reference	participants' characteristics	intervention group/ control group	outcomes	critical appraisal/ conclusion
Salengros et al. 2010 Different anaesthetic techniques associated with different incidences of chronic post-thoracotomy pain: low-dose remifentanil plus presurgical epidural analgesia is preferable to high-dose remifentanil with postsurgical epidural analgesia. J Cardiothorac Vasc Anesth. 2010;24(4):608-16.	**inclusion criteria** - not reported **exclusion criteria** - a contraindication for epidural catheter insertion - catheter insertion was impossible - had an allergy to remifentanil, propofol or ropivacaine - were not fluent in French - suffered from pain in the thoracic region; - declined to participate - age <18 yrs **demographic data**: group HR group LR age (yrs) 59.6±12.5 60.7±14.7 weight (kg) 70.8±15.5 70.8±19.7 height (cm) 168.9±7.5 167.4±9.6 sex (m/f) 13/7 8/10 **patient flow and follow up:** total patient number included: 38 randomised in: group HR: 20 group LR: 18 excluded: 0 analysed: 38 follow-up: *Allodynia and acute pain* - every 15 min for 1 h - every h for the next 2 h - every 4 h for the remainder of the initial 24 h postop *Chronic postop pain* 1, 3, 6 months	**intervention prior to anaesthesia** - high-dose remifentanil group (group HR): surgery using a propofol and remifentanil TCI, CeT of 10 ng/mL - low-dose remifentanil group (group LR): surgery using TCI, maximal remifentanil CeT of 2 ng/mL ropivacaine (0.5%) continuously infused through the epidural catheter at rate of 6 mL/h **mode of anaesthesia** - propofol-remifentanil TCI - TEA for 72h **at the end of surgery** group HR, at the end of surgery, but before the end of anaesthesia: 5 mL bolus 0.5% ropivacaine + 100 µg fentanyl injected into epidural catheter group LR, at the end of surgery, but before the end of anaesthesia: - bolus of 100 µg of fentanyl **postoperative analgesia:** - PCA: continuous infusion of a 10 µg/mL fentanyl at 6 mL/h **supplementary analgesia** - if VAS>5 or supplementary analgesia requested: bolus f 2–6 mL 1.5% lidocaine + 6.25 µg/mL epinephrine via epidural catheter - IV paracetamol 1 g/6 h - IV diclofenac 75 mg/12 h - after 72 h (TEA discontinuation): PO morphine given	**postoperative pain [NRS]: mean±SD** during hospital stay HR LR p at rest 1.2±1.0 1.7±1.6 0.64 at cough 2.2±1.3 2.6 ±1.7 0.77 all patients at month 1, month 3 and month 6 HR LR p NRS Max M1 4.25±1.92 3.75±2.61 0.18 NRS Min M1 1.45±1.39 1.39±1.46 0.89 NRS at M3 2.25±1.86 0.94±1.55 0.0253 NRS at M6 2.30±1.69 0.78±1.80 0.003 **other pain outcomes** no. patients with pain (%) HR LR p M1 16 (80%) 12 (66.7%) 0.364 M3 15 (75%) 5 (27.8%) 0.013 M6 16 (80%) 5 (27.8%) 0.008 Study end 14 (70%) 3 (16.7%) 0.009 patients with DN4 neuropathic pain diagnostic questionnaire score >4, n (%) HR LR p M1 16 (80%) 5 (27.8%) 0.008 M3 10 (50%) 3 (16.7%) 0.055 M6 11 (55%) 3 (16.7%) 0.034 Study end 11 (55%) 2 (11.1%) 0.022 - patients in the group HR had a higher incidence of analgesic drug use 6 months after hospital discharge - this difference was due essentially to a more frequent use of opioids and amitriptyline surface area of allodynia between groups up to 1 month postop - the surface area of allodynia measured with von Frey hairs was much larger in group HR, representing almost three times the surface area larger than group LR (p<0.001) **adverse effects/ events** - not reported	**methodological shortcomings** - method used to implement the random allocation sequence no reported - not reported if the sequence was adequately concealed until interventions were assigned - not reported who generated the allocation sequence, who enrolled participants, and who assigned the participants to their groups **level of evidence: 1** **authors' conclusion** "High-dose remifentanil (0.14-0.26 µg/kg/min) without epidural analgesia during surgery is associated with a large area of allodynia around the wound. These patients develop a much higher incidence of chronic pain than those receiving low-dose remifentanil with epidural analgesia during surgery."
