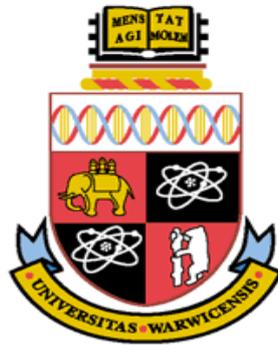


Surgical & Emotional Scars of Skin Cancer



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Surgical & Emotional Scars of Skin Cancer

1. Introduction

Cancer of the skin is unique. It is the only cancer that is directly visible to the patient from its early stages and as such serves as a constant reminder of its presence. Treatment has traditionally meant excision, and – as with any such intervention – resultant of the body’s attempts to heal itself, the patient is inevitably left with a scar. The medical literature has long recognised the importance of dealing with scars, from the early half of the last century *Straith*¹ eloquently realised scars’ “...*devastating effects on happiness, mental health and even livelihood of disfigured victims must not be underestimated*“

The problem of skin cancer is epidemic. It is reported that one in six Americans will develop some form of skin cancer² and it is estimated that there may be as many as 100,000 new cases of non melanoma skin cancer (NMSC) annually³, and around 7000 cases of malignant melanoma (MM)³. The incidence of MM has increased more than for any other major cancer in the UK, with male rates having quadrupled from around 2.5 in 1975 to 11.0 in 2002, while the female rates have tripled from 3.9 to 12.7 over the same period in Great Britain⁴.

“Skin cancer” is a broad topic, and in order to define this discussion a brief description of the major types is given.

1.1 Types of Skin Cancer

- Non Melanoma Skin Cancer (NMSC). Responsible for 90% of skin cancers worldwide ⁵. The two principle NMSCs are Basal Cell Carcinomas (BCC) and Squamous Cell Carcinomas (SCC). These are cutaneous epithelial cancers originating from the adnexal structures or epidermal germinative keratinocytes ⁶. The SSC commonly arises from a Squamous Cell Carcinoma In Situ and are significant due to their ability to metastasize, although only accounting for 20-30% of NMSCs ⁷. The BCC is a superficial eroding ulcer deriving from and resembling epidermal basal cells ⁸ and causing approximately 75% of NMSCs ⁷. Other types of NMSC include Kaposi's sarcoma, skin adnexal tumours, Merkel cell carcinoma, other types of sarcoma and cutaneous lymphoma, accounting for less than 1% ⁷.
- Melanoma. Arising from the epidermal dermal junction, melanomas grow initially horizontally and non invasively, before the appearance of a tumour nodule - the hallmark of vertical growth and invasion of deeper levels of skin, increasing risk of metastases ⁸ – if tumour invasion is deeper than 3.5mm, five-year survival is under 50% ⁹. Of the melanomas, there are 4 types ;

Type	Proportion of melanomas ⁸	Clinical Comment ¹⁰

Superficial spreading	Represents 70% of melanomas	Flat and occur anywhere on body except hands or feet. Relatively long horizontal growth phase.
Nodular	Represents 15-30% of melanomas	Darker and raised than superficial, they require histological criteria of no radial growth peripheral to vertical growth.
Lentigo Maligna	Represents 4-15% of melanomas	Occur mainly on neck, face and dorsum of hands. Good prognosis since invasion is late.
Acral Lentiginous	Represents 2-8% of melanomas	Occurs on palms, soles and subungual regions.

2 Surgical Scars of Skin Cancer

The term “scar” encompasses a spectrum of marks left on the skin as a result of healing – from the keloid, hypertrophic, contracted or atrophic scars to a fine line ¹¹ and can lead to disfigurement, functional impairment, pain and pruritus. Interestingly, *Bayat et.al.* hypothesise that the scar represents an evolutionary boon – the rapid responses that are involved in scar formation result in quick healing, thus preventing infection and future breakdown ¹¹, contrasting with *Groover et. al’s* view of “skewed healing” ¹².

