

Influence of regional anesthesia component on the rate of chronic post-thoractomy pain syndrome in lung cancer patients

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Introduction. Chronic post-thoractomy pain syndrome (CPPS) is one of the most common side effects after lung surgery [1]. After extended pulmonary resections performed via thoractomy approach its incidence varies from 30% to 40% [2]. We aimed to assess the influence of the type of regional anesthesia (paravertebral nerve block (PNB), thoracic epidural anesthesia (TEA) and intercostal nerve block (INB) on the incidence of CPPS.

Materials and Methods. This was a prospective, randomized study. 300 patients (53 ± 8,5yrs), undergone lung cancer surgery via thoractomy were randomized into three groups: 1) 100 patients - TEA; 2) 100 patients - PNB; 3) 100 patients – INB. In TEA group epidural catheter was placed at Th4-Th6 interspace before induction of anesthesia, then the intraepidural infusion of anesthetic solution (ropivacaine 0,3%, fentanyl 4 µg/ml, adrenalin 2 µg/ml) was started at 5-15 ml/h. Patients of this group received anesthetic solution during first 2 days after surgery, and then peridural infusion of ropivacaine 0,2% was administered until the 5th postoperative day. In PNB group paravertebral catheter was placed under ultrasound guide at the Th5-Th6 level. Before induction of anesthesia patients received in paravertebral space a bolus of lidocaine 2% - 10 ml and anesthetic solution (as in TEA group) – 20 ml. At the end of operation they received the second bolus dose of the anesthetic solution – 20 ml. Patients received anesthetic solution with the infusion rate at 8-12 ml/h during first 2 days after surgery, and then peridural infusion of ropivacaine 0,2% was administered until the 5th postoperative day. In INB group intercostal nerve block was provided by the surgery team after the lung or lobe extraction. In that case a solution of ethanol 96% - 30 ml and novocain 0,5% - 30 ml was injected in the intercostal space of surgery incision. One additional level above the incision and one below were also blocked.

All patients received orally pregabalin 75 mg twice a day before surgery and once on a day of surgery 2 hours before anesthesia induction. After operation pregabalin-therapy (75 mg twice daily) was continued. Also patients received lornoxicam 8mg preoperatively and two times daily after surgery. Nefopam 20 mg was injected intramuscular for the first time 40 minutes before the end of the surgery and then after extubation it was continued from the beginning of initial pain syndrome during 5 days postoperatively at the same dose twice per day. In the case of persistent pain syndrome morphine 10 mg was additionally prescribed. General anesthesia was standard in all groups and included sevofluran, fentanyl, ketamin, rocuronium bromide. 100 mm visual analogue scale (VAS) was used to assess the intensity of postoperative pain syndrome (PPS). Static and dynamic pain components were assessed in 7 days, 1 and 6 months after surgery. The intensity of PPS 1-29 mm was considered as mild, 30-49 mm – moderate, 50 mm and more – severe.

Results. Patients in the 3 groups were comparable with respect to age, sex, body weight, height, ASA status, type and duration of surgery.

There was no statistical difference in the frequency of PPS at rest between groups in 7 days, 1 and 6 months after surgery. But the analyze of dynamic pain component showed that in 7th postoperative day patients in INB and PVB groups suffered from PPS more than in TEA group (p<0,01 and p<0,04, respectively). The incidence of PPS was higher in 1 and 6 months after surgery in INB group compared with TEA group. There frequency of PPS at moving in PVB group did not differ significantly from other groups in 1 and 6 months after surgery. (Table 1.)

Table 1. The frequency of postoperative pain syndrome in study groups

End points	TEA (n=100)		PVB (n=100)		INB (n=100)	
	static pain	dynamic pain	static pain	dynamic pain	static pain	dynamic pain
7 d.	14	32 ^{***}	24	46	18	50
n(%)	(14%)	(32%)	(24%)	(46%)	(18%)	(50%)
1 m.	12	24 [*]	22	36	16	44
n(%)	(12%)	(24%)	(22%)	(36%)	(16%)	(44%)
6 m.	10	23 [*]	16	34	14	40
n(%)	(10%)	(23%)	(16%)	(34%)	(14%)	(40%)

TEA - thoracic epidural anesthesia; PNB - paravertebral nerve block; INB - intercostal nerve block; * - p<0,05 to compare with INB; ** - p<0,05 to compare with PVB

As can be seen from the Table 1, the number of patients with PPS in 1 month after surgery did not differ significantly from the number of patients with PPS in 6 months after surgery in all study groups.

