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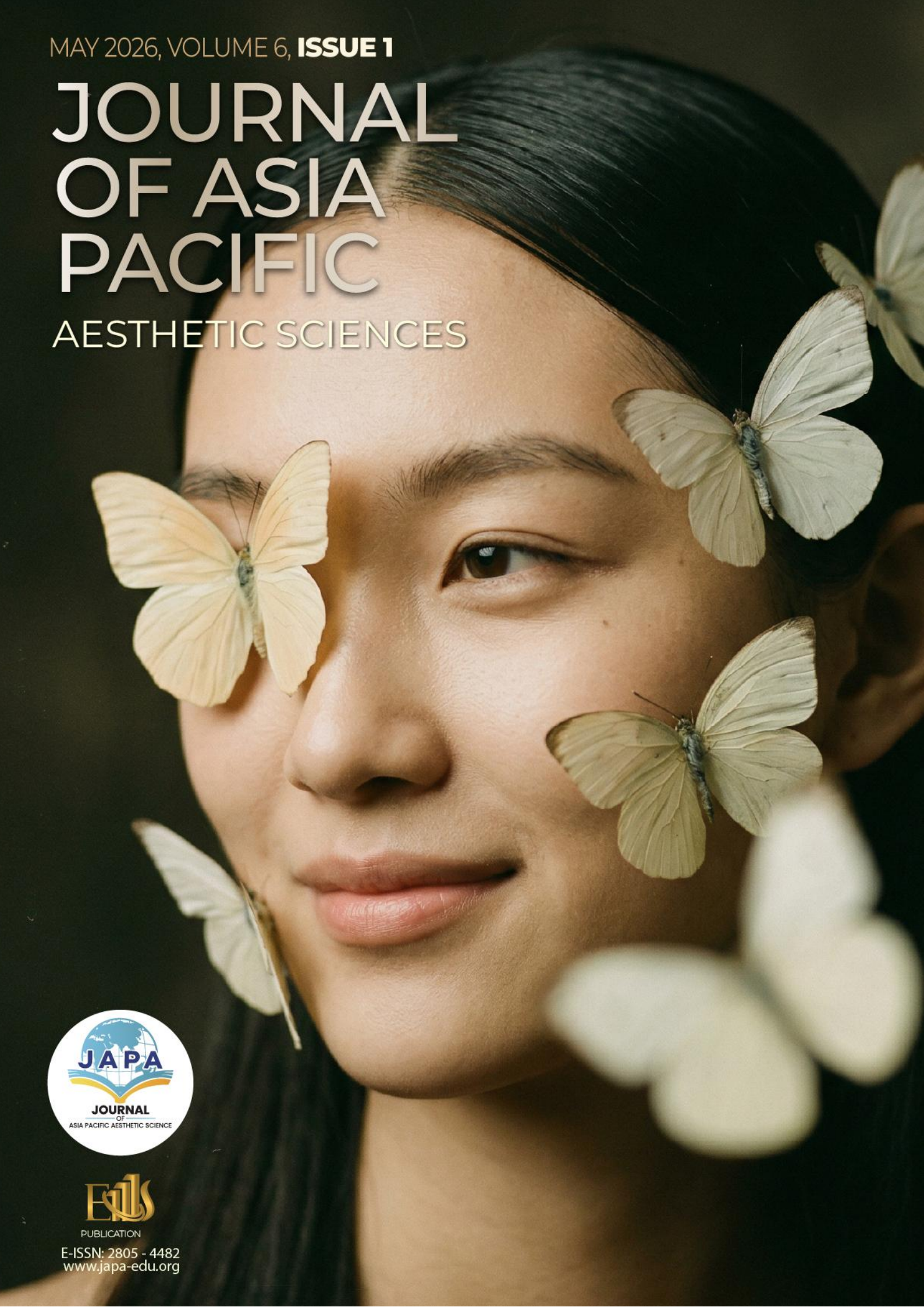

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The Shifting Face of Beauty—Southeast Asia's Aesthetic Surge Amidst the Middle East Conflict

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In the rapidly evolving landscape of 2026, Southeast Asia (SEA) has strengthened its position as a global titan in aesthetic medicine. Driven by a unique confluence of cultural, demographic, and technological factors, the region is no longer just a destination for affordable procedures but a pioneer in innovation. However, as the industry reaches new heights, it faces an unexpected catalyst: the escalating conflict in the Middle East.

The boom of aesthetic medicine in SEA is fueled by internal factors such as an increase in the ageing population and growing clamor for rejuvenation, higher social media engagement especially among Gen Z, and much improved medical tourism hubs, especially in Thailand and Malaysia. Gen Z in Indonesia and Vietnam has normalised cosmetic enhancements on TikTok, particularly minimally invasive procedures like fillers, skin boosters, and neurotoxins.

In the first quarter of 2026, the intensifying conflict in the Middle East has sent profound ripples through the global medical landscape. While human life is the primary concern, the economic and logistical implications for aesthetic medicine are significant.

In recent years, some Middle Eastern countries, like Dubai, have been well recognised as a primary hub for Middle Eastern patients seeking high-end aesthetics. With regional air hubs like Dubai, Saudi Arabia, and Doha facing disruptions, patients may search for safer alternatives in SEA with credible healthcare reputations. In addition, disrupted key maritime corridors like the Strait of Hormuz may have an impact on cold-chain logistics for injectables and increased freight costs. Clinics may face stockouts of high-demand consumables and specialised medical devices if these disruptions persist beyond the existing 3-month inventory buffer. Surging oil prices will most likely drive up the cost of biomedical research and development as well as hospital and clinic operations.

The convergence of SEA's aesthetic maturity and Middle Eastern instability creates a complex "new normal". While SEA may see a short-term influx of international patients, the long-term sustainability of the industry will depend on supply chain resilience, regulatory strengthening and ethical governance. The rise of "botched" procedures due to unlicensed providers remains a critical shadow over the industry's growth, necessitating more robust legal frameworks to protect both domestic and international patients.

As we move through 2026, Southeast Asia's vision to develop and maintain "excellence in aesthetics" will definitely be challenged and put to the test, but hopefully SEA countries will maintain the agility in navigating a volatile global stage. I, Johannes F. Dayrit, and the JAPA editorial board are hopeful that despite global conflict, we will continue to foster collaboration and share meaningful scientific information among colleagues within the SEA region.

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CONTENT

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ORIGINAL ARTICLE

Exploring Factors Influencing Consumers in Seeking Aesthetic Medicine Services in Malaysia: A Cross-Sectional Study

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ABSTRACT: Although the aesthetic medicine industry in Malaysia is experiencing rapid growth, the underlying factors driving consumer behavior remain underexplored. This study aimed to identify the factors influencing consumers' decisions to pursue aesthetic treatments and their criteria for selecting aesthetic clinics. A cross-sectional survey was conducted among individuals aged 18 years and above who had previously undergone or intended to undergo aesthetic treatments. The survey collected data on respondents' sociodemographic characteristics, factors influencing decisions to seek aesthetic treatment, and criteria for selecting aesthetic clinics. A total of 141 respondents completed the survey, the majority of whom were female (n=118, 83.7%) and aged 30–39 years (n=62, 44.0%). Among the respondents, 89 (63.1%) had previously undergone aesthetic procedures, while 52 (36.9%) intended to pursue treatment in the future. The findings indicated that psychosocial factors, influence of others, personal desires, social media influence, and life events contributed to respondents' decisions to undergo aesthetic treatment. Key determinants influencing clinic selection included safety and professional credibility, social and media influence, and convenience and accessibility. Insights from this study can assist practitioners in adopting a more patient-centered approach to aesthetic services, ultimately enhancing patient satisfaction and care outcomes.

Keywords: Aesthetic medicine, Consumer behavior, Motivational factors, Psychosocial factors, Social media influence, Clinic selection

INTRODUCTION

Aesthetic medicine is a rapidly growing industry in Malaysia. According to the International Society of Aesthetic Plastic Surgery (ISAPS), the total number of procedures performed by plastic surgeons in Malaysia, including both surgical and non-surgical interventions, increased from 23,923 in 2023 to 30,885 in 2024 [1,2]. Despite this rising demand, there remains limited understanding of the factors driving consumers to seek aesthetic treatments in Malaysia. This gap restricts practitioners' ability to tailor services and support informed consumer decision-making.

The demand for aesthetic procedures had been increasing prior to the COVID-19 pandemic; however, the pandemic further accelerated this trend, particularly for non-surgical treatments [3,4]. This increase may be attributed to greater participation in virtual meetings, prolonged screen

exposure leading to heightened self-scrutiny of facial appearance, extended periods at home, and increased engagement with social media platforms [4].

As video communication platforms and social media have become embedded in daily life, concerns about on-screen appearance have increasingly influenced consumer behavior toward aesthetic procedures [5]. During virtual interactions, individuals are continuously exposed to their own facial image, which facilitates self-comparison in ways that differ from face-to-face communication [6]. Similarly, social media plays a significant role in shaping appearance-related perceptions and decisions. Arab et al. [7] reported that exposure to cosmetic surgery–related content, prolonged social media use, and negative self-perception are associated with a higher likelihood of considering cosmetic procedures. Collectively, these factors contribute to increased appearance awareness and greater interest in aesthetic treatments [6].

Psychosocial motivations represent another key determinant of aesthetic treatment uptake. Improvements in physical appearance are often perceived as a pathway to enhanced psychosocial well-being [8]. Previous studies have identified that desire to improve self-esteem, enhance self-confidence, and conform to social or familial expectations are common motivators for undergoing or continuing aesthetic treatments [9,10]. In addition, external pressures such as societal norms and expectations from family and peers to maintain a youthful appearance further contribute to interest in aesthetic interventions [11,12].

This study aims to explore the factors influencing consumers' decisions to pursue aesthetic medicine services in Malaysia. The study is guided by a conceptual framework (**Figure 1**) comprising two interrelated domains: psychosocial factors (such as self-esteem, appearance satisfaction, and desire for confidence) and social influences (including family, peers, life events, and social media). These factors shape the decision to undergo treatment, followed by practical considerations influencing clinic selection such as accessibility, reputation, and prior experience. To the best of the authors' knowledge, at the time of manuscript preparation, no published studies in Malaysia have specifically examined the factors influencing consumers' decisions to seek aesthetic medicine treatments.

METHODOLOGY

A cross-sectional survey was conducted between December 2024 and July 2025 to assess the factors influencing consumers in seeking aesthetic medicine services. Ethical exemption was granted by the Hospital UMRA Medical Research Ethics Committee, as the study constituted a non-sensitive, fully anonymous educational survey. The survey instrument was developed based on a comprehensive literature review and administered using the Google Forms platform (Google Inc., Mountain View, CA, USA). The purpose of the survey and the anonymity of respondents' data were clearly stated at the beginning of the survey. Respondents were encouraged to provide honest responses and were assured that their data would remain confidential and used solely for research purposes. No personally identifiable information was collected, ensuring respondent anonymity. Informed consent was obtained electronically prior to participation. Respondents who did not provide consent were automatically excluded from the survey.

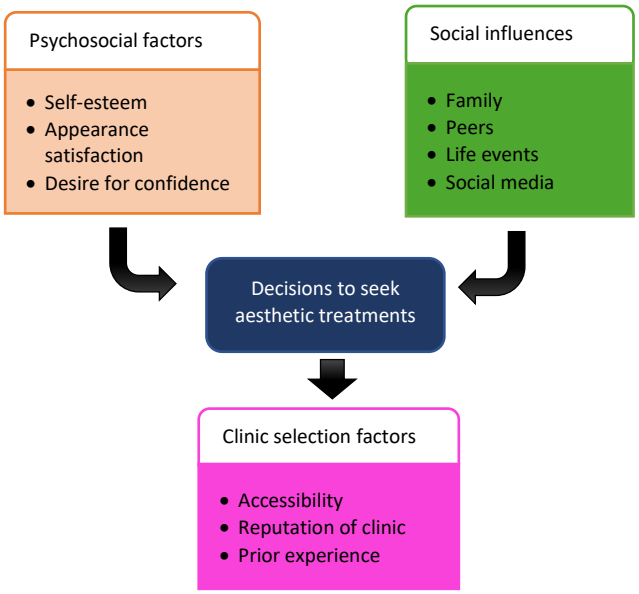

Figure 1. Conceptual framework of factors influencing consumer decisions to pursue aesthetic treatments.

Survey Respondents

Eligible respondents were individuals aged 18 years and older who had either previously undergone or intended to undergo aesthetic treatment and were willing to participate in the study. Individuals who had neither undergone nor intended to undergo aesthetic treatment were excluded. A convenience sampling approach was employed to obtain a

diverse sample across demographic variables, including age, gender, socioeconomic status, and geographic location. Participants were recruited from the Aesthetic and Cosmetic Symposium (ACOS) 2024 and during scheduled follow-up visits of individuals involved in USMARI clinical studies.

Survey Instrument

The survey comprised three sections. Section A collected respondents' sociodemographic information, including age, gender, education level, income, occupation, sources of information, and history of aesthetic treatment. Section B assessed factors influencing respondents' decisions to seek aesthetic medicine services, including personal desires, physical concerns, psychosocial influences, social media exposure, influence of others, and life events. Section C examined the criteria guiding respondents in selecting an aesthetic clinic. Sections B and C employed a Likert scale items to measure respondents' level of agreement with statements related to these factors.

Statistical Analysis

Survey data were analyzed using descriptive and inferential statistics in SPSS (IBM Corp., Armonk, NY, USA). Results are presented as frequencies (%), means, and standard errors, as appropriate. Exploratory factor analysis (EFA) with varimax rotation and Kaiser normalization was performed to identify the underlying factors influencing consumers' decisions to seek aesthetic medicine services, as well as factors affecting clinic selection. Internal consistency reliability for each factor was assessed using Cronbach's alpha. The associations between sociodemographic variables and the identified factors were further examined using multivariate analysis of variance (MANOVA). A p-value of < 0.05 was considered statistically significant.

RESULTS

Sociodemographic Profile

A total of 141 respondents completed the survey (**Table 1**). While the participant-to-item ratio falls below traditional guidelines for EFA, a total sample size of 100–200 respondents is considered methodologically acceptable [13]. Furthermore, sampling adequacy was confirmed prior to analysis

Table 1. Sociodemographic characteristics of respondents (n=141).

Characteristic	Frequency (%)	
Age (years)		
18 - 29	36	(25.5)
30 - 39	62	(44.0)
40 - 49	28	(19.9)
50 - 80	15	(10.6)
Gender		
Male	23	(16.3)
Female	118	(83.7)
Marital status		
Married	78	(55.3)
Single	54	(38.3)
Divorced	9	(6.4)
Ethnicity		
Malay	101	(71.6)
Chinese	23	(16.3)
Indian	14	(9.9)
Others	3	(2.1)
Highest education level		
Doctorate degree	5	(3.5)
Master's degree	17	(12.1)
Bachelor's degree	85	(60.3)
Diploma	25	(17.7)
High school	9	(6.4)
Occupation		
Employed	93	(66.0)
Self-employed	28	(19.9)
Pensioner	1	(0.7)
Student	12	(8.5)
Housewife	5	(3.5)
Unemployed	2	(1.4)
Household income		
< RM2500	18	(12.8)
RM2500 - RM5000	48	(34.0)
RM 5001 - RM9999	35	(24.8)
> RM10000	40	(28.4)
Aesthetic treatment history		
Previously received treatment	89	(63.1%)
Intention to undergo treatment	52	(36.9%)

using the Kaiser-Meyer-Olkin (KMO) measure.

The demographic profile of respondents showed that the majority were female (n=118, 83.7%) and aged between 30 and 39 years (n=62, 44.0%). Most respondents were employed (n=93, 66.0%) and had attained a bachelor's degree as their highest level of education (n=85, 60.3%). Household income was predominantly between RM2,500 and RM5,000 (n=48, 34.0%). Regarding aesthetic treatment, 89 respondents (63.1%) had previously undergone aesthetic procedures, while 52 respondents (36.9%) reported an intention to undergo treatment in the future.

Aesthetic Treatment Characteristics

Table 2 summarizes the characteristics of aesthetic treatments among the 89 respondents who had previously undergone such procedures. The majority received treatment in clinics (n=60, 67.4%), and most reported initiating treatment between the ages of 30 and 39 years (n=38, 42.7%). A total of 61 respondents (68.5%) indicated that their most recent treatment had occurred within the past year, and the most common treatment frequency was 2–5 times per year (n=40, 44.9%). Non-invasive procedures were the most frequently reported, with skin-lightening or laser treatments being the most common (n=63, 70.8%).

Source of Information and Desired Areas for Improvement

Figures 2 and **3** present the sources of information regarding aesthetic treatments and the body areas respondents wished to improve. Most respondents reported learning about aesthetic treatments through social media (n=98, 69.5%), followed by internet searches (n=50, 35.5%). Regarding desired areas for improvement, skin texture was the most commonly reported concern (n=84, 59.6%), followed by the periocular region (n=52, 36.9%) and hair (n=49, 34.8%).

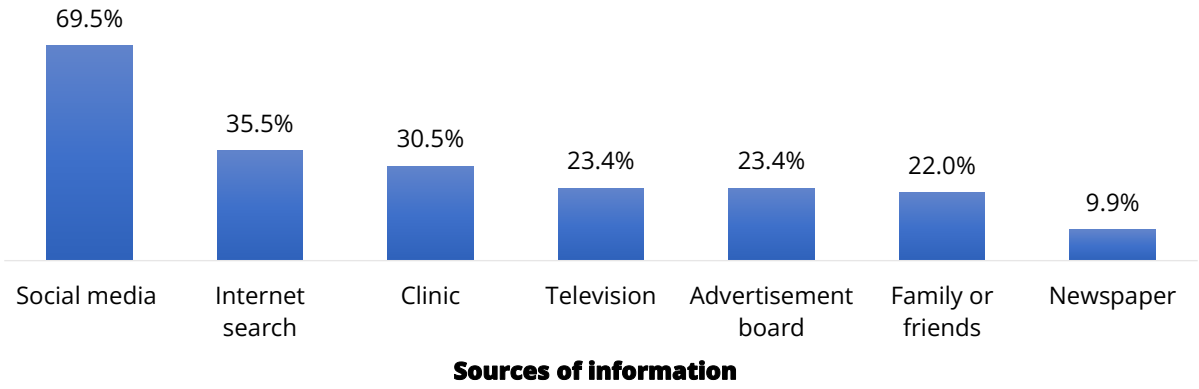

Figure 2. Sources of information regarding aesthetic treatments among respondents (n=141).

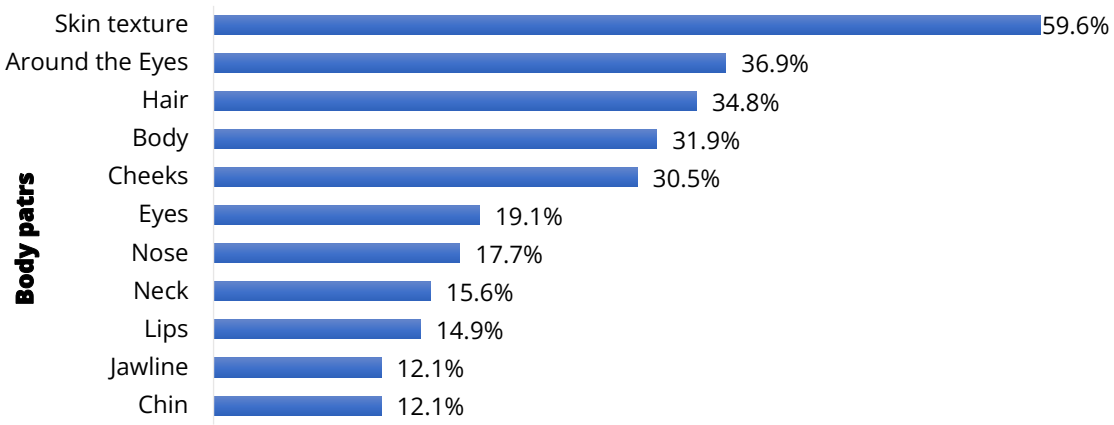

Figure 3. Body parts respondents wish to improve (n=141).

Table 2. Aesthetic treatment characteristics of respondents (n = 89).

Characteristic	Frequency (%)	
Place of treatment		
Clinic	60	(67.4)
Beauty Centre	29	(32.6)
Age at first aesthetic treatment (years)		
15 -19	3	(3.4)
20 - 29	36	(40.4)
30 - 39	38	(42.7)
40 - 49	11	(12.4)
50 - 80	1	(1.1)
Most recent aesthetic treatment		
Less than 1 year ago	61	(68.5)
1 - 5 years ago	24	(27.0)
More than 5 years ago	4	(4.5)
Frequency of treatments within the past year		
Once	21	(23.6)
2 times - 5 times	40	(44.9)
6 times - 10 times	9	(10.1)
>10 times	1	(1.1)
Never	18	(20.2)
Treatment type:		
Invasive treatment		
Face lift or thread lift (inclusive of neck lift)	18	(20.2)
Nose reconstruction	8	(9.0)
Eyelid surgery	2	(2.2)
Breast augmentation or reduction	1	(1.1)
Tummy tuck	5	(5.6)
Buttock lift	1	(1.1)
Hair transplantation	6	(6.7)
Non-invasive treatments		
Skin lightening or laser treatments	63	(70.8)
Skin tightening procedures	23	(25.8)
Botulinum toxin injections	18	(20.2)
Fillers	18	(20.2)
Liposuction or fat-dissolving injections	5	(5.6)
Microneedling	34	(38.2)
Dermabrasion	20	(22.5)
Chemical peel	41	(46.1)
Platelet - rich plasma (PRP)	19	(21.3)

Factors Influencing Respondents to Undergo Aesthetic Medicine Services

The factors influencing respondents' decisions to seek aesthetic medicine services were analyzed using EFA. The KMO measure of sampling adequacy was 0.905, and Bartlett's test of sphericity was statistically significant ($p<0.05$), indicating the suitability of the data for factor analysis. Five underlying factors were identified (**Table 3**): psychosocial factors, influence of others, personal desires, social media influence, and life events. All factors demonstrated good to excellent internal consistency, with Cronbach's alpha values ranging from 0.80 to 0.97.

Clinic Selection Factors for Aesthetic Medicine Service

The EFA was also utilized to analyze clinic selection criteria. The KMO measure of sampling adequacy was 0.894, and Bartlett's test of sphericity was statistically significant ($p < 0.05$), indicating that the data were suitable for factor analysis. Three distinct factors were identified (**Table 4**): safety and professional credibility, social and media influence, and convenience and accessibility. All factors demonstrated excellent internal consistency, with Cronbach's alpha values above 0.90.

Associations Between Sociodemographic Characteristics and Factors Influencing Respondents to Undergo Aesthetic Medicine Services

The associations between sociodemographic characteristics and factors influencing consumers' decisions to undergo aesthetic medicine treatment were analyzed (**Table 5, Supplementary Material**). Age, gender, marital status, ethnicity, highest education level, and occupation were not significantly associated with any of the identified factors ($p > 0.05$). However, household income was significantly associated with psychosocial factors and life events. Post-hoc comparisons revealed that psychosocial factors and life events were significantly more influential among respondents with a household income of RM2,500–RM5,000 compared with those earning >RM10,000 and RM5,001–RM9,999, respectively ($p < 0.05$).

