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Botox and hypertrophic scars

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Abstract
Hypertrophic scars exhibit a higher prevalence within groups with darker skin tones. The Vancouver Scar Scale, patient and observer scar evaluation scale, high resolution ultrasound, Modified Vancouver Scar Scales, ultra-high frequency ultrasound, tonometry, multiphoton microscopy and laser Doppler imaging are considered to be optimal tools for measurement of scar. The therapeutic modalities employed for the hypertrophic scars management encompass surgical excision, application of ointments, the use of silicone gel sheeting, topical administration of steroids, utilization of topical 5% imiquimod cream, and application of topical vitamin E. Intraregional therapy encompasses many treatment modalities, such as verapamil, corticosteroids, botulinum toxin (BTX) and five fluorouracil. This research aims to explore the topic of hypertrophic scars, focusing on the many treatment techniques that are now accessible, with particular emphasis on the Botox utilization.

Keywords: Hypertrophic, scars, darker

Introduction
Keloids and hypertrophic scars are considered as major clinical problems for plastic surgeons and dermatologists. They occur due to alterations in the process of wound-healing at any stage [1]. They may develop following burn, surgery, inflammation, and trauma in susceptible participants**.** They impact patients physically and psychologically in the form of pruritus, pain cosmetic disfigurement, and sometimes joint movement restriction [2].
Hypertrophic scars are more common in dark skinned individuals. They also appear on areas of skin with increased tension. Type A botulinum toxin (BTX) is a neurotoxin that has been used to treat scars since the year 2ooo. The most favorable intralesional BTX advantage is the limited side effects [3]. Its effect on scaring may be attributed to its inhibitory effect on decreasing transforming growth factor beta (TGF b) expression and fibroblast that may play a role in scarring. Furthermore, BTX may play a role in scar development via signaling between cells. In hypertrophic scars, *in vitro* researches demonstrated that it directly inhibits fibroblast-to-myfibroblast differentiation [4].

Risk factors
Pathological scarring can be influenced by a variety of hereditary, systemic and regional variables. Some studies have found a familial tendency in patients with hypertrophic scars, although the evidence is not conclusive [5].

Picture of clinical
Hypertrophic scars are shiny, raised, smooth, irregular, firm textures and solid [6].

Difference between keloids and hypertrophic scars
Unlike keloids, hypertrophic scars remain within the original injury boundaries, do not appear spontaneously (7). Figure one

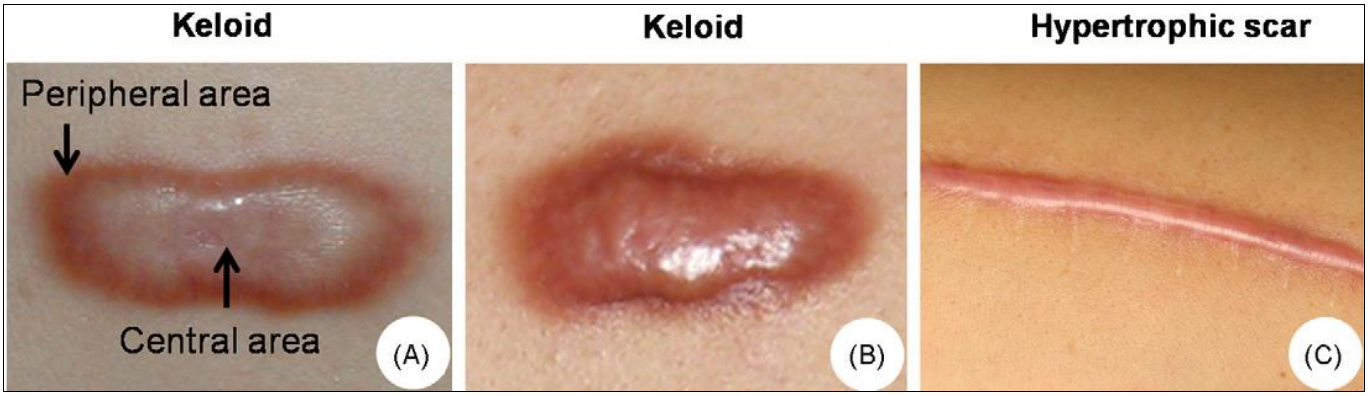

Fig 1: Variance between hypertrophic scar A and keloid. Keloid with less erythematous central regression area and active peripheral area. B. shows keloid with whole active area extending beyond original wound. C boundaries. Shows regular active hypertrophic scar respecting the wound boundaries [7]

