

# TORAKS

Paravertebral mi?

EPİDURAL MI?

Dr. Elif Başađan Mođol

Uludađ Üniversitesi Tıp Fakóltesi  
Anesteziyoloji ve Reanimasyon AD

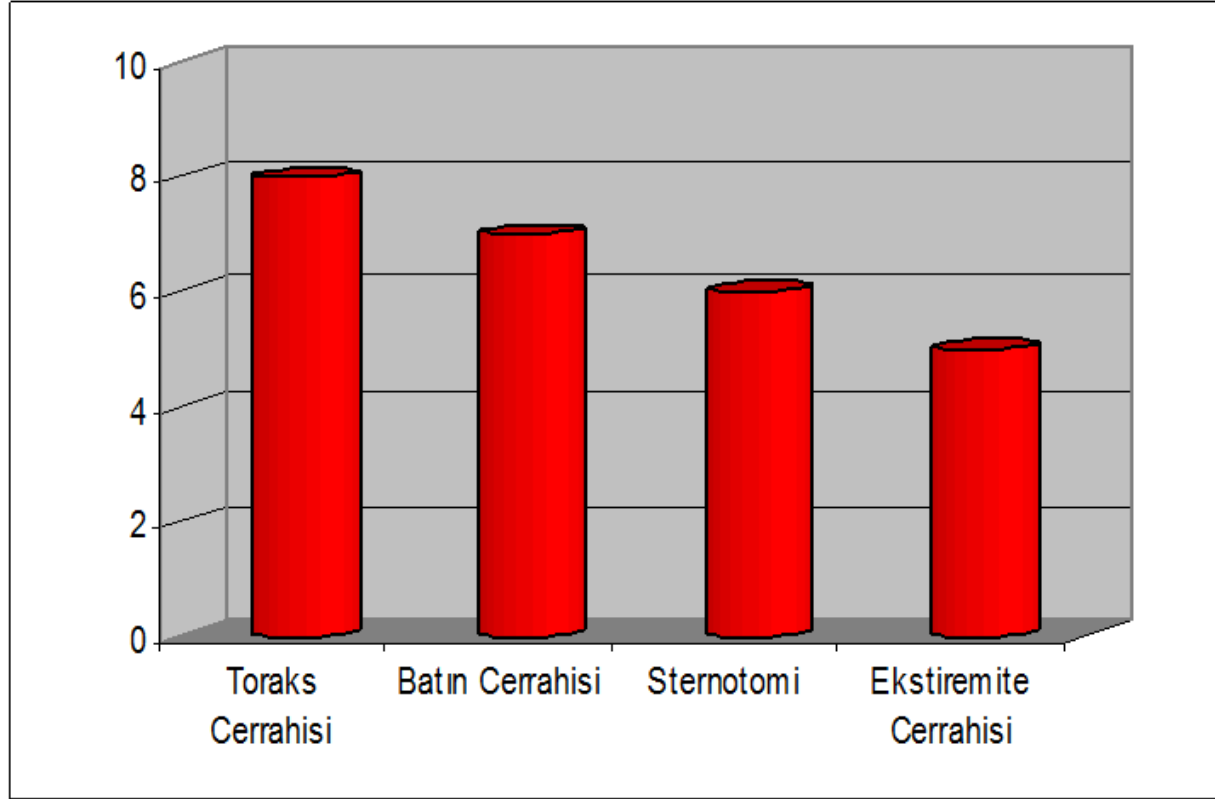
## Akciğer patolojileri

- Akciğer kanseri
- Pnömotoraks
- Plevral efüzyon
- Biyopsi
- Travma

## Cerrahi prosedürler

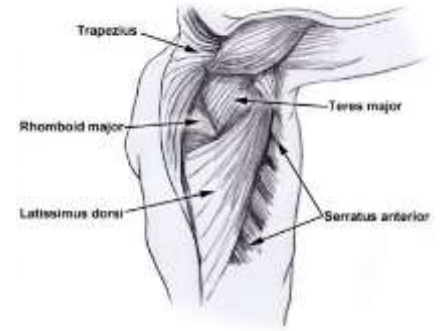
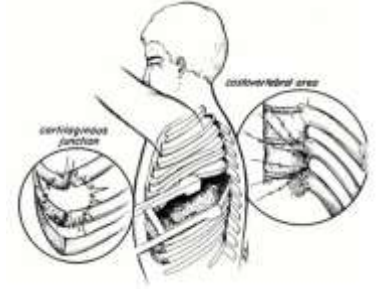
- Açık torakotomi
- Torakoskopi VATS
- Mediastinoskopi
- Mediastinotomi
- Bronkoskopi

# Postoperatif ağrı şiddeti



# Toraks operasyonlarında ağrı nedenleri

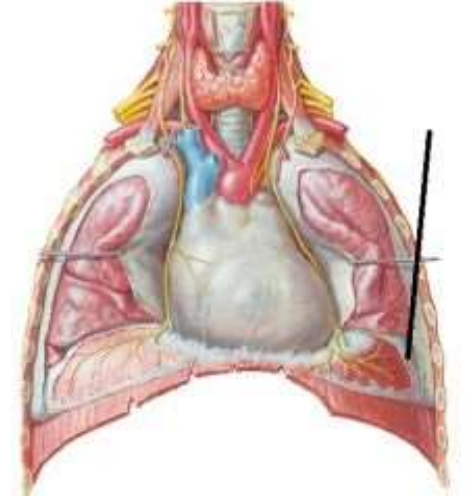
- Cilt insizyonu (ant spinal dal)
- Göğüs duvarının insizyonu ve inflamasyonu
  - Kaslar (post spinal kasların retraksiyonu/post spinal dal)
  - Akut kostokondrit
  - Kosta hasarı
  - Kostovertebral yapıların hasarı
  - Akut interkostal nevralji
- Pariyetal plevra



SOMATİK İNTERKOSTAL SİNİRLER

# Toraks operasyonlarında ağrı nedenleri

- Diyafragma
- Mediasten
- Akciğer
- Perikardiyal plevra
- Visseral plevra



SEMPATİK FRENİK VE VAGAL SİNİRLER

# Yetersiz ağrı tedavisinin sonuçları

- Pulmoner komplikasyonlar ↑
- Trakeal entübasyon ve ventilasyon süresinde ↑
- YB süresinde ↑
- Reentübasyon gereksiniminde ↑
- Hastanede kalış süresi ↑
- Kronik persistan cerrahiye bağlı ağrı ↑
- Ruh sağlığında bozulma
- Günlük yaşama dönüşte gecikme
- Hasta memnuniyetinde ↓

# Multimodal Analgesia Techniques and Postoperative Rehabilitation

Girish P. Joshi, MB, BS, MD, FFARCSI

- Devamlı santral, periferik veya paravertebral blok
- Advers etkileri en az olan yöntemler tercih edilmeli
- Oral / parenteral NSAİ veya COX-2- inhibitörleri
- Asetaminofen
- Persistan postoperatif ağrı riski ↑
  - Kortikosteroidler, ketamin,  $\alpha$ 2agonistler, gabapentin vb
- İV HKA
- Preemptif analjezi ?
  - Unimodal tekniklerin kullanılması
  - Aynı zamanda farklı analjezik yolların hedeflenmesi
  - Analjezinin zamanlaması
  - *Peak* etkinin anestezi sonlanmasından hemen önce oluşması

# A Systematic Review of Randomized Trials Evaluating Regional Techniques for Postthoracotomy Analgesia

Girish P. Joshi, MB, BS, MD, FFARCSI\*

Francis Bonnet, MD, FRCA†

Rajesh Shah, FRCS (C/Th)‡

Roseanne C. Wilkinson, PhD§

Frederic Camu, MD¶

Barrie Fischer, FRCA||

Edmund A. M. Neugebauer, PhD#

Narinder Rawal, MD\*\*

Stephan A. Schug, MD (Cgn), FANZCA, FFP MANZCA††

Christian Simanski, MD‡‡

Henrik Kehlet, MD§§

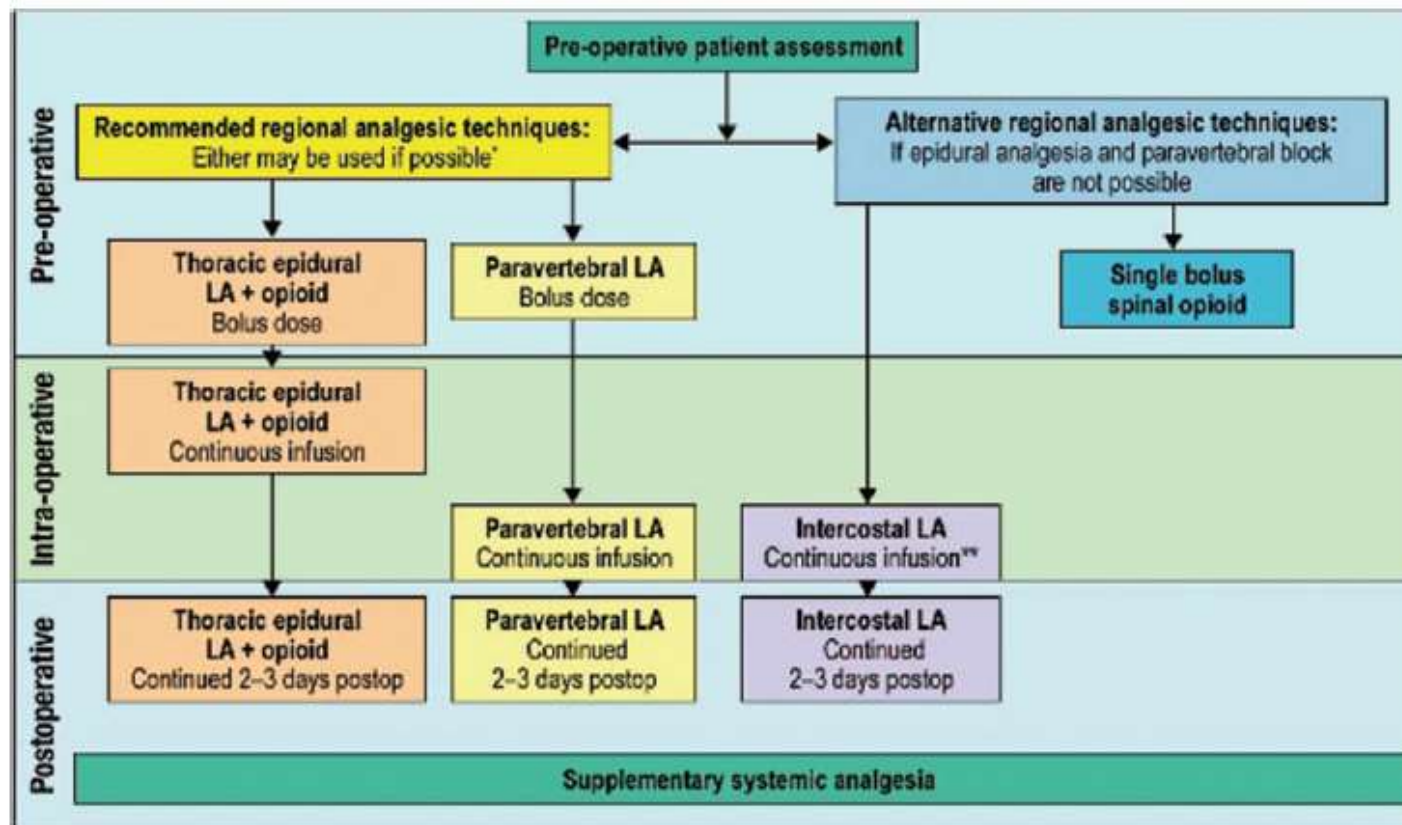


Figure 8. Overall PROSPECT recommendations: regional techniques for post-thoracotomy analgesia. \*Either thoracic epidural local anesthetic (LA) + opioid or paravertebral block with LA is recommended as the primary analgesic approach; further studies on efficacy and safety are necessary to determine which technique is superior. \*\*If intercostal LA is used, administration by continuous infusion is recommended, despite limited data, because of the requirement for continuous analgesia for the long duration of post-thoracotomy pain.