Excision treatment is the treatment that the majority of patients suffering from BCC, SCC or melanoma receive ¹⁰ with inevitable scar formation. In this section, the way a scar is formed in the treatment of skin cancer is discussed, and the surgical and medical methods of lessening their impact.

2.1 Biological Basis of Scar Formation

Upon damage to the skin - such as a surgeon's knife - a cascade of events occurs to heal and restore skin. Even if appearance is normal, following injury the skin will only achieve 70-80% of its original tensile strength ¹². Healing of a wound is a complex interaction between the extracellular matrix, epidermal and dermal cells, plasma proteins and angiogenesis. It is traditionally divided into three stages: ¹³

1 – Inflammation – neutrophils predominate, later replaced by macrophages, mediating transition to proliferation through release of mediators such as tumour necrosis factor (TNF) and insulin growth factor.

2 – Proliferation – Extracellular matrix formation by fibroblasts, and collagen deposited (first type III, then type I). New tissue is formed and surrounding tissues contracted. Metalloproteinases degrade the surrounding matrix. Keratinocytes migrate over the wound bed, leading to wound closure.

3 – Remodelling – Blood flow and cell content is reduced, and remodelling and maturation of the scar occurs over months or years.

This traditional view of scar formation is somewhat oversimplified - there is complex interplay between the phases of scarring and an individual's response. Wound healing is essentially a fibroproliferative process, with keloids and hypertrophic scars resultant from excessive "healing"¹⁴ (hypertrophic from excessive collagen synthesis and reduced lysis, and keloids from metabolic alterations in collagen¹²). Excitement in the literature in the early 1990s was stimulated by the discovery of peptide growth factors, influencing wound cells via autocrine and paracrine mechanisms – two examples include transforming growth factor (TGF) alpha and epidermal growth factor, whose receptors are synthesised by platelets, keratinocytes and macrophages and have been shown to aid wound healing in animal models¹⁵. Today, the wealth of literature is testament to the progress made in identifying further peptides involved. One such success is the discovery of the role of over-expression of tumour necrosis factor beta in the development of keloids and hypertrophic scars¹⁶.

2.2 Principles of Treatment of Skin Cancers

Marko et al. sensibly describe the main goals of primary cutaneous malignant melanoma to be to prevent disease recurrences and to promote long-term survival. The secondary aims are to do this with minimal surgical morbidity, short hospital stay, and good cosmetic results ¹⁷. This can broadly be applied to the other skin cancers.

The secondary aims are heavily influenced by the width of excision margin, and thus the size and impact that a scar has on a patient is lessened by a smaller incision margin. However, at what price?

The pioneering work of Samson Handley in the early 1900's is credited with laying the foundations for melanoma treatment, and recommending a wide, two inch removal of subcutaneous tissues surrounding the tumour ¹⁸. In order to prevent local recurrence, a wide (at least 5 cm) excision around the primary tumour was – until the late 1980s – thought necessary.

The debate about melanoma, margin excision size and risk of recurrence is well into its fourth decade and yet rages on. Despite now numerous randomised control trials and studies ^{17,19,20,21}, there is still a need for more evidence to determine the relative risk of recurrence with smaller margins ²².

With lesion excision, the skill of the surgeon, the lesion location, the health and genetics of the patient and the desired requirements in terms of appearance combine to influence the end result and eventual scar.

In cosmetically and functionally important areas, one method of lessening the scar formation and of potentially reducing recurrence (particularly with BCCs and SCCs ²³) is the use of Mohs Micrographic Surgery (MMS). Developed by Frederic Mohs whilst still a medical student in 1953, the procedure involves the angled excision of cancers and subsequent identification of remaining tissue through light microscopy ²⁴. Advantages of MMS are the histological control of surgical margins, high cure rates and tissue conservation ²⁵; however, it requires a multidisciplinary qualified operating team, and obvious time and labour intensity – particular concerns in the modern NHS.

