Vol. 16, No. 4
ORIGINAL PAPER

RECONSTRUCTIVE SURGERY

MEDICAL CHANNEL
OCTOBER- DECEMBER 2010

SURGICAL RECONSTRUCTION OF SCALP

1. **ABDUL RAZAK MEMON**
MCPS, MS
2. **MAHESH KUMAR**
FCPS
3. **BILAL FAZAL SHAIKH**
MBBS
4. **AWATIF QAZI**
MBBS

1. ***Chairman,***
Department of Plastic Surgery
LIAQUAT UNIVERSITY OF MEDICAL & HEALTH SCIENCES, JAMSHORO
2. ***Assistant Professor***
Department of Plastic Surgery
LIAQUAT UNIVERSITY OF MEDICAL & HEALTH SCIENCES, JAMSHORO
3. ***Resident,***
Department of Plastic Surgery
LIAQUAT UNIVERISTY OF MEDICAL & HEALTH SCIENCES, JAMSHORO
4. ***Resident,***
Department of Plastic Surgery
LIAQUAT UNIVERISTY OF MEDICAL & HEALTH SCIENCES, JAMSHORO

Corresponding Author:
PROF. ABDUL RAZAK MEMON
47 Defense Housing Soceity,
Hyderabad
Cell: 0300-3010383
Email: razakmemon@hotmail.com

ABSTRACT:

BACKGROUND: *Scalp reconstruction after ablative surgery can be challenging. A useful Reconstructive algorithm is lacking. The purpose of this study was to evaluate our experience and to identify an appropriate reconstructive strategy.*
METHODOLOGY: *This was a prospective observational study was conducted in the Department of Plastic & Burn Surgery during over a period of four years. Etiology of scalp defects, reconstructive methods, independent factors and outcomes were evaluated. A total of 7 procedures were performed in 38 patients. Techniques for reconstruction included primary closure, grafts, and Local flaps.*
CONCLUSION: *Important tenets for successful management of scalp defects are durable coverage, adequate debridement, preservation of blood supply, and proper wound drainage. Local scalp flaps with skin grafts remain the mainstay of reconstruction in most instances.*

KEY WORDS: scalp defect, local flap, reconstruction

INTRODUCTION:

The scalp is unique as structure, shape and location. It is highest point of the body, most exposed and usually uncovered by clothing. These factors make it vulnerable to trauma including burns. Being exposed mild degree of scarring is easily noticeable and lead to disfigurement. On the other hand the skin of the scalp lacks laxity and primary closure of wounds greater then 2 cm is often not possible. 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]. The scalp has a rich vascular supply; the ability to withstand wounds of greater tension than other regions, and often has hair that can camouflage resulting scars or asymmetries. Nevertheless, most of the scalp is relatively inelastic; repair of even small defect is difficult and is ideally reconstructed with hair-bearing skin. These properties compromise the ease of effective reconstruction and affect the surgeon's ability to reconstruct defects in this area. Therefore the decision-making process behind a successful outcome requires a solid knowledge of anatomy, a clear evaluation of the defect, the recognition of relevant patient attributes, and the knowledge of a variety of reconstruction options available. Multiple reconstructive options exists that includes, primary wound repair, healing by secondary intention, and the use of skin grafts, local tissue flaps, regional myocutaneous flaps, and micro vascular free flaps. While considering reconstructive options the plan must always be tailored to the individual patient's needs and due attention be given to the aesthetic outcome that specially includes preservation of the hairline and hair follicle orientation, scar camouflage, avoidance of alopecia, and secondary restoration of alopecia.[2,3,4,5]
Scalp reconstruction after oncologic resection can be more challenging. Wide surgical resections, in combination with co-morbid conditions such as infected alloplastic material, cerebrospinal fluid (CSF) leak, or devascularized bone after craniotomy necessitate healthy, vascularized tissues for reconstruction. Although primary closure is feasible in some cases, the mainstay of treatment involves local tissue rearrangement with or without split thickness skin grafting. In addition, free tissue transfer is an important adjunct to therapy in patients with poor local tissues. Careful analysis of the defect and local tissues can help tailor the method of reconstruction and result in satisfactory closure in a majority of patients.[6, 7, 8.]
Tissue expansion is also one of the most important armamentaria for aesthetic scalp reconstruction after burn [9]. Tissue expanders are silicone envelopes that have self-sealing injection ports and at weekly intervals, saline is progressively injected through a remote injection port and it passes into the expander space, which then enlarges thus allows the

surgeon to generate additional amounts of precious tissue to replace the defected tissue. However, the application of tissue expanders carries inherent complications such as wound infection, extrusion of the envelope from the implantations site due to unhealed wound margins or flap necrosis, that develop as a result of ischemia following the expansion of the envelope.[10-13.]

