

Definition of outcomes

Primary outcome

Postoperative pulmonary complications: The occurrence of any one or more of the complications listed in Supplemental Table S1.

Second outcomes

(1) The quality of postoperative recovery (QoR-40 scores): It is an important measure of quality of recovery after anaesthesia and surgery which contains 40-item questionnaire. It is a form developed by Myles, which has been published (Supplemental file 3).

(2) The length of hospital stay: It was determined by the number of days from admission to discharge.

(3) The incidence of moderate to severe pain: The severity of pain will be evaluated using the numerical rating scale (NRS, 0=no pain, 1-3=mild pain, 4-6=moderate pain, 6-10=severe pain).

(4) The incidence of additional rescue analgesics use: In addition to routine analgesia, the incidence of patients who used analgesics or pressed analgesia pumps because of VAS \geq 4.

(5) The incidence of opioid-related adverse events (ORADE): It was defined as patients that had an opioid dispensed during their visit and at least one of the diagnosis including respiratory depression (respiratory rate < 10 per min or oxygen saturation < 92% for > 5 min), nausea, vomiting, itchy skin, dizziness or lethargy, constipation and urinary retention. The no ORADE was defined as patients that also had an opioid dispensed but did not have any of the above diagnosis.

Supplemental Table S1. The criteria for postoperative pulmonary complications

Complication	Definition
Respiratory infection	When a patient received antibiotics for suspected respiratory infection and met at least one of the following criteria: new or changed sputum, new or changed lung opacities, fever, leukocyte count $> 12,000 \times 10^9 L^{-1}$
Respiratory failure	When postoperative PaO ₂ < 60 mmHg on room air, a ratio of PaO ₂ to inspired oxygen fraction < 300 or arterial oxyhemoglobin saturation measured with pulse oximetry $< 90\%$ and requiring oxygen therapy.
Pneumothorax	Air in the pleural space with no vascular bed surrounding the visceral pleura.
Atelectasis	Lung opacification with a shift of the mediastinum, hilum, or hemidiaphragm toward the affected area, and compensatory overinflation in the adjacent nonatelectatic lung.
Pleural effusion	Chest x-ray demonstrating blunting of the costophrenic angle, loss of the sharp silhouette of the ipsilateral hemidiaphragm in upright position, evidence of displacement of adjacent anatomical structures, or (in supine position) a hazy opacity in one hemithorax with preserved vascular shadows.
Bronchospasm	Newly detected expiratory wheezing treated with bronchodilators.
Aspiration pneumonitis	Acute lung injury after the inhalation of regurgitated gastric contents.

PaO₂: partial pressure of oxygen in arterial blood.