Reconstruction Of An Extensive Scalp Defect Using Free Radial Forearm Fasciocutanaeous Flap Report of A Case

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Abstract : Reconstruction of small and intermediate defects of the skull have already been done with a variety of techniques. However, scalp defects due to trauma, congenital lesions, and resection of neoplasms are often large and can be a technical challenge. The free flap reconstruction provides a reliable, single stage coverage of these difficult scalp and forehead defects where other methods are unsuitable. Also, reconstruction of bony and dural defects should be considered separately utilizing autogenous tissue and / or alloplastic material. In this paper, a 50–year–old man with a recurrent basal cell carcinoma of the scalp which also invaded bone and dura and its management with free radial forearm flap is presented.

Key Words : Scalp Reconstruction, Scalp Ca, Radial Forearm Flap

INTRODUCTION

The diagnosis of scalp carcinomas does not need sophisticated investigations. Planned exicision and reconstruction provides the best chance of cure in the majority of cases. Occasionally patients present with extensive tumours involving the facial skin or scalp. The majority are basal cell or squamous cell carcinomas which, in addition to peripheral extension, may also invade deeper structures such as the skull, dura, orbit, and maxillary sinus. The excision, reconstruction, and pathological assessment of these advanced tumors becomes increasingly complex, with an accompanying rise in failure rate.

Several methods of scalp reconstruction are currently available to the practising plastic and reconstructive surgeon. For scalp defects with intact pericranium, split–thickness skin grafts are usually successful owing to the excellent vascularity of the skull periosteum. When the periosteum is lacking or a full–thickness scalp defect is present, reconstruction can be a technical challenge. In such cases skin grafts are usually unsuitable, and the adjacent scalp must be used as a local flap. To obtain adequate soft tissue coverage over the exposed skull, primary reconstructions of smaller or intermediate scalp defects have been done with a variety of immediate scalp rotation flaps. Orticochea (22,23) described a technique of multiple unipedicled scalp flaps so that reconstruction becomes easier and the blood supply of the flaps is better since their pedicles are wider. When, however, there is a more extensive loss of scalp, local rotation flaps cannot provide enough tissue for coverage, and distant or free flap reconstruction is the only alternative. A pedicled distant flap carries the disadvantages of requiring some element of immobilization and a second stage division. Staged distant flaps have now been virtually eliminated by free flap reconstruction. Many extensive tumours are not operated because resection would lead to further exposure of vital structures, especially the brain

and dura, or because the resultant defect could not be covered by conventional techniques owing to limitations of the size (14) or the arc of rotation of the available flaps. However, microsurgical free tissue transfer permits immediate single stage reconstruction of these wounds with well vascularized and stable tissues. Free tissue transfer would seem to be the ideal reconstructive solution for extensive defects of the face and scalp. Such surgery may allow radical curative resection or, alternatively, palliative resection, so preventing progressive disfigurement and intractable pain. This paper illustrates our choice with the thin, well vascularized free fasciocutaneous radial forearm flap and also, tactical and technical treatment options, which are necessary to achieve patient specific reconstructive procedures.

CASE REPORT

M.T., the 50-year-old man first presented in June 1994 with extensive ulceration on the left parietal region (Fig. 1). From the history we learned that he was operated six years previously for a similar lesion of the same region and was skin grafted, but there was no report of histopathological investigation available. We harvested a specimen by incisional biopsy which was evaluated and diagnosed as basal cell carcinoma. Plain skull x –rays showed evidence of bony involvement. With MRI, dural invasion was also visualised, reported to be due to the previous operation or carcinomatous invasion (Fig. 2). Prior to surgery superficial temporal vessels were assessed using ultrasonic doppler and Allen's test was performed. At operation, two teams worked simultaneously, one dissecting the radial forearm fasciocutaneous free flap and the other resecting the tumour. There was a neurosurgeon in the latter group. The tumour was resected together with the craniectomy and the involved part of the dura. The final defect was 16 X12 cm. The dural defect was reconstructed using a fascia lata graft. Since infection was not suspected, the bony defect of the skull was also reconstructed by screwed fixed split rib grafts and an acceptable bony contour was obtained. After preparing the superficial temporal artery and vein as recipient vessels, the radial forearm flap was cut free and transferred. The anastomoses were done in end–to–end fashion (Fig. 3a,b). The postoperative course was uneventful and the patient returned home ten days after surgery. On the first post operative visit, the patient was taken into an adjuvant radiotherapy programme. At the sixth postoperative month, there is no sign of recurrence (Fig 4).

