Clinical Trial to Compare between Different Dressing Methods on Split Thickness Graft Donor site (Conventional Method VS Ca Alginate Vs Hydrocolloid Sheet)

Thesis

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Marihan Mamdouh Adib Shihata

Dedication

To the soul of ***My Sister Sandra*** *who passed away during a surgical operation, I vow to be an honest, safe surgeon and to fight fiercely for the live of my patients.*

To ***My Parents*** *who push me up when I loose stamina, to my tutors who sent me this far, to* ***My Friends*** *who never ceased to believe in me and above all my heavenly* ***Father*** *"thanks" for making a promise come true.*

"Surgeons must be very careful
When they take the knife
Underneath their fine incisions
Stirs the Culprit – Life"

By Emily Dickinson

List of Contents

List of Tables

List of Figures

List of Figures Cont...

List of Abbreviations

Abb.	Full term
Ca alginate	*Calcium alginate*
CEA	*Cultured epidermal autograft*
CSS	*Cultured skin substitute*
EDGF	*Epidermal-derived growth factor*
EGP	*Egyptian pound*
FGF	*Fibroblast growth factor*
FTSG	*Full thickness skin graft*
IGF-1	*Insulin like growth factor*
NPWT	*Negative Pressure Wound Therapy*
NRS	*Numeric rating score*
PDGF	*Platelet-derived growth factor*
PNL	*Polymorph nuclear leucocytes*
RTA	*Road traffic accidents*
STSG	*Split thickness skin graft*
TNF- ά	Tumor necrosis factor- ά
VAC	*Vacuum assisted closure*
VEGF	*Vascular endothelial growth factor*
WHO	*World health organization*

INTRODUCTION

Road traffic accidents (RTA) are highly increased in developing countries contributing to mortality and morbidity ***(Puvanachandra et al., 2012).***

While burns according to the WHO are one of the leading causes of injury, morbidity and mortality in the East Mediterranean region with an alarming incidence rate in Egypt ***(Othman & Kendrick, 2010).***

Hence split thickness skin grafting is a widely used surgical operation in daily practice to reconstruct skin and soft tissue defects ***(Janis et al., 2011)***

The advantages of STSG are the simplicity of operation, higher rates of take, possible multiple re-harvesting from the same site and covering wide areas owing to the abundant available donor site and meshing technique of the STSG ***(Janis & Harrison, 2014).***

Skin is the largest body organ around 16% of total body weight, responsible for many functions such as protection, metabolism and thermoregulation ***(Janis et al., 2014)***.

The wound healing passes through three phases inflammatory, proliferative and the maturation phase.Partial thickness skin wounds are capable for epidermal regeneration from the skin appendages and could be re-harvested many times as long as the injury is partial to dermis not the full thickness down to the hypodermis ***(Lu & Galiano, 2007).***

In ideal conditions donor site is expected to heal spontaneously in 7-14 days however the outcome may include many complications as transformation to raw areas or delay in healing due to infection, and in patients with limited donor sites enhancing the healing rate and associated morbidities wound increase multiple re-harvesting and decrease morbidity and mortality ***(McGregor A & McGregor I, 2000).***

Wound dressing quest for the optimum wound type need many researches and studies however in the meanwhile there is no ideal wound dressing but a specialy designed selection according to each case. Wound healing is a dynamic process that needs enhancement in each phase to achieve wound closure, and area ***(Khanna & Rombeau, 2011).***

There is a wide variety of dressings ranging from conventional methods to more modern ones ***(Borda et al., 2016)***.

The dressing research and trial started in ancient eras with contributions of the Pharaohs and ancient Greeks; in

nineteenth century a major breakthrough happened by the discovery of antibiotics that led to decrease in morbidity and mortality, further research and advancement in technology manufactured the modern wound dressings which not only covered and protected the wounds but also intervened in the wound healing phases for greater enhancement ***(Jayesh, 2011)***.

Recent studies are directed toward skin analogues and increasing autologus skin by tissue engineering techniques many times their original size and therefore become immunologically tolerant, but these techniques are known to be extremely expensive ***(Supp & Boyce, 2005)***.

