

Case Report

Preoperative Ultrasound-guided Head and Neck Non-palpable Tumor Detection

Guillaume Buiet^{1*} and Tiphaine Vaché²

¹ENT and Head and Neck Surgery Department, Valencia Hospital Center, France

²Medical Imaging Department, Valence Hospital Center, France

Received: 05 October, 2024

Accepted: 16 October, 2024

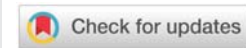
Published: 17 October, 2024

***Corresponding author:** Guillaume Buiet, MD, ENT and Head and Neck Surgery Department, Valencia Hospital Center, France, E-mail: gbuiet@ch-valence.fr

ORCID: <https://orcid.org/0000-0001-5425-6835>

Copyright License: © 2024 Buiet G, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

<https://www.organscigroup.us>



Abstract

Objective: Preoperative ultrasound-guided breast cancer detection was developed in the 1980s for non-palpable breast cancers. This technique was applied to neck surgery in 5 specific cases.

Methods: Retrospective study to assess the efficacy and safety of this technique.

Results: The mean surgical time was 35.2 ± 15.2 min. There were no complications of this percutaneous target location procedure. All surgical procedures allowed easy target retrieval without any complications. All targets were later confirmed to be the site of cancer.

Conclusion: This adaptation of a senology technique to the head and neck region allows us to improve neck procedures by enhancing diagnostic precision, safety, and surgical efficiency.

Introduction

Head and neck non-palpable tumors pose a significant challenge in clinical practice due to the difficulty in identifying specific targets, especially when prior treatments or surgical interventions are involved. Preoperative ultrasound-guided breast cancer detection was developed in the 1980s for non-palpable breast cancers [1-6]. The metallic end of a sterile implantable percutaneous "harpoon" in the form of a hook or double hook is positioned in a non-palpable tumor. The other end, a radio-opaque or non-opaque wire, emerges from the skin. During lumpectomy, the gynecologist follows the wire until the harpoon is palpated and performs an excision with appropriate safety margins.

In cervical surgery, it is sometimes necessary to take a specific non-palpable sample determined by imaging for histological purposes. The challenges include avoiding critical anatomical structures such as major blood vessels and nerves and increasing the complexity of such interventions compared to breast surgeries. Ultrasound-guided techniques

were described to improve the neck surgery, by needle [7,8] or harpoon/hook [9-12]. For two years, we have applied the technique of preoperative ultrasound-guided location to neck surgery in specific cases.

Case presentation

After feasibility was confirmed by preoperative ultrasound imaging and after disinfection and local anesthesia, the target was approached transcutaneously under ultrasound control. The tip of the needle (Fil d'Ariane™ Laurane Medical, Le Pradet, France) was positioned within the lesion (Figure 1), and then the harpoon was deployed under visual control, avoiding risky structures, particularly vascular ones. The guide wire was fixed by strips to the skin.

Immediately after the procedure, a CT scan without injection (without contrast) was performed to validate the correct positioning of the harpoon concerning the target to be sampled (Figure 2). On the day of surgery, the occlusive dressing was carefully removed. The incision site did not necessarily correspond to the cutaneous emergence of the guide wire.

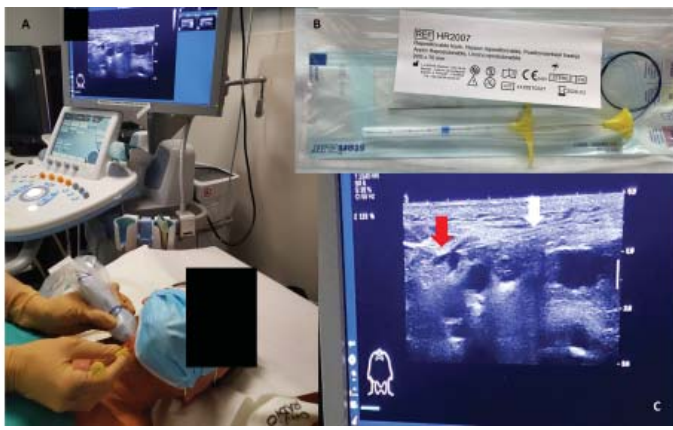


Figure 1: Ultrasound-guided harpoon positioning in patient No. 5. A: position of the patient. B: Fil d'Ariane™, Laurane Medical, Le Pradet, France. C: Zoom on the ultrasonography screen (red arrow = target/harpoon, white arrow = path of the needle)

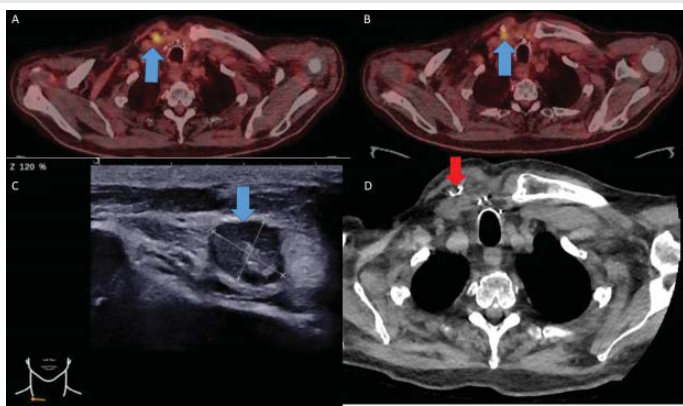


Figure 2: Procedure in patient No. 4. (A and B: preoperative pet scan, C: ultrasound location of the adenopathy, D: CT scan control after harpoon placement) (red arrow = harpoon, blue arrow = target).

