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FacEcofast: Proposal of a Standardized Ultrasound Protocol for Facial Aesthetic Medicine

Michela Piludu[1], Simone Ugo Urso[2], Paola Molinari[3], Antonella Franceschelli[4], Elena Calabria[5], Martina Zuccaro[6], Bianca Genovese[7] and Giovanni Mosti[8*]

[1]General Surgeon, Aesthetic doctor, Private practice, Cagliari, Italy

[2]Aesthetic Doctor, Studio Medico 109 and Eco109, Zola Predosa (BO), Italy

[3]General Surgeon, Aesthetic Doctor, Private practice, Modena, Italy

[4]Aesthetic Doctor, Unicamillus International Medical University - Roma, Rome, Italy

[5]Doctor in Dental Science, School of Dentistry, Department of Health Sciences, Magna Graecia University, Catanzaro, Italy

[6]Aesthetic Doctor Private Practice, Latina, Italy

[7]Aesthetic doctor, Private Practice, Siracusa, Italy

[8]Aesthetic doctor, Private Practice, Lucca, Italy

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***Corresponding author:** Giovanni Mosti, Aesthetic doctor, Private practice, Lucca, Viale Apua 69, 55045 Pietrasanta (LU), Italy

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ABSTRACT

Background: Facial ultrasound became an essential tool in aesthetic medicine for anatomical assessment, vascular mapping, treatment planning, and complication management. Despite its growing adoption, it remains operator-dependent and often lacks a standardized scanning strategy. FacEcoFast® is a rapid, reproducible, clinically oriented ultrasound protocol that enables targeted evaluation of clinically relevant facial regions.

Aim: describing the FacEcoFast® protocol assessing its feasibility and clinical applicability as a rapid, standardized method for high-frequency facial ultrasound in aesthetic medicine.

Methods: An evaluation of the FacEcoFast protocol was conducted in 463 consecutive patients undergoing facial ultrasound. The face was divided into four anatomical regions (lower third, midface, upper third, and nose), each examined at predefined scanning checkpoints using an 18 MHz to 20 MHz high-frequency linear probe. Feasibility, examination performance, and clinical indications are reported.

Results: FacEcoFast was successfully completed in all patients, demonstrating procedural feasibility. The midface, including the infraorbital and lower eyelid regions, was the most commonly evaluated anatomical area. Clinical indications included complication assessment (82%), pretreatment planning (12%), and post-treatment follow-up (6%). All predefined anatomical structures were identified, and diagnostic image quality was adequate in every examination. The mean examination time was 9 minutes (range 4 minutes to 20 minutes).

Conclusions: FacEcoFast offers a standardized and rapid approach to facial ultrasound. The protocol demonstrated complete anatomical visualization and integration into routine clinical practice, while reducing unnecessary scanning. By standardizing ultrasound assessment with predefined anatomical checkpoints, FacEcoFast may improve procedural safety, facilitate longitudinal follow-up, enhance physician training, and support broader implementation of facial ultrasound in aesthetic medicine.

Keywords: Aesthetic medicine; Ultrasound examination; Face ultrasound; Standardized face ultrasound

INTRODUCTION

High-frequency ultrasound is becoming a key tool for diagnosing and planning treatments in facial aesthetic medicine, driven by technological advances. High-frequency linear probes, often connected wirelessly to tablets and smartphones, have made ultrasound exams more accessible, faster, and easier to integrate into daily practice. Frequencies above 18 MHz enable detailed visualization of tissue layers, fascial planes, blood vessels, and previously injected materials. Ultrasound enables patient evaluation beyond clinical observation and palpation by visualizing each patient's unique anatomy [1]. Its use is increasing in facial assessment for patients requiring aesthetic treatment, in the pre-treatment phase to monitor treatment outcomes, in the diagnosis of complications, and in guiding treatment of complications [2-13]. However, ultrasound remains inherently operator-dependent, and without a structured approach it can become unfocused and time-consuming. The FacEcoFast protocol (registered in Italy and Europe by the author) was designed to address this challenge. Inspired by the Focused Assessment with Sonography for Trauma (FAST) used in emergency medicine; this approach emphasizes speed while adapting to the specific needs of facial aesthetic medicine.

