



Case report

Beware of hemopneumothorax following core needle breast biopsy



Nikos Schizas^a, Achileas Lazopoulos^a, Dimitris Krimiotis^a, Thomas Rallis^a, Dimitris Paliouras^a, Apostolos Gogakos^a, Fotis Chatzinikolaou^b, Pavlos Sarafis^c, Philip Domeyer^d, Paul Zarogoulidis^{e,*}, Theodora Tsiouda^e, Chrysanthi Sardeli^f, Stella Laskou^g, Charilaos Koulouris^g, Efstathios Pavlidis^g, Stylianos Mantalobas^g, Dimitris Giannakidis^g, Isaak Kesisoglou^g, Konstantinos Sapalidis^g, Nikos Barbetakis^a

^a Thoracic Surgery Department, "Theagenio" Cancer Hospital, Thessaloniki, Greece

^b Pathology Department, "Theagenio" Cancer Hospital, Thessaloniki, Greece

^c Nursing Department, Cyprus University of Technology, Cyprus

^d Hellenic Open University, Cyprus

^e Pulmonary Department-Oncology Unit, "Theagenio" Cancer Hospital, Thessaloniki, Greece

^f Obstetric Department, "Saint Luke" Private Hospital, Panorama, Thessaloniki, Greece

^g 3rd Department of Surgery, "AHEPA" University Hospital, Aristotle University of Thessaloniki, Medical School, Thessaloniki, Greece

ARTICLE INFO

Keywords:

Breast

VATS

Core needle breast biopsy

ABSTRACT

Minimal diagnostic procedures are conducted regularly by the radiologists for several lesions within the body. The usual methodology is biopsy with a needle, either fine needle aspiration or core biopsy. The guidance is under CT or U/S. Fine needle aspiration has usually small diameter in comparison to the core biopsy. In any case the radiologist will choose the appropriate method based on the site of the lesion and safety of the patient. Pneumothorax and hemothorax are adverse effects that can be managed either on site with the help of a small catheter, however; there are cases where video-assisted thoracic surgery is needed in order to manage a more severe case. In the current study we present such a case where video-assisted surgery was necessary.

1. Introduction

Core needle biopsy is a commonly used technique for the diagnosis of breast tumors as it is a minimal invasive method with satisfactory outcomes while many studies show significant financial benefits [1–3]. This technique is considered to be safe although very severe complications may appear such as haematomas, pneumothorax and rarely hemopneumothorax [4,5]. More specifically pneumothorax seems to be a possible complication but relatively rare and in most cases is treated only with observation [6]. As regards hemopneumothorax, there are a few references in the literature recorded and certainly is a potential life threatening condition [7]. In the case reported here, hemopneumothorax was caused by a core needle biopsy for the histological diagnosis of a breast tumor. The patient's condition suggested a surgical confrontation and she was finally submitted to a video-assisted thoracic surgery for hemorrhage restoration.

2. Case report

A 41 years old female, without any medical background, was referred for a core needle biopsy of a peri-areolar left breast mass. The lesion's diameter was 1,8cm and was categorized as BI-RADS IV from its radiological depiction. The woman's BMI was around 20. A general surgeon performed an ultrasound guided core needle biopsy by using a 14-gauge automated gun and needle and three samples of the lesion were obtained. The biopsy was completed uneventfully and the patient was discharged home after a 3-hour observation based on the protocol used in our institution. The next day she presented with chest pain and subsequently she passed out. She was transferred immediately to the nearby hospital, where she was diagnosed with a hemopneumothorax (Fig. 1). Patient's vital points were affected, (blood pressure 83/55 and heart beats reaching 120 per minute), hematocrit 24,2 and hemoglobin 7,2. A chest tube was urgently placed in the left hemithorax with air and bloody fluid drained while transfusion of red blood cells and fresh frozen plasma was granted. The total quantity of fluid drained by the chest tube was 1200 ml with bloody shade.

* Corresponding author.

E-mail address: pzarog@hotmail.com (P. Zarogoulidis).

