



Cheek and Perioral Cancer

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Core Messages

- As surgeons, we ignore history and the patient's history at our peril.
- Facial disfigurement is catastrophic. In reconstruction, perfection is only just good enough.
- First, mentally create a plan deciding whatever sized defect is required to excise the cancer and then think what is missing and what is displaced?
- Replace like with like.
- Always strive to perform better surgery and be open to new and innovative methods.

1 Introduction

History teaches us. Although plastic and reconstructive surgery developed as a specific discipline of surgery relatively recently, some operations that would now be classified under the umbrella of plastic surgery were developed hundreds of years ago. An example being the forehead flap for nasal reconstruction described in the *Sushruta Samhita*, a Sanskrit medical treatise from the fifth-century BC.

It is to the pioneers of yesteryear that we owe respect and admiration as theirs are the footsteps in which we follow. The former professor of philosophy at Harvard, George Santayana, stated “Those who cannot remember the past are condemned to repeat it”. In both medicine and surgery, therapeutic options that lost favour are sometimes revitalized and come back into favour as the problems that occur with the latest and greatest are realized.

Michael Tempest FRCS (former editor of the *British Journal of Plastic Surgery*) recorded that a full-page editorial in the *Lancet* on 24 July 1920 reviewed the new book by Major Harold Gillies CBE, FRCS of the Royal Army Medical

Corps and titled *Plastic Surgery Of The Face* [1]. Sir Harold Gillies (1882–1960), a New Zealander and a surgeon of remarkable inventiveness and vision, had documented his unrivalled experience of treating the casualties of World War 1. It included burns of the face as well as gunshot and blast injuries, with a chapter on the application of prosthetics by Captain W. Kelsey Fry M.C., RAMC and remarks on anaesthesia by Captain R. Wade, RAMC. The editorial noted the rapid development of plastic surgery as a remarkable vindication of the value of teamwork. The value of the graphic record, sparing of words but lavish of pictures and diagrams was another laudation. In many respects, this monumental book by Gillies was the inspiration for *An Atlas of Extreme Facial Cancer*.

Sir Benjamin Rank (1911–2002) of Australia, who was a pupil of Gillies pre-World War 2, experienced the “indelible imprint” of the master surgeon and wrote the foreword to the facsimile of *Plastic Surgery Of The Face* published in 1983. In it, he praises the opening chapter on principles and the fundamental Gillies principle “To restore to their normal relationships, those parts damaged by disease or injury and to reconstruct or substitute for parts lost, tissues like in kind and amount”.

Rank also reminds us that Gillies himself acknowledged the use of all methods described in his text before, some of which had been described more than six centuries before. The Indian forehead and Italian arm flaps for nasal reconstruction of course, along with the lesser known local cheek flap of Middeldorp which was illustrated in an 1857 Surgical Atlas by Bruns (Fig. 1).

The thousands of hideous facial injuries from war, treated in the temporary hutted hospital set in the grounds of the country estate of the first Viscount Sydney, are documented for eternity. An example of Gillies' reconstructive skills for the face is illustrated below in Fig. 2. Private Bell sustained a gunshot wound to his mid- and lower face on the Western Front circa 1916–1917. He was managed initially by Charles Valadier a French American dentist with whom the young Gillies had originally been mentored in the treatment of war facial injuries at the beginning of WW1. Valadier referred

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the young man to Gillies who had established the Face and Jaw Injuries Unit at the Queen Mary's Hospital, Sidcup, Kent, England in 1917. In his 1920 monumental textbook, *Surgery of the Face* [1], Private Bell is case 525 with total loss of his upper lip, a contracted mouth and pouting lower lip. Gillies recorded that the whole of Private Bell's nose was also lengthened and depressed (due to maxillary bone loss). In his first of several operations dated 23 July 1918 at Sidcup, Gillies recorded in his detailed operative note, drawings and photographs the surgical plan. The scar tissue was excised, and the stumps of the upper lip that had been crudely approximated by Valadier were separated and returned to their normal position. This principle determines what tissue is missing and what tissue is displaced. The nose was freed from its scars and repositioned cephalad on a small but vital upper skin bridge, which maintained its vascularity. Later, a total of six cheek–chin local flaps were mobilized and inset to provide lining and skin cover. A vulcanite upper prosthesis maintained the structural support for the new upper lip and nose.

Sir Benjamin Rank reflects that injuries like Private Bell presented as surgical, social and humane problems of the highest order. Gillies himself hoped that the book would be distributed as a deterrent to the politicians of every country, to promote peace and not war. Dr. Andrew Bamji the Gillies Archivist has written about this and the historical evolution of plastic surgery in his excellent *Faces From The Front* [3].

Gillies divided the face into regions and each region into groups, as judged by the extent of destruction. Many injuries overlapped so that cheek injuries often involved the lower eyelids, nose and mouth. Gillies wrote that the cheek is an area of plastic surgery, which lends itself to good results by restoring the lining membrane, the supporting bone structure and the skin cover.

Almost 70 years later, Professor Ian McGregor FRCS (1921–1998) of the Canniesburn Plastic Surgery Unit in Glasgow, Scotland reminded us of the generous quantity and quality of donor skin that was available in the cheek and neighbouring cervical region for modern methods of loco-regional facial reconstruction (Fig. 3).

Fig. 1 The flap of Middeldorp for a cheek defect, perhaps the precursor of the modern rhomboid local flap and illustrated in a 1857 Bruns Chirurgischer Atlas (courtesy of the late Professor Neven Olivari; re-used with permission from Klaassen et al. [2])

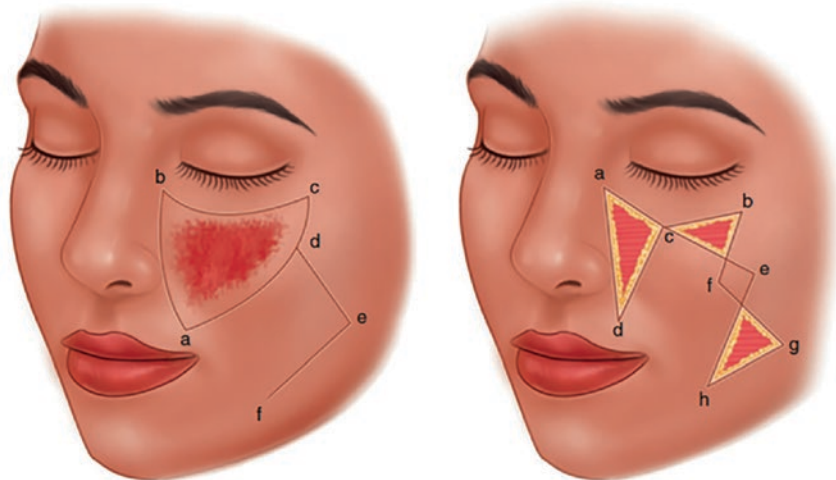




Fig. 2 (a and b) Private Bell, referred by Charles Valadier in France to Harold Gillies at Sidcup, England, circa, 1918 after a gunshot wound to the central face. The final result in September 1919 after a series of staged reconstructions with local cheek flaps, repositioning of the nose

and a vulcanite maxillary prosthesis (courtesy of Dr. Andrew Bamji, retired rheumatologist and Gillies Archivist, Queen Mary's Hospital, Sidcup, Kent, UK, and from the Archives of the Royal College of Surgeons of England)