**A comparison of the analgesic efficacy and side-effects of paravertebral vs epidural blockade for thoracotomy—a systematic review and meta-analysis of randomized trials**

R. G. Davies<sup>1</sup>, P. S. Myles<sup>1,2,3\*</sup> and J. M. Graham<sup>4</sup>

- 10 çalışma / 520 hasta
- TPVB ile TEA analjezik etkinliği aynı
- Pulmoner komplikasyonlar TPVB < TEA
- Üriner retansiyon, kusma, hipotansiyon TPVB < TEA
- Başarısız blok oranı TPVB < TEA
- Tüm çalışmalarda n < 130, kör Ø

**Table 1** Characteristics of the randomized trials included in the meta-analysis. \*Each study is rated according to its quality of bias-minimization using the Jadad scale.<sup>17</sup> 0 (high bias) to 5 (low bias). PCA, patient controlled analgesia; PO, per oral; SC, subcutaneous; PR, per rectal

Study*	Type of surgery	No. of patients	Epidural block	PVB	Additional analgesics
Matthews <i>et al.</i> <sup>30</sup> (Jadad score 3)	Thoracotomy	20	Thoracic bupivacaine 0.25% bolus, then infusion	Catheter inserted post-induction; bupivacaine 0.25% bolus+infusion	None
Richardson <i>et al.</i> <sup>38</sup> (Jadad score 3)	Thoracotomy	36	Thoracic bupivacaine 0.25% bolus, then infusion	Catheter inserted by surgeon; bupivacaine 0.25% bolus+infusion	PCA morphine
Dhole <i>et al.</i> <sup>10</sup> (Jadad score 2)	Thoracotomy	30	Thoracic bupivacaine 0.5% intraoperatively, then 0.25–0.375% bupivacaine+fentanyl infusion	Catheter inserted by surgeon; bupivacaine 0.5% bolus+infusion	PO meflumaminic acid SC nicomorphine
De Cosmo <i>et al.</i> <sup>8</sup> (Jadad score 2)	Thoracotomy	100	Thoracic bupivacaine 0.25% bolus, then infusion	Single injection pre-induction, then intraoperative catheter placement by surgeon; pre-induction bupivacaine 0.5% bolus; intraoperative bupivacaine 0.25% bolus; postoperative bupivacaine 0.5% infusion	PO/PR diclofenac PCA morphine
Wedad <i>et al.</i> <sup>46</sup> (Jadad score 2)	Thoracotomy	50	Thoracic bupivacaine 0.1%+fentanyl infusion	Catheter inserted by surgeon; bupivacaine 0.5%+fentanyl bolus; bupivacaine 0.1%+fentanyl infusion	Not specified
Luketich <i>et al.</i> <sup>28</sup> (Jadad score 2)	Thoracotomy	41	Thoracic bupivacaine 0.5% bolus, then bupivacaine 0.25% infusion	Catheter inserted pre-induction; bupivacaine 0.5% bolus; bupivacaine 0.25% infusion	i.m. ketorolac
Leaver <i>et al.</i> <sup>24</sup> (Jadad score 3)	Thoracotomy	50	Thoracic ropivacaine 0.2%+sufentanil bolus, then infusion	Catheter inserted by surgeon; ropivacaine 0.475% bolus; ropivacaine 0.3% infusion	i.v. ketorolac
Pertunen <i>et al.</i> <sup>35</sup> (Jadad score 2)	Thoracotomy	40	Thoracic bupivacaine 0.25% bolus, then infusion	Catheter inserted by surgeon; bupivacaine 0.25% bolus+infusion	Meperidine
Kaiser <i>et al.</i> <sup>17</sup> (Jadad score 2)	Thoracotomy	124	Thoracic bupivacaine 0.125%+morphine infusion	Percutaneous nerve block pre-induction, then intraoperative catheter placement by surgeon; pre-induction bupivacaine 0.25% bolus; intraoperative bupivacaine 0.5% bolus; postoperative bupivacaine 0.25% infusion	PCA morphine
Richardson <i>et al.</i> <sup>38</sup> (Jadad score 3)	Thoracotomy	29	Thoracic bupivacaine 0.5% bolus, then bupivacaine 0.125% infusion	Catheter inserted by surgeon; 0.5% bupivacaine bolus + infusion	PCA morphine

**Table 2:** Summary of the findings of the studies

	Pain management	Rescue analgesia	Other outcome	Complications	Comments
Matthews and Govinden [18]	Comparable analgesia in either technique up to 24 h postoperatively	Not mentioned		Hypotension and urine retention more frequent with TEA than with PVB	
Perttunen et al. [19]	Comparable analgesia in either technique at rest. TEA associated with more pain during coughing up to 4 h after surgery	Comparable postoperative morphine consumption	Comparable ventilatory and oxygenation parameters	Adverse effects were comparable in either groups	
Richardson et al. [20]	PVB provided better analgesia than TEA at rest and at coughing	Cumulative morphine consumption was higher with TEA	Pulmonary function and oximetry better in the PVB group. Glycaemic response was less in the PVB group	Hypotension was more common in the TEA group	
Bimston et al. [21]	TEA was more effective than PVB in the first 32 h, thereafter equally effective for postoperative analgesia	Equivalent postoperative opioid consumption	Comparable pulmonary and haemodynamic complications and more urinary retention with TEA. Ventilatory parameters were comparable		
De Cosmo et al. [22]	TEA provided superior analgesia up to 8 h postoperatively, then TEA and PVB were comparable	Equivalent postoperative ketorolac consumption	Respiratory parameters are comparable in either group	More minor complications in the TEA group	Patients' satisfaction is greater in the PVB group
Casati et al. [23]	PVB and TEA are equally effective for postoperative analgesia, both at rest and coughing	Comparable number of patients required rescue morphine	Respiratory parameters: partial pressure of arterial oxygen/fraction of inspired oxygen concentration (PaO <sub>2</sub> /FIO <sub>2</sub> ) are comparable in either group	Hypotension was more common in the TEA group	
Messina et al. [24]	VAS at rest was comparable in either group	Morphine consumption was significantly higher in the PVB group	FVC was better preserved in the epidural group on Day 3		
Gulbahar et al. [25]	PVB and TEA were equally effective for postoperative analgesia	Equivalent postoperative morphine consumption	Peak expiratory flow rate (PEFR), forced expiratory volume 1 (FEV <sub>1</sub> ) and SpO <sub>2</sub> was comparable in either group	More adverse effects with the TPB group	Postoperative glucose and cortisol were similar in the two groups
Mukherjee et al. [26]	Mean duration of postoperative analgesia after single bolus injection was longer in the TPB group	Not reported (NR)	NR	Hypotension was not observed in either group	Only bolus LA was used, no postoperative infusion was used in this study
Pintaric et al. [27]	Postoperative static and dynamic VAS scores were comparable in either group	Consumption of piritramide was similar in both groups	To maintain DO <sub>2</sub> I at or above the targeted value, a significantly higher amount of colloids was required in the TEA group	In the epidural group, systolic blood pressure was significantly lower at 24 and 48 h	
Kanazi et al. [28]	TEA provided superior analgesia both at rest and coughing			The incidence of hypotension within the first 6 h was higher in the TEA group	Seven patients (33%) were converted to TEA at 3.9 (4.8) h because of an inability to maintain the VAS <sub>R</sub> score of <7 cm
Grider et al. [29]	Comparable analgesia with epidural LA and paravertebral LA; however, epidural LA + opioid provided superior pain relief	No difference in opioid use among patients using iv PCA supplementation	Postoperative spirometry was best with an epidural LA + opioid group		
Kobayashi et al. [30]	PVB was not inferior to EP with respect to the primary endpoint: The mean VAS scores at rest, 2, 24 and 48 h after thoracotomy	No significant differences in the need for additional analgesic agents	Less time to insert catheter with PVB than EP	There were no significant differences between the groups in the incidence of complications	

## Analgesic efficacy and safety of thoracic paravertebral and epidural analgesia for thoracic surgery: a systematic review and meta-analysis

Dalim Kumar Baidya, Puneet Khanna and Souvik Maitra\*

- 12 çalışma, 541 hasta
- Analjezik etkinlik  
TEA = TPVB
- LA konsantrasyonu  
TEA < TPVB
- TPVB tekniği etkilemiyor
- TA ↓, üriner retansiyon  
TEA > TPVB
- Çalışmalar bias açısından da değerlendirilmiş

# A Comparison of the Analgesia Efficacy and Side Effects of Paravertebral Compared with Epidural Blockade for Thoracotomy: An Updated Meta-Analysis

Xibing Ding<sup>1,2\*</sup>, Shuqing Jin<sup>1,2\*</sup>, Xiaoyin Niu<sup>2</sup>, Hao Ren<sup>2</sup>, Shukun Fu<sup>1</sup>, Quan Li<sup>1,2\*</sup>

- 18 çalışma , 777 hasta
- En az bias etkisi olan meta-analiz
- Analjezik etkinlik aynı
- Pulmoner komplikasyonlarda fark yok

**Table 3.** All detailed results.

		Heterogeneity		Test for overall effect	
		I <sup>2</sup> (%)	P	Z	P
Primary outcomes	VAS 4–8 h	68	0.0004	1.30	0.19
	VAS 24 h	54	0.01	0.30	0.77
	VAS 48 h	0	0.67	1.31	0.19
	morphine usage 24 h	0	0.55	0.66	0.51
Secondary outcomes	Urinary retention	0	0.43	4.05	<0.0001
	Nausea and Vomiting	27	0.22	2.46	0.01
	Hypotension	0	0.98	5.37	<0.00001
	Failed block	29	0.15	2.55	0.01
	Pulmonary complications	0	0.47	1.69	0.09



# Trends and New Evidence in the Management of Acute and Chronic Post-Thoracotomy Pain—An Overview of the Literature from 2005 to 2015

## REVIEW ARTICLE

Paul G. Barash, MD  
Giovanni Landoni, MD  
Section Editors

David Rodriguez-Aldrete, MD, Keith A. Candiotti, MD, Rengarajan Janakiraman, MD,  
and Yiliam F. Rodriguez-Blanco, MD

Table 1. Summary of Evidence on Post-Thoracotomy Analgesia Techniques From 2005 to 2015

