

## Folliculitis following hair removal using Intense Pulsed Light: Successful management with 1927 nm Thulium laser - A case report

Nguyen Dac Khoi Nguyen<sup>1</sup>

<sup>1</sup>Training Center, Pham Ngoc Thach University of Medicine, Ho Chi Minh city, Vietnam

### Abstract

**Background:** Hair holds significant aesthetic value; however, unwanted hair growth often negatively impacts psychological well-being and quality of life. Energy-based devices (EBDs), such as lasers and intense pulsed light (IPL), are currently effective and popular solutions for hair removal with few complications. Nevertheless, post-treatment folliculitis can occur, adversely affecting skin health and reducing patient satisfaction with the procedure.

**Case Report:** A 22-year-old male (Fitzpatrick skin type IV) presented with acne vulgaris accompanied by pseudofolliculitis barbae. He was initially treated with topical medications combined with IPL hair removal. Following the second IPL session, the patient experienced a massive pustular flare-up. Initial management with IPL in acne mode yielded an incomplete response. Subsequent combination therapy with a 1927 nm Thulium laser resulted in rapid inflammation reduction within 7 days. Clinical outcomes showed significant remission of symptoms alongside a reduction in hair density, meeting the patient's therapeutic goals.

**Conclusions:** Folliculitis following hair removal using IPL or other EBDs is a rare and transient complication but requires careful clinical assessment and device parameter adjustment for prevention. Therapeutic interventions, utilizing topical agents or EBDs such as the 1927 nm Thulium laser originally indicated for acne can significantly improve the condition should complications arise. Further research is needed to optimize treatment parameters, particularly for Asian skin types, to maximize hair removal efficacy without compromising the patient's quality of life.

**Keywords:** Folliculitis, Hair Removal, Intense Pulsed Light

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**Author contact:**

Nguyen Dac Khoi Nguyen

**Email:**

nguyennkd@pnt.edu.vn

**Phone:** +84 839896799

### 1. INTRODUCTION

Beyond its physiological functions, hair plays a major role in aesthetics. Conversely, unwanted hair growth can become a source of distress for many individuals, potentially affecting their emotional state and quality of life [1].

Energy-based devices (EBDs), including various lasers and light sources, are currently established as effective, long-term methods for hair removal and are generally associated with few serious

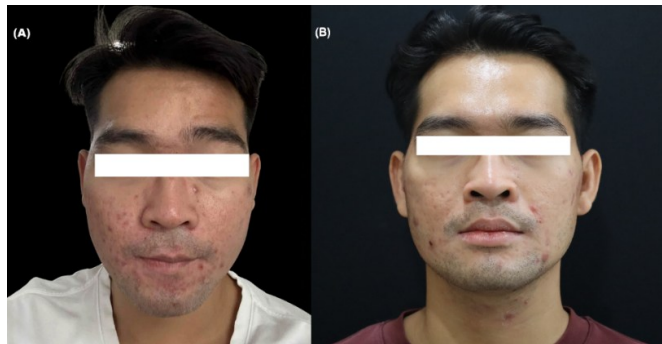
complications. Folliculitis following hair removal is a known potential adverse effect; however, literature on this condition remains limited primarily to sporadic case reports [2,3]. Post-hair removal folliculitis not only impacts skin health but also diminishes patient satisfaction, potentially causing hesitation in continuing the treatment [2]. In this article, we report a case of folliculitis following hair removal using Intense Pulsed Light (IPL).

## 2. CASE PRESENTATION

A 22-year-old male with Fitzpatrick skin type IV presented to the clinic with a chief complaint of frequent pustular outbreaks around the mouth following shaving. The patient had no prior history of treatment. Clinical examination revealed coarse hair distribution in the perioral regions, with multiple nodules and pustules on both cheeks and the chin. The patient was diagnosed with acne vulgaris accompanied by pseudofolliculitis barbae caused by frequent shaving (Figure 1A). Expressing a preference to avoid oral medications, the patient was treated with topical Adapalene 0.1% / Benzoyl Peroxide 2.5% applied to

inflammatory lesions and pustules.

