Effect of intralesional botulinum toxin type A injection on keloid and hypertrophic scar

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بسم الله الرحمن الرحيم

قَالُواْ سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا عَلَّمْتَنَا
إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

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List of Abbreviations

ACh.	Acetylcholine
B.C.	Before Christ
BTX	Botulinum neurotoxin
BTX-A	Botulinum toxin type A
C. botulinum	Clostridium botulinum
Ca^{2+}	Calcium
Cl^{-}	Chlorine
CO_2	Carbon dioxide
DNA	Deoxyribonucleic acid
EGA	Estimated gestational age
EGF	Epidermal growth factor
ELISA	Enzyme-linked immunosorbent assay
FDA	Food and Drug Administration
H2O2	Hydrogen peroxide
HC	Heavy chain
HCC	Carboxyl-terminal of the heavy chain of botulinum toxin
He-Ne	Helium-neon
HN	Amino terminal of the heavy chain of botulinum toxin
HPV	Human papilloma virus
ICAM-1	Intercellular adhesion molecule-1
Ig	Immunoglobulin
IGF-1	Insulin-like growth factor-1
IL	Interleukin
INF	Interferon
J	Joules
K^{+}	Potassium
KCl	Potassium chloride

kDa.	Kilo dalton
KTP	Potassium-titanyl-phosphate
LASER	Light amplification by stimulated emission of radiation
LC	Light chain
LP	Long-pulsed
MASER	Microwave amplification by stimulated emission of radiation.
Mg/min.	Milligrams per minute
MSH	Melanocyte stimulating hormone
Na^{+}	Sodium
NaCl	Sodium chloride
Nd	Neodymium
NMJ	Neuromuscular junction
NO	Nitric oxide
NOS	Nitric oxide synthase
NRC	National Research Center
O	Singlet oxygen
$O2^{-}$	Superoxide anion radical
OH^{-}	Hydroxyl radical
PDGF	Platelet derived growth factor
pH.	potential Hydrogen
PTH	Parathyroid hormone
QOL	Quality of life
QS	Quality-switched
RNA	Ribonucleic acid
ROS	Reactive oxygen species
SNARE	Soluble N-ethyl-maleimide-sensitive fusion protein attachment receptor
SOD	Superoxide dismutase
TWI	Tap water iontophoresis
TAC	Triamcinolone acetonide

TGF	Transforming growth factor
TNF	Tumour necrosis factor
TRT	Thermal relaxation time
VIP	Vasoactive intestinal polypeptide
Zn	Zinc
5-FU	5-Flurouracil

Introduction

A keloid is a benign cutaneous tumor produced by uncontrolled synthesis and deposition of dermal collagen in predisposed individuals. Keloids affect both sexes equally, although the incidence in young female patients has been reported to be higher than in young males, probably reflecting the greater frequency of earlobe piercing among women. There is a fifteen times higher frequency of occurrence in highly pigmented people. Persons of African descent are at increased risk of keloid occurrences ***(Zhibo and Miaobo, 2009).***

A keloid is a type of scar, which depending on its maturity, is composed mainly of either type III (early) or type I (late) collagen. It is a result of an overgrowth of granulation tissue (collagen type III) at the site of a healed skin injury which is then slowly replaced by collagen type I ***(Rapini et al., 2007).***

Keloids are firm, rubbery lesions or shiny, fibrous nodules, and can vary from pink to flesh-coloured or red to dark brown in colour. A keloid scar is benign, non-contagious, but sometimes accompanied by severe itching, pain and changes in texture. In severe cases, it can affect movement of skin. Keloids should not be confused with hypertrophic scars , which are raised scars that

do not grow beyond the boundaries of the original wound ***(Ogawa, 2010).***

Histologically, keloids are fibrotic tumors characterized by a collection of atypical fibroblasts with excessive deposition of extracellular matrix components, especially collagen, fibronectin, elastin, and proteoglycans. Generally, keloids contain relatively acellular centers and thick, abundant collagen bundles that form nodules in the deep dermal portion of the lesion. There are four histologic features that are consistently found in keloid specimens that are deemed pathognomonic for their diagnosis,They are: 1) the presence of keloidal hyalinized collagen, 2) a tonguelike advancing edge underneath normal-appearing epidermis and papillary dermis, 3) horizontal cellular fibrous bands in the upper reticular dermis, and 4) prominent fascia-like fibrous bands ***(Lee et al.,2004).***

Keloids are associated with small-fiber neuropathy and typically present with itching, pain, and usually causes major physical, psychological, and cosmetic problems. Treatment of the hypertrophic scar still is a dilemma due to the lack of effective and excellent methods and agents ***(Uyesugi et al., 2010).***

Keloids present a therapeutic challenge that must be addressed, numerous treatments are currently available but they do not always yield excellent therapeutic results. Hence,

alternatives are needed. Recent basic and clinical research has shown that botulinum toxin type A (BTXA) has antihypertrophic scar properties but the molecular mechanism for this action is still unknown ***(Xiao et al., 2010).***

Botulinum toxin injection has been used for a variety of indications in humans, including blepharospasm, hyperhidrosis and hyperfunctional facial lines ***(Gassner and Sherris, 2002).***

the efficacy and safety of botulinum toxin type A in inhibiting and preventing the tensile force caused by shrinking of skin and muscle have been established by long-term follow-up studies ***(Zhibo and Miaobo, 2009).***

Aim of work

The aim of work is to assess the efficacy and safety of intralesional injection of botulinum toxin types A (BTXA) in the treatment of keloids and hypertrophic scars.