Technique	Improves Postoperative Analgesia?	Reduces Incidence of CPTP?	Improves Post-Thoracotomy Pulmonary Function?	Reduces Use of Opioids or Local Anesthetics?	Common Side Effects	Major Risks or Adverse Effects
TEA	Yes <sup>56</sup>	Yes, but pre-emptive TEA is not superior to postoperative TEA <sup>56</sup>	Yes <sup>2</sup>	N/A	Hypotension, urinary retention, nausea/ vomiting, and pruritus	Injury to neuraxis, intrathecal injection
TPVB	Yes <sup>4-7</sup>	Not studied	Yes <sup>7</sup>	N/A	Hypotension (much less common compared with TEA)	Pneumothorax, ipsilateral Horner's syndrome
IT opioid analgesia	Yes <sup>16-18</sup>	Not studied	Yes <sup>16</sup>	N/A	Nausea, vomiting, pruritus	Injury to neuraxis
Continuous wound catheter analgesia	Questionable <sup>19,20</sup>	Not studied	Not studied	No <sup>20</sup>	Redness, swelling	Local anesthetic toxicity
TENS	Yes <sup>21-24</sup>	Not studied	Yes <sup>21-23</sup>	Yes <sup>22</sup>	Skin irritation	None reported
Cryoanalgesia	Questionable <sup>26</sup>	No; associated with an increased incidence of chronic neuropathic pain <sup>25,27</sup>	Not studied	Not studied	Neuropathic pain	Pneumothorax, increased pain
TIVA (remifentanyl and propofol)	Yes <sup>63</sup>	Yes <sup>63,64</sup>	Not studied	Not studied	Increased intraoperative hypotension	Possible increased incidence of intraoperative awareness
GETA with sevoflurane	No <sup>63</sup>	No	Not studied	Not studied	Nausea, vomiting, hypotension	Malignant hyperthermia

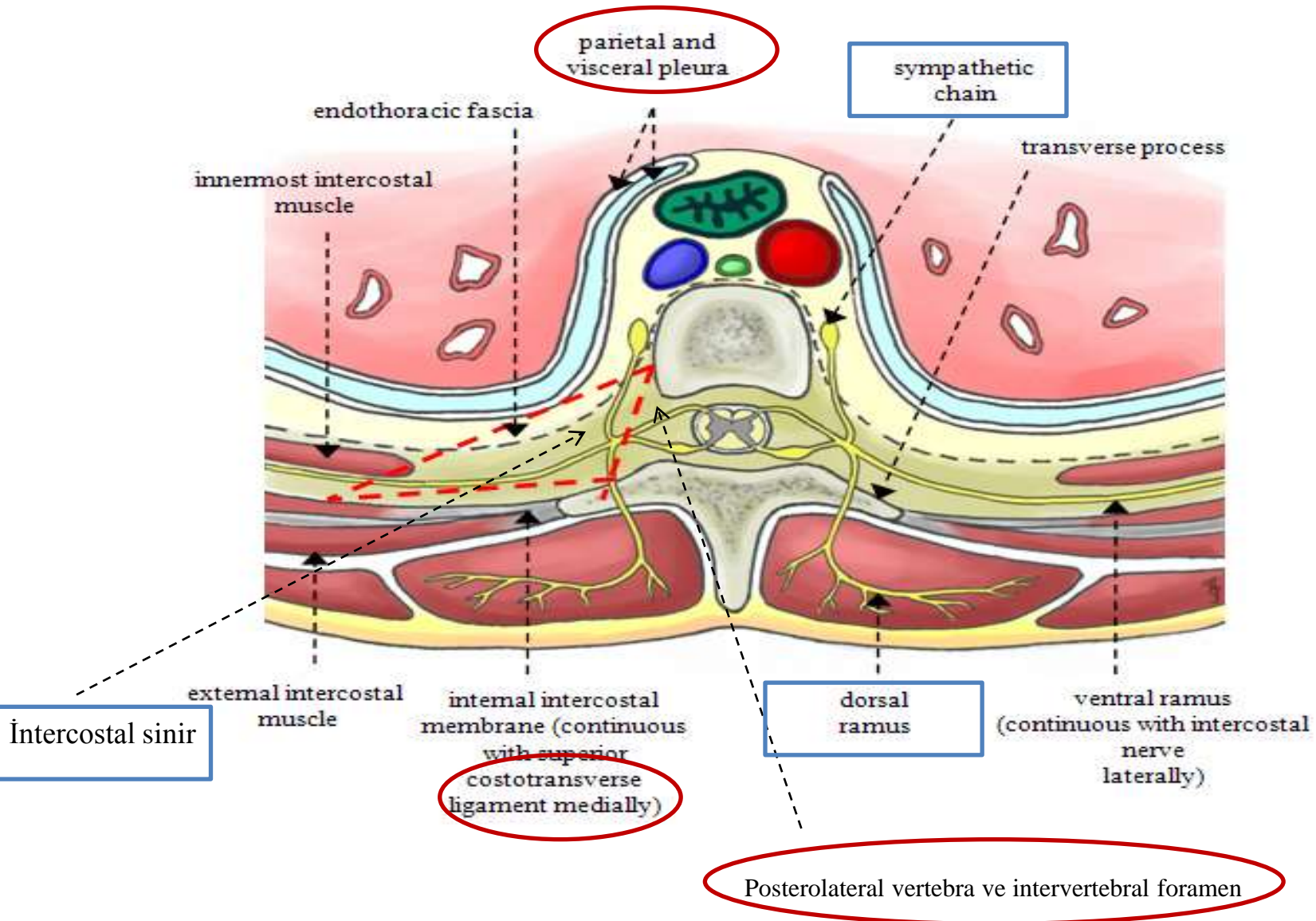
Abbreviations: CPTP, chronic post-thoracotomy pain; GETA, general endotracheal anesthesia; IT, intrathecal; N/A, not applicable; TEA, thoracic epidural analgesia; TPVB, thoracic paravertebral block; TENS, transcutaneous electric nerve stimulation; TIVA, total intravenous anesthesia

- 78 çalışma
- TPVB, TEA ile kıyaslanabilir analjezik etkinliğe sahip
- Farmakolojik adjuvanlarla post-torakotomi analjezisinde TEA ye alternatif olabilir

# Torakal Paravertebral Blok

- Sellheim
  - 1905, abdominal analjezi
- Lawen
  - 1911 '*paravertebral conduction anesthesia*'
- Kappis
  - 1919, cerrahi anestezi, abdominal op
- Eason & Wyatt
- 1979, TPVB, kateter tekniği

# Torakal Paravertebral Blok

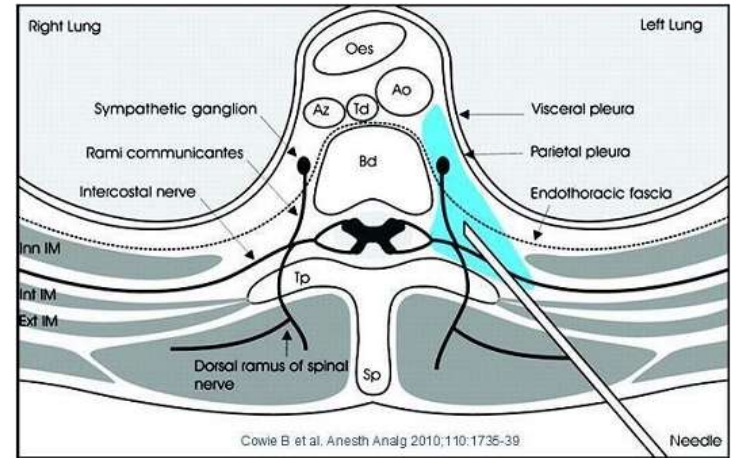
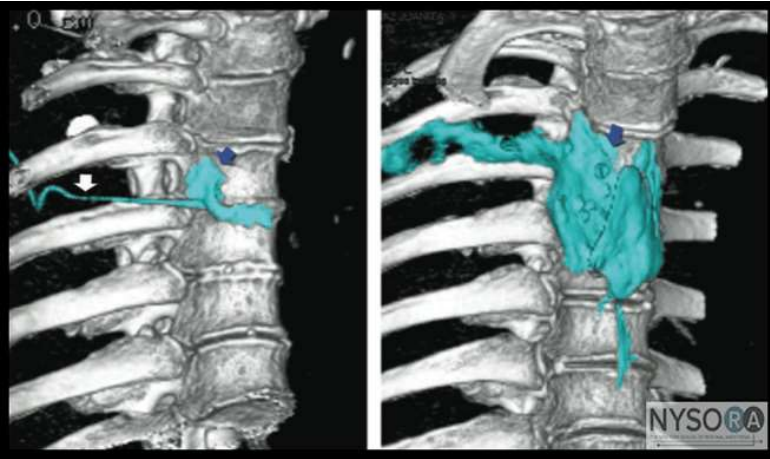


# Torakal Paravertebral Blok

- Klasik yöntem
- Lateral yaklaşım
- Medial yaklaşım
- Cerrah tarafından direkt görüş
- Direnç kaybı yöntemi
- Basınç transducer
- Nörostimülasyon tekniği
- ✓ Ultrason eşliğinde

# Mekanizması ve Anestezinin Yayılımı

- Enjekte edilen seviyede lokalizasyon
- Bitişik seviyelere  $\uparrow$   $\downarrow$  dağılım
- İnterkostal alan
- Epidural bölge
- Yerçekimine göre hareket yok, kaudal yayılım  $\uparrow$
- İlacın dağılımı ile duyu kaybı olan bölge arasında tutarsızlık %29
  - İlk görüntüden sonra epidural alana sekonder dağılım





## TPVB Endikasyonları

- Unilateral operasyonlar
  - Açık torakotomi
  - VATS
  - Minimal invaziv kardiyak cerrahiler
- Pektus ekskavatum onarımı (özellikle çocuklar için)
- Multipl kosta kırığı

## TPVB Kontrendikasyonları

- İğne giriş yerinde enfeksiyon
- Ampiyem
- LA karşı allerji
- TPV alanda tümör

# TPVB Komplikasyonları

- Plevral ponksiyon (%1) ve pnömotoraks (%0.5)
- Hematom (%2.4)
- Epidural ve intratekal yayılım (%1-70)
  - Medial yaklaşım tekniği, ultrason kullanımı
  - LA 15 mL ↑
  - Deneyim
  - Spinal deformite
- Enfeksiyon
- Sinir hasarı (sensoriyal, motor Ø)
- Hipotansiyon (%4)
- Horner sendromu

# TPVB Avantajları

## TEKNİK

- Basit ve öğrenmesi kolay
- TEA'den güvenli ve kolay
- Sedatize ve ventile edilen hastalarda da güvenli
- Torasik cerrahi sırasında görerek kateter yerleştirilmesi ile güvenli ve doğru sonuç

## KLİNİK

- Tek enjeksiyonla multidermatomal ipsilateral somatik ve sempatik sinir blokajı
- Post. ramusu bloke eder
- Kortikal yanıtı kaldırır
- Stres yanıtı ↓
- Hemodinamik stabilite
- Opioid gereksinimini ↓
- Komplikasyon riski ↓
- Motor güç ve mesane yanıtını korur
- Erken mobilizasyon

# TEA avantajları

- Dinamik ağrıyı ↓, '*Altın Standart*'
- PL torakotomilerde (6 dermatom)
- Mukosilier aktivite, oksijenasyon ↑
- Pulmoner komplikasyonlar, atelektazi, ve enfeksiyon ↓
- Stres ve sempatik yanıtı ↓
- Endokardiyal ve epikardiyal kan akımı ↑, KH ↓
- İskemik miyokarda O<sub>2</sub> sunumu ve tüketimini dengeler
- LV fonk ↑, KVS komplikasyonlar ↓
- Disritmiler ↓
- Tromboembolik komplikasyonlar ↓
- Barsak motilitesini ↑
- İmmun sistemi ↑
- Yüksek riskli hastalarda avantajlar ↑