This study aims to describe the FacEcoFast protocol and evaluate its feasibility, reproducibility, and clinical applicability as a rapid, standardized approach to high-frequency facial ultrasound in aesthetic medicine. Specifically, we assessed whether a predefined sequence of targeted anatomical scans could reliably identify clinically relevant facial structures, limit examination time, and facilitate the integration of ultrasound into routine clinical practice.

MATERIALS AND METHODS

The FacEcoFast outlines a standardized ultrasound examination protocol for facial assessment. It can be performed with any ultrasound machine equipped with a high-frequency (18 MHz to 20 MHz) linear transducer, or with a linear probe operating at a frequency between 18 MHz and 20 MHz, wirelessly connected to a tablet, capable of providing high-resolution imaging of superficial facial structures. The protocol does not require predefined ultrasound machine or transducer settings. The operator should optimize imaging parameters based on the ultrasound system used, the anatomical region examined, and the patient's individual characteristics to achieve the highest possible image quality. Integrating Color Doppler and/or spectral Doppler imaging enables vascular mapping and blood flow assessment, providing relevant information for both the prevention and management of potential vascular complications.

The examination is performed with the patient in a semi-seated position in a well-lit environment, using an adequate amount of conductive gel to ensure proper acoustic coupling while avoiding excess that could cause artifacts. The

operator steadies the probe, aligns it along predefined trajectories, and follows a structured sequence to evaluate the main facial anatomical regions: lower third, midface, upper third, and nose (Figure 1A-1D).

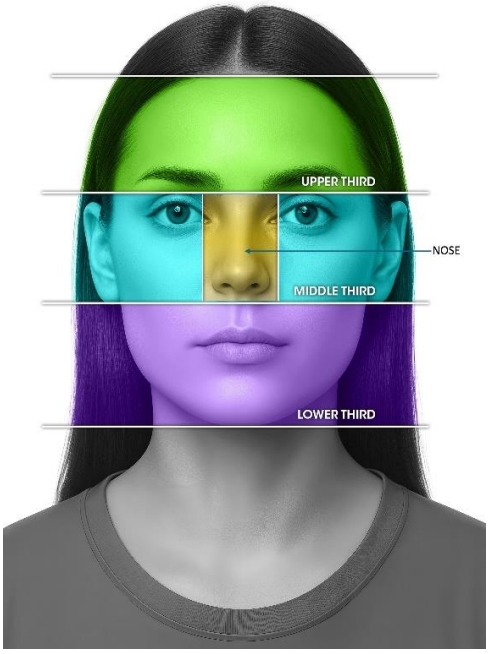


Figure 1: Face scheme. Lower third. Midface Upper third, and Nose in different colors.

Lower third

This includes a sequence of horizontal scans starting at the parotid gland along the mandibular border and extending to the anterior chin region. The scans evaluate the parotid gland, the masseter muscle and its fascia, the facial artery and vein at their vascular pole, the Depressor Anguli Oris (DAO), the Depressor Labii Inferioris (DLI), and the labial region, including its superior and inferior arterial branches. The sequence concludes with a scan of the mental region to identify the mentalis muscle and the submental artery (Table 1, Figure 2, 3A, 3B, 4A, 4B).



Figure 2: 28-year-old female with face marked with the standardized lower third scanning sequence. This female's face is reproduced in all the figures where a face appears.

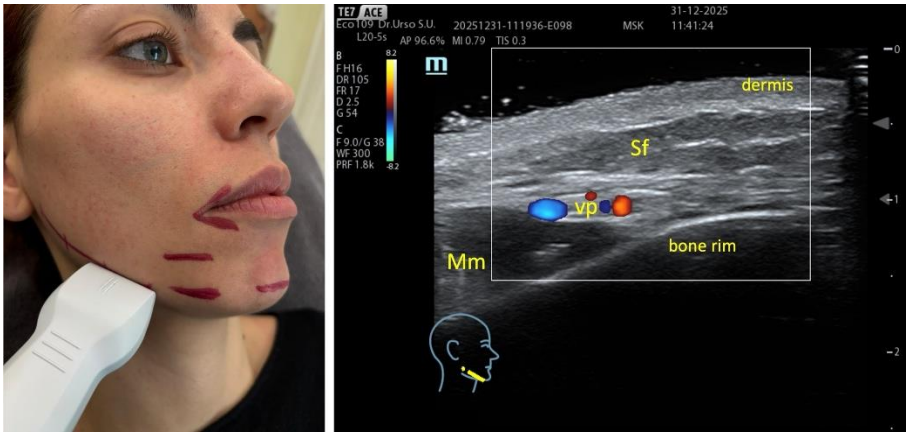


Figure 3: Left side: LT-H3: Horizontal scan of the inferior mandibular border at the mid-third level. Right side: Ultrasound appearance of the anterior belly of the Masseter muscle (Mm) and the emergence of the Vascular pole (Vp), with visualization of the Subcutaneous fat (Sf).

