

Combination Treatment with Cryolipolysis and Hyaluronic Acid Fillers for Jawline Enhancement

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Background: Facial contouring procedures are increasingly sought to address aesthetic concerns such as submental fat accumulation and lack of jawline definition. Cryolipolysis and hyaluronic acid (HA) injection have emerged as promising modalities for lower face contouring, targeting fat reduction and jawline enhancement, respectively.

Objective: This study aims to assess the efficacy and safety of a combined treatment approach involving cryolipolysis followed by HA injection for addressing lower face contour concerns. Specifically, the study seeks to evaluate outcomes associated with this comprehensive treatment modality in the lower face region.

Methods: A retrospective analysis was conducted on four females and one male who underwent cryolipolysis treatment for double chin reduction, followed by HA injection for jawline contouring. Pre- and post-treatment assessments, including digital photographs and standardized measurements, were performed to evaluate changes in lower face contouring. Objective evaluation of treatment outcomes was facilitated using digital photographs and standardized measurements, including 3-D images captured using the VECTRA system. Post-treatment assessments were conducted at 4-week intervals to monitor progress, with participant satisfaction assessed using the Global Aesthetic Improvement Scale (GAIS) at the end of six months after filler treatment.

Results: Findings from this pilot study demonstrate significant improvement in lower face contouring resulting from the combined treatment of cryolipolysis and HA injection. Post-treatment improvements included reduced submental fullness, enhanced definition in the jawline and improved chin projection. The cervicomental angle, measured using VECTRA, demonstrated a reduction post-treatment in all subjects. After Cryolipolysis only, the mean change in cervicomental angle was -4.94° , with a p-value of 0.0635. After both cryolipolysis and fillers, the mean change in cervicomental angle was -9.34° , and the p-value was 0.0244, indicating a statistically significant reduction. Subjective reports from participants, using GAIS, indicated high satisfaction with treatment outcomes.

Conclusion: These results indicate that while cryolipolysis alone shows a trend toward improvement, the addition of hyaluronic acid fillers provides a statistically significant enhancement in cervicomental angle and overall lower face contouring. Hence, integrating cryolipolysis and HA injections offers a comprehensive solution for addressing lower face contour concerns, providing synergistic benefits for both modalities.

Keywords: fillers, cryolipolysis, jawline fillers, chin fillers, hyaluronic acid

Introduction

Facial aesthetics are integral to overall appearance perception, with well-defined contours often synonymous with youthfulness and attractiveness. However, various factors, including ageing,^{1,2} genetic predispositions, and lifestyle choices, can precipitate changes in facial structure, notably manifesting as a less defined jawline and submental fat accumulation, commonly called a double chin. The conspicuous nature of a double chin, which cannot be obscured by clothing, often triggers feelings of embarrassment and self-consciousness, significantly impacting an individual's confidence and overall quality of life.^{3,4}

The lower face, particularly the jawline region, is paramount in facial harmony and balance. A defined jawline contributes substantially to a youthful and appealing appearance, whereas excess submental fat can compromise facial contours, imparting an aged or overweight aesthetic appearance. Effective resolution of these concerns necessitates a combination approach targeting submental fat reduction and jawline enhancement.

In recent years, the rise of non-invasive cosmetic procedures has revolutionized aesthetic interventions, offering minimal downtime and reduced risks compared to traditional surgical methods. Cryolipolysis has emerged as a leading nonsurgical technique for targeted fat reduction, employing controlled cooling in adipocytes and subsequently facilitating their gradual elimination from the body. On the other hand, hyaluronic acid injections have garnered widespread acclaim for their efficacy in facial contouring and volumization, delivering natural-looking outcomes with minimal adverse effects.⁵

This study assesses the efficacy and safety of a synergistic treatment approach employing cryolipolysis for submental fat reduction,⁶ followed by hyaluronic acid injection for jawline enhancement to refine lower face contouring.⁷ By sequentially addressing fat accumulation first, followed by jawline definition with fillers, this integrated approach offers a comprehensive solution for individuals seeking to rejuvenate their lower facial profile.

Of particular interest is the suitability of this combination treatment for individuals who prefer nonsurgical enhancements that yield natural and significant outcomes. The discreet nature of this treatment aligns with preferences for understated transformations, facilitating acceptance among individuals desiring aesthetic improvements without attracting undue attention associated with surgical procedures. This dual approach allows for both fat reduction and structural enhancement, offering a synergistic treatment plan tailored to address common aesthetic concerns such as double chin and underdefined jawlines.

