Narayanan's bipolar scalp flap revisited

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Introduction

Oral and oropharyngeal cancers are the major cause of cancer related deaths contributing to 18.3% of all deaths in men and 6.8% of all deaths in women in India. The high incidence of oral cancer in India is mostly due to the abundant consumption of tobacco in its various forms. Surgery, usually done with wide local excision and neck dissection as and when required, is always somewhat disfiguring, requiring reconstruction to make up the significant loss of soft tissue. Attempt for adequate oncological clearance leaves the patient with mutilated and disfigured contour and deranged physiology of the oral cavity. Proper reconstruction and rehabilitation mandates closure of the oral gap by some method giving a tolerable resemblance to the original face, if not the original contour. Quality of life after surgery greatly depends on the skill and expertise of the surgeon [1].

In 1970, Narayanan M described a novel method of reconstruction with bipolar scalp flaps in post-irradiation-recurrence cases, cases too locally advanced for radiotherapy and in cases too advanced for classical surgery because of bone involvement [2].

Case presentation I

A 60 years old male patient presented with a huge ulceroproliferative growth over right cheek (T4N2bM0) fungating through the skin with intermittent bleeding, offensive smell and intolerable pain. Upfront resection of the tumour was done including part of the upper lip and lower lip with segmental mandibulectomy and right-sided modified radical neck dissection (MRND) followed by reconstruction with Narayanan's bipolar scalp flap. Pedicles were detached after 4 weeks. Final biopsy report was moderately differentiated squamous cell carcinoma with free margins but with lymphovascular and perineural invasions, hence the patient was treated with adjuvant radiotherapy. The

patient is surviving without any evidence of disease even after 3 years.

Case presentation II

A 35-year-old female presented with carcinoma of right gingivobuccal sulcus for which she was treated with wide local excision of the growth, right-sided MRND, right

Figure 1. Pre operation

Figure 2. During follow up after the operation

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hemimandibulectomy followed by reconstruction with Pectoralis. Major myocutaneous flap which unfortunately underwent necrosis leading to a huge defect. Histopathologically it was poorly differentiated squamous cell carcinoma with close anterior margin and presence of perineural, lymphovascular invasions and extracapsular extensions. 4 out of 20 lymph nodes were positive for malignancy. The patient also started developing nodules at the periphery of the resection margin which were proven histopathologically as malignant nodules. Hence a decision was taken in the multidisciplinary tumour board for re-resection and reconstruction by Narayanan's flap as a salvage procedure. The wound was refashioned including all the newly developed nodules and the resultant defect was covered by bipolar scalp flap. In the postoperative period, the

Figure 3. Raising of flap

Figure 4. Reconstruction

patient developed oro-cutaneous fistula which was managed conservatively. She received radiation after recovery from surgical interventions but succumbed within 1 year out of metastatic disease.

Case presentation III

A 42 years old male presented with carcinoma of right buccal mucosa for which wide excision, right-sided MRND and primary closure was done. The patient received adjuvant radiotherapy as 3 out of 21 lymph nodes were positive and lymphovascular invasion was present. The patient lost to follow up after that and returned to us after 8 months with a huge fungated ulceroproliferative mass over the right cheek. Narayanan's flap appeared to be a salvage procedure for this patient in the tumour board. Therefore he was treated with re-resection and reconstruction with bipolar scalp flap. Pedicles were detached and repositioned after 6 weeks. Recovery was uneventful. The patient is surviving at 9 months now without any feature of loco-regional recurrence or distant metastasis.

Figure 5. Reconstruction

Discussion

Gilles first described the use of pedicle scalp flap based on the superficial temporal artery for the reconstruction of defects in lip and eyebrow. Extensive work has been done with the layers and blood supply of the scalp, resulting in advances and refinements in the use of tissue from this area. Scalp tissues can be used as random local fascial flaps or as axial flaps due to rich vascularity, proximity and similarity in texture for complex head and neck reconstructions. These can be used as a pedicle, free or composite flaps with calvarium or hair-bearing skin to reconstruct defects all over the body especially auricle, orbit, cheek and oral cavity. They have also been used to treat Frey's syndrome, osteoradionecrosis, nasal septal perforations and temporal bone pathologies. Plentiful of options are available for reconstruction of the defect in early cases of head-neck cancers like primary closure, local flap, free flap etc. but very few of them can be applied

actually in highly advanced or radiotherapy -failure cases which makes Narayanan's flap so useful and handy [3].

Optimal post-surgical reconstruction in the head-neck region should be performed with local tissues that best mimics the facial complexion, texture and hair-bearing attributes. Simultaneously, the capacity of articulation and maintenance of oral and oropharyngeal functions like mastication and swallowing are also to be kept in mind while performing the reconstruction. Ideal reconstructive procedure mandates adequate tissue bulk, volume, texture, contour, pliability, innervation, colour, mobility and sensation.

The bilobed flap was first described by Esser in 1918 who used it for nasal reconstruction. Later on it was used by Zimany (1953), Elliot (1969), Tardy et al. (1972), Dean et al. (1975), Haas (1977), Kastenbauer (1977), Babin and Krause (1978), Gunter (1978) and Weerda (1978) in various areas all over the body. More relevant use of bilobed flaps in head and neck reconstructions was described by Narayanan in 1970 who used a bipolar scalp flap based on superficial temporal artery territory. The lobes are based on the anterior division of superficial temporal artery (non-hair bearing) and posterior division of superficial temporal artery (hair-bearing) which are sandwiched with each other. Non-hair bearing lobe (forehead) is placed intraorally and the hair-bearing lobe (scalp) is placed extra orally. The flap can be islanded and is mostly suitable for male patients.

Narayanan's flap has some distinct advantages like reliable blood supply due to high vascularity, proximity to the face, excellent match of complexion for cheek and lip, concealment of facial asymmetry by beard in male patients, less operating time, no need of special infrastructure (e.g.-free flap) and easy reproducibility. The main disadvantage, besides being a multistage procedure, is that it causes growth of hair over face in females. All other reconstructive measures have their shortcomings – skin grafts have poor tissue texture and thickness, non-hair bearing and contracts to a great extent, local advancement, transposition and rotational flaps can be used in small to medium-sized defects, myofascial flaps are too bulky, time-consuming, non-hair bearing and have significant donor-site morbidity.

In comparison, Narayanan's flap actually acts as a salvage method with much less morbidities. Therefore it can be considered as an optimal choice in locally advanced, recurrent or refractory oral cancers [4].

Bipolar scalp flaps offer great flexibility in the use of available local tissue than many other regional flaps. Golomb and Neumann (1958) hypothesised that the bilobed flap uses less tissue than any other method of wound closure minimising local stretch and tissue tension. In head-neck reconstruction it is very much important to avoid tissue distortion as it simultaneously distorts functions. The length of both the lobes can be adjusted according to the need and size of the defect and these two arms can be moved in different planes helping in one-stage reconstruction. The stress imposed on the flap appears to be transferred to the long axis of each lobe making this technique very safe in the face. If proper attention is paid to the thickness of the flaps then an excellent facial contour can be achieved far superior to skin grafts or loco-regional flaps [5].

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

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Learning Points:

- Narayanan's flap has some distinct advantages like reliable blood supply, proximity to face, match of complexion for cheek and lip, concealment of facial asymmetry by beard in male patients, less operating time, no need of special infrastructure and easy reproducibility.