Comparative Study between Erbium:YAG Laser and Nd:YAG Laser in Treatment of Dermatosis Papulosa Nigra

Thesis

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LIST OF ABBREVIATIONS

AK	**:**	Actinic keratosis.
C°	**:**	Degree Celsius.
Cm^2	**:**	Centimeter square.
CO_2	**:**	Carbon dioxide.
DPN	**:**	Dermatosis papulosa nigra.
EN	**:**	Epidermal nevus.
Er	**:**	Erbium.
FGFR3	**:**	Fibroblast growth factor receptor 3.
HS	**:**	Hidradenitis suppurativa.
HSV	**:**	Herpes simplex virus.
Hz	**:**	Hertz.
IFK	**:**	Inverted follicular keratosis.
ILVEN	**:**	Inflamatory linear verrucous epidermal nevus.
IPL	**:**	Intensed pulsed light.
J	**:**	Joule.
K	**:**	Kilo.
KP	**:**	Keratosis pylaris.
KTP	**:**	Potassium – titanyl – phodphate.
Laser	**:**	Light amplification by stimulated emission of radiation.
LCA	**:**	Lage cell acanthom.
LK	**:**	Lichenoid keratosis.
MEP	**:**	Milia en plaque.
mj	**:**	milijoule.
mm	**:**	Millimeter.
msec	**:**	millisecond.
Nd	**:**	Neodymium.

nm	**:**	nanometer.
PAS	**:**	Periodic Acid Shiff.
PDL	**:**	Pulsed dye laser.
PFB	**:**	Pseudo - folliculitis barbe.
PG	**:**	Pyogenic granuloma.
PIK3CA	**:**	Encoding for the catalyticp110 subunit of class 1 phosphatidylinositol 3-kinase
Q-S	**:**	Quality-switched.
SK	**:**	Seborrhic keratosis.
TRT	**:**	Thermal relaxation time.
us	**:**	microsecond.
VS	**:**	Versus.
VSP	**:**	Variable square pulsed.
W	**:**	Watt.
YAG	**:**	Ythrium – Aluminium – Garnet.

INTRODUCTION

Dermatosis papulosa nigra (DPN) is a chronic skin condition characterized by verrucous hyperpigmented papules on the face, neck and upper trunk. Lesions appear in darker skinned adults as 1-5 mm hyperpigmented macules or papules but may be also pedunculated ***(Schweiger et al., 2008).***The lesions appear initially on the face and then spread to photoexposed *areas* ***(Niang et al., 2007).***

Incidence in dark races is between 35-77% with women being more commonly affected than men ***(Schweiger et al., 2008).*** About one-half of patients have a positive family history of DPN ***(Shwartzberg et al., 2007).***

Pathology shows DPN to be similar to the acanthotic type of seborrheic keratosis (SK), but DPN is smaller showing parakeratosis, acanthosis, hyper- pigmentation, thick interwoven tracts of epithelial cells and horn cysts ***(Shwartzberg et al., 2007).***

No treatment is required for DPN, however, patients often seek treatment for cosmetic reasons. A variety of techniques may be employed to treat DPN including cryotherapy, electrodessication and/or curettage. Pedunculated lesions can be removed by scissoring. These treatment methods (in particular cryotherapy) may cause unsatisfactory cosmetic results including

scarring and post inflammatory hyper- or hypopigmentation. Additionally, these procedures may cause patient discomfort requiring anesthesia prior to treatment ***(Schweiger et al., 2008)***.

Other method termed “light abrasive curettage” is used to remove individual lesions, the curette was used to irritate but not completely remove the lesions. Minimal bleeding around the base of lesions was noted commonly after treatment, but in all cases, local pressure applied for a period was sufficient to provide adequate hemostasis ***(Kauh et al., 1983)***.