Throughout world different procedures are performed and their outcome is seen as described above, the objective of our study is to see the outcome of different procedures that are commonly performed in our set up.

MATERIAL AND METHODS:

This prospective observational study was conducted in the Department of Plastic & Reconstructive Surgery from January 2006 to December 2009. During the study period 38 scalp defects were managed. Patients were included in the study after obtaining an informed consent, all the study variables were collected on pre designed proforma such as age, sex, etiology of wound, procedure performed and complications noted. The data was compiled, computed through SPSS 17.

RESULTS:

Among 38 patients; 28 were male and 10 were females, with male to female ratio of 2.8:1 as shown in Fig 1.

The mean age of the patients was 23. The trauma excluding burn was the most common cause (31.5%) for the scalp defect. When burn and electrical injury is consider as trauma then it account for more then 60% of all cases of scalp defects. Other causes include avulsion injury, malignant and benign tumors, benign skin lesions and infections as shown in table no 1.

The diabetes as co morbid state was present in 5 patients of this series. The mean size of the defects in its longest dimension was 4.75 cm while bone was exposed in 34 cases. All patients underwent through surgical debridement and immunization for tetanus. In only 04 cases the primary closure found feasible, while all remaining cases required some reconstructive procedure. The rotation flap was the most common procedure (31.5%) while skin graft alone or in combination with other techniques was the 2nd commonest procedure performed in this series of patients. The skin graft alone or in combination with the other techniques was the most common procedure (n=19, 50%) for repair of the scalp defects while rotation flap was the 2nd commonest (n=12, 31.50%) procedure performed. The other technique used to facilitates the repair

FIGURE 1

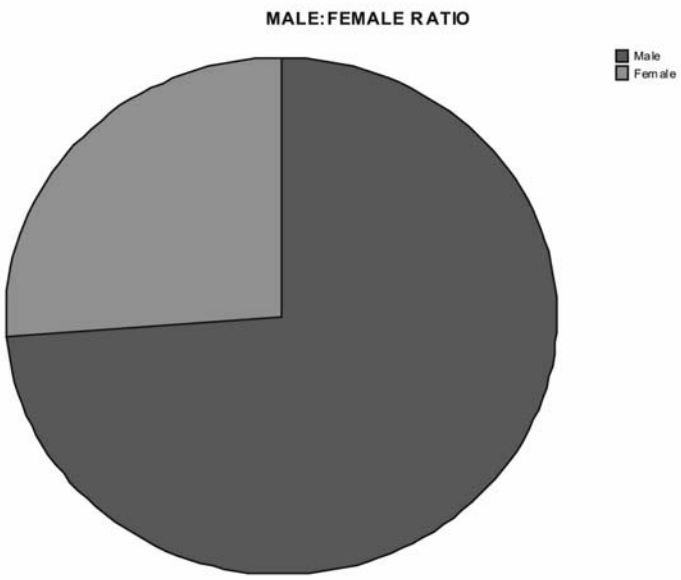


TABLE-1:
ETIOLOGY OF THE SCALP DEFECTS.

Etiology of lesion over the scalp	Number of patients
Direct trauma	12(31.50%)
Avulsion injury	03(07.90%)
Electric injury	08(21.05%)
Benign lesion	05(13.15%)
Burns	04(10.52%)
Tumor	03(07.90%)
Infection	02(05.20%)
Haemangioma	01(02.60%)

TABLE-2:
DEPICTS THE TYPE OF PROCEDURE WAS PERFORMED AND NUMBER OF PATIENTS

TYPE OF PROCEDURE	NO OF PATIENTS
Primary closure	4(10.8%)
Primary closure & scoring of galea	3(7.8%)
Skin graft	9(23.6%)
Outer table drilling and skin grafting	5(31.1%)
Pericranial flap with skin grafting	4(10.5%)
Rotation flap	12(31.5%)
Tissue expansion with graft and flap reconstruction	1(2.6%)

of scalp defects were scoring of glea, outer table drilling and pericaranial flap. The tissue expender, relatively new technique was use in 1 patient as shown in table No 2.
The postoperative complications seen in this series includes wounds infection in 3 cases and partial skin loss in 2 cases. These cases respond well to the conservative management that includes antiseptic dressings and use of antimicrobial agents. In only 2 cases the marginal necrosis after rotation flap was significant enough to warrant flap revision.