Anatomical factors play a key role in the selection and efficacy of these treatments. Cryolipolysis is specifically targeted to reduce submental fat, and the effectiveness of this treatment is influenced by the amount and distribution of fat in the submental area. Hyaluronic acid injections, on the other hand, are strategically placed along the jawline and chin to enhance definition and projection. This treatment is especially beneficial for individuals with underdefined jawlines or micrognathia, where HA injections provide structural support and improve the overall appearance of the lower face. Variations in facial anatomy, such as jaw and chin structure, influence the choice of treatment areas and the volume of HA used. Ideal candidates for this combined treatment approach include patients with submental fat accumulation and a desire for enhanced jawline definition. This treatment is particularly effective for individuals seeking non-invasive procedures to address aesthetic concerns related to the chin and jawline.

This study seeks to investigate the efficacy and safety of a combined cryolipolysis and hyaluronic acid injection approach for lower face contouring, catering to the aesthetic preferences of individuals. The findings hold implications for refining treatment protocols and expanding personalized aesthetic interventions in facial rejuvenation.

Materials and Methods

This retrospective study analyzed data from four female and one male participants who underwent treatment for concerns related to submental fat accumulation and a less defined jawline (Table 1). Inclusion criteria comprised individuals aged between 31 to 55 years old, with a BMI less than 28, presenting with submental fat accumulation or a double chin, and willing to undergo cryolipolysis followed by hyaluronic acid (HA) injection for lower face contouring. Exclusion criteria encompassed a history of facial surgery, significant medical conditions, peripheral circulatory insufficiency, cryoglobulinemia, paroxysmal cold hemoglobinuria, Raynaud’s disease, pregnancy, or lactation.

Table 1 Details of the Patients, Cryolipolysis and Filler Treatments

S No.	Sex	Age (yrs)	BMI	CL Cycles per Session	CL Sessions	Fillers in Chin and Jawline (mL)
1	F	37	23.5	2	2	4
2	F	47	22.4	2	2	4
3	M	51	24.9	2	2	4
4	F	31	19.3	2	2	3
5	F	55	20.9	2	2	5.5

Written informed consent was obtained from all patients for the publication of their case details and any accompanying images. Formal ethics approval was not required for this case series, as the treatments were carried out as part of routine clinical practice. The study followed the ethical guidelines outlined in the Declaration of Helsinki. All treatments were performed in accordance with standard clinical protocols. Pre-treatment assessments were conducted to document baseline characteristics and assess the severity of submental fat accumulation and lack of jawline definition. Digital photographs and standardized measurements were obtained to evaluate treatment outcomes objectively.

Participants underwent three treatment sessions at a KUMIKO clinic in Japan. Cryolipolysis treatment was administered to the submental area using a CoolSculpting (Allergan Inc, USA) machine and Cool Mini applicator during the first two sessions. The applicator was positioned on the right side, followed by the left side over the target area, which overlapped in the middle of the submental region. The treatment time per cycle was 45 minutes, and the total treatment time for the session, which included two cycles, was 90 minutes. The second Cryolipolysis session was performed eight weeks later to maximize efficacy.

Approximately eight weeks following the second cryolipolysis session, participants received HA injections, Juvéderm Volux (Allergan, Inc, USA), along the chin and jawline to enhance definition and projection. One session of fillers with a combination of needle and cannula with MD Codes technique was done. Topical anaesthesia was applied before injection to minimize discomfort. The amount of HA filler used was tailored to individual anatomy and treatment goals to achieve natural-looking results.

Two-dimensional (2-D) photographic and three-dimensional (3-D) images were obtained at baseline and four weeks after the final treatment session. The VECTRA system captured 3-D face images for volume and surface area analysis. Volume difference, cervicomental angle, and surface area reduction measures were calculated using VECTRA Analysis software. Post-treatment assessments were conducted at 4-week intervals to monitor progress and evaluate treatment outcomes. Participants provided feedback on satisfaction using the 5-point Global Aesthetic Improvement Scale (GAIS).

Data analysis involved quantifying changes in lower face contouring using objective measurements from 2-D and 3-D images. Statistical analysis was performed to assess treatment efficacy and participant satisfaction. The study adhered to ethical guidelines, obtaining informed consent from all participants and ensuring patient confidentiality.