The conventional dressing widely used on donor sites is Vaseline® Petroleum gauze as it is widely available and least expensive (per piece) of all dressings but the problems associated with removal of gauze as it tends to dry out include pain, tissue damage and limitations as in patients that need long term dressing changes or heavily exudating wounds ***(Watson & Hodgkin, 2005).***

Hydrocolloid is a moist modern wound dressing that has an active surface coated with a cross linked adhesive mass containing methylcellulose together with other polymers and adhesives forming a flexible wafer. The moist conditions produced under the dressing are intended to promote fribrinolysis, angiogenesis and wound healing without causing maceration of the tissues ***(Dhivya et al., 2015)***.

Ca alginate is highly absorbent sea weed forming a strong hydrophilic gel on contact with highly secreting wounds and minimizes bacterial contamination.They are assumed to be suitable for moderate to heavily exudating wounds retaining optimum moisture but traumatic on dry wounds mildly exudating ones ***(Dabiri et al., 2016)***.

Therefore the dressing should enhance the healing time, supply moisture without soaking or dryness, decrease infection rate, comfortable and not traumatizing with good cost effectiveness thus decreasing hospital stay and treatment of morbidity burdens ***(Dhivya et al., 2015)***.

AIM OF THE WORK

The goal of this study is to compare between 3 types of dressings: The Conventional method (Vaseline gauze), Calcium alginate and Hydrocolloid sheets to determine which donor-site dressings are associated with the best outcomes for faster healing rate, less Pain, decreased Infection rate, healing quality and cost-effectiveness.

Chapter 1

SKIN FUNCTION AND STRUCTURE

Relevant Anatomy

Skin is the largest organ of the body around 1.6 to 1.8 m^2 and composed of three major layers **epidermis**, **dermis** and **hypodermis (subcutaneous)** multifactorial variation of thickness present as in anatomic location where it is thicker around 4 mm at the back, buttocks, palm, and soles of feet while as thin as 0-5 mm in eyelids, supraclavicular and post auricular, gender variation as female skin is more thin than male and also it gets thinner in the extremes of age ***(Constance et al., 2007).***

The epidermis is vascular and receives nutrition by diffusion from the dermis which contains capillaries and large blood vessels. The dermis consists of cells and epidermal appendages that are responsible for the resurfacing and regeneration of skin after trauma however this ability is limited both functionally and aesthetically after deep dermal and full thickness wounds and thus managed by surgical intervention such as grafts ***(Evans et al., 2013).***

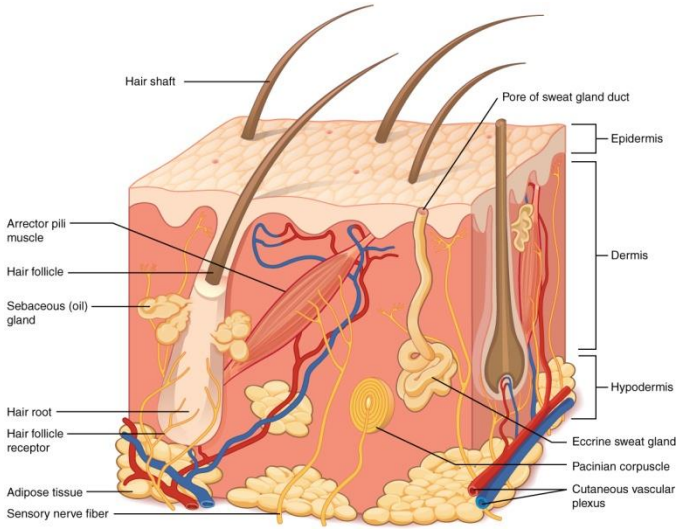

Fig. (1): Cross section of skin ***(Poinern et al., 2011).***

Histology

1. Epidermis average thickness is 1mm and thickest in the palm and sole, composed of 5 layers which are a)Stratum corneum which is present in Thick skin b)Stratum lucidum together with the first layer are considered non viable keratinocytes c)Stratum granulosum d)Stratum basale, the origin of many skin cancers. The cells present are the **keratinocytes**(the predominant cell type) and responsible for acting as a protective barrier.the other type is **Immigrating cells** a)melanocytes for pigmentation and UV protection b)Langerhan cells for Immunity and antigen presentation c)Merkel cells are mechanoreceptors as in two touch discrimination and pressure ***(Kanitakis, 2002).***

2. Dermis is extremely variable in thickness according to location, it consists of Papillary and Reticular layers and they form a network of cells, connective tissue, nerves, vessels and dermal appendages.