2.3 Lessening the impact (i) – Surgical techniques used in scar prevention

The skill and aesthetic artistry of the dermato-surgeon unite with the physics of the biomechanics of scar formation, looking into the complex geometry and stress states in different parts of the body and the background tensions applied to the skin ²⁶ to reduce planned scar's impacts - surgical incisions along relaxed skin tension lines and tied, well placed skin sutures can relieve tension and be hidden in natural skin lines ²⁷.

Once a surgical defect is made there are a number of surgical techniques that can lessen the impact of a potential scar- flaps can be formed, either local, regional, muscle or free and/or skin grafts applied, using either split or full

thickness skin grafts with great success ²⁸. Reconstruction can be aided with dermal regeneration templates and skin substitutes ²⁹, and attempts at reconstruction have been made using allograft ³⁰. The pace of development is rapid – *Hayward* ³¹ uses the example of SCC of the mandible to illustrate – treatment having moved from excision and closure, to flap repair and now to innervated sensate flap reconstruction.

An ideal method of wound closure would not distort local architecture, and allow excellent cosmetic and functional results, without recurrence or infection. Healing by second intention allows these to occur and has been proposed as an effective method of wound healing in well defined cases ³². However, in the majority of cases, both conventional excision and micrographic surgery will require that the wound heal by first intention.

2.4 Lessening the impact (ii) - Non Surgical Scar Treatment

Scars have proved formidable lesions to eradicate. Treatments for scars have available for over 30 years, but what use are they to the dermatologist? Silicone gel sheeting was first used in 1982 for the treatment of hypertrophic scars, and is now backed by substantial evidence for its effectiveness in hypertrophic scars ³³, although its role in normal scarring and keloids is questionable ³⁴. The mode of action is unknown although suggestions include increasing pressure, hydration, temperature and the

creation of a static electric field affecting wound healing ³³ and reduced oxygen permeability ³⁵.

Intralesional corticosteroids have been the mainstay of therapy for keloids with good response rates both intra and post operatively shown to be effective in the treatment of hypertrophic and keloid scars ³⁶, with suggested mechanism being the inhibition of fibroblast growth and increased collagen breakdown ³⁴. Other agents such as the chemotic 5-fluorouracil have shown promise in softening of scar tissue ^{37, 38}. Interferons have been shown to successfully reduce hypertrophic scars via inducing apoptosis in and thus reducing fibroblast and myofibroblast numbers ³⁹.

Other treatment methods have included dermabrasion, cryotherapy, pressure therapy, radiation and the use of laser technology ⁴⁰. Pulsed Dye Laser therapy is of use in hypertrophic scars, and its use on newly formed scars is yet to be elucidated, despite promising short term results ⁴¹.

3. Emotional Scars of Skin Cancer

“The psychic trauma may cause more suffering than the physical lesion itself...”¹

The diagnosis of a skin cancer can produce emotional scars of two kinds, the first the initial weight of the diagnosis of a cancer and its implications, the second having to deal with the psychosocial burden of disfigurement and change in body image which - despite recent advances – may last a lifetime.

3.1 The psycho-social impact of skin cancer

The impact of a diagnosis of cancer upon the psyche and its implications has received much attention both in the literature⁴²⁻⁴⁴ and in the media, emphasised by numerous patient testimonials^{45,46}, the most famous example being Johns Diamond's *C: Because Cowards Get Cancer Too*⁴⁷. The cancer diagnosis is classically associated with psychological models such as those of *Kubler Ross*⁴⁸ or *Horowitz*⁴⁹ and the word cancer continues to be associated with fear and pessimism among the general public, perceived as nasty, painful and reducing the life span of a previously healthy individual⁵⁰. Cancer diagnosis has been associated with anxiety, depression, psychosexual issues and has financial repercussions⁵¹.

Fortunately, perceiving all cancer patients as a homogeneous group is an erroneous assumption⁵². The psychological impact of a skin cancer diagnosis is considered lower than that of other types such as lung or breast⁵² possibly due to higher cure rates for skin cancers.