Results

Preliminary analysis of the retrospective data revealed significant enhancements in lower face contouring after the combined cryolipolysis and hyaluronic acid (HA) injection treatment. Objective measurements demonstrated notable improvements in mandible line definition and jaw projection in all participants along with reduction in cervicomental angle.

Subjective feedback from participants echoed the objective findings, with an overwhelming majority reporting a discernible reduction in submental fat and a more defined jawline contour. Participants expressed satisfaction with the natural-looking results attained through the combined treatment approach, noting enhancements in facial symmetry and overall appearance.

Participant surveys, administered using the Global Aesthetic Improvement Scale (GAIS) 5-point scale, indicated that all participants perceived exceptional or very improved fat reduction and jawline shape on completion of treatment. Subsequent surveys conducted at 1-year post-treatment also yielded positive perceptions of improvement, with participants expressing satisfaction with the results at the one-year mark.

Digital photographs captured during post-treatment follow-up visits further corroborated the improvements in lower face contouring, showcasing visible reductions in submental fullness and enhanced jawline definition. The cervicomental angle, measured using the VECTRA system, showed a reduction post-treatment in all subjects (Figures 1–10).

Following two cycles of cryolipolysis, the mean cervicomental angle significantly improved, changing from 141.18° to 136.24° . The reduction in the cervicomental angle ranged from -0.4° to -10.2° after cryolipolysis. A further reduction in cervicomental angle was observed after hyaluronic acid filler injections, with the mean cervicomental angle reaching 131.84° . The reduction in cervicomental angle after both cryolipolysis and fillers ranged from -3.1° to -15.6° . The additional reduction in cervicomental angle after fillers alone ranged from -0.9° to -6.7° (Table 2).

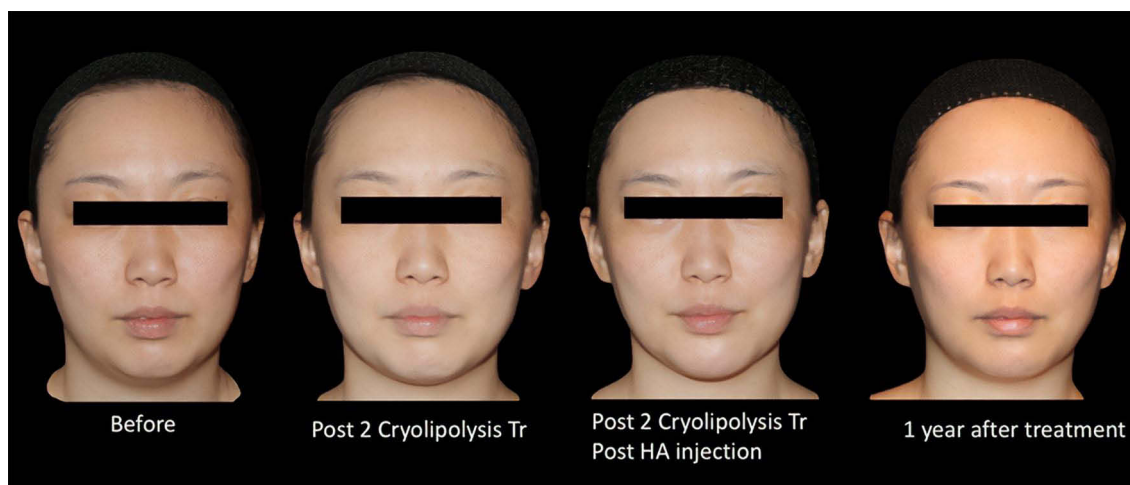


Figure 1 Presents the front view of Case 1, showcasing the outcomes following cryolipolysis treatment for double chin reduction and jawline enhancement. Subsequent addition of hyaluronic acid (HA) further enhances the improvement, resulting in a harmonized balance across the upper, middle, and lower facial regions. Noticeable enhancements in jaw projection contribute to a smaller and sharper facial appearance despite the absence of treatment on the upper and midfacial surfaces. These results underscore the comprehensive benefits of the combined treatment approach in achieving facial harmony and contour refinement.

