ROLE OF ONCOPLASTIC SURGERY IN MANAGEMENT OF CUTANEOUS MALIGNANCIES OF THE FACE

An essay submitted for partial fulfillment of master degree in general surgery.

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2010 - 2011

Acknowledgment

Before all, thanks to Allah the most merciful for giving me the ability to achieve this modest work.

Thanks to my teacher

Professor,

MOHAMED KANDEEL ABDEL FATTAH,

who suggested the subject of this essay and guided me to the ideas upon which the work is established.

Finally, I must thank

Dr. ***SHERIF ABDEL HALIM,*** *who was an elder brother to me doing his best to help me, providing me with his sincere advice and directing me to achieve the best work. But for his loyal efforts, I would never be able to complete my work.*

Mohamed Fikry….

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MMS	Mohs micrographic surgery
DEJ	Dermal-epidermal junction
LM	Light Microscopy
RSTLs	Resting Skin Tension Lines
BCC	Basal cell carcinoma
nBCC	Nodular Basal cell carcinoma
sBCC	Superficial Basal cell carcinoma
SCC	Squamous cell carcinoma
cSCC	Cutaneous Squamous cell carcinoma
NMSC	Non-melanoma skin cancer
SST	Staged surgical therapy
FNA	Fine needle aspiration
IMQ	Imiquimod
PDT	Photodynamic therapy
BAD	British Association of Dermatology
ALA	Amino-Leviolenic Acid
DNA	Deoxy-ribose Nucleic acid
5-FU	5-Flouro-Uracil
AJCC	American Joint Committee on Cancer
PNI	Perineural invasion
OTRs	Organ transplantation recipients
CLL	Chronic lymphocytic leukemia
MM	Malignant Melanoma
VGP	Vertical growth phase
UV	Ultraviolet
CT	Computed tomography
MRI	Magnetic resonance imaging
FDG-PET	Fludeoxyglucose positron emission tomography
LDH	Lactate dehydrogenase
ELND	Elective lymph node dissection
SNB	Sentinel node biopsy
H&E	Hematoxylin and eosin
MIS	Melanoma in situ

INTRODUCTION

Malignant cutaneous lesions of the face, head and neck area are of particular importance in the field of plastic and reconstructive surgery. Patients fear the lifelong stigmata associated with visible postoperative scars and deformities. Surgeons face the problem of removing sufficient tissue to ensure oncologically sound treatment, while avoiding an unnecessarily large excision with its avoidable consequences.

These cancers despite being malignant lesions they are often radically excisable. But sometimes facial lesions arise in close relation to critical structures of the face and usually cause evident disfigurement. Such lesions are not only difficult to excise with adequate safety margins, but also their excision leaves massive distortion of the facial features and sometimes functional compromise if any of the critical structures is involved.

Hence the role of oncoplastic surgery appears to make a combination between the oncological aspect regarding radical excision of malignant lesions in order to achieve the highest possible cure rate and to minimize the risk of recurrence, and the plastic cosmetic aspect aiming at performing what is indicated oncologically in a conservative manner, by employing suitable techniques such as Mohs micrographic surgery (MMS), combined with adequate reconstruction to achieve satisfactory cosmetic results and to avoid possible functional disabilities without oncological compromise.

(*Karin H. Kim and Roy G. Geronemus, 2007)*

Skin is a complex organ system. It may be viewed as a bilayer sheath, cushioned by the underlying subcutaneous fat, which covers the entire surface of the body. The outer layer is known as the epidermis separated from the inner layer known as the dermis by the basement membrane. The dermis is attached to the underlying subcutaneous tissue and muscles by fibrous insertions. Skin contains many important structures, such as epidermal appendages (hair follicles, sebaceous glands, and sweat glands), nerves, blood vessels and immunologic cells.

Complete understanding of anatomy is a cornerstone for successful surgery. Moreover, full awareness of cutaneous anatomy is essential for appreciation of human body's functional, social and aesthetic relationship with the environment.

(Christopher K. Bichakjian and Timothy M. Johnson, 2007)

General criteria of skin:

Skin is highly variable from person to person and from anatomical region to another, with differences in colour, texture, thickness, and contents (hair follicles and sebaceous glands). Skin can be divided into smooth, non-hair bearing and hair bearing areas, though practically skin is always hair bearing. Skin is the largest human organ weighing about 3.8 kg and its surface area measures about 1.7 m^2.

