Research Article

The importance of portable ultrasound in neck fat assessment and treatment

Abstract

Obesity can lead to excessive neck fat, affecting aesthetics and respiratory function. Accurate assessment of fat location is crucial for treatment selection. Portable ultrasound offers real-time, dynamic imaging of the submental region, allowing for precise evaluation of the fat deposit and underlying muscle. High-frequency linear array transducers with frequencies ranging from 7 to 15 MHz are typically used. If the majority of the fat deposit is above the platysma muscle, liposuction may be recommended. Deep neck surgery may be necessary if the fat deposit is below the muscle. Portable ultrasound offers numerous benefits, including real-time imaging, non-invasiveness, absence of radiation exposure, and office setting availability. It can also monitor treatment progress and effectiveness. Accurate assessment of neck fat anatomy is vital for choosing the right treatment approach, and portable ultrasound is an essential tool in achieving optimal cosmetic and functional outcomes.

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Introduction

Excessive fat accumulation in the neck can cause cosmetic concerns and potentially impact respiratory function. Accurate identification of the location of the fat deposit, whether it is above or below the platysma muscle, is crucial in selecting the appropriate treatment approach. While clinical evaluation can provide some insight, portable ultrasound can offer real-time, dynamic imaging of the submental region, allowing for accurate assessment of the fat deposit and the underlying muscle.[1,2]

If the majority of the fat deposit is located above the platysma muscle, liposuction may be a viable treatment option. In contrast, if the fat deposit is primarily situated below the platysma muscle, deep neck surgery may be required. In such cases, the surgeon makes an incision in the natural crease line underneath the chin, providing access to the deep neck structures. The platysma muscle is then carefully separated from the deeper neck structures, and the excess fat is removed before reapproximating the muscle to enhance the neck contour.[2,3]

Portable ultrasound offers several benefits in defining the anatomy of neck fat and determining the appropriate treatment approach. These benefits include real-time, dynamic imaging; non-invasiveness; absence of radiation exposure; and the capacity to perform the examination in an office setting, thereby reducing the need for additional visits to hospitals or imaging centers. Moreover, portable ultrasound can facilitate monitoring of treatment progress and evaluation of treatment effectiveness.[4,5,6,7]

Methods

The study involved a series of ultrasound examinations performed on patients presenting with cosmetic concerns related to neck fat accumulation. The examinations were conducted using a high-resolution portable ultrasound machine equipped with a linear array transducer operating at frequencies ranging from 7 to 15 MHz.

To ensure standardization and accuracy in image acquisition and interpretation, all examinations were performed by a single experienced sonographer who had undergone extensive training in the use of ultrasound for assessing submental anatomy and pathology. Prior to the study, the sonographer had performed over 100 ultrasound examinations of the neck region, demonstrating proficiency in identifying key anatomical structures and differentiating between superficial and deep fat deposits.

The importance of training and learning curve in using ultrasound as a diagnostic tool cannot be overstated. Proper training ensures that sonographers are familiar with the technical aspects of operating the machine, as well as the principles of ultrasound physics and image optimization. Moreover, experience and repetition are critical in developing the skills needed to interpret ultrasound images accurately and reliably.

To address these challenges, the study sonographer underwent a rigorous training program that included didactic lectures, hands-on workshops, and supervised scanning sessions. The training covered topics such as ultrasound physics, instrumentation, image acquisition and interpretation, normal anatomy, and pathologic conditions. The sonographer also participated in regular quality assurance meetings to review image quality and accuracy of interpretations.

In addition to the sonographer's training, the learning curve associated with ultrasound image interpretation was also addressed in the study. It is well established that interpretation of ultrasound images requires a significant amount of practice and experience. Therefore, the sonographer's interpretations were cross-checked with those of an expert panel consisting of plastic surgeons and radiologists with extensive experience in ultrasound imaging. Discrepancies were resolved through consensus review and discussion.

Overall, the study emphasizes the importance of proper training and experience in utilizing ultrasound as a diagnostic tool for plastic surgeons and aesthetic surgeons. By ensuring that sonographers are adequately trained and experienced, healthcare providers can enhance the accuracy and reliability of ultrasound examinations, ultimately leading to improved patient outcomes (Figure 1).
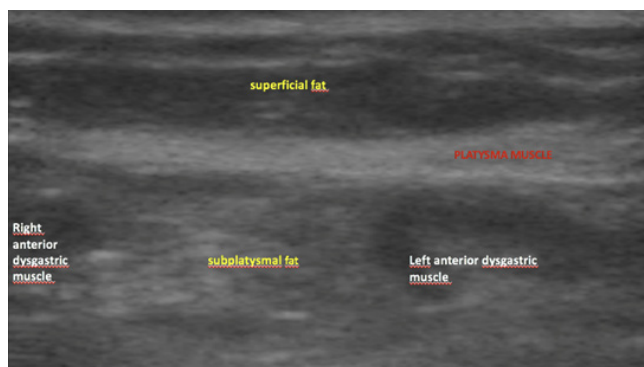
Figure 1 Ultrasound image with 10 mHz showing the anatomy of the submental region and its structures, with evidence of both superficial and deep fat, demarcated by the platysma muscle.

