Awake Video-assisted Thoracic Surgery with Thoracic Epidural Anesthesia in a Patient with Chronic Obstructive Pulmonary Disease

Zeynep Ceren YAHŞi [1]
Şişli Etfal Hamidiye Hastanesi
zeynepcerenyahsi@gmail.com
ORCID:0009-0000-5051-0031

Kairatbek MIIZAMOV[1]
Şişli Etfal Hamidiye Hastanesi
mkdemir90@gmail.com
ORCID:0009-0007-4187-8126

İsmail DUYMAZ [1]
Şişli Etfal Hamidiye Hastanesi
isduymaz.92@gmail.com
ORCID:009-005-5526-5377

Celal KAYA [2]
Şişli Etfal Hamidiye Hastanesi
C.kaya47@hotmail.com
ORCID:0000-0002-3626-1283

Onur DERDIYOK [3]
Şişli Etfal Hamidiye Hastanesi
derdiyokonur@gmail.com
ORCID:0000-0001-9994-8501

Sevgi KESICI [1]
Şişli Etfal Hamidiye Hastanesi
Md.kesici@mynet.com
ORCID:0000-0002-8276-6039

Sibel OBA [1]
Şişli Etfal Hamidiye Hastanesi
sibeloba@yahoo.com
ORCID:0000-0002-5466-1715

[1] Department of Anesthesiology and Reanimation, Health Sciences University Sisli Hamidiye Etfal Training and Research Hospital,
[2] Department of Anesthesiology and Reanimation, Health Sciences University Taksim Training and Research Hospital,
[3] Department of Thoracic Surgery, Health Sciences University Sisli Hamidiye Etfal Training and Research Hospital.
*Sorumlu yazar
Makale geliş tarihi:16/08/2024 - Makale Kabul tarihi;21/10/2024
DOI:10.17932/IAU.ASD.2015.007/asd_v010i3006

ABSTRACT

Video-assisted thoracic surgery is the gold standard for minimally invasive surgery and can eliminate the need for general anesthesia in high-risk patients. In patients with significant respiratory dysfunction, such as chronic obstructive pulmonary disease, the choice of anesthesia technique is critical for surgical outcomes. This case report examines the application of thoracic epidural anesthesia during awake video-assisted thoracic surgery in a patient with advanced-stage chronic obstructive pulmonary disease. Thoracic epidural anesthesia offers significant advantages, including effective pain management, reduced opioid consumption, and improved postoperative respiratory function. Furthermore, it contributes to the reduction of postoperative complications and acceleration of recovery by minimizing the risks associated with tracheal intubation and mechanical ventilation. This case demonstrates that thoracic epidural anesthesia is safe and effective for video-assisted thoracic surgery with stable hemodynamic and respiratory parameters.

Keywords: *awake surgery, thoracic epidural anesthesia, video-assisted thorasic surgery, chronic obstructive pulmonary disease.*

Kronik Obstrüktif Akciğer Hastalığı Olan Bir Hastada Torasik Epidural Anestezi ile Uyanık Video Yardımlı Torasik Cerrahi

ÖZET

Video yardımlı torasik cerrahi, minimal invaziv cerrahinin altın standardı olup, risk grubundaki hastalarda genel anestezi ihtiyacını ortadan kaldırma potansiyeline sahiptir. Kronik obstrüktif akciğer hastalığı gibi ciddi solunum fonksiyon bozukluğu olan hastalarda, anestezi yöntemi seçimi cerrahi sonuçlar için kritik öneme sahiptir. Bu vaka raporunda, ileri evre kronik obstrüktif akciğer hastalığı olan hastada uyanık video yardımlı torasik cerrahi sırasında torasik epidural anestezinin uygulanması incelenmiştir. Torakal epidural anestezi, etkili ağrı yönetimi, opioid kullanımının azaltılması ve postoperatif solunum fonksiyonlarının iyileştirilmesi gibi önemli avantajlar sunmaktadır. Ayrıca, trakeal entübasyon ve mekanik ventilasyona bağlı riskleri en aza indirerek postoperatif komplikasyonların azalmasına ve iyileşme sürecinin hızlanmasına katkı sağlamaktadır. Bu vaka, stabil hemodinamik ve solunum parametreleri ile birlikte torakal

epidural anestezinin video yardımlı torasik cerrahide güvenli ve etkili olduğunu göstermektedir.

Anahtar Kelimeler: *uyanık cerrahi, torasik epidural anestezi, video yardımlı torasik cerrahi, kronik*

INTRODUCTION

Video-assisted thoracic surgery (VATS) has emerged as the gold standard for minimally invasive surgery (Rocco et al, 2013). Advancements in VATS equipment have facilitated surgeries without the need for general anesthesia or double-lumen intubation.