Hypertrophic scars clinical assessment

Ideal scar measurement tools are those which are reliable, valid, and feasible [8].

- The Vancouver Scar Scale [9] was the first instrument to attempt to measure the height, width, blood vessel density, and pliability of scars.
- Modified Vancouver Scar Scales (MVSSs): The 8-point Vancouver Scar Scale has been revised in a number of ways.
- Scars can be evaluated using the Patient and Observer Scar Assessment Scale (POSAS), which features two scores, one for observers and one for patients [10].

Tools of objectives

Provide a trustworthy means of assessing lesions after receiving various forms of treatment [11].

- **High resolution ultrasound:** is a more accessible, less time-consuming, and cheaper option for accomplishing the same task [8].
- **Ultra-high frequency ultrasound (UHFUS):** it was employed for measuring vascularity of trophic acral lesions and malignant cutaneous through its color Doppler mood [12].
- **Laser Doppler Imaging (LDI)** is a technique that use a laser beam to systematically scan many locations over the surface of a tissue. This process results in the creation of a two-dimensional image that is color-coded, with each color corresponding to the blood flow in the respective area [13].
- **Tonometry:** It is a simple, sensitive, inexpensive and clinically useful technique for monitoring an individual's scar [14].
- **Multiphoton microscopy:** this technique avoids tissue fixation and staining and is used to examine the extracellular matrix of pathological scars at the level of molecular [15].

Hypertrophic scars treatment

There are many treatment modalities for pathological scars that can be used either as monotherapy or in combination with each other [21].

Surgical removal

The main scar bulk is excised, it is associated with very high recurrence rate ranged from seventeen% to fifty eight% in variant researches [22].

Topical treatment

Because of their affordability, convenience, noninvasiveness, and ease of application, they could be the first step in the hypertrophic scars treatment [23].

Ointments and silicone gel sheeting

Products based on silicone are thought to work by keeping the wound hydrated, preventing the deposition of collagen, and decreasing TGF-β2 [24].

- **Application of Topical steroid:** can be used either alone under occlusion or combined with trans epidermal delivery methods as fractional laser or micro needling with better finding [25].
- **Topical five% imiquimod cream:** Imiquimod five% cream is a topical medication that exerts immune-modulatory effects [26].
- **Topical vitamin E:** is tocopherol which present in our nutrients and known to have antioxidant photo protective role [26].
- **Intralesional therapy** is presently employed in the management of pathological scars, either as a standalone treatment or in conjunction with other therapeutic approaches [27].
- **Corticosteroids:** are antiproliferative, vasoconstrictive, and immunosuppressive
- **Five fluorouracil (5-FU)** is an antiproliferative medication that is administered through injection. It is commonly used as a second-line treatment for scarring that is resistant to other forms of therapy [28].
- **Verapamil** is a pharmaceutical agent classified as a calcium channel blocker that has been found to have an extended application in the treatment of scar tissue [29].
- **Botulinum toxin:** Intralesional administration of botulinum toxin A is a type of injectable treatment. Clostridium botulinum is an anaerobic spore-forming bacterium that produces a neurotoxin. The utilization of this medication has been observed in the management of glabella and periorbital wrinkles, severe primary axillary hyperhidrosis, as well as several neurologic conditions [35]. The mechanism of action of BTX encompasses a sequential four-step process. Initially, the heavy chain of BTX-A attaches itself to the presynaptic membrane of cholinergic nerve endings. Subsequently, the toxin complex is internalized by the cell. Following internalization, the light chain of BTX is liberated into the cytoplasm. Finally, the light chain selectively cleaves proteins known as N-ethylmaleimide-sensitive factor attachment protein receptor proteins (SNAREs). Figure three