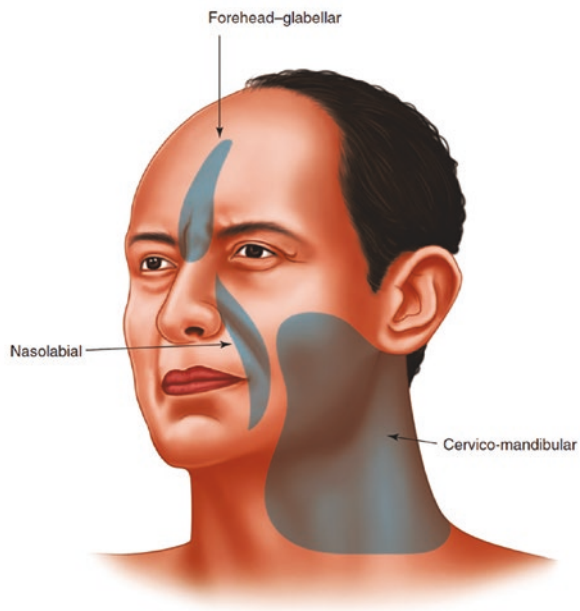


Fig. 3 Areas of spare cheek skin on the face (*from* Klaassen et al. [2]; *with permission*)

2 Modern Concepts

Dr. John J. Coleman III wrote an excellent chapter in 1994 describing the modern principles for osseous reconstruction of the midface and orbits [4]. He stressed the importance of understanding both the functional and aesthetic relationships of the midface unit. For large composite defects of the midface, the reconstructive solutions varied between prosthesis versus replacement of the tissue defect with vascularized free flaps of bone and soft tissue. Refinements in both the design of perforator free flaps and the osseointegrated maxillofacial prostheses have added many options to these most challenging cases. The addition of vascularized bone and soft tissue is particularly valuable in the setting of radiation damage or high bacterial colonization of the facial wound. For complex composite defects of the orbitomaxillary region the subscapular pedicle with its thoracodorsal and circumflex scapular vascular branches provide free flaps with soft tissue and more than one segment of bone. The details of these refinements are described further in Chap. 7 “Pedicled Versus Free Flaps” and Chap. 17 “Modern Maxillofacial Rehabilitation”.

Dr. Frederick J. Menick of Arizona, USA wrote a very helpful article in the August 2011 issue of *Plastic and Reconstructive Surgery*, which the author recommends [5]. Menick also refers to the topographic units of the face by anatomy, contour and colour. The central units are more demanding for the reconstructive surgeon than the peripheral units and restoration of normal appearance should always be the goal, if possible. The design of anteriorly based and posteriorly based cervicofacial flaps using an extensile approach, which may include chest skin, is clearly described. Skin

grafts are best for temporary cover, and distant flaps have a poor colour match and are best used for providing hidden lining or vascularized bulk for large and deep defects of the cheek.

Accompanying nasal defects, which may be overlapping with the cheek defect, are best reconstructed secondarily, once a stable cheek platform is achieved and this is brilliantly illustrated in the textbook co-written with the late Dr. Gary Burget (1941–2017) of Chicago, USA [6].

The choice of reconstructive options includes the pyramid concept of direct closure (when skin laxity allows), local flaps, loco-regional flaps, distant flaps (pedicled and free) and finally facial transplantation. The detailed choices of pedicled versus free flaps have been carefully considered by Professor Damian Marucci FRACS in Chap. 7 “Pedicled Versus Free Flaps”. In the illustrated cases below, the author describes the challenges he has faced when dealing with patients with cheek cancers.

3 Management/Technique

3.1 Direct Closure After Undermining

In the elderly patient and those with skin laxity in the lower face and neck, direct closure of moderate-sized defects of the lateral cheek can be achieved after undermining. The author uses the techniques of face and neck lift surgery with plication sutures of the platysma muscle at the first neck crease and the preauricular superficial musculoaponeurotic system (SMAS) with vertical vectors. These aid skin closure by shifting the tension to the deep plane (Fig. 4).



Fig. 4 (a–d) A 94-year-old woman with a biopsy-proven 5 × 2 cm well-differentiated SCC of her left jawline. Wide excision and direct closure after undermining and platysma—SMAS plication to reduce tension on skin closure

3.2 Local Cheek Flap

The author's local flap closure technique of choice is the sigmoid oblique island advancement local flap described by Dr. Ono of Japan [7]. This shifts skin and subcutaneous tissue from an area of laxity to the area of tension and respects the relaxed skin tension lines (Fig. 5). This Ono flap was for a small defect, but the right infraorbital location made the risk of postoperative lower lid retraction a reality.

The next case in an older gentleman, with a larger SCC tumour of his left malar region, demonstrates the

application of a larger Ono flap based on the relaxed skin tension lines (Fig. 6). Despite wide and complete excision, the SCC recurred 6 months later whilst the author was abroad. Another colleague managed the recurrence with further wide excision, repair with a posteriorly based cervicofacial local flap and adjuvant radiotherapy. The patient returned some years later with further BCCs of his nose, right preauricular and right temple regions. The latter were widely excised, and the defects were repaired with a type II facelift local flap [2].



Fig. 5 (a–d) A 58-year-old gentleman with a nodulocystic basal cell carcinoma of his right infraorbital region, widely excised and the defect repaired with a sigmoid oblique island advancement flap of Ono, immediate, 6-month and 5-year results



Fig. 6 (a–f) An 88-year-old gentleman with a moderate–poorly differentiated squamous cell carcinoma of his left malar cheek region widely excised and the defect repaired with a sigmoid oblique island advancement local flap. The tumour recurred at 6 months at the lower end of the flap and was again widely excised, salvage repair with a

cervicofacial flap and 17/20 fractions of adjuvant radiotherapy given. A year later, he returned with nodular basal cell carcinomata of his supra-tilt nose, right temple and right preauricular regions. The latter were excised, and the defects were repaired with a facelift advancement flap. Final result is shown at 3-year follow-up