Awake VATS with Thoracic Epidural Anesthesia (TEA) has emerged as a promising strategy for managing high-risk patients requiring thoracic interventions. Given the compromised lung function of patients with Chronic Obstructive Pulmonary Disease (COPD), selecting an appropriate anesthesia is paramount for optimal outcomes. TEA in VATS offers several benefits, such as enhanced pain management, reduced opioid use, and potentially improved postoperative respiratory function (Liu J et al, 2015). This case report describes the application of TEA in an awake setting for VATS in a patient with severe COPD.

CASE REPORT

A 66-year-old male with severe COPD, weight 70 kg, was admitted to our hospital for superior segmentectomy of the right lower lobe due to the diagnosis of a tumor. Preoperative assessment revealed dyspnea and widespread rhonchi upon lung auscultation.

On the operating table, following the administration of 2 mg of intravenous midazolam, a thoracal epidural catheter was carefully inserted at the T6-7 interspace. TEA was initiated through a carefully titrated combination of 10 mL of 0.5% bupivacaine, 5 mL of 2% lidocaine, and 50 mcg of fentanyl. Comprehensive monitoring involving electrocardiogram, SO2, invasive arterial pressure, temperature, respiratory rate, ETCO2, and Bispectral Index monitoring.

Perioperative measures were diligently implemented to ensure adequate oxygenation and to sustain saturation above 92%. An additional 2 mg of midazolam and 25 mcg of fentanyl were administered after the first hour. The patient's hemodynamic parameters remained stable with no pain

reported, and VATS was completed without complications. Subsequently, the patient was transferred to the ward and discharged home after 7 days.

DISCUSSION

Awake VATS with TEA offers several advantages over traditional methods for patients with COPD. The use of intravenous opioid-free anesthesia strategies, such as sedation combined with TEA, allow for spontaneous breathing during surgery, thereby reducing the risks associated with tracheal intubation and mechanical ventilation (Yang M et al, 2024). This approach significantly decreases postoperative respiratory complications, optimizes postoperative analgesia, and facilitates enhanced recovery after surgery.

Compared with the traditional approach of intubated, ventilated general anesthesia with one-lung ventilation, awake VATS with TEA is a less invasive alternative. Use of minimally invasive techniques, reducing perioperative surgical stress on the patient (Fabo J et al, 2022). Awake VATS has been shown to be feasible, resulting in shorter hospital stays, reduced costs, and equivalent outcomes compared to procedures performed under general anesthesia (Pombeo E et al, 2007).

The benefits of TEA in awake VATSs are significant, but concerns regarding its associated risks must be addressed. Epidural anesthesia can cause complications ranging from minor discomfort to severe consequences. Although high TEA levels involving segments T1 to T5 may cause a slight reduction in heart rate with minimal vasodilatory effects, hypotension and bradycardia can be managed with intravenous fluids and vasopressors. However, inadvertent subdural or subarachnoid injections pose more serious risks, necessitating immediate intervention, such as airway support and rapid administration of fluids and vasopressors, to stabilize hemodynamics. Although severe neurological complications, like permanent paraplegia, are extremely rare, they can result from various causes, including epidural hematoma, abscess, direct cord trauma, spinal infarction, and neurotoxicity due to accidental subarachnoid injection or chemical contamination (Moen Vet al, 2004), (Kao M C et al ,2004) To mitigate these risks, performing TEA requires exceptional caution, followed by close post-procedural monitoring and prompt management of the adverse effects. Vigilance and proactive measures are crucial for preventing or minimizing the undesirable consequences of TEA during awake VATS procedures.

There are risks associated with high TEA in patients with severe COPD. For instance, TEA can lead to a reduction in vital capacity and forced expiratory volume in 1 second, however a meta-analysis showed reduction of pulmonary complications after epidural analgesia, probably due to earlier mobilization, reduced opioid consumption, and adequate pain relief for coughing (Groeben H. (2006)), (.Pöpping, D et al,2008). In addition, TEA can expedite the restoration of intestinal function after surgery and alleviate the systemic stress response to surgical procedures. (Jørgensen, H et al, 2000(4)), (Loick, H et al, 1999).

The total volume (15 mL) and dose used in our case are within the ranges reported in the literature for thoracic epidural anesthesia (TEA). For instance, a study compared general anesthesia and TEA for breast oncologic surgeries used a total volume of 20 mL with 75 mg of bupivacaine and 100 mcg of fentanyl, demonstrating effective analgesia without significant adverse hemodynamic or respiratory effects. (Belzarena SD,2008). In another retrospective study, awake TEA was achieved using 8–12 mL of 0.5% bupivacaine with 50 mcg of fentanyl, administered via an epidural catheter (Al-Abdullatief M et al,2007). While lower doses of local anesthetics are sometimes used for awake thoracic epidural anesthesia, the choice of dose and volume should be individualized based on several factors, including the specific surgical procedure, the patient's comorbidities, and the catheter's level of insertion.

CONCLUSION

In conclusion, awake VATS with TEA is a promising approach for patients with COPD undergoing thoracic surgery. The advantages of this approach include reduced respiratory complications, optimized postoperative analgesia, faster recovery times, and decreased morbidity compared with traditional methods. The evolving landscape of anesthesia techniques for thoracic surgery continues to enhance patient outcomes and pave the way for further minimally invasive approaches.

