flap was useful for reconstructing central defect, and huge defect.

CONCLUSION

Reconstruction of scalp defects with local flaps is a safe, relatively short and simple procedure unlikely to cause any major complications or demand special postoperative care. In cranial or dural defect, a local scalp flap is the reconstructive method of choice. Applications of local axial flaps indicate that complications were quite rare and did not extensively affect the survival of the flaps.

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إستخدام الشرائح الموضعية المحورية في إعادة بناء نقص انسجة فروة الرأس

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خلفية البحث: تتكون فروة الرأس من أنسجة متخصصة تتكون من بصيلات الشعر الكثيفة، والخوذة السفاقية السميكة وغير المرنة على عكس أنسجة الجسم الأخرى ويمكن أن يكون إعادة بناء فروة الرأس أمرًا صعباً بسبب تحدب الهيكل العظمي الأساسي، وعدم مرونة الخوذة السفاقية، وندرة الأنسجة المجاورة، مما يجعل النقص الصغير يصعب إغلاقه.

الهدف من البحث: تقييم استخدام الشرائح الموضعيه في اعادة بناء نقص أنسجة فروة الرأس مختلفة الأسباب من حيث الاوعية الدموية المغذية ومحور الدوران و حجم الشريحة.

المرضى وطرق البحث: تم إجراء هذه الدراسة على 20 مريضاً تتراوح أعمارهم بين 5-68 عاماً يعانون من نقص متوسط إلى ضخم في فروة الرأس بسبب الحروق والحوادث والأورام الخبيثة في مستشفيات جامعة الأزهر (الحسين والسيد جلال) لتقييم تأثير السديلة المحورية الموضعية من حيث التغطية المستقرة للنقص بالأنسجة الحاملة للشعر، وإعادة تكوين خط الشعر، ومطابقة سماكة الجلد واللون والحد الأدنى من الاعتلال في موضع التبرع.

نتائج البحث: كانت السديلة الدورانية غير الممدة والسديلة التقديمية الممدة هي السديلة الأكثر إستخدامًا وكانت الشرائح المتنقلة الأقل استخداما وكانت الشرائح ناجحة بالكامل في 17 مريض.

وقد شملت المضاعفات البسيطة تراكم سوائل تحت الجلد في 3 مرضى (25.0٪)، فقدان بالرقع الجلدية في مريضين(10٪)، بينما حدث نخر بأطراف السديلة في 3 مرضى (15٪)، وانكشاف بممدد الانسجة في مريضين (10٪)، وتفزر بالجرح في مريضين (10٪)، ونخر إقفاري للجلد فوق الممد في مريض واحد(5٪).

الاستنتاج: اعادة بناء نقص أنسجة فروة الرأس باستخدام السديلة الموضعية هو إجراء آمن وقصيرالوقت نسبيًا وبسيط ومن غير المحتمل أن يسبب أي مضاعفات كبيرة أو يتطلب رعاية خاصة بعد الجراحة. وبالنسبة للنقص الكبير والمعقد في انسجة فروة الرأس، سواء كان يتضمن نقص في الجمجمة أو الأم الجافية أم لا، فإن سديلة فروة الرأس الموضعية هي الطريقة الترميمية المفضلة. وتشير نتائجنا من تطبيق الشرائح المحورية المحلية إلى أن المضاعفات كانت نادرة جدًا ولم تؤثر بشكل كبير على بقاء الشرائح.

الكلمات الدالة: الشرائح الموضعية المحلية، اعادة بناء نقص انسجة فروة الرأس.