However, despite the incidence rates for skin cancers, there has been surprisingly little research into psychosocial effects - much of the literature based on patient narrative, such as research by *Winterbottom et al.*⁵³, whose work demonstrates the differences in patients' experiences of different types of skin cancer, with differing prognosis and consequences. Impact of a BCC or SCC diagnosis was lessened by information and knowledge and increased patient satisfaction. These key themes were repeated in melanoma, but patients were more reflective, and utilized more coping strategies⁵³. Coping strategies use is echoed by *Trask et al.*⁵⁴ who found that although melanoma patients in the majority showed no signs of distress, 29% of patients reported medium to high levels, and this group were more likely to adopt mal-adaptive coping strategies such as avoidance and eventual reduction in quality of life. Clear dissemination of information is key in management.

Interestingly, melanoma patients are notably superior to other dermatology patients with regards to emotional well being, with an intensified utilization of psychic resources postulated as explanation⁵⁵, an observation repeated when assessing quality of life in older patients – patients with lesions had significantly higher quality of life scores than those with rashes⁵⁶.

3.1 The psycho-social impact of skin cancer's scars

Much research has been done on the impact of burn scars and there psychosocial impact, however, the resultant scars from skin cancer surgery can be equally traumatic. There is a lack of studies looking directly at the impact of scars resultant from elective surgery; instead these are often grouped into the category of disfigurement, along with cleft lip and palate, acne, portwine stains, burns victims, haemangiomas etc...⁵⁷. A broad aetiological group is a limitation of many studies – there are distinct differences between a congenital abnormality and disfigurement developed in later life ⁵⁸.

It is also important to note that the location, severity or size of scarring is not correlated with level of psychosocial sequelae ⁵⁹. *Newell*⁶⁰ sheds some light on the distribution of those affected – women show higher levels of disturbance than men, and higher levels are also found those undergoing surgical revision of scars.

In their elegant review, *Bayat et. al.*¹¹ lists some of the psychosocial sequelae of scarring and disfigurement – daily activity disruption, sleep disturbances, anxiety, depression, loss of self esteem, stigmatisation and even post traumatic stress reactions ¹¹.

The effects on body image and quality of life can be profound. Visible disfigurement and difference from societal norms has been equated to a social disability⁶¹. Persons with facial disfigurements have similar levels of socially phobic and agoraphobic avoidance to socially phobic patients⁵⁸. Social interaction, concerns over meeting new people, long term relationships, accounts of staring, audible comments, avoidant behaviours are also reported^{58, 57}. Such reports allude to a *societal* problem rather than an *individual* problem – is the time for an analogous awareness programme such as that which is helping to dispel the old medical for a social model and view of physical disability?

The health care team has a vital role in psycho-social rehabilitation – it extends from the initial treating dermato-surgeon, nurses, physios and ward staff to the long term care provided by the general practitioner. The charity for disfigurement *changing faces* identifies four factors which health workers can address⁶²:

1. ensuring that family and other support systems can provide the background for patients to (re)build their self-esteem and self-belief.
2. enabling patients to overcome their functional limitations
3. enabling patients to be informed about surgical and other treatment options
4. enabling patients to acquire effective social skills to manage the reactions of their peers and strangers to their unusual appearance.

The importance of psychological intervention should not be overlooked – cognitive behavioural interventions have proven efficacy in disfigurement cases, with particular success with the Bristol *Outlook* programme⁶³.

4. Closing Comments

The emotional and surgical scars of skin cancer can be profound. It is clear that the vast majority of patients receive minor scarring and little long lasting distress resulting from the treatment of their skin cancer, and of those who suffer disfiguring scarring, the majority adapt functionally and emotionally. However, for a small proportion, the effects of scarring can be devastating. Dealing with the cancer, the scar and the emotional burden of an individual requires a health provision team educated in the public's fear of cancer, the difficulties that scar formation can bring, and on a societal front public education and attitude change towards disfigurement and all its causes.

Fortunately, the combination of advances in surgical techniques and in the understanding of the biology of scar formation are beginning to combine to reduce the effects of scarring, with recent development, it is possible that scar formation could be removed as a reminder of evolution's remarkable healing process.

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