Author Contribution:

Zeynep Ceren Yahşı: Data collections.study design.
literature review,writing the article.
Kairabek Miizamov: Literatıre review, writing the article, study design , English editing.
İsmail Duymz: Data collection, analysis and interpretation. Literature review.

Celal Kaya: Literatıre review, English editing, writing the article.
Onur Derdiyok: Analysis and interpretation, literature review.
Sevgş Kesici: Study design, analysis and interpretation, writing the article, literature review.
Sibel Oba: Literatıre review, writing the article, English editing**.**

REFERENCES:

Al-Abdullatief M, Wahood A, Al-Shirawi N, et al. Awake anaesthesia for major thoracic surgical procedures: an observational study. *Eur J Cardiothorac Surg*. 2007;32(2):346-350. doi:10.1016/j.ejcts.2007.04.029

Belzarena SD. Comparative study between thoracic epidural block and general anesthesia for oncologic mastectomy. *Rev Bras Anestesiol*. 2008;58(6):561-568. doi:10.1590/s0034-70942008000600001

Fabo, C., Oszlanyi, A., Barta, Z. V., Nemeth, T., Lantos, J., Vaida, S. N., & Szabo, Z. (2022). Anesthesiology of the spontaneous ventilation in thoracic surgery: A narrative review. AME Surgical Journal, 2, 1 https://doi.org/10.21037/asj-21-2

Groeben H. (2006). Epidural anesthesia and pulmonary function. Journal of anesthesia, 20(4), 290–299. https://doi.org/10.1007/s00540-006-0425-6

Jørgensen, H., Wetterslev, J., Møiniche, S., & Dahl, J. B. (2000). Epidural local anaesthetics versus opioid-based analgesic regimens on post-operative gastrointestinal paralysis, PONV and pain after abdominal surgery. Cochrane Database of Systematic Reviews, 2000(4), CD001893. https://doi.org/1002/14651858.CD001893

Kao, M. C., Tsai, S. K., Tsou, M. Y., Lee, H. K., Guo, W. Y., & Hu, J. S. (2004). Paraplegia after delayed detection of inadvertent spinal cord injury during thoracic epidural catheterization in an anesthetized elderly patient. Anesthesia & Analgesia, 99(2), 580-583. https://doi.org/10.1213/01.ANE.0000130391.62612.3E

Liu, J., Cui, F., Li, S., Chen, H., Shao, W., Liang, L., Yin, W., Lin, Y., & He, J. (2015). Nonintubated video-assisted thoracoscopic surgery under epidural anesthesia compared with conventional anesthetic option: A randomized control study. Surgical Innovation, 22(2), 123-130. https://doi.org/10.1177/1553350614531662

Loick, H. M., Schmidt, C., Van Aken, H., Junker, R., Erren, M., Berendes, E., Rolf, N., Meissner, A., Schmid, C., Scheld, H. H., & Möllhoff, T. (1999). High thoracic epidural anesthesia, but not clonidine, attenuates the perioperative stress response via sympatholysis and reduces the release of troponin T in patients undergoing coronary artery bypass grafting. Anesthesia & Analgesia, 88(4), 701-709. https://doi.org/10.1097/00000539-199904000-00001

Moen, V., Dahlgren, N., & Irestedt, L. (2004). Severe neurological complications after central neuraxial blockades in Sweden 1990-1999. Anesthesiology, 101(4), 950–959. https://doi.org/10.1097/00000542-200410000-00021

Pompeo, E., Tacconi, F., Mineo, D., & Mineo, T. C. (2007). The role of awake video-assisted thoracoscopic surgery in spontaneous pneumothorax. Journal of Thoracic and Cardiovascular Surgery, 133(3), 786-790. https://doi.org/10.1016/j.jtcvs.2006.11.001

Pöpping, D. M., Elia, N., Marret, E., Remy, C., & Tramèr, M. R. (2008). Protective effects of epidural analgesia on pulmonary complications after abdominal and thoracic surgery: A meta-analysis. Archives of Surgery, 143(10), 990-99 https://doi.org/10.1001/archsurg.143.10.990

Rocco, G., Martucci, N., La Manna, C., Jones, D. R., De Luca, G., La Rocca, A., Cuomo, A., & Accardo, R. (2013). Ten-year experience on 644 patients undergoing single-port (uniportal) video-assisted thoracoscopic surgery. Annals of Thoracic Surgery, 96(2), 434-438. https://doi.org/10.1016/j.athoracsur.2013.04.044

Yang, M., Wang, D., Xu, X., Yu, X., Xu, H., Zeng, Z., & Dai, J. (2024). Application of OFA-based ERAS for video-assisted thoracoscopic surgery in elderly patients with airway stenosis: A case report. Medicine, 103(16), e37662. https://doi.org/10.1097/MD.0000000000037662.