Survey of Thoracic Anesthetic Practice in Italy

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Objective: **The object of this study was to conduct and analyze the output of a survey involving a cohort of all Italian hospitals performing thoracic surgery to gather data on anesthetic management, one-lung ventilation (OLV) management, and post-thoracotomy pain relief in thoracic anesthesia.**

Design: **Survey.**

Setting: **Italy.**

Participants: **An invitation to participate in the survey was e-mailed to all the members of the Italian Society of Anesthesia and Intensive Care Medicine.**

Intervention: **None.**

Measurements and Main Results: **A total of 62 responses were received from 47 centers. The key findings were: Double-lumen tube is still the first choice lung separation technique in current use; pressure-controlled ventilation and volume-controlled ventilation modes are homogenously distributed across the sample and, a tidal volumes (V_T) of 4-6 mL/kg during OLV was preferred to all others; moderate or restrictive fluid management were the most used strategies of fluid administration in thoracic anesthesia; thoracic epidural analgesia represented the "gold standard" for post-thoracotomy pain relief in combination with intravenous analgesia.**

Conclusion: **The results of this survey showed that Italian anesthesiologist follow the recommended standard of care for anesthetic management during OLV.**

KEY WORDS: thoracic anesthesia, airway management, one-lung ventilation, fluid management, postoperative pain relief, double-lumen tube, bronchial blockers.

ANESTHETIC PRACTICE has been changing over recent years due to advancements in technologic and pharmaceutical research. The aim of the present survey was to explore the following issues in thoracic surgery: Airway management, ventilation strategy, fluids management, and postoperative pain relief.

Thoracic surgery commonly requires exclusion of the non-dependent lung from ventilation, one-lung ventilation (OLV), in order to improve surgical conditions. OLV can be accomplished in 2 different ways. The first involves the use of a double-lumen endotracheal tube (DLT), the most common device used during lung separation techniques.[1–3] The second involves the blockade of a mainstem bronchus to allow distal lung collapse, with several bronchial blockers (BB) available today.[4,5]

During OLV, hypoxemia may occur as a result of intrapulmonary shunting caused by the collapse of the non-dependent lung and larger amounts of atelectasis in the dependent lung, and this presents a serious challenge for anesthesiologists.[6] Numerous authors have reported that the use of large intraoperative tidal volumes (V_T) during OLV can improve oxygenation, but this also may be associated with an increase in postoperative pulmonary complications. Indeed, protective ventilation strategies involving small V_T have been associated with a lower incidence of postoperative lung dysfunction.[7]

Volume-controlled ventilation (VCV) has become the most widely used mechanism of ventilation in the operating room, despite the fact that pressure-controlled ventilation (PVC) is thought to allow for a more homogenous distribution of ventilation and improved ventilation-perfusion matching.[8]

Fluid management in thoracic surgery is also of particular importance since the effects of OLV can result in postoperative pulmonary edema; however, the evidence indicating that fluid restriction can protect against lung injury is weak.[9]

Acute pain after thoracotomy can lead to cardiopulmonary complications and the development of post-thoracotomy chronic pain. Thoracic epidural analgesia (TEA), achieved using local anesthetic and opioid infusion, is used widely for the prevention of pain associated with thoracotomy and to reduce pain-associated complications.[10] Very little information is available about thoracic anesthetic practices used in different countries.[11,12]

The present study was designed as a survey to investigate anesthetic OLV management and post-thoracotomy pain relief practices used in thoracic anesthesia among anesthesiologists. The study cohort included all Italian hospitals performing thoracic surgery.

METHODS

The survey was endorsed by the Italian Society of Anesthesia and Intensive Care Medicine (SIAARTI). To obtain an overview of thoracic anesthesia clinical practices in Italy, an invitation to participate in the survey was e-mailed to all SIAARTI members. All participating anesthesiologists were informed about the study aims and methodology to ensure they understood the study context. Respondents were asked to indicate 1 or more (when necessary) reply options in response to each question and to return the completed questionnaire by fax or e-mail.

The questionnaire did not obtain data about anesthetic procedures performed outside the operating room, in intensive care units, or those performed by the surgeons or pulmonologists without the presence of an anesthesiologists.

Respondents were asked to provide the following information: Type of hospital, number of years of experience as an anesthesiologist, number of OLV procedures performed in their hospital per year, main strategies used by the anesthesiologist to achieve lung

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separation, tools used to check the position of the DLT, type of ventilation used during OLV, use of PEEP and CPAP during OLV, recruitment maneuvers employed before and during OLV, recruitment maneuvers employed before the use of PEEP, use of blood gas analysis during OLV, presence of dedicated informed consent for OLV, tidal volume used (in mg/kg), anesthetic management during thoracic surgery and routine monitoring, use of perioperative fluid management, use of colloids, management of perioperative hypovolemia, hemoglobin cut-off value used for transfusions, and use of postoperative thoracotomy pain relief.

The questionnaire was issued in Italian, and an English translation is reported in Appendix 1.

In cases in which more than 1 questionnaire was returned from the same hospital, an average of the individual responses was made to homogenize the sample such that all participating hospitals were represented equally.

Collected data were transferred to a purpose-built database. Statistical analysis was performed using the statistical software program SAS 9.2 (SAS Institute Inc., Cary, NC). Data were assumed to be nonparametric in their distribution and analyzed using frequency distributions and Fisher tests. A value of $p < 0.05$ was considered statistically significant.

RESULTS

Thoracic surgery in Italy currently is performed in a total of 92 centers. Sixty-two responses were received from a total of 47 hospitals, located across 16 geographic regions of Italy (21 hospitals across the 5 northern regions, 10 hospitals across the 4 central regions and 16 hospitals across the 7 southern regions). The proportion of centers represented 51% of the overall potential respondents. Eighteen centers (38.5%) were university hospitals and 29 (61.5%) non-university hospitals (Fig. 1).

Thirty-one of the 62 responding anesthesiologists (50%) were experts, with more than 15 years of clinical practice. Nine (15%) reported 10 to 15 years of experience, 12 (19%) reported 5 to 10 years of experience, and 10 respondents (16%) reported less than 5 years of experience.

The majority of the centers (27; 57.5%) reported performing more than 150 OLV procedures per year. Seven centers (15%) reported 100 to 150 OLV procedures per year, and the remaining 13 centers (27.5%) reported fewer than 100 procedures. In only 10 hospitals (21%), was thoracic anesthesia performed by a dedicated team.

Anesthetic Technique

Nineteen centers (40%) only maintained anesthesia with an inhalation agent, while 16 centers (34%) reported the sole use of intravenous anesthesia (total intravenous anesthetic technique and target-controlled infusion technique). Twelve centers (26%) used either a volatile anesthetic agent or intravenous anesthesia.

All respondents used standard monitoring involving ECG, pulse oximetry, and arterial pressure measurements. Thirty centers (64%) used both IBP and NIBP. Ten centers (21%) reported the sole use of IBP, while 7 centers (15%) indicated the sole use of NIBP.

Twenty-eight centers (60%) used temperature monitoring, while only six (18%) used transesophageal echocardiography. Twenty-eight centers (60%) used a central venous catheter

