

Application and Experience of Various Reconstructive Procedures in Scalp Defects

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ABSTRACT

Aim: To evaluate the outcome of various reconstructive procedures in scalp defects.

Study Design: Cross sectional descriptive study.

Place and Duration of Study: Department of Plastic/Reconstructive Surgery & Burns, LUMHS Jamshoro from 1st January 2018 to 31st December 2020.

Methodology: Thirty patients of scalp wounds were admitted through outpatient and casualty departments. The patients were diagnosed by pre-operative workup and on clinical parameters were included. The patients unfit for general anaesthesia, patients having associated skin pathology, patients with history of allergic reactions and patients having any poorly controlled systemic co-morbidity like diabetes and hypertension were excluded.

Results: Twenty two (73.33%) were males and 8 (26.66%) were females with mean age of 38.98±8.25 years. Scalp defect was due to trauma in 46.66%, electric injury 23.33%, benign lesions 16.66%, malignant tumour 3.33%, infection 3.33%, haemangioma and pigmented nevus 3.33%. Follow up duration was 42.34±7.83 weeks.

Conclusion: Primary closure remained the mainstay of our treatments hence proved that simplest reconstruction should be used whenever possible to provide the most functional and aesthetic scalp reconstruction, with the least amount of complexity.

Key Words: Scalp, Reconstructive surgical procedure, Graft, Flap

INTRODUCTION

The scalp is a significant functional and aesthetic structure that secures the cranial bone. Because of its inelastic property, soft-tissue defects of the scalp make reconstruction procedure troublesome.¹ Scalp reconstruction procedures range from those for medical indications to those for cosmetic reasons made a detailed analysis of trauma-related scalping injuries and their management.² The history of scalp reconstruction techniques mirrors that of plastic surgery techniques, including the use of free flaps for very large defects.³

Benign lesions of the scalp that are excisable include epidermoid cysts, nevus sebaceous, blue and melanocytic nevi. Malignant lesions that typically undergo excision include basal cell carcinoma, Bowen disease, squamous cell carcinoma, Merkel cell carcinoma and malignant melanoma. Wounds developed secondarily from these surgeries may be small, superficial and amenable to primary closure, but often are large, deep (down to calvaria) and extensive needing more complex closure and covering.^{4,5}

Scalp reconstruction surgery has been used in the past to treat alopecia but is rarely used nowadays, due to advances in hair transplantation. Cosmetic indications are not in the remit of this article and will not be part of the discussion here. Reconstruction of the scalp follows the reconstructive ladder of any other plastic surgical procedure: granulation (secondary intention), primary closure, advancement flap, rotational flap, use of split-thickness or full-thickness skin graft and free flaps. The procedure selected could be one or mixture of other methods depends on anatomical (skin laxity, wound depth,

location) and patient-related factors (smoker, wound care, general health).^{6,7}

Traumatic scalp avulsed injuries can occur and be devastating. These can be addressed as above with other defects or require potentially significantly more extensive surgeries both in regards to the number and complexity.⁸

Immediate coverage is necessary to prevent desiccation, infection and bone necrosis. If periosteal is intact skin grafting is method of choice (partial thickness defect). If bone is exposed always cover it with local or distant flaps (full thickness defect). If bone is lost, cover it with vascularized soft tissue. Bone is replaced at a later date and wounds without tissues loss is always closed with direct approximation.⁹

MATERIALS AND METHODS

This descriptive cross sectional study was carried out in Department of Plastic Surgery, Liaquat University Hospital Jamshoro from 1st January 2018 to 31st December 2020. Thirty patients of scalp defects were admitted through outpatient and casualty departments of Liaquat University Hospital Jamshoro/Hyderabad. All patients with scalp defects were included in the study irrespective of their age. The patients unfit for general anaesthesia, patients having associated skin pathology, patients with history of allergic reactions and patients having any poorly controlled systemic co-morbidity like diabetes, hypertension were not included.

The patients were diagnosed by pre-operative workup and on clinical parameters finding. The study intended compares the outcome of the different surgical procedures in term of post-operative infection, patient acceptance. The

detailed history and clinical examination operative findings, postoperative recovery, postoperative complications and follow-up record were made. Clinical examination of the patient was done with assessment of sore that does not heal within 3-4 weeks. The sample patients were consulted about their willingness and written consent before adapting either of the operative method. The follow-up comprised mandatory 1st visit after 5days in skin graft and after 1 week in flap and then 2nd visit after 8 days in skin graft and after 3 month in flap. Data was analyzed by SPSS version 22.

RESULTS

There were 22(73.33%) males and 8 (26.66%) females with mean age of 38.98±8.25 years. Patients presented with different etiologies; trauma14 (46.66%), electric injury 7 (23.33%) benign lesions 5 (16.66%), malignant tumor (3.33%), infection 1 (3.33%), haemangioma 1 (3.33%) and pigmented nevus 1 (3.33%). Techniques for reconstruction included primary closure 9 (30%), rotation flap 8 (26.66%), drilling of bone and skin grafting 5 (16.66%), skin graft 4 (13.33%), primary closure + scoring of galea 3 (10%), tissue expansion with graft and flap reconstruction 1 (3.33%). The graft complications including partial skin loss 2 (6.66%) and infection 2 (6.66%). The flaps revision due to marginal necrosis in 2 (6.66%) was done and best results were achieved in primary closure. Follow-up duration was 42.34±7.83 weeks (Tables 1-2).