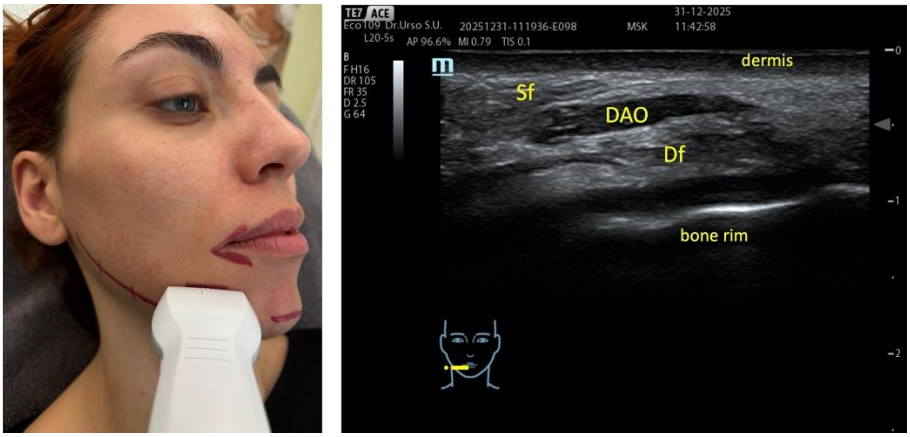


Figure 4: Left side: LT-H4: Horizontal scan of the inferior perioral region at the level of the Depressor Anguli Oris muscle (DAO). Right side: Ultrasound appearance of the DAO belly interposed between the Superficial (Sf) and Deep fat (Df).

Table 1: Scan scheme of the lower third.

Compartment	Abbreviation	Scan Type	Main Reference Structures
Lower Third (LT)	LT-H1	Horizontal	Parotid gland
	LT-H2	Horizontal	Masseter muscle + masseteric fascia
	LT-H3	Horizontal	Facial artery and vein vascular pole
	LT-H4	Horizontal	Depressor Anguli Oris muscle (DAO)
	LT-H5	Horizontal	Depressor Labii Inferioris muscle (DLI)
	LT-H6	Horizontal	Labial region with arterial branches
	LT-H7	Horizontal	Mental region: mentalis muscle + submental artery

Midface

The analysis extends from the infraorbital rim to the superior margin of the prolabium. Both horizontal and vertical scans are included. The first horizontal sequence begins at the medial and lateral infraorbital rims, evaluates the central midface, and proceeds to the lower third at the level of the nasal ala. Two vertical scans are performed: one along the medial canthal line and another, an oblique vertical scan, along the nasolabial fold. These allow

visualization of the zygomaticus major and minor, the levator alae nasi and levator labii superioris, the levator labii superioris alone, and the inferior portion of the orbicularis oculi. The scans also include assessment of the angular artery, the infraorbital artery, and the arrangement of superficial and deep fat compartments separated by the SMAS (Table 2, Figure 5, 6A, 6B, 7A, 7B).

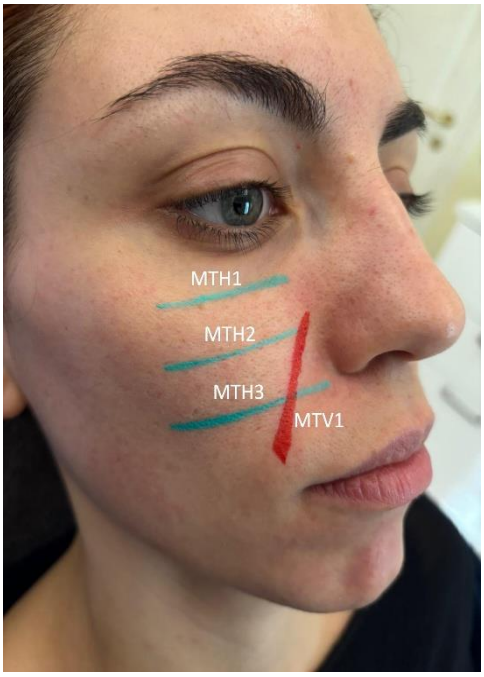


Figure 5: Standardized Middle Third scanning sequence.