According to the Table 2 patients in INB group suffered from the severe PPS more frequently than in other groups (p=0,04). There was no difference in the frequency of appearance of moderate and severe PPS between TEA and PVB group.

Table 2. The intensity of postoperative pain syndrome in the study groups (dynamic pain component)

Groups	Number of patients with pain syndrome after surgery								
	PPS in 7 days			PPS in 1 months			PPS in 6 months		
	mild	moderate	severe	mild	moderate	severe	mild	moderate	severe
TEA (n=100)	26 ^{**}	6	0 [*]	22	2	0 [*]	21 [*]	2	0
PVB (n=100)	42	4	0 [*]	24	8	0 [*]	30	4	0
INB (n=100)	39	7	4	32	8	4	34	4	2

PPS – postoperative pain syndrome; TEA - thoracic epidural anesthesia; PNB - paravertebral nerve block; INB - intercostal nerve block; * - p<0,05 to compare with INB; ** - p<0,05 to compare with PVB

Discussion. In our study the frequency of CPPS (6 months after surgery) was significantly lower in TEA group than in INB group (40% versus 23%, p=0,01). Moreover, the intensity of PPS in patients after epidural anesthesia was significantly lower. There were no patients with severe PPS in TEA and PVB groups. But the use of paravertebral nerve block did not impact significantly on the frequency of CPPS.

Our study showed that thoracic epidural anesthesia stays a «gold standard» in open lung cancer surgery. A number of investigators have notified that PVB provides acceptable analgesia for post-thoractomy pain [3,4], but we did not find advantages of PVB over TEA for prevention of CPPS. In INB group initiation of block was provided only after basic stage of surgery. But it is supposed, that preemptive regional anesthesia is more preferable and it provides better results[5].

In our study the number of patients with postoperative pain syndrome detected in 1 month after surgery did not change in 6 month period. Chronic postthoractomy pain has been defined somewhat arbitrarily as “pain that recurs or persists along a thoractomy scar at least two months following the surgical procedure.” [6,7] It seems important to identify pain levels also in 1 month after surgery. We should pay attention if the pain levels is higher than expected.

References.

- 1) Wildgaard K, Ravn J, Kehlet H., Prevention of chronic pain after surgery: new insights for future research and patient care // Eur J CardiothoracSurg -2009; 36: 170-80.
- 2) Macrae WA. Chronic post-surgical pain: 10 years on // BJA British Journal of Anaesthesia - 2008; 101(1):77-86.
- 3) Grider J.S., Mullet T.W., Saha S.P., et al. A randomized, double-blind trial comparing continuous thoracic epidural bupivacaine with and without opioid in contrast to a continuous paravertebral infusion of bupivacaine for postthoractomy pain.// J. Cardiothorac. Vasc. Anesth. 2012;26(1):83–89.
- 4) Norum H. M., Breivik H. Thoracic Paravertebral Blockade and Thoracic Epidural Analgesia // Anesthesia & Analgesia.2011;112(40):990.
- 5) Yegin B., Erdogan A., Kayacan N., Karsli B. Early postoperative pain management after thoracic surgery; pre- and postoperative versus postoperative epidural analgesia: a randomised study. // Eur. J. Cardiothorac. Surg. 2003;24(3):420-4.
- 6) Gottschalk A, Cohen S.P., Yang S., Ochroch E.A.Preventing and treating pain after thoracic surgery. // Anesthesiology. 2006 Mar;104(3):594-600.
- 7) Task Force on Taxonomy of the International Association for the Study of Pain: Classification of Chronic Pain: Descriptions of Chronic Pain Syndromes and Definitions of Pain Terms, 2nd edition. Edited by Mersky H, Bogduk N. Seattle, IASP Press, 1994, pp 143–4Mersky H, Bogduk N. Seattle IASP Press