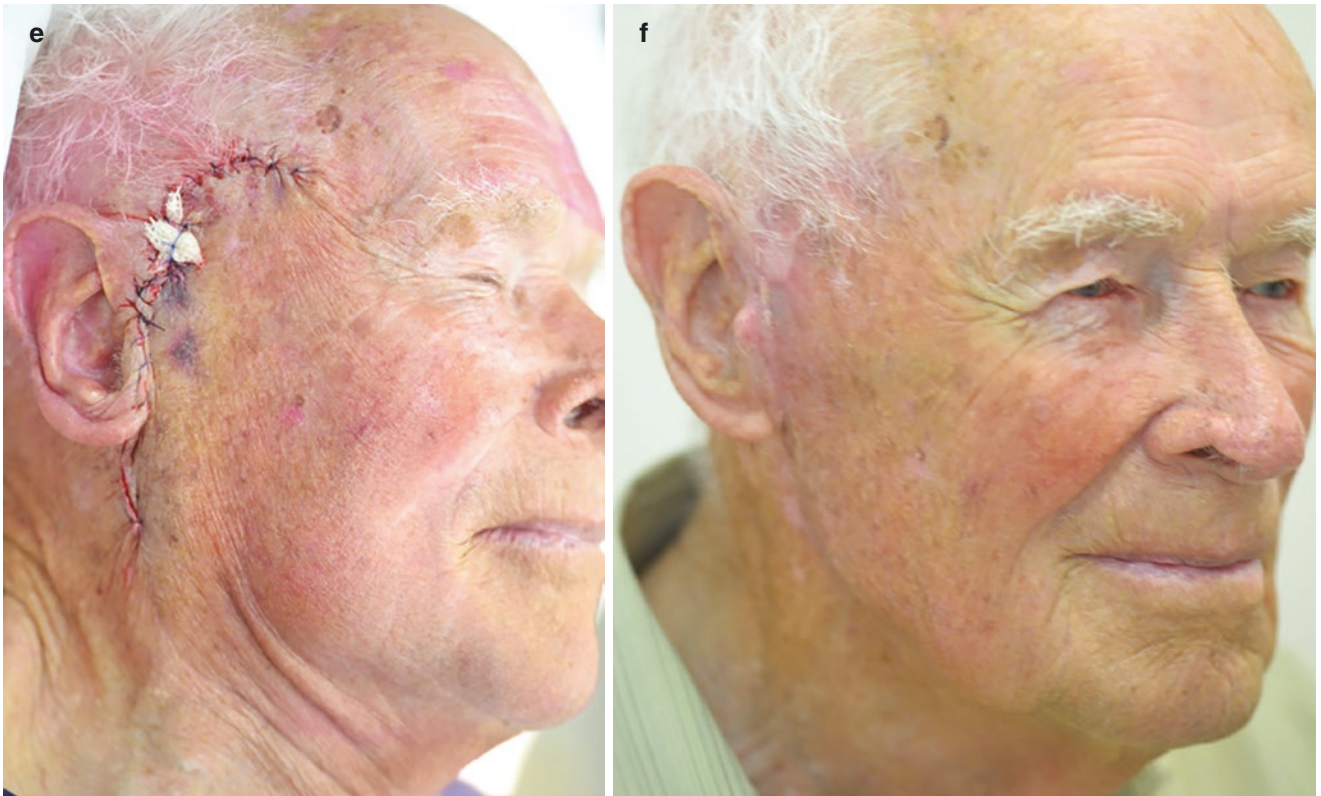


Fig. 6 (continued)

3.3 The Facelift Flap

The concept of aesthetica, previously referenced in Chap. 5 “The Team Approach in Cancer Care”, was reported by James Frame FRCS, Paul Levick FRCS and the author in 2017 [8]. It was an idea the author had after hearing Professor Frame present the Flick lift for minimalist facial rejuvenation early in 2017 at the Face Symposium in Queenstown, New Zealand. Aesthetica is a new and modern terminology that describes the application of cosmetic surgical techniques to improve the appearance of congenital or acquired soft tissue defects.

A classic example is the facelift incision and preauricular flap raised to access the sebaceous cyst in this young woman’s left masseteric region. The aesthetica approach avoids a large scar over her lateral cheek (Fig. 7). There is a small scar representing the excised punctum.

The 89-year-old patient in Fig. 8 is one of the clinical cases reported in the 2017 Aesthetica paper [8].

The next clinical example is a more traditional direct advancement facelift flap for an infiltrating ulcerated SCC of an elderly patient’s lower left preauricular and earlobe region (Fig. 9). The excision margins for the SCC lesion are the inner marking and the outer anterior markings are the planned undermining in the facelift plane, between subcutaneous tissue and SMAS.

The author defined a classification for facelift flaps for cheek repair in his 2018 publication with Dr. Earle Brown and Professor Felix Behan, *Simply Local Flaps* [2]. Type I is a mini-preauricular facelift flap, type II is a moderate-sized flap and type III is an extended facelift flap. Figures 10 and 11 show clinical examples of these.

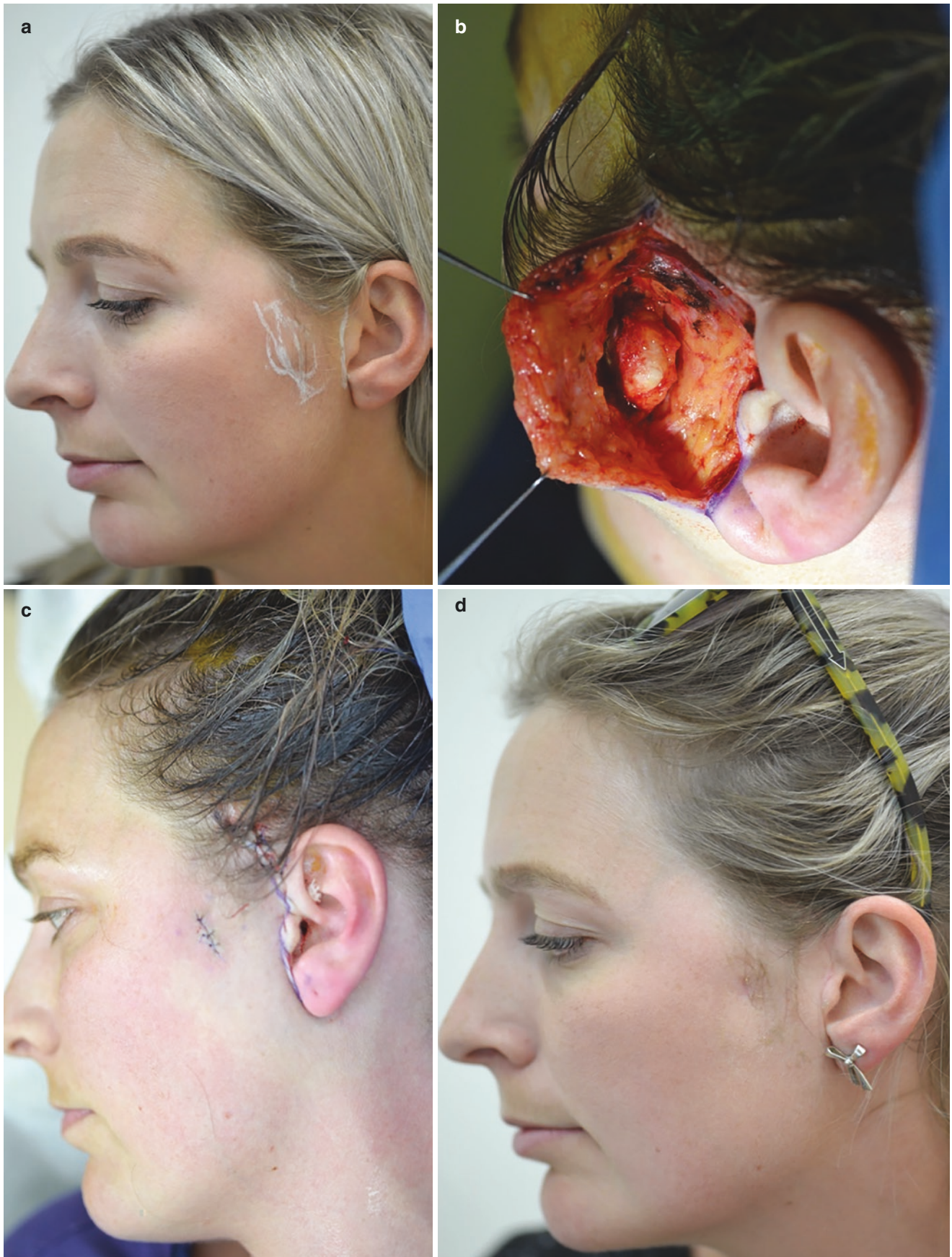


Fig. 7 (a–d) Facelift flap approach to remove a left preauricular sebaceous cyst (20 × 13 mm) in a 28-year-old woman, result at 6 weeks