Associations Between Sociodemographic Characteristics and Clinic Selection Factors

The associations between sociodemographic characteristics and clinic selection factors were assessed (**Table 6, Supplementary Material**). The results indicated that age, gender, marital status, education level, occupation, and household income were not significantly associated with any of the clinic selection factors ($p>0.05$). However, ethnicity showed a significant association with the professional credibility factor ($p< 0.05$), with post-hoc comparisons revealing that respondents of Malay and other ethnicities placed more emphasis on professional credibility compared with Chinese respondents ($p < 0.05$).

Table 3. Factors influencing aesthetic treatment decisions.

Determinants	Factors					Cronbach's Alpha
	1	2	3	4	5	
To eliminate discomfort due to societal judgments about me	0.809					0.968
To look normal like others	0.806					
To be accepted by those around me (such as family, partner, friends, co-workers)	0.785					
To make it easier to make friends	0.769					
To eliminate discomfort caused by my physical defects	0.767					
To reduce the stress caused by my appearance	0.755					
To socialize more easily with people around me	0.751					
To make it easier to find a partner	0.747					
Due to fear of being left behind compared to others	0.726					
Due to societal pressure emphasizing beauty	0.722					
So that I am not looked down upon	0.719					
To look attractive in the eyes of others	0.693					
To reduce the stress, I am experiencing	0.686					
To feel more appreciated by others	0.659					
So that I do not feel embarrassed when facing others	0.657					
When my friend suggested I do it		0.876				0.946
When a family member suggested I do it		0.828				
Because my friend did it		0.800				
Because my friend looked beautiful after doing it		0.774				
Because my partner asked me to do it		0.771				
Because one of my family members did it		0.761				
Because my family member looked beautiful after doing it		0.719				
To look as beautiful as my friends		0.581				
To match my partner's appearance		0.569				
So that my appearance remains beautiful even as I age			0.863			0.942
To look younger			0.849			
To achieve the appearance I've always desired			0.832			
To get smoother and clearer skin			0.807			
To look beautiful without makeup			0.799			
To become more beautiful			0.777			
I see online reviews on social media about aesthetic treatments				0.838		0.943
I see posts about aesthetic treatments shared on social media				0.828		

I see an advertisement for aesthetic treatments on social media	0.804		
I see advertisement on social media stating that "aesthetic treatments can make me beautiful"	0.720		
I see celebrities or influencers I follow on social media undergoing aesthetic treatments	0.657		
Celebrities/influencers on social media recommend undergoing aesthetic treatments.	0.600		
I know the latest trend on social media is to undergo aesthetic treatments	0.577		
Because I will be attending a celebration soon		0.808	0.898
Because I have an important event to attend soon		0.786	
Because I have a job interview coming up soon		0.746	

Factor 1- psychosocial factors; Factor 2- influence of others; Factor 3- personal desires; Factor 4- social media influence; Factor 5- life events

Table 4. Factors influencing clinic selection for aesthetic treatment.

Determinants	**Factors**			**Cronbach's Alpha**
	1	**2**	**3**	
Go to a clinic with a good reputation	0.878			0.923
Ensure the procedure is safe	0.843			
Look for a doctor with LCP (Letter of Credentialing & Privileging)	0.761			
Look for an experienced doctor in the treatment I want	0.754			
Choose a clinic recommended by the doctor (such as a dermatologist) who has treated me before	0.750			
Go to a clinic with up-to-date equipment	0.721			
Go to a clinic run by a specialist doctor	0.711			
Check the background of the doctor performing the treatment	0.674			
Ensure the procedure is painless	0.613			
Go to a clinic with many good reviews regarding its treatment	0.593			
Go to a clinic recommended by my friend		0.876		0.932
Go to a clinic my family/partner has previously visited		0.836		
Go to a clinic my friend has previously visited		0.835		
Go to a clinic recommended by my family/partner		0.813		
Go to a clinic recommended by many on social media		0.700		
Go to a clinic run by a doctor who is famous on social media		0.669		
Go to a clinic with affordable treatment prices		0.604		
Go to a clinic that a celebrity I like or follow visits		0.590		
Go to a well-known clinic		0.548		
Go to a clinic that is easy to reach			0.842	0.906
Go to a clinic with convenient opening and closing hours for my schedule			0.788	
Go to a clinic near my house			0.748	
Go to a clinic with easy appointment scheduling			0.692	
Go to a clinic offering free trials or first-time free treatments			0.654	
Go to a clinic with beautiful decor			0.636	
Go to a clinic offering discounts			0.558	

Factor 1- safety and professional credibility; Factor 2- social and media influence; Factor 3- convenience and accessibility

DISCUSSION

This study aimed to identify factors influencing consumer decisions to undergo aesthetic treatments in Malaysia. The majority of respondents who had undergone or planned to undergo such treatments were women aged 30–39 years with a bachelor's degree. These findings align with previous studies reporting that women constitute the majority of individuals seeking aesthetic procedures [10,14–16], likely reflecting greater attention to physical appearance and a desire to maintain youthfulness [17].

Regarding treatment priorities, skin texture was the most commonly identified feature respondents wished to improve, followed by the periocular area. Previous studies have reported varying priorities, including the eyes and cheeks [14], under-eye bags and dark circles [18,19], crow's feet, forehead lines, and uneven skin tone [18], as well as general facial rejuvenation [16]. In the present study, most respondents reported social media as their primary source of information, highlighting its role as a key platform for both information dissemination and consumer education in aesthetic medicine [20-22].

Five key factors influencing consumers' decisions were identified: psychosocial factors, influence of others, personal desires, social media influence, and life events. These can be broadly categorized into internal motivations (psychosocial factors and personal desires) and external motivations (influence of others, social media, and life events), which interact to shape consumer decision-making. Psychosocial factors and personal desires are well-established drivers of aesthetic treatment uptake. Consumers often seek procedures to improve self-confidence [10,23], reduce self-consciousness around others [23], enhance attractiveness or improve appearance [23-25], and modify undesirable physical features [24]. Additionally, aesthetic treatments may be pursued to improve overall quality of life, enhance happiness, or serve as a form of self-reward [23].

External influences also play a significant role. Individuals are more likely to consider aesthetic treatments if they are exposed to others who have undergone such procedures [14,23,26]. Social media further amplifies this effect by increasing awareness, shaping perceptions, and normalizing aesthetic treatments. Prior studies have demonstrated associations between aesthetic-related search trends and the number of active social media users [27], as well as positive correlations between social media engagement and interest in aesthetic procedures [27–29]. Increased exposure to social media may contribute to heightened appearance-related pressure, thereby further motivating individuals to seek aesthetic procedures [28]. In addition, influencers' portrayals of aesthetic treatments may reinforce acceptance and desirability [30]. Life events such as marriage, divorce, bereavement, or upcoming important occasions may also act as triggers that intensify motivation and accelerate decision-making [14,26,31].

In the present study, it was found that, in selecting aesthetic clinics, respondents prioritized safety and professional credibility, followed by social and media influence, as well as convenience and accessibility. These findings are consistent with previous studies, which have identified practitioner competence as a key determinant in consumers' decisions to undergo aesthetic medicine services, given the inherent risks associated with such procedures [32]. Beyond practitioner credibility, social and media influence, as well as convenience and accessibility, also play important roles in clinic selection. Al Qurashi et al. [33] reported that, in addition to surgeons' qualifications, advice from friends and relatives and the clinic environment were key considerations when selecting an aesthetic surgeon. Patients often rely on past patient experiences, including direct referrals from personal acquaintances and indirect referrals through patient reviews, as these sources are perceived as highly trustworthy [34]. Furthermore, Ankiel et al. [32] further highlighted that clinic infrastructure, communication quality, flexibility toward patients, and overall clinic image influence decision-making.

All the factors identified in the present study align with the Theory of Planned Behavior (TPB), which posits that human behavior is guided by three main components: attitude toward the behavior, subjective norms, and perceived behavioral control (PBC) [35]. Internal factors, including psychosocial influences and personal desires, reflect the role of attitudes in shaping behavioral intentions, as described in the TPB. These factors are likely to influence the formation of favorable attitudes toward aesthetic procedures by strengthening individuals' beliefs in their benefits, thereby influencing consumer decision-making. The external factors identified correspond to subjective norms within the TPB framework, as

they capture the influence of social and media-related pressures on individuals' decisions. In addition, clinic-related factors reflect PBC, as they influence individuals' perceived ease, confidence, and ability to access aesthetic medicine services. When expectations regarding the clinic are met, the likelihood of proceeding with treatment increases. Collectively, these components predict behavioral intention, which in turn influences the likelihood of performing the behavior, in this context, undergoing aesthetic procedures. The conceptual framework of consumer decision-making based on TPB is illustrated in **Figure 4**.

Practical and Ethical Implications

These findings have several practical implications for aesthetic clinics and practitioners. Understanding the interplay between internal motivations and external influences can help practitioners tailor consultation approaches, address psychosocial concerns, and manage patient expectations more effectively. Emphasizing patient education, transparent communication, and professional credibility may enhance patient trust and satisfaction, ultimately improving treatment outcomes.

The widespread promotion of aesthetic procedures through influencers and digital content raises important ethical concerns. Such content may contribute to unrealistic beauty expectations, body dissatisfaction, and increased psychosocial pressure, particularly among vulnerable individuals. Ethical issues are further amplified when marketing strategies exploit insecurities for commercial gain.

Therefore, practitioners and service providers have a responsibility to ensure that promotional content is transparent, accurate, and evidence-based, avoiding exaggerated claims or minimization of risks. Informed consent should also incorporate discussion of psychological and social influences that may affect decision-making. Furthermore, regulations governing aesthetic advertising should be strengthened and strictly enforced to protect consumers. Balancing patient autonomy with ethical marketing practices is essential to maintaining professional integrity and safeguarding consumer well-being in an increasingly social media–driven aesthetic industry.

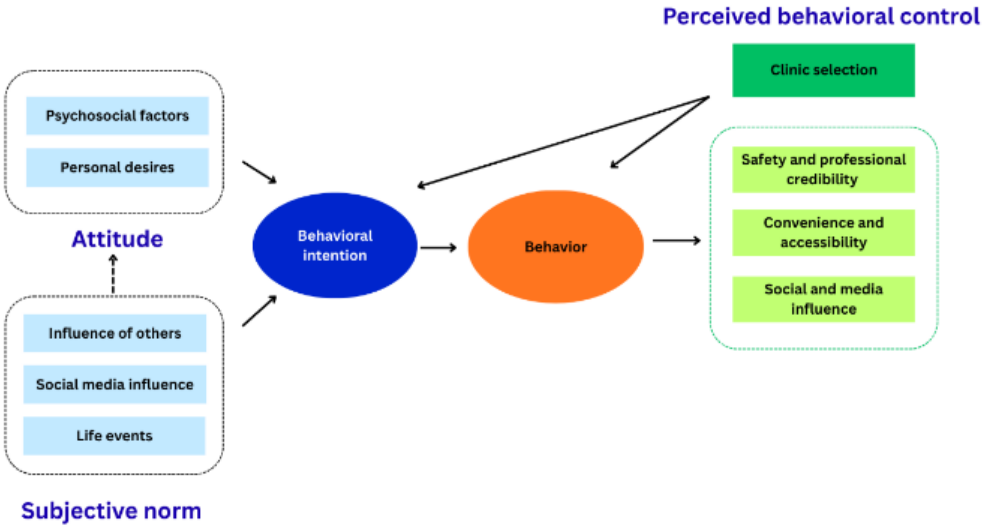

Figure 4. Conceptual framework of consumer decision-making based on the Theory of Planned Behavior.

Limitation of Study

This study is not without limitations. The relatively small sample size and the sampling method employed may have introduced selection bias, thereby limiting the generalizability of the findings and reducing the statistical power to detect certain associations. A larger sample with more balanced representation across sociodemographic groups would improve the robustness of the results and provide a more comprehensive understanding of consumer motivations. In addition, respondents were recruited using convenience sampling from events and existing databases, which may not fully represent the broader population of aesthetic medicine consumers. Conducting future studies directly through clinics or centers that provide aesthetic treatments may enhance data accuracy

and improve representativeness. Furthermore, the findings should be interpreted with caution, as the use of self-reported surveys relies on respondents' personal perceptions and may be subject to response bias, potentially affecting the reliability of the data.

CONCLUSION

This study provides foundational insights into the multi-dimensional factors driving the uptake of aesthetic medicine services in Malaysia. The findings underscore that aesthetic interventions are rarely sought for purely physical modifications; rather, they are deeply intertwined with psychosocial well-being, social influence, and the pervasive impact of social media. For the aesthetic medicine industry, these results highlight the urgent need for ethical marketing practices and comprehensive, patient-centered consultations that explore underlying psychological motivations. By prioritizing professional credibility and transparent communication, practitioners can mitigate the risks of social media-induced body dissatisfaction and foster safer, more satisfactory patient outcomes.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

Supplementary Table

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CASE SERIES

Real-World Evidence on The Use of a Novel Skin Pigmentation Balancing Kit in Melasma Management in Filipino Patients with Asian Skin Types

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ABSTRACT: A topical skin pigmentation-balancing (SPB) kit containing kojic acid and glycolic acid has previously been evaluated in individuals with Fitzpatrick skin phototypes II–III. This case series aimed to assess the efficacy and safety of the SPB kit in women of Asian origin with melasma and Fitzpatrick skin phototype IV. Ten patients were treated individually over a period ranging from 2 to 24 months. Clinical assessments were performed at baseline and at the final visit using a melanin index (MI) derived from a melanometer and the modified Melasma Area and Severity Index (mMASI). Additional evaluations included dermoscopic assessment, QuantifiCare medical imaging system analysis, and Physician's Global Assessment scores to further explore their utility in skin pigmentation studies. Mean melanin index and mMASI scores decreased in all patients, with consistent improvement observed across all secondary outcome measures. Patients reported satisfaction with the treatment, and no treatment-related adverse events were observed. This is the first case series evaluating the SPB kit in patients with Fitzpatrick skin phototype IV, demonstrating its efficacy and tolerability.

Keywords: Asian skin phototypes, Dermoscopy, Glycolic acid, Kojic acid

INTRODUCTION

Asian skin types typically fall within Fitzpatrick phototypes III (light brown) to V (dark brown) [1,2]. Differences in Asian skin compared with lower or higher phototypes are largely attributed to variations in melanosome characteristics, including single, larger, more discrete units (typical of higher phototypes) and clustered units that degrade more rapidly (typical of lower phototypes) [2,3]. Following ultraviolet (UV) exposure, melanogenesis results in an approximate increase in melanin content of 1% in phototypes I–II, 4% in phototypes III–IV, and 12% in phototypes V–VI [4]. In some individuals, this process may contribute to melasma, which can lead to psychological distress, frustration, and embarrassment, thereby negatively affecting emotional well-being, interpersonal relationships, and social functioning [5].

Management of melasma generally aims to inhibit melanocyte proliferation and/or melanin synthesis, disrupt melanosome-associated pigment granules, and promote melanin removal [6]. Among various treatment modalities, topical therapy remains a mainstay of management, particularly due to its accessibility. In this context, a

topically applied skin pigmentation-balancing (SPB) kit has been developed for the management of melasma. The SPB kit consists of a cleanser and day and night creams and is applied as a daily regimen. The cleanser, which contains scrubbing beads, is used morning and night, followed by application of either the day or night cream. The formulation contains ingredients known to reduce melasma-associated pigmentation and promote cellular renewal [7–13]. These include kojic acid, a metabolite of *Aspergillus oryzae* that inhibits tyrosinase activity and induces keratinocyte interleukin-6 expression, thereby reducing melanogenesis [11,12], and glycolic acid, an alpha hydroxy acid that enhances epidermal turnover and accelerates desquamation of pigmented keratinocytes [13]. The combination of these ingredients has been reported to demonstrate efficacy comparable to a glycolic acid and hydroquinone regimen in the treatment of melasma [12]. The SPB kit has also previously been evaluated in individuals with Fitzpatrick skin phototypes II–III, demonstrating significant reductions in dark spot area, pigmentation intensity, and colour contrast after 28–90 days of use, with good tolerability [7–9].

This case series reports the effects and tolerability of the SPB kit in women with predominantly Fitzpatrick skin phototype IV from the Philippines. Treatment with the SPB kit was individualised for each patient.

METHODOLOGY

Participants

Ten women with melasma were included in this case series. All patients had a clinical diagnosis of melasma of any aetiology, confirmed by a consultant dermatologist at the De La Salle Medical and Health Sciences Institute, Dasmariñas City, Philippines. Baseline medical histories were obtained prior to treatment initiation. There were no restrictions regarding disease duration or prior treatments, and all eligible patients presenting during the recruitment period were included. Participants first attended the clinic between 15 April and 5 May 2022. Written informed consent was obtained from all patients for inclusion and publication of anonymised clinical data in this case series.

Treatment Protocol

The SPB kit (Pigment Solution Program™, Relife Menarini S.r.l., Florence, Italy), consisting of a cleanser, a day cream, and a night cream, was provided to each patient. The cleanser, containing 1.5% scrubbing beads, was used twice daily. The day cream was applied each morning after cleansing and contains 0.3% kojic acid, vitamins A and E, and Aquaxyl™ (a combination of glucose and xylitol). Following evening cleansing, the night cream was applied; it contains 0.3% kojic acid, 5.7% glycolic acid, and biodegradable scrubbing beads. The cleanser was applied to the entire face, whereas the day and night creams were gently massaged only onto hyperpigmented areas.

Patients used a minimum of two SPB kits, with additional kits provided according to individual clinical need. A two-week washout period was required for patients using other SPB products. However, treatments for other medical conditions were allowed to continue. These included isotretinoin or metronidazole for rosacea and 577-nm laser therapy for facial erythema and telangiectasia. Patients were instructed to apply broad-spectrum sunscreen daily (sun protection factor ≥30), as ultraviolet exposure is a known contributing factor in melasma pathogenesis [14]. Patients were followed up after completion of the SPB kit regimen for the duration of their clinical care, which varied between individuals.

Assessment

Skin examinations were performed at baseline and at the end of the treatment period, with duration varying according to individual patient needs. Treatment response in melasma was evaluated using both objective and subjective assessment methods [15–17].

a. Melanometer assessment (Quanta Systems, Milan, Italy)

Objective assessment was performed using a melanometer-based skin analysis system. The Melanin Index (MI) was measured at the most hyperpigmented areas of the melasma lesions (malar and zygomatic regions, as close as possible to the Redka–Galadari point). Three readings were obtained per site, and the mean value was recorded.

b. Modified Melasma Area and Severity Index (mMASI)

Clinical severity was assessed using the mMASI score, calculated using a weighted formula incorporating the extent of involvement and pigmentation intensity across four facial regions (forehead, right malar, left malar, and chin) [15,16].

c. Dermoscopic assessment (DermLite, San Juan Capistrano, CA, USA)

Dermoscopy with polarized light was performed on melasma-affected areas. Grading was based on the presence of pseudoreticular brown pigmentation and dark brown blotches or clods at baseline and after treatment. Changes were assessed relative to baseline (score of 0), ranging from 0 (no improvement) to 5 (complete disappearance of all dermoscopic features), corresponding to estimated percentage improvements (0 = 0%, 1 = 20%, 2 = 40%, 3 = 60%, 4 = 80%, 5 = 100%).

d. Physician's Global Assessment (PGA)

Overall clinical improvement was assessed using dermoscopic findings and clinical photographs. The PGA scale was defined as: 0 = completely clear; 1 = almost clear with minimal residual hyperpigmentation; and 2 = significant residual hyperpigmentation [17].

e. *QuantifiCare medical imaging system (LiveViz® Mini, QuantifiCare, Biot, France)*

This system was used to capture standardized 3D clinical images. Melasma improvement was graded based on percentage change from baseline (score of 0), determined by the appearance of black dots within a defined triangular region (base at the infraorbital area and apex at the lower malar region). Improvement was scored from 0 (no improvement) to 5 (complete disappearance of black dots), corresponding to estimated percentage changes (0 = 0%, 1 = 20%, 2 = 40%, 3 = 60%, 4 = 80%, 5 = 100%).

f. Patient Satisfaction

Patient-reported outcomes included treatment satisfaction (slightly satisfied to very satisfied), willingness to continue treatment (yes/no), and occurrence of adverse events (yes/no).

RESULTS

Patient Characteristics

Figure 1 summarizes patient clinical characteristics, prior treatment history, and duration of SPB kit use for each case. The majority of patients had Fitzpatrick skin phototype IV and presented with varying subtypes of melasma. As treatment was individualised, the duration of SPB kit use varied widely, ranging from 2 to 24 months. While some patients used the SPB kit as monotherapy, others received concurrent treatments, including low-dose oral isotretinoin for rosacea and monthly 577-nm laser therapy for facial erythema and telangiectasia (**Tables 1** and **2**).

Primary Outcomes

Overall, improvement in melasma was consistently observed across all cases based on the assessed outcome measures (**Table 1**). However, the magnitude of improvement varied among patients and did not appear to be consistently associated with treatment duration or concomitant therapies.

For MI, reductions were observed on both facial sides following treatment with the SPB kit in all patients, with generally comparable improvement between the right and left regions. Among patients who received adjunctive 577-nm laser therapy, the greatest reduction in MI was observed in Case 4 after 3 months of combined SPB kit and laser treatment. In contrast, Case 5, who also received the same combination therapy for 3 months, demonstrated a smaller reduction in MI. Similarly, Case 8 showed a lower MI reduction despite 12 months of SPB kit use with concomitant laser therapy compared with Case 4. Among patients who did not receive concomitant therapies, Case 1, treated with the SPB kit for 2 months, demonstrated a greater reduction in MI compared with Case 10, who underwent 24 months of treatment.

Reductions in mMASI scores were also observed in all patients. The greatest reduction in mMASI was seen in Case 1 after 2 months of SPB kit monotherapy, whereas the smallest reduction was observed in Case 7 after 6 months of treatment without adjunctive therapy. Changes from baseline in MI and mMASI scores are shown in **Figure 2**.