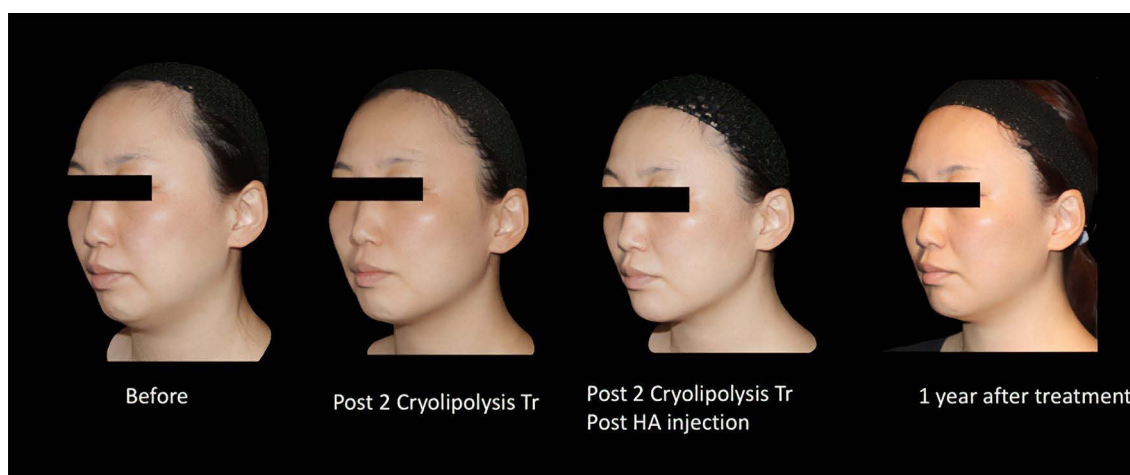


Figure 2 It showcases the left oblique view of Case 1, illustrating the outcomes following cryolipolysis treatment for submental fat reduction. After cryolipolysis, a reduction in submental fat is observed, leading to the enhanced definition of the jawline and pre-jowl sulcus. Adding hyaluronic acid (HA) fillers to the lower face further improves chin projection and diminishes the appearance of chin dimpling resulting from overactivity of the mentalis muscles. Notably, one year post-treatment, the jawline definition is maintained, underscoring the enduring benefits of the combined treatment approach in achieving sustained aesthetic improvements.

A paired *t*-test was conducted to evaluate the changes in cervicomenal angle following cryolipolysis and the combination of cryolipolysis with hyaluronic acid fillers. After cryolipolysis only, the mean change in cervicomenal angle was -4.94° , with a *p*-value of 0.0635. Although this change approached statistical significance, it was not found to be significant at the 0.05 level. The 95% confidence interval (CI) for the mean difference ranged from -10.32° to 0.44° , suggesting that the reduction in cervicomenal angle was not statistically significant in this group with cryolipolysis alone.

After both cryolipolysis and fillers, the mean change in cervicomenal angle was -9.34° , and the *p*-value was 0.0244, indicating a statistically significant reduction. The 95% confidence interval for the mean difference ranged from -16.70° to -1.98° , supporting the significant improvement in jawline definition and submental contouring with the combined treatment. These results indicate that while cryolipolysis alone shows a trend toward improvement, the addition of hyaluronic acid fillers provides a statistically significant enhancement in cervicomenal angle and overall lower face contouring.