There is significant variation in skin thickness and content of appendages and elastic fibres according to age, sex and anatomic region. These variations are of clinical importance for wound healing and aesthetics as the play an integral role in definition of aesthetic regions, boundaries and junctions. This knowledge must be applied to achieve best reconstructive results in grafting or flap surgery. So skin must be examined carefully for tissue matching to achieve aesthetic reconstruction. *(Christopher K. Bichakjian and Timothy M. Johnson, 2007)*

Epidermis:

The outer most layer of skin is continuously renewing, keratinized stratified squamous epithelium. All skin appendages are derived from this layer. It consists of four types of cells: keratinocytes, melanocytes, Langerhans cells and Merkel cells. Keratinocytes are the dominant cell type (80%). They are differentiated into four distinct layers: Basal layer (stratum basal, or stratum germinativum), spinous layer (stratum spinosum), granular layer (stratum granulosum), and cornified layer (stratum corneum).

The basal layer consists of columnar keratinocytes attached to the basement membrane. They are germinatve cells giving rise to the more superficial epidermal layers. The spinous layer is several cells thick. It is formed of polygonal cells with abundant eosinophilic cytoplasm. There are small spiny desmosomal attachments between cells, hence the name spinous layer. As spinous cells migrate superficially they become larger and more flattened. Granular layer is usually 1-4 cells thick. It is composed of flat cells with deeply basophilic cytoplasm (keratohyaline granules).Further maturation occurs in the outer most layers: stratum corneum which is highly variable in thickness. Keratinocytes lose their nuclei and become much flattened becoming flattened keratin plates which are shed as dead skin. Stratum corneum shows maximal thickness in palms and soles, while minimal thickness in eyelids and genitalia. Total epidermal turnover from basal layer to keratin plates takes about 30 days. Epidermis is thin in childhood and get thicker at puberty and early adulthood and thins out again at old age.

(Christopher K. Bichakjian and Timothy M. Johnson, 2007)

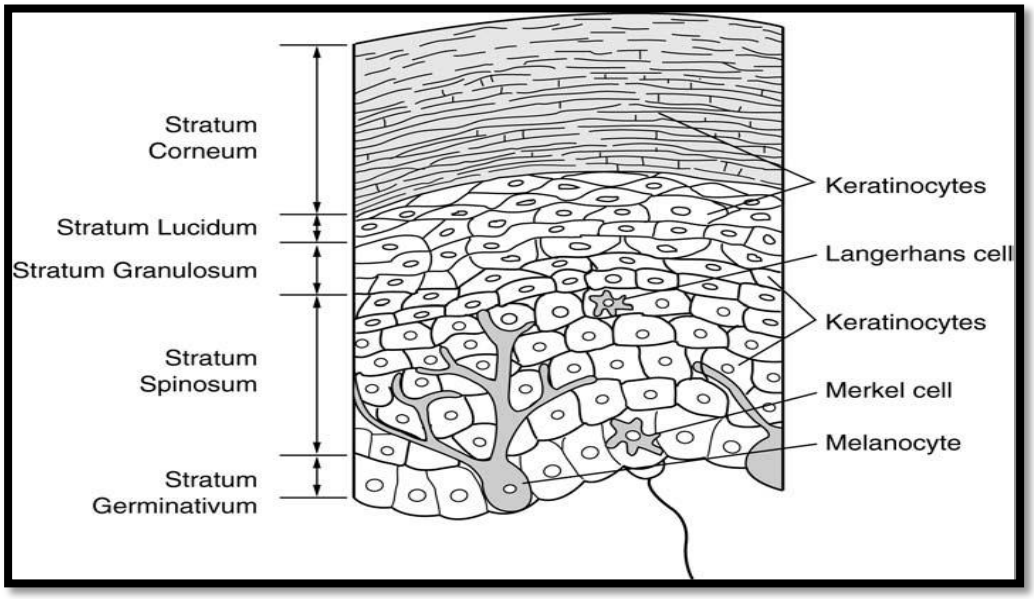

Fig No. 1: *Micro anatomy of epidermis.*

(Robert W. Dolan, 2001)