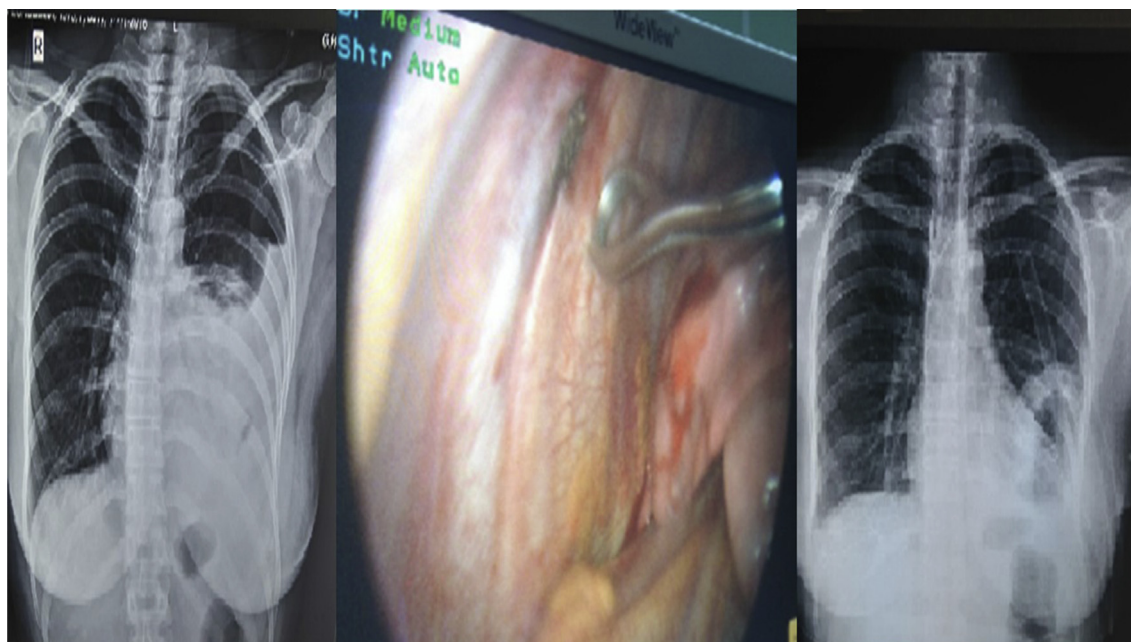


Fig. 1. Left x-ray upon diagnosis of hemothorax, middle within the surgery, and right upon follow-up.

The physicians of the regional hospital addressed to our department for further confrontation. The patient was transferred to our department after her vital points stabilized and the transportation was safe. The woman was stable when she arrived although the hemorrhage continued as pretty much 100–150ml of bloody liquid drained per hour. Furthermore the depiction in the X-ray suggested a persisted pneumothorax and gathering of coagulated blood. The confrontation included the transfusion of red blood cell and fresh frozen plasma, an immediate surgical intervention was decided as the woman's situation did not seem to improve.

The patient was submitted to a video-assisted thoracic surgery in order to locate the site of the injury. Initially an encapsulated pleural effusion was drained, approximately 400ml, and a significant quantity of coagulated blood was found and removed (Fig. 1.). After this the visibility improved and the localization of the injury was possible. The hemorrhage was provoked by an injury of intercostal 4th intercostal artery after the temno biopsy (Fig. 1.). Fortunately the bleeding point was located and diathermy was used to clot the vessel. Moreover a small rupture of the lung parenchyma was restored. Following VATS the patient was hospitalized for one day at the intensive care unit and then she was moved to our department as her clinical condition and X-ray imaging improved (Fig. 1). Finally she was discharged in the 6th postoperative day in overall good condition.

3. Discussion

Nowadays core needle biopsies for breast tumors constitute an integral part in the diagnosing procedure reaching the efficacy of open surgeries, especially when there is a stereotactical or ultrasound guidance. In any case studies show that patient who have submitted to a pre-operative biopsy are more likely to be cured with a single surgical operation, over others initially diagnosed with an open surgical biopsy. The complications of these techniques are negligible compared to open surgical biopsies while in the same time there is an obvious financial benefit [8]. The diagnostic accuracy rate reaches 96,6% for lesions less than 2 cm in diameter as long as multiple samples are received [9]. The major factor than can lead to false-negative diagnosis is the inadequate sampling during the procedure. The radiologist or the surgeon that performs the core needle biopsy of the breast should be familiar with the depiction of breast lesions in correlation with the BI-RADS

classification and receive a minimum number of four to five specimens from the suspicious areas [10].