After 4 weeks of topical treatment, the symptoms improved. The patient continued the topical regimen and initiated hair removal using an IPL (Nordlys<sup>®</sup>, Candela, USA). The HRL 600 applicator, designed for hair removal, was used with Fluence of 10.9 J/cm<sup>2</sup>, a pulse duration of 40 ms, and 1 pass to prevent the recurrence of pseudofolliculitis. Immediately post-treatment, mild hair shedding was observed upon wiping. The patient developed perifollicular erythema in the treated area and was prescribed a single dose of topical Clobetasol propionate 0.05% to alleviate post-procedural symptoms.



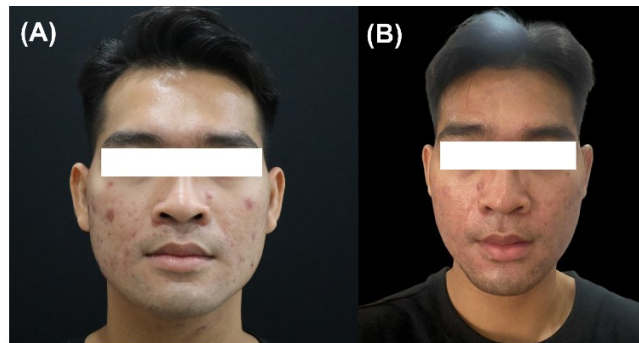
**Figure 1.** (A) Patient at baseline; (B) Patient 3 days after the first IPL hair removal session.

Six weeks later, the patient underwent the second IPL hair removal session with an fluence of 11.1 J/cm<sup>2</sup>, pulse duration of 40 ms, 1 pass, followed by a single application of Clobetasol propionate 0.05%. Approximately 3 days after the second session, the patient developed a massive eruption of superficial pustules accompanied by erythema and intense pruritus in the treated area (Figure 2).



**Figure 2.** Multiple inflammatory papules and superficial pustules around hair follicles 3 days after the second IPL session.

The symptoms persisted with new pustules forming around hair follicles over the next 4 days. The patient returned for follow-up and was advised to undergo IPL treatment using the PR530 applicator in acne mode (Fluence 6.3 J/cm<sup>2</sup>, pulse duration 2.5 ms x 2, 1 pass) and facial telangiectasias mode (Fluence 6.3 J/cm<sup>2</sup>, pulse duration 10 ms, 1 pass) to rapidly reduce erythema, inflammation lesions and pustules. The patient also continued using topical Adapalene 0.1% / Benzoyl Peroxide 2.5% to manage inflammatory lesions. Three days later, symptoms had decreased, but some inflammatory lesions persisted (Figure 3A). Consequently, the patient was treated with a 1927 nm Thulium laser (LaseMD Ultra, Cynosure Lutronic, USA) at an energy level of 10 J with 6 passes over the affected area to accelerate the resolution of folliculitis. Seven days post-laser treatment, symptoms had significantly resolved, pustules had nearly cleared and erythema had faded. A marked reduction in hair density was also observed (Figure 3B).



**Figure 3.** (A) Patient 3 days after IPL acne treatment; (B) Patient 7 days after 1927 nm Thulium laser treatment.

### 3. DISCUSSION

Hair removal using EBDs, such as lasers and lights, is an effective measure for treating pseudofolliculitis barbae caused by hypertrichosis [4]. Additionally, EBD-assisted hair removal has applications in treating other follicular skin conditions, including acne keloidalis nuchae and hidradenitis suppurativa [5,6]. However, folliculitis has been reported as a potential side effect of hair removal. The incidence rate is approximately 2% for IPL and 6.4% for laser devices [1,7]. Risk factors may include the use of Neodymium-doped Yttrium Aluminum Garnet (Nd:YAG) lasers, younger patient age, and darker skin types [1]. The most commonly affected sites are the face, neck, and groin [8].