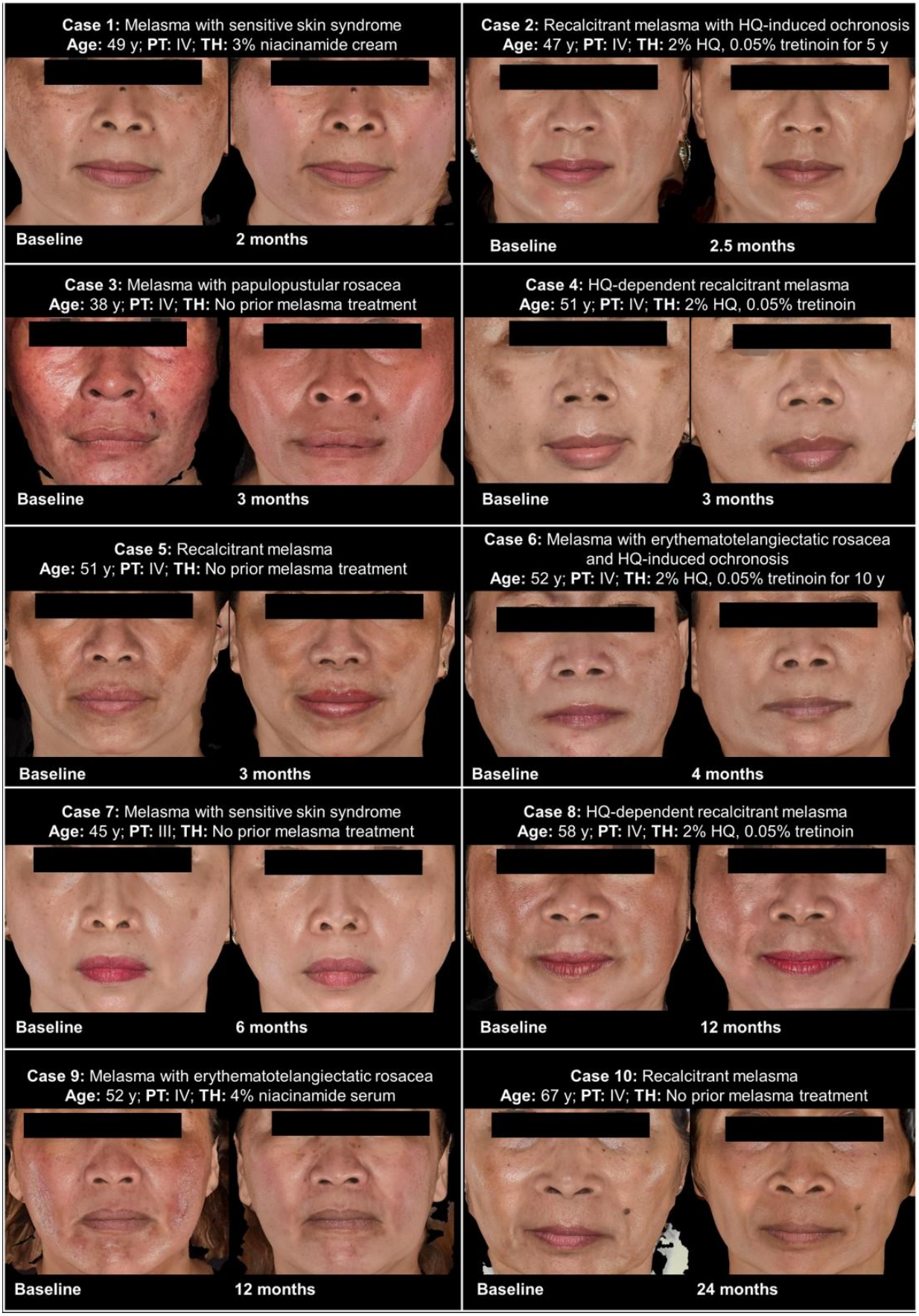

Figure 1. Patient characteristics, previous treatment history, and clinical appearance before and after use of the SPB kit. Abbreviations: HQ, hydroquinone; PT, skin phototype; TH, previous melasma treatment history.

Table 1. Melasma improvement based on Melanin Index and modified Melasma Area and Severity Index (mMASI) scores.

Case	Duration of SPB kit Use (months)	Melanin Index (Melanometre)				Modified Melasma Area and Severity Index		Concomitant Treatments During SPB kit Use
		Right Side		Left Side				
		Baseline	Post-treatment	Baseline	Post-treatment	Baseline	Post-treatment	
1	2	57.6	48.6	56.4	47.5	8.1	7.5	None
2	2.5	66.4	56.4	63.4	54.8	3.6	2.4	Monthly 577 nm laser[a]
3	3	57.6	40.4	56.4	42.4	6.0	5.4	Low-dose oral isotretinoin[b]; metronidazole cream 0.75%[b]
4	3	57.6	20.1	56.4	19.8	5.4	4.8	Monthly 577 nm laser[a]
5	3	70.4	64.8	64.8	62.8	10.1	1.8	Monthly 577 nm laser[a]
6	4	68.4	2.0	55.4	3.0	4.8	4.2	Low-dose oral isotretinoin[b]
7	6	42.0	34.6	40.6	34.0	0.9	0.3	None
8	12	65.6	48.8	66.4	46.4	9.9	4.5	Monthly 577 nm laser[a]
9	12	66.4	54.2	64.8	53.2	8.2	5.9	None
10	24	58.4	52.8	56.6	52.4	2.4	1.8	None

[a] QuadroStar Pro Yellow (Asclepion, Jena, Germany), used for treatment of facial erythema and telangiectasia.
[b]Treatment for rosacea

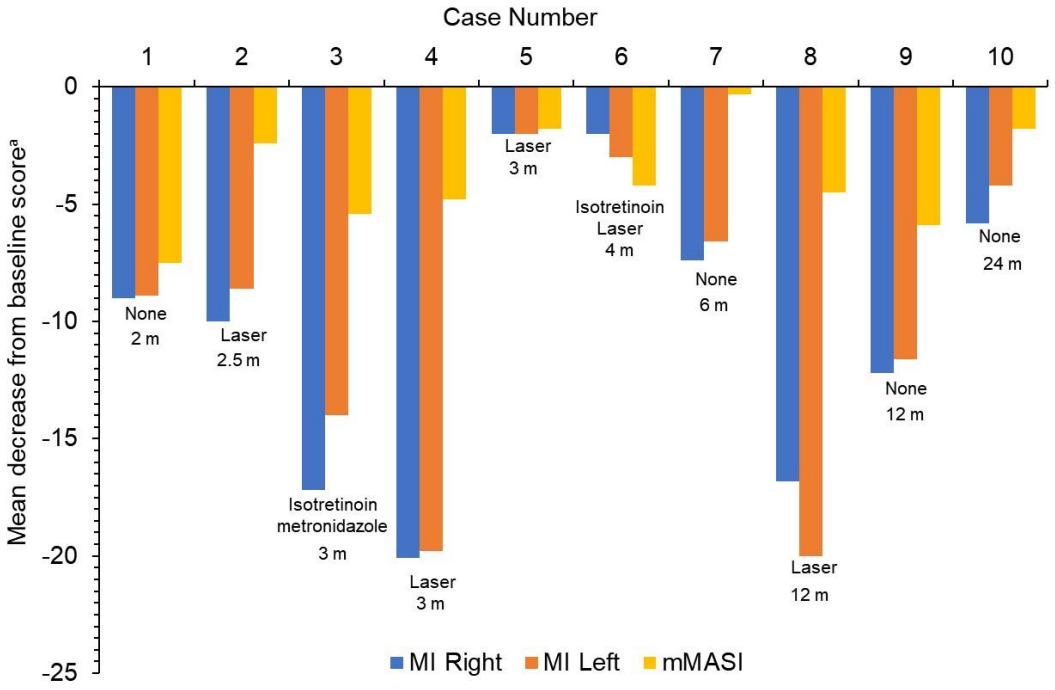

Figure 2. Change from baseline in Melanin Index and modified Melasma Area and Severity Index (mMASI) scores.
[a]Mean change from baseline in MI and mMASI scores.
Abbreviations: m, months; MI, Melanin Index; mMASI, modified Melasma Area and Severity Index.

Secondary Outcomes

Improvements in dermoscopic and QuantifiCare grading were observed in all cases, with concordant findings between both assessment methods (**Table 2**). While most cases with larger reductions in MI and mMASI scores demonstrated a score of 4 in dermoscopic and QuantifiCare grading (Cases 3, 4, and 8), similar improvements were also observed in cases with smaller reductions in MI and mMASI scores (Cases 5, 6, and 10). At baseline, all cases had a PGA score of 2, which improved to 0 or 1 at the end of treatment (**Table 2**). These improvements did not consistently correspond to the magnitude of MI or mMASI reductions.

Patient-reported feedback (data not shown) indicated that all patients were either satisfied or very satisfied with the SPB kit and would continue its use. No cases of ochronosis, dyschromia, or other adverse events were reported during the treatment period. Three patients were followed for 3 months post-treatment, while seven were followed for up to 24 months. During follow-up, no plateauing of response or recurrence of melasma was observed.

Table 2. Melasma improvement based on dermoscopy, QuantifiCare grading, and Physician's Global Assessment score

Case	Duration of SPB kit Use (months)	Dermoscopy grading[a] Change from baseline (0)		QuantifiCare grading[a] Change from baseline (0)		Post-Treatment Physician's Global Assessment score	Concomitant Treatments During SPB kit Use
		Right Side	Left Side	Right Side	Left Side		
1	2	3	3	3	3	1	None
2	2.5	4	4	4	4	1	Monthly 577 nm laser[b]
3	3	4	4	4	4	0	Low-dose oral isotretinoin[c]; metronidazole cream 0.75%[c]
4	3	4	4	4	4	0	Monthly 577 nm laser[b]
5	3	4	4	4	4	1	Monthly 577 nm laser[b]
6	4	4	4	4	4	0	Low-dose oral isotretinoin[c]
7	6	3	3	3	3	0	None
8	12	4	4	4	4	1	Monthly 577 nm laser[b]
9	12	2	3	3	3	1	None
10	24	4	4	4	4	0	None

[a]Dermoscopy and QuantifiCare grading changes were assessed relative to a baseline score of 0, where 0 = 0%, 1 = 20%, 2 = 40%, 3 = 60%, 4 = 80%, and 5 = 100%.
[b]QuadroStar Pro Yellow (Asclepion, Jena, Germany), used for treatment of facial erythema and telangiectasia.
[c]Treatment for rosacea

DISCUSSION

Melasma can be psychologically distressing and may significantly affect social and emotional well-being [5]. Consequently, many patients seek treatment for the condition. Among the available treatment modalities, topical therapies are commonly preferred due to their accessibility and affordability.

In the present case series, use of the SPB kit containing 0.3% kojic acid and 5.7% glycolic acid was associated with improvement in melasma, including in patients with recalcitrant disease, prior treatment failure, hydroquinone-induced ochronosis, and coexisting dermatologic conditions such as rosacea and sensitive-skin syndrome. Notably, clinical improvement was observed as early as 2 weeks after initiation of treatment (dermatologist observation, data not shown).

Overall, reductions in mMASI scores ranged from 0.3 to 7.5 across treatment durations of 2 to 24 months, although no clear relationship was observed between treatment duration and magnitude of response. Studies investigating kojic

acid in patients with melasma and similar Fitzpatrick skin phototypes in India have also reported comparable reductions in mMASI scores, ranging from 0.7 (2% for 16 weeks) [18], 2.4 (0.75% for 12 weeks) [19], to 5.6 (1% for 12 weeks) [20]. For glycolic acid, most evidence has been derived from chemical peel studies. However, a study using 13% glycolic acid cream for 8 weeks reported a mean mMASI reduction of 2.0 [21]. Collectively, these findings suggest that both kojic acid and glycolic acid contribute to improvement in melasma. Evidence regarding their combined use remains limited; however, a previous study evaluating a formulation containing 5% glycolic acid and 2% kojic acid demonstrated reductions in pigment intensity comparable to those achieved with a hydroquinone-based regimen (2% hydroquinone and 5% glycolic acid) although mMASI was not assessed [12].

Hydroquinone remains a standard therapy for melasma [7], and a recent meta-analysis demonstrated that hydroquinone has greater efficacy compared with kojic acid [22]. However, its use is limited by a higher incidence of adverse effects, including irritation, contact dermatitis, post-inflammatory hyperpigmentation, and ochronosis [7,22]. Notably, patients with hydroquinone-induced ochronosis and hydroquinone-dependent recalcitrant melasma in the present case series demonstrated clinical improvement following SPB kit use, suggesting a potential alternative treatment option in such cases.

Although kojic acid has been associated with irritation in some reports [10], the SPB kit was generally well tolerated in the present case series, including when used in combination with adjunctive laser therapy or other dermatologic treatments, without additional adverse events. This finding is consistent with previous studies reporting good tolerability and high patient satisfaction with the SPB kit [8,9].

The SPB kit has previously been evaluated in individuals with Fitzpatrick skin phototypes II–III, demonstrating significant improvements in mMASI scores, dark spot area, pigmentation intensity, and colour contrast after 28–90 days of use [7–10]. The present findings extend these observations to patients with Fitzpatrick skin phototype IV, suggesting comparable improvements in melasma severity in a darker-skinned population. It is important to note that some patients received concomitant therapies, including 577-nm laser treatment [23] and oral isotretinoin [24], which were not specifically indicated for melasma but may have contributed to clinical improvement. However, the greatest improvements in MI were not consistently associated with adjunctive treatments, as some patients receiving additional therapies demonstrated only modest changes.

Additionally, other assessment tools, including dermoscopy, PGA, and QuantifiCare imaging, demonstrated general improvement trends; however, these findings did not consistently correspond with changes in MI and mMASI scores. Further studies are warranted to validate the role of these modalities in melasma assessment and to establish standardized outcome measures for treatment response evaluation. Overall, the findings suggest that the SPB kit may provide clinical benefit in melasma management. However, due to variability in melasma subtype, baseline severity, treatment duration, and coexisting dermatologic conditions, treatment outcomes should be interpreted with caution.

Limitations

This case series included a selected group of patients with melasma of varying etiologies. The study was non-blinded, with heterogeneous treatment durations and the use of concomitant therapies in some but not all patients. Therefore, direct statistical comparisons between cases were not performed. Another limitation is the absence of direct comparison with standard treatments such as hydroquinone, which limits interpretation of relative efficacy and safety.

Future studies should include well-designed clinical trials with predefined inclusion criteria, placebo or active comparators, standardized treatment duration, and statistical analysis. In addition, further investigation is warranted to evaluate the effects of the SPB kit in combination with other therapies compared with monotherapy. Head-to-head comparative studies would also be valuable to better position the SPB kit within existing treatment algorithms for melasma.

CONCLUSION

In this case series of 10 women with predominantly Fitzpatrick skin phototype IV, the SPB kit containing kojic acid and glycolic acid was associated with clinical improvement in melasma and was generally

well tolerated. These findings suggest that the SPB kit may represent a potential treatment option for melasma and associated hyperpigmentation. Further well-designed clinical trials are warranted to evaluate its efficacy and safety across a broader range of skin phototypes, with appropriate placebo or active comparators, and to assess its use as monotherapy and in combination with other treatments.

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CONFLICT OF INTEREST

JFD is a regional Key Opinion Leader for the Menarini Group and Relife, and serves as a Board Director of the International Society of Dermatology. PGPL reports being a Key Opinion Leader and member of the speaker bureaus for the Menarini Group, Relife S.r.l., Galderma, Johnson & Johnson, Karihome, Eli Lilly, Zuellig Therapeutics, Creative Skin Med Equipment Inc., and D'mark Multisales, as well as a global trainer and regional speaker for Menarini/Relife. EB declares no conflicts of interest.

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JAPA JOURNAL OF ASIA PACIFIC AESTHETIC SCIENCE

CASE REPORT

Rapid Hair Regrowth in Localized Alopecia Areata Following Low-Dose Intralesional Corticosteroid

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ABSTRACT: Intralesional triamcinolone acetonide (ILTA) is a well-established treatment for localized alopecia areata (AA). However, reports on the recommended dosage of ILTA, particularly in the Malaysian context, remain limited. We present the case of a 32-year-old Chinese woman who presented with sudden-onset patchy hair loss over the biparietal and frontal scalp regions, with no family history of alopecia or underlying systemic illness. Clinical examination revealed localized non-scarring alopecia, with normal laboratory findings and no evidence of scalp infection. A diagnosis of localized AA was made. The patient was treated with ILTA at a concentration of 5 mg/mL, administered as multiple 0.1 mL intradermal injections spaced approximately 1 cm apart, using a 34-gauge, 1.5 mm needle and a 1 mL syringe. Sterile saline was used as a diluent to reduce discomfort, and topical lidocaine cream was optionally applied prior to injection. At three weeks, the patient demonstrated significant hair regrowth, accompanied by an improvement in the Severity of Alopecia Tool (SALT) score from 21% to 3–4%, along with high patient-reported treatment satisfaction. This case highlights the rapid efficacy and good tolerability of ILTA at a concentration of 5 mg/mL in the management of localized AA.

Keywords: Alopecia areata, Intralesional triamcinolone acetonide, Localized alopecia, corticosteroid therapy

INTRODUCTION

Alopecia areata (AA) is a chronic autoimmune disorder characterized by the sudden onset of well-circumscribed, non-scarring patches of hair loss resulting from immune-mediated attack on anagen hair follicles [1,2]. It may affect the scalp and other hair-bearing areas, including the beard, eyebrows, eyelashes, and ears [3]. AA is also associated with several comorbid conditions, including psychiatric disorders such as depression and anxiety, as well as autoimmune diseases such as thyroid disease, systemic lupus erythematosus, vitiligo, psoriasis, rheumatoid arthritis, and inflammatory bowel disease [4,5].

There are several factors that may contribute to the development of AA. Hormonal changes, such as those occurring during pregnancy or menopause, may also play a role in its onset [6]. Environmental triggers, including viral infections, stressful life events, and physical injury, may precipitate AA in susceptible individuals [7].

Psychological factors such as anxiety and depression have also been implicated, as stress can affect immune function and potentially trigger disease onset [8].

Management of AA depends on disease severity and the extent of scalp involvement [9]. In adults with localized patchy AA affecting less than 50% of the scalp, intralesional corticosteroid therapy remains a widely accepted first-line treatment [9,10]. Intralesional triamcinolone acetonide (ILTA) is commonly administered at concentrations ranging from 2.5 to 10 mg/mL at intervals of approximately 6–12 weeks [9,10]. In many ILTA treatment protocols, 10 mg/mL is considered the conventional concentration for scalp lesions, whereas 5 mg/mL represents a lower-dose regimen that may reduce the risk of local adverse effects such as dermal atrophy. Lower concentrations such as 2.5 mg/mL are typically reserved for sensitive areas, including the eyebrows and face.

We report a case of localized AA in a Malaysian patient who demonstrated rapid hair regrowth within three weeks following a single treatment session of ILTA at 5 mg/mL.

CASE PRESENTATION

A 32-year-old Chinese woman presented to our clinic in May 2025 with a history of sudden hair loss. She had no known medical illnesses and had one child. She was a full-time mother and reported no family history of hereditary hair loss or autoimmune disease. On examination, patchy hair loss was noted predominantly over the left parietal and frontal regions of the scalp (**Figures 1** and **2**). The underlying scalp appeared normal, with no erythema, scaling, or signs of infection. No nail abnormalities, including pitting or trachyonychia, were observed.

No other abnormalities were noted on systemic examination. Routine laboratory investigations, including complete blood count, serum ferritin, thyroid-stimulating hormone (TSH), renal function tests, liver function tests, and vitamin D levels, were within normal limits. There was no history of traction hairstyles, chemical exposure, or recent severe illness. Hair pull test performed at the periphery of the lesion was mildly positive.

Severity of AA was assessed using the Severity of Alopecia Tool (SALT) score and graded according to the National AA Foundation guidelines as follows: S0, no hair loss; S1, <25%; S2, 26–50%; S3, 51–75%; S4, 76–99%; and S5, 100% hair loss (alopecia totalis) [11]. The SALT score in this patient was <21%, consistent with S1 disease severity.

Additional investigations such as trichogram or scalp biopsy were not performed due to limited equipment availability. However, a clinical diagnosis of localized AA was made based on the characteristic presentation of well-demarcated, non-scarring patches of hair loss.

Figure 1. Hair loss over the left parietal scalp

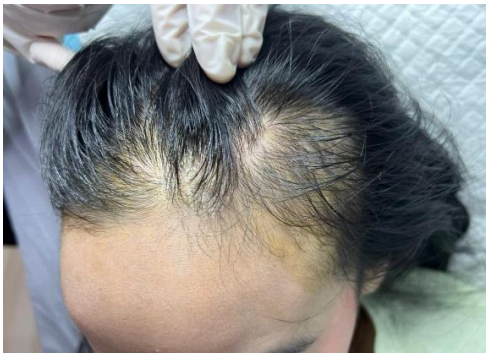

Figure 2. Hair loss over the frontal scalp.

MANAGEMENT AND OUTCOME

The patient was treated with ILTA (Shincort, Yung Shin Pharmaceutical Industrial Co., Ltd., Taiwan). A total of 2 mL of triamcinolone acetonide (5 mg/mL) was delivered via multiple 0.1 mL intradermal injections spaced approximately 1 cm apart across the affected scalp. A 1 cc syringe was used to minimize leakage between the syringe and needle, and a 34-gauge, 1.5 mm needle was selected for optimal delivery. Sterile saline was used as the diluent due to its lower associated stinging sensation. To reduce discomfort, topical lidocaine cream was offered 30 minutes prior to treatment.

After the first treatment session, the patient was scheduled for reassessment at 3 weeks. At follow-up, marked hair regrowth was observed, with the SALT score reduced to

approximately 3–4%, corresponding to an estimated >80% reduction in scalp hair loss from baseline (**Figures 3** and **Figure 4**). She reported satisfaction with the treatment. The patient was initially scheduled for subsequent treatment sessions at three-week intervals. However, due to high satisfaction with the outcome after the first session, she did not return for further follow-up. Consequently, long-term treatment outcomes and relapse risk could not be evaluated.

Figure 3. Hair regrowth over the left parietal scalp.

Figure 4. Hair regrowth over the frontal scalp.

DISCUSSION

AA is an autoimmune disorder characterized by patchy, non-scarring hair loss resulting from immune-mediated inflammation targeting hair follicles. Treatment strategies vary according to disease severity and extent. For localized disease involving less than 50% of the scalp, ILTA (2.5–10 mg/mL) is strongly recommended as a first-line option [9]. In Malaysia, however, evidence regarding the use and optimal dosing of ILTA for AA remains limited.

In the present case, improvement in AA was observed after a single session of 5 mg/mL ILTA. The rapid hair regrowth may be attributed to early disease detection and treatment while hair follicles remained viable. In addition, localized disease with limited scalp involvement typically responds more favorably than extensive disease.

Although ILTA at 10 mg/mL has been shown to produce faster results, as early as 4 weeks compared with 5 mg/mL, it is also associated with a higher risk of adverse effects [12,13]. In contrast, ILTA at 5 mg/mL may be a more suitable option for patients with focal AA, given its more favorable risk–benefit profile [14].

No adverse effects were observed following treatment, and the patient reported satisfaction with the outcome. However, no follow-up was conducted as the patient did not return for monitoring. Although ILTA is generally well tolerated, potential adverse effects should be considered. Proper injection technique and appropriate dosing are essential, as excessive volume per site, frequent injections, or superficial administration may increase the risk of cutaneous atrophy and compromise treatment efficacy [16]. Continued monitoring is recommended, as recurrence may occur.

CONCLUSION

ILTA is a widely used and recommended treatment for localized AA. This case demonstrates that ILTA at 5 mg/mL may achieve rapid and satisfactory hair regrowth, particularly when the condition is identified and treated early. Further studies involving larger populations and longer follow-up are warranted to better evaluate optimal dosage, treatment outcomes, adverse effects, and recurrence of AA following ILTA therapy.