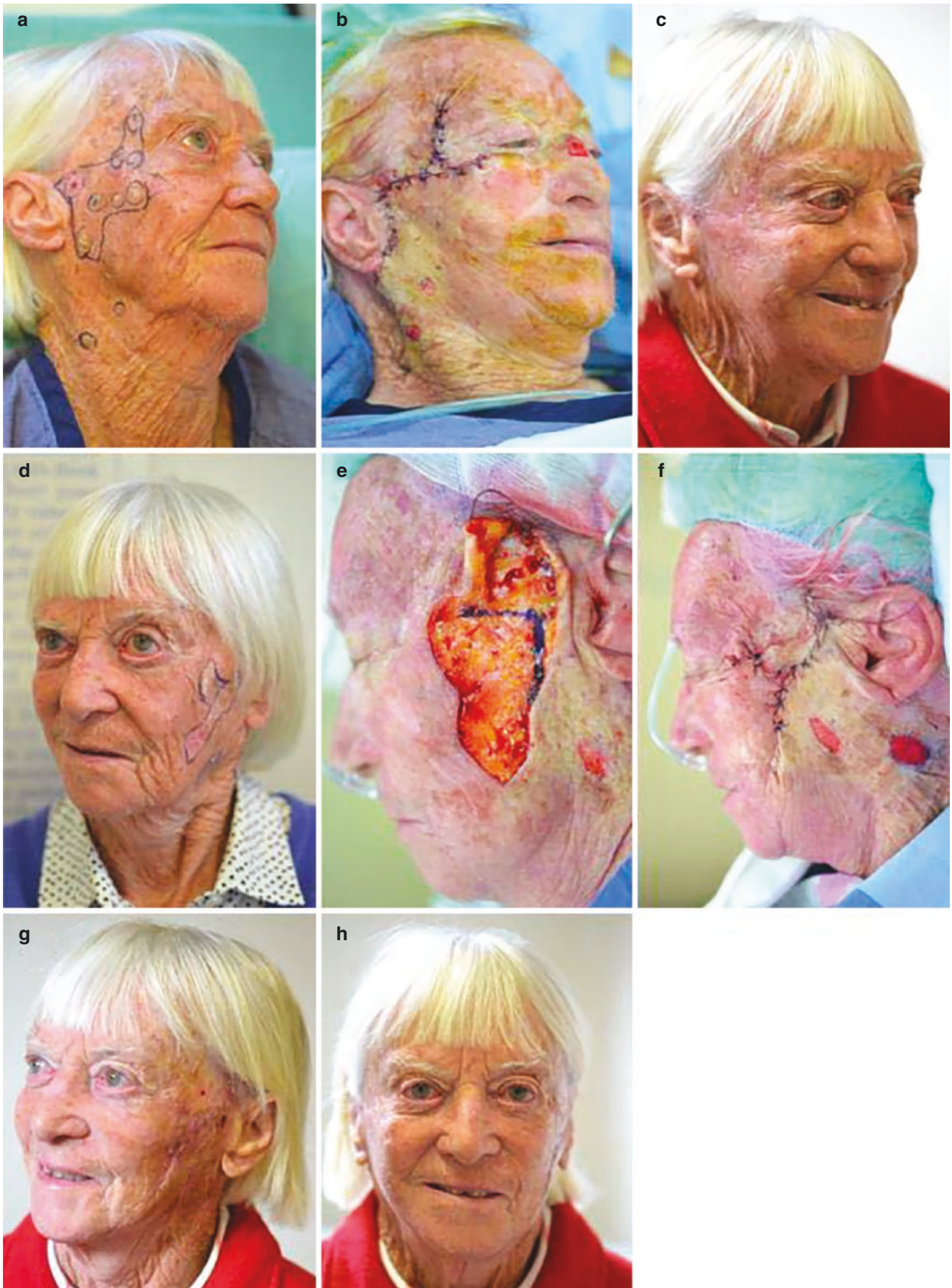


Fig. 8 (a–h) An active 89-year-old tennis player with severe facial photo-damage and large areas of SCC in situ both cheeks. In two stages, these areas were completely excised and the defects were repaired with the Flick lift flap

Fig. 9 (a and b) An elderly female patient with an ulcerated, infiltrating SCC of her lower left preauricular region. Widely excised including partial left earlobe and repair with a direct advancement type II facelift flap, after moderate undermining