# TEA

## KONTRENDİKASYONLARI

- Koagülopati
- Antikoagülan kullanımı ?
- Sepsis
- Nörolojik hastalık
- Vertebral deformite
- Geçirilmiş op

## KOMPLİKASYONLARI

- Üriner retansiyon
- Hipotansiyon
- Bradikardi
- Bulantı kusma
- Kaşıntı
- Geçici nörolojik hasar
- İntratekal enjeksiyon
- Epidural hematom
- Epidural abse
- Enfeksiyon
- *Yerleştirilememe (%11)*

# A comparison of epidural and paravertebral catheterisation techniques in post-thoracotomy pain management<sup>S</sup>

Gultekin Gulbahar<sup>a,\*</sup>, Bulent Kocer<sup>a</sup>, Serife Nursel Muratli<sup>b</sup>, Erkan Yildirim<sup>c</sup>, Ozlem Gulbahar<sup>d</sup>, Koray Dural<sup>a</sup>, Unal Sakinci<sup>a</sup>

PL Torakotomi

VAS, FEV1, PEFr, serum kortizol düzeyi, KŞ

TE kateter preop, TPV kateter intraop

Op sonunda HKA 0.1 ml/kg/st %0.25 bupivakain (2 ml bolus, 1 st kilit)

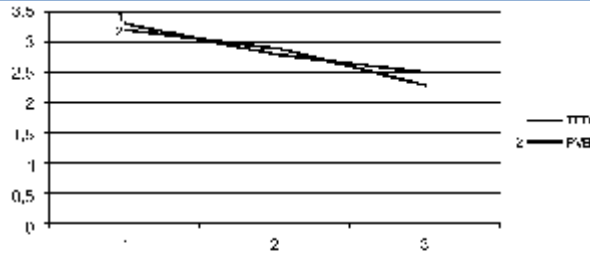
TPV kateterin görerek yerleştirilmesi güvenli

Analjezi etkin ve eşit

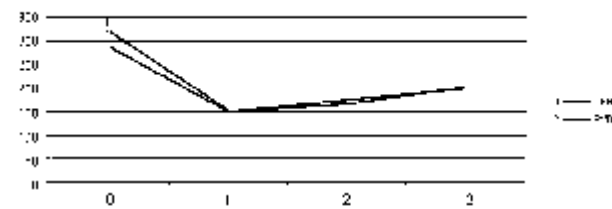
KŞ ve kortizol düzeyi aynı

Yan etkiler LA yüksek dozuna bağlı

Kateter yerleşim süresi TPVB'da kısa



**Fig. 1.** Mean postoperative pain scores. Although it has been seen a tendency for a decrease in the postoperative pain scores toward the third day in both groups in the graph, there was no statistically significant difference detected regarding analgesic efficiency.



**Fig. 2.** Mean postoperative PEFr values. Although there was a rapid decline in the PEFr values in both groups in the first postoperative day (1) comparing to the preoperative day (0), there was a tendency for increment toward the third postoperative day. But, no statistically significant difference was detected between the groups related to the PEFr values.

Table 2

The distribution of the patient groups regarding the study results.

	TEB (n = 19)	PVB (n = 25)	p-value
Side effects	14	0	0.011
Urinary retention	4	0	—
Nausea	5	0	—
Vomiting	3	0	—
Hypotension	2	0	—
Need for ICU	3	1	—
Indication for catheter removal	4	0	—
Unable to place the catheter	2	0	—
The duration for the procedure (min)	13.21 ± 3.42 (9–20)	4.24 ± 0.72 (3–6)	0.000
Hospital stay (day)	15.74 ± 5.02 (6–28)	14.60 ± 5.57 (8–30)	0.269
Postoperative hospital stay (day)	8.63 ± 2.16 (5–12)	7.96 ± 2.11 (4–13)	0.265

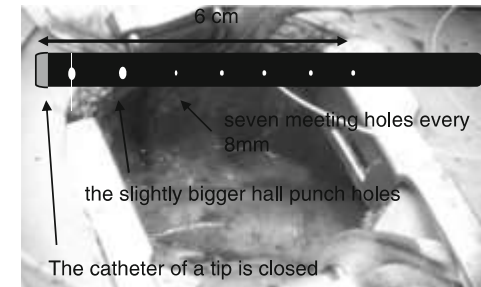
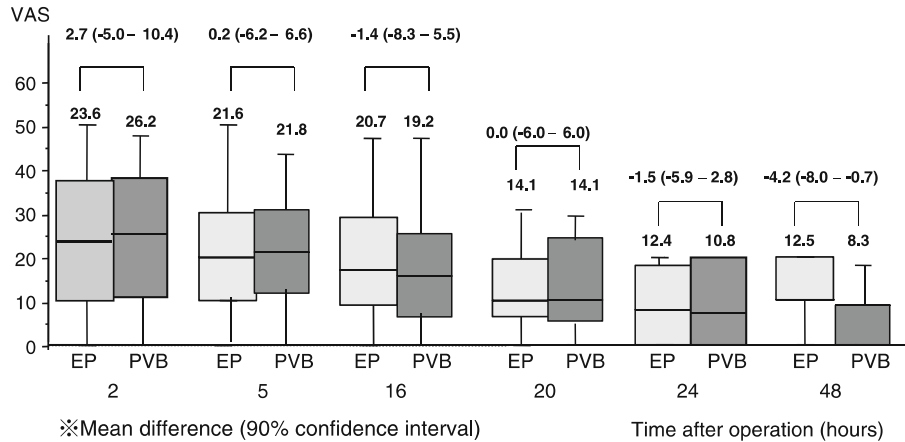
TEB: thoracal epidural blockade; PVB: paravertebral blockade; ICU: intensive care unit.

# Paravertebral block via the surgical field versus epidural block for patients undergoing thoracotomy: a randomized clinical trial

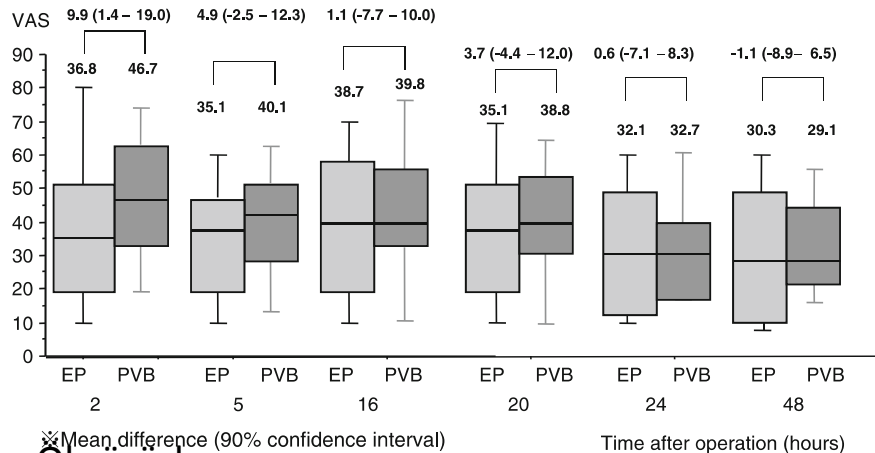
Rei Kobayashi · Shoichi Mori · Kenji Wakai · Koichi Fukumoto · Takuya Saito · Tatsuya Katayama · Junya Nakata · Takayuki Fukui · Simon Ito · Tetsuya Abe · Shunzo Hatooka · Renko Hosoda · Tetsuya Mitsudomi

TPVB ve TEA: op sonunda kullanılıyor  
Kas koruyucu torakotomi ile lobektomi  
Bolus + infüzyon (ropivakain %2 + 800 mcg fentanil)  
VAS: 2, 24, 48 st

PVB TEA'in yerini alabilir  
Teknik açıdan basit ve güvenli



## Dinlenme



**Table 3** Incidence of adverse effects of the anesthetic agents

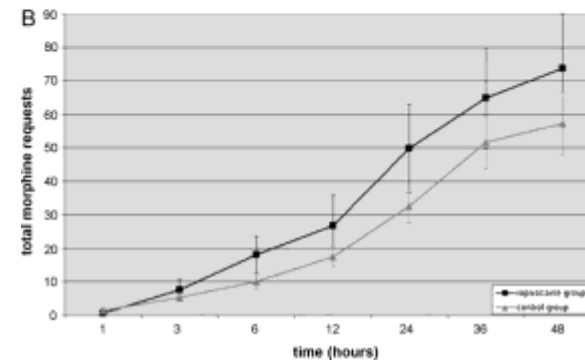
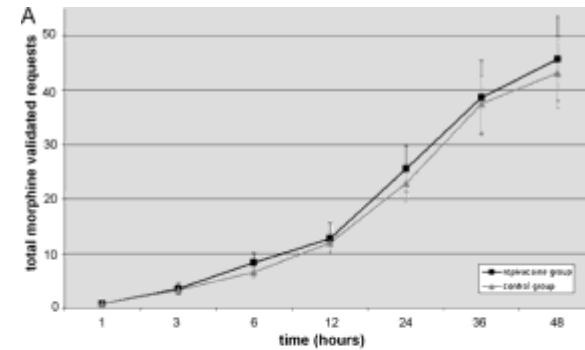
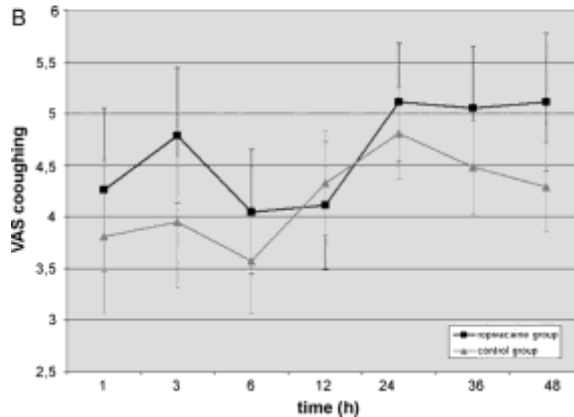
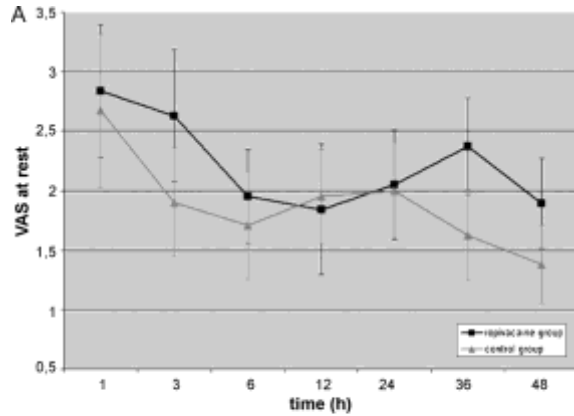
	EP group (n = 35)	PVB group (n = 35)	P value
No adverse effects	24	30	0.088
Adverse effects	11	5	
Hypotension	5	2	
Nausea, vomiting	8	3	

# Intra-operative paravertebral block for postoperative analgesia in thoracotomy patients: a randomized, double-blind, placebo-controlled study

Olivier Helms<sup>a,\*</sup>, Juliette Mariano<sup>a</sup>, Jean-Gustave Hentz<sup>a</sup>, Nicola Santelmo<sup>b</sup>, Pierre-Emmanuel Falcoz<sup>b</sup>, Gilbert Massard<sup>b</sup>, Annick Steib<sup>a</sup>

