

## Technical Note

# Long Term Follow-Up in Gluteal Augmentation Using Cross-Linked Hyaluronic Acid: Up to 20 Months Ultrasound Follow-Up

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**Abstract:** This article describes a technique for gluteal augmentation using cross-linked hyaluronic acid (HA) filler, with a focus on long-term patient follow-up. The rising demand for buttock enhancement driven by esthetic preferences has led to the exploration of minimally invasive alternatives to traditional surgical methods. Ultrasound imaging was utilised to evaluate the presence and distribution of HA filler over time. The patients reported satisfactory aesthetic improvements, with mild transient side effects. The findings highlight the technique's effectiveness in achieving enhanced gluteal contour with a minimal volume of filler, demonstrating both safety and durability in the long term. This innovative approach may serve as a valuable option in aesthetic practises focused on body contouring.

**Keywords:** gluteal augmentation; dermal filler; hyaluronic acid; ultrasound imaging



**Citation:** Pazzini, R.; Viana, R.; Petrone, G. Long Term Follow-Up in Gluteal Augmentation Using Cross-Linked Hyaluronic Acid: Up to 20 Months Ultrasound Follow-Up. *Cosmetics* **2024**, *11*, 194. <https://doi.org/10.3390/cosmetics11060194>

Academic Editor: Enzo Berardesca

Received: 7 October 2024

Revised: 6 November 2024

Accepted: 8 November 2024

Published: 15 November 2024



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## 1. Introduction

In recent decades, the demand for buttock augmentation has been increasing, driven by aesthetics preferences for enhanced gluteal contour. Initial approaches, such as those by Bartels et al., in 1969 using silicone breast implants, aimed to correct buttock asymmetry [1]. While several surgical techniques have since been developed for gluteal enlargement and harmonisation, they are often accompanied by significantly elevated risks, including infection, and may result in unfavourable outcomes, like surgical scarring and suture dehiscence [2–4].

With the introduction of liposuction in the 1980s, autologous fat grafting became a popular alternative; however, issues regarding the outcomes, durability of grafts, and complications such as fat embolism led to an exploration of less invasive options [5–7].

Hyaluronic acid (HA), a biocompatible and biodegradable substance naturally found in the human body, has gained attention in aesthetics procedures in its cross-linked gel form, particularly for facial volumization. Its safety profile has prompted investigations into its use for body contouring, including in the gluteal region [8,9]. Nevertheless, limited studies address the rheologic properties, efficacy, durability, and safety of HA in body anatomies [8,10,11].

Recent advancements in HA technology have enhanced the rheologic properties of HA, such as viscosity, elasticity, and cohesion, making it suitable for different facial and body areas. For body contouring, there is a need for a durable material with high lift capability to lift thicker tissues such as the gluteal region [11,12].

Successful outcomes hinge mainly on a thorough knowledge of the gluteal anatomy, dermal filler rheologic properties, and professional experience with injectable procedures [11,13–15]. Beyond that, to achieve satisfactory results of gluteal beautification,

one must also consider patient ethnicity, sex-related anatomical differences, and individual aesthetics preferences [15–17].

In this article, an innovative technique for female gluteal augmentation and beautification using a cross-linked HA dermal filler suitable for body regions is described.

## 2. Materials and Methods

The procedures were performed in a private outpatient clinic. Five female patients aged 25 to 30 years were treated. All patients provided informed consent for scientific use of their data and images. Clinical follow-ups occurred at 6 months and 12 months. Two patients returned for a 20-month follow-up, during which ultrasound was performed to assess the HA status. Aesthetic satisfaction was also assessed using the Global Aesthetic Improvement Scale (GAIS).

### 2.1. Product

The selected HA filler, UP Max (by Ilikia, CGBIO, Hwaseong, Gyeonggi-do, Republic of Korea), a novel HA cross-linked dermal filler, featuring 20 mg/mL of HA macroparticles sized from 800 to 1200  $\mu\text{m}$  and high G prime. The formulation includes 0.3% lidocaine for enhanced patient comfort. Utilising “R2” (Rotation and Revolution) technology, this product achieves uniform encapsulation of all HA particles, resulting in a multiphasic filler [18–20].