Table 1: Etiologic factors for scalp wound (n=40)

Etiological factors	No.	%
Trauma	14	46.66
Electric injury	7	23.33
Benign lesions	5	16.66
Haemangioma	1	3.33
Pigmented nevus	1	3.33
Malignant tumour	1	3.33
Infection	1	3.33

Table 2: Reconstructive procedure in patients (n=40)

Type of procedure performed	No.	%
Primary closure	9	30.0
Rotation flap	8	26.66
Outer table drilling & skin grafting	5	16.66
Skin grafting	4	13.33
Primary closure + scoring of galea	3	10.0
Tissue expansion with graft & flap reconstruction	1	3.33

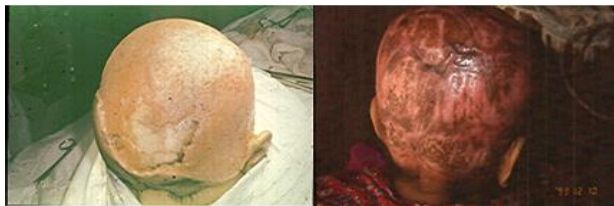


Fig. 1: Avulsion injury and grafting



Fig. 2 Scoring of galea and flap



Fig. 3: Scoring of galea and rotational flap



Fig. 4: Primary closure and skin grafting



Fig. 5: Haemangioma and primary closure after excision



Fig. 6: Tissue expansion with flap and graft

DISCUSSION

The scalp is a typical site for cutaneous malignancies and is habitually exposed to injury. Thus, the specialist is regularly confronted with complex scalp surrenders needing fix. The scalp presents novel difficulties to the reconstructive specialist: it is thick and inelastic; it is hair bearing; it's anything but a curved surface; and it gives the sole delicate tissue covering for the head. Specifically, the absence of versatility of the scalp makes the maintenance of even little deformities troublesome. This part is expected to give an outline of the pertinent life structures of the scalp and the methods that are regularly used in its maintenance.^{1,2}

Primary closure is normally the principal strategy for decision while treating little (<5 cm²) wounds.¹⁰ Skin grafting is an appropriate procedure when the wound bed is very much vascularized, however unsuitable practical and aesthetic results limit the utilization of this technique [11].At the point When the defect is n between 5-20 cm² or enormous in size (>20 cm²), with a stripped periosteum of calvarium, uncovered dura, or leaking CSF, the right reconstructive method is to go for any sort of flap; local, regional, or free flap.¹² Nonetheless, in widely huge defects, skin harmed by radiation therapy, a considerable bone misfortune, or when the imperfection covers in excess of 50% of the scalp, nearby tissues may not be the fitting methodology, and the options are tissue expansion, distal pedicle or free flaps.¹³ In the present study, we performed various reconstructive procedures; Primary closure in 30%

patients, rotation flap in 26.66%, drilling of bone and skin grafting in 16.66%, Skin graft in 13.33%, Primary closure plus scoring of galea in 10%, tissue expansion with graft and flap reconstruction 3.33% cases.

In study by Zayakova et al¹⁴ for Local axial flaps of 13 cases, observed average age of 61.7 years in 11 men and 2 women. They achieved complete tissue coverage in all without any complications. We observed in our study 22 (73.33%) were males and 8 (26.66%) were females with mean age of 38.98±8.25 years.

In retrospective review of ten cases of the large scalp defects by Richardson¹⁵ by delayed grafting after application of integral bilayer wound matrix, observed mean age of 71.5 year, (80%) were men with Mean follow-up of 481.1 days, his methodology has brilliant outcomes and can be done under little bit sedation and local anaesthesia, which keeps away from the dangers related with general anaesthesia while we witnessed follow-up duration of 42.34±7.83 weeks in our data.

In study on 30 cases of reconstruction with superficial temporal artery island flap by Tenna¹⁶ and he included the defects which resulted secondarily to tumour surgery, he used parietal branch in 26 and frontal branch pedicle in 4. They reported that 96.7% flaps survived with average follow-up of one year. Flap mobilized in a V-Y fashion.

In review of 34 articles by Johnson¹⁷ regarding integral-based reconstruction of large scalp wounds; wound were in the range of 5.7 to 610 cm², with average defect size >100 cm² in 35.3%, average percentage take of skin graft in ≥90%

Kruse-Lösler¹⁸ in the reconstruction of 39 cases of resection of tumour on the scalp and forehead observed the average defect of 146cm² in the range of 80.6-546cm². The used multiple rotation-advancement flap in 19, split-thickness skin graft in 6 after drilling in bone for inducing granulation. They used free latissimus dorsi muscle flaps in 8 patients and radial forearm flaps in 4 cases with rare complications.

In ten year experience by Chao¹⁹, regarding 138 microsurgical reconstruction, 48 cranioplasties, per operative complications were 21.0%, while late recipient site complications rate was 11.6%. We observed few of complications like graft complications including partial skin loss in 6.66% patients and infection in 6.66% patients and also done flaps revision due to marginal necrosis in 6.66% patients.

Guzey²⁰ achieved natural scalp skin in 15 by reconstruction of lateral scalp burn alopecia with tissue expanders, all of whom were satisfied with the final outcome.

Othman²¹ in his retrospective case control study evaluated 127 cases with mean age of 74.6±12.2 years, defect area 80.2±89.4 cm² and wound age 10.0±65.4 days, he observed acceptability in 84% subjects following bilayer wound matrix-based cutaneous scalp reconstruction, though postoperative radiation was related with failures.

Cho²² retrospectively collected data for 7 years regarding infantile haemangiomas; among 1916 total cases, 8% were scalp lesions. They went for surgical correction with procedures as elliptical excision with

primary closure (85.7%) or with rotational flap closure (14.3%) with mean age of surgery was 3 years (1-8 years). while we reported one case of hemangioma in 3 year baby that was dealt with primary closure after excision.

CONCLUSION

Primary closure remained the mainstay of our treatments hence proved that simplest reconstruction should be used whenever possible to provide the most functional and aesthetic scalp reconstruction, with the least amount of complexity.

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