Nesher et al. 2009
Morphine with adjuvant ketamine vs higher dose of morphine alone for immediate postthoracotomy analgesia.

Inclusion criteria
- First-time isolated coronary bypass
- If patient’s surgeon considered them candidates for a MIDCAB procedure, - if patient were to undergo lung surgery

Exclusion criteria
- ASA physical status III
- Undergone emergency surgery
- Q-wave myocardial infarct occurring during the previous 3 weeks
- Poor left ventricular function
- BMI >35 kg/m^2
- Past or current neuropathy
- Use of psychiatric medications, including antidepressants and antipsychotic agents
- Chronic liver or renal failure requiring dialysis
- Past or current alcoholism
- Clotting abnormalities
- Platelet count <70,000/µL
- WBC count <3,000 µL or >14,000/µL
- Uncontrolled diabetes mellitus or fasting blood glucose >250 g/dL
- Evidence of sepsis or infection up to 1 week prior to randomisation

Demographic data:
- Group MO: n=22; Group MK: n=22

Patient flow and follow-up:
- Total patient number included: 44
- Randomised in:
  - Group MO: 22
  - Group MK: 22
- Excluded:
  - Group MO: 2
  - Group MK: 1
- Analyzed:
  - Group MO: 20
  - Group MK: 21
- Follow-up:
  - 0, 15, 30, 45, 60, 75, 90, 105, 120, 135, 150, 165, 180, 195, 210, 225, 240 mins

Intervention group: control group

Intervention prior to anaesthesia
- Not reported

Mode of anaesthesia
- Fentanyl

Surgical approach
- Thoracotomy for minimally invasive direct coronary artery bypass or for lung tumor resection

Duration of surgery, h:
- Group MO: 5.6±0.5
- Group MK: 5.7±0.7

Supplemental analgesia
- 75 mg IM diclofenac, as rescue

Postoperative analgesia
- Group MO: morphine only
- Group MK: morphine + ketamine
- IV PCA delivering 1.5 mg morphine plus saline solution
- IV PCA delivering 1.0 mg of morphine plus a 5 mg ketamine bolus, with a 7 min lo

Postoperative pain (VAS): mean (±SD)
- Group MO: 5.6±1.0
- Group MK: 3.7±1.7

Diclofenac consumption (n)
- Group MO: 4
- Group MK: 1

Consumption of morphine (mg): mean±SD
- Group MO: 6.8±1.9
- Group MK: 3.7±1.2

Adverse effects/events (n)
- Incidence of PONV: Group MO: 3, Group MK: 1

Methodological shortcomings
- Method used to implement the random allocation sequence not reported
- Not reported whether the sequence was adequately concealed until interventions were assigned
- Not reported how the sequence was concealed until interventions were assigned

Level of evidence: 1

Authors’ conclusion
"Immediate (4 h) postoperative subanaesthetic doses of ketamine added to two thirds the standard dose of morphine provided equivalent analgesia with a better safety profile compared to that obtained by a standard dose of morphine alone in patients undergoing thoracotomy.”