### 2.2. Gluteal Assessment

A meticulous assessment of the gluteal region is crucial, focusing on desired shape, volume deficiency, and lifting necessity. Important aspects related to the presence of sagging, cellulite, lipoedema, and structural asymmetry must also be considered. Patients with normal or hypertrophic gluteal muscles often yield the most favourable outcomes, while those presenting with other non-favourable findings such as sagging or cellulite may require adjunct therapies [21].

### 2.3. Skin Marking

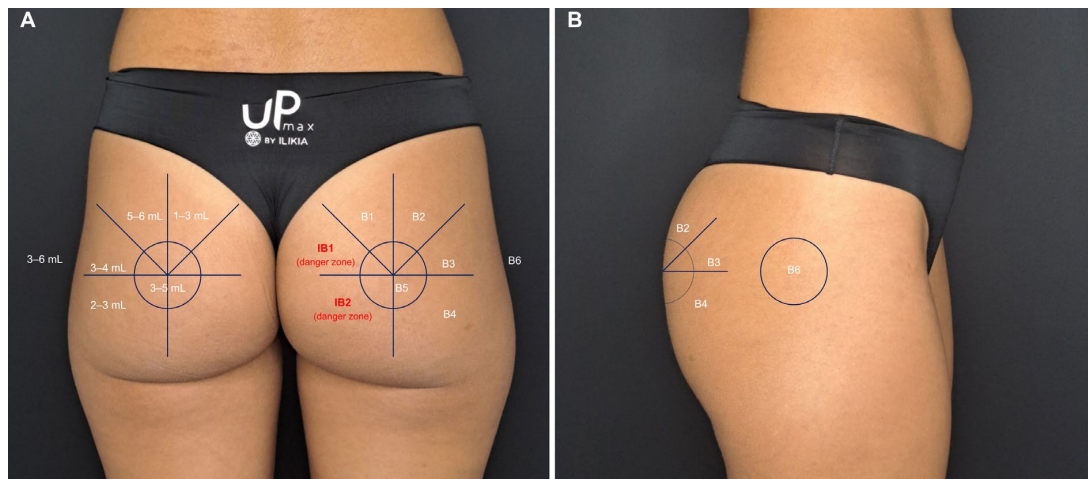
Patients are typically in an upright position to facilitate accurate pre-procedure skin marking. This crucial step plays a significant role in guiding injections while ensuring symmetrical results.

The initial markings involve dividing the buttocks into four quadrants, with the vertical line referencing the midline of the thigh and a horizontal line drawn at the level of the greater trochanter of the femur. The intersection point of these lines serves as the main entry point for the filling procedure and as a reference for the region of planned gluteal projection.

The upper quadrants are equally divided by drawing bisector lines, resulting in four triangles—skin-marking areas. In the upper medial quadrants, the inner triangle region is identified as IB1 (Inner Buttock), and the other triangle as B1. Following that, the areas are labelled B2 and B3 (clockwise). Bisector lines are not drawn in the lower quadrants, which are labelled B4 and IB2.

Area B5 corresponds to a circular region with a radius of approximately 2 cm around the main insertion point (Figure 1). Laterally, the B6 area—hip-dip—must be evaluated and addressed in some patients that may present a significant depression in this region.

The internal buttock areas indicated as IB1 and IB2 are danger zones, where the large gluteal veins are predominantly located; thus, the injection of products in these zones should be avoided [22].



**Figure 1.** (A) on the right, pre-procedure marking of the buttocks showing the six gluteal areas (B1–B6) where injections should be applied. IB1 and IB2 are the danger zones. On the left, the suggested filler quantities. (B) Lateral view of the marking showing hip-dip area (B6).

#### 2.4. Procedure and Injection Technique

Injections were performed at the puncture site using an aseptic technique and local infiltrative anaesthesia with lidocaine 2%. An 18G blunt-tipped cannula measuring 70 mm is recommended. The product is implanted by performing retrograde injections into the superficial subcutaneous layer. A total of 30 mL of HA was injected across defined anatomical regions tailored to individual patient needs.