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CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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CASE REPORT

Clinical Improvement of Long-Standing Nevus of Ota and Freckles with Combined 1064 nm Nd:YAG Toning and 660 nm Ruby Laser-like: A Single-Patient Longitudinal Study

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ABSTRACT: Nevus of Ota and freckles are common pigmentary disorders that may coexist; however, their differing depths of pigmentation present a therapeutic challenge. Nevus of Ota is a dermal melanocytic hamartoma requiring deeply penetrating wavelengths, whereas freckles (ephelides) are superficial epidermal lesions that respond best to low-fluence visible-light therapy. A combination of a 1064 nm Q-switched Nd:YAG (QSNY) laser and a 660 nm ruby laser-like, targeting pigment at different skin depths, may provide a complementary approach for simultaneously addressing both conditions. This report describes a 54-year-old woman diagnosed with type II unilateral nevus of Ota and freckles. The patient underwent 23 treatment sessions using a 1064 nm QSNY laser and a 660 nm ruby laser-like over two years. Progressive improvement of both nevus of Ota and freckles was observed from the 8th session onward compared with baseline. The nevus of Ota showed significant lightening, while freckles demonstrated marked superficial clearance by the 23rd session. No recurrence of pigmentation was observed at the 6-month follow-up after the last treatment. Adverse effects were minimal and limited to transient erythema and frosting after each session, which resolved spontaneously. The patient reported high satisfaction with the treatment outcome. The combination of 1064 nm Q-switched Nd:YAG and 660 nm ruby laser-likes may offer a safe and effective treatment approach for patients with concurrent nevus of Ota and freckles. Further studies with larger patient cohorts are required to validate these findings and optimize treatment parameters.

Keywords: Nevus of Ota, Freckles, 1064 nm Nd:YAG, 660 nm ruby laser-like

INTRODUCTION

Nevus of Ota and freckles are distinct pigmentary disorders that may coexist; however therapeutic strategies that address both lesions simultaneously remain limited. Nevus of Ota, also known as oculodermal melanocytosis, is a benign dermal melanocytic hamartoma characterized by blue-gray hyperpigmentation affecting areas of the skin and eyes innervated by the ophthalmic and maxillary branches of the trigeminal nerve, including the periorbital region, sclera, and adjacent facial skin [1,2]. It is typically unilateral. Asian populations are more frequently affected, with an estimated prevalence of 0.014% to 0.034%, often appearing at birth or during adolescence and potentially darkening progressively throughout adulthood [3]. The condition is more common in females and can cause significant cosmetic concern.

Freckles (ephelides), in contrast, are superficial epidermal macules caused by ultraviolet (UV)-induced melanin overproduction in genetically predisposed individuals [4]. When both conditions coexist, differences in pigment depth pose therapeutic challenges, as no single laser wavelength is ideal for treating both dermal and epidermal pigmentation.

Advancements in laser technology, in nanosecond pulse durations, have enhanced the ability to selectively target melanin-containing structures like melanosomes with effective tissue breakdown and minimal collateral thermal damage [5]. 1064 nm Q-Switched Nd:YAG (QSNY) laser are well established for the treatment of dermal melanocytosis with varying success, potentially due to their deeper penetration and selective photothermolysis of melanocytes [6]. Meanwhile, shorter wavelengths such as 660 nm ruby laser-like may be more effective for epidermal pigment [7], making them suitable for freckles.

Although nevus of Ota and freckles have been extensively studied individually, their coexistence in the same anatomical region is rarely addressed. This case report highlights the simultaneous management of mixed-depth pigmentation, including dermal nevus of Ota and epidermal freckles, using a dual-wavelength laser strategy, providing an alternative approach in treating overlapping pigmentary disorders.

CASE PRESENTATION

A 54-year-old postmenopausal woman with Fitzpatrick skin type IV and no known medical illness presented to our clinic with left-sided unilateral blue-gray hyperpigmentation distributed over the first and second divisions of the trigeminal nerve, namely the ophthalmic and maxillary branches involving the temple, periorbital region, zygomatic (cheek) region, and buccal area with concurrent freckles. She reported that the pigmentation began at the age of 15 and had progressively worsened over the decades.

She was currently unemployed but had previously worked as a hawker, with prolonged sun exposure during working hours. There was no family history of similar pigmentation. She had undergone ablative laser treatment at a beauty salon 20 years prior, with no improvement. The patient reported feeling insecure and having low self-esteem due to the noticeable facial pigmentation. She also perceived that others focused on her pigmentation when looking at her, which affected her confidence and led her to avoid social interactions.

On physical examination, a patch of bluish-gray hyperpigmentation was observed on the left side of the face, involving the temple, upper cheek, mid-cheek, and buccal region, with small, round, dark brown spots overlying the pigmented patch (**Figure 1**). Based on photographic assessment and clinical judgment, she was diagnosed with type II nevus of Ota according to Tanino's classification (**Table 1**), with concurrent freckles.

Table 1. Tanino's classification for nevus of Ota

Type	Subtypes	Areas involved
Type I	IA	Distribution over the upper and lower eyelids, periocular and temple region
	IB	Infrapalpebral fold, nasolabial fold and zygomatic regions are affected
	IC	Forehead only
	ID	Nasal only
Type II		Moderate type - The lesions affect upper and lower eyelids, periocular, zygomatic, cheek and temple
Type III		Scalp, forehead, eyebrow and nose.
Type IV		Bilateral

MANAGEMENT AND OUTCOME

The patient underwent depigmentation treatment in our clinic using the 1064 nm QSNY laser (Spectra XT, Lutronic Corp., Goyang, Korea) with a fixed pulse duration of 5–10 ns, and the 660 nm ruby laser-like (Ruby-like Versatile YAG, RuVY; Spectra XT, Lutronic Corp., Goyang, Korea), without any additional topical or oral medications. A total of 23 laser sessions combining both lasers were completed at 1-month intervals over 2 years.

For nevus of Ota, the 1064 nm QSNY laser was applied with a fluence of 5.6–6.0 J/cm^2, a spot size of 4 mm, and a frequency of 5 Hz, delivered in a single pass over the lesion. The 660 nm ruby laser-like was subsequently applied to freckles overlying the nevus of Ota, using a spot size of 3 mm, frequency of 1 Hz, and fluence of 0.75–1.0 J/cm^2, adjusted to achieve the endpoint of frosting. The endpoint for 1064 nm QSNY laser of the nevus of Ota was erythema to mild petechiae, whereas the

endpoint for the 660 nm ruby laser-like was whitening of the freckles, with fluence adjusted according to the tissue response. After each session, the patient underwent an oxyinfusion facial as a cooling method. Patient improvement was assessed through clinical photographs and patient satisfaction using the Global Aesthetic Improvement Scale (GAIS).

Figure 1. Left-sided facial photograph of the patient at the first presentation. Nevus of Ota (⇦); Freckles (←)

Patients was asked to subjectively report their satisfaction with the treatment course. The GAIS employs a 5-point scale ranging from 1 = very much improved to 5 = worse to rate overall cosmetic improvement.

Progressive improvement of both nevus of Ota and freckles was observed starting from the 8th session (**Figure 2**) compared to baseline. The nevus of Ota lightened significantly while the freckles showed superficial clearing by the 23rd session. The patient reported high satisfaction, with a GAIS score of 1. Adverse effects were limited to transient erythema and frosting of the spots after each session, which resolved spontaneously. At 6 months after the last treatment session, there was no recurrence of pigmentation, and the patient remained highly satisfied with the results (**Figure 3**).

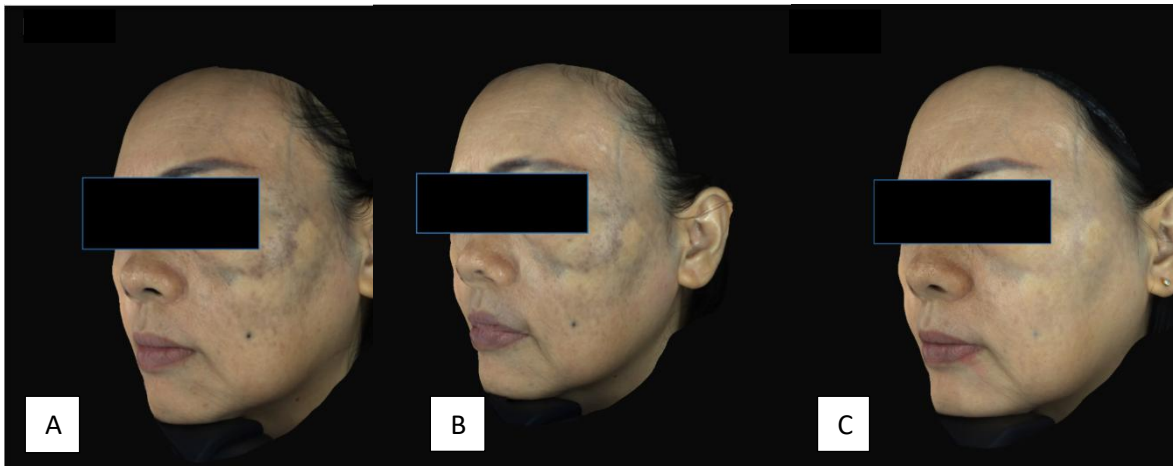

Figure 2. Left facial view of the patient captured using the Isemeco 3D imaging system at the 8th session (A), the 11th session (B), and the 23rd session (C) of treatment. A progressive improvement in nevus of Ota and freckles was observed. The baseline image is unavailable.

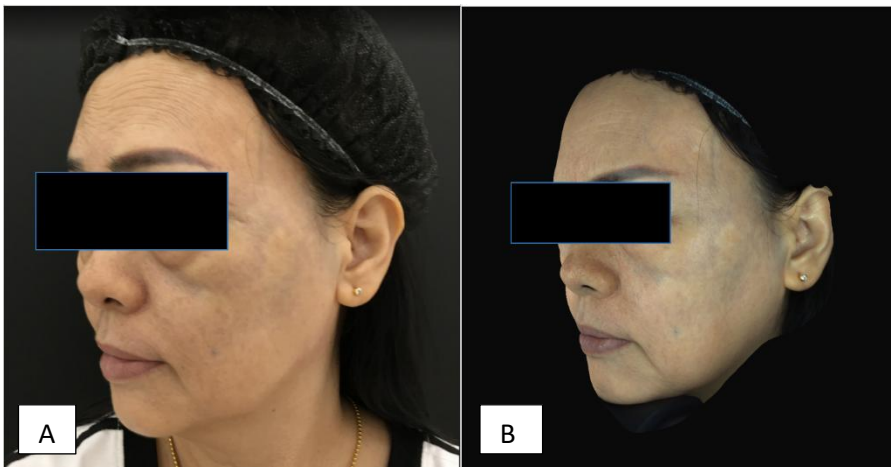

Figure 3. Left facial view of the patient at 6-month follow-up. (A) Standard clinical photograph; (B) Isemeco 3D imaging system. No recurrence of pigmentation was observed during follow-up.

DISCUSSION

Nevus of Ota and freckles are two distinct pigmentary disorders with fundamentally different histopathological characteristics and depths of melanin deposition, which makes their simultaneous treatment challenging. Nevus of Ota is a dermal melanocytosis in which melanocytes are located deep within the dermis, whereas freckles are epidermal lesions resulting from increased melanin production without an increase in melanocyte number [8]. Consequently, no single laser wavelength can optimally target both conditions.

In this case report, a combined treatment approach using a 1064 nm QSNY laser and a 660 nm ruby laser-like was employed in a patient with concomitant nevus of Ota and freckles. Over 23 treatment sessions spanning two years, the patient demonstrated progressive and sustained improvement in both conditions without significant adverse effects. Observed adverse effects were limited to transient, expected post-laser reactions.

The 1064 nm QSNY laser is regarded as the gold standard treatment for nevus of Ota by the European Society for Laser Dermatology [9]. QSNY lasers have been extensively studied, with substantial evidence supporting their efficacy in nevus of Ota, including in patients with darker skin phototypes (Fitzpatrick skin types V and VI) [10-14]. Additionally, QSNY lasers have demonstrated a superior safety profile compared with other laser modalities. This is attributed to their 1064 nm wavelength, which allows deeper dermal penetration and more selective targeting of dermal melanocytes while minimizing epidermal melanin absorption, thereby reducing the risk of adverse pigmentary changes. This safety advantage is particularly relevant in individuals with darker skin types, in whom increased epidermal melanin content heightens the risk of treatment-related dyspigmentation [15].

In the present study, laser fluence was adjusted according to the patient's clinical response. Choi et al. [10] demonstrated that a low-fluence QSNY laser approach is associated with fewer adverse effects and reduced downtime in the treatment of nevus of Ota. This modality is particularly advantageous in Asian patients, who are at higher risk of post-inflammatory hyperpigmentation [10]. In darker skin phototypes, fluence should be maintained at the lowest effective level to reduce the risk of post-inflammatory hyperpigmentation [16]. This is because darker skin type (VI) can absorb up to 40% more energy than lighter skin types (I–II), and exceeding clinical thresholds may increase the risk of complications [17]. Therefore, careful titration of laser fluence is essential for each patient.

Freckles have been treated using various laser modalities. Among these, 694 nm Q-switched ruby lasers have demonstrated efficacy in the treatment of solar lentigines and freckles, likely due to their wavelength and short pulse duration of 25–40 nanoseconds [18], which are well suited for targeting epidermal pigment. Similarly, a 660 nm ruby laser-like has been reported to achieve near-complete resolution of freckles after a single treatment session without significant adverse effects [7]. Consistently, in the present patient, treatment with the 660 nm ruby laser-like resulted in clinical improvement of freckles with minimal adverse events.

The present case suggests that pigmentary lesions at different skin depths may be addressed through the strategic combination of laser wavelengths with different penetration profiles. No recurrence was observed at the 6-month follow-up; however, further studies in larger populations are required to validate these findings.

CONCLUSION

The combined use of a 1064 nm QSNY laser and 660 nm ruby laser-like therapy may provide a safe and effective approach for patients with concurrent nevus of Ota and freckles, particularly in those with darker skin types. This dual-wavelength strategy, utilizing lasers with different penetration depths, enables simultaneous targeting of superficial epidermal pigmentation and dermal melanocytosis. Further studies in larger populations are required to optimize treatment parameters and protocols, as well as to evaluate long-term outcomes and recurrence rates.

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CONFLICT OF INTEREST

The author declares no potential conflicts of interest.

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JOURNAL OF ASIA PACIFIC AESTHETIC SCIENCE

CASE REPORT

Combination of 660-nm Ruby Laser-like Technology and Low-Fluence 1064-nm Laser Toning for Melasma and Solar Lentigines: A 20-Session Longitudinal Case Study

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ABSTRACT: Melasma and solar lentigines are common acquired facial pigmentary disorders that frequently coexist in clinical practice. The management of mixed pigmentary conditions remains challenging, and evidence for combination laser therapy in such cases is limited, particularly in extended treatment protocols. We report the case of a 52-year-old woman with Fitzpatrick skin type III who presented with coexisting melasma and solar lentigines of five years' duration. She underwent 20 sessions of exclusive laser therapy over 2.5 years using low-fluence 1064-nm Q-switched Nd:YAG (QSNY) laser and 660-nm ruby laser–like technology. Progressive and sustained clinical improvement was observed throughout the treatment course, with visible changes noted after 10 sessions. The modified Melasma Area and Severity Index (mMASI) score demonstrated a 75% reduction, decreasing from 21.30 at baseline to 5.30 after 20 sessions. The treatments were well tolerated, with only transient post-treatment erythema resolving within 1–2 days. This case suggests that extended combination laser therapy using low-fluence 1064-nm QSNY and 660-nm ruby laser-like technology may be an effective and well-tolerated option for patients with coexisting melasma and solar lentigines when carefully planned and closely monitored.

Keywords: Melasma, Solar lentigines, Low-fluence Q-switched laser therapy, Mixed pigmentary disorders, Q-switched Nd:YAG

INTRODUCTION

Melasma and solar lentigines are common acquired facial pigmentary disorders [1]. Melasma is one of the most frequently encountered pigmentary conditions in clinical practice and typically presents as symmetrical brown macules or patches on the face. Its development is influenced by ultraviolet (UV) exposure, hormonal factors, and genetic predisposition [2]. Solar lentigines, also known as sunspots, are well-defined brown macules that commonly occur on sun-exposed areas as a result of chronic UV damage and represent an early sign of photoaging [3].

In clinical practice, patients often present with mixed pigmentary disorders rather than a single condition. The coexistence of melasma and solar lentigines poses a therapeutic challenge, as these conditions differ in pathophysiology, pigment depth, and treatment response. Careful selection and balancing of treatment parameters are therefore required to avoid undertreatment of one condition or complications such as post-inflammatory hyperpigmentation (PIH).

Treatment modalities, including topical depigmenting agents, chemical peels, and laser-based therapies, are well established in the management of both melasma and solar lentigines [2,3]. Among laser modalities, low-fluence 1064-nm Q-switched Nd:YAG (QSNY) laser is widely recommended for the treatment of melasma in Asian populations [4]. It acts via selective photothermolysis, targeting melanosomes while minimizing damage to surrounding tissue, thereby enabling safe pigment reduction [5,6]. In contrast, shorter wavelengths have demonstrated greater efficacy in epidermal pigmented lesions such as solar lentigines. The 532-nm and 660-nm QSNY lasers have both shown therapeutic efficacy, with greater melanin reduction observed using the 660-nm wavelength [7]. The 694-nm Q-switched ruby laser has also demonstrated high efficacy, achieving >75% improvement after a single session and complete lesion clearance after two sessions in patients with solar lentigines [8]. In addition, 660-nm ruby laser–like technology has been explored for pigmentary disorders such as lentigines, with promising clinical outcomes [9].

However, most published studies have focused on single pigmentary conditions or relatively short treatment protocols. Evidence regarding extended, repeated low-fluence 1064-nm QSNY laser therapy combined with ruby laser–like technology for concurrent melasma and solar lentigines remains limited. This case report therefore aims to describe the outcomes of an extended combination laser regimen using low-fluence 1064-nm QSNY and 660-nm ruby laser–like technology over 20 treatment sessions in a patient with coexisting melasma and solar lentigines.

CASE PRESENTATION

A 52-year-old woman with Fitzpatrick skin type III presented in May 2023 with facial pigmentation involving diffuse melasma and solar lentigines over her bilateral cheeks, which had been present for five years. She reported no medical issues, no family history of pigmentation disorders, and had never undergone any aesthetic treatments. She previously worked as a scuba diving instructor in Hong Kong for over 10 years, during which she performed multiple daily dives without sun protection. She retired one year prior to consultation and sought treatment after noticing a gradual worsening of her pigmentation.

Clinical examination revealed symmetrical brown patches over the forehead, bilateral cheeks, and chin, consistent with melasma, and discrete darker brown spots over the bilateral cheeks, suggestive of solar lentigines. The diagnosis was made clinically. Melasma severity was assessed using the modified Melasma Area and Severity Index (mMASI), a validated scoring system evaluating the area and darkness of pigmentation across four facial regions (forehead, right malar, left malar, and chin), with total scores ranging from 0 to 24. Her baseline mMASI score was 21.30. Written informed consent was obtained from the patient for publication of the clinical images and case details.

MANAGEMENT AND OUTCOME

The patient underwent exclusive laser therapy using the Spectra XT platform (Lutronic, South Korea), delivering 1064-nm QSNY and 660-nm ruby laser–like treatment (RuVY Touch laser). Both melasma and solar lentigines were treated within the same session. The 1064-nm QSNY served as the primary modality for melasma, while the 660-nm ruby laser–like therapy was applied selectively to target solar lentigines. Fluence ranged from 0.65–1.0 J/cm^2 for the 1064-nm QSNY and 0.75–1.0 J/cm^2 for the 660-nm ruby laser–like therapy. Fluence was adjusted at each visit according to clinical response and patient tolerance, while spot size and pulse duration remained constant throughout the treatment course. Laser parameters are summarized in **Table 1**.

Treatment sessions were initially performed at 4-week intervals and gradually extended to 8-week intervals as clinical improvement stabilized. The patient completed a total of 20 sessions over 2.5 years, with good adherence to the treatment schedule. No topical depigmenting agents or adjunctive therapies were used during this period. She was advised to maintain strict photoprotection, including daily use of broad-spectrum SPF 50 PA+++ sunscreen, adequate moisturization, and avoidance of potentially irritating skincare products.

Progressive and consistent clinical improvement was observed throughout the treatment course, with visible changes after 10 sessions (**Figures 1B–3B**) and further improvement after 20 sessions (**Figures 1C–3C**) in both pigmentary conditions. The modified Melasma Area and Severity Index (mMASI) score decreased

from 21.30 at baseline to 9.40 after 10 sessions and 5.30 after 20 sessions, representing a 75% reduction from baseline. The treatment was well tolerated, with only transient post-treatment erythema resolving within 1–2 days. The patient reported satisfaction with the outcome. No recurrence has been observed to date during ongoing maintenance therapy.

Table 1. Laser treatment parameters during the treatment course.

Laser	Spot size (mm)	Fluence (J/cm²)	Frequency	Pulse type	Number of passes
1064-nm QS Nd:YAG	8	0.65–1.0	10 Hz	Q-switched	2–3 passes over melasma-affected areas
660-nm RuVY Touch	3	0.75–1.0	Single shot	Q-switched	Focal passes over solar lentigines

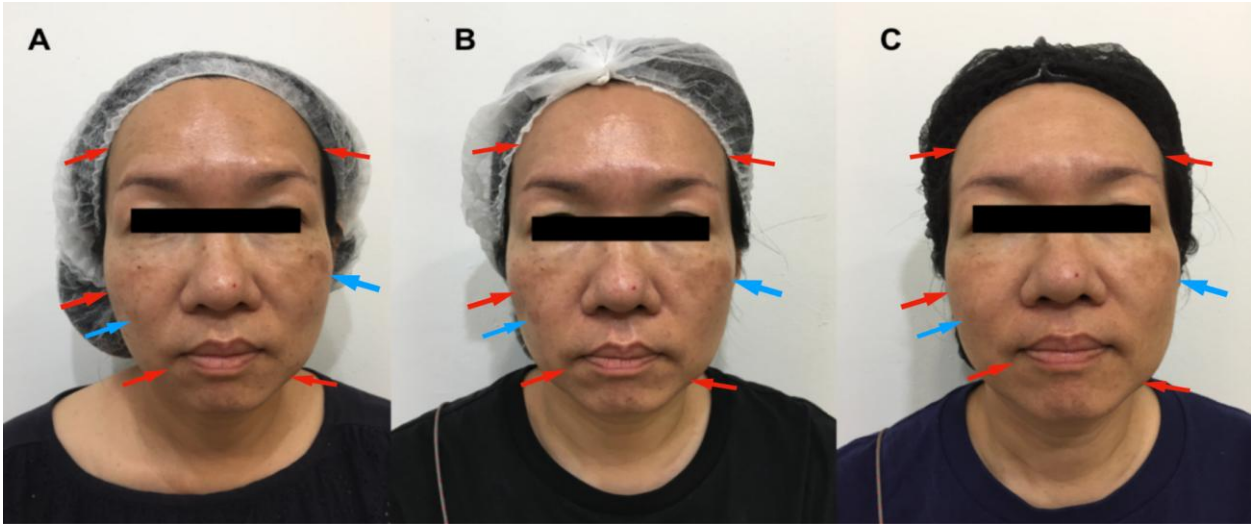

Figure 1. Frontal view of facial pigmentation at baseline **(A)**, after 10 sessions **(B)**, and after 20 sessions **(C)**. Red arrows indicate melasma, and blue arrows indicate solar lentigines.