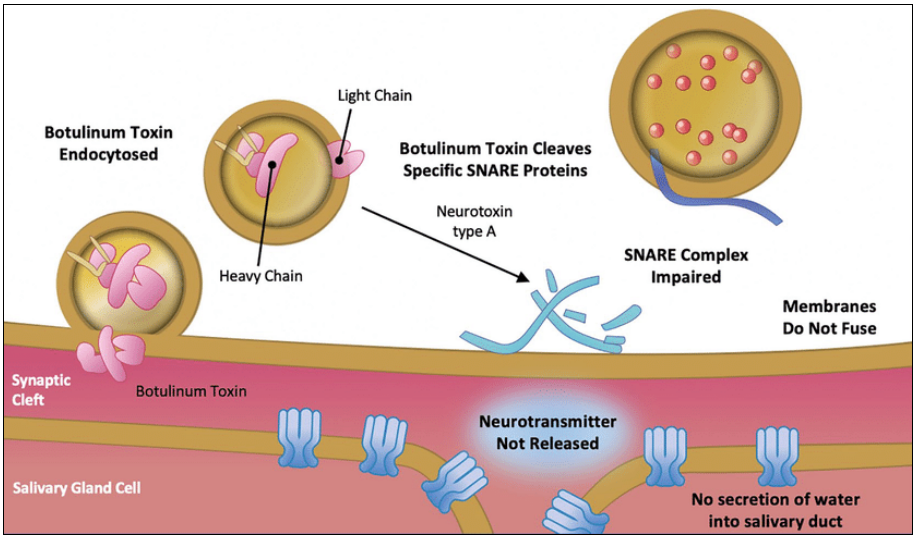

Fig 2: BTX mechanism of action [36]

Office procedure

- **Intralesional cryotherapy:** Scar tissue can be treated with liquid nitrogen delivered by a specially developed cryoneedle [30].
- **Radiotherapy**: utilizes ionizing radiation to induce apoptosis in tissue proliferation [31].
- **Light devices and Laser:** Scar erythema is the main indicator that drives laser device selection [32].
- **Intense pulsed light (IPL):** refers to a non-coherent filtered flash lamp that emits a broadband spectrum ranging from five hundred and fifteen to thousand and two hundred nm.) [33]. Figure two

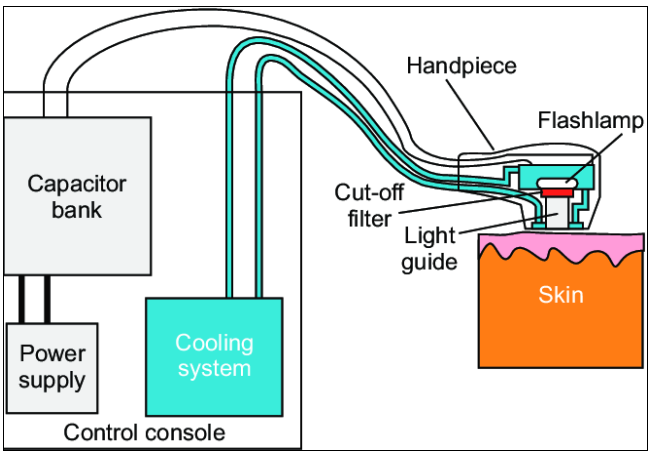

Fig 3: IPL device structure [33]

Micro needling is a procedure that involves the creation of microchannel into scar tissue, which in turn can lead to the physical disruption of densely packed collagen bundles located within the dermis [34].

Microdermabrasion is a technique that involves the application of aluminum oxide crystals onto the skin using a pressure mechanism [34].

Conflict of Interest

Not available

Financial Support

Not available

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