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Surgical reconstruction

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THE oropharynx is the crossroads of the air and food passages and surgical repair therefore presents a formidable challenge in so far as the whole area is critically concerned with the functions of speech and swallow. Squamous cancer is the most likely lesion to require surgical ablation and since early lesions are generally treated by irradiation, operation is likely either planned to follow irradiation in advanced lesions or in those recurrent after initial irradiation. Except for a few limited lesions confined to the palatine tonsil or posterior pharyngeal wall which may be locally removed, the majority of resections will therefore need to be extensive. Neighbouring anatomical areas are often involved and frequently part of the mandible or the maxilla will have to be resected.

In such circumstances the provision of good healing and restoration of function requires generous replacement of soft tissue by the use of large skin flaps with good blood supply and suitable bulk.

Types of repair

1. *Epithelialization.* In the few limited lesions there is no need for resurfacing. A clean granulating surface will heal easily by second intention and without functional deficit.

2. *Direct Closure.* In some cases where the surface loss of tissue has also been small and where the ramus and part of the mandibular bone have been removed for access, it is possible to carry out a direct mucosa-to-mucosa suture with careful back-up of the submucous tissues and muscle layers. After ablation of a limited lesion in the linguo-tonsillar groove or fauces of a patient with preferably non-irradiated tissues, by a 'Commando' resection, satisfactory closure may be achieved in this way.

Certain T2 or T3 lesions further down the lateral wall of the oropharynx and encroaching on the tongue base or posterior wall of one side, may also be resected without mandibular removal by the classical Trotter (1929) procedure with primary closure.

3. *Local Mucosal Flaps.* For small lesions on the upper part of the faucial arch, a local rotation flap from the anterior tongue may be used to resurface the fauces (Adkins and Putney, 1976). Although tempting in conception this method has a limited application.

A vascular pedicled island flap from the hard palate backed by a flap of pharyngeal mucosa also provides a neat method of soft palate repair

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after full thickness resections (Millard and Seider, 1977). However, oral prosthetics are now so successful that they are generally preferable after resections for cancer.

4. *Regional Skin Flaps.* In the great majority of cases the soft tissue loss will have been considerable and within radiation fields. To replace this with any chance of good healing and proper functional rehabilitation a pedicled skin flap of generous proportions with a good blood supply will be required.

(a) *Random vascular pattern flaps.* These are from the neck and shoulder areas. They should mainly be used in non-irradiated subjects or where reduced dosage has been given in view of the healing potential. Examples are those described by Bakamjian and Littlewood (1964), Conley (1970) and Farr *et al.* (1976). However, the Mutter type flap based on the occipito-mastoid area and extending down the shoulder can be used undelayed in some circumstances since it lies outside the radiation fields (Robson *et al.*, 1976). They can be effective but have the disadvantage of a temporary pharyngo-cutaneous fistula requiring secondary closure and encouraging local infection.

(b) *Axial vascular pattern flaps.* These are regional skin flaps based on an axial blood supply and raised in adjacent but non-contiguous regions: (1) *Delto-pectoral flap.* Originally described for use in the pharynx by Bakamjian (1965) this can be used to resurface defects in the lateral walls of the oropharynx and tongue base. However, it also requires a temporary pharyngeal fistula since it must be introduced through an upper neck incision, usually following a neck dissection. In addition, the viability of these flaps especially at the tip is questionable in about 10–15 per cent when non-delayed. (2) *Forehead flap.* Much experience of its use in the mouth and oropharynx has been obtained in the past 15 years since it was first advocated by McGregor (1963). Anatomically and physiologically it is the ideal type of flap for repair of any magnitude in this area. Properly raised, inserted and secured it has few hazards and importantly gives an immediate salivary seal. It can also reach further back and downward in the oropharynx than the other pedicled flaps and has a better blood supply with more appropriate texture and bulk. It does require a second small operation for retrieval and closure but this is outweighed by its prime advantages. The disadvantages are cosmetic, more especially in the male, but modern technique can now do much to mitigate this.

(c) *Musculo-cutaneous flaps.* Much valuable experimental and clinical work has gone into the development of these axial compound flaps in the past few years (McCraw *et al.*, 1977; Ariyan, 1979). They are complete or island pedicle flaps based on the anatomical and surgical axis of a large superficial trunk or limb muscle with a good blood supply, and having perforating branches to the skin. They can furnish, without

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delay, substantial extended flaps providing complete soft-tissue replacement, new blood supply and additional bulk for filling defects or protecting vital structures. For defects in the oropharynx or other head and neck sites, those based on the pectoralis major, sterno-mastoid or trapezius muscles are the most practical. The latter may also supplement the Mutter flap. They can be brought up directly for surface cover or inserted for lining through the incisions of a standard neck dissection.

5. *Free Skin Flaps.* The concept of moving a free full-thickness skin flap from one region of the body to another is not new, but its reality in head and neck surgery is due to the work of recent pioneers such as O'Brien *et al.* (1973), Acland and Flynn (1978) and Harii *et al.* (1976). Axial-supplied skin angiotomes are selected and the operating microscope is used for dissection and micro-vascular anastomoses at the recipient site. In the oral cavity and oropharynx, the groin flap based on a pedicle of the inferior epigastric vessels or a delto-pectoral flap based on a perforating vascular pedicle of the internal mammary vessels is used (Panje *et al.*, 1977). The pattern of flap can be fashioned precisely to fill the defect and its vessels are anastomosed to the superficial temporal or facial vessels. The main problems of this method are vascular spasm or thrombosis at the site of anastomosis, and operating time, usually prolonged, together with the availability of a skilled operator.

Choice of flap

Adequate functional restoration in practice means proper replacement of soft tissue, and for the majority of lesions in this area, usually T2 or larger, there is little doubt that a skin flap repair will be required. A technique which is relatively quick, adaptable to various oro-pharyngeal sites, with simple post-operative management and few hazards, such as the forehead flap has seemed ideal until recently. However, it is now likely that the pectoralis major myo-cutaneous flap (Ariyan, 1979) or the free skin flap (Harii *et al.*, 1976) may supersede it for reasons of versatility, single-stage operation and minimal cosmetic defect. It would seem clear that the method which most reduces morbidity and hospital time with fewer anaesthetics and which gives the best functional results will eventually become the first choice for the larger defects.

For the minority of smaller lesions either healing by simple epithelialization or direct closure will meet the stated requirements.

Results of repair

Any objective assessment of the results of surgical reconstruction in such an important area is preferably made at an interval of about one year to allow for physiological and psychological adjustments. Simple direct repair after a limited loss of soft tissue will generally give an excellent

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functional result. However, if there has been distortion or tension of tissues, especially in the lateral wall of the oropharynx and with reduction of tongue mobility, a disturbance of speech will result with likely difficulties of chewing, swallow and possible drooling. Any additional scarring due to irradiation or loss of neuromuscular control due to infirmity will aggravate this problem.

Where large flaps are used to make good soft tissue loss, the least functional disturbance is likely to follow the precise insertion of a free vascular pedicle graft. Successful use of an adequate inlay from a myo-cutaneous, delto-pectoral or forehead pedicle flap should also result in minimal handicap. Where tongue base replacement has been necessary, however, there may well be the additional problem of laryngeal spillover with more prolonged rehabilitation.

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