

The Rahima Dawood Travelling Fellow Oration 2011, Lusaka –Zambia Head and Neck Cancer

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Introduction

Head and Neck Cancer (H&N CA) has had a fascinating and, along with most surgery, a fairly troubled history before becoming a recognized specialty with contributions from: surgery in general, otorhinolaryngology (ENT), plastic surgery and oral and maxillofacial surgery (OMFS).

A brief overview of the history of head and neck cancer

The first surgeon to really comprehensively look at his results, critically evaluate these results, before trying to improve his practice by well documented strategies and then re auditing his results was George Crile (1864 – 1943)^{1,2}. Slightly earlier other surgeons (Langenbeck, Billroth, Volkmann and Kocher) had documented the surgical approaches to the oral cavity, oropharynx and larynx and had developed neck dissection techniques. Crile demonstrated better operative survival and improved disease control^{1,2}, with his operative planning and technical skills (Table 1) including the use of ‘block’ radical neck dissection (RND). He was overtaken at the time by the popularity of the new application of radiotherapy for malignant disease and it was only in the late 1940s with the advent of improvements in anaesthesia and antibiotic therapy that surgery began to play an important part again in the management of H&N CA.

The concept of control of neck (regional) metastases using radical neck dissection became further developed and popularized by Hayes Martin³ with a paper published in 1951 recording 599 cases of RND for patients with positive neck disease.

RND remained the standard for control of positive neck disease until the patterns of lymph node spread were further sub divided for different anatomic sites⁴. This knowledge meant that nodal dissection could be tailored to the disease and spare structures such as the spinal accessory nerve where possible. Less radical procedures were developed even before this work primarily by Suárez⁵ termed ‘functional neck dissection’ preserving accessory nerve, sternocleidomastoid muscle and internal jugular vein.

Table 1. Innovations utilized by George Crile:

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- Recognition from his own and other's results that radical neck dissection (RND) was the treatment of choice for positive neck disease.
 - Avoiding post operative fistulae between mouth, pharynx and neck and neck and chest by sequencing surgery for the primary from the neck dissection.
 - Ether inhalational anaesthesia via nasopharyngeal catheters (anaesthetist separate from the operative site).
 - Introduction of a 'pressure suit' in order to minimize operative and immediate post operative hypovolaemia (IV fluid replacement not an option).
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Suárez's results and the research on the different levels of metastasis lead to a number of different neck dissections including the specific levels being developed for squamous cell cancer at different anatomical sites, in an attempt to remove only those lymph nodes draining the particular cancer. This sort of selective neck surgery is probably only practical if working in a multi disciplinary team with oncologists who are able to target the patients with particularly risky histological findings with post surgical adjuvant therapy (radiation or chemo radiation). As in other sites for cancer, research is now looking at 'sentinel node' sampling as an indication of which necks should be treated in the clinically N0 neck.

As the management of H&N CA advanced in the 1950s oncology and surgery began working together for the better treatment of the patient. Eventually dual modality treatment for larger and more aggressive disease became more standardized, with surgery usually performed before radiotherapy. This also means that adjuvant treatment can be planned, selected and targeted for those who really may benefit acknowledging the increased morbidity for more treatment.

More recently chemotherapy has become much more involved for management of H&N SCC using in particular the platinum drugs with some increased survival at the cost of more side effects. The response of oropharyngeal cancers to the chemo radiation protocols have tended to make these protocols the first choice as organ preservation and comparable response rates to surgery and radiotherapy combinations have been achieved. The surgical specialty has further subdivided into areas of particular expertise with some surgeons mastering more than several areas. Some of these sub divisions relate to specialty anatomical areas (laryngectomy and oral cancer for example). Others are to do with the need to not operate continually for hours at a time (though this is an attraction for some). Surgery for neck dissection and resection, reconstructive (including microvascular tissue transfer) surgery, skull base surgery and minimal access surgery (endoscopic) are some examples.

The West of Scotland experience

Research is a major part of the way the specialty will progress in the future. This is likely to involve the sort of cellular research advances that are benefiting all cancer management. Unfortunately squamous cell cancer (SCC) presents difficulties with cellular analysis and manipulation as the disease seems to be so heterogeneous in its makeup. In the West of Scotland we have a Managed Clinical Network for Head and Neck Cancer that involves surgeons from ENT, OMFS and Plastic Surgeons as well as oncologists from the Regional Cancer Institute (the Beatson Oncology Service), specialist cancer nurses, speech and language specialists and dieticians. We have a population of 2.5 million and in 1999 to 2001 we conducted a prospective audit into our patients⁶.

In this time period we treated 177 oral cavity SCC and 68 patients with oropharyngeal SCC with surgery. One of the findings from this audit was that 24% of oral and 37% oropharyngeal had positive

margins on pathological evaluation. Two of the leading surgeons in the Regional OMFS Centre decided with their colleagues to address this issue by introducing three main techniques:

The use of vital staining technique to assess the oral margins using Lugol's iodine to stain for dysplastic cells in oral surface epithelium is not a new technique but this report⁷ is the first using it in the mouth with a prospective trial. McMahon analyzed an historic group of 50 patients undergoing resection of a previously untreated primary SCC of oral cavity (2004-2005). This historic group received a 1cm macroscopic margin around the tumour and any visible resectable leukoplakia. Analysis showed 16 out of 50 (32%) had dysplasia, ca-in-situ or invasive carcinoma at a mucosal margin.

In the second group a consecutive series of 50 patients (March 2006-March 2007) Carbocysteine + 1.25% Lugol's Iodine was used and the cancer excised with a 1 cm macroscopic margin and the resectable unstained area. Histology revealed 2 out of 50 (4%) had dysplasia at a mucosal margin ($p=0.001$; 95% CI 16-45).

The use of access surgery in order to better visualize the oral / oropharyngeal cancer for resection purposes is again not a new technique, however the Glasgow Regional Unit has developed several modifications (8) we think are beneficial.

The use of a CT protocol using slices 0.9 mm thick and dual contrast bolus timed to maximize enhancement of the primary tumour and regional vasculature, has enabled detailed surgical planning. By routinely planning through the volume of the tumour in three spatial planes, the Glasgow team is able to gain a precise understanding of the anatomy to be resected and the requirements for access to the primary cancer in terms of planning the resection margins. There are several publications^{9,10} detailing the dramatic reduction in the incidence of positive margins following the introduction of these measures.

In a paper now available on line¹¹ the Glasgow team (lead by McMahon and Devine) assessed 162 patients (2006 to 2009) undergoing these further measures in a comparable series to the audit in 1999 to 2001. Eighty seven (54%) of the patients had surgery only, 46 (28%) adjuvant radiotherapy and 29 (18%) received adjuvant chemo radiation. They report a three-year local recurrence-free (LR) survival was 96%, disease-specific survival (DSS) was 86%, and overall survival (OS) was 77%. Nine patients (6%) had tumour at or within 1 mm of a surgical margin (involved margins – compare this to the figures for 1999 - 2001). The median interval from the time of operation to recurrence was 14 months (range 3-36). Six (4%) of the patients had local recurrence, 8 (5%) developed regional recurrence, and in 12 (7%), distant metastasis was the first sign that treatment had failed.

We think this is a reasonable outcome of an audit cycle with a direct result of improving outcomes for patients when compared to a previous prospective audit locally and with results from other units in the published literature. Further studies are ongoing and these can be quantified as we have a good idea of where we are coming from in terms of overall success with this particular cancer and the various stages it presents for treatment.

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