



Head and Neck reconstruction: the past, present and the future

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It is important to stress at the outset that this editorial is a personal view and so the points made may not be fully backed up with appropriate background information or references. The aim of this series of articles is not to provide the answers, but to add opinion and hopefully valid data to back up the view of the various contributors. In my experience, reconstructive surgery options have not been arrived at after the gold standard of randomised trials but are largely based on opinion which makes the case for such a series of articles as presented here.

The reconstruction of the mouth, face and especially the jaws remains a formidable challenge to all clinicians and supporting staff treating patients with head and neck cancer. My own association started as a graduate in dentistry becoming interested in Maxillofacial Trauma and then Head and Neck Oncology and returning to undergraduate study in Medicine at the Westminster Medical School in 1982. I really enjoyed my medical studies and the experience was enhanced by the discovery of a new immunodeficiency affecting homosexual men with a rare pneumonia which became known as AIDS (1). Not known to me at the time but a major development in reconstructive surgery with the introduction of the principle of free tissue transfer was being popularised by surgeons such as David Soutar describing the use of the radial forearm flap for oral reconstruction in 1983 (2), following initial work by Dr. Yang and colleagues at the Shenyang Military Hospital in China (3). After Medical school and then 6 months each of Medicine and Surgery as a Pre-registration House Officer, I went to Sunderland as the Specialist Registrar in Oral and Maxillofacial Surgery and started to learn how the surgical opportunities were becoming much more challenging than I had anticipated.

The principle of transferring tissue from one body site to another with time to revascularize and set the new tissue healing was a paradigm shift (excuse the cliché), of significant proportion. But there was a problem! It is rarely, if ever, stated succinctly: but the problem with more complex techniques is that necessary surgical skill is not necessarily acquirable by all—and that some individuals may have a higher complication rate as a result. The events in Bristol (4) as regards the delivery of complex paediatric cardiac surgery are well known, and in my view had more chance of being avoided if the above fact was or had been acknowledged. I have emphasised this point because when I looked at the chapters that are contributing to this publication, it was clear that complications were an integral part (e.g., defining success and failure in Head and Neck Reconstruction: is flap survival the ultimate measure? Reconstructive failure: the cost to patients), both indicate that the success of this complex reconstructive surgery has certain factors which this piece of work and opinion will address. I hope we can make suggestions based on some clear evidence so that any change has at least a firm basis.

This last point regarding evidence is the main problem with reconstructive surgery. During my training, it was clear that the introduction of free tissue transfer was going to be the main challenge for any surgeon involved in the treatment of Head and Neck Cancer and in particular oral cancer. Most units in the 1980's were treating head and neck cancer with primary radiotherapy which could be standard Teletherapy or in some units Brachytherapy. Surgery was reserved if it was considered to be a possibility of salvage should there be local or regional recurrence. But the results of primary radiotherapy/brachytherapy methods

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showed a recurrence rate as high as 45% (5) and evidence accumulated that primary surgery was the best option for most oral squamous cell carcinoma cases especially when function and aesthetics could be maintained. Our publication from the Liverpool Regional Unit reported a local recurrence rate of 10% following primary surgery (6). The use of postoperative radiotherapy and more recently chemoradiotherapy emphasises the importance of a low rate of complications post-surgery to avoid delays to the start of the adjunctive therapy.

It is widely acknowledged that for oral cancer patients the management of the neck and adequacy of ablative surgery at the primary site is paramount, followed by appropriate adjunctive therapy as required. The reconstruction result is secondary to the treatment for the cancer but is important to maintain an optimum quality of life for the individual patient. When I was treating cancer, I considered the reconstruction was similar to making a contract with the patient which I could deliver. When complications and even failure occurred, I felt that the contract had been broken in some way and felt responsible. Avoiding a similar event in a future patient became the main aim after considering the reasons that may have contributed to the result. We hope that this series of papers will help to point out some of the issues which may be avoided to enhance the overall high expectation of a good result.

Having said all that, the most important element of any oral and maxillofacial ablative and reconstructive surgery are the structures that remain and can still function. A skilful surgeon will achieve clear or even close margins and avoid the risk of local recurrence without compromising the function. There are structures which we do our best to maintain which include the facial nerve, the tongue, facial skin, soft palate, and the floor of the mouth especially if bilateral. The best examples when the margin is compromised are buccal mucosa resections, parotid surgery and skull base resections. On the other hand, although retaining the eye is an important aim, the aesthetics and function after orbital exenteration can be surprisingly good. Hence a good knowledge of what can be achieved in terms of reconstruction and rehabilitation is an important issue for the whole oncology team.

When considering the reconstruction, I took the trouble to compare the outcomes for patients suffering tongue resection to those with soft palate resection (7), to find that it was possible to achieve a good functional outcome after soft palate resection especially using the superiorly based pharyngeal flap in conjunction with a radial forearm flap (8)

compared to the what could be achieved after tongue reconstruction. For oral reconstruction, the radial forearm flap remains a most effective option as it is reliable with a long pedicle and has shown excellent healing and function. The main argument against this flap is the donor site, which requires a skin graft (9), and although in an area not favoured by patients (10), is generally very well tolerated. This flap is much less favoured for composite reconstruction of the mandible or maxilla, although in my hands I have found it excellent for the reconstruction of the nose or Class VI midface/maxillary region (11).