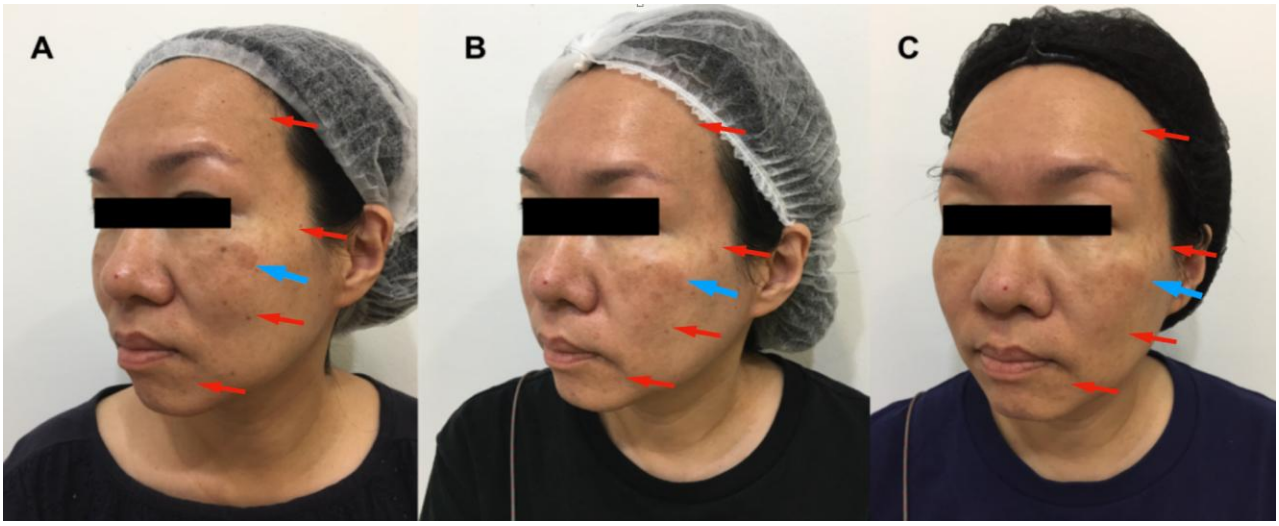

Figure 2. Left oblique (45°) view of facial pigmentation at baseline **(A)**, after 10 sessions **(B)**, and after 20 sessions **(C)**. Red arrows indicate melasma, and blue arrows indicate solar lentigines.

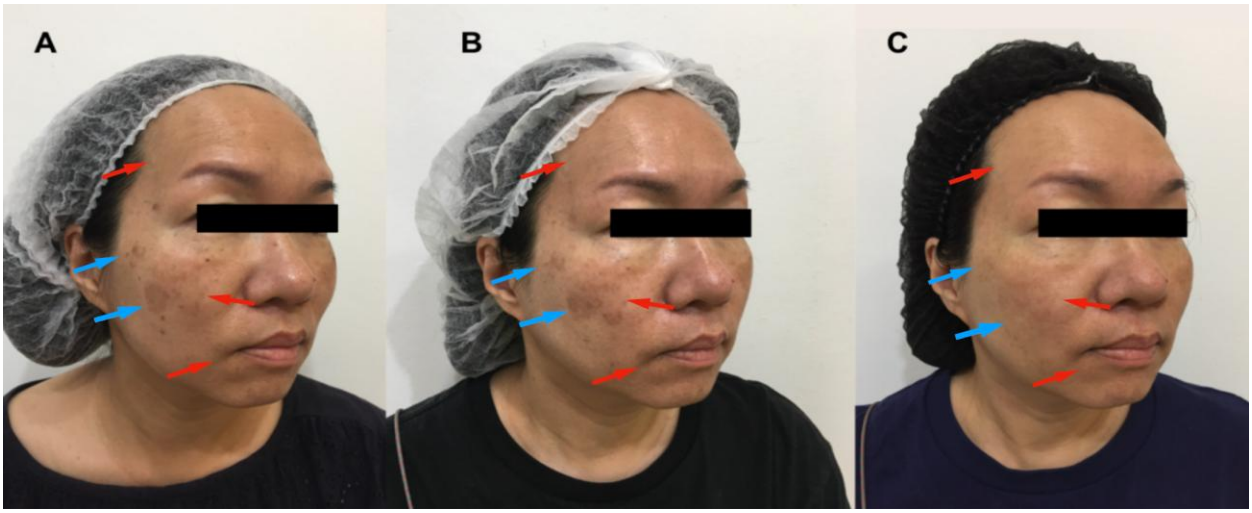

Figure 3. Right oblique (45°) view of facial pigmentation at baseline **(A)**, after 10 sessions **(B)**, and after 20 sessions **(C)**. Red arrows indicate melasma, and blue arrows indicate solar lentigines.

DISCUSSION

Melasma and solar lentigines frequently coexist in clinical practice due to cumulative ultraviolet exposure and shared risk factors. However, differences in their pathophysiology and depth of pigment deposition may result in variable treatment responses, making simultaneous management of both conditions challenging.

Low-fluence 1064-nm QSNY laser therapy is widely used for the treatment of melasma due to its ability to selectively target melanin with a favorable safety profile [4]. In contrast, shorter wavelengths such as the 694-nm Q-switched ruby laser have been shown to be effective in treating epidermal pigmented lesions, including solar lentigines [8, 10,11]. In the present case, combined treatment with low-fluence 1064-nm QSNY laser and 660-nm ruby laser–like therapy resulted in progressive clinical improvement of both melasma and solar lentigines, with minimal adverse effects.

Evidence for combined or extended laser protocols in mixed pigmentary disorders remains limited, as most studies have focused on single conditions or short treatment courses. In addition, data on 660-nm ruby laser–like technology for solar lentigines are still scarce. This case therefore suggests a potential role for long-term sequential laser therapy targeting both dermal and epidermal pigment components to achieve gradual and sustained improvement.

Extended treatment sessions may enhance outcomes by facilitating progressive clearance of both superficial and deeper pigment while minimizing the risk of adverse effects, such as PIH. This approach may be particularly relevant in higher-risk populations such as Asian skin types. In this case, treatment intervals guided by clinical response and good patient adherence likely contributed to the sustained improvement observed.

CONCLUSION

This case report demonstrates that combination therapy with low-fluence 1064-nm QSNY and 660-nm ruby laser-like technology over 20 sessions may achieve sustained clinical improvement in patients with coexisting melasma and solar lentigines. Different pigmentary components may respond at varying rates, requiring repeated treatment sessions to achieve gradual and sustained clearance while minimizing adverse effects. Careful patient selection, individualized treatment parameters, and close clinical monitoring are essential to optimize therapeutic outcomes.

Further studies with larger sample sizes are required to establish standardized protocols for the long-term management of concurrent melasma and solar lentigines. Future research may incorporate objective skin imaging systems, such as VISIA, Antera 3D, or ISEMECO analysis, to enable more quantitative and reproducible assessment of pigmentary changes.

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CONFLICT OF INTEREST

The author declares no potential conflicts of interest.

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CASE REPORT

Sequential Q-Switched Nd:YAG Laser and Polynucleotide Therapy for Chronic Lower Limb Hyperpigmentation: A Two-Year Case Report

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ABSTRACT: Chronic solar lentigines of the lower limbs are challenging to manage due to delayed healing and variable responses to conventional therapies, and evidence guiding optimal treatment strategies for this anatomical region remains limited. We report a case of a 69-year-old Malaysian Chinese woman with a 20-year history of progressive solar lentigines affecting both lower limbs, predominantly over the knees and calves, with minimal response to conservative skincare measures. A sequential treatment protocol was employed, consisting of six sessions of Q-switched Nd:YAG laser (QSNYL) at two-month intervals (Phase 1), followed by alternating monthly sessions of QSNYL and polynucleotide (PN) therapy (Phase 2). Progressive lightening of pigmentation was observed during Phase 1, with further improvement after the introduction of combination therapy in Phase 2. The treatment was well tolerated, with no significant adverse events. Patient-reported outcomes, assessed using the Global Aesthetic Improvement Scale (GAIS), scored 1 (very much improved). At the two-year follow-up, sustained clinical improvement was observed. This sequential combination therapy may represent a safe, effective, and well-tolerated strategy for managing chronic lower limb solar lentigines.

Keywords: Q-Switched Nd:YAG Laser, Polynucleotide, Chronic lower limb hyperpigmentation

INTRODUCTION

Chronic hyperpigmentation of the lower limbs, including solar lentigines, is commonly encountered in clinical practice. However, clinical evidence on treatment remains limited compared with facial pigmentary disorders. Most published studies on the management of solar lentigines have primarily focused on the face and upper extremities [1]. Consequently, current treatment strategies for pigmentary disorders of the lower extremities are largely extrapolated from evidence derived from facial or generalized cutaneous involvement.

Q-switched Nd:YAG laser (QSNYL) therapy is an established modality for the treatment of benign pigmented lesions, including solar lentigines. QSNYL operates on the principle of selective photothermolysis, whereby melanin is targeted while minimizing thermal injury to surrounding tissues. It has been widely used in the treatment of solar lentigines with favourable clinical outcomes [2-5]. However, adverse effects such as post-inflammatory hyperpigmentation have also been reported, particularly in Asian skin types [6].

Polynucleotides (PN) are highly purified natural DNA molecules extracted from trout gonads [7]. Emerging evidence suggests that PN may provide a safe and effective option for skin rejuvenation, including improvement in skin texture, elasticity, and reduction of fine wrinkles [8]. Accordingly, PN may serve as a potential adjunct in

combination-based aesthetic treatments to enhance overall clinical outcomes.

Treatment of photoaged skin on the lower limbs is inherently more challenging due to slower healing capacity and reduced density of follicular sebaceous units [9]. Therefore, conservative therapeutic approaches, including lower fluence settings, longer treatment intervals, and staged protocols, may be more appropriate for this anatomical region. Furthermore, management of lower limb skin concerns often requires a multimodal approach, as pigmentary changes may coexist with alterations in skin texture, elasticity, and overall dermal quality. A review of leg rejuvenation techniques has emphasized that combination strategies are typically necessary to address the multifactorial nature of lower limb ageing [9]. Such approaches aim to target multiple contributing factors simultaneously and may lead to better aesthetic outcomes compared with monotherapy. This case report presents the clinical outcome of a combination treatment involving QSNYL and PN in a patient with solar lentigines of the lower limbs.

CASE PRESENTATION

A 69-year-old Malaysian Chinese woman presented with a 20-year history of progressive hyperpigmentation affecting both lower limbs, which had gradually worsened and resulted in cosmetic concern, negatively impacting her self-confidence. The pigmentation was predominantly distributed over the knees and calves, where discrete to coalescent areas of hyperpigmentation were observed. Similar lesions were also present on the face, chest, and bilateral upper limbs. However, these areas were not treated as part of the present protocol, as the patient's primary concern was the lower limbs.

Conservative management with regular use of body moisturisers and sun protection resulted in minimal improvement. The patient denied associated pain, pruritus, ulceration, or episodes of inflammation. Relevant contributing factors included a history of regular swimming from a young age, suggestive of chronic ultraviolet exposure, as well as xerosis. Her past medical history was significant for traumatic brain injury five years prior, for which she was receiving prophylactic levetiracetam once daily. There was no history of photosensitising medication use, chronic venous insufficiency, or recent lower limb trauma.

On physical examination, multiple symmetrical, well-demarcated brown to dark brown macules consistent with solar lentigines were observed over the bilateral lower limbs, with no evidence of active inflammation, scaling, ulceration, or infection. Peripheral circulation was clinically adequate. A clinical diagnosis of bilateral lower limb solar lentigines was made.

MANAGEMENT

After obtaining written informed consent, a sequential two-phase treatment protocol was initiated. In Phase 1, the patient underwent treatment with a QSNYL system (Lutronic Spectra XT, South Korea), utilizing both 1064 nm and 660 nm ruby laser-like treatment mode. Sessions were performed at approximately 2-month intervals for a total of six sessions, aiming to gradually reduce pigment burden while allowing adequate recovery between treatments. The 1064 nm QSNYL was delivered at a fluence of 1 J/cm^2, spot size of 8 mm, frequency of 10 Hz, and three passes. This was combined with the 660 nm ruby-like handpiece at a fluence of 1 J/cm^2, spot size of 3 mm, frequency of 1 Hz, and a single pass, with frosting used as the clinical endpoint.

Following completion of Phase 1, Phase 2 consisted of alternating monthly sessions of QSNYL and polynucleotide (PN) therapy (Plinest®, Mastelli, Italy), with each modality administered at approximately 4-week intervals. A total of four PN sessions were performed. PN was administered at a total volume of 2 mL via intradermal microinjections using a 31G needle, targeting the pigmented areas of the lower limbs. QSNYL sessions during Phase 2 were performed using the same parameters as those applied in Phase 1.

After completion of the planned combination phase, QSNYL treatment was continued as maintenance therapy. Treatment intervals for Sessions 14–16 were extended beyond monthly scheduling as part of an individualised treatment approach. The total treatment duration was approximately 26 months, from June 2023 to August 2025. **Figure 1** provides an overview of the treatment protocol administered.

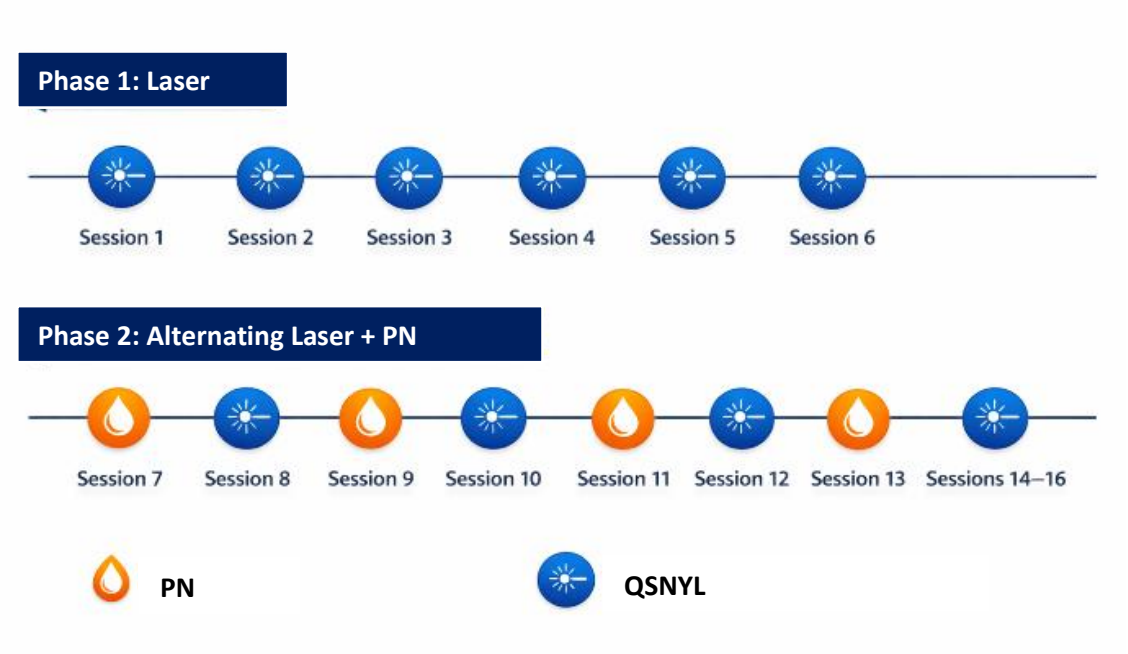

Figure 1. Schematic representation of the sequential two-phase QSNYL and PN treatment protocol. Phase 1 consisted of six QSNYL sessions performed at approximately 2-month intervals. Phase 2 involved alternating sessions of QSNYL and PN therapy. PN was administered for a total of four sessions, followed by continuation of QSNYL as maintenance therapy.

CLINICAL OUTCOMES

Standardized clinical photographs were obtained at predefined time points using consistent patient positioning, camera settings, and lighting conditions to facilitate objective visual comparison. Clinical outcomes were evaluated by both the clinician and the patient using the Global Aesthetic Improvement Scale (GAIS), a 5-point subjective scale comparing post-treatment appearance with baseline (1 = very much improved, 2 = much improved, 3 = improved, 4 = no change, and 5 = worse).

Progressive improvement in pigmentation was observed throughout the treatment course. During Phase 1, gradual lightening of solar lentigines was noted following repeated QSNYL sessions (**Figures 2B** and **3B**) compared with baseline (**Figures 2A** and **3A**), without evidence of worsening pigmentation or prolonged inflammatory response. Following the introduction of combination therapy in Phase 2 and subsequent maintenance treatment, further improvement in pigmentation was observed (**Figures 2C** and **3C**), accompanied by a more uniform skin tone and enhanced overall appearance of the bilateral lower limbs.

Following Phase 1, the patient-reported and clinician-assessed GAIS scores were 2 (much improved) and 3 (improved), respectively. After Phase 2, both scores improved to 1 (very much improved), as shown in **Table 1**.

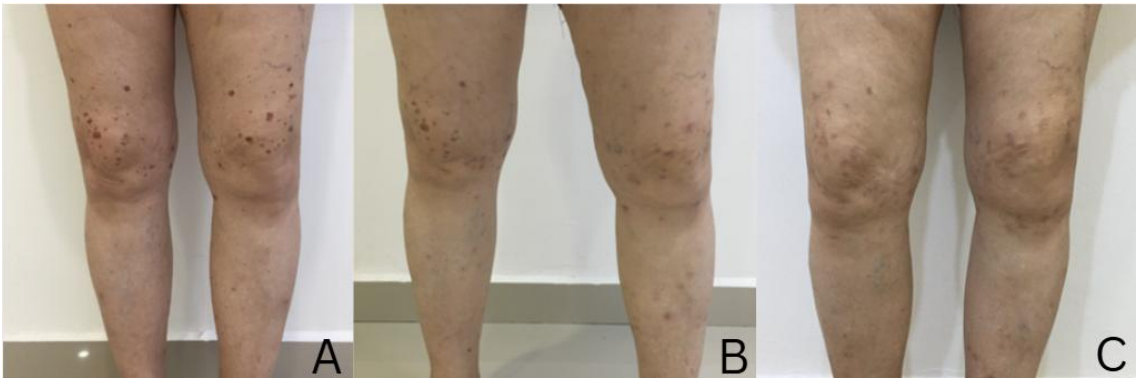

Figure 2. Anterior view of the lower limbs showing solar lentigines at **(A)** baseline, **(B)** after completion of Phase 1 (Session 6), and **(C)** after completion of Phase 2 (Session 16).

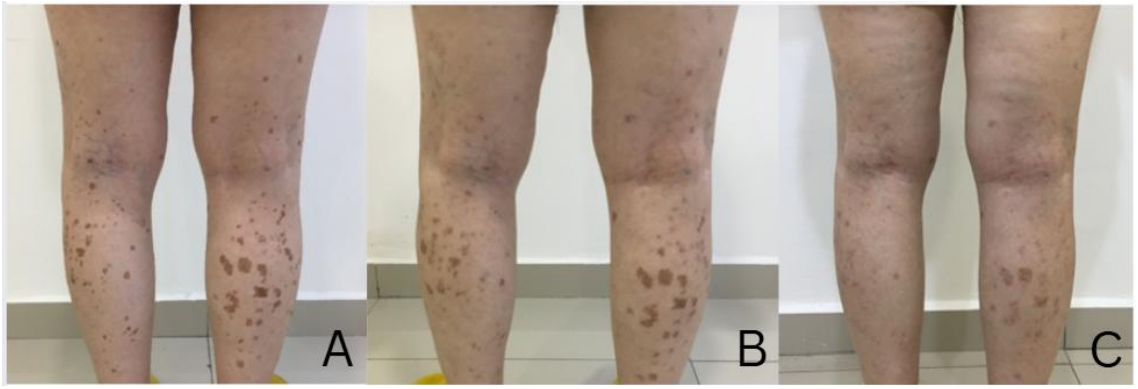

Figure 3. Posterior view of the lower limbs showing solar lentigines at **(A)** baseline, **(B)** after completion of Phase 1 (Session 6), and **(C)** after completion of Phase 2 (Session 16).

Table 1. GAIS scores across treatment phases.

Treatment Phase	Patient	Clinician
Phase 1	2	3
Phase 2	1	1

The patient tolerated both QSNYL and PN treatments well. Transient post-procedural erythema and mild pruritus were occasionally reported and resolved with conservative measures, including moisturisation, menthol-containing topical agents, and oral antihistamines as needed. No significant adverse events, such as blistering, scarring, or post-inflammatory hyperpigmentation, were observed throughout the treatment course. At the two-year follow-up after completion of Phase 2, clinical improvement was maintained, with sustained lightening of solar lentigines and no evidence of recurrence.

DISCUSSION

Chronic solar lentigines affecting the lower limbs may present a therapeutic challenge in aesthetic practice. Available treatments for lentigines include topical agents and energy-based devices, while laser therapy has demonstrated greater effectiveness compared with other treatment modalities, with a favourable safety profile [1].

In the present case, treatment was guided by a theoretical “break and build” concept. This approach refers to an initial pigment-targeting phase using laser therapy to fragment melanin (“break”), followed by a subsequent regenerative phase in which PN are introduced to support dermal recovery and improve overall skin quality (“build”). This sequential strategy was applied to achieve both pigment reduction and adjunctive improvement in skin quality.

Repeated QSNYL treatment during Phase 1 was associated with gradual lightening of pigmentation without significant adverse effects. This finding is consistent with previous studies demonstrating the efficacy of QSNYL in the treatment of solar lentigines [2–5]. In addition, comparative studies have reported superior efficacy and higher patient satisfaction with QSNYL than with cryotherapy, along with a lower incidence of adverse effects [10].

The introduction of PN therapy during Phase 2 represents a sequential combination approach in which a pigment-targeting modality was complemented by a treatment aimed at enhancing skin quality. While QSNYL continued to address residual pigmentation, PN was incorporated as an adjunctive biostimulatory treatment in the later phase. Previous studies have reported improvements in skin texture, elasticity, tone uniformity, and radiance following PN therapy in aesthetic applications [8,11]. In this context, PN may have contributed to the observed improvement in overall skin quality and tone homogeneity. Both QSNYL and PN treatments were well tolerated, with no serious adverse events reported throughout the treatment course.

CONCLUSION

This case demonstrates that a sequential treatment strategy combining QSNYL and PN therapy may be a safe and effective approach for managing chronic lower limb solar lentigines. A staged protocol involving initial pigment reduction followed by regenerative support was associated with sustained clinical improvement and high patient satisfaction at the two-year follow-up after the last treatment. Further studies are warranted to evaluate this approach in larger patient cohorts

and to establish standardized treatment protocols for lower limb pigmentary disorders, incorporating objective pigment quantification and controlled comparative designs.

ACKNOWLEDGEMENT

The author would like to thank the patient for providing consent for the publication of this case and the accompanying clinical images. Appreciation is also extended to all individuals who contributed, directly or indirectly, to this work.

CONFLICT OF INTEREST

The author declares no potential conflicts of interest.

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CASE REPORT

A Single Session of Combined 1064 nm Nd:YAG and 660 nm Ruby Laser–Like Therapy for Long-Standing Facial Solar Lentigines: A Case Study

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ABSTRACT: Solar lentigines are benign hyperpigmented lesions caused by chronic ultraviolet exposure and are a common aesthetic concern, particularly on facial skin. Q-switched lasers are among the principal treatment modality due to their ability to selectively target melanin with minimal downtime and a favorable safety profile. This case reports a 53-year-old Fitzpatrick skin type IV woman who presented with bilateral cheek pigmentation of 30 years' duration and was diagnosed with solar lentigines and concurrent melasma. She underwent a single session of combined 1064 nm Q-switched Nd:YAG (QSNY) laser and 660 nm ruby laser-like modality. Significant improvement was observed at 1-month follow-up without adverse effects. A Global Aesthetic Improvement Scale (GAIS) score of 5 ("very much improved") was recorded. This case highlights the potential effectiveness of a combined wavelength approach in the treatment of solar lentigines, offering an effective and safe treatment option.