Results and discussion

Portable ultrasound is a valuable tool in defining the anatomy of neck fat and determining the appropriate treatment approach. With high-resolution imaging capabilities, portable ultrasound can provide real-time, dynamic images of the submental region, allowing for accurate assessment of the fat deposit and the underlying muscle. High-frequency linear array transducers are typically used for this purpose, with frequencies ranging from 7 to 15 MHz.[6,7,8] The transducer can be placed on the skin to visualize the location and thickness of the fat deposit, as well as the integrity of the overlying skin and the underlying muscle. If the majority of the fat deposit is located above the platysma muscle, then liposuction may be a viable treatment option. In this case, the cannula can be inserted through small incisions in the skin, targeting the subcutaneous fat layer without disrupting the underlying muscle. On the other hand, if the fat deposit is primarily located below the platysma muscle, then deep neck surgery may be necessary. In this case, the surgeon would make an incision in the natural crease line underneath the chin, allowing access to the deep neck structures. The surgeon would then carefully separate the platysma muscle from the deeper neck structures, removing the excess fat and reapproximating the muscle to improve the neck contour.[1,9,10,11]

Accurately defining the anatomy of neck fat is critical in selecting the most appropriate treatment approach. While clinical evaluation can provide some insight, portable ultrasound can offer real-time, dynamic imaging of the submental region, enabling accurate assessment of the fat deposit and the underlying muscle. High-frequency linear array transducers are typically employed for this purpose, providing high-resolution images of the superficial structures. By precisely defining the location of the fat deposit, practitioners can select the most appropriate treatment approach, whether it be liposuction or deep neck surgery, to achieve optimal cosmetic and functional outcomes. Portable ultrasound can also serve as a valuable tool in monitoring treatment progress and evaluating treatment effectiveness.[7,10,11]

Furthermore, portable ultrasound can also help in monitoring the progress of the treatment and evaluating the effectiveness of the procedure. After liposuction or deep neck surgery, follow-up ultrasound examinations can be performed to assess the reduction in fat deposit and the improvement in neck contour. This can help the practitioner determine whether further treatment is necessary and adjust the treatment plan accordingly.[10,11]

Conclusion

Portable ultrasound is a valuable tool in defining the anatomy of neck fat and determining the appropriate treatment approach. Its real-time, dynamic imaging capabilities, non-invasiveness, and convenience make it an attractive option for both patients and practitioners. By accurately assessing the location and thickness of the fat deposit, as well as the integrity of the overlying skin and underlying muscle, portable ultrasound can help guide treatment decisions and improve patient outcomes. Additionally, its versatility in evaluating other neck structures and its potential psychological benefits further highlight its utility in the field of aesthetics and medicine.

Acknowledgments

None.

Conflicts of interest

The authors declare there is no conflicts interest.

References

1. Fattahi T. Submental liposuction versus formal cervicoplasty: which one to choose? *J Oral Maxillofac Surg*. 2012;70(12):2854–2658.

2. Pérez P, Hohman MH. *Neck Rejuvenation*. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2024.

3. Charafeddine AH, Couto RA, Zins JE. Neck Rejuvenation: Anatomy and Technique. *Clin Plast Surg*. 2019;46(4):573–586.

4. Meng S. Sonographie der Halsorgane [Ultrasound of the neck]. *Radiologie (Heidelb)*. 2023;63(4):293–306.

5. Koischwitz D, Gritzmann N. Ultrasound of the neck. *Radiol Clin North Am*. 2000;38(5):1029–1045.

6. Safran T, Gorsky K, Viezel-Mathieu A, et al. The role of ultrasound technology in plastic surgery. *J Plast Reconstr Aesthet Surg*. 2018;71(3):416–424.

7. Suwanchinda A, Rudolph C, Hladik C, et al. The layered anatomy of the jawline. *J Cosmet Dermatol*. 2018;17(4):625–631.

8. de la Pena JA, Soto-Miranda MA, Lopez-Salguero JF. Ultrasonically assisted face-lift. *Aesthetic Plast Surg*. 2012;36(4):780–787.

9. Mlosek RK, Debowska RM, Lewandowski M, et al. Imaging of the skin and subcutaneous tissue using classical and high-frequency ultrasonographies in anti-cellulite therapy. *Skin Res Technol*. 2011;17(4):461–468.

10. Miller DL, Smith NB, Bailey MR, et al. Overview of therapeutic ultrasound applications and safety considerations. *J Ultrasound Med*. 2012;31(4):623–634.

11. Sklar LR, El Tal AK, Kerwin LY. Use of transcutaneous ultrasound for lipolysis and skin tightening: a review. *Aesthetic Plast Surg*. 2014;38(2):429–441.