Cok et al. 2011 Thoracic epidural anaesthesia and analgesia during the perioperative period of thoracic surgery: levobupivacaine versus bupivacaine. J Cardiothorac Vasc Anesth. 2011;25(3):449-54.	**inclusion criteria** - age >18 yrs - ASA physical status I–III **exclusion criteria** - uncontrolled hypertension - cardiac valvular diseases - unstable angina pectoris - cardiac, hepatic, or renal failure - contraindications for epidural block **demographic data:** group L group B p age (yrs)	**intervention prior to anaesthesia** - group bupivacaine (B): TEA bolus 0.1 mL/kg 0.25% bupivacaine - group levobupivacaine (L): TEA bolus 0.1 mL/kg 0.25% levobupivacaine **mode of anaesthesia** - fentanyl **postoperative analgesia**	**postoperative pain [VAS]:** - VAS at rest and during activity were comparable between groups for 48 h postop, except for VAS on movement at 36 h postop, which was higher in group L **other outcomes** - total drug consumption, number of demands and boluses during PCA, and rescue analgesic requirements for 48 h postop were similar up to 48 h in the 2 groups (NS)	**methodological shortcomings** - primary and secondary outcome measures not clearly defined - method used to implement the random allocation sequence not reported - not reported if the sequence was adequately concealed until interventions were assigned - not reported who generated the allocation sequence, who enrolled participants, and who assigned the participants to their groups

reference	participants' characteristics	intervention group/ control group	outcomes	critical appraisal/ conclusion
	48.32±13.54 44.96±15.58 0.42 weight (kg) 69.12±9.76 0.28±11.43 0.70 height (cm) 168±8.78 166±8.74 0.42 sex (m/f) 22/3 20/5 0.35 ASA (I/II/III) (number of patients) 5/12/8 5/14/6 0.80 **patient flow and follow up:** total patient number included: 50 randomised in: group B: 25 group L: 25 excluded: 0 analysed: 50 follow-up: 30 min, 1, 2, 4, 6, 12, 18, 24, 36, 48 h	- postop PCEA for 48h with the same study drug at 0.125% concentration a 4 mL/h bolus 2 mL/lo 20 min **supplemental analgesia** - TEA peroperative infusion of the study drug at 0.1 mL/kg/h - IV paracetamol 1 g/8 h - IV tenoxicam 20 mg/8 h if VAS >3: rescue analgesics twice/day - IV fentanyl, 0.3 µg/kg for the first 24 h - PO tramadol 50 mg between 24 and 48 h	- in the first 24 h, none of the patients in group B demanded additional analgesics, whereas 1 patient in group L required fentanyl administration once (NS) - one patient in each group required tramadol in the 24- to 48-h postop period (NS) - the number of dermatomes blocked at each assessment time point (after 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, and 20 mins) was similar in both groups **adverse events** - group L: 1 patient treated for nausea - group B: 2 patients treated for nausea	- flow of participants through each stage not detailed - protocol deviations from study as planned not described **level of evidence:** 1 **authors' conclusion** "Thoracic epidural anaesthesia with either levobupivacaine or bupivacaine provided comparable sensory block features, intraoperative hemodynamics, and postoperative analgesia for thoracic surgery"
Li et al. 2015 Effects of epidural analgesia with different concentrations of bupivacaine plus fentanyl on pain in patients undergoing thoracic surgery. Int J Clin Exp Med. 2015;8(8):14123-6.	