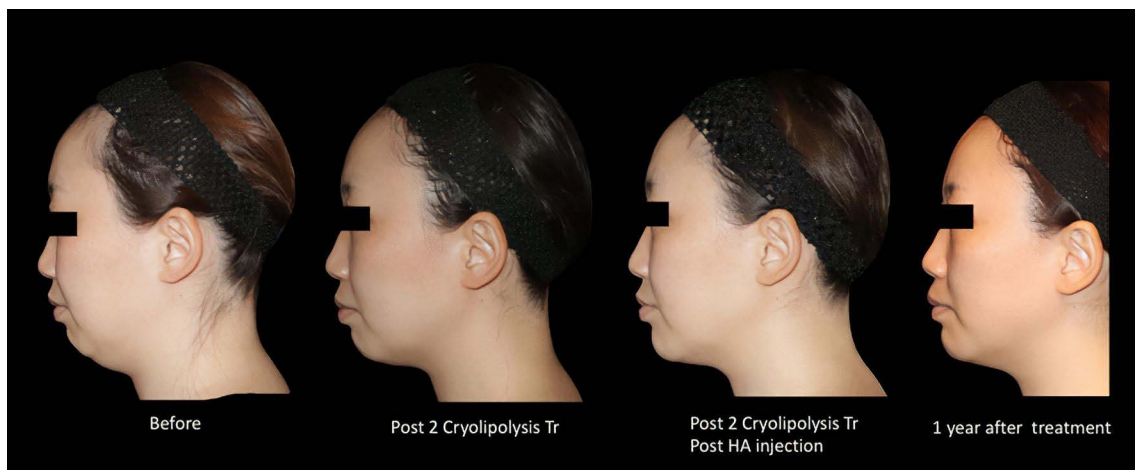


Figure 3 Illustrates the left profile view of Case 1, depicting the outcomes following cryolipolysis treatment for submental fat reduction. Noticeable improvements in submental fat reduction are evident, accompanied by enhanced jawline definition, resulting in a more streamlined facial appearance and elongated neck. Subsequent hyaluronic acid (HA) injection further enhances chin projection and jawline contour, creating a pleasing aesthetic line. These results highlight the transformative effects of the combined treatment approach in achieving balanced and harmonious facial contours.

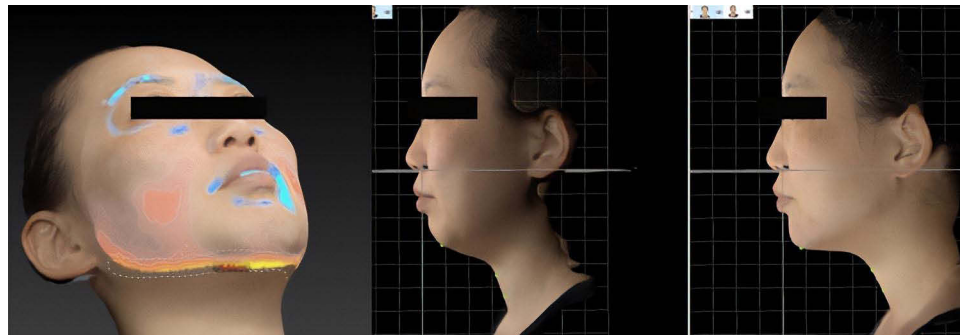


Figure 4 Case 1 depicts the results of the combination treatment in a patient presenting with submental fat accumulation. Utilizing VECTRA software, the reduction in submental fat volume and the change in cervicomental angle following cryolipolysis and hyaluronic acid (HA) injection were measured. A marked reduction in submental fat volume by -6.8 cc was observed, accompanied by a notable change in the cervicomental angle, becoming more acute by -7.9° . These objective measurements indicate significant improvements in lower face contouring, highlighting the efficacy of the combined treatment approach in achieving desired aesthetic outcomes.



Figure 5 Shows case 2, which showcases the outcome of the combination treatment in a patient with submental fat accumulation. Cryolipolysis reduced submental fat volume by -1.16 cc despite a slightly higher BMI during follow-up. Subsequent chin projection and jawline definition enhancement were achieved through hyaluronic acid (HA) injection. Notably, despite an increase in BMI at one year, the patient exhibited a slimmer and more toned appearance post-treatment. These results underscore the efficacy of the combined approach in achieving significant aesthetic improvements in facial contouring.



Figure 6 Case 2 illustrates the case of a participant with significant submental fat, demonstrating improvements following the combination treatment approach. The cervicomental angle, reflecting the angle between the chin and neck, significantly decreased from 140° to 124.5° , indicative of enhanced jawline definition and reduced submental fullness. Notably, despite a subsequent weight gain of 15 kg one year post-treatment, a minimal increase in submental fat was observed, with an apparent reduction compared to pre-treatment levels. This phenomenon underscores the enduring effects of cryolipolysis in reducing fat cell volume, contributing to sustained aesthetic improvements over time.