Pneumothorax as a complication of fine-needle aspiration of the breast is not considered a negligent act, happens more often in the tail of the breast of a thin woman and there is a correlation with the experience of the practitioner [11]. Its incidence varies between 0,01%–3% [11]. The rupture of an intercostal artery suggests a life threatening situation which requires an immediate confrontation. For medical acts performed in the chest wall, the practitioner should always be aware of a disruption of the pleural cavity. There are incidents recorded in the literature, presenting hemorrhage caused by thoracentesis, breast biopsy or other medical acts [7,12,13].

Traumatic hemothorax most of the times is treated with thoracostomy (a percentage reaching 88%), followed by open thoracotomy (approximately 9%), while VATS or sternotomy are indicated in some cases [14]. The last decade there is a growing number of surgeons supporting the significant role of VATS in diagnosis and evaluation of thoracic injuries [15], while others suggest that it is a safe surgical method with satisfactory therapeutic results in certain circumstances offering a fast-track rehabilitation [16]. Thoracoscopy is an option in the management of a thoracic trauma, indicated in patients hemodynamically stable, suffering from an ongoing hemorrhage for more than 2 days with assembled clotted blood in the pleural cavity [17]. Early endoscopic confrontation reduces the possibility of empyema, fibrothorax or lung entrapment when it is performed in the first five days [18]. In our case, this fact suggested that the VATS was the confrontation indicated in order to control bleeding and remove the coagulated blood from the pleural cavity, although other techniques, such as transcatheter arterial embolization, are minimally invasive and effective enough in hemorrhage control [19].

As regards the technical issues of core needle breast biopsy with ultrasound guidance, the practitioner should be well qualified with adequate education in the use of ultrasound and continuous on-hand training in the US-guided biopsies. In order to avoid any penetration of the chest wall causing pneumothorax or hemothorax, the needle should be kept parallel to the chest wall and the maneuvers should be performed with accuracy [20]. A nonthrow biopsy device is an alternative option in cases that the tumor's location suggests increased risk [20].

The incidence of other complication such as haematomas or infection of the insertion site is less than 1% and 0,01% to 0,2% respectively

[22]. FNAB is a liable method for breast biopsy in patients treated with anticoagulants in comparison with core needle biopsy, especially when then the lesion is located below the skin or is adhered to the chest wall or in proximity with blood vessels.[22] This method, when performed properly, is related to lower complication rate and lesser disturbance and anxiety for the patient [21].

Disclosure

The authors declare no conflict of interest.