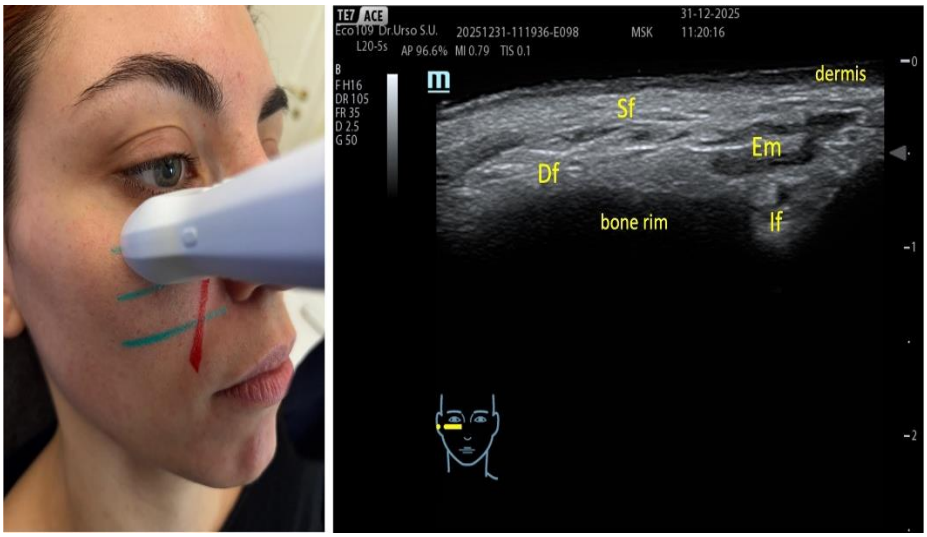


Figure 6: Left side: MT-H1: Horizontal scan of the medial inferior orbital rim. Right side: Ultrasound appearance of the Infraorbital foramen (If) and the muscular components of the area (Em), highlighting the Superficial and Deep fat of the midface (Sf and Df).

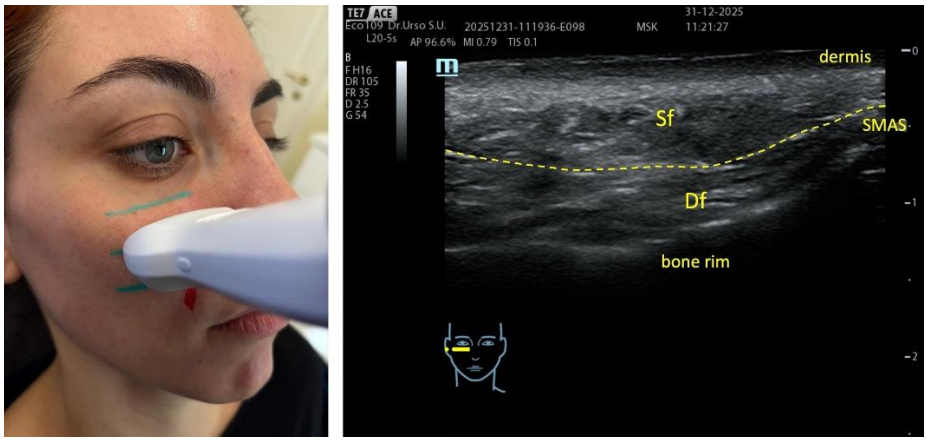


Figure7: Left side: MT-H2: Horizontal scan middle third (cheek). Right side: Ultrasound appearance of the Superficial and Deep fat (Sf and Df) separated by the SMAS (Superficial Muscular Aponeurotic System).

Table 2: Scan scheme of the middle third.