**inclusion criteria** - not reported **exclusion criteria** - liver or kidney dysfunction - allergy to any of the study drugs - blood coagulation dysfunction - contraindication for epidural analgesia **demographic data:** A B C D age (yrs) 62.31±8.47 63.04±7.82 62.63±8.16 62.55±7.68 sex (m/f) 17/13 15/14 17/12 16/14 weight (kg) 60.65±6.13 59.75±6.62 60.48±6.45 60.11±6.38 ASA (I/II) 10/20 11/18 12/18 11/19 **patient flow and follow up:** total patient number included: 120 randomised in: group A: 30 group B: 29 group C: 29 group D: 30 excluded: 2 analysed: 118 follow-up: 4, 8, 12, 24, 48 h	**intervention prior to anaesthesia** PCEA connected after surgery with different doses of bupivacaine + 0.4 µg fentanyl - group A: bupivacaine 0.25% - group B: bupivacaine 0.375% - group C: bupivacaine 0.5% - group D: bupivacaine 0.75% - loading dose: 6 mL, continuous 2 mL/h - PCEA 0.5 mL/ 15 min for 48 h **mode of anaesthesia** - fentanyl - TEA periop: intermittent injection of 10 mL lidocaine 1%. Discontinued for about 15 m before skin closure. **postoperative analgesia** PCEA as stated above	**postoperative pain [VAS]: mean±SD** h 4 8 12r 24 48 A 1.68±0.70 1.16±0.57 0.74±0.45 0.42±0.31 0.22±0.24 B 1.62±0.61 1.12±0.56 0.68±0.48 0.44±0.29 0.24±0.27 C 1.52±0.68 1.15±0.61 0.71±0.46 0.41±0.33 0.22±0.25 D 1.22±0.62 1.08±0.53 0.70±0.43 0.40±0.30 0.21±0.24 S NS NS NS NS - the pressure times of PCA of four groups within 48 h group A group B group C group D 8.25±2.33 5.46±1.32 3.24±0.72 2.11±0.48 S **adverse effects/events: n (%)** group A group B group C group D 1(3.3%) 2(6.9%) 6(20.7%) 7(23.3%) - the incidence of respiratory depression in groups C and D were evidently higher than groups A and B; the difference was statistically significant - the gastrointestinal effects, dizziness, pruritus and urinary retention of four groups over the first 48 h were not significantly different.	**methodological shortcomings** - allocation concealment not reported - blinding of outcome assessor not reported - no sample size calculation **level of evidence:** 1 **authors' conclusion** **"**0.25%–0.375% bupivacaine + 0.4 mg fentanyl used in epidural analgesia in patients undergoing thoracic surgery can lead to safe and effective analgesic effect**"**
Yang et al. 2015 Pre-emptive epidural analgesia improves post-operative pain and immune function in patients undergoing thoracotomy.	**inclusion criteria** - stage I (T1-2N0M0) lung cancer - ASA physical status I–III - age 30–70 yrs **exclusion criteria** - pregnancy	**intervention prior to anaesthesia** - group control (A): 6 mL saline as a placebo at the corresponding time points, then PCEA - group postoperative TEA (B): 6 mL of 0.125% ropivacaine 30 min after surgery	**postoperative pain [VAS]** at rest 2 12 24 48 72 h B 4.2 4.5 C 2.8 3.3	**methodological shortcomings** - method used to implement the random allocation sequence not reportes - not reported if the sequence was adequately concealed until interventions were assigned

reference	participants' characteristics	intervention group/ control group	outcomes	critical appraisal/ conclusion
ANZ J Surg. 2015;85(6):472-7.	- hypertension - chronic pain or regular intake of analgesics - drug addiction - body mass index ≥24 m/kg^2 - body temperature disturbance - previous or current treatment with antibiotics - corticosteroid therapy - epidural analgesia contraindications **demographic data:** A B C age (yrs) 57.5±28.3 55.5±22.6 52.5±24.5 sex (m/f) 22/18 25/15 27/13 weight (kg) 62.8±10.2 67.5±8.5 64.8±10.9 height (cm) 176.5±8.2 171.5±5.5 172.5±6.8 smoking history (pack-years) 23.5±10.2 28.5±12.5 26.7±13.8 ASA (I/II/III) 4/33/3 6/31/3 7/28/5 TNM stage (I/IIa/IIb) 7/15/18 6/15/19 4/18/18 **patient flow and follow up:** total patient number included: 90 randomised in: group A: 30 group B: 30 group C: 30 excluded: group B: 3 group C: 3 analysed: 84 follow-up: 0, 2, 12, 24, 48, 72 h	- group pre-emptive TEA (C): 6 mL of 0.125% ropivacaine, 30 min before incision, then every 60 min during surgery **surgical procedure n** Procedure / A / B / C Lobectomy 20 22 24 Pneumonectomy 4 6 8 Bi-lobectomy 6 4 2 Wedge resection 10 8 6 Side (R/L) 