- Torakotomi, TEA için kontrendikasyon
- TPVB: op sonunda cerrah tarafından
- Salin / ropivakain %0.5 bolus + 0.1 ml/kg/st
- Parasetamol, nefopam, iv HKA
- VAS, total morfin tüketimi

- TPVB iv HKA'den daha etkin  $\emptyset$
- Diğer TPVB çalışmalarına göre morfin ve LA tüketimi  $\uparrow$
- İntraop kateter yerleşimi ???
- Parietal plevra rüptürü nedeniyle sızıntı





# Analgesia in patients undergoing thoracotomy: Epidural versus paravertebral technique. A randomized, double-blind, prospective study

J Thorac Cardiovasc Surg 2014;147:469-74)

Federico Raveglia, MD,<sup>a</sup> Alessandro Rizzi, MD,<sup>a</sup> Andrea Leporati, MD,<sup>a</sup> Piero Di Mauro, MD,<sup>b</sup> Ugo Cioffi, PhD,<sup>c</sup> and Alessandro Baisi, MD<sup>a</sup>

- Kas koruyucu torakotomi
- TEA: fentanil 10 mcg/ml+bupivakain
- TPVB: ropivakain %0.3
- Parasetamol, tramadol
- PV kateter görerek + hemostatik sünger
- Ağrı (3 ay), cerrahi stres, pulmoner fonk

- TPV kateter yerleştirilmesi 4-5 dk
- Hastanın op odasında kalış süresi ↓
- Inop değişikikte kateter yerleştirilebilir
- TPVB güvenilir ve etkili

TABLE 4. Overall results

Parameter	-24 h	6 h	12 h	24 h	48 h	72 h	P
Visual analog scale	—	5.92 ± 1.269	4.62 ± 1.540	3.60 ± 1.572	2.98 ± 1.545	2.78 ± 1.608	.002*
	—	6.00 (2-8)	5.00 (1-7)	4.00 (1-7)	3.00 (1-7)	2.00 (1-7)	
Vas cough	—	6.10 ± 1.276	4.79 ± 1.641	3.62 ± 1.556	3.09 ± 1.607	2.87 ± 1.687	.002*
	—	6.00 (2-9)	5.00 (1-8)	4.00 (1-7)	3.00 (1-7)	2.00 (1-7)	
Cortisol	—	16.33 ± 4.400	13.74 ± 3.564	11.85 ± 3.789	9.42 ± 2.387	8.00 ± 2.456	.08
	—	18.00 (5-22)	14.00 (6-22)	11.00 (5-20)	9.90 (5-16)	8.00 (4-14)	
Saturation	96.77 ± 1.387	91.35 ± 3.049	94.26 ± 2.059	94.93 ± 1.959	96.13 ± 1.546	96.64 ± 1.264	.001*
	97.00 (93-99)	92.00 (81-96)	95.00 (89-98)	95.00 (90-98)	96.00 (93-99)	96.00 (95-99)	
Forced expiratory volume in 1 second	79.63 ± 10.724	—	47.62 ± 10.233	52.53 ± 11.918	56.27 ± 10.672	60.67 ± 9.888	.023*
	83.00 (51-95)	—	45.00 (33-76)	50.00 (39-79)	57.00 (39-81)	61.00 (40-82)	

Anlamlılıklar TPVB lehine

TABLE 3. Perioperative characteristics of participants

Characteristic	Total (N = 48)	Group A (n = 24)	Group B (n = 24)	P
Length of surgery, min	124.9 ± 19.61 (122.5 [95-154])	141.3 ± 10.09 (146.0 [118-154])	108.6 ± 11.170 (108.0 [95-140])	<.0001*
Allergy (no)	48 (100.0)	24 (100.0)	24 (100.0)	1.00
Hypotension (yes)	9 (18.75)	9 (37.5)	0 (0)	0.002*
Urinary retention (yes)	6 (12.50)	6 (25)	0 (0)	0.022*
Vomiting/nausea (yes)	8 (16.66)	8 (33.3)	0 (0)	0.004*
Hitch (yes)	6 (12.50)	6 (25)	0 (0)	0.022*

Anlamlılıklar TEA lehine

# A Randomized, Double-Blind Trial Comparing Continuous Thoracic Epidural Bupivacaine With and Without Opioid in Contrast to a Continuous Paravertebral Infusion of Bupivacaine for Post-thoracotomy Pain

Jay S. Grider, DO, PhD,\* Timothy W. Mullet, MD,† Siby P. Saha, MD,† Michael E. Harned, MD,\* and Paul A. Sloan, MD\*

- AL Torakotomi
- TEA /LA, TEA /LA+O , TPVB/LA
- Bupivacain %0.25, hidromorfon 0.01 mg/ml
- interkostal blok
- İnfüzyonlar op sonunda
- VAS dinlenme/spirometre, Spirometri

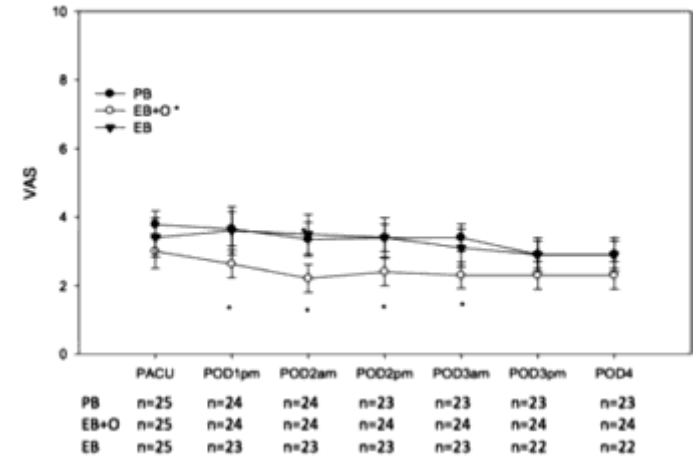


Table 3. VAS Score, Incentive Spirometry Data, and Intravenous PCA Incidence From All Collection Periods

	EB + O (n = 24)	EB (n = 22)†	PB (n = 23)
Mean ± standard error VAS pain score	2.6 ± 0.4* Basal rate 3.24 mL	3.1 ± 0.5 Basal rate 5.1 mL	3.3 ± 0.5
Intravenous PCA	1/24	3/18	5/23*
Spirometry (>2 L)	21/24*‡	14/18	18/23

\* $p < 0.05$ .

†Three subjects with hypotension receiving 0.125% bupivacaine dose reduction included in the intention-to-treat analysis.

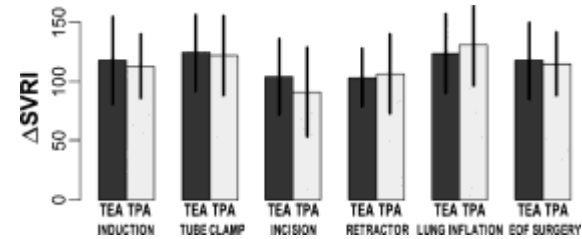
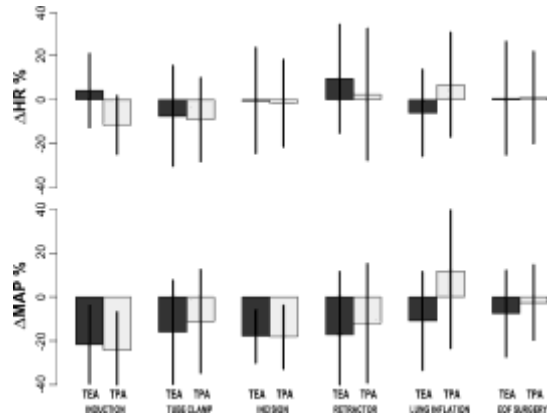
‡EB + O incentive spirometry VAS data missing for 1 subject on POD4 (n = 23) impacting comparison across groups.

- TEA / LA+O > TEA /LA = TPV
- Hipotansiyon TEA / LA > TEA / LA + O

# Comparison of Continuous Thoracic Epidural With Paravertebral Block on Perioperative Analgesia and Hemodynamic Stability in Patients Having Open Lung Surgery

- AL torakotomi
- LIDCO SİSTEM: HR, OAB, SVI, CI, SVRI
- TEA: %0.25 levo + 30 mcg/kg M
- TPVB: Preop, %0.5 levo + 30 mcg/kg M
- Op. sonu: HKA %0.125 levo+ 20 mcg/mL infüzyon
- Diklofenak, pritramid

- Analjezi TEA = TPVB
- KVS stabilite TPVB > TEA
- Kolloid miktarı TEA>TPVB
- O2 sunumunu sürdürmek için sıvı optimizasyonu önemli



**TABLE 3.** Systolic Blood Pressure Measured 6, 24, and 48 Hours After Surgery

Systolic Blood Pressure	TEA	TPA	P
After 6 h	116 ± 19	132 ± 16	0.06
After 24 h	110 ± 11	126 ± 15	0.01
After 48 h	98 ± 11	122 ± 18	0.004

Values are means ± SD. Systolic blood pressure was significantly lower in the epidural group after 24 ( $P = 0.01$ ) and 48 hrs ( $P = 0.004$ ).

**TABLE 1.** Patients and Baseline Hemodynamic Data

	TEA	TPA
Age, y	62 ± 9.5	63 ± 12
Weight, kg	78 ± 14.5	81 ± 15
Height, cm	171 ± 8	168 ± 9
Males/females, n	10/6	10/5
ASA status (I/II/III/IV), n	0/12/4/0	0/10/5/0
Duration of surgery, min	174 ± 39	169 ± 39
DO <sub>2</sub> I, mL/min/m <sup>2</sup>	916 ± 356	807 ± 211
Cardiac index, L/min/m <sup>2</sup>	4.5 ± 2.0	3.3 ± 0.9
SV, mL	97 ± 41	82 ± 28
SVV, %	9.6 ± 5.5	13.3 ± 9.0
SVRI, dyn/cm <sup>5</sup> /m <sup>2</sup>	2100 ± 577	2533 ± 1045
MAP, mm Hg	103.5 ± 21	99 ± 23
HR, /min	81 ± 25	72 ± 7
CVP, mm Hg	9 ± 6	11 ± 11

# Regional analgesia for video-assisted thoracic surgery: a systematic review

Kristin Julia Steinhorsdottir<sup>a,\*</sup>, Lorna Wildgaard<sup>b</sup>, Henrik Jessen Hansen<sup>a</sup>, René Horsleben Petersen<sup>a</sup>  
and Kim Wildgaard<sup>c</sup>

European Journal of Cardio-Thoracic Surgery 45 (2014) 959–966

- Akut ağrı VATS < Torakotomi
- Kronik ağrı VATS = Torakotomi
- Preop ağrı, portların ve göğüs tüplerinin sayısı, op süresi
- 'Altın Standart' rejyonel teknik yok
- TPVB ve TEA