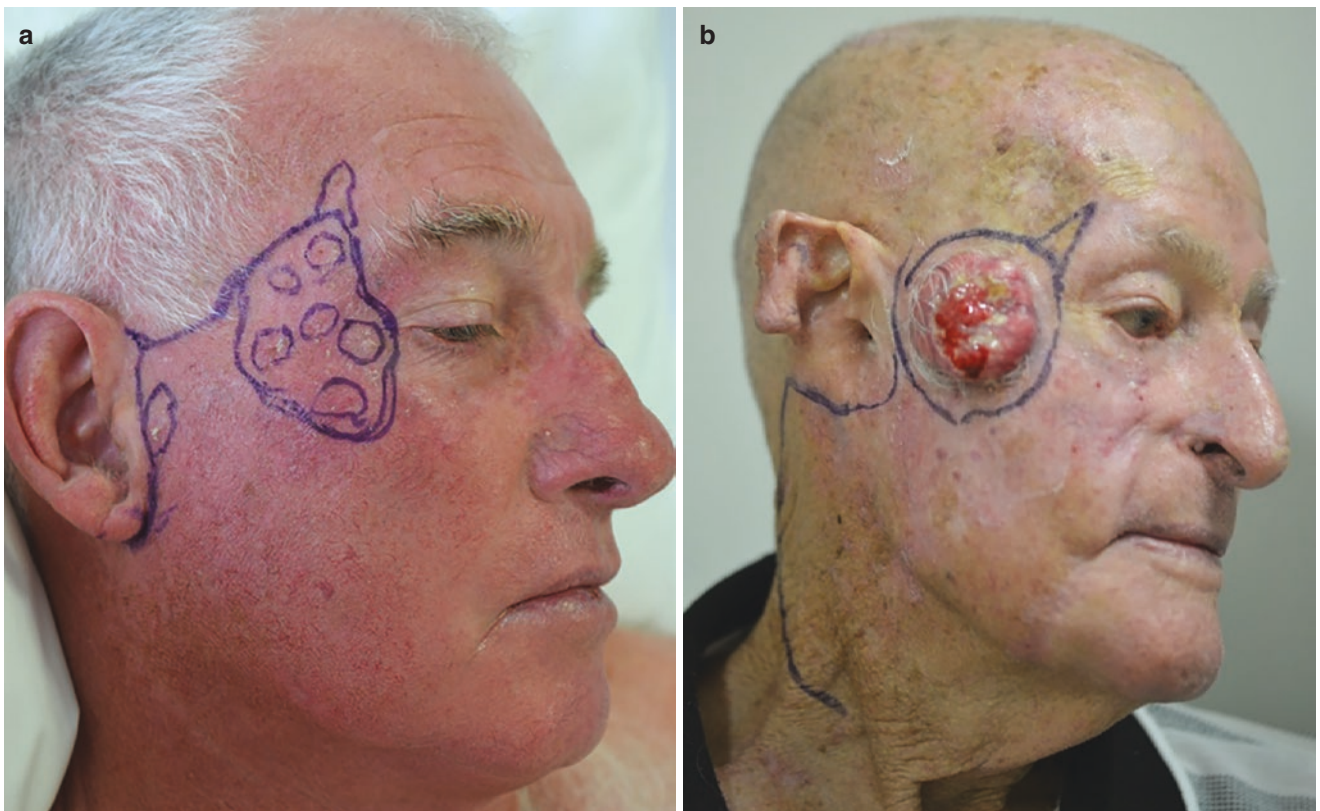
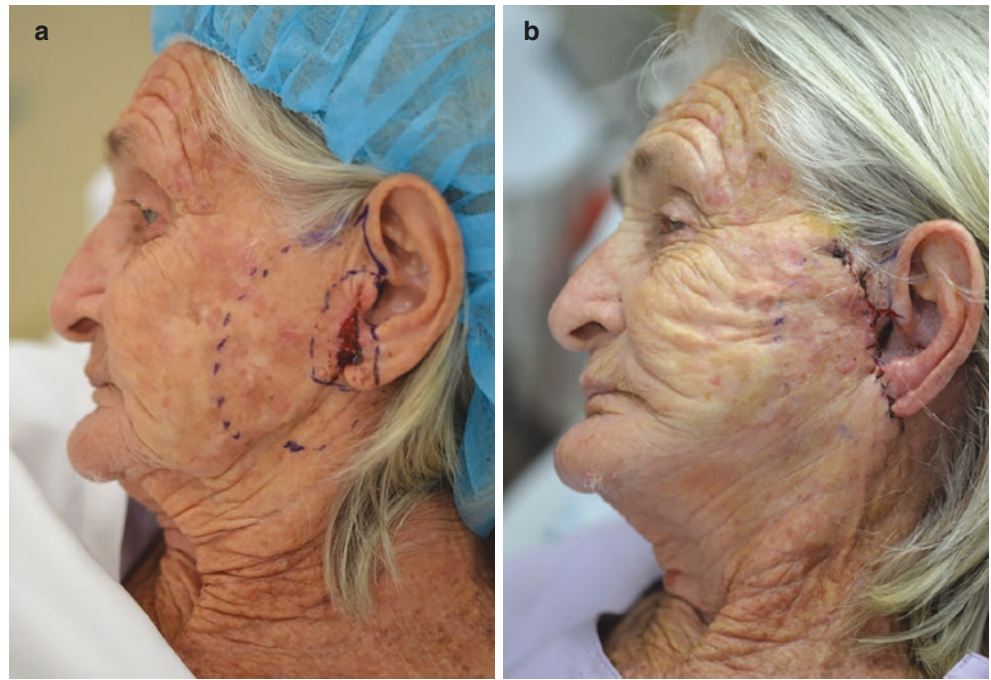


Fig. 10 (a and b) Two male patients with zygomatic cheek region malignant tumours suitable for wide excision and immediate repair with the extended type III facelift flap



Fig. 11 (a and b) A 93-year-old woman with rapidly growing well-differentiated SCC right zygomatic arch region of upper lateral cheek. Wide excision and repair with type III facelift advancement flap. Result shown at 3 weeks

3.4 Anteriorly Based Cervicofacial Rotation Advancement Local Flaps of the Cheek

These are in design similar to the Mustardé cheek rotation flap described in Chap. 12 “Extreme Cancer of the Periorbital Region” on cancers of the periorbital region but are an evolu-

tion of the facelift flap concept (Figs. 12 and 13). Increasingly, the author is using the haemostatic net sutures of Auerswald from Brazil, which were taught to him by Dr. Daniel Labbé of Caen, France, in 2019. These reduce the risk of haematoma and avoid the need for a drain under the flap. They are removed usually at day 3 [9].



Fig. 12 (a–d) An 83-year-old woman with biopsy-proven melanoma in situ of the right cheek widely excised with >5 mm margins radially and repaired with an inferiorly based cheek rotation flap. NB Auerswald’s haemostatic net sutures. Result at 2 months



Fig. 13 (a–c) A 77-year-old gentleman with a squamous cell carcinoma in situ of his left malar region, completely excised and the defect repaired with a Mustardé inferiorly based lateral cheek rotation flap after triangulating the defect. Note the haemostatic net sutures of Auerswald, which were removed on day 3 postsurgery and the result at 8 weeks

3.5 Posteriorly Based Cervicofacial Rotation Advancement Local Flaps of the Cheek

These flaps are a variant of the anteriorly based cervicofacial flaps. Usually, the medial flap edge follows the nasola-

bial fold. They can be combined with a Z-plasty in the neck as illustrated in Fig. 14. This is a patient of Dr. Swee Tan [2].

Occasionally, this flap may be combined with other local flaps such as the paramedian forehead flap if the cheek defect also involves the nasal region (Fig. 15).