The mechanism underlying post-hair removal folliculitis is not fully understood. It is hypothesized to share a pathogenesis

similar to pseudofolliculitis barbae, involving a foreign body inflammatory reaction to ingrown hair. Following hair removal, the remaining hair shaft is extruded from the skin over time. Folliculitis may result from an inflammatory response to these extruded hair fragments acting as foreign bodies [2]. Furthermore, post-treatment follicular edema, combined with hair debris, may occlude the follicular ostia, leading to folliculitis [7]. This hypothesis is consistent with histopathological studies of hair follicles after EBD treatment, which show follicular contraction and deformed, curved hair shafts trapped within keratin plugs [9].

In this case, the patient experienced no adverse effects other than transient erythema after the first session. However, folliculitis occurred after the second session when the fluence was increased. Our patient also presented with several known risk factors

for developing folliculitis, including younger age, Asian skin type and the specific treatment location (facial area). Juhong et al. hypothesized that higher fluences might cause thermal injury to the follicular epithelium, leading to epidermal detachment and dermal inflammation, characterized by infiltration of neutrophils and lymphocytes. [3]. This aligns with histopathological findings showing lymphocytic infiltration around the follicular surface following IPL hair removal [9].

While post-hair removal folliculitis is typically mild and self-limiting, medical intervention is warranted when severe symptoms adversely affect the patient's quality of life. Topical retinoids, such as adapalene 0.1%, are often used to treat pseudofolliculitis by reducing follicular hyperkeratosis with less irritation than tretinoin. Benzoyl peroxide 2.5% may be added to accelerate inflammation reduction [4,10]. The combination of adapalene 0.1%/benzoyl peroxide 2.5% is also an effective method for acne treatment [11]. Recommendations to prevent post-hair removal folliculitis include the use of adequate cooling, optimal fluence settings and avoiding pulse stacking [1]. Optimal fluence is defined as the highest energy level the patient can tolerate without side effects while achieving therapeutic goals [3]. In addition to topical medications, the patient was treated with a combination of IPL and a 1927 nm Thulium laser. IPL is a well-established modality for treating acne vulgaris—a condition that shares similar clinical features with folliculitis, such as pustules and inflammatory papules [11]. Similarly, the 1927 nm Thulium laser has emerged as a novel therapeutic intervention for acne [12,13]. Its mechanism involves thermal coagulation of the follicular infundibulum at a depth of approximately 400  $\mu\text{m}$ , which is sufficient to resolve

inflammatory acne lesions [12]. Given the morphological similarities, we hypothesized that this mechanism could be extrapolated to effectively control the symptoms of folliculitis. Furthermore, the 1927 nm Thulium laser induces neocollagenesis and subsequent dermal remodeling, offering the potential for overall improvement in skin quality concurrent with lesion resolution.

Schuler et al. reported a case of multiple folliculitis, pustules and erythema 5–7 days after Nd:YAG laser hair removal on the neck. The patient received no treatment and symptoms gradually improved over 2–4 weeks [2]. In this case, follicular inflammation was also noted post-treatment; however, with active intervention, lesions almost healed within 1–2 weeks. These results demonstrate the superior efficacy of early intervention compared to allowing for spontaneous resolution. The healed areas showed complete hair removal, which may serve as a prognostic indicator of treatment response, although further evidence is required to confirm this conclusion.

Additional research is essential to better understand the incidence and risk factors associated with this adverse effect, thereby enabling the development of more effective preventive and treatment recommendations.

#### 4. CONCLUSION

Folliculitis following hair removal by IPL, and EBDs in general, is a relatively rare, underreported, but easily diagnosed and typically transient side effect. To achieve effective hair removal with minimal side effects, a combination of patient epidemiology, clinical assessment, appropriate device selection and a standardized protocol is essential. Further research is warranted to improve procedural protocols and establish recommended parameters, especially for Asian skin types, to avoid negatively impacting the quality

of life of patients seeking hair removal. The combination of acne treatment modalities, such as topical medications and EBDs, can also contribute to the effective management of post-treatment folliculitis. Notably, this case report expands the therapeutic landscape by highlighting the potential of the 1927 nm Thulium laser in managing this condition.

### LIST OF ABBREVIATIONS

EBDs	Energy-based devices
IPL	Intense Pulsed Light
Nd:YAG	Neodymium-doped Yttrium Aluminum Garnet

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