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Brief overview about Updated Management Lines of Post Acne Erythema: Review Article

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ABSTRACT

Background: Post Acne Erythema (PAE) is a common sequelae of acne inflammation. Time may help some acne erythema lesions clear up. Although the inflammation caused by acne has subsided, the cosmetic fallout of treatment for these visible red markings, remains a therapeutic issue.

Objective: Review of the literature on updated management lines of post acne erythema.

Methods: We scoured medical papers and databases including PubMed, Google Scholar, and Science Direct for information on: Post acne erythema, its management, and its treatment. However, only the most recent or comprehensive study conducted between September 2013 and March 2022 was considered. The authors also analyzed references from similar literature. Documents written in languages other than English have been overlooked because of a lack of funding to translate them. It was commonly recognized that scientific research did not include things like unpublished publications, oral presentations, conference abstracts, or dissertations.

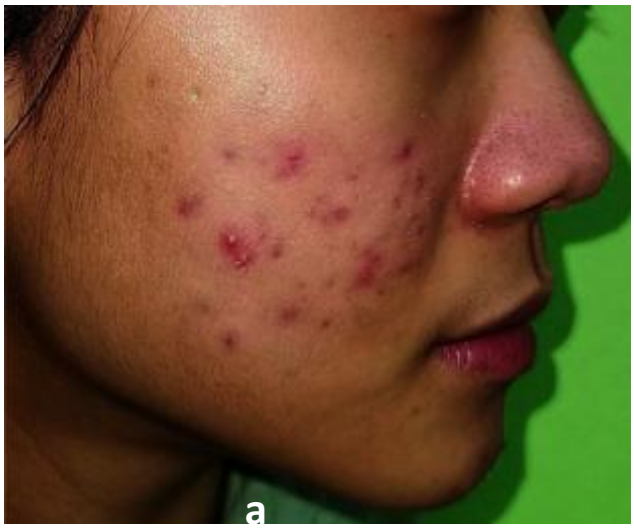
Conclusion: PAE has been treated with a variety of approaches, from topical therapies to surgical interventions. In the same way as treating acne lesions is essential, so is attending to post-acne effects (PAE) and scarring. Different forms of vitamin C and topical treatments such 0.025% retinoic acid, 12.5% glycolic acid, 0.2% brimonidine tartrate, and 5% tranexamic acid solution have all been explored. Vascular lasers have been used to treat PAE, although most studies have only looked at their effectiveness in treating active inflammatory acne.

Keywords: Post acne erythema, Vitamin C, Interleukin-1.

INTRODUCTION

Acne is a skin condition that is quite widespread. It is characterized by the presence of comedones (both open and closed), nodules, pustules as well as papules (all inflammatory lesions), and variable degrees of scarring. Early and late stage inflammation were crucial to the idea of acne aetiology. At every stage, from onset to clearing up, acne is predominantly an inflammatory illness. Therefore, reducing inflammation should be a primary goal of acne therapies [(1)].

More people in urban areas suffer from acne than those living in rural areas. A significant percentage of those affected (20%) suffers from severe acne that can leave scars. It seems that some racial groups are disproportionately impacted. Acne is more common in Caucasian groups, but is typically milder in Asians and Africans [(2)].



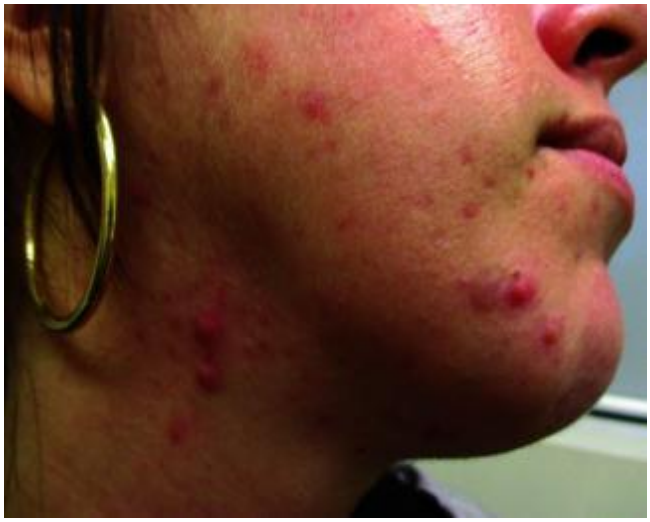


Figure (1) (a & b): Acne lesions in the form of inflamed papules and pustules [(3)]

Acne lesions develop due to four main pathogenic processes: comedone formation due to follicular keratinization changes, complex inflammatory pathways combining innate and acquired immunity, androgen-regulated increased and altered sebum production, and follicular colonization by Propionibacterium acnes all contribute to the development of acne [(4)].

Adult female acne has a highly convoluted aetiology. Women with normal androgen levels may experience unwanted side effects from hormone-based therapy such as oral contraceptives and anti-androgen medicines when treating hyperandrogenism diseases such polycystic ovarian syndrome (PCOS). The effectiveness of hormone therapies for adult female acne reveals the significance of androgens. Sebaceous glands

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crank out more oil when androgens attach to their receptors [3].