Melanocytes:

They are dendritic pigment synthesizing cells with clear cytoplasm. They are confined to the basal layer with a ratio 1:4 to the basal cells in cheeks and 1:10 in limbs. Melanocytes originate from neural crest. They function to produce protective melanin pigment packed as melanosomes transported through dendritic projections to adjacent basal and spinous

keratinocytes. They engulf melanosomes and arrange melanin in an umbrella like distribution around the nucleus towards the surface thus protecting against potentially harmful Ultraviolet rays. This explains why less pigmented people are at higher risk of developing cutaneous malignancies especially with chronic sun exposure. Number of melanocytes doesn't differ between races, but number and size of melanosomes are much greater in dark races. In vitilligo, melanocytes are completely absent, while in albinism melanocytes are present but they lack the enzyme tyrosinase without which tyrosine can't be transformed into melanin.

(Christopher K. Bichakjian and Timothy M. Johnson, 2007)

Langerhans cells:

They are bone marrow derived antigen presenting cells found in suprabasal layer of epidermis. They are also found in other stratified squamous epithelia and normal dermis.

(Christopher K. Bichakjian and Timothy M. Johnson, 2007)

Merkel cells:

They are slowly-adapting mechanoreceptors of neural crest origin primarily concerned with touch sensation. They are mainly found among basal keratinocytes in areas with high tactile sensitivity e.g. lips and digits where Merkel cells aggregate forming specialized structures named tactile discs or touch domes, closely associated with peripheral nerve endings forming Merkel cell – neurite complex.

They are characterized by membrane bound dense - core granules similar to neuronal neurosecretory granules containing neurotransmitter like substances.

(Christopher K. Bichakjian and Timothy M. Johnson, 2007)

Dermal-epidermal junction:

Epidermis is attached to the dermis by basement membrane zone known as dermal-epidermal junction (DEJ). It appears in LM as a thin pink band. DEJ provides mechanical support to epidermis and acts as a semi-permeable barrier. Keratin filaments of basal keratinocytes condense and attach to electron dense plaque at inferior cell membrane known as hemi-desmosomes which are firmly anchored to underlying lamina densa through connecting anchoring filaments in lamina lucida attached to dermis by elastic fibres.

(Christopher K. Bichakjian and Timothy M. Johnson, 2007)

Epidermal appendages:

I. Hair follicles:

It is the main component of the pilosebaceous unit, which also includes the hair shaft, sebaceous gland, erector pili muscle and sensory nerve ending. This unit perform motor and sensory functions and responsible for production of hair and sebum. In scalp follicular component is predominant, giving thick dense terminal hair. In nasal tip sebaceous component predominates (sometimes the whole structure is termed sebaceous follicle). Pilosebaceous units are absent in palms and soles. Re-epithelialisation of partial thickness wounds occurs not only from the wound edges but also from pilosebaceous units.

Longitudinally the follicle is divided into three regions:

- ***INFUNDIBULUM:*** the uppermost portion extending from the skin surface to the opening of the sebaceous gland.
- ***ISTHMUS:*** the segment between the opening of sebaceous duct and the bulge.
- ***The lowermost portion:*** lies below the bulge area. It includes the hair bulb enriched with follicular epithelial stem cells. In this portion the erector pili muscle inserts into perifollicular connective tissue. It contracts with sympathetic stimulation causing the hair to stand up.

The pilosebaceous units contain sensory nerves located around the isthmus and the inferior portion of the follicle. These nerves are stimulated as touch receptors when the hair is touched.

(Christopher K. Bichakjian and Timothy M. Johnson, 2007)

II. Sebaceous gland:

Sebaceous glands are unilobular or multilobular structures connected to the hair follicle by squamous epithelial duct. Each lobule consists of peripheral cuboidal or flattened germinative. They give rise to central, lipid laden, vacuolated cells with characteristic clear to foamy cytoplasm. The glands enlarge at puberty and secrete sebum, a complex lipid mixture, acting as emollient to the hair and skin. Its secretion is under the control of androgens. The glands are found all over the body except in palms and soles and are most abundant in scalp and face.

(Christopher K. Bichakjian and Timothy M. Johnson, 2007)