The initial 30 mL protocol in a single session generally achieves satisfactory results. However, this amount may vary and additional volume or sessions can be performed depending on a patient's desire or need for buttock volume, shape, lift and projection.

The gluteal region is divided into predefined anatomical areas, designated as B1 to B6, with each area targeted based on the specific aesthetic goals outlined in the treatment plan.

**B1:** A volume of 1 to 3 mL of hyaluronic acid filler is injected in this area to achieve an external rotation effect, enhancing the overall contour of the buttock region.

**B2:** This area is critical for achieving a lifting effect in the buttock. An injection of 5 to 6 mL of filler is recommended to provide adequate volume and support for the desired elevation.

**B3:** For this area, 3 to 4 mL of filler is administered to harmonise the transition zone between areas B2 and B6, specifically addressing the hip dip or trochanteric depression. This enhances the overall aesthetic flow of the gluteal contour.

**B4:** This region is typically targeted for additional contouring, with 2 to 3 mL of filler used in male or female patients who desire a more sculpted appearance.

**B5:** To enhance the projection of the buttocks, a bolus of 3 to 5 mL of filler is deposited in this area. This volume is crucial for achieving the desired prominence and roundness of the gluteal profile.

**B6:** Corresponding to the trochanteric depression, this area should be filled with 3 to 6 mL of filler, only in patients who specifically report concerns related to hip dips. This targeted injection helps to smooth the contour and provide a more balanced silhouette.

#### 2.5. Satisfaction Scale

Global Aesthetic Improvement Scale (GAIS) was used to assess patient satisfaction [23].

#### 2.6. Ultrasound Imaging

Ultrasound imaging was performed to verify the presence and distribution of the product at 12 months. In addition, several parameters were verified, such as product topography and echogenicity, surrounding tissues characteristics, and the identification

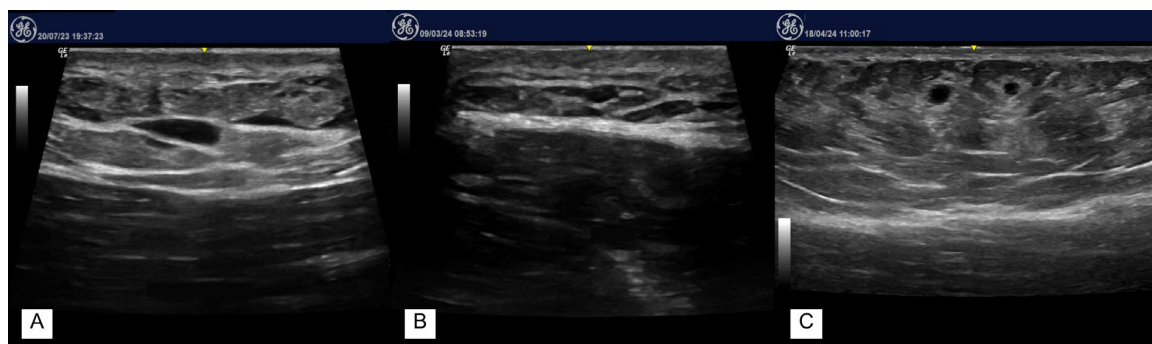
of abnormalities if any. A multifrequency linear transducer (8–18 MHz) from LOGIQ™ Pro (GE Healthcare, Chicago, IL, USA) was employed, and the high-frequency transducer presets were adjusted for skin sonographic evaluation.

A 20-month imaging follow-up was also performed in two patients.

### 3. Results

All patients reported satisfactory aesthetic improvements, with no major complications. Mild adverse effects included transient oedema and ecchymosis. Improved buttocks contour was achieved in all patients.

Ultrasound findings at 12 months confirmed the presence of multiple hypoechoic formations consistent with HA in gluteal regions, with the largest HA pocket measuring approximately  $14.9 \times 2.3 \times 6.6$  mm, while a 20-month imaging follow-up performed in two patients revealed persisting HA in the gluteal region, although in smaller quantity, with the largest pocket measured reduced to  $10.2 \times 1.7 \times 7.2$  mm (Figure 2).