Subcutaneous dissection allowed the guide wire to be followed to the swelling, which was located (by careful palpation of the tip of the harpoon) and removed with an appropriate margin planned in advance (surgical video in the appendix).

This study is retrospective. The internal review board of clinical research of our hospital approved this study on November 22, 2022, with ethical approval number NRIPH-CHV-03. A letter was sent to every patient informing them about the study and giving them the option of refusing to have their data used. No patient refused consent.

This procedure was used in 5 patients whose characteristics are presented in Table 1. The patients in this study had various conditions that increased the complexity of the procedure, with a previous history of surgery and/or radiotherapy for head and neck cancer or thyroid cancer, making the detection of non-palpable lymph nodes even more challenging. The cancer stage varied between early-stage and locally advanced cases, further contributing to the diversity of the cohort.

The mean surgical time (from skin opening to closure) was 35.2 ± 15.2 min. There were no complications from this percutaneous target location procedure. All surgical procedures allowed easy target retrieval. By limiting dissection spaces, no

drainage was required, and no local complications occurred. All targets were later confirmed to be the site of cancer.

Discussion

Several diagnostic tools are available for detecting non-palpable head and neck tumors, including fine-needle aspiration cytology, MRI, and CT-guided biopsy. However, these methods have limitations. Fine-needle aspiration can yield insufficient samples, MRI may miss small or deep lesions and CT-guided biopsies are associated with higher radiation exposure. This ultrasound-guided technique provides a safer, more precise alternative, especially in patients with challenging anatomical structures or after prior surgeries.

Ultrasound-guided biopsy techniques, such as the one described in this study, have been shown to improve accuracy in head and neck tumor detection. Recent studies, including MacFarlane, et al. [13], highlight the increasing role of ultrasound in the management of head and neck tumors, noting its advantages in visualizing soft tissue structures compared to other modalities. Many examples are seen of using a technique from one specialty in head and neck [7-12] or in other domains [13-15]. This technique was first described almost 40 years ago in breast cancer management [1-5] to locate small, non-palpable tumors within the fatty tissue of the breast for minimal-impact removal in case the tumor was benign. From a radiologist's point of view, the technique applied in ENT is quite similar. Indeed, the target needs to be seen via ultrasound scan, and a harpoon must be deployed. The main difference is the presence of critical structures in the neck, particularly vascular, that are not present in the breast. Even though these vessels can easily be seen via ultrasound scan, it requires a skilled radiologist to perform. Once the preoperative preparation is done, the surgical procedure is very easy and quick. The other imaging techniques (CT scan, MRI, PET scan) give information on the location and/or the activity but don't give the radiologist any advantage compared to the US scan to put a hook within the target. The precision of ultrasound-guided techniques is further supported by studies [14-16], which have demonstrated the accuracy of ultrasound in guiding interventions, significantly reducing the risk of targeting errors compared to traditional palpation-guided methods.

However, every ENT surgeon has encountered such situations without being sure that the precise target was removed before the histological results were obtained many days later. This procedure enables avoidance of this surgical stress, allowing the surgeon to confidently confirm to the patient in the recovery room that the correct sample was removed.

Conclusion

This adaptation of a senology technique to the head and neck region allows us to describe a more refined neck procedure in terms of diagnostic quality (location of each previously targeted lesion), safety (no complications in the harpoon positioning and the surgery), and speed of the surgery.

(Surgical video in the appendix)