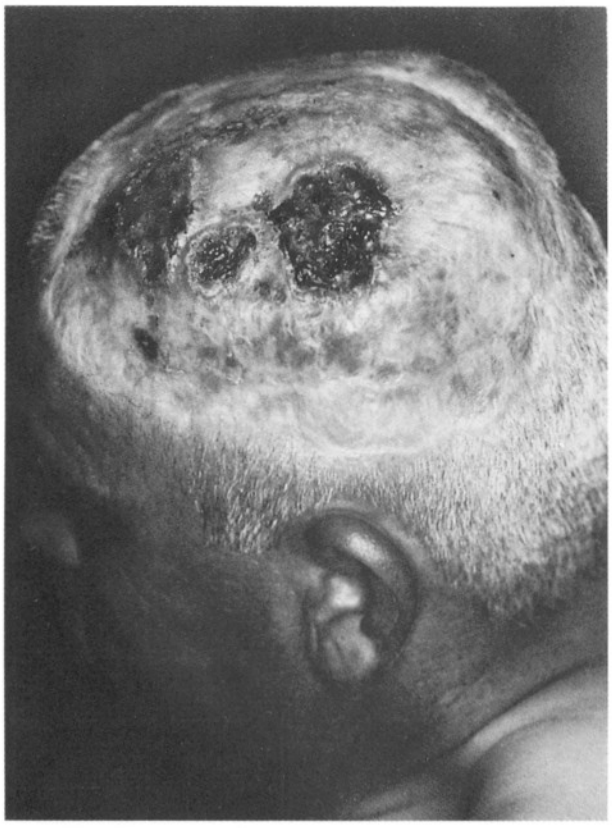

Fig. 1 : Extensive ulceration and the skin grafted area around the lesion.

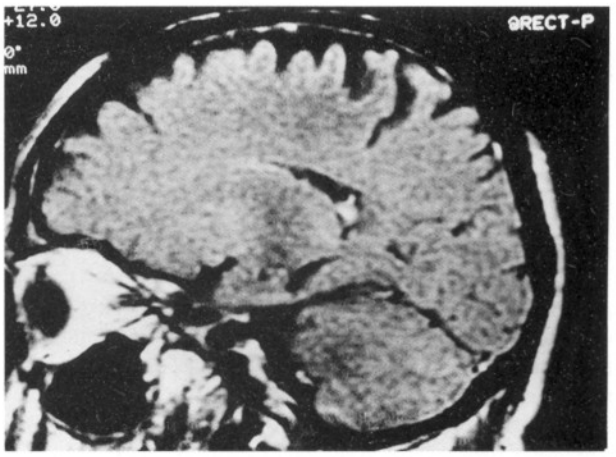

Fig. 2 : Magnetic resonance images of the bony involvement and dural irregularity.

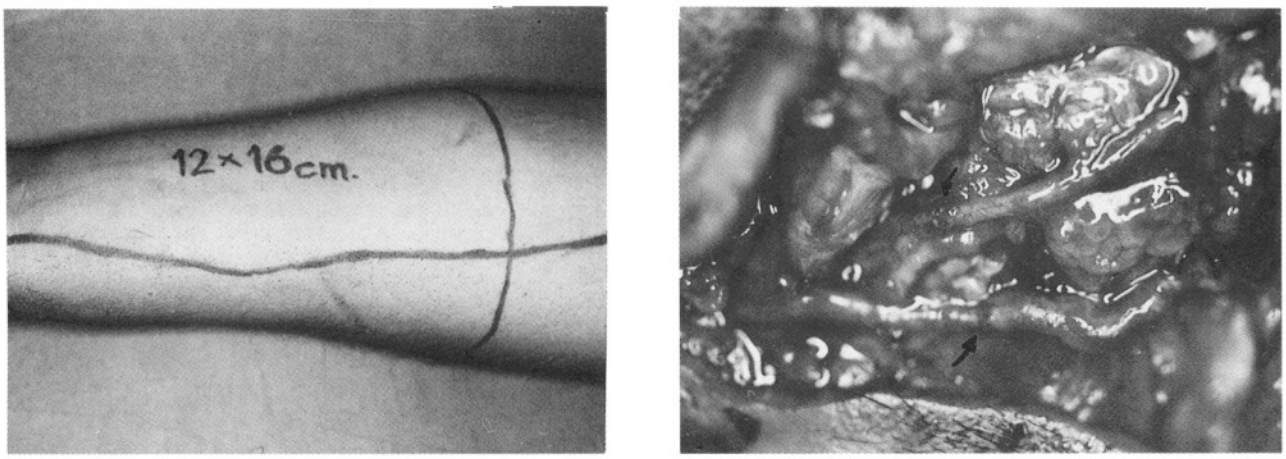

Fig. 3 (a,b): Preoperative design of the radial forearm fasciacutaneous flap (a) and the site of the anastomoses (b).