Middle Third (MT)	MT-H1	Horizontal	Medial inferior orbital rim
	MT-H2	Horizontal	Middle third (cheek)
	MT-H3	Horizontal	Lower third at the level of the nasal ala
	MT-V1	Oblique vertical	Nasolabial fold

Upper third

A series of vertical scans is performed over the temporal area, with the probe positioned slightly oblique along the line extending from the eyebrow base to the hairline. This allows visualization of the superficial and deep temporal arteries and the stratification of the temple. A subsequent dynamic horizontal scan between the temporal lines evaluates the frontalis muscle, followed by a dedicated horizontal scan of the glabellar area to visualize the procerus and corrugator muscles (Table 3; Figure 8, 9A, 9B, 10A, 10B).

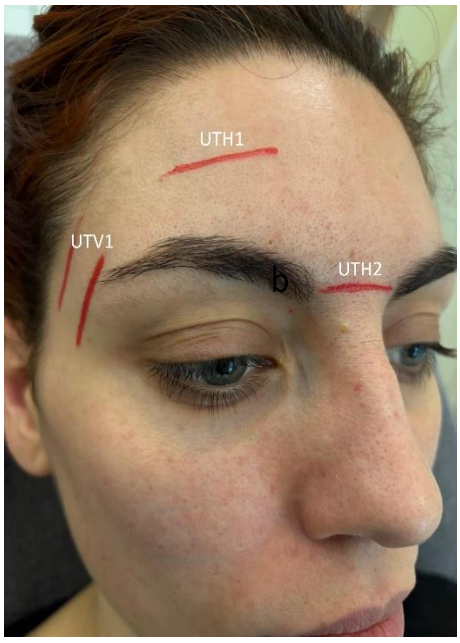


Figure 8: Standardized Upper Third scanning sequence.

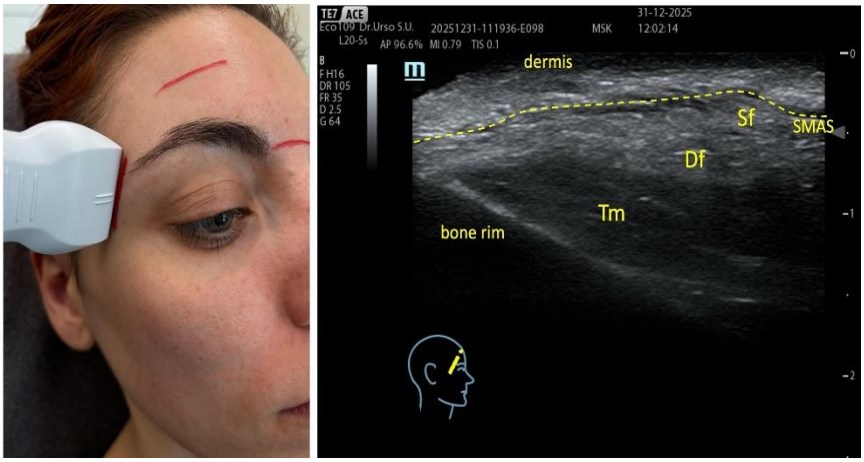


Figure 9: Left side: UT-V1: Oblique vertical scan at the tail of the eyebrow. Right side: Ultrasound appearance of the stratification of the temporal region, showing the temporal muscle (Tm) and the Superficial and Deep fat of this area (Sf and Df).

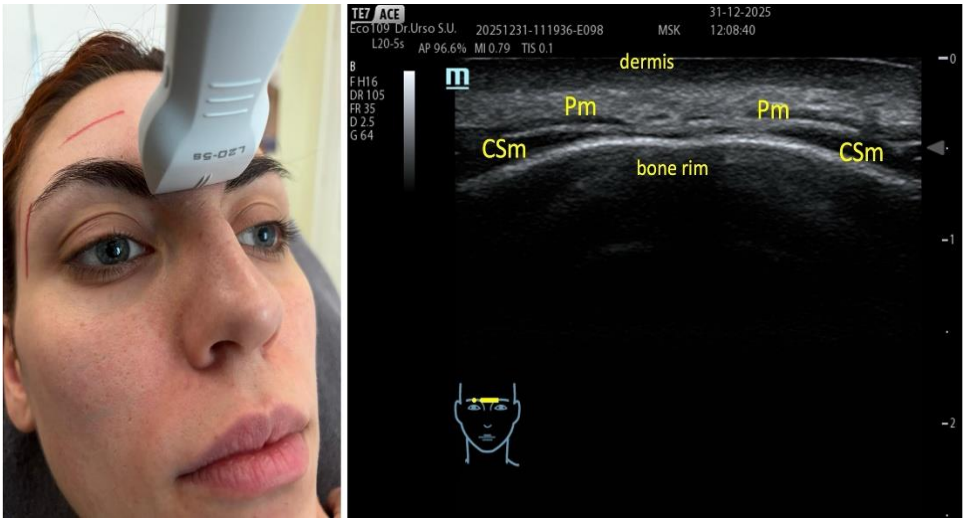


Figure 10: Left side: UT-H3: Horizontal ultrasound scan of the glabellar region. Right side: Ultrasound appearance of the muscular components of the area, including the procerus muscle (Pm) and the Corrugator Supercilii muscles (CSm).