20/20 26/14 22/18 **mode of anaesthesia** - fentanyl for induction, then remifentanil **postoperative analgesia** - PCEA for 72 h: 1mL bolus 0.125% ropivacaine, continuous infusion of 2 mL/h, lo 15 min, to a max of 15 mL in 4h **supplemental analgesia** - if VAS >4: - bolus IV tramadol 100 mg - IM morphine 5 mg if required	S NS S NS NS on coughing 2 12 24 48 72 h B 4.2 4.6 4.5 3.9 C 2.8 3.7 3.3 3.1 S S S S NS - there were signigficantly lower postop VAS scores at rest and during coughing in groups B and C compared with group A - from 2 h to 48 h postop, VAS scores of group C were always lower than group B at rest and coughing (but not always S, see graph) - PCEA demands were significantly lower at 24, 48 and 72 h in groups B and C compared with group A - PCEA demands were significantly less in group B vs group C at: 24 h (83 vs 108 mL) 48 h (135 vs 167 mL) 72 h (179 vs 209 mL) - the % of patients who required rescue analgesics were higher in group A compared with groups B and C. A B C 60.0% 22.2% 14.8% S **adverse effects/ events n (%):** * =significant vs group A; **=significant vs group B A B C nausea/vomiting 24 (80.0) 11 (40.7)* 4 (14.8)*,** pruritis 9 (30.0) 2 (7.4)* 2 (7.4)* hypotension 23 (76.7) 11 (40.7)* 4 (14.8)*,** respiratory depression 7 (20.0) 1 (3.7)* 0* **additional outcomes** - expression of proteins TNF-α, IL-8 and IL-6 were lower at 24, 48 and 72 h postop in groups B and C compared with group A (p<0.05).	- not reported who generated the allocation sequence, who enrolled participants, and who assigned the participants to their groups **level of evidence:** 1 **authors' conclusion** "Lower VAS scores at rest and on coughing in group C compared with group B, less boluses of PCEA at 24, 48 and 72 h after surgery"
Tekelioglu et al. 2012 Combinations of fentanyl and levobupivacaine for post-thoracotomy pain. Acta Anaesthesiol Taiwan. 2012;50(3):131-3.	**inclusion criteria** - age 20–80 yrs - ASA physical status I–III **exclusion criteria** - allergies to any of the study medicines - serious cardiac, renal, or liver diseases - morbid obesity (body mass index >40) - history of bleeding disorders - contraindications for epidural anaesthesia	**mode of anaesthesia** - not reported **at the end of surgery** - PCEA: loading dose of 14 mL at an infusion rate of 4 mL/h + bolus dose of 2 mL/h, with 15 min lo, to max 60 mL in 4-hr **supplemental analgesia** - if VAS >3, rescue IM pethidine 1 mg/kg	**postoperative pain [VAS]: mean±SD** VAS I (at rest) Group I / Group II / Group III 5 min 1.75±0.97 3.60±1.10 4.25±0.91 15 min 1.60±0.75 2.55±1.05 2.90±0.91 30 min 1.10±0.79 1.95±0.69 2.35± 0.99 1 h 0.50±0.51 1.40±0.82 2.45± 1.1 2 h 0.40±0.50 1.15±1.04 1.95± 0.95 8 h 0.10±0.31 0.45±0.68 1.40±1.39 24 h 0.05±0.22 0.1±0.31 0.55±0.69	**methodological shortcomings** - primary and secondary outcome measures not defined - not reported how sample size was determined and explanation of any interim analyses and/or stopping rules - method used to implement the random allocation sequence not reported - not reported whether the sequence was adequately concealed until interventions were assigned

reference	participants' characteristics	intervention group/ control group	outcomes	critical appraisal/ conclusion