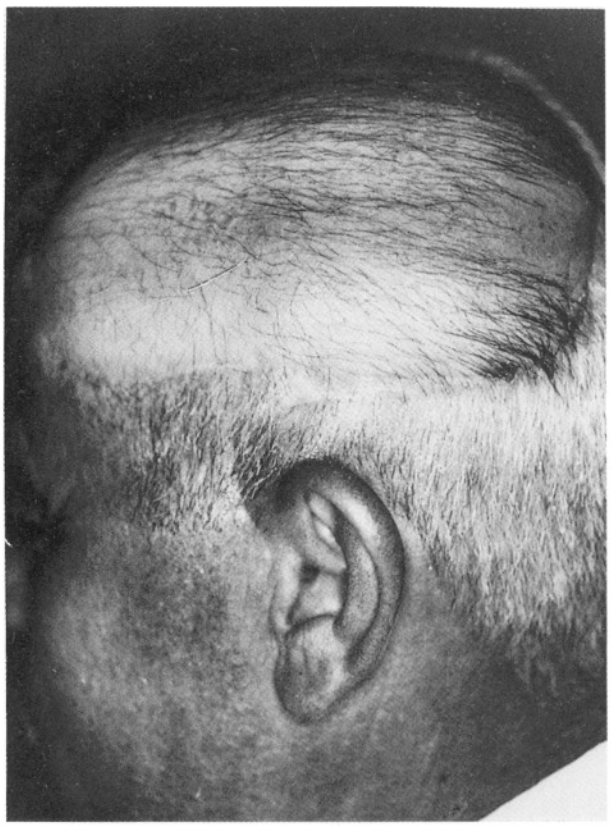

Fig. 4 : Lateral view of the patient at postoperative sixth month.

DISCUSSION

Usually the treatment regimen for scalp tumours is: 1. Investigation and assessment 2. Excisional and reconstructive surgery 3. Adjuvant therapy. Initially a detailed history and physical examination followed by CT scans should be obtained. Haematological and biochemical assessments of the patient should be within the normal limits. Patients with advanced malignancy of the scalp and skull must be managed with a surgical team consisting of a neurosurgeon, plastic surgeon and, in some selected cases an ENT surgeon as well. It is important that patients be evaluated preoperatively by each member of this multidisciplinary surgical team so that a definitive plan for resection and reconstruction can be formulated.

Scalp defects due to trauma, infections, congenital lesions, and resection of neoplasms are often large and pose a challenging reconstruction problem. Local flaps, regional musculocutaneous flaps, skin grafts, free flaps, and tissue expansion have all been used (15,22,23,24,27). The choice of a particular technique depends upon the location and size of the defect as well as the preference of the reconstructive surgeon.

Microsurgical free tissue transfer now allows the coverage of defects of virtually any size. Consequently, ablation of an extensive tumour should never be limited by the constraints of conventional reconstructive techniques. Also the vascularity and robustness of the free microvascular tissue transfer will withstand adjuvant radiotherapy, whereas a more traditional local flap or skin graft may not. Numerous donor sites can be utilized for free flap coverage of scalp wounds. Mc Lean and Buncke (17) first described free tissue transfer for scalp reconstruction using free omentum covered by a split – thickness skin graft. In addition to the omentum (2,3,13), the groin

flap (5,7,8). Latissimus dorsi musculocutenous flap (1,16). Latissimus dorsi muscle covered by split thickness skin graft (1), latissimus dorsi musculocutenous flap combined with either a serratus muscle flap (12), a scapular skin flap (4), or scapular or parascapular skin flap (10), radial forearm fasciocutanenous flap (9), scalp flap (11,20), and extended deep inferior epigastric artery flap (18) have all been used for coverage of scalp defects. Omentum necessitates a laparatomy, may often be bulky, and requires a skin graft for coverage and the availability of other less morbid flaps limites the usefulness of this transfer. The groin flap has a short vascular pedicle with variable anatomy and is quite bulky when compared with the scalp. The latissimus dorsi muscle flap has probably been most popular, but the main disadvantage with its use is that it provides excessive bulk, which may be difficult to revise at a later date. The serratus anterior is a thin muscle which seems appropiate for scalp reconstruction but it also has disadvantages like the need for split thickness skin grafting and scapular winging. In the transfer of muscle with skin grafts, the texture of the skin does not compare to that of the scalp or a thin cutaneous flap. Obviously, scalp flaps are ideal for hair - bearing areas , but they are often inadequate or unavailable for extensive scalp defects and are inappropriate in forehead reconstruction.

The free neurovascular forearm flap, however, is a reliable thin fasciocutaneous flap. It is thin and pliable and closely approximates the tissue consistency of normal scalp with a thin layer of subcutaneous fat that does not usually need secondary defatting procedure and has no tendency to fat deposition. The texture and quality closely resemble scalp. Radial forearm flaps have skin of excellent quality in relatively large size, allowing flap design to meet various requirements. Its constant anatomy, reliability, and ease of dissection has been shown previously by other authors (6,19,25,26). Relatively large calibre nutrient vessels allow easy and safe microsurgical anastomosis and a long vascular pedicle diminishes the need for interpositional vein graft. The skin graft to the forearm has not posed a significant cosmetic or functional problem especially with the use of silicone sheeting. In our cases, we use this procedure as a routine measure for prevention of scar formation (21).

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