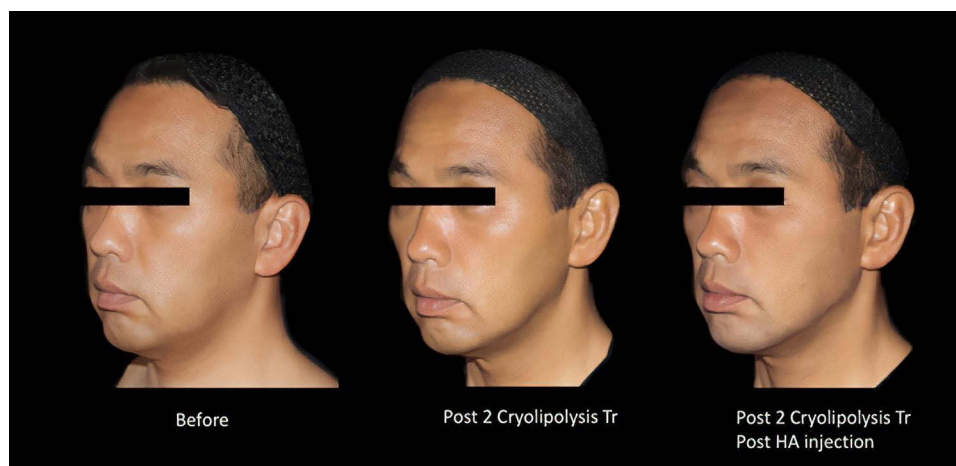


Figure 7 Case 3 shows the treatment progression for a male participant undergoing cryolipolysis to target submental fat reduction and fillers to enhance the jawline contour, similar to the approach employed for female participants. Following cryolipolysis, subsequent contouring was tailored to impart a more masculine appearance by strategically adjusting the injection sites for fillers. This versatile combination treatment allows for precise design adjustments with hyaluronic acid (HA) following the removal of large fat bulges with cryolipolysis. The quantitative reduction in submental fat volume post-cryolipolysis is noted as -5.5cc , accompanied by a decrease in the cervicomental angle by -3.1° , indicative of improved jawline definition and neck aesthetics.

Transient side effects, including minor oedema, redness, numbness, and tingling, were observed immediately post-treatment after cryolipolysis, predominantly resolving within hours to a few days. No significant adverse events or complications were reported throughout the study period, underscoring the safety and tolerability of the combined treatment approach.

Discussion

The findings of this study underscore the efficacy of a combined treatment approach utilizing cryolipolysis and hyaluronic acid (HA) injection for lower face contouring. This integrated approach offers a comprehensive solution for individuals seeking aesthetic improvements in the lower face region by concurrently addressing submental fat accumulation and jawline definition. In the past, sequential treatment with cryolipolysis and ATX-101 (Deoxycholic



Figure 8 Case 4 illustrates a participant with a low BMI and relatively minimal submental fat volume compared to other cases. Despite the lower fat mass, submental fat remains a common concern among individuals with similar characteristics, particularly within the Japanese population, where the average BMI for women is 22. In instances where submental fat volume is limited, additional improvements in jawline contouring can be achieved by strategically injecting hyaluronic acid (HA) into the midface region to provide lifting effects and enhance overall facial harmony. Cervicomental angle change in this case was -15.6° .

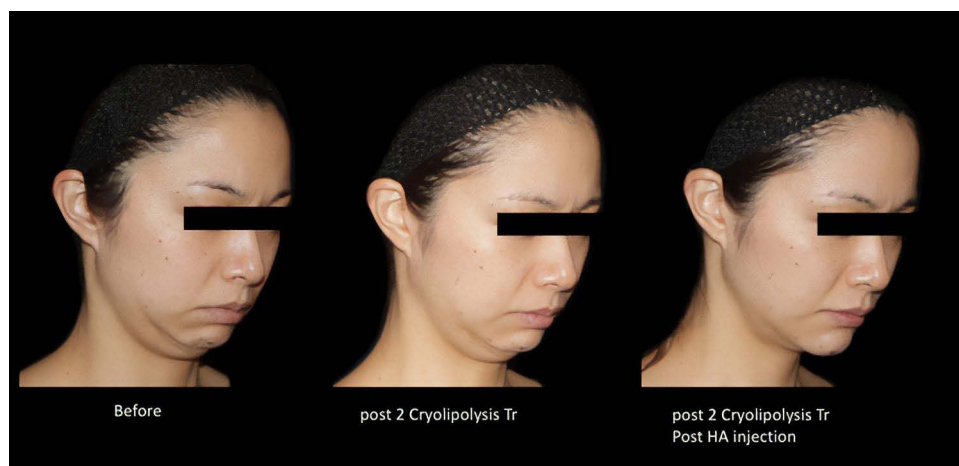


Figure 9 Case 4 depicts a patient with prominent submental fat accentuated when the chin is retracted. Cryolipolysis treatment primarily targeted the outer regions, resulting in a noticeable reduction of submental fat. Subsequent hyaluronic acid injection further enhanced the jawline contour, yielding a clearer and slimmer appearance, particularly evident when the chin is further retracted.