	demographic data: group I group II group III p sex (m/f) 17/3 16/4 17/3 0.376 age (yrs) 51.35±11.96 44.80±17.24 46.15±16.21 0.367 ASA (I/II/III) 0/13/7 0/12/8 1/14/5 0.089 **patient flow and follow up:** total patient number included: 60 randomised in: group I: 20 group II: 20 group III: 20 excluded: not reported analysed: 60 follow-up: 5, 15, 30 mins, 1, 2, 8, 24 h	**postoperative analgesia** - group I: 0.125% levobupivacaine + 3 µg/mL fentanyl -group II: 0.1% levobupivacaine + 3 µg/mL fentanyl - group III: 0.05% levobupivacaine + 3 µg/mL fentanyl	All p<0.001 VAS II (deep breathing or coughing) 5 min 2.80 ±1.40 5.05±1.32 6.45±1.19 15 min 2.55± 0.89 3.95 ±0.95 4.25 ±1.16 30 min 2.25±0.91 3.0±0.86 4.20 ±1.24 1 h 1.50± 0.69 2.45±0.83 4.35± 1.27 2 h 1.35± 0.75 2.0± 0.92 3.55± 0.95 8 h 0.60± 0.60 1.1±0.72 3.05 ±1.39 24 h 0.50 0.61 0.75 0.64 2.15 1.04 < 0.001 All p<0.001 **other outcomes** group I group II group III p MAP 85.45±12.03 85.8±10.62 93.55±9.53 0.033 HRa 85.5±11.38 88.7±15.15 97.55±14.84 0.023 RR 20.1±6.4 19.1±3.43 22.2±4.38 0.134 SpO2 98.8±1.15 98.55±1.05 98±1.77 0.175 PSS 1.15±0.37 1.45±0.68 2.1±0.71 <0.001 - Bromage scale was 3 in all groups, and no motor blocks were observed	- not reported who generated the allocation sequence, who enrolled participants, and who assigned the participants to their groups - flow of participants through each stage not described **level of evidence:** 1 **authors' conclusion** "the use of 0.125% levobupivacaine, together with 3 mg/mL fentanyl, constitutes a good combination, and can be used safely without causing hemodynamic change and motor block."
Ali et al. 2010 Prospective, randomized, controlled trial of thoracic epidural or patient-controlled opiate analgesia on perioperative quality of life. Br J Anaesth. 2010;104(3):292-7.	**inclusion criteria** - age 18–80 yrs **exclusion criteria** - age <18 or >80 yrs - patients with educational or physical disability, - severe cardiovascular disease - severe respiratory disease (forced expiratory volume 50% of predicted) - contraindication to epidural catheter placement **demographic data:** TEA PCA age (yrs) 58 (20–80) 58 (20–80) sex (m/f) 18/19 17/6 **patient flow and follow up:** total patient number included: 68 randomised in: group TEA: 38 group PCA: 30 excluded: group TEA: 1 group PCA: 7 analysed: group TEA: 37 group PCA: 23 follow-up: 6, 12, 18 h, 2, 3 days	**intervention prior to anaesthesia** - not reported **mode of anaesthesia** - not reported **surgical approach (n)** TEA PCA Thoracotomy 25 18 Oesophagectomy 9 1 Laparotomy 3 4 **supplemental analgesia** - not reported **postoperative analgesia** - group TEA: 0.1 % bupivacaine + 2 µg/mL fentanyl at 5–10 mL/h - group PCA: PCA, morphine 1 mg/mL, 7 min lo	**postoperative pain [VAS]: mean (95% CI)** h TEA PCA 6 4.4 (5.3) 5.4 (6.6) 12 2.4 (3.0) 3.8 (4.8) 18 1.7 (2.4) 3.2 (4.4) 48 1.8 (2.2) 3.1 (3.9) 72 1.4 (1.9) 2.8 (3.8) - p-values at 6, 12, 18 h, and for days 1, 2, and 3 were 0.176, 0.026, 0.018, 0.004, 0.003, and 0.008, respectively - average pain scores were lower in the epidural group at 6, 12, and 18 h and second and third postoperative days in group TEA **patient satisfaction** - overall, patient satisfaction was 97.3% in the epidural group TEA compared with 74% in the group PCA (p<0.05) - patient satisfaction: one patient in the epidural group was not satisfied with the mode of analgesia (due to catheter leakage)	**methodological shortcomings** - failure of the block randomisation to achieve equal numbers of patients in the two groups - not reported whether the sequence was adequately concealed until interventions were assigned - not reported who generated the allocation sequence, who enrolled participants, and who assigned the participants to their groups - not reported if participants, those administering the interventions, and those assessing the outcomes were aware of group assignment - dates defining the period of recruitment and follow-up not reported - all important adverse events or side-effects in each intervention group were not reported **level of evidence:** 1 **authors' conclusion** "Epidural analgesia with local anaesthetic and opioid improves QoL and delivers better analgesia compared with PCA in patients undergoing major thoraco-abdominal surgery."