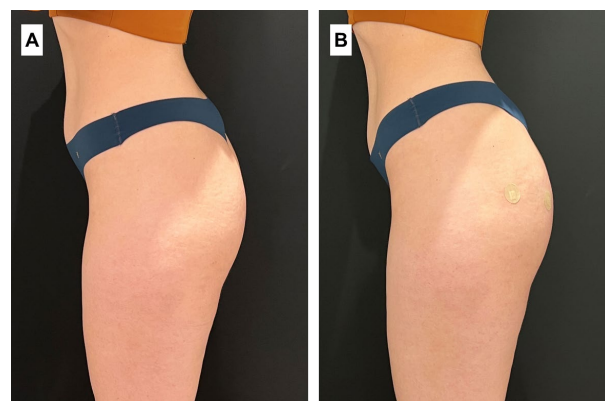


**Figure 2.** Multifrequency ultrasound image showing hyaluronic acid pockets in the buttocks at 12-month (A) and 20-month (B,C) imaging follow-ups.

Although a decrease in the amount of HA gel was noted over time, characterised by a reduction in both the number and size of gel pockets, multiple hypoechoic formations with a pseudocystic appearance and slight hyperechogenicity surrounding the hypodermis were consistently observed. Colour Doppler studies did not reveal any anomalous flows. Throughout the follow-up period, patients did not report any adverse events.

Notably, these imaging results correlated with clinical assessments, as the patient expressed satisfaction, rating their outcomes as “improved” and “much improved” on the Global Aesthetic Improvement Scale (GAIS).

In Figure 3, an immediate improvement in buttock volume and shape can be observed right after the procedure. Interestingly, at the 6-month follow-up assessment, the aesthetic appearance of the buttock seemed to have improved when compared to immediately after the procedure image (Figure 4).



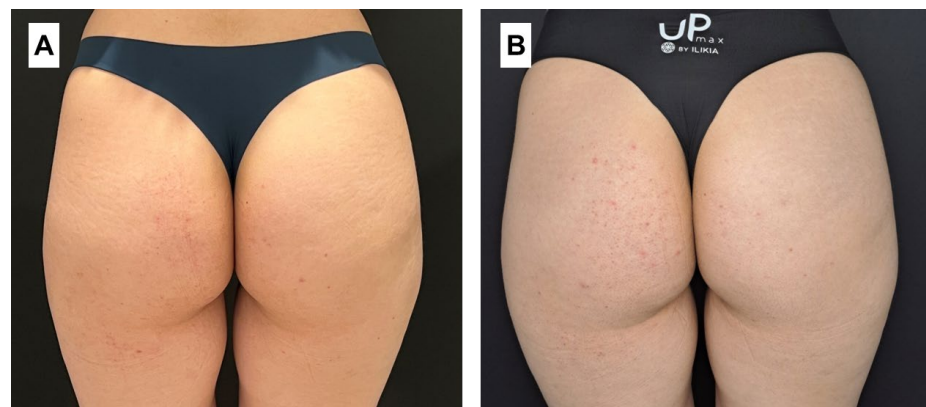
**Figure 3.** (A) Pre-procedure clinical picture. (B) Immediate post-procedure picture.





**Figure 4.** (A) Pre-procedure clinical picture. (B) Immediate post-procedure picture. (C) The 6-month follow-up clinical picture.

Additionally, patients spontaneously reported significant improvement in skin quality, reporting a reduction in cellulite and stretch marks (Figure 5).



**Figure 5.** (A) Pre-procedure clinical picture. (B) Six-month follow-up clinical picture.

#### 4. Discussion

Numerous techniques and products have been utilised for body contouring, encompassing silicone implants and permanent fillers like polymethyl methacrylate (PMMA) [24,25]. Recent trends indicate a growing preference for temporary fillers with bioabsorbable properties, particularly hyaluronic acid (HA)-based fillers, which have traditionally been employed for facial procedures but are increasingly utilised for body contouring applications. An ideal filler for body areas must possess certain rheological properties, such as high G prime and macroparticle size, which are not commonly found in most commercially available fillers.