Funding Acknowledgement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

References

- [1] B.I. Bodai, B. Boyd, L. Brown, H. Wadley, V.J. Zannis, M. Holzman, Total cost comparison of 2 biopsy methods for nonpalpable breast lesions, *Am J Manag Care* 7 (5) (2001) 527–538.
- [2] A.R. Hatmaker, R.M. Donahue, J.L. Tarpley, A.S. Pearson, Cost-effective use of breast biopsy techniques in a Veterans health care system, *Am J Surg* 192 (5) (2006) e37–41.
- [3] S.H. Parker, F. Burbank, R.J. Jackman, C.J. Aucreman, G. Cardenosa, T.M. Cink, J.L. Coscia Jr., G.W. Eklund, W.P. Evans 3rd, P.R. Garver, et al., Percutaneous large-core breast biopsy: a multi-institutional study, *Radiology* 193 (2) (1994 Nov) 359–364.
- [4] K. Hertl, M. Marolt-Music, I. Kocijancic, V. Prevodnik-Kloboves, J. Zgajnar, Haematomas after percutaneous vacuum-assisted breast biopsy, *Eur J Ultrasound* 30 (1) (2009) 33–36.
- [5] C.A. Gateley, P.R. Maddox, R.E. Mansel, Pneumothorax: a complication of fine needle aspiration of the breast, *Bmj* 303 (6803) (1991) 627–628.
- [6] Z. Kaufman, B. Shpitz, M. Shapiro, A. Dinbar, Pneumothorax. A complication of fine needle aspiration of breast tumors, *Acta Cytol* 38 (5) (1994) 737–738.
- [7] I.S. Whitaker, B. Elmihyeh, M.N. Siddiqui, T.C. Holme, Haemopneumothorax after fine needle aspiration of the breast, *J Roy Soc Med* 96 (11) (2003) 555–556.
- [8] W. Bruening, J. Fontanarosa, K. Tipton, J.R. Treadwell, J. Launder, K. Schoelles, Systematic review: comparative effectiveness of core-needle and open surgical biopsy to diagnose breast lesions, *Ann Intern Med* 152 (4) (2010) 238–246.
- [9] Yan-Jun Zhang, Lichun Wei, Jie Li, Yi-Qiong Zheng, Xi-Ru Li, Status quo and development trend of breast biopsy technology, *Gland Surg* 2 (1) (2013) 15–24.
- [10] Vivian Youngjean Park, Eun-Kyung Kim, Hee Jung Moon, Jung Hyun Yoon, Min Jung Kim, Evaluating imaging-pathology concordance and discordance after ultrasound-guided breast biopsy, *Ultrasonography* 37 (2) (2018 Apr) 107–120.
- [11] T. Bates, T. Davidson, R.E. Mansel, Litigation for pneumothorax as a complication of fine-needle aspiration of the breast, *Br J Surg* 89 (2) (2002) 134–137.
- [12] I. Spanuchart, S. Gallacher, Hemothorax after thoracentesis, *N Engl J Med* 375 (19) (2016) 1878.
- [13] K. Maruo, T. Tachibana, S. Inoue, F. Arizumi, S. Yoshiya, Hemothorax caused by the trocar tip of the rod inserter after minimally invasive transforaminal lumbar interbody fusion: case report, *J Neurosurg Spine* 24 (3) (2016) 394–397.
- [14] M. Cakmak, M. Nail Kandemir, Study of 433 operated cases of thoracic trauma, *Indian J Surg* 78 (6) (2016) 477–481.
- [15] M. Paci, V. Annessi, S. de Franco, G. Ferrari, G. Sgarbi, Videothoroscopic evaluation of thoracic injuries, *Chir Ital* 54 (3) (2002) 335–339.
- [16] Z. Szentkereszty, P. Horkai, A. Furka, P. Sapy, S. Sz Kiss, K. Fekete, The role of VATS in the treatment of blunt thoracic injuries, *Magyar sebeszet* 60 (1) (2007) 510–513.
- [17] L.M. Darlong, Thoracoscopy for trauma, *Lung India Off Organ Indian Chest Soc* 28 (2) (2011) 87–88.
- [18] C.H. Morales Uribe, M.I. Villegas Lanau, R.D. Petro Sanchez, Best timing for thoracoscopic evacuation of retained post-traumatic hemothorax, *Surg Endosc* 22 (1) (2008) 91–95.
- [19] Andreas P. Chemelli, Michael Thauerer, Franz Wiedemann, Alexander Strasak, Jossef Klocker, Iris E. Chemelli-Steingruber, Transcatheter arterial embolization for the management of iatrogenic and blunt traumatic intercostal artery injuries, *J Vasc Surg* 49 (2009) 1505–1513.
- [20] ACR practice guideline for the performance of ultrasound-guided percutaneous breast interventional procedures” Revised 2014 (Resolution 7). Accessed December 20, 2014.
- [21] Marzanna Obrzut, Marian Cholewa, Jakub Baran, Agnieszka Obrzut-Palusińska, Ewa Kurczab, Does fine-needle aspiration biopsy still have a place in the diagnosis of breast lesions? *Prz Menopauzalny* 17 (1) (2018 Mar) 28–31, <http://dx.doi.org/10.5114/pm.2018.74900>.
- [22] S.M. Willems, C.H. van Deurzen, P.J. van Diest, Diagnosis of breast lesions: fine-needle aspiration cytology or core needle biopsy? A review, *J Clin Pathol* 65 (2012) 287–292.