Different lines of laser example 532 diode laser, Nd:YAG laser has been used with positive results. Long pulsed 1064 Nd:YAG proved to be effective after single treatment and excellent cosmetic results without any side effects. Melanin is weakly absorbed at 1064 nm Nd:YAG which makes it safe to be used with dark skin. Also it is useful in treating vascular lesions such as blue spider veins and it is laser of choice for hair removal in patients with Fitzpatrick skin type IV or higher. Although, patients experienced no adverse effects, the potential risks do include pigmentary changes and possible scarring ***(Schweiger et al., 2008).***

Erbium:YAG laser can be used to ablate DPN and many other benign, pre-malignant and superficial malignant cutaneous lesions. It can be used to treat seborrheic keratosis, actinic

keratosis, lentigens, epidermal nevi, xanthelasma, syringoma, sebaceous hyperplasia, warts, melasma, milia, acrochordons, hypertrophic scars, rhinophyma, superficial basal cell carcinoma, squamous cell carcinoma in situ. Epidermal lesions can be removed without damaging the dermis and minimizing risk of scarring ***(Khatri 2003)***.

Erbium:YAG laser are flash lamp-pumped crystal lasers that emit light at a wavelength of 2940 nm which closely approximates the absorption peak of water (3000 nm). Nearly all of the energy is absorbed in the epidermis and papillary dermis, yielding superficial ablation and less underlying thermal damage compared with CO^2 laser. Vaporization of water by Er:YAG laser in the ablated epidermis and superficial dermis allows cooling of the tissue as the heat escapes as steam and decreases the heat transferred to the surrounding tissues. This allows Er:YAG laser to be used for several passes over the ablated area without greatly increasing the zone of thermal damage ***(Riggs et al., 2007).***

Although, the recurrence rate is low and the risk of complications is minimal, familiar levels of erythema, swelling and pin point bleeding is associated with use of Er:YAG laser ***(Khatri, 2003)*** .

AIM OF THE WORK

To compare betweenfor Er:YAG laser and Nd:YAG laser in treatment of DPN as regards efficacy, side effects and patient satisfaction.

REVIEW OF LITERATURE

I-Dermatosis Papulosa Nigra

Introduction:

Dermatosis papulosa nigra (DPN) is a benign epithelial tumor common in dark races. DPN is considered to be a form of seaborrheic keratosis (SK). The lesions appear initially on face then spread to the neck and trunk ***(Niang et al., 2008)***.

Pathogenesis:

Dermatosis papulosa nigra is likely to be genetically determined, with 40-54% having a positive family history of involvement. DPN is believed to be caused by nevoid development of pilosebaceous follicle ***(Nowfar–Rad et al., 2009)***.

Hairston et al (1964) have suggested that DPN should be classified with group of epithelial nevi. Although, few studies have been performed on DPN due to its benign nature, family predisposition and female predominance were found to be greatly related to development of DPN. Sun exposure increase risk of DPN and usually flat lesions start on face and then spread to photoexposed areas ***(Niang et al., 2008).***

As DPN is considered a clinical variant of SK, several underling mechanism and contributing factors have been identified. Increased levels of cyclin-dependent kinase inhibitor, p16 in SK suggest that they are benign neoplasm with accumulation keratinocytes and G1 arrest. Somatic fibroblast growth factor receptors 3(FGFR3) mutations likely contribute to the pathogenesis of SK ***(Hafner et al., 2007)***.

An autosomal dominant mode of inheritance of SK has been suggested. Benign proliferation can occur congenitally in childhood or adulthood, resulting in many variations of clinic pathological lesions ***(Noiles and Vender 2008)***.

A study was done by ***Hafner et al (2009)***, to analyze FGFR3 and PIK3CA mutations in stucco keratosis and dermatosis papulosa nigra. The analysis of the two DPN samples revealed FGFR3 mutations in each sample. The PIK3CA Snapshot assay revealed no PIK3CA hotspot mutations in the DPN samples.

Mortality and Morbidity:

Dermatosis papulosa nigra is not associated with any mortality or morbidity ***(Nowfar-Rad et al., 2009)***.