References

- Meurette J, Laurent JC, Cambier L, Leblanc P. The harpoon technique in excision of subclinical mammary lesions. Preliminary results. *J Chir (Paris)*. 1985;122(12):723-726. Available from: <https://pubmed.ncbi.nlm.nih.gov/3910667/>
- Dufrane P, Mazy G, Vanhauendaerde C. Prebiopsy localization of non-palpable breast cancer. *J Belge Radiol*. 1990;73(5):401-404. Available from: <https://pubmed.ncbi.nlm.nih.gov/2273050/>
- Cambier L, Meurette J, Laurent JC, Olivier G. Preoperative location of deep subclinical breast lesions using the harpoon technique. Apropos of 149 cases. *J Radiol*. 1987;68(8-9):569-573. Available from: <https://pubmed.ncbi.nlm.nih.gov/3316633/>
- Wyshoff H, Gastelblum A, Lenaerts L. Preoperative localization of nonpalpable breast lesions using the so-called harpoon technique. A 1-year evaluation. *J Belge Radiol*. 1985;68(4):275-280. Available from: <https://pubmed.ncbi.nlm.nih.gov/4086458/>
- Nogaret JM, Guenier C, Coibion M, Dagnelie J. Technical aspects of guided biopsy following placement of a "harpoon" for infra-clinical, radiologically suspect breast lesions. *Rev Med Brux*. 1989;10(6):219-224. Available from: <https://pubmed.ncbi.nlm.nih.gov/2772459/>
- Delporte P, Laurent JC, Cambier L. Preoperative marking of non-palpable breast lesions by the stereotaxic tattooing and "harpoon" technique. 670 cases. *J Gynecol Obstet Biol Reprod*. 1994;23(3):259-263. Available from: <https://pubmed.ncbi.nlm.nih.gov/8051345/>
- Zimmerman P, DaSilva M, Izquierdo R, Cico L, Kort K, Numann P. Intraoperative needle localization during neck reexploration. *Am J Surg*. 2004;188(1):92-93. Available from: <https://doi.org/10.1016/j.amjsurg.2003.11.037>
- Purayidathil MJ, Manjaly G, Howlett DC. Removal of an impalpable thyroglossal cyst using ultrasound-guided wire localisation - a technical note. *Clin Otolaryngol*. 2007;32(2):141-142. Available from: <https://doi.org/10.1111/j.1365-2273.2007.01348.x>
- Woodhouse NR, Williams MD, Saha S, Howlett DC. Ultrasound-guided wire localisation to aid surgical biopsy of impalpable parotid oncocytoma. *Int J Oral Maxillofac Surg*. 2011;40(4):427-429. Available from: <https://doi.org/10.1016/j.ijom.2010.10.017>
- Duprez R, Lebas P, Marc OS, Mongeois E, Emy P, Michenet P. Preoperative US-guided hook-needle insertion in recurrent lymph nodes of papillary thyroid cancer: a help for the surgeon. *Eur J Radiol*. 2010;73(1):40-42. Available from: <https://doi.org/10.1016/j.ejrad.2008.10.001>
- Zaveri S, Rastatter JC, Carter JM, Kim S, Maddalozzo J. Pre-operative ultrasound guided wire localization for recurrent or persistent thyroid disease: a series of four cases. *Int J Pediatr Otorhinolaryngol*. 2018;113:67-71. Available from: <https://doi.org/10.1016/j.ijporl.2018.06.047>
- Laxague F, Gualtieri T, Brahm G, Yoo J, MacNeil SD, Fung K, et al. Ultrasound-guided wire localisation: a GPS for hidden head and neck tumours? A case series. *Acta Otorhinolaryngol Ital*. 2023;43(6):375-381. Available from: <https://doi.org/10.14639/0392-100x-n2280>
- MacFarlane D, Shah K, Wysong A, Wortsman X, Humphreys TR. The role of imaging in the management of patients with nonmelanoma skin cancer: diagnostic modalities and applications. *J Am Acad Dermatol*. 2017;76(4):579-588. Available from: <https://doi.org/10.1016/j.jaad.2015.10.010>
- Lee MMH, Robson NK, Carpenter TT. Ultrasound-guided wired localisation for resection of impalpable anterior abdominal wall scar endometriomas. *Gynecol Surg*. 2012;9:103-105. Available from: <https://gynecolsurg.springeropen.com/articles/10.1007/s10397-011-0678-4>
- Rutten MJ, Schreurs BW, van Kampen A, Schreuder HW. Excisional biopsy of impalpable soft tissue tumors: US-guided preoperative localization in 12 cases. *Acta Orthop Scand*. 1997;68(4):384-386. Available from: <https://doi.org/10.3109/17453679708996182>
- Samara E, Williams M, Howlett DC. Current applications of ultrasound-guided wire localization in head and neck surgery. *Int J Oral Maxillofac Surg*. 2019;48(4):443-446. Available from: <https://doi.org/10.1016/j.ijom.2018.09.013>

Discover a bigger Impact and Visibility of your article publication with Peertechz Publications

Highlights

- ❖ Signatory publisher of ORCID
- ❖ Signatory Publisher of DORA (San Francisco Declaration on Research Assessment)
- ❖ Articles archived in worlds' renowned service providers such as Portico, CNKI, AGRIS, TDNet, Base (Bielefeld University Library), CrossRef, Scilit, J-Gate etc.
- ❖ Journals indexed in ICMJE, SHERPA/ROMEO, Google Scholar etc.
- ❖ OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting)
- ❖ Dedicated Editorial Board for every journal
- ❖ Accurate and rapid peer-review process
- ❖ Increased citations of published articles through promotions
- ❖ Reduced timeline for article publication

Submit your articles and experience a new surge in publication services

<https://www.peertechzpublications.org/submission>

Peertechz journals wishes everlasting success in your every endeavours.