Table 3: Scan scheme of the upper third.

Upper Third (UT)	UT-V1	Vertical/oblique	Temporal region: superficial and deep temporal arteries
	UT-H1	Horizontal	Frontalis muscle
	UT-H2	Horizontal	Frontalis muscle (between temporal lines)
	UT-H3	Horizontal	Glabellar area: procerus + corrugator muscles

Nose

The nose is examined with vertical scans from the nasal root to the tip, passing through the rhinion, and with horizontal scans in the same sequence to evaluate vascularization, including post-surgical changes, since overlooking this may result in serious complications (Table 4, Figure 11, 12A, 12B, 13A, 13B).

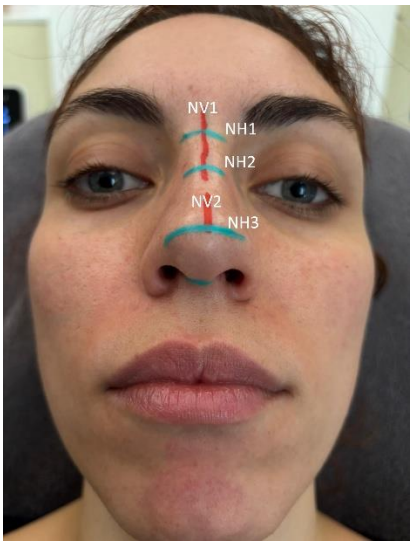


Figure 11: Standardized Nose scanning sequence.

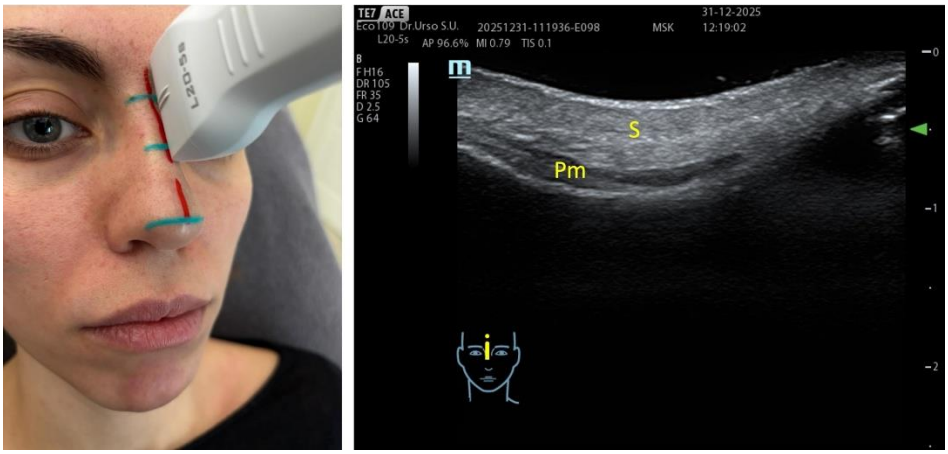


Figure 12: Left side: N-V1: Vertical scan of the nasal dorsum. Right side: Ultrasound appearance of the dermal, Subcutaneous (S), and muscular stratification of the area (Procerus Muscle: Pm).