P. acnes can form a biofilm of extracellular polysaccharides in inflammatory acne. This biological glue promotes the integrin-modulating adhesion of P. acnes to follicular walls. Additionally, it controls bacterial growth and metabolism, promotes P. acnes colonisation, and provides protection against both antibiotics and the inflammatory response of the host [2, 3].

Antibiotic-resistant bacteria are on the rise, making effective treatment of inflammatory acne all the more essential. This can be accomplished by using natural substances that restore the skin's natural microbiota to restore its protective barrier function and restrict P. acnes proliferation without building resistance [3].

Early on in the development of non-inflammatory acne, the expression and secretion of interleukin-1 (IL-1) in otherwise non-inflamed skin is dramatically increased, leading to less inflammation [3].

The recent surge of antibiotic-resistant bacteria highlights the importance of effective care of inflammatory acne. This can be done by employing natural ingredients that limit the spread of P. acnes on the skin, inhibit the development of resistance, and manage the quantity and quality of sebum production, as well as by rebalancing the skin's natural microbiota to restore the skin's natural barrier [4]. However, it has been shown that interleukin-1 (IL-1) expression and secretion in non-inflamed skin are considerably elevated during the early stages of acne development in non-inflammatory acne, which inhibits inflammation [5].

PAE is a typical sequelae of acne inflammation. Time may help some acne erythema lesions clear up. Although the inflammation caused by acne has subsided, the cosmetic fallout of treatment for this condition, visible red markings, remains a therapeutic issue. Sometimes, it's just not possible to get rid of all the post-inflammatory erythema (PIE). Post-acne erythema is the reddening of the skin that occurs after a wound has healed and is caused by dilatation of the capillaries in the superficial dermis. Additionally, the epidermis is still immature following healing, making it possible for more incident light to be reflected off the dilated microvasculature, thus contributing to the overall "redness." Individuals taking isotretinoin are more likely to experience this [6].

Clinical presentation:

Acne causes more than scarring; many individuals also experience post-inflammatory dyspigmentation as a result of the condition. Many people with darker skin tones experience the opposite symptom of this dyspigmentation and hyperpigmentation. Patients with lighter skin tones (I-III) show up with isolated erythematous macules. Post-inflammatory erythema is commonly associated with acne, but it can be caused by any resolving cutaneous inflammatory disease [7].

The development of postinflammatory hyperpigmentation (PIH) and erythema scoring systems would facilitate more accurate evaluation of treatment outcomes and more accurate comparisons of treatment modalities [8].

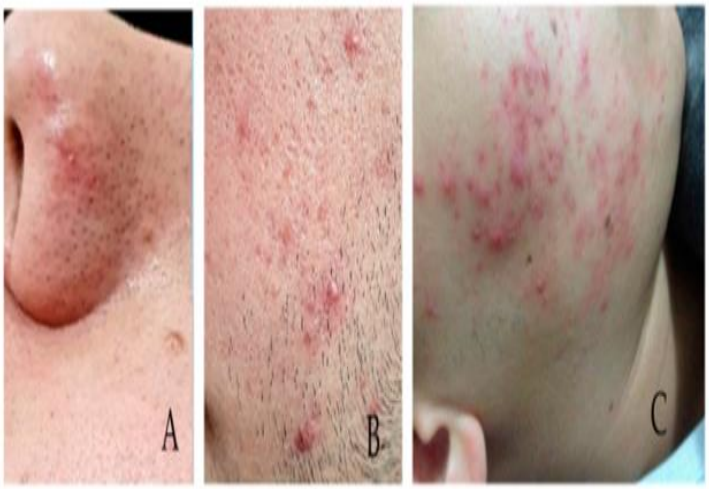

Figure (2): Acne grades, (A) Grade 1, (B) grade II and (C) grade III [8].

TREATMENTS

PAE has been treated with a variety of methods, from topical to surgical [9].

1- Topical treatment:

Although some PAE lesions may heal on their own, chronic lesions are far more common [10]. In the same way as treating acne lesions is essential, so is attending to post-acne erythema (PAE) and scarring. Numerous topical medications, such as 0.025% retinoic acid, 12.5% glycolic acid, 0.2% brimonidine tartrate, 5% tranexamic acid solution, and vitamin C formulations have been used with varying degrees of success [6]. Large-scale or long-term trials are needed to confirm these methods' efficacy and safety [10].

A. Oxymetazoline (OXZ):

Application of OXZ to a specific area. There was a notable decrease in PAE levels after just two weeks of treatment with 1.5% liposomal base twice daily. Dryness, pruritus, pallor, paradoxical, and rebound erythema were some of the side effects of topically applied OXZ, but they gradually improved [6].

B. Topical 5% tranexamic acid:

Applying a topical solution of tranexamic acid at a concentration of 5% for a period of 6-8 weeks was very effective. It was observed to have no major side effects, making it a viable alternative for treating PAE in addition to its low cost and convenience of usage [9].

C. Vitamin C gel:

There were no negative side effects associated with topical vitamin C treatment for PAE [10].