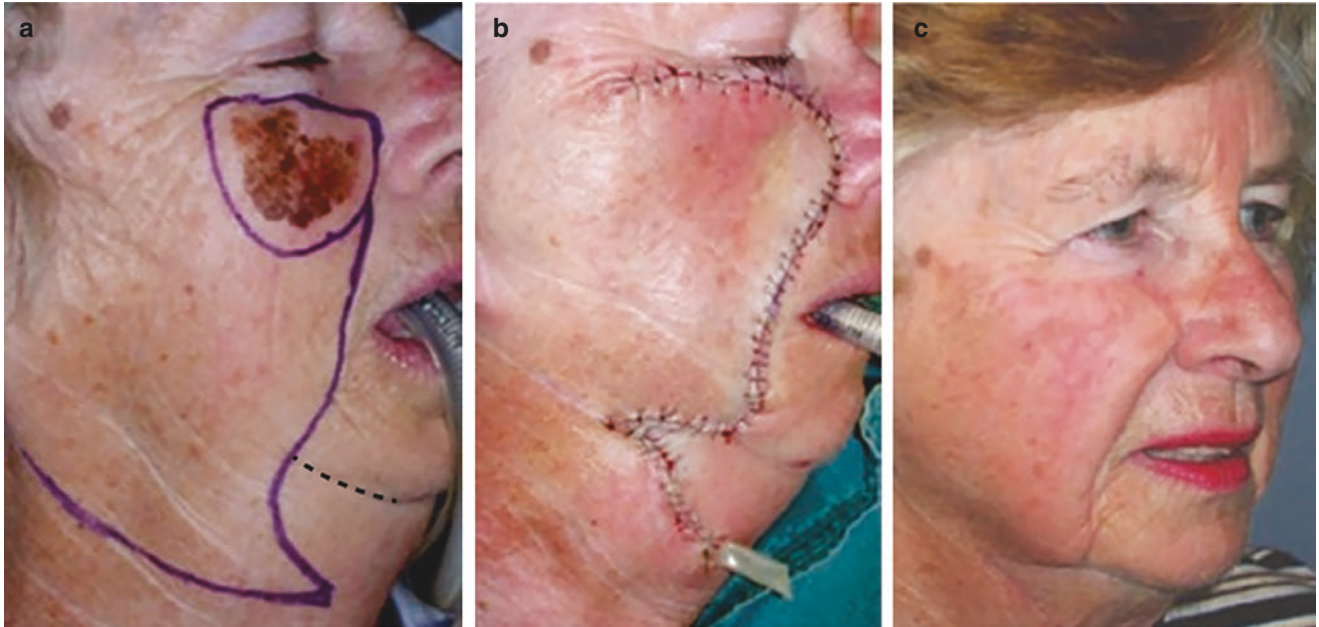


Fig. 14 (a–c) A 76-year-old patient of Dr. Swee Tan MD, FRACS with wide excision of a medial upper cheek melanoma in situ and reconstruction with a posteriorly based cervicofacial rotation local flap incor-

porating a Z-plasty in the submental region. Final appearance at 14 months (from Klaassen et al. [2]; with permission)

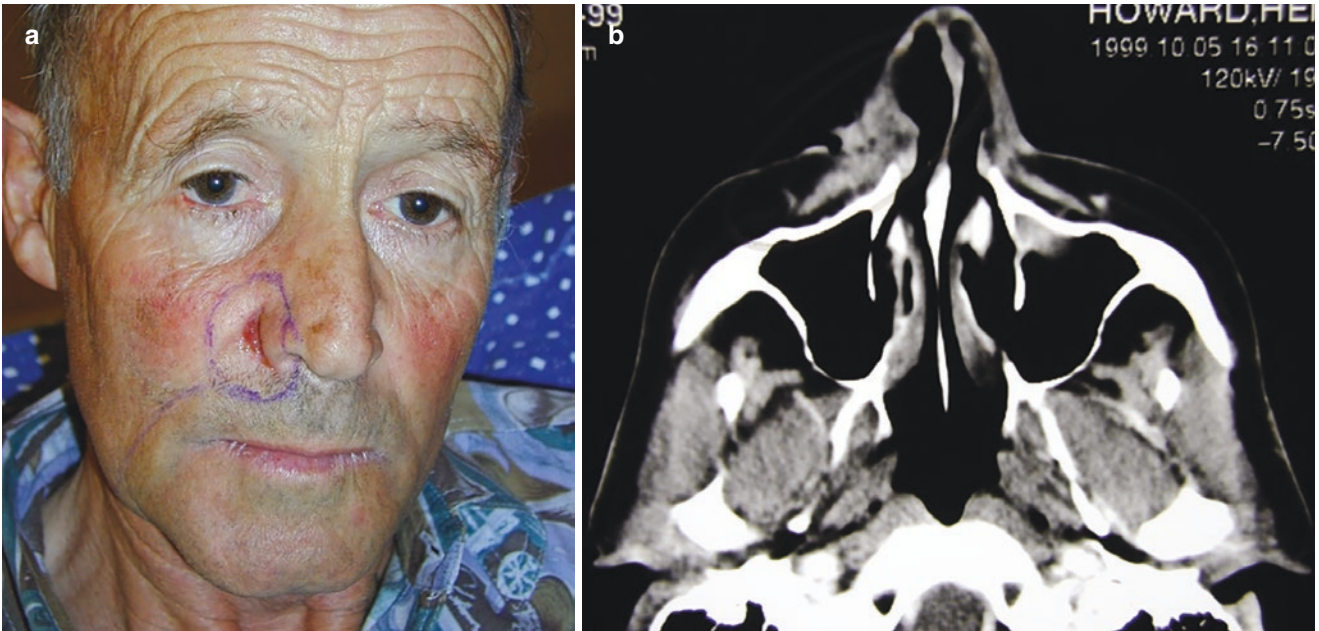


Fig. 15 (a–e) An ulcerated amelanotic malignant melanoma of the right nasolabial groove/alar nasal junction. CT scan shows proximity to right maxilla. Wide excision and staged reconstruction with large pos-

teriorly based cervicofacial flap, paramedian forehead and auricular cartilage grafts. 1-year appearance



Fig. 15 (continued)

4 Lip Reconstruction

The lips and perioral region are the central unit of the mid-face facial region. The late Dr. Gary Burget et al. wrote an elegant paper in the February 1998 issue of *Operative Techniques in Plastic and Reconstructive Surgery*, about the aesthetic reconstruction of the confluence of the nose, lip and cheek, which illustrates the relationship of the various central face aesthetic units very well [10].

Cancers of the lip and perioral region are common in every plastic surgeon's practice and most defects will be small–moderate, being less than one third of either the upper or lower lip. The late Dr. Stephen S. Kroll of Texas USA defined reconstruction of large lip defects in another issue of *Operative Techniques in Plastic and Reconstructive Surgery* (November 1999) [11]. Large defects are always difficult because of the special form and function of the lips. This challenge is addressed in more detail by Dr Rafael Acosta Rojas FRACS in Chap. 15 “Palliative Surgery”.

A typical lower lip cancer is shown in Fig. 16. This was a 62-year-old man who presented to the author with a 4-month history of lip dysplasia and an associated central lower lip well-differentiated squamous cell carcinoma. A combined wide wedge resection and lip shave were repaired with partial bilateral Karapandzic neurovascular island local flaps designed along the relaxed skin tension lines of the lower lip–chin junction.

The full bilateral Karapandzic flaps are more suitable for a subtotal lower defect as seen in the young woman in Fig. 17 who was referred by a dermatologist with a biopsy-proven desmoplastic malignant melanoma of her central lower lip. Radical excision including the right mental nerve was followed by immediate flap reconstruction and adjuvant radiotherapy.

Large defects present a real challenge as in this 45-year-old patient from Papua New Guinea, referred to the author's Interplast Team in 2000. The images in Fig. 18 show the extensive fungating SCC of his upper lip, right cheek, lower lip and chin from chronic betel nut chewing. This practice of chewing is widespread in parts of the Pacific.



Fig. 16 (a–d) A 62-year-old man with 4-month history of biopsy-proven well-differentiated pT2 SCC of the central lower lip with associated lower lip dysplasia. Wide excision + lip shave and reconstruction

with bilateral subtotal neurovascular island Karapandzic local flaps and mucosal advancement flap. Last image shows the result at 12 months



Fig. 17 (a–e) A young woman with desmoplastic malignant melanoma of her lower lip vermillion. Wide full-thickness lower lip resection in-continuity with right mental nerve to the foramen in her mandible (see oriented specimen), immediate reconstruction with bilat-

eral Karapandzic neurovascular island local flaps. No Abbe flap is required from upper lip. Postoperative radiotherapy. Appearance at 1 year



Fig. 17 (continued)



Fig. 18 (a–e) An extensive fungating SCC in a 45-year-old clergyman from Port Moresby, Papua New Guinea (*from* Klaassen et al. [2]; *with permission*)

5 Chin Reconstruction

The chin subunit is closely related to the lower lip and neck units. Serendipitously for the reader, the modern master of facial reconstruction, Dr. Frederick Menick from Arizona, USA published a paper on Subunit Reconstruction of the Chin in the

same issue of *Operative Techniques in Plastic and Reconstructive Surgery* (November 1999) as Dr. Stephen Kroll's large lip defect paper [12]. The author has not had cause to use Menick's staged submental local flap for total chin soft tissue reconstruction but has used the reliable keystone perforator island local flap of Behan, to achieve aesthetic reconstructions (Figs. 19 and 20).