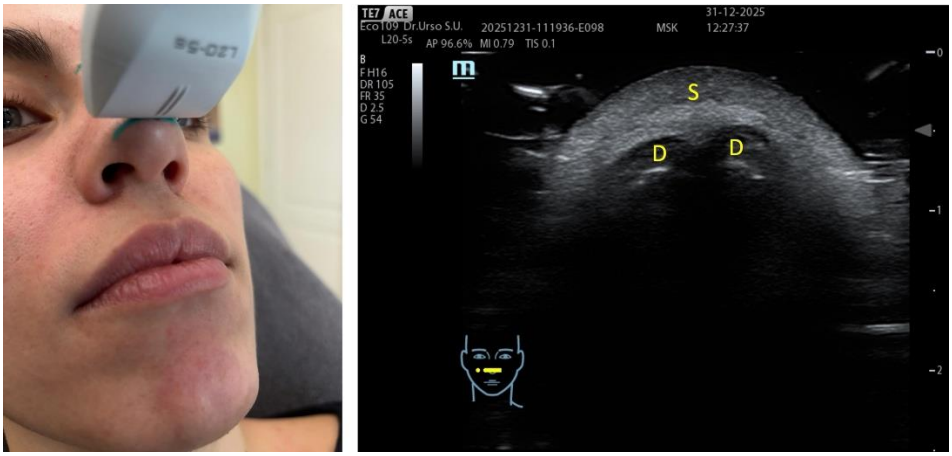


Figure 13: Left side: N-H3: Horizontal scan of the nasal tip. Right side: Ultrasound appearance of the paired nasal Domes (D) and the dermal–subcutaneous Stratification (S) of the nasal tip.

Table 4: Scan scheme of the nose.

Nose (N)	N-V1	Vertical	Upper nasal axis (sellion → rhinion)
	N-V2	Vertical	Lower nasal axis (rhinion → tip)
	N-H1	Horizontal	At the level of the sellion
	N-H2	Horizontal	At the level of the rhinion
	N-H3	Horizontal	At the level of the tip

Ethics: The study was conducted in accordance with the ethical principles outlined in the 2013 Declaration of Helsinki for biomedical research involving human subjects. Ultrasound examination is part of our aesthetic medicine practice and cannot harm the patient. On the contrary, it is highly beneficial, helping assess individual anatomy and guide safer treatment. We do not ask the patient's permission to perform a facial ultrasound examination before planning any treatment, and we do not require ethics committee approval. The exam protocol described in this manuscript is an intellectual activity based on developing a more precise examination workflow. We do not think that patient permission and ethics committee approval are necessary for the doctor's private intellectual activity.

RESULTS

Four hundred sixty-three consecutive patients (441 women and 22 men, mean age 53 years ± 8 years, range 32 years to 74 years) underwent facial ultrasound using the FacEcoFast® protocol. The examination was successfully completed in all patients, demonstrating the feasibility of the proposed protocol in routine clinical practice. The main indication for ultrasound examination was assessment and management of aesthetic complications (82%), followed by pretreatment evaluation (12%) and post-treatment follow-up (6%). The most frequently explored anatomical region was the midface, including the infraorbital and lower eyelid regions, reflecting the clinical distribution of treatment requests and complications encountered in daily practice. On average, the examination included three standardized bilateral scanning sequences, focused exclusively on the anatomical region of clinical interest rather than on a complete facial assessment. Color Doppler imaging was performed in 80% of examinations, mainly for vascular mapping and during the evaluation of patients with suspected vascular compromise or previous aesthetic treatments. The predefined anatomical checkpoints were consistently identified in every examination, yielding a 100% identification rate for the expected anatomical structures. Repeat scanning was required in only 10% of examinations to improve visualization of the target structure or pathological finding by modifying probe angulation or scan orientation. The mean examination time was 9 minutes (range 4 minutes to 20 minutes), depending on the anatomical region explored and the clinical indication. In all cases, the standardized scanning sequence achieved diagnostic images adequate for clinical decision-making.

DISCUSSION

One perceived limitation of facial ultrasound in routine clinical practice is the time required for image acquisition, particularly when a comprehensive examination of the entire face is performed without a consistent, systematic exam protocol. An extensive facial ultrasound examination may be appropriate during an initial assessment, particularly to identify previously injected fillers, anatomical variations, and individual vascular patterns relevant to subsequent treatment planning [2,5-7]. In contrast, during pre-treatment assessment or when evaluating a suspected complication, the ultrasound examination should focus on the specific anatomical region to be treated, enabling

procedural accuracy while saving time. FacEcoFast® aims to perform a few targeted scans focused solely on treatment or complication areas by identifying key structures through a predefined sequence of focused ultrasound scans. Its main strength is its targeted, time-saving approach: a limited set of standardized scans can streamline outpatient workflow, providing the relevant anatomical and vascular information while avoiding unnecessary exploration of areas unrelated to the clinical problem.