**Table 1:** Comparative studies on regional analgesia, effect on pain scores and adverse effects

Regional analgesia, groups compared	Authors	n	Surgical procedure	Standardized surgical	Pain POD 0	Pain POD 1	Pain POD 2	Number of pain scoring/day procedure	Supplementary analgesic: POD 0/1/2	Basic analgesic treatment*	Adverse events
TEA vs IV opioids + NSAID	Kim et al. [15]	37	L	(+)	NS rest + movement	NS rest + movement	NS rest + movement	1/1/1	NS	-	↑ (nausea, vomiting)
TEA vs IV opioids	Yie et al. [16]	105	L	(+)	NS rest + movement	NS rest + movement	↓	1/1/1	-	-	↑ (pruritus), ↓ (dizziness)
TEA vs IM/rectal NSAID	Yoshioka et al. [7]	48	LW	(-)	↓ rest + movement	↓ rest + movement	↓ rest + movement	1/1/1	↓	-	↑
TEA vs intercostal catheter	Hotta et al. [20]	40	-	(-)	NS rest + movement	NS rest + movement	NS rest + movement	3/1/1	NS	-	NS (nausea, vomiting, pruritus, urinary retention)
TEA vs intercostal block + IV opioids, PVB + IV opioids or IV opioids	Fernandez et al. [21]	47	MM	(+)	NS	NS	NS -	-/-/-	-	-	-
TEA (sole) vs general anaesthesia + TEA	Pompeo et al. [22]	60	MM	(+)	-	NS	-	-/1/-	-	-	NS (vomiting, urinary retention)
TEA (sole) vs general anaesthesia + IV NSAID	Pompeo et al. [23]	43	MM	(+)	↓	-	-	1/-/-	-	-	-
PVC vs intrapleural spray + IV (morphine) or IV (morphine)	El-Dawlatly et al. [24]	30	MM	(-)	NS	NS	-	>6/1/-	↓	-	NS (nausea, vomiting, pruritus, urinary retention)
PVB vs IV (PCM)	Fibls et al. [6]	40	MM	(+)	↓	↓	↓	2/1/1	↓	+	NS (nausea, vomiting, urinary retention)
PVB (multilevel) vs PVB (single)	Kaya et al. [27]	50	MM	(+)	NS	NS	-	6/1/-	NS	-	NS (nausea, vomiting, pruritus, respiratory depression)
PVB (multilevel) vs placebo	Hill et al. [25]	80	MM	(+)	↓	-	-	3/-/-	↓	+	-
PVB (multilevel) vs placebo	Kaya et al. [26]	50	MM	(-)	↓ rest + cough	NS rest + cough	NS rest + cough	6/2/1	↓	-	NS (nausea, vomiting, pruritus, urinary retention)
PVB (single) vs placebo	Vogt et al. [8]	40	MM	(-)	↓ rest	↓ rest	↓ rest	4/1/1	NS	+	NS (nausea, vomiting, sedation)
Long thoracic nerve block (single) vs control	Kwon et al. [28]	50	MM	(+)	↓	NS	-	7/1/-	NS	-	-
Intercostal analgesia vs IV (fentanyl)	Demmy et al. [18]	30	LW	(-)	NS	-	-	1/-/-	NS	-	NS (atrial fibrillation)

Surgical procedure: ↓ Pain scores or analgesic use reduced at one or more time points during the specified day in the treatment group vs control group; ↑ Pain scores or analgesic use increased at one or more time points during the specified day in the treatment group vs control group.

NS: no significant difference between groups—data not available.



L: lobectomy; LW: lobectomy and wedge resection; MM: mixed and minor procedures (bullectomy, biopsies of the lung and pleura); IM: intramuscular; IV: intravenous; NSAID: non-steroid anti-inflammatory drug; PCM: paracetamol; POD: postoperative day; PVB: paravertebral blockade; PVC: paravertebral catheter; TEA: thoracic epidural analgesia.

\*Basic analgesic treatment consisting of PCM and/or NSAID covering all 24 h.

# Preoperative Multiple-Injection Thoracic Paravertebral Blocks Reduce Postoperative Pain and Analgesic Requirements After Video-Assisted Thoracic Surgery

Fatma Nur Kaya, MD,\* Gurkan Turker, MD,\* Elif Basagan-Mogol, MD,\* Suna Goren, MD,\* Sami Bayram, MD,† and Cengiz Gebitekin, MD†

*Journal of Cardiothoracic and Vascular Anesthesia*, Vol 20, No 5 (October), 2006; pp 639-643

- Pre-op çoklu enj. TPVB
  - Ağrı şiddeti
  - Opioid tüketimi
  - İyileşme süreci
- TPVB: T4-T8 5X 4 mL %0.5 bupivakain+ Epi
- Kontrol: salin enj
- İV- HKA Morfin
- TPVB Erken postop dönemde ağrı yönetimi 
- İV morfin kullanımı ↓
- Hemodinamik veri 

**Table 2. The Characteristics of Surgery, Intraoperative Anesthetic Dosage, and Hemodynamic Data**

	PVB Group (n = 25)	Control Group (n = 22)	p
<b>Surgical characteristics</b>			
Type of surgery			
Wedge resection (n)	5	4	NS
Lung biopsy (n)	9	9	NS
Pleural biopsy (n)	11	9	NS
Duration of surgery (min)	56.8 ± 8.5	62.6 ± 7.2	NS
<b>Intraoperative data</b>			
Total fentanyl used (µg/kg)	1.7 ± 0.08	2.7 ± 0.05	<0.01
Inspired sevoflurane (%)	1.5 ± 0.1	1.4 ± 0.1	NS
Heart rate (beats/min)	70.5 ± 2.4	71.2 ± 3.1	NS
Mean arterial blood pressure (mmHg)	85.6 ± 8.4	86.5 ± 10.5	NS

**Table 3. Postoperative Data**

	PVB Group (n = 25)	Control Group (n = 22)	p
Time to first analgesic requirement (h)	2 (2-2)	0 (0-1)	<0.05
VAS pain scores at first analgesic requirement	3 (2-3)	6 (5-7.5)	<0.01
Maximum VAS pain scores during 48-hour study period	4 (3-4.5)	7 (5-8)	<0.01
Patient satisfaction with analgesia*	3 (3-3)	2 (2-3)	<0.05
Time to first mobilization (h)	4 (4-5)	7 (6-7.8)	<0.01
Time to hospital discharge (d)	2 (2-3)	3 (2-4.5)	<0.05

**Table 4. Postoperative Pain Scores at Rest and With Coughing**

Time After Surgery	PVB Group (n = 25)		Control Group (n = 22)	
	VAS <sub>R</sub>	VAS <sub>C</sub>	VAS <sub>R</sub>	VAS <sub>C</sub>
0 h	2 (1-2)*	3 (3-4)*	5 (4-6)	6 (5-7)
1 h	2 (1-2)†	3 (3-4)†	3 (2.8-4)	6 (4-6.5)
2 h	2 (1-3)†	3 (2-3)†	3 (2-3.5)	4 (2.8-4)
4 h	1 (1-2)†	3 (2-4)†	3 (2-4)	5 (4-6)
8 h	2 (1-2)	3 (3-4)	2 (1-3)	3 (3-4.5)
16 h	2 (1-2)	3 (2-3)	2 (1-2.5)	3 (2-4)
24 h	2 (1-2)	2 (2-3)	2 (1-3.5)	3 (2-3.5)
36 h	2 (1-2)	2 (2-3)	2 (1-3)	3 (2-3.5)
48 h	1 (1-2)	2 (2-3)	2 (1-2.5)	3 (2-3)

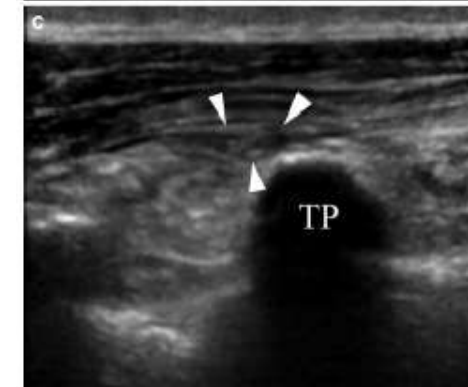
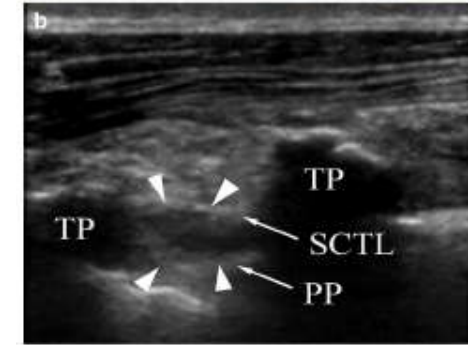


# Ultrasound-guided continuous thoracic paravertebral block provides comparable analgesia and fewer episodes of hypotension than continuous epidural block after lung surgery

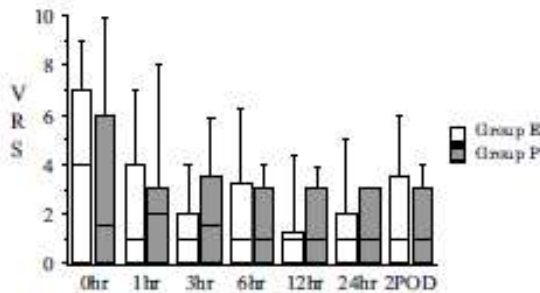
Hanae Okajima · Osamu Tanaka · Masahiro Ushio · Yasuko Higuchi · Yukiko Nagai · Katsuhiko Iijima · Yoshio Horikawa · Kazuko Ijichi

J Anesth (2015) 29:373–378

- USG-TPVB vs TEA / VATS
- Postop analjezi, yan etki
- TPVB: 2., 6. ve 8. TV tekli enj 5ml ropivakain %0.5  
4. TV kateter 15 mL ropivakain %0.5
- TEA: 5 – 7mL ropivakain %0.25 0.375
- İnfüzyon: ropivakain + fentanil



**Fig. 1** a The probe facing the needle. b An ultrasonogram of the paravertebral space after local anesthetic infusion. c An ultrasonogram of inadequate saline infusion at the dorsum of the transverse process by the conventional loss-of-resistance method. TP transverse process, PP parietal pleural, SCTL superior costotransverse ligament



**Fig. 3** The verbal rating scales were recorded at 0, 1, 3, 6, 12, and 24 h, and on the second postoperative day (POD2). No statistically significant differences were noted between the two groups at each time point. Box 25th–75th percentiles, solid line median, extended bars 10th–90th percentiles

**Table 2** Incidence of side effects

	Group E	Group P	P value
Hypotension	7/33	1/36	0.02
PONV	10/33	9/36	0.62
Pruritus	1/33	0/36	0.29
Supplemental analgesia <sup>a</sup>	1.0 [0.0–3.0]	2.0 [1.0–3.9]	0.26
Overall satisfaction score	5.0 [3.0–5.0]	4.5 [3.0–5.0]	0.26

<sup>a</sup> The frequency of supplemental analgesia

Benzer analjezik etkinlik

TPVB 4 olguda intratorasik kateter migrasyonu

# Thoracic Paravertebral Block for Video-Assisted Thoracoscopic Surgery: Single Injection Versus Multiple Injections

Fatma Nur Kaya, MD, Gurkan Turker, MD, Elif Basagan Mogol, MD, and Selcan Bayraktar, MD

*Journal of Cardiothoracic and Vascular Anesthesia*, Vol 26, No 1 (February), 2012: pp 90-94

- VATS
- PVB: Tekli enjek vs çoklu enjek
- Tekli : T6 20 mL
- Çoklu : T4 –T8 5 x 4 mL
- Bupivakaian % 0.5 + epinefrin
- HKA morfin + diklofenak
- 3 torokoskopi port
- Analjezi kalitesi farklı  $\emptyset$
- İşlem süresi  $\uparrow$  hasta memnuniyeti  $\downarrow$
- Çoklu enjeksiyonda risk  $\uparrow$