Fig. 19 (a–d) A 73-year-old woman with a biopsy-proven infiltrating BCC of her left chin, widely excised and repaired with a keystone perforator island local flap. Immediate, 2-month and 8-month results shown



Fig. 20 (a–c) A 74-year-old woman with nodulocystic BCC of her central chin, widely excised and the defect repaired with a keystone perforator island local flap. Immediate result and early result at 1 month postsurgery

6 Very Extreme Cases

These are fortunately rare but require a comprehensive workup and surgical plan within the context of a Multidisciplinary

Team. Curative intent may often be unrealistic, and palliative resection plus reconstruction is more the norm. This cohort of patients is detailed in Chap. 15 “Palliative Surgery”, and some cases treated by the author are illustrated below (Fig. 21).



Fig. 21 (a–d) Extreme cheek cancers including an ulcerated long-standing BCC of the left hemi-face, an ulcerated SCC of the right pre-auricular cheek with associated right facial palsy, a recurrent Merkel

cell cancer right midcheek and the defect following radical resection of a rhabdomyosarcoma of the left cheek and maxilla

7 Fundamental Surgical Techniques/ Surgical Anatomy

These are best seen and experienced in the anatomy dissecting room, where the novice surgeon will learn from experienced mentors and then have greater confidence in the operating theatre. In May 2005, a small group of Sydney and Melbourne-based plastic surgeon anatomists organized the Inaugural Head & Neck Reconstruction & Aesthetic Facial Surgery Applied Anatomy Workshop. This was inspired by the Canniesburn Flap Course from Glasgow, Scotland and the subsequent Waikato Liverpool Hospitals Flaps Courses in the 1990s. Led by the author and hosted by the Surgical Training Centre, University of New South Wales, Sydney, Australia, the enthusiastic organizing committee included Dr. Antonio Fernandes, Dr. Lawrence Ho, Dr. Paul Stephens and Sven Kunkel (Manager STC). The passionate teaching faculty included Professor Michael Poole, Dr. Bryan Mendelson, Dr. Swee Tan, Dr. Lawrence Ho, anatomists Assoc. Professor Brian Freeman and Dr. Dzung Vu. Professor Michael Esson from the UNSW School of Fine Arts also contributed. Fourteen participants included Drs Ahmed Alkadhi, Lee Brown, Eddy Dona, Peter Callan, Ian Carlisle, John de Waal, Megan Hassall, Ian Holten, Gary Kode, Nita Ling, Stephen Mills, Zak Moaveni, Sandrine Roman and Andy Williams. It was a 3-day course, and we hoped to make it an annual Sydney event, but circumstances prevented this. In 2009, the late Dr. Simon Bernard (1967–2011) and Dr. Bryan Mendelson started, what would evolve into the Melbourne Advanced Facial Anatomy (MAFAC) course, which is still an annual event and also international.

From little things, big things grow (song by Paul Kelly, 1991).

8 Parotidectomy

The key is identification and preservation of the facial nerve trunk and its branches coursing between the superficial and deep lobes of the parotid gland. A facelift incision behind the tragus and taking a little bit of the tragal cartilage to make the skin more viable is our technique. The incision is deepened into the parotid fascia, where the facial nerve is still at least 4 cm deeper. Find the cartilaginous meatus and dissect anteriorly along it, which is an easy plane. The lip on the anterior edge of the bony meatus points to the trunk of the facial nerve exiting the stylomastoid foramen and a good 5 cm deep to the earlobe. The mastoid process and attachments of the sternocleidomastoid and posterior belly of digastric muscle are posterior landmarks.

9 Neck Dissection

A functional neck dissection aims to remove the fascial compartments of the neck that contain the draining lymph nodes. These are levels 1, 2 and 3. A submental flap is raised in the relaxed skin tension lines and a supra-platysma plane dissected up to the lower border of the mandible. The marginal mandibular branch of the facial nerve is identified and dissected free of its attachments if necessary. A safe approach is to identify the anterior facial vein as it runs over the submandibular gland. By ligating and retracting it cephalad, the marginal mandibular branch of VII is protected. The greater auricular nerve is usually sacrificed as the investing cervical fascia is divided. Begin the dissection posteriorly over the sternocleidomastoid muscle, lifting the node-containing soft tissues anteriorly. The spinal accessory nerve (XI) is seen entering the deep layer of sternocleidomastoid in its upper third and exits the muscle in the midneck. The surgeon should be aware of palpable nodes in the upper cervical chain. This means that the spinal accessory nerve cannot be spared from an oncological perspective. The XI nerve crosses the upper internal jugular vein marked by the transverse process of the atlas vertebral bone. It is best to ligate the IJV superiorly first to get rid of the “sausage”. The cervical plexus branch of XI is divided anteriorly and the dissection continues caudally over omohyoid muscle and the floor of the posterior triangle of the neck where the levator scapulae will be seen. The carotid sheath and the hypoglossal nerve (XII) will also be seen. In the patient with a previously irradiated neck, the levator scapulae muscle can be turned over to protect the carotid vessels. The omohyoid muscle is in the lower posterior triangle of the neck and deep to its fascia lies the brachial plexus, IJV, phrenic and vagus nerves. In this deeper plane on the left side lies the thoracic duct.

10 Tracheostomy

The airway is a shared anatomical region in all head and neck surgery for trauma, cancer and congenital anomalies. It is the authors' personal view that all clinicians should be competent in the emergency management of the airway.

In the neck dissection scenario, it is important to keep the tracheostomy wound separate from the neck dissection wound, if possible. This can be achieved with both a horizontal and short vertical skin incision. The midline strap muscles are separated, and the thyroid isthmus may need to be retracted cephalad or surgically divided. The tracheal rings are exposed, and a hole is cut for the tracheostomy tube placement. This is best done in the author's experience with

a Bjork inferiorly based tracheal ring flap, but alternatives include a horizontal or vertical cut, wide enough to take the tube. Ideally, the tracheostomy and neck dissection wound should not communicate. Revision of tracheostomy scars is an easy elective procedure down the track.