Sagiroglu et al. 2014 A comparison of thoracic or lumbar patient-controlled epidural analgesia methods after thoracic surgery.	**inclusion criteria** - age 46–86 yrs - ASA physical status I–III **exclusion criteria** - ASA physical status >III	**intervention prior to anaesthesia** - group TEA: T4-T6 - group LEA: L2-L3 - 0.125% bupivacaine with 0.6 µg/mL sufentanil	**postoperative pain [VAS]: mean±SD** at rest h TEA LEA Basal 5.43±1.8 5.36±1.85 2 4.28±1.59 5.33±1.88	**methodological shortcomings** - method used to implement the random allocation sequence not reported - not reported if the sequence was adequately concealed until interventions were assigned

reference	participants' characteristics	intervention group/ control group	outcomes	critical appraisal/ conclusion
World J Surg Oncol. 2014;12:96.	- known drug allergies - prior lumbar spine surgery - pregnancy - abnormal coagulation tests - history of comorbidities - neurological impairment causing inability to understand consent form or pain measurement **demographic data:** TEA LEA *P age (yrs) 55.37±13.3 52.73±13.33 0.281 height (cm) 167.77±7.87 166.4±10.705 0.428 weight (kg) 69.39±12.44 74.24±15.83 0.066 BMI (kg/m^2) 24.6±3.58 25.14±4.9 0.492 sex - female 7 (12.3) 9 (14.3) 0.747 - male 50 (87.7) 54 (85.7) ASA status I 6 (10.5) 10 (15.9) 0.39 II 40 (70.2) 36 (57.1) 0.139 III 11 (19.3) 17 (27) 0.32 Charlson comorbidity index 0 6 (10.5) 9 (14.3) 0.534 1–2 38 (66.7) 40 (63.5) 0.716 >2 13 (22.8) 14 (22.2) 0.939 **patient flow and follow up:** total patient number included: 134 randomised in: group TEA: 65 group LEA: 69 excluded: group TEA: 7 group LEA: 5 analysed: group TEA: 57 group LEA: 63 follow-up: 0, 2, 4, 8, 16, 24 h	- infusion of 2 mL/h intraop **mode of anaesthesia** - fentanyl - intraoperative TEA or LEA **postoperative analgesia** - PCEA: 0.1 mL/kg/h, 2 mL bolus, lo 30 min for 24 h **additional analgesia** - IV paracetamol 1 g/8 h - if VAS score >3 after 4 boluses, IV morphine 2 mg	4 3.84±1.84 4.84±2.3 8 1.86±1.97 2.84±2.02 16 1.72±1.81 2.49±2.17 24 1.51±1.72 1.6±1.77 after cough Basal 7.75±1.48 7.32±1.52 2 5.23±1.96 6.02±2.07 4 4.72±2.47 5.81±2.7 8 3.18±0.66 4.1±2.09 16 3.54±1.72 4.03±1.78 24 3.21±1.7 3.81±2.01 **total dosage of morphine [mg]: mean±SD** - total 24-h analgesic consumption was different between groups (175±20 mL versus 185±31 mL; p=0.034), - total morphine consumption was similar (8.2±11.3 mg versus 10.3±11 mg) **adverse effects/ events: n (%)** TEA LEA p nausea and vomiting 7 (11.1) 4 (7) 0.438 hypotension episode 8 (12.7) 21 (36.8) 0.002* bradycardia 2 (3.2) 9 (15.8) 0.017* **additional outcomes: n (%)** ICU stay >24 h 0 (0) 5 (7.9) 0.031* atelectasis 1 (1.8) 7 (11.1) 0.042* pneumonia 2 (3.2) 3 (5.3) 0.567	- not reported who generated the allocation sequence, who enrolled participants, and who assigned the participants to their groups - dates defining the period of recruitment and follow-up not reported **level of evidence:** 1 **authors' conclusion** **"**TEA has beneficial haemodynamic effects in comparison to LEA after thoracotomy, along with a more satisfactory pain relief profile in the 24-hour postoperative period**"**