**Table 2. Characteristics of Paravertebral Block and Intraoperative Data**

	Group S (n = 25)	Group M (n = 25)	p Value
<b>Paravertebral block characteristics</b>			
Time to perform block (min)	6.8 $\pm$ 1.9	17.9 $\pm$ 3.0	<0.001
Time to block onset (min)	8.3 $\pm$ 1.8	7.2 $\pm$ 0.9	0.014
Anesthetized dermatomes (n)	5.8 $\pm$ 0.8	6.6 $\pm$ 1.1	0.009
<b>Intraoperative data</b>			
Total fentanyl used ( $\mu$ g/kg)	2.2 $\pm$ 0.3	2.1 $\pm$ 0.4	0.323
Inspired sevoflurane (%)	1.7 $\pm$ 0.6	1.6 $\pm$ 0.4	0.489
Heart rate (beats/min)	71.8 $\pm$ 6.9	70.9 $\pm$ 8.1	0.672
Mean arterial pressure (mmHg)	83.2 $\pm$ 7.4	84.3 $\pm$ 9.2	0.642

**Table 3. Postoperative Data**

	Group S (n = 25)	Group M (n = 25)	p Value
Time to first analgesic requirement (h)	1.9 $\pm$ 0.7	1.6 $\pm$ 0.5	0.509
VAS pain scores at first analgesic requirement	3.6 $\pm$ 0.7	3.3 $\pm$ 0.6	0.140
Maximum VAS pain scores during 24-h study period	4.3 $\pm$ 0.6	4.2 $\pm$ 0.9	0.360
Patients satisfaction with analgesic procedure*	1/2/9/13	3/4/13/5	0.028
Time to first mobilization (h)	4.4 $\pm$ 0.5	4.6 $\pm$ 0.6	0.296
Time to hospital discharge (h)	29.3 $\pm$ 3.5	28.4 $\pm$ 3.4	0.324

**Table 4. Postoperative Pain Scores at Rest and With Coughing**

Time after surgery (h)	Group S (n = 25)		Group M (n = 25)	
	VAS <sub>R</sub>	VAS <sub>C</sub>	VAS <sub>R</sub>	VAS <sub>C</sub>
0	2 (0-5)	3 (2-5)	2 (0-4)	3 (2-6)
1	2 (0-5)	4 (2-5)	2 (0-4)	3 (3-5)
2	3 (0-5)	3 (2-4)	2 (0-4)	3 (2-4)
4	2 (0-4)	4 (3-5)	2 (0-4)	4 (3-5)
8	2 (0-4)	3 (2-5)	2 (0-4)	3 (2-5)
12	2 (0-4)	3 (2-4)	2 (0-4)	3 (2-4)
24	2 (0-4)	3 (2-3)	2 (0-3)	3 (2-4)

# A prospective, multicentre, observational cohort study of analgesia and outcome after pneumonectomy

E. S. Powell<sup>1</sup>, D. Cook<sup>1</sup>, A. C. Pearce<sup>2</sup>, P. Davies<sup>1</sup>, G. M. R. Bowler<sup>3</sup>, B. Naidu<sup>1</sup>, F. Gao<sup>1\*</sup>  
and UKPOS Investigators<sup>†</sup>

*British Journal of Anaesthesia* 106 (3): 364–70 (2011)

- Prospektiv, multicenter, gözlemsel, kohort çalışması
- Pnömonektomi hastalarında analjezi teknikleri ve major komplikasyonların insidansı
- TEA (n=187 %61) : LA + opioid (%94) ve TPVB (n=95 %31): LA (%86) (%79 iv HKA)

**Table 3** Perioperative management for the epidural and paravertebral groups [median and (range) unless otherwise specified]. Number indicates the number of patients in each group (epidural, paravertebral) with complete data set in that field. ICU, intensive care unit; HDU, high-dependency unit

Perioperative management	Number	Epidural	Paravertebral	P-value
Blood loss during surgery (ml)	187	390 (200–700)	350 (200–700)	0.46
Fluid balance at 24 h (ml kg <sup>-1</sup> )	174	14.8 (–42.3 to 87.6)	20.4 (–6 to 62.5)	0.003
Duration of surgery (min)	182	150 (67 to 460)	140.5 (75 to 330)	0.07
Duration of OLV (min)	172	120 (40–450)	115 (45–270)	0.06
Plateau inspiratory pressure >25 cm H <sub>2</sub> O (vs ≤25)	155	33 (21.2%)	15 (22.4%)	0.49
Pressure- vs volume-controlled ventilation	178	85 (47.5%)	37 (41.6%)	0.37
Converted procedure (vs planned)	186	58 (31.2%)	32 (35.6%)	0.50
Stump closure with staples (vs sutures)	185	163 (88.1%)	57 (85.1%)	0.53
Postop. location: ICU and HDU vs ward	185	164 (88.7%)	83 (87.4%)	0.43
Postop. location: ICU vs HDU	164	30 (18.3%)	7 (8.4%)	0.003



# A prospective, multicentre, observational cohort study of analgesia and outcome after pneumonectomy

E. S. Powell<sup>1</sup>, D. Cook<sup>1</sup>, A. C. Pearce<sup>2</sup>, P. Davies<sup>1</sup>, G. M. R. Bowler<sup>3</sup>, B. Naidu<sup>1</sup>, F. Gao<sup>1\*</sup>  
and UKPOS Investigators<sup>†</sup>

*British Journal of Anaesthesia* 106 (3): 364–70 (2011)

- Majör komplikasyon insidansı TEA > TPVB
- TEA hipotansiyona bağlı komplikasyonlar ↑
- TEA: Majör komplikasyon için bağımsız bir risk faktörü

**Table 2** Preoperative pulmonary function for the epidural and paravertebral groups [medians and (ranges) unless otherwise specified]. Number indicates the number of patients in each group (epidural, paravertebral) with complete data set in that field. FEV<sub>1</sub>, forced expiratory volume (litre) in 1 s; FVC, forced vital capacity (litre); FEV<sub>1</sub>%, percentage of measured FEV<sub>1</sub> to predicted normal; ppo, predicted postoperative; DLCO, diffusion capacity for carbon monoxide, ml CO min<sup>-1</sup> mm Hg<sup>-1</sup>

Pulmonary function	Number	Epidural	Paravertebral	P-value
FEV <sub>1</sub> /FVC	174, 89	69 (41.3–90.5)	67.7 (37–100)	0.33
FEV <sub>1</sub>	186, 89	2.14 (0.82–4.1)	2.25 (0.49–3.66)	0.84
FEV <sub>1</sub> %	181, 87	78.9 (35.8–130.8)	77.7 (17.4–125.6)	0.47
ppo FEV <sub>1</sub> %	183, 89	40 (19–69.3)	39.1 (8.1–66.6)	0.55
DLCO	102, 40	5.6 (0.8–12.2)	6.3 (3.1–11.8)	0.30
DLCO %	106, 43	69 (29–136)	72 (39–112)	0.17
ppo DLCO %	105, 43	34.6 (15.3–71.6)	37 (20.5–53.1)	0.25
Preop. saturations <95%	21	16 (9.8%)	5 (7.8%)	0.80

**Table 4** Incidence of major complications between the epidural and paravertebral groups and length of hospital stay. Length of hospital stay; median (range)

Complications	Epidural analgesia (%), n=187	Paravertebral blockade (%), n=95	P-value
Major complication	66 (35.3)	22 (23.1)	0.049
Arrhythmia	39 (20.9)	17 (18.9)	0.75
Atrial fibrillation	34 (18.2)	16 (17.8)	1.00
Hypotension needing inotropes	10 (5.3)	1 (1.1)	0.11
Respiratory	14 (7.5)	4 (4.4)	0.44
Unplanned ICU admissions	17 (9.1)	4 (4.4)	0.23
Further surgery	10 (5.3)	2 (2.2)	0.35
30 day mortality	12 (6.4)	4 (4.2)	0.80
Length of hospital stay (days)	8 (1–63)	8 (4–27)	0.74

# Kronik post-torakotomi ağrısı

Torakotomi skarında operasyondan sonra en az 2 ay devam eden ve yineleyen ağrı

- İnsidansı %50 (op.dan sonra 3. ve 6. ayda)
- 1990'lardan beri aynı düzeyde
- Miyofasiyal ve nöropatik
- Postop çok erken dönemde nöropatik karakterli ağrı ile ilişkili
- Akut ağrının şiddeti risk faktörü

# The Effects of Three Different Analgesia Techniques on Long-Term Postthoracotomy Pain

Anesth Analg 2002;94:11-5

Mert Şentürk, MD\*, Perihan Ergin Özcan, MD\*, Gül Köknel Talu, MD\*, Esen Kiyan, MD†, Emre Çamci, MD\*, Süleyman Özyalçın, MD\*, Şükrü Dilege, MD‡, and Kamil Pembeci, MD\*

- Pre-TEA :preop 10 mL bolus bupivakain %0.1 + 0.1 mg/mL M inf 7 mL/st, postop HKA
- Post-TEA : HKA
- İv HKA : M 5 mg başlangıç + 2 mg / 15 dk *lock-out*

Table 3. Results of the Questionnaire at the Sixth Month

Results	All patients (n = 69)	Group Pre-TEA (n = 22)	Group Post-TEA (n = 24)	Group IV-PCA (n = 23)
Pain at 6 mo*	43 (62%)	10 (45%)	15 (63%)	18 (78%)
Pain lasting at least 2 mo*	47 (68%)	11 (50%)	16 (67%)	20 (87%)
NRS*	1 ± 1.0 (0-4)	0.6 ± 0.8 (0-3)	0.9 ± 0.9 (0-3)	1.4 ± 1.2 (0-4)
Affecting daily life	0	0	0	0

Table 2. Pain Levels During the First 48 Hours After the Operation at Rest, Coughing, and Movement

Variable	Time (h)	Group Pre-TEA	Group Post-TEA	Group IV-PCA
At rest	0*†	2.4 ± 1.7	5.6 ± 1.8	5.7 ± 2
	4*†	1.2 ± 1	2.8 ± 1.6	3.2 ± 1.4
	8*†§	0.6 ± 0.8	1.6 ± 1	2.9 ± 1.2
	12*†§	0.2 ± 0.3	1.4 ± 0.9	2.4 ± 1.1
	24*†§	0.1 ± 0.3	0.5 ± 1.9	1.9 ± 1
	48*†§	0	0.2 ± 0.4	1 ± 0.4
At cough	0*†	4.2 ± 1.7	7.1 ± 1.5	7 ± 1.6
	4*†	2.9 ± 1.8	4.6 ± 1.8	4.6 ± 1.9
	8*†	2.7 ± 1.7	4.1 ± 1.2	4 ± 1
	12*†	1.6 ± 0.7	3.2 ± 1.3	3.2 ± 1.2
	24*†	0.8 ± 1	2.3 ± 1.2	2.4 ± 1.1
	48*†	0.5 ± 0.7	1.8 ± 0.8	2.2 ± 1.1
At movement	0*†	5.1 ± 1.5	7.3 ± 1.3	7 ± 1.4
	4*†	3.5 ± 1.7	5.4 ± 1.5	5.3 ± 1.7
	8*†¶	3.1 ± 2.1	4.3 ± 1.1	4.4 ± 1.3
	12*†	1.9 ± 1.2	3.6 ± 1.4	4.1 ± 1.4
	24*†	1.3 ± 1	2.7 ± 1.4	3.3 ± 1.4
	48*†‡	0.6 ± 0.8	1.6 ± 1.2	2.3 ± 1.2

Values are expressed as mean ± sd.