11 Gaining Access to the Oral Cavity

This is predominantly for the treatment of oropharyngeal cancer. Any compromise of treatment will adversely affect the patient's survival and quality of life. Functional aspects of chewing, swallowing and speech are a priority and covered comprehensively in Chap. 19 "Assessment of Function Post-Cancer" by Professor Julia Maclean of Sydney, Australia. Radical surgical excision with or without adjuvant chemoradiation is therefore the goal, and surgical exposure should be designed to maximize adequate exposure of the cancer and adjacent structures. The surgeon should also think about the potential dimensions of the resection defect, the loco-regional lymph node zones and the potential recipient vessels for microvascular free tissue transfer. The management of oral cancer is covered in more detail in Chap. 17 "Modern Maxillofacial Rehabilitation". Dr. David Soutar FRCS always emphasized the value of a proper examination under anaesthetic (EUA) for initial surgical assessment and planning [13]. Endoscopic examination combined with CT/MRI imaging is also worth considering in the workup. There are various approaches to the oral cavity exposure including transoral (with or without robotic technology), transhyoid pharyngotomy and the traditional lower lip splitting mandibulotomy. The latter is the preferred method of the author. After splitting the lower lip, the mandibular periosteum is exposed, mobilized and a step osteotomy is performed with a powered mini-saw anterior to the mental foramen. Whilst the genioglossus and geniohyoid muscles are left attached to the central mandibular segment, a cut is made through mylohyoid muscle and its attachment to the lateral mandibular segment. The mandibulotomy is swung laterally and this gives great access to the posterior tongue and posterior oropharynx. Composite resections will require mandibular reconstruction ideally with vascularized bone flaps and rigid fixation with reconstructive plates and screws. For hemi-maxillectomy access, a Weber-Fergusson incision parasally and through the upper lip is combined with an upper buccal sulcus incision. See Chap. 17 "Modern Maxillofacial Rehabilitation" for more details.

12 FAMM Flap

The author champions the mirror image of the external skin nasolabial flap, the facial artery myomucosal flap (FAMM flap) for reconstruction of small-moderate defects intraorally. This flap was first described in 1992 by Professor Julian Pribaz FRCS, FRACS an Australian of Italian birth who moved to the Harvard Medical School, Boston, USA [14]. This flap was taught to the author by Professor Michael Poole FRCS and is an exceptional flap for intraoral application. The markings for the facial artery are drawn from the angle of the mandible towards the nasolabial groove. It runs a tortuous path cephalad giving off superior and inferior labial branches. The deep course of the facial artery is drawn inside the buccal sulcus anterior to Stenson's parotid duct. The facial artery runs on the outer surface of the buccinator muscle but deep to the risorius muscle and the lip elevators. The FAMM flap can be based superiorly or inferiorly, and the surgeon should try and include the facial vein in the pedicle and leave a cuff of soft tissue around the artery. The superiorly based FAMM flap can be used to reconstruct defects in the hard palate, alveolus, maxillary antrum, nose, upper lip and orbit. The inferiorly based FAMM flap, after dividing the facial artery superiorly at the top end of the flap, can be used to reconstruct defects of the hard and soft palate, the tonsillar fossa, alveolus, and floor of mouth and lower lip [14].

13 Deep Facial Spaces

These were described by Drs Bryan Mendelson also of Melbourne, Australia and Steven Jacobson of the Mayo Clinic USA in 2008 [15]. The fourth layer of the face is akin to the fourth layer of the scalp schematically and is the gliding loose areolar layer, which contains the retaining ligaments of the face attached to the facial skeleton. Between the ligaments are the deep facial spaces: pre-masseteric space, pre-zygomatic space and cephalad, the pre-septal space. The facial nerves and vessels traverse through the walls, but do not enter the spaces. The orbicularis fascia forms the roof of the deep facial spaces, whilst the deep fascia or periosteum forms the floor of these spaces. The retaining ligaments branch out through the SMAS layer (third layer), to form the perpendicular part of the reticular dermis, which fixes to the dermis [15]. The spaces and their distension with ageing of the face have relevance for rejuvenation surgery but also for dissection planes in reconstructive facial surgery after cancer resection. This is particularly important for preserving the multiple facial nerve branches exiting the anterior part of the parotid gland.

14 Innovations

14.1 Changes to the Classification and Staging of Lip SCC

A recent paper by Yung et al. from Sydney has analysed the new classification of SCC of the vermillion lip (v1SCC) as a cutaneous SCC (previously classified as an oral SCC). This is a feature of the eighth edition of the American Joint Committee on Cancer compared to the former seventh edi-

tion and causes important aberrations leading to unwarranted upstaging of pT1 lesions [16].

14.2 Tissue-Expanded Local Flaps

This is covered extensively in Chap. 8 “The Novel Expanded Forehead Flap” showing many examples of the novel forehead flap for forehead and cheek reconstruction as a delayed procedure (Fig. 22).



Fig. 22 (a and b) A radiation-induced lesion of the right midcheek, excised and reconstructed with tissue-expanded local flaps

14.3 Keystone Interposition Flap

The author has used the keystone perforator island flap frequently for facial defects where the sigmoid oblique island advancement flap of Ono is inadequate and a common clinical

scenario is when two cancerous lesions are in close proximity as in Fig. 23. The wide application of the keystone perforator island flap concept is discussed comprehensively by Professor Felix Behan FRACS, in Chap. 9 “Keystone Flap Concepts”.



Fig. 23 (a and b) This 61-year-old cardiac transplant patient (15 years previously) on long-term immunosuppressants was referred with multiple scalp and facial SCCs. The left midcheek well-differentiated SCC and left preauricular region poorly differentiated SCC were in close

proximity, which precluded direct closure after wide excision. The novel use of an interposition keystone flap, described by the author conveniently, closes both defects without undue tension

15 Complication Management

Skin grafts are generally contraindicated for midface and cheek reconstruction except for temporary cover, whilst the Delayed Reconstruction After Pathological Examination (DRAPE) principle is being observed. The

colour match and contour are poor and shrinkage of the graft may lead to malposition and deformity of the lower eyelids. This is illustrated in Figs. 24 and 25 below.

And finally, an unusual case of a pedicled pectoralis major myocutaneous flap to the right face, which was never divided! (Fig. 26).



Fig. 24 (a and b) Lower lid malposition secondary to contracture of skin grafts, released and repaired with a full thickness skin graft (FTSG), result at 30 days



Fig. 25 Contour, colour and contraction complications of a split skin graft used for a midface cheek reconstruction. The left lower eyelid cicatricial ectropion needs to be released, the lower eyelid malposition restored with a lateral canthoplasty and new skin cover provided for the infraorbital, cheek and mandibular regions. A tissue-expanded posteriorly based cervicofacial flap would be one solution



Fig. 26 (a–d) Eleven years previously, this 82-year-old gentleman had radical surgery and radiotherapy for recurrent SCC of his neck resulting from a primary on the right ear. This was complicated by radionecrosis and an ulcer in his right submandibular region, which was reconstructed

with a pectoralis major myocutaneous pedicled flap. He got lost to follow-up and the flap was not divided and inset until the author came across him during a locum in North Queensland. Early postoperative result shown

16 Conclusion/Summary

The cheek and perioral regions are common anatomical locations for cancer. The related anatomical zones of the ear, orbit, nose and mouth may have overlapping reconstructive needs after cancer ablation. The modern master facial reconstructive surgeon Dr. Frederick Menick from Tucson, Arizona, USA is experienced and knowledgeable about the historical evolution of modern plastic surgery, and his refinements of the reconstructive principles are to be recommended. In his own words from the *Introduction* to the February 1998 issue of *Operative Techniques in Plastic and Reconstructive Surgery* “*Thoughtful analysis is the secret of facial reconstruction*”.

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