DISCUSSION:

The management of scalp defects remains a continuous challenge to the reconstructive surgeon worldwide [1, 3]. This becomes even more so in many centers of the developing world, where presentation and dearth of personnel, equipments remains the norm. Though in this study, the total number of patients seen appears relatively small, this compares well with figures from other reports[8]. Most of the patients in our study were males and they had scalp defect mostly due to direct trauma and electric burn, this reflects the fact that male while performing most of outdoor activities are more prone to trauma, and females of our society remain at home for domestic affairs are largely protected.
The skin grafting and local rotational flaps were performed in majority of patients while galeal scoring and undermining of adjacent scalp skin facilitated closure without tension, criss crossing of galeal incision was also made where additional flap width was required, this gave us the advantage of closing the secondary defect directly and this the major advantage of rotational flap over the transpositonal flap. Spilt thickness skin grafting was done in those wounds that were covered with granulation tissue. However in minor defects primary closure and galeal scoring to facilitate the primary closure without tension was also performed (table -3). Pericranium flap is also used in some of the patient (table -3), it is just like perostium of long bone rich in blood supply, it may be utilized as a pedical flap that provides coverage of denude bone and act as a vascular covering over areas of bone grafting for calvarial reconstruction to enhance graft survival. The great advantage of pericranial flaps is their minimal donor site morbidity and their dependability as a bed for skin grafting if properly designed.[8]in some patients outer table drilling was performed and it was the case when pericranium was not intact and also the local flap was not possible and outer table drilling then made the bed for graft possible. The morbidity in all of these cases was not so



Fig 2 A) A case of Electric shock injury. The defect was about 5.0×7..5cm.



Fig 2 B) The rotation flap raised and scoring og glea performed.



Fig 2 C) The flap inset into the defect. Immediate postopertive view.

much however few of the complications like infection of grafted site and partial loss of skin (table-4) was note that was treated with antibiotic according to culture and sensitivity and proper antiseptic dressing of wound. In case of flap marginal necrosis was also noted that was treated with revision. Putting together the finding of this study showed that graft and flap rotation were the main stay of the treatment in majority of patients according to the tissue defect.

CONCLUSION:

All trauma patients must always be seen by the reconstructive surgeon so that appropriate tissue preserving technique may be adopted. This will help to minimize the aggressive reconstructive procedure for such patients. The skin grafting and local scalp flaps remain the mainstay of reconstruction, however the quality and amount of skin left behind plays important role.

REFFERNCES:

1. Tamas C, Popa L, Turliuc D, Morosanu C, Lazar M. Surgical reconstruction in scalp defects. Clinics of Plastic and Reconstructive Surgery. 2005. 1(2); 83-86
2. Lisa M. Earnest, Patrick J. Byrne. Scalp Reconstruction. Facial plastic surgery clinics of North America. May 2005 13(2): 345-353
3. Blackwell KE, Rawnsley JD. Aesthetic considerations in scalp reconstruction. FPS. 2008; 24(1):11-21.
4. García del Campo JA, García de Marcos JA, del Castillo Pardo de Vera JL, García de Marcos MJ. Local flap reconstruction of large scalp defects. Med Oral Patol Oral Cir Bucal. 2008 Oct 1;13(10):E666-70.
5. Newman MI, Hanasono MM, Disa JJ, Cordeiro PG, Mehrara BJ. Scalp reconstruction: a 15-year experience. Ann Plast Surg. 2004 May;52(5):501-6.
6. Michaelidis IG, Stefanopoulos PK, Papadimitriou GA. The triple rotation scalp flap revisited: a case of reconstruction of cicatricial pressure alopecia. Int J Oral Maxillofac Surg. 2006 Dec;35(12):1153-5.
7. Zhang GL, Zhang M, Jing H, Guo A, Ling AJ, Cai GR. [Repair of scalp defect using V-Y-S rotation flap]. Zhongguo Gu Shang. 2008 May;21(5):375-6.
8. Legbo JN, Shehu BB. Managing scalp defects in sub-Saharan Africa. East Afr Med J. 2004 Feb;81(2):87-91
9. Fan J, Yang P. Aesthetic reconstruction of burn alopecia by using expanded hair-bearing scalp flaps. Aesthetic Plast Surg. 1997 Nov-Dec;21(6):440-4.
10. Halpern M, Adams C, Ratner D. Galeal hinge flaps: a useful technique for immediate repair of scalp defects extending to periosteum. Dermatol Surg. 2009 Jan;35(1):127-30.
11. Pasyk KA, Hassett C. Quantitative analysis of the thickness of human skin and subcutaneous tissue following controlled expansion with silicone implant. Plast Surg 1986;92:127.
12. Revis D. Tissue expansion. http://www.emedicine.com/ent/topic708.htm. Accessed on August 26, 2010
13. Cunha MS, Nakamoto HA, Herson MR, Faes JC, Gemperli R, Ferreira MC. Tissue expander complication in plastic surgery: A 10 year experience. Rev Hosp Clin Fac Med 2002;57:93-7.