Keywords: Solar Lentigines; Fitzpatrick type IV-VI; Q-switched Nd:YAG Laser; 660nm ruby laser-like therapy

INTRODUCTION

Solar lentigines are benign pigmented macules that develop on chronically sun-exposed skin and are among the most common cosmetic concerns encountered in clinical dermatology. These lesions arise from increased melanin production and accumulation within the epidermis, often due to chronic ultraviolet radiation exposure [1].

Over recent decades, various laser modalities have been used to treat solar lentigines with promising clinical outcomes. Q-switched lasers are most commonly employed due to their ability to selectively target melanin, including Q-switched Nd:YAG (QSNY), Q-switched ruby, and Q-switched KTP lasers, all of which have demonstrated significant efficacy in lesion clearance [2]. Among these, the QSNY laser has been most extensively studied, with commonly used wavelengths including 532 nm, 660 nm, and 1064 nm [2].

In this case report, we present a patient with long-standing facial solar lentigines and concurrent melasma treated with a combination of 1064 nm QSNY laser and 660 nm ruby laser-like modality, contributing practical insight into combined laser strategies for pigmentary disorders.

CASE PRESENTATION

A 53-year-old postmenopausal woman with Fitzpatrick skin type IV and no known comorbidities presented with a 30-year history of progressively worsening hyperpigmented lesions over both cheeks, associated with uneven skin tone. She reported significant cumulative sun exposure due to regular participation in outdoor sports since her 30s and had not used sunscreen. There was no

family history of pigmentary disorders, and she had not previously sought dermatological consultation. In 2022, she underwent ablative laser treatment, which resulted in one week of erythema and downtime, with only partial improvement. Subsequently, she developed increased photosensitivity, which limited her tolerance to sunlight and negatively affected her outdoor activities. She had not used any topical treatments for her pigmentation.

On physical examination, multiple well-defined, round, flat, brown macules were observed over the right cheek and left lateral cheek, without associated telangiectasia. In contrast, the left anterior cheek demonstrated an ill-defined, oval, light brown patch with underlying telangiectasia. Additional ill-defined hyperpigmented patches were also noted over both lateral cheeks. Based on the clinical history and examination findings, a diagnosis of solar lentigines with concurrent melasma was made. Dermoscopic evaluation of the lesions was not performed.

MANAGEMENT AND OUTCOME

Written informed consent was obtained from the patient prior to treatment. The patient underwent a single session of depigmentation therapy using a 1064 nm QSNY laser (Cynosure Lutronic, Lutronic Corporation, South Korea) and a 660 nm ruby laser-like modality (RuVY Touch, Cynosure Lutronic, Lutronic Corporation, South Korea). The 1064 nm QSNY laser was delivered at a low fluence of 0.75 J/cm^2, a frequency of 10 Hz, and a spot size of 8 mm, with three passes over the full face (approximately 4,000 shots). In addition, the 660 nm ruby laser-like modality was applied to the solar lentigines at a fluence of 0.75 J/cm^2, using a 3-mm spot size with a single stacking pass. No adjunctive topical or systemic therapies were prescribed during or after treatment.

At 1-month follow-up, marked improvement in solar lentigines was observed (**Figures 1** and **2**). Treatment response was assessed using the Global Aesthetic Improvement Scale (GAIS), a 5-point scale ranging from 1 (worse) to 5 (very much improved). The patient achieved a GAIS score of 5, indicating very much improved appearance compared with baseline. No post-treatment downtime, erythema, or pruritus upon sun exposure was reported, in contrast to her prior experience with ablative laser therapy. The patient expressed high satisfaction with the outcome, noting substantial reduction in pigmentation after a single treatment session, which contributed to improved confidence and quality of life. Further treatment sessions at monthly intervals were planned to address residual pigmentation.

DISCUSSION

Solar lentigo is a common epidermal hyperpigmented lesion that typically manifests in sun-exposed areas. Although benign, these lesions may cause cosmetic disfigurement and negatively affect quality of life, thereby prompting treatment [3]. Various treatment modalities are available for solar lentigines, including topical agents, cryotherapy, chemical peels, and laser therapy. Among monotherapies, laser treatment has demonstrated superior efficacy with a favorable safety profile in the management of solar lentigines [2]. In the present case, a combination of low-fluence 1064 nm QSNY laser and 660 nm ruby laser-like modality was used. Marked pigment clearance was achieved after a single treatment session without downtime or adverse effects.

Previous studies have demonstrated the efficacy of QSNY laser at wavelengths of 532 nm, 660 nm, and 1064 nm in the treatment of solar lentigines. Noh et al. reported that both 532 nm and 660 nm QSNY laser were effective for treating lentigines in patients with darker skin types [4]. Similarly, Kaminaka et al. demonstrated that more than 50% pigment clearance was achieved after 10 weekly sessions of low-fluence 1064 nm QSNY laser treatment in 50.0% of patients with melasma and 62.5% of patients with solar lentigines [5]. Nam et al. further reported marked to near-total improvement in 58.3% of patients with solar lentigines following several sessions of low-fluence 1064 nm QSNY laser treatment using an 8-mm spot size and fluence ranging from 0.8 to 2.0 J/cm^2 [6]. Similarly, the present case utilized a 1064 nm QSNY laser with an 8-mm spot size. However, a lower fluence of 0.75 J/cm^2 was delivered in a single treatment session while still achieving marked pigment clearance.

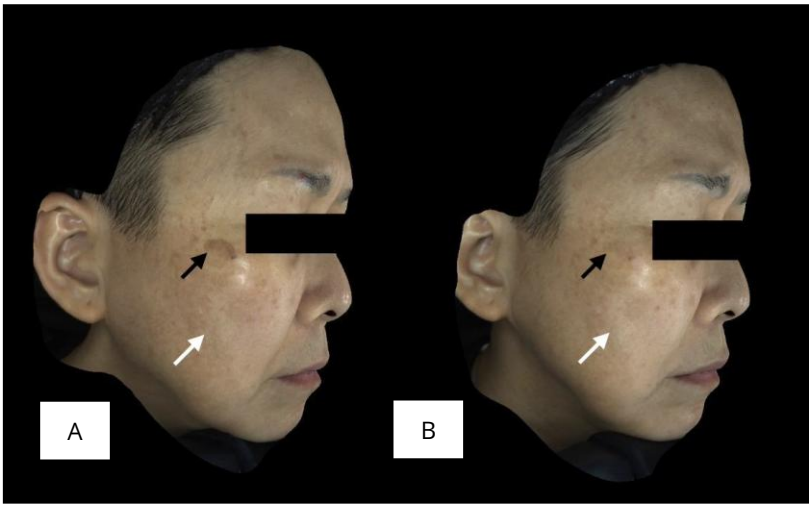

Figure 1. Clinical photographs of the patient at baseline **(A)** and 1-month post-treatment **(B)**, showing improvement in right cheek solar lentigines (black arrows) and melasma (white arrow).

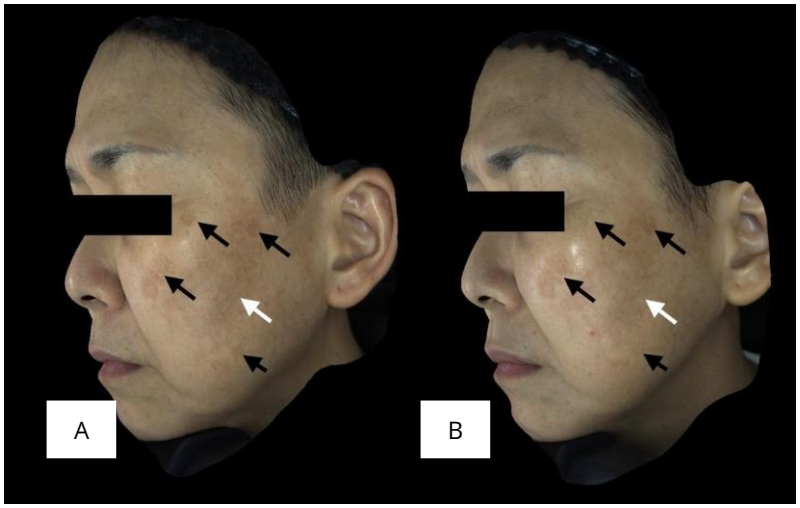

Figure 2. Clinical photographs of the patient at baseline **(A)** and 1-month post-treatment **(B)**, showing improvement in left cheek solar lentigines (black arrows) and melasma (white arrow).

In addition, combination laser approaches may further enhance treatment efficacy. Bohnert et al. demonstrated that combined 532 nm and1064 nm QSNY laser treatment was superior to 1064 nm QSNY laser monotherapy in improving the appearance of solar lentigines [7]. This may be attributed to the different penetration depths and melanin absorption characteristics of the two wavelengths, allowing simultaneous targeting of both superficial epidermal pigmentation and deeper dermal melanin deposits. The 1064 nm wavelength penetrates deeper into the dermis, thereby enabling fragmentation of deeper melanin deposits while also promoting collagen stimulation. In contrast, the 532 nm wavelength preferentially targets superficial epidermal pigmentation because of its higher melanin absorption coefficient [7]. Similarly, the combination of 1064 nm QSNY laser and 660 nm ruby laser–like modality used in the present case may have facilitated the targeting of pigment at both superficial and deeper dermal levels, contributing to the favorable clinical outcome observed.

CONCLUSION

This case demonstrates that the combination of a 1064 nm QSNY laser and a 660 nm ruby-like laser modality may serve as an effective and well-tolerated treatment for long-standing facial solar lentigines with concurrent melasma in a patient with Fitzpatrick skin type IV. Notably, significant clinical improvement was observed after a single treatment session, without post-treatment downtime or adverse effects. Nevertheless, further studies involving larger patient cohorts are warranted to establish optimal treatment parameters, evaluate long-term efficacy, and determine recurrence rates using objective outcome measures.

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The author would like to express sincere gratitude to the patient for granting consent to share her clinical case and photographs for academic and educational purposes. Appreciation is also extended to UR Klinik and the USMARI Research and Innovation Centre for their valuable guidance and support in the preparation of this case report.

CONFLICT OF INTEREST

The author declares no conflict of interest related to the publication of this paper.

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CASE REPORT

Layer-Targeted Multimodal Treatment for Melasma with Concurrent Skin Laxity and Infraorbital Eyebags: A 3-Year Case Report

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ABSTRACT: Melasma is a chronic acquired hypermelanosis that predominantly affects Asian women with Fitzpatrick skin types III–IV. Its multifactorial pathogenesis and high recurrence rate make long-term management challenging, particularly in patients with concurrent facial aging concerns. This study evaluated a layer-targeted multimodal treatment strategy addressing both pigmentation and skin aging. A 46-year-old Asian woman (Fitzpatrick skin type IV) with a history of melasma exceeding 10 years, accompanied by midface laxity and infraorbital eyebags, underwent a sequential treatment protocol. This included 25 sessions of low-fluence 1064-nm and 595-nm Q-switched Nd:YAG (QSNY) laser, 7 sessions of high-intensity focused ultrasound (HIFU), 2 sessions of calcium hydroxyapatite (CaHA), and 4 sessions of pulsed-wave radiofrequency (RF) microneedling. Clinical outcomes were assessed using the modified Melasma Area and Severity Index (mMASI) and the Global Aesthetic Improvement Scale (GAIS). The mMASI score improved from 4.5 at baseline to 0.6 at final follow-up, with visible improvement in skin laxity and infraorbital contour. The final GAIS rating was Grade 1 (very much improved). No adverse events, including post-inflammatory hyperpigmentation, were observed over a 3-year follow-up period. This case suggests that a layer-targeted multimodal approach integrating pigment modulation, structural support, and dermal remodelling may achieve sustained improvement in chronic melasma while concurrently addressing facial aging in patients with darker skin types.

Keywords: Melasma, Multimodal therapy, Q-switched Nd:YAG, HIFU, Calcium hydroxyapatite, RF microneedling, Fitzpatrick IV, Asian skin

INTRODUCTION

Melasma is an acquired hyperpigmentation disorder characterized by symmetric, irregular brown macules and patches that predominantly affect the malar regions and forehead. It occurs more frequently in women and individuals with darker skin types [1,2] and is associated with significant emotional and psychosocial burden [2,3]. Despite the availability of topical agents, oral therapies, and energy-based devices, long-term disease control remains challenging due to its multifactorial pathogenesis, which involves ultraviolet (UV) exposure, hormonal influences, and genetic predisposition [1]. In addition, melasma pathogenesis is associated with structural alterations involving the epidermis, basement membrane, and dermis, including vascular changes, solar elastosis, mast cell activation, and fibroblast senescence [4]. These factors are believed to contribute to treatment resistance and disease recurrence. Consequently, single-modality

therapies often provide suboptimal outcomes, highlighting the potential benefit of a multimodal treatment approach for melasma management [3].

This case report describes a layer-targeted, sequential multimodal treatment strategy combining low-fluence Q-switched Nd:YAG (QSNY) laser toning, high-intensity focused ultrasound (HIFU), calcium hydroxyapatite (CaHA), and pulsed-wave radiofrequency (RF) microneedling over a 3-year period to improve chronic melasma while concurrently addressing skin laxity and infraorbital eyebags in a patient with Fitzpatrick skin type IV.

CASE PRESENTATION

A 46-year-old Asian woman with Fitzpatrick skin type IV presented with melasma of more than 10 years' duration, progressive midface skin laxity, and prominent infraorbital eyebags. She reported worsening facial pigmentation following her second pregnancy 12 years earlier. She had no prior dermatological or aesthetic procedures. Her menstrual cycles were regular, and she denied any significant medical history or hormonal therapy. She worked at a morning market with daily UV exposure and did not practice routine photoprotection. She reported increasing self-consciousness due to progressive facial pigmentation and age-related changes.

Clinical examination revealed diffuse brown hyperpigmented patches with irregular borders over both malar regions. A diagnosis of melasma was made based on clinical and photographic evaluation, with concurrent midface skin laxity and prominent infraorbital eyebags. Baseline melasma severity, assessed using the modified Melasma Area and Severity Index (mMASI), was 4.5, indicating moderate severity.

MANAGEMENT AND OUTCOME

A structured, sequential multimodal protocol was implemented between 2023 and 2025. The protocol included repeated low-fluence QSNY laser sessions, HIFU for structural tightening, CaHA biostimulation for dermal remodelling, and RF microneedling for additional dermal modulation. Photoprotection was emphasized throughout the treatment period. The treatment modalities, device specifications, parameters, and clinical targets are summarized in **Table 1**, while the overall treatment timeline is illustrated in **Figures 1** to **3**. Written informed consent was obtained from the patient for publication of this case report and the accompanying clinical photographs. All identifying information was removed to ensure patient confidentiality.

Following the multimodal treatment regimen, the patient demonstrated progressive improvement in pigmentation and overall skin quality. Melasma improved compared with baseline, with the mMASI score decreasing from 4.5 to 0.6 at final follow-up, three months after the last intervention. Clinical photographic assessments demonstrated improvement in midface and lower-face laxity, as well as reduction in infraorbital eyebags with improved periorbital contour. These improvements are shown in **Figures 4** to **5**.

Patient outcomes were further evaluated using the Global Aesthetic Improvement Scale (GAIS), which employs a 5-point scale ranging from 1 (very much improved) to 5 (worse) to rate overall cosmetic improvement. The final GAIS score was 1 (very much improved). No adverse events, including PIH, prolonged erythema, blistering, scarring, or prolonged downtime, were observed throughout the 3-year treatment period.

Table 1. Summary of the layer-targeted multimodal treatment regimen, including treatment modality, indication, schedule, and key procedural parameters.

Modality (Brand)	Details
Low-fluence Q-switched Nd:YAG laser *(Spectra XT; Lutronic, Goyang, South Korea)*	• Performed from January 2023 to October 2025 at 1–2-month intervals (25 sessions) without adjunctive oral or topical depigmenting agents. • Used primarily for melasma. • Parameters: 1064-nm at 0.55–0.65 J/cm^2, 8 mm, 10 Hz, pulse-to-pulse (PTP) mode; 595-nm at 0.17–0.22 J/cm^2, 5 mm, 5 Hz. (Both wavelengths were used in the same session)
High-intensity focused ultrasound (HIFU) *(Ultraformer; Classys Inc., Seoul, South Korea)*	• Performed in August 2023, October 2023, February 2024, June 2024, October 2024, April 2025, and October 2025 (7 sessions). • Used primarily for skin laxity, midface descent, and infraorbital eyebags. • Parameters: 4.5 mm at 0.6 J, 100 shots; 3.0 mm at 0.4–0.5 J, 150 shots; 2.0 mm at 0.2 J, 150 shots.

	• Intensive phase: the first two sessions were performed at 2-month intervals, followed by three sessions at 4-month intervals to achieve initial structural correction. • Maintenance phase: subsequent 6-monthly sessions used to preserve treatment effect.
Calcium hydroxyapatite (CaHA) biostimulation *(Radiesse; Merz Aesthetics, Frankfurt, Germany)*	• Performed in November 2023 and December 2023 (2 sessions). • Used primarily for dermal remodeling and midface support. • Each session used 1.5 mL, diluted 1:1, injected in the subdermal plane using a 25G, 50 mm cannula across the anterior medial cheek and submalar region.
Radiofrequency (RF) microneedling *(Sylfirm X; Viol Co., Seongnam, South Korea)*	• Performed in March 2025, May 2025, July 2025, and September 2025 (4 sessions). • Introduced after mild melasma fluctuation was observed despite prior improvement. Each session conducted separately from Q-switched Nd:YAG laser. • Used primarily for melasma stabilization. • Parameters: pulsed-wave 2 (PW2) mode, 0.3 mm depth, power 3, 200–250 shots.
Photoprotection	• Continuous throughout treatment. • Broad-spectrum sunscreen, sun protection factor (SPF) ≥ 50 daily. • Used for maintenance and relapse prevention.

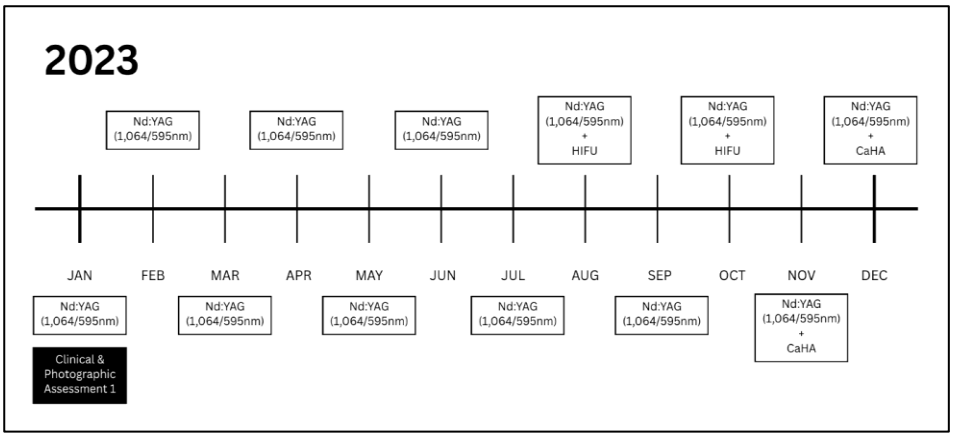

Figure 1. Layer-targeted multimodal treatment course conducted in 2023, consisting of serial low-fluence QSNY (1064/595-nm) laser sessions with adjunctive HIFU and CaHA administered at selected time points following baseline clinical and photographic assessment.

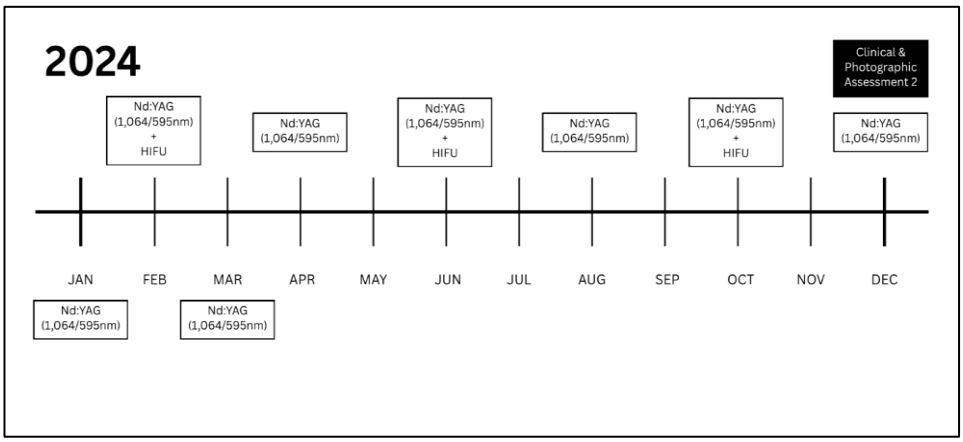

Figure 2. Layer-targeted multimodal treatment course conducted in 2024, consisting of serial low-fluence QSNY (1064/595-nm) laser sessions with adjunctive HIFU administered at 4-month intervals, followed by a second clinical and photographic assessment at the end of the year.

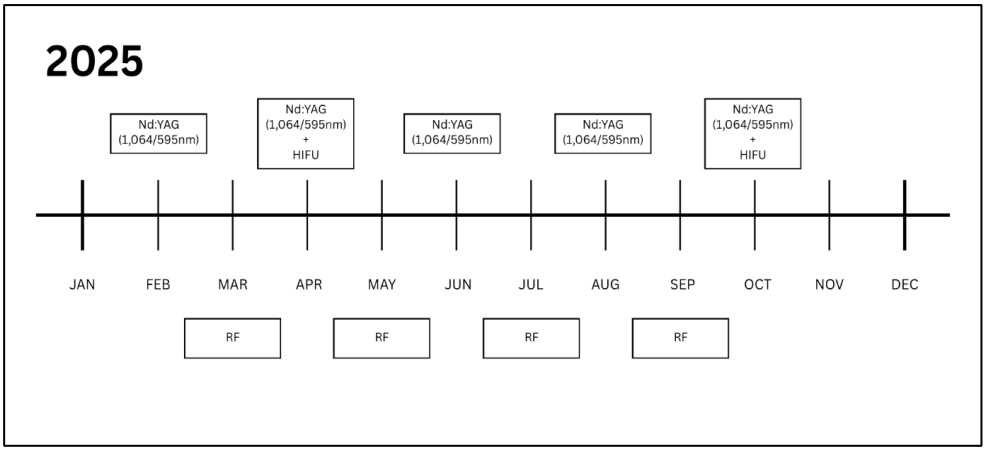

Figure 3. Layer-targeted multimodal treatment course conducted in 2025, consisting of low-fluence QSNY (1064/595-nm) laser sessions, HIFU administered at 6-month intervals, and additional RF microneedling treatments performed every 2 months as maintenance therapy.