Standardization is achieved through a precise scan sequence based on anatomical landmarks for each compartment and may ensure repeatability by repositioning the probe in the same planes as in previous examinations, reducing operator-dependent variability and ensuring consistent execution.

In addition to pre-treatment assessment, this approach also supports complication management. In cases of vascular obstruction, nodules, or inflammatory reactions, ultrasound imaging allows for immediate localization of the issue and guides targeted treatment procedures,[13] such as hyaluronidase infiltration or the use of an Interstitial Laser Fiber (ILT).

Finally, we think that the standardized examination as proposed by FacEcoFast® could also benefit follow-up by enabling direct comparison of the same ultrasound scans over time. In this sense, FacEcoFast®, more than a complex diagnostic method, is a practical, agile tool that can be seamlessly integrated into routine clinical practice, balancing accuracy with speed and providing the aesthetic physician with concrete support to work more safely, efficiently, and with greater awareness.

Beyond its immediate clinical applications, the protocol may offer a structured educational framework that may accelerate physician training in facial ultrasound.

The limitation of this work is that it presents the initial clinical evaluation of the FacEcoFast® protocol. Although comparative validation against conventional facial ultrasound protocols was beyond its scope, our data show that the protocol is feasible and readily applicable in routine clinical practice. Patient selection indicates that the protocol was adopted for managing aesthetic complications. FacEcoFast performance among routine, uncomplicated pretreatment patients remains under-characterized, which could be considered a limitation; however, we reiterate that this is just a proposal for a standardized protocol for ultrasound examination of the face. Consequently, it may be adopted for diagnostic purposes, complication management, and post-treatment follow-up. The lack of diagnostic sensitivity, specificity, procedural safety and interobserver variability could be considered study limitations. However, we note that these limitations pertain to the ultrasound examination itself, not to this or any other standardized protocol for performing facial ultrasound. Anyway, future multicenter studies should investigate FacEcoFast®'s diagnostic accuracy, interobserver agreement, and educational value.

CONCLUSIONS

The FacEcoFast® protocol is not a new ultrasound exam of the face that requires a special ultrasound machine, special probes, special settings, or special education for the doctor. It offers a simple, standardized, clinically feasible, time-saving examination workflow for facial ultrasound in aesthetic medicine, helping the doctor perform a rapid, reproducible assessment of clinically relevant areas by following a standardized sequence of targeted scans while avoiding unnecessary examination of uninvolved regions. This approach might facilitate pretreatment planning, complication management, and longitudinal follow-up, possibly making facial ultrasound more accessible

and easier to integrate into routine clinical practice. However, this is a feasibility study only, and the FacEcoFast® protocol will need clinical verification.

Note for the readers: Dr. Piludu registered FacEcoFast® in Italy and Europe. This simply means that nobody can use the word FacEcoFast without the symbol®. Of course, everyone can use the protocol in daily practice, but if someone wants to use the word FacEcoFast in presentations or publications, they must report it as FacEcoFast®.

DECLARATIONS

Ethics approval and consent to participate

We have already defined in the text the ethics of this work, which we repeat here. The study was conducted in accordance with the ethical principles outlined in the 2013 Declaration of Helsinki for biomedical research involving human subjects. Ultrasound examination is part of our aesthetic medicine practice and cannot harm the patient. On the contrary, it is highly beneficial, helping assess individual anatomy and guide safer treatment. We do not ask the patient's permission to perform a facial ultrasound examination before planning any treatment, and we do not require ethics committee approval. The exam protocol described in this manuscript is an intellectual activity based on developing a more precise examination workflow. We do not think that patient permission and ethics committee approval are necessary for the doctor's private intellectual activity.

Consent for publication

This publication contains no patient data. We have the model's consent for the pictures.

Author's contributions

Michela Piludu is the inventor of the protocol; Giovanni Mosti and Simone Ugo Urso wrote the first draft; Paola Molinari, Antonella Franceschelli, Elena Calabria, Martina Zuccaro, Bianca Genovese received the first draft and added suggestions, comments, proposal for amendments and changes. Giovanni Mosti and Simone Ugo Urso wrote the final draft, incorporating the other coauthors' proposals. The final draft was shared with all the authors who agreed on the final version. All the authors contributed to the case series collection.

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