Advancement in new HA filler products with innovative technologies, including larger particles, increased cross-linking, and improved tissue lifting capacity, has resulted in more noticeable outcomes with reduced product volume per session [26,27]. In our cases, the HA gel utilised demonstrated excellent rheological features for the body, exhibiting no local migration and durability, supported by ultrasound findings over 20 months. Furthermore, it provided high satisfaction, aligning with results found in the literature [28].

The use of HA for gluteal augmentation is relatively new, and more data on safety, efficacy, and durability are of great importance. Mendieta et al. suggested a buttocks classification in four different shape types: square shape, A shape, V shape, and round shape. The ideal buttock shape would be the A shape, having equivalent volume in all 4 buttocks quadrants. The author suggests that on the lateral view, the ideal buttock contour should have a smooth C shape without depression and ptosis, and most of the buttock

volume should be centrally located [29,30]. This classification correlates with the target areas in our technique, particularly B5, which must be addressed during the procedure to improve buttocks projection.

Currently, there is no consensus correlating the amount of injected HA with patient satisfaction and safety. Mortada et al. found an estimated mean of 250.75 mL of HA injected per subject in a single session, with a range of 20 mL to 400 mL. This review also demonstrated a product durability of at least 24 months, with minimal displacement and high patient satisfaction [28]. In our cases, a total amount of 30 mL of HA per patient was injected in a single session, effectively enhancing gluteal volume and projection with this relatively small quantity of dermal filler.

In our technique, we injected the product into a superficial plane, which has been reported as a safe area due to the absence of large vessels and nerves [22,28]. This method not only ensures patient safety but also allows for more precise contouring. Further exploration into the optimal volume based on individual anatomy and desired outcomes is warranted, as highlighted by recent studies emphasising tailored approaches to aesthetic procedures [29,30].

Additionally, the incorporation of newer imaging techniques, such as high-resolution ultrasound, is essential for assessing the longevity and migration of fillers, as demonstrated by our findings at the 20-month follow-up. Incorporating ultrasound as a monitoring tool allows for the precise visualisation of the filler's distribution and behaviour over time. Initially, pure HA formulations appear as well-defined, spherical, anechoic structures on ultrasound, presenting a "pseudocystic" appearance, while HA with lidocaine may show internal linear echoes within these pseudocysts. This anechoic appearance reflects the hydrated and homogeneous nature of the filler [31,32].

Over several months, however, the filler may shift from an anechoic to a hypoechoic appearance, reflecting its gradual loss of water content and integration into tissues. Hypoechoic structures reflect more echoes and appear grey, indicating the partial resorption of the filler [31,32]. These ultrasound characteristics, corroborated by our 20-month follow-up, underscore the utility of ultrasound in distinguishing filler formulations, tracking their longevity and enhancing procedural safety when used to guide the procedure, aiding practitioners in refining injection techniques and avoiding critical structures in aesthetic procedures [33].

It is also important to consider practical limitations when using ultrasound in this context. While ultrasound imaging can be costly and may have limited availability in some settings, these factors do not preclude the application of the technique described here. Additionally, this study relies primarily on qualitative ultrasound analysis to assess filler stability and distribution, as ultrasound technology lacks the precision needed for quantifying the remaining filler volume over time. Future studies could benefit from incorporating advanced imaging modalities to provide quantitative data on filler degradation and volumetric distribution, thus enhancing and complementing the qualitative insights presented here.

## 5. Conclusions

The technique was seen to promote satisfactory aesthetic results for gluteal augmentation and beautification with a small amount of HA dermal filler, with no major adverse events. It also showed evidence of product durability in the gluteal area when the product was observed by ultrasound imaging at 12 months of follow-up. Larger studies should be conducted to refine the technique and assess its long-term safety and product durability.

**Author Contributions:** Conceptualization and procedure, R.P. and G.P.; writing—review and editing, R.P., R.V. and G.P. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** The hyaluronic acid and hydroxyl apatite are approved for body injection by the regulatory board (ANVISA). This study describes a technique to combine both treatments in different areas and doesn't need approvals from the ethics committees.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patients to publish this paper.

**Data Availability Statement:** No new data were created or analyzed in this study. Data sharing is not applicable to this article.

**Conflicts of Interest:** The authors declare no conflicts of interest.

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