NRS = numeric rating scale; TEA = thoracic epidural analgesia; PCA = patient-controlled analgesia.

\* P < 0.001; † P < 0.01; ¶ P < 0.05 between Group Pre-TEA and Group Post-TEA.

‡ P < 0.001; || P < 0.01 between Group Pre-TEA and Group IV-PCA.

§ P < 0.001 between Group Post-TEA and Group IV-PCA.

- Kronik ağrı insidansı ↑
- Ağrı şiddeti ↓
- Pre-TEA olumlu
- Postop akut ağrı ↓

## Effects of Preemptive Epidural Analgesia on Post-thoracotomy Pain

Choon Looi Bong, MBChB, FRCA,\* Miny Samuel, MSc, PhD,† Ju Mei Ng, MBBS, FANZCA,‡ and  
Chris Ip-Yam, MBChB, FFARCSI, FRCA, FAMS, MBA‡  
*Journal of Cardiothoracic and Vascular Anesthesia*, Vol 19, No 6 (December), 2005: pp 786-793

- Preemptiv TEA akut ve kronik posttorakotomi ağrısı şiddeti ve insidansına etkisi
- Meta-analiz
- Akut ağrı şiddeti ↓
- Kronik ağrı insidansı üzerine etkisi yok

## Thoracic Paravertebral Block in Chronic Postoperative Pain

OLLI KIRVELÄ, M.D., PH.D. HEIKKI ANTILA, M.D.

Regional Anesthesia  
1992: 17: 348-350

- TPVB uygulamasının kronik ağrı üzerine etkisini inceleyen klinik deneyimleri
- İnterkostal sinirlerdeki gerilme ve skarlaşma sonucu nöroma oluşmaktadır
- 4 segment için 15-20 mL bupivakain %0.5
- Segment ↑ ise her segmente 5-10 mL (max 25 mL)

TABLE 1. Immediate and Long-term Effects of Thoracic Paravertebral Block in Patients Suffering from Chronic Post-thoracotomy Pain or Chronic Pain after Mastectomy

Indication	Age (median, range); sex (F/M)	Duration of pain (median, range)	No. of blocks	Duration of pain relief (%)
Chronic post-thoracotomy pain	66, 35-86; 7/15	3.5 years, 1 month-20 years	169	>1 month (58) >2 months (30) >4 months (8) >5 months (3)
Chronic pain after mastectomy	45, 42-70; 10/0	1.5 years, 2 months-3 years	112	<1 week (6) <1 month (88) >5 months (6)

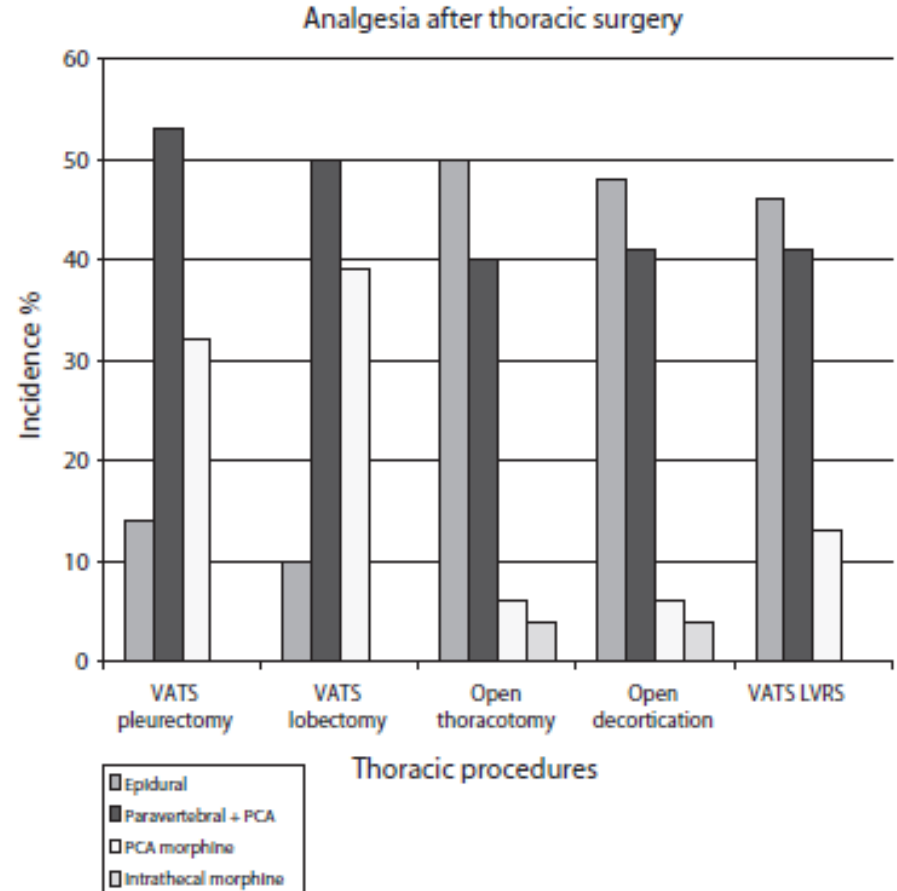


# Analgesic techniques following thoracic surgery: a survey of United Kingdom practice

Naren C. Kotemane, Niraj Gopinath and Rakesh Vaja

*Eur J Anaesthesiol* 2010;27:897–899

- Toraks op. postop analjezi tercihleri
- 36 torak cerrahi merkezi
- 240 anesteziist
- %78 yanıt / 187 anesteziist
- Cerrahi işlem
- Cerrahi yöntem
  - Torakotomi
  - VATS
- Postop analjezi teknikleri
  - TEA
  - TPVB
  - İV HKA



# A French Nationwide Survey on Anesthesiologist-Perceived Barriers to the Use of Epidural and Paravertebral Block in Thoracic Surgery

Christian Dualé, MD, PhD,\*† Guillaume Gayraud, MB,\*‡ Hammou Taheri, MB,\*§ Olivier Bastien, MD, PhD,¶||\*\* and Pierre Schoeffler, MD††††

Journal of Cardiothoracic and Vascular Anesthesia, Vol 29, No 4 (August), 2015; pp 942–949

- TEA veya TPVB'un kullanımını engelleyen faktörlerin araştırılması
- Torasik cerrahi klinikleri 103 / 84 (%81.6)
- Torakoskopi: 13,089, Torakotomi 14,067
- Gerçek kullanım ile algılanan engeller arasındaki Korelasyonda farklılıklar
  - Zaman kaybı ve buna bağlı isteksizlik
- 'Complexity': yetersiz eğitim
- TPVB: Dr.lar eğitilmeli, yaygınlaştırılmalı
- Bu tekniklerin yararları iş arkadaşlarına anlatılmalı

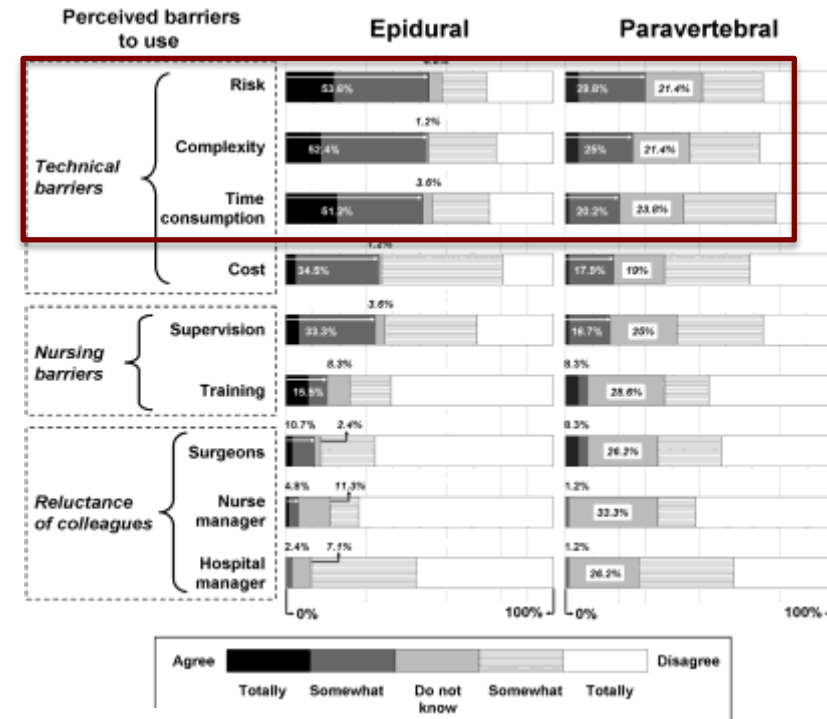


Table 2. Correlation Matrix: Barriers Versus Actual Practice

Variables	Epidural Block		Paravertebral Block	
	p	p Value	p	p Value
Activity per center*	-0.164	0.135	<b>0.228</b>	<b>0.037</b>
Team size†	0.049	0.657	0.076	0.490
Activity per physician‡	-0.125	0.257	0.093	0.402
<b>Technical barriers</b>				
Risk	-0.204	0.063	<b>-0.377</b>	<b>0.000</b>
Complexity	<b>0.001</b>	<b>0.991</b>	<b>-0.288</b>	<b>0.008</b>
Time consumption	<b>-0.258</b>	<b>0.018</b>	<b>-0.241</b>	<b>0.028</b>
Cost	-0.184	0.094	-0.189	0.085
<b>Nursing barriers</b>				
Supervision	<b>-0.260</b>	<b>0.017</b>	-0.136	0.216
Training	<b>-0.276</b>	<b>0.011</b>	-0.186	0.089
<b>Reluctance of colleagues</b>				
Surgeons	<b>-0.279</b>	<b>0.010</b>	<b>-0.353</b>	<b>0.001</b>
Nurse manager	<b>-0.348</b>	<b>0.001</b>	<b>-0.317</b>	<b>0.003</b>
Hospital manager	<b>-0.346</b>	<b>0.001</b>	<b>-0.364</b>	<b>0.001</b>

# Sonuç olarak

- TPVB, TEA ile kıyaslanabilecek analjezi oluşturmaktadır
- Özellikle diğer farmakolojik adjuvanlarla TEA'e alternatiftir
- TEA'nin yararları geçmişte düşünüldüğünden daha sınırlı
- TEA ile maliyet açısından olumlu sonuç yok
- Profilaktik antikoagülanların kullanılıyorsa TEA riskli olabilir
- TPVB ile tek taraflı sempatik blokaj elde edildiği için kardiyovasküler stabilite daha kolay sağlanmaktadır
- İnterkostal kasların tek taraflı etkilenmesi respiratuvar rezervi olumlu etkilemektedir
- TEA toraks operasyonlarında analjezi için 'altın standart' değil

- Postop analjezi yöntemi seçilirken
  - Cerrahi işlem
  - Hastanın özellikleri
  - Anestezistin yöntemle ilgili bilgi ve becerisi dikkate alınmalı
- Hangi teknik olursa olsun toraks cerrahisinde temel dayanak noktası multimodal postoperatif analjezi





**Teşekkürler**