acid) was found to be safe and effective for reducing extreme submental fat (SMF), resulting in approximately a 2-grade improvement.⁸

Liposuction is frequently performed for submental fat reduction. However, it is an invasive procedure with the potential for severe complications, such as hematomas and nerve injury.⁹ Ageing leads to skin laxity and the accumulation of submental fat, resulting in an unclear jawline. Consequently, many ageing patients seeking lower face contouring are concerned with age-related changes and the associated risks of invasive treatments. Moreover, the complication rates and treatment outcomes of liposuction surgery heavily depend on the practitioner's skill. In contrast, cryolipolysis offers a safer alternative, with its safety profile being less influenced by the practitioner's technique.

Cryolipolysis is a valuable tool for targeted fat reduction, providing permanent results with minimal discomfort and downtime.¹⁰ By inducing apoptosis in fat cells, cryolipolysis effectively reduces submental fullness,^{11,12} laying the foundation for subsequent jawline enhancement with HA injection. HA injection complements cryolipolysis by offering natural-looking outcomes, long-lasting results, and minimal risk of adverse reactions.

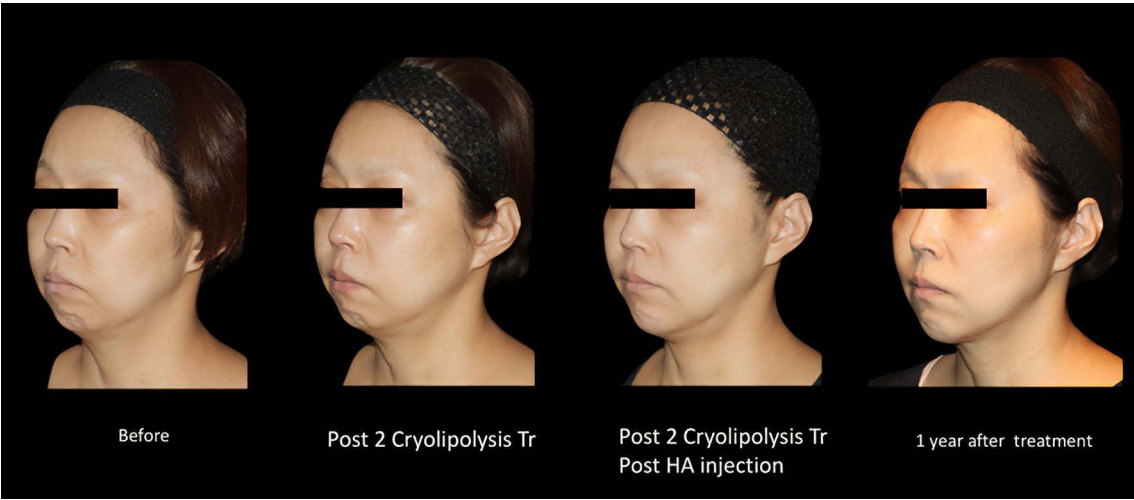


Figure 10 Case 5 illustrates the case of a patient with micrognathia, presenting with apparent submental fat accumulation despite limited fat volume. Cryolipolysis treatment resulted in subtle improvement of submental fat, with more significant enhancement observed in jawline definition. Hyaluronic acid was utilized to augment chin projection and refine jawline contour, achieving a sharp and youthful appearance. One year post-treatment, further improvements in jawline clarity and submental fat reduction were observed despite no changes in weight. This delayed effect suggests the cumulative benefits of cryolipolysis, including fat reduction and skin tightening, contributing to sustained aesthetic enhancements over time.

Cryolipolysis is a pivotal component of the lower face treatment regimen, facilitating targeted fat reduction with minimal discomfort and downtime. This non-invasive technique works by gradually eliminating fat deposits and reducing submental fullness effectively, even in the Asian population.¹³ Bilateral submental cryolipolysis is a well-tolerated procedure and produces visible and significant fat layer reduction.¹⁴ The synergistic effects of cryolipolysis and HA injection for jawline enhancement yield harmonious and balanced facial profiles, contributing to overall facial rejuvenation.