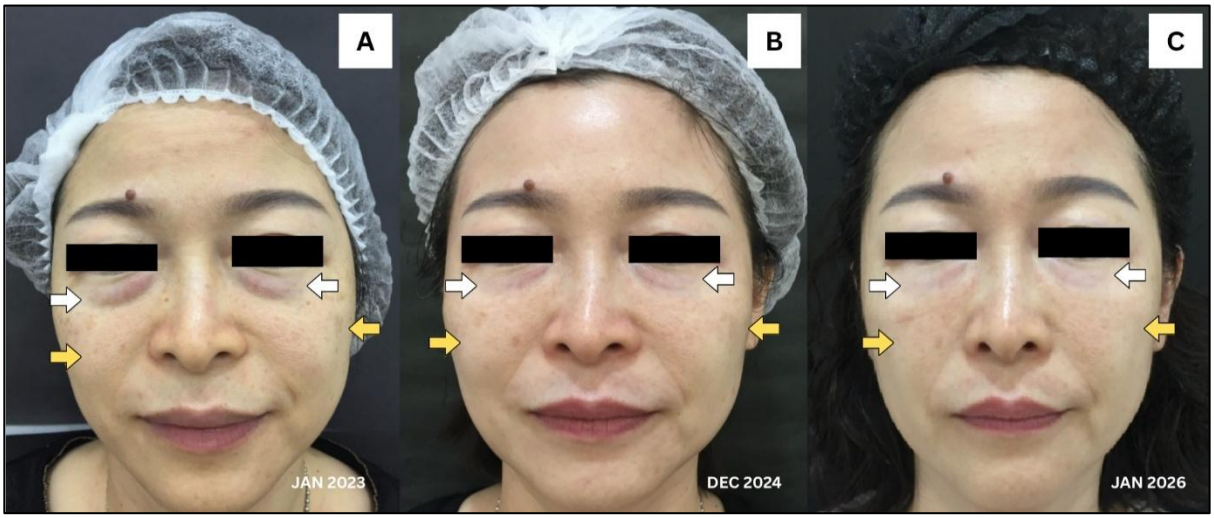

Figure 4. Clinical photographs of the patient in right oblique view at baseline **(A)**, follow-up in December 2024 **(B)**, and three months after the last intervention **(C)**, demonstrating progressive improvement in infraorbital eyebag prominence and periorbital hyperpigmentation (white arrows), with concurrent reduction in malar hyperpigmentation and improvement in overall skin quality (yellow arrows) over the treatment course.

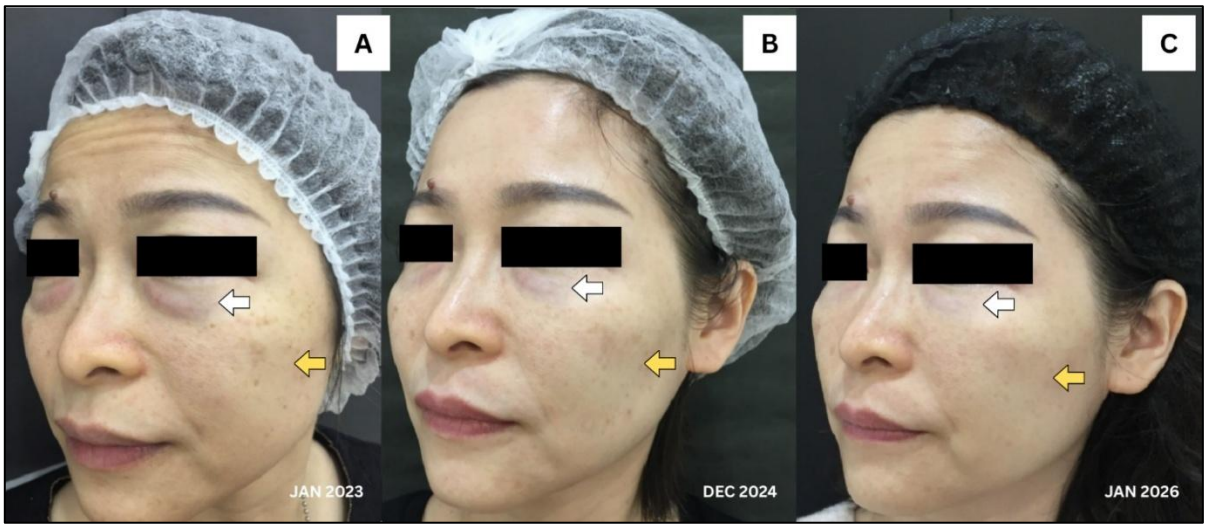

Figure 5. Clinical photographs of the patient in left oblique view at baseline **(A)**, follow-up in December 2024 **(B)**, and three months after the last intervention **(C)**, demonstrating progressive improvement in infraorbital eyebag prominence and periorbital hyperpigmentation (white arrows), with concurrent reduction in malar hyperpigmentation and improvement in overall skin quality (yellow arrows) over the treatment course.

DISCUSSION

The pathogenesis of melasma is multifactorial and involves not only UV exposure and hormonal influences, but also dermal, vascular, and photoaging-related alterations, including basement membrane disruption, increased vascularity, and fibroblast senescence [4]. These factors may contribute to disease chronicity, treatment resistance, and recurrence. As a result, pigment-targeted monotherapies often provide only partial or temporary improvement because they do not adequately address the underlying dermal microenvironment. Therefore, a stepwise multimodal approach targeting different pathogenic components has been recommended for the long-term management of melasma [3].

In this case, treatment was structured according to a layer-targeted rationale. Initial therapy focused on pigment reduction using low-fluence QSNY laser, followed by structural remodeling with HIFU and CaHA to address concurrent facial aging concerns. Adjunctive RF microneedling was later incorporated as maintenance therapy. This sequential approach may be described as a "break-and-build" strategy.

Low-fluence 1064-nm QSNY laser was used as the initial "break" phase to achieve gradual pigment reduction before introducing deeper structural modalities. This approach is supported by its established efficacy in melasma, particularly among Asian patients [5,6]. In this patient, a conservative serial low-fluence protocol using PTP mode was adopted. By delivering two closely spaced low-energy pulses within a single Q-switched cycle, PTP enhances photoacoustic disruption of melanosomes while minimizing thermal injury, making it suitable for gradual pigment reduction in darker skin types. Previous studies have demonstrated that low-fluence 1064-nm QSNY laser with PTP mode is both safe and effective for melasma, with significant clinical improvement reported after repeated sessions in Asian populations [7]. Additionally, the 595-nm wavelength was incorporated within the same session as an adjunct vascular-targeted modality, given the recognized role of vascular components in melasma pathophysiology [4].

Following initial pigment control, HIFU was introduced primarily to address concurrent midface laxity and infraorbital eyebags. This represented the structural "build" phase, aiming to improve tissue support across multiple layers, including the superficial musculoaponeurotic system (SMAS), deep dermis, and upper dermis. HIFU is well established in facial rejuvenation due to its ability to target deeper tissue layers without epidermal disruption [8]. Although not primarily intended for melasma management, it may have provided additional adjunctive benefit for the patient's pigmentation. Studies have suggested that HIFU may improve melasma outcomes when used alongside QSNY therapy, with acceptable safety profiles [9,10]. One proposed mechanism is that ultrasound-induced vibration and friction exert mechanical destructive effects that facilitate the elimination of melanin and pigmented debris from the epidermis and upper dermis [11].

Diluted CaHA was subsequently administered as a biostimulatory agent to improve dermal quality and structural integrity through neocollagenesis and extracellular matrix remodeling. Previous studies have demonstrated that diluted or hyperdiluted CaHA improves skin laxity and quality through collagen remodeling, particularly in the mid- and lower face [12]. In addition, CaHA microspheres have been shown to directly stimulate fibroblast activity, promoting collagen production [13].

Although progressive improvement was observed, mild fluctuations occurred during follow-up, likely related to ongoing UV exposure and the chronic relapsing nature of melasma. Therefore, RF microneedling with pulsed-wave delivery at a shallow depth of 0.3 mm was incorporated as a superficial dermal maintenance strategy to enhance treatment stability. Evidence from a prospective split-face study demonstrated that the addition of 0.3-mm fractional microneedling RF following QSNY laser toning produced synergistic effects, resulting in greater improvement in pigmentation indices compared with QSNY monotherapy [14]. Similarly, Kwon et al. reported superior efficacy of combination therapy with fractional microneedling RF compared with conventional QSNY monotherapy in melasma treatment [15]. Jung et al. further demonstrated that combination therapy using microneedling RF and low-fluence 1064-nm QSNY laser was safe and effective for melasma treatment, with additional improvement in periocular wrinkles and no serious adverse effects [16]. Maintenance therapy using RF microneedling has also been shown to sustain clinical improvement following conventional melasma treatment, supporting its role as a stabilizing adjunct [17]. Collectively, these findings

suggest that superficial RF microneedling may be particularly useful in patients with recurrent or fluctuating melasma.

Overall, this case suggests that melasma in patients with concurrent facial aging may benefit from a multimodal, layer-targeted approach rather than pigment-focused monotherapy alone. By combining pigment modulation, vascular-targeted treatment, dermal regeneration, and structural support, sustained clinical improvement can be achieved with a favorable safety profile.

CONCLUSION

These findings suggest that a layer-targeted, multimodal treatment strategy may be associated with improvement in both pigmentation and structural aging features in this patient. The combination of low-fluence QSNY laser therapy, HIFU, CaHA biostimulation, and RF microneedling may address multiple components of melasma, including pigmentary, dermal, vascular, and structural alterations. However, given the inherent limitations of a single case report, the level of evidence remains low. Therefore, larger, well-designed controlled studies are required to further validate this multimodal layer-targeted approach in individuals with melasma and concomitant skin aging concerns.

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None.

CONFLICT OF INTEREST

The author declares no conflict of interest. No sponsorship or financial support was received for this case report.

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CASE REPORT

Sequential Q-switched Nd:YAG Laser Therapy with Adjunctive High-Intensity Focused Ultrasound for Melasma and Acquired Bilateral Nevus of Ota-like Macules (ABNOM): A Four-Year Case Report

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ABSTRACT: Management of patients with concomitant melasma and acquired bilateral nevus of Ota-like macules (ABNOM) remains challenging due to the risk of post-laser induction or exacerbation of melasma and the potential development of post-inflammatory hyperpigmentation (PIH). We report a case of a 56-year-old woman with long-standing facial melasma and ABNOM treated with low-fluence 1064 nm Q-switched Nd:YAG (QSNY) laser and high-intensity focused ultrasound (HIFU). A total of 31 QSNY laser sessions were performed at 1–2-month intervals, together with four sessions of HIFU over four years. Marked clinical improvement with progressive pigment lightening was observed throughout the treatment period. The modified Melasma Area and Severity Index (mMASI) score decreased from 11 at baseline to 3, representing a 73% reduction. Near-complete clearance of ABNOM lesions was achieved, accompanied by improvement in skin turgor and laxity. Throughout the treatment course, only mild transient erythema and post-laser hyperpigmentation were observed, both resolving spontaneously without intervention, with no other significant adverse effects reported. This combined approach resulted in sustained improvement in pigmentation and skin quality, suggesting that low-fluence QSNY laser combined with HIFU may be an effective and safe treatment option for patients with concomitant melasma and ABNOM.

Keywords: Melasma, ABNOM, Q-switched Nd:YAG, Laser toning, High-intensity focused ultrasound, Pigmentary disorders

INTRODUCTION

Melasma and acquired bilateral nevus of Ota-like macules (ABNOM) are hyperpigmentary disorders that commonly affect sun-exposed facial areas in middle-aged women and have been associated with genetic predisposition and hormonal influences [1]. Melasma is characterized by irregular brown macules symmetrically distributed over sun-exposed areas, particularly the face, and commonly affects women with Fitzpatrick skin phototypes III–V [2]. In contrast, ABNOM, also known as Hori's nevus, presents as bilateral blue-brown macules involving the forehead, temporal regions, lateral and lower eyelids, nasal root, and alae nasi, without involvement of the conjunctivae or mucous membranes. It is a relatively common pigmentary disorder among Asian populations [3].

Several studies have identified melasma as the most common concomitant pigmentary disorder in patients with ABNOM [4,5]. Wang et al. reported that 24.0% of patients with ABNOM had concomitant melasma in their study [1]. In addition, Yang et al. demonstrated that increasing age in

patients with ABNOM was associated with a higher likelihood of concomitant melasma and darker lesion pigmentation, both of which may increase the risk of post-inflammatory hyperpigmentation (PIH), thereby complicating treatment and reducing therapeutic efficacy [6].

Q-switched lasers, particularly the 1064 nm Q-switched Nd:YAG (QSNY) laser, have been widely used for the treatment of melasma and ABNOM. The 1064 nm QSNY laser is considered relatively safe in darker-skinned individuals due to its lower risk of pigmentary complications [3]. However, the coexistence of melasma in patients with ABNOM has been identified as an important factor influencing the efficacy of Q-switched laser treatment, with treatment outcomes reported to be 47 times more favorable in patients without concomitant melasma [3]. Furthermore, Wang et al. observed that treatment of ABNOM using a 1064 nm QSNY laser may induce new melasma lesions or exacerbate pre-existing melasma, a phenomenon not observed in patients with nevus of Ota [1].

Therefore, careful selection of laser parameters and the use of adjunctive therapies may be beneficial in patients presenting with concomitant melasma and ABNOM. In the present case, we evaluated the efficacy of combined low-fluence 1064 nm QSNY laser and high-intensity focused ultrasound (HIFU) in a patient with untreated melasma and ABNOM of more than 20 years' duration.

CASE PRESENTATION

A 56-year-old postmenopausal woman presented with a 20-year history of progressively worsening bilateral facial hyperpigmentation over the malar regions, extending to the temples and mid-cheeks, with intermittent exacerbations following sun exposure. She reported intermittent occupational sun exposure while working at her husband's factory, with inconsistent photoprotection (SPF 50 sunscreen used approximately 2–3 times per week). She had not received any prior treatment. A positive family history of similar pigmentation was noted in her mother. Her medical history was otherwise unremarkable, and she had no history of hormone replacement therapy.

On examination, speckled bluish-gray macules were observed over both malar regions, extending to the temples and mid-cheeks, along with diffuse brown patches with ill-defined borders over the same areas (**Figure 1**). The forehead, upper lip, and chin were spared. She had Fitzpatrick skin phototype IV. The baseline modified Melasma Area and Severity Index (mMASI) score was 11. A clinical diagnosis of melasma with concomitant ABNOM was made based on patient history and clinical examination. Wood's lamp examination and dermoscopy were not performed. Differential diagnoses were excluded based on clinical assessment, history, and lesion distribution.

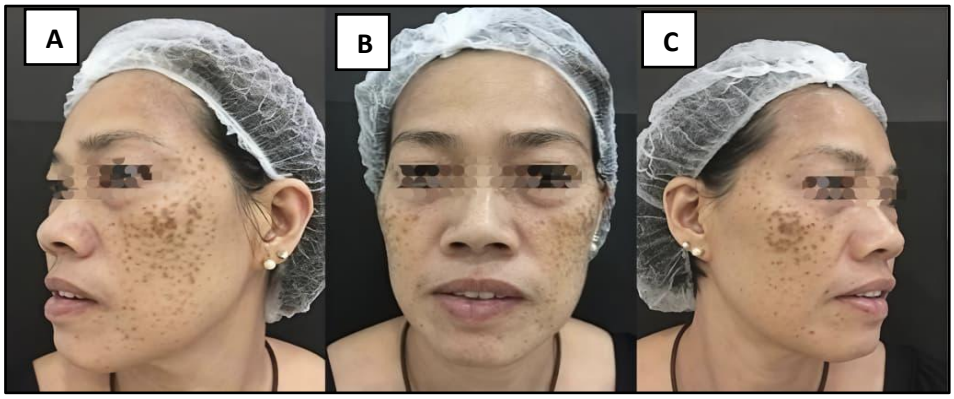

Figure 1. Clinical photographs at baseline showing facial hyperpigmentation over both malar regions: **(A)** left oblique (45°), **(B)** frontal, and **(C)** right oblique (45°) views.

MANAGEMENT AND OUTCOME

Written informed consent was obtained prior to treatment and publication of this case report. The patient underwent a multimodal treatment regimen from 2022 to 2025, consisting of repeated 1064 nm QSNY laser therapy combined with adjunctive HIFU, together with strict and consistent photoprotection throughout the treatment period.

A QSNY laser system (Lutronic Spectra XT®, Lutronic, Korea) was used, and parameters were individualized according to the clinical features of melasma and ABNOM. For melasma, full-face toning was performed using low-fluence settings of

0.8–1.0 J/cm² at 10 Hz with an 8-mm spot size, delivering one pass per session. This aimed to achieve gradual pigment reduction while minimizing epidermal injury and reducing the risk of PIH. For ABNOM lesions, targeted treatment was performed using higher fluence settings of 4.0–4.8 J/cm² at 5 Hz with a 4-mm spot size, also with a single pass. Treatment was continued until a clinical endpoint of mild dermal whitening was achieved, with care taken to avoid overtreatment and excessive thermal damage. A total of 31 sessions were performed at 1–2-month intervals, with parameters adjusted over time based on clinical response and tolerance. Adjunctive HIFU was administered separately from laser sessions, with a total of four sessions performed in 2025. Multiple transducers were used (4.5 mm at 0.7 J, 3.0 mm at 0.5 J, and 2.0 mm at 0.3 J) to promote dermal remodeling, improve skin laxity, and enhance overall skin quality.

Marked clinical improvement with progressive pigment lightening was observed over the 4-year treatment period (**Figures 2** and **3**). The mMASI score decreased from 11 at baseline to 3, representing a 73% reduction in mMASI score. Near-complete clearance of ABNOM lesions was achieved, along with clinically appreciable improvement in skin turgor and laxity. Throughout the treatment course, only mild transient erythema and short-lived post-laser hyperpigmentation were observed, both of which resolved spontaneously without intervention. No significant adverse effects, including persistent hyperpigmentation, hypopigmentation, scarring, prolonged erythema, or edema, were reported. No recurrence was observed during follow-up.

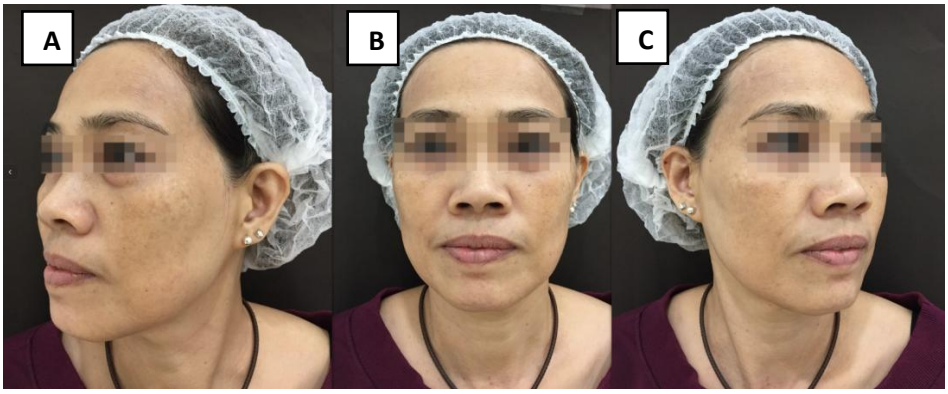

Figure 2. Clinical photographs showing marked improvement in facial pigmentation at 1 month after the 26th 1064 nm QSNY laser session and 1st HIFU treatment: **(A)** left oblique (45°), **(B)** frontal, and **(C)** right oblique (45°) views.

Figure 3. Clinical photographs showing near-complete clearance of facial pigmentation with improvement in skin quality at 1 month after the 31st 1064 nm QSNY laser session and 4th HIFU treatment: **(A)** left oblique (45°), **(B)** frontal, and **(C)** right oblique (45°) views.

DISCUSSION

This case report describes the clinical outcome of a patient with concomitant melasma and ABNOM treated with combined low-fluence 1064-nm QSNY laser and HIFU therapy. QSNY laser has been widely utilized in the treatment of both melasma and ABNOM due to its favorable efficacy and safety profile. In melasma, low-fluence QSNY laser toning has demonstrated effectiveness with acceptable

tolerability in multiple studies [7-11]. Similarly, QSNY laser, including low-fluence settings, has been regarded as an effective and safe treatment modality for ABNOM [12-15].

Despite its efficacy, the management of patients with concomitant melasma and ABNOM remains challenging due to the risk of post-laser induction or exacerbation of melasma and the potential development of PIH. Patients with ABNOM and concomitant melasma generally exhibit less favorable treatment outcomes and a higher susceptibility to PIH, as well as worsening of melasma [6]. Earlier studies using higher fluence QSNY laser settings ranging from 7–10 J/cm^2 reported post-treatment hyperpigmentation in some patients [13,15]. In contrast, Cho et al. demonstrated favorable outcomes using lower fluence settings of 2.2–6.0 J/cm^2 for ABNOM, with no cases of hypo- or hyperpigmentation observed after multiple treatment sessions and high patient satisfaction rates [12]. Furthermore, Yang et al. reported reducing laser fluence to 2.5–4.0 J/cm^2 in patients with concomitant ABNOM and melasma in order to minimize disease exacerbation [6]. Therefore, in patients with concomitant melasma and ABNOM, the use of lower laser energy settings is recommended to minimize adverse effects. In the present case, low-fluence settings of 0.8–1.0 J/cm^2 were used for melasma, while 4.0–4.8 J/cm^2 was applied for ABNOM, resulting in marked clinical improvement by the end of the treatment course.

In addition, adjunctive HIFU may have contributed further benefit by improving pigmentation while enhancing skin turgor and laxity. HIFU promotes dermal remodeling and collagen stimulation, thereby improving overall skin quality and potentially contributing to pigmentary improvement. Importantly, no worsening of hyperpigmentation was observed during the HIFU treatment period. Several studies have reported improvements in skin laxity following HIFU treatment [16-18]. Furthermore, emerging evidence suggests that HIFU may enhance treatment outcomes in melasma when combined with QSNY laser therapy, with an acceptable safety profile [19,20]. No adverse effects were observed in this case, likely due to the use of conservative treatment parameters and appropriate treatment intervals, which are particularly important in patients with darker skin types.

CONCLUSION

This case report suggests that repeated low-fluence QSNY laser therapy combined with adjunctive HIFU may represent an effective and safe treatment option for patients with concomitant melasma and ABNOM. The treatment approach achieved gradual pigment reduction with minimal adverse effects and was well tolerated. Nevertheless, further studies involving larger patient cohorts, standardized treatment protocols, and objective assessment tools are required to validate these findings.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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CASE REPORT

A Case of Milia En Plaque Secondary to Granulomatous Rosacea in a 22-Year-Old Filipino

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ABSTRACT: Milia en plaque (MEP) is a rare variant of primary milia characterized by multiple grouped milia arising on an erythematous plaque. Its etiopathogenesis remains unclear, although some cases have been associated with genetic and autoimmune conditions. We report the case of a 22-year-old Filipina with a 10-month history of an erythematous facial patch with papules and pustules, which progressively evolved into an erythematous plaque with multiple red and white papules. An initial diagnosis of MEP, likely secondary to papulopustular rosacea, was made, and a skin punch biopsy was performed for confirmatory diagnosis. Histopathological examination revealed epidermal spongiosis with a dense dermal nodular granulomatous inflammatory infiltrate composed of lymphocytes and histiocytes, along with small milia-like cysts. A definitive diagnosis of MEP secondary to granulomatous rosacea was established. The patient was treated with low-dose oral isotretinoin and azithromycin, together with topical metronidazole, azelaic acid, trifarotene, ivermectin, and serial milia extraction. Treatment adjustments, including discontinuation or modification of topical agents, were made based on clinical response. Complete resolution was achieved through combined management targeting both the MEP (topical retinoids and extraction) and the underlying rosacea. This case highlights the importance of careful clinical assessment and histopathological confirmation in diagnosing rare dermatologic conditions such as MEP associated with more common but potentially underdiagnosed inflammatory dermatoses.