D. Brimonidine tartrate 0.2% solution:

Genedy [11] found that after 4 weeks of treatment with a topical 0.2% solution of brimonidine tartrate, erythema was significantly reduced. Skin

discoloration, allergic reactions, pain, rebound, and paradoxical erythema were among the side effects.

E. Timolol:

Timolol, a nonselective beta-adrenergic receptor blocker with good safety profiles, is gaining popularity in the field of dermatology [18]. Timolol's anti-inflammatory effects could also be useful in treating acne and rosacea, wherein inflammation is thought to play a central role in disease development [19].

Those who are predicted to have insufficient or protracted healing may benefit from timolol because it has been shown to speed up re-epithelialization, a key step in the wound healing process [20].

Timolol's beta-blocking capabilities can reduce disease severity and erythema in chronic inflammatory skin diseases including acne and rosacea by inhibiting inflammatory mediators and inducing vasoconstriction, respectively. Also, it helps restore skin barrier function after acne treatments like fractional CO_2 laser [21].

Adverse effects and safety profile:

Timolol used topically is generally well tolerated and causes little side effects. Systemic absorption may occur after topical application to mucosal membranes and ulcerated skin [22].

When applied topically, Timolol's adverse effects are often modest and manageable. The most commonly reported adverse effect is dryness, although additional symptoms can include burning, moderate irritation, scaly skin, and itching [19].

Patients should be initiated and maintained on the lowest concentration of timolol possible because the optimal dosing of topical timolol is not yet identified. Patients should be asked about any unwanted side effects at each subsequent appointment once therapy has begun. In addition, it's important for people to remember that they should go to the doctor right away if they're experiencing any kind of health issue [23].

2- Lasers and energy-based modalities:

Similarly, difficult has been laser and energy-based modality treatment of PAE. Although several different vascular lasers have been used to treat PAE, the majority of studies only discussed the success of these treatments in cases of active inflammatory acne. Targeting dilated blood vessels and reducing redness can be accomplished by a variety of laser therapies [12].

A. Non-ablative lasers:

Oxyhemoglobin is the primary chromophore for facial erythema, and it exhibits three visible-light peak spots at 418 nm, 542 nm, and 577 nm. The 577 nm pro-yellow laser has been found to be effective in treating vascular lesions [12].

The 577-nm yellow laser has been used for over 20 years, initially used to treat diabetic retinopathy. However, its use in dermatology is relatively new. This laser generates primarily yellow light, which is absorbed most strongly by oxyhemoglobin in vascular lesions and reflected less strongly by melanin, making hyperpigmentation less likely, especially on individuals with darker skin tones [13].

Lasers with wavelengths of 585 and 595 nm destroy oxyhemoglobin in blood vessels, while a laser with 1550 nm wavelength heats water, leading to photothermal death of cutaneous vasculature [14].

B. Intense pulsed light (IPL) therapy:

The non-coherent polychromatic light source provided by intense pulsed light (IPL) has a wavelength spectrum that spans 400 to 1200 nm. Because peak absorption of oxyhemoglobin occurs at 577 nm, the vascular mode of IPL works at 560 nm, allowing for more selective destruction of superficial arteries [13].

After receiving IPL treatment, the average erythema score was significantly decreased. Patients with persistent acne erythema were treated with IPL, which had additional benefits like decreasing oil production, evening out skin tone, and smoothing out face texture in addition to treating acne. Furthermore, erythema, hyperpigmentation, and hypopigmentation were all short-lived side effects [13].

3- Radiofrequency:

The various energy modes of radio frequency (RF) include the monopolar, bipolar, fractional, and multipolar varieties. Radiofrequency (RF) is based on the premise that by heating the reticular dermis to temperatures between 40 and 45°C, new collagen and elastin will be formed, hence tightening the skin [15]. Histological evidence suggests that fractional micro-needling radiofrequency (FMR) is anti-inflammatory and anti-angiogenic [14].

Lately, microneedle arrays have been the preferred approach for administering fractional radiofrequency. Microneedle RF applicators deliver radiofrequency energy to the dermis, heating it to a depth of 3.5 mm while simultaneously inserting extremely sharp microneedles into the skin. Needle length (2.5 mm, 3.5 mm), sharpness, coating (stainless steel, gold), and insertion methods all vary widely across the various microneedle RF delivery systems on the market [16].

Invasive short pulsed-type bipolar radiofrequency device treatment reduced erythema and mean erythema index IGA scores (EI). Slight enhancements were observed in Melanin Index (MI) and Trans-epidermal Water Loss (TEWL). Further, no serious adverse effects were reported [17].

CONCLUSION

PAE has been treated with a variety of approaches, from topical therapies to surgical interventions. In the same way as treating acne lesions is essential, so is attending to post-acne effects (PAE) and scarring. Many other topical medications have been tried, including 0.025% retinoic acid, 12.5% glycolic acid, 0.2% brimonidine tartrate, 5% tranexamic acid solution, and various vitamin C formulations. Although many types of vascular lasers have been used to treat PAE, the majority

of publications exclusively discuss the results in cases of active inflammatory acne.

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