The strategic administration of HA filler along the chin and jawline allows for precise adjustment of contour and projection, yielding natural-looking results with long-lasting outcomes.^{15,16} Strategically injecting filler along the jawline enhances definition and projection, creating a more youthful and attractive facial profile.^{17,18} Participants of varying demographics experienced tailored treatment approaches, emphasizing the adaptability and versatility of HA injection in addressing individual aesthetic concerns.

Of particular note is the observed myomodulatory effect of HA injection on the mentalis muscle, which facilitates relaxation and mitigates contractions associated with smaller mandible sizes. This effect underscores the nuanced impact of HA injection beyond volumization, contributing to overall facial harmony and balance.¹⁹

The sustained efficacy of cryolipolysis, demonstrated even one year post-treatment, underscores its potential as a permanent solution for submental fat reduction by fat reduction and possible skin tightening.^{20,21} Participants reported maintained improvements and stable fat volumes despite fluctuations in body weight, highlighting the lasting impact of

Table 2 Change in Cervicomental Angle After Cryolipolysis and After Combination of Cryolipolysis and Fillers

S No.	Cervicomental Angle (Before Any Treatment)	Cervicomental Angle (After Only Cryolipolysis)	Cervicomental Angle Change, (After Only Cryolipolysis_	Cervicomental Angle (After Both Cryolipolysis and Fillers)	Cervicomental Angle Change, (After Both Cryolipolysis and Fillers)	Additional Change in Cervicomental Angle with Fillers, Compared to Only Cryolipolysis
1	140.5	137.5	-3.0	132.6	-7.9	-4.9
2	140.0	129.8	-10.2	124.5	-15.5	-5.3
3	142.2	140.0	-2.2	139.1	-3.1	-0.9
4	140.3	131.4	-8.9	124.7	-15.6	-6.7
5	142.9	142.5	-0.4	138.3	-4.6	-4.2

cryolipolysis on fat cell reduction and prevention of fat reaccumulation. Long-term outcomes of this combined treatment approach indicates sustained fat reduction achieved through cryolipolysis, which eliminates fat cells permanently. Although hyaluronic acid injections provide temporary results, lasting between 12–18 months, the long-term benefits of cryolipolysis are evident even after one year, as fat reduction remains stable. Patients are likely to maintain a more defined jawline and chin projection, particularly with periodic maintenance sessions of HA injections. The synergy of cryolipolysis and HA injections ensures that the results are not only immediate but also durable over time, contributing to lasting aesthetic improvements.

Asian individuals with smaller mandibles often exhibit noticeable submental fat accumulation and concerns regarding chin projection. This study demonstrates the efficacy of the combined treatment approach in addressing these concerns despite the challenges posed by micrognathia. Cryolipolysis reduces fat volume and stimulates collagen production, contributing to dermal remodelling and tightening. However, further investigation is warranted to elucidate the mechanisms underlying these effects, particularly in submandibular gland size and mandibular geometry.

Limitations

Despite the promising findings, several limitations warrant consideration. The study's small sample size and retrospective design may limit the generalizability of the results. Additionally, the absence of a control group precludes direct comparison of the combined treatment approach with alternative interventions or individual modalities separately. Future research endeavours should address these limitations through larger sample sizes and randomized controlled trials, facilitating validation of the findings and assessment of long-term outcomes. It is important to note that while the combination treatment of cryolipolysis and hyaluronic acid fillers offers significant short-term improvements in lower face contouring, maintenance treatments may be required to sustain optimal results especially with fillers. Additionally, longer follow-up periods are necessary to assess the long-term durability of the outcomes, particularly with regard to fat reduction and jawline definition.

Conclusions

Integrating cryolipolysis followed by hyaluronic acid (HA) injection represents a safe, effective, and minimally invasive approach to lower face contouring. By addressing submental fat accumulation and jawline definition, this combination treatment offers comprehensive enhancements in lower facial aesthetics, ultimately leading to heightened patient satisfaction and improved quality of life. The versatility of the cryolipolysis and HA injection combination allows for precise customization to meet individual patient requirements, facilitating the creation of natural and aesthetically pleasing results. This tailored approach expands the repertoire of options for personalized treatment plans, catering to diverse patient needs and preferences.

While this study's findings are promising, further research is warranted to corroborate these results and establish optimal treatment protocols for individuals seeking lower face contouring interventions. Continued investigation into the long-term outcomes and safety profile of this combined treatment modality will contribute to its ongoing refinement and advancement in clinical practice.

Disclosure

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