Keywords: Milia, Milia en plaque, Rosacea, Granulomatous rosacea, Filipina

INTRODUCTION

Milia is a benign and generally asymptomatic skin condition that results from obstruction of a hair follicle or eccrine sweat duct. These small keratin-containing cysts may be classified as primary, occurring spontaneously, or secondary, arising following triggering events such as trauma, inflammatory and/or bullous skin diseases, or medication use [1]. Milia en plaque (MEP), characterized by multiple grouped milia distributed over an erythematous plaque, is a rare variant of primary milia. Although its exact etiology and pathogenesis remain unclear, several cases have been reported in association with genetic and autoimmune diseases, including pseudoxanthoma elasticum and discoid lupus erythematosus [2]. In this report, we present a case of MEP secondary to granulomatous rosacea to highlight the rarity of this association and to describe the clinical diagnostic and therapeutic approaches undertaken in the management of the patient.

CASE PRESENTATION

A 22-year-old woman presented with a 10-month history of an erythematous patch accompanied by papules and pustules on the right cheek, which developed one day after intense sun exposure. No other significant triggering factors, such as trauma,

burns, or medication use, were identified. Four months after the onset of the initial lesions, the erythematous patch progressed into an erythematous plaque with multiple red and white papules. Informed consent was obtained for publication of this case report.

MANAGEMENT AND OUTCOME

An initial clinical impression of milia en plaque (MEP), likely secondary to papulopustular rosacea, was made based on clinical examination. As part of the diagnostic workup, a skin punch biopsy was performed to establish a definitive diagnosis of MEP. Histopathological examination revealed epidermal spongiosis with a dense nodular granulomatous inflammatory infiltrate composed of lymphocytes and histiocytes within the dermis, along with small milia-like cysts, consistent with granulomatous rosacea and MEP, respectively (**Figure 1**). Immunohistochemical staining demonstrated CD3 and CD68 positivity, indicating the presence of T cells and macrophages, thereby supporting the diagnosis of granulomatous rosacea (**Figure 2**). A final histopathological diagnosis of MEP secondary to granulomatous rosacea was established.

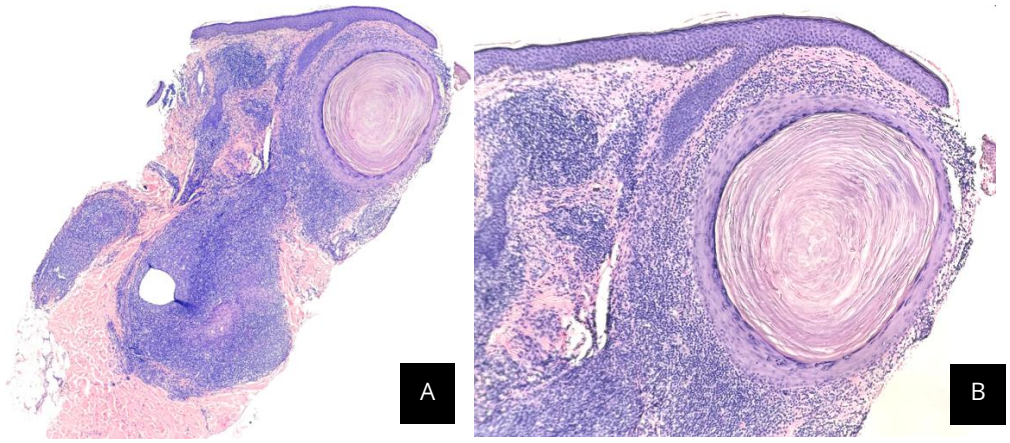

Figure 1. Histopathologic examination at **(A)** scanning magnification (×4) and **(B)** higher magnification (×10), showing a dense nodular granulomatous inflammatory infiltrate composed of lymphocytes and histiocytes within the dermis, along with small milia-like cysts, consistent with granulomatous rosacea and MEP, respectively.

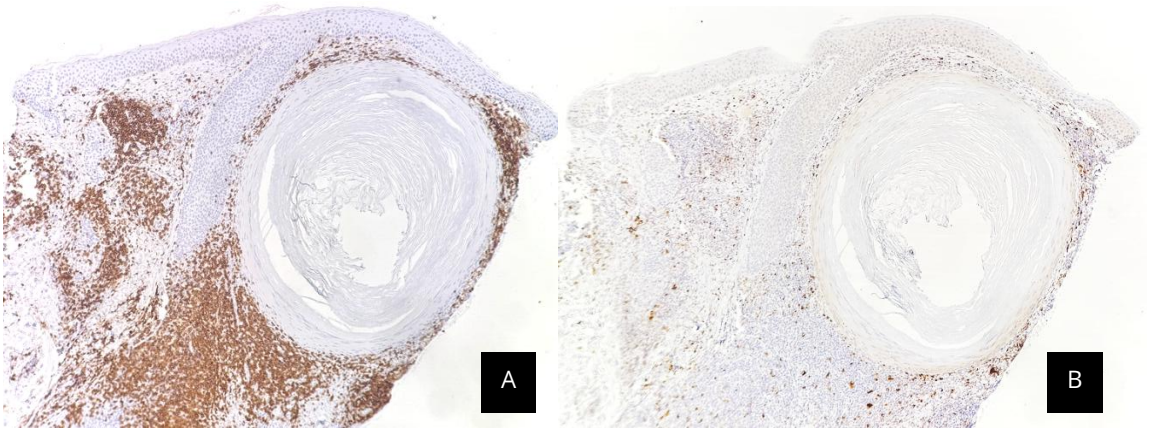

Figure 2. Immunohistochemical staining for **(A)** CD3 and **(B)** CD68, showing positive and weakly positive expression, respectively. These findings indicate the presence of T cells and macrophages, supporting the diagnosis of granulomatous rosacea.

Treatment was initiated with isotretinoin 10 mg once daily, azithromycin 500 mg three times weekly for six weeks, topical metronidazole 0.75% cream once daily in the morning, and azelaic acid 15% cream once daily at night. Initial management focused on controlling the inflammatory and erythematous features of rosacea prior to definitive treatment of MEP. After one month, only slight improvement in both rosacea and MEP was observed, therefore, trifarotene 0.005% cream for MEP and topical ivermectin 1% cream as adjunctive treatment for rosacea were added, applied once daily in the morning and at night, respectively. Approximately 80% improvement in both

conditions was observed after six months of treatment, along with three monthly sessions of milia extraction. The patient was subsequently maintained on isotretinoin 10 mg once daily, trifarotene 0.005% cream, and topical ivermectin 1% cream. Oral isotretinoin was gradually tapered to twice weekly at seven months of treatment. Near-complete resolution was achieved after nine months of combined oral and topical treatment (**Figure 3**). The treatment timeline and clinical response are illustrated in **Figure 4**.

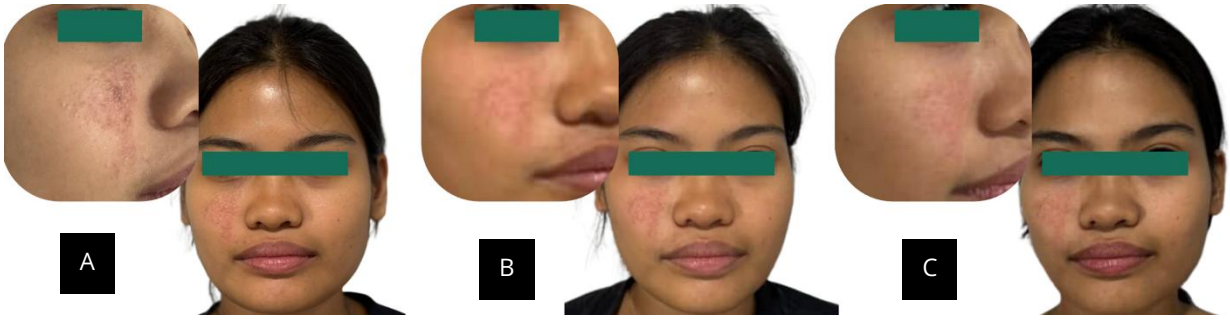

Figure 3. Clinical images showing lesions at **(A)** baseline, **(B)** 80% improvement after six months of treatment, and **(C)** near-complete resolution after nine months of treatment.

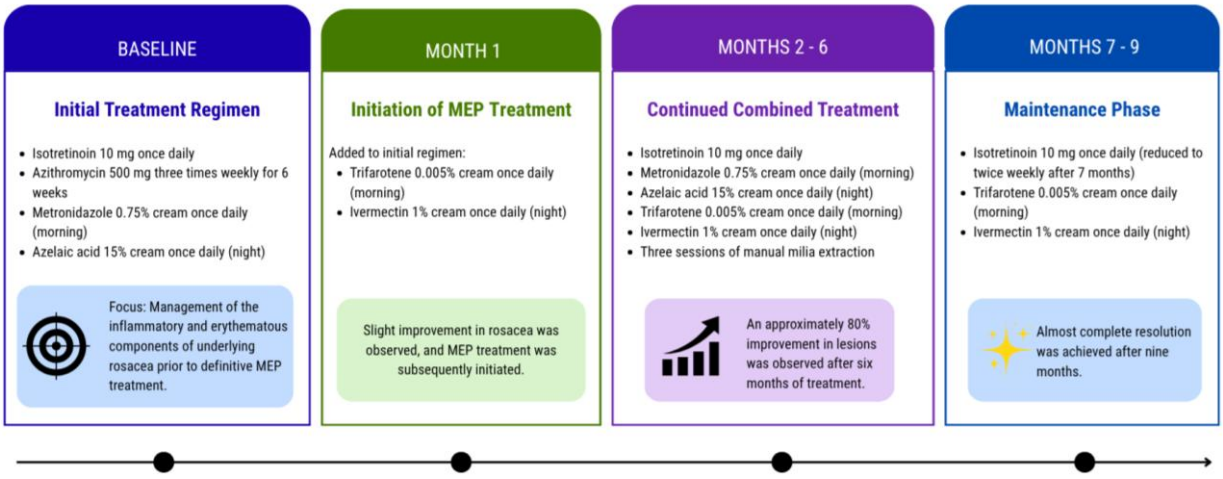

Figure 4. Timeline of the treatment regimen and clinical response.

DISCUSSION

MEP is a rare variant of primary milia, with fewer than 50 cases reported in the literature to date [3]. It was first described by Balzer in 1903 as a cystic hamartoma with trichoepithelial features, while the term "milia en plaque" was introduced by Hübler in 1978 [4]. It predominantly affects middle-aged women, with a female-to-male ratio of approximately 3:1 [5], and typically involves the head and neck region, particularly the preauricular and submandibular areas [6–9].

Histopathologically, primary milia are believed to arise from vellus hair, whereas secondary milia represent retention cysts that may originate from eccrine sweat ducts or from aberrant epidermis of hair follicles [10]. Although MEP is generally considered a primary condition arising spontaneously without a clear etiology, several secondary cases have been reported in association with conditions including discoid lupus erythematosus, pseudoxanthoma elasticum, lichen planus, trauma (including burns, dermabrasion, and ablative laser resurfacing), drug exposure (e.g., cyclosporine), and renal transplantation [11]. To the best of our knowledge, this is the first reported case of secondary MEP in the Philippines and the first associated with granulomatous rosacea.

The differential diagnoses of MEP include comedone nevus and Favre–Racouchot disease, which can be distinguished clinically [1]. In contrast to MEP, comedone nevus (nevus comedonicus) presents as nevoid, linear, or zosteriform-distributed comedones, typically with onset before 10 years of age. Favre–Racouchot disease, on the other hand, has a later onset and is characterized

by large comedones and cysts, commonly occurring in actinically damaged skin, particularly the lower and lateral periorbital regions. However, histopathological evaluation is often required to exclude these conditions and other secondary causes of MEP. In the present case, the diagnosis was established based on clinical history and examination and confirmed histopathologically. Notably, similar histopathological findings have been described in two previous cases of MEP with rosacea-like features, demonstrating dense inflammatory infiltrates surrounding milia-like structures [5].

Management of MEP remains challenging due to its rarity and the limited number of reported cases in the literature. Although spontaneous regression has been reported, the condition generally remains unchanged and asymptomatic when untreated. However, patients typically seek treatment due to cosmetic concerns that may cause significant psychological distress [1]. Treatment options include topical and systemic retinoids, topical corticosteroids, oral antibiotics such as minocycline, and procedural modalities such as manual extraction, electrodessication, cryotherapy, and CO2 laser therapy [12]. Topical retinoids remain the most commonly used treatment, while procedural interventions, including radiosurgery, are occasionally used in combination with retinoids and may result in less scarring compared with other modalities [13].

In the present case, treatment was initiated primarily targeting the underlying rosacea using a combination of oral and topical agents, including azithromycin, metronidazole, and azelaic acid, which provided anti-inflammatory benefits. Oral isotretinoin was also introduced early to address both conditions. Due to suboptimal initial response, topical ivermectin was added to target Demodex-associated inflammation. Subsequently, topical retinoid (trifarotene) was introduced to further improve both rosacea and MEP. Once substantial improvement in both conditions was observed, the maintenance phase consisting mainly of oral and topical retinoids and topical ivermectin was sufficient to achieve complete resolution of the lesions.

Treatment response may be influenced by the depth of MEP based on histopathologic examination. Superficial lesions tend to respond well to manual extraction and topical retinoids, whereas deeper lesions extending into the reticular dermis may require systemic therapy or more extensive procedures [5]. In this case, histopathology demonstrated a deep dermal nodular granulomatous inflammatory infiltrate surrounding milia-like cysts, which likely contributed to the favorable response to systemic isotretinoin.

CONCLUSION

This case highlights a rare presentation of MEP secondary to granulomatous rosacea, emphasizing the importance of clinicopathologic correlation in establishing an accurate diagnosis. Histopathologic evaluation was essential in confirming the diagnosis and guiding management. A combined therapeutic approach for both the MEP and the underlying granulomatous rosacea, including systemic and topical agents, and procedural extraction, resulted in significant clinical improvement and eventual resolution. This report contributes to the limited literature on MEP and underscores the need to consider underlying inflammatory dermatoses in atypical presentations.

ACKNOWLEDGEMENT

None

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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CASE REPORT

Successful Treatment of Nevus of Ota using Nanosecond Q-Switched Nd:YAG Laser

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ABSTRACT: Nevus of Ota is a benign dermal melanocytic condition characterized by unilateral blue-grey facial hyperpigmentation, often associated with cosmetic concern. Laser therapy, particularly the Q-switched Nd:YAG (QSNY) laser, is considered the treatment of choice. We report a case of a 25-year-old woman with Fitzpatrick skin type IV who presented with congenital Nevus of Ota involving the right cheek. She underwent 20 sessions of 1064 nm QSNY laser at 4-week intervals, with progressive lightening observed after each session. Marked clinical improvement was achieved after completion of treatment, with no adverse effects observed. This case demonstrates a favourable outcome with QSNY 1064 nm laser for Nevus of Ota, suggesting that it may be a safe and effective treatment option in similar patients.

Keywords: Nevus of Ota, Q-switched Nd:YAG Laser, Hyperpigmentation, Laser therapy

INTRODUCTION

Nevus of Ota, also known as oculodermal melanocytosis, is a benign dermal melanocytic lesion that typically presents as unilateral blue-grey or slate-blue pigmentation involving the facial skin innervated by the ophthalmic (V1) and maxillary (V2) branches of the trigeminal nerve [1,2]. It is usually congenital, appears in early childhood, and persists throughout life without spontaneous regression. Although benign, it may cause significant psychological distress and cosmetic concern [2].

Laser therapy has become the mainstay of treatment, with Q-switched lasers demonstrating favorable outcomes through selective photothermolysis of dermal melanin [2,3]. Among these, the 1064 nm Q-switched Nd:YAG (QSNY) laser is particularly suitable for patients with darker skin types due to its deeper dermal penetration and lower epidermal melanin absorption [4,5], thereby reducing the risk of pigmentary complications such as post-inflammatory hyperpigmentation and hypopigmentation. This case report describes the successful treatment of Nevus of Ota using 1064 nm QSNY laser in a patient with Fitzpatrick skin type IV.

CASE PRESENTATION

A 25-year-old woman with Fitzpatrick skin type IV and no known medical illness presented to our clinic with unilateral blue-grey hyperpigmentation over the right cheek. The pigmentation had been present since birth and remained stable over time but caused significant cosmetic concern. Clinical examination revealed diffuse blue-grey macular pigmentation confined to the right malar region (**Figure 1**), consistent with Nevus of Ota. There was no associated ocular or mucosal involvement, and the patient had not received any prior treatment.

MANAGEMENT AND OUTCOME

Written informed consent was obtained from the patient prior to treatment, including consent for the publication of clinical information and photographs. The patient was treated with a 1064 nm QSNY laser (Lutronic Spectra XT, Lutronic Corp-

oration, South Korea) at 4-week intervals. Laser parameters were gradually adjusted based on clinical response and patient tolerance (**Table 1**). A total of 20 treatment sessions were performed.

Progressive lightening of the hyperpigmentation was observed from the fifth session onwards, with marked clinical improvement achieved after completion of the treatment course compared with baseline (**Figure 2**). Treatment outcomes were assessed using the Global Aesthetic Improvement Scale (GAIS), a 5-point scale in which 1 indicates "very much improved" and 5 indicates "worse." The patient achieved a GAIS score of 1 ("very much improved") and reported high satisfaction at the end of treatment.

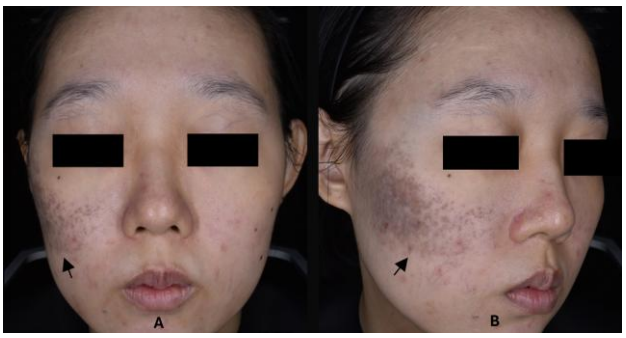

Figure 1. Clinical photographs of the patient at initial presentation showing frontal **(A)** and right lateral **(B)** views. Arrows indicate the Nevus of Ota.

The procedure was well tolerated, with only mild transient erythema observed post-treatment, which resolved spontaneously. No significant adverse effects, including post-inflammatory hyperpigmentation, hypopigmentation, or scarring, were observed during the treatment period. Following completion of the 20-session QSNY laser treatment course, the patient continued with maintenance therapy consisting of monthly QSNY sessions for general skin rejuvenation. Over a 10-month follow-up period, the clinical improvement of Nevus of Ota remained stable, with no evidence of delayed complications such as hypopigmentation or pigment recurrence (**Figure 3**).

Table 1. 1064 nm Q-switched Nd:YAG laser treatment parameters.

Parameter	Setting
Wavelength	1064 nm
Frequency	5 Hz
Spot Size	4 mm
Fluence	Started at 4 J/cm² and gradually increased to 6 J/cm² over subsequent sessions
Technique	Pulse-stacking for 3–5 seconds
Passes	1–2 passes per session
Clinical Endpoint	Appearance of petechiae

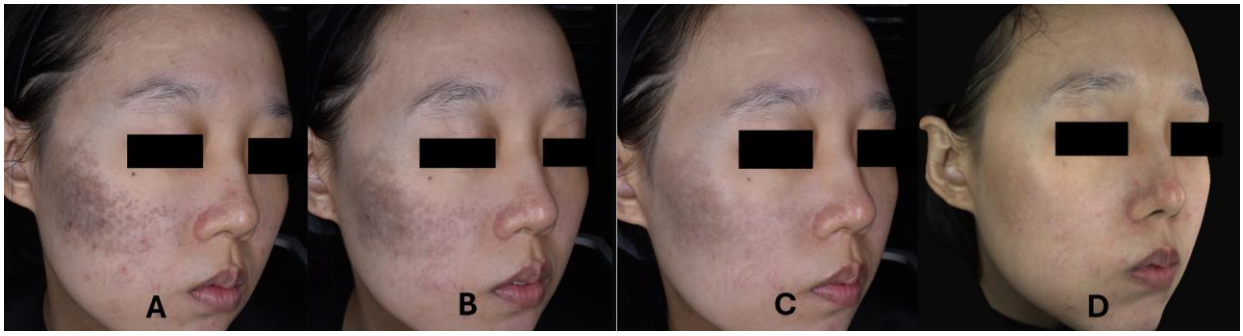

Figure 2. Clinical photographs of the patient showing progressive improvement of Nevus of Ota from baseline **(A)**, after 5 sessions **(B)**, 10 sessions **(C)**, and 20 sessions **(D)** of 1064 nm QSNY laser treatment.

DISCUSSION

Nevus of Ota is characterized by the presence of dermal melanocytes, which produce the characteristic blue-grey discoloration of the affected skin. Treatment options include cryotherapy, dermabrasion, and laser therapy. Among these, the 1064 nm QSNY laser is a recommended treatment modality for Nevus of Ota [6] and has substantial evidence supporting its efficacy in pigment clearance [7].

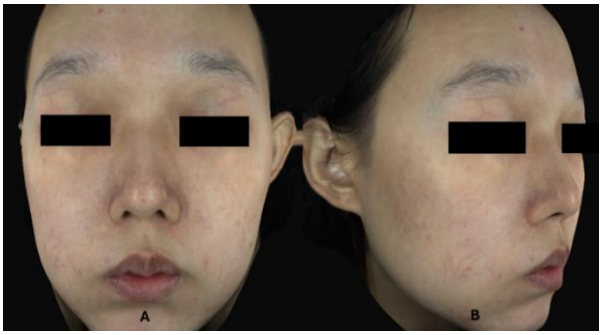

Figure 3. Clinical photographs of the patient at 10-month follow-up showing frontal **(A)** and right lateral **(B)** views. The results remain stable with no pigment recurrence or complications following the maintenance phase.

Published studies on 1064 nm QSNY laser treatment for Nevus of Ota have demonstrated considerable variability in treatment parameters, particularly regarding treatment intervals and the total number of sessions required. Some protocols employ shorter treatment intervals, such as every 2 weeks [3], whereas others utilize longer intervals ranging from 3 months to 1 year [2,8,9] to minimize procedure-related adverse effects, including burning sensations and hyperpigmentation.

In contrast, the present case was managed using 1064 nm QSNY laser treatment administered at fixed 4-week intervals. Marked clinical clearance and high patient satisfaction were achieved following 20 treatment sessions. Progressive pigment clearance was observed throughout the treatment course without significant adverse effects. Furthermore, no treatment-related complications were identified in this patient.

CONCLUSION

This case demonstrates that the 1064 nm QSNY laser may be a safe and effective treatment modality for Nevus of Ota, particularly among local patients. Furthermore, treatment administered at 4-week intervals may achieve effective pigment clearance while maintaining a favorable safety profile. Future prospective studies involving larger patient cohorts are warranted to further evaluate the optimal treatment protocol, long-term safety, and recurrence patterns associated with shorter treatment intervals in patients with Nevus of Ota.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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