Maxillary and midface reconstructive surgery presents a challenging problem for any surgical team. Teamwork is the essential part of this care as the provision of a facial and/or dental prosthesis is a vital part of the rehabilitation for this patient group. In Liverpool, John Cawood and Bob Howell provided the expertise to develop the use of oral implants (12), and now Chris Butterworth has developed an early rehabilitation for a Class II maxillectomy (11) by using zygomatic implants that perforate a radial forearm flap with no bone reconstruction (ZIP flap) (13).

My interest and involvement in reconstruction of the maxilla started when I was training in the West Midlands and as part of my remit. I prepared the site for the adapted denture (obturator) and took the impressions for the Maxillofacial Technicians following ablative surgery by the Head a Neck team (Otorhinolaryngologists). Martin Deadman and Steve Worrollo were the Maxillofacial Technicians I was privileged to work with, and they came to the operating room to make sure that the site was properly prepared for the wearing of the appliance. Also, as part of their work they developed the use of extra-oral implants for the retention of facial prosthetics such as ears and eyes and they made sure that my Senior Consultant placed the implants into sites around which they could work and importantly allow sufficient space to construct the prosthesis especially for orbital rehabilitation. Working with them made me realise the complexity of their work, and how by working directly with the surgical team the results could be optimised. I looked after the patients that required an adapted denture and soon became aware of the limitations of these prostheses even with such an excellent team.

When I started using reconstructive techniques for maxillary defects which were mainly free flaps including the Iliac crest with internal oblique (14,15), I was impressed with the way the patients recovered. Even when postoperative radiotherapy was needed which was common as most were pT4a invading bone, they did well with little

wound breakdown and excellent function with the use of internal oblique to replace the immobile hard palate. I cannot provide the data needed to prove the point, but I remember one of my patients treated elsewhere who came to me as she could not tolerate her obturator. I used Iliac crest with internal oblique as a secondary reconstruction and she was very grateful and although not initially wishing to proceed to an implant-retained prosthesis this was provided for her in the longer term.

The reason that I know that there is very little evidence to show a definite advantage of a particular reconstruction is because I was asked by the Lancet Oncology to give a lecture at an Asian Oncology Conference and thought I would talk on the reconstruction of the mandible. This was not a major subject in my career but as soon as I started to review the extensive literature on the subject, I realised that there was very little evidence to promote one option over another using free tissue transfer. It was also obvious to me that a defect classification as devised for the maxilla (11) may allow a more accurate comparison of techniques. I was able to present a reasonable classification of the mandibular defect to try and increase our understanding of what was possible (16). Many surgeons will simply use fibula for all their composite flaps but in certain circumstances both the scapula and iliac crest should be considered, and I have already mentioned the composite radial for nasal (Class VI) reconstruction (11).

One of the most important elements of understanding the outcomes of reconstructive techniques is the assessment of patients in the clinic postoperatively and then post dental and/or facial rehabilitation. In Maxillofacial Surgery, the speciality is often providing both the cancer treatment and the reconstruction and hence we all spend time with our patients after the cancer treatment to check on their progress. It is during these visits that poor reconstructive and hence rehabilitation results can be seen and in the best circumstances improvements made. If there have been technical or judgemental errors, these can be recognised and hopefully avoided, so that alternative methods can be considered in future cases. In situations in which the reconstructive team are not involved with the cancer treatment this second element of seeing the patient months after the surgery usually for cancer surveillance is often missed. In these circumstances, only a major problem requiring corrective surgery is likely to be referred back to the reconstructive team and more subtle problems remain undetected.

Whether you work as an ablative/reconstructive surgeon

or purely reconstructive, the way that the team communicates and helps each other along the way is a vital part of the clinician's role. The oncologists must know what can be achieved in oral, facial and facial skeleton reconstruction to be able to advise the patient when there is an option for therapy which may depend on the reconstructive success. It has been my privilege to work with excellent colleagues and we have striven to be able to respond to new techniques and ideas in reconstructive surgery. When I came to Liverpool in 1992, my senior colleague David Vaughan (to whom I owe a great deal), was already expert in the use of the radial forearm, latissimus dorsi free flap and used the vascularised Iliac crest for extensive resections with a more favourable prognosis. As new ideas and techniques were discussed at meetings and in the literature, the best of these were introduced to the unit (17,18), including the fibula, scapular (19), rectus abdominus, lateral arm, Iliac crest with internal oblique (14), antero-lateral thigh (20), latissimus dorsi perforator (21), and even the medial sural artery perforator, and this principle is ongoing. Larger units with a higher referral rate have a significant advantage in developing and learning this array of options to offer patients. As a result, I am a great advocate of large tertiary referral centres to provide the width of experience both for reconstructive options and appropriate clinical support. For smaller units, appropriate referral for complex cases should be part of the routine which is sometimes lacking. The wider the armamentarium of the reconstructive and rehabilitation team, the more likely that the patient will be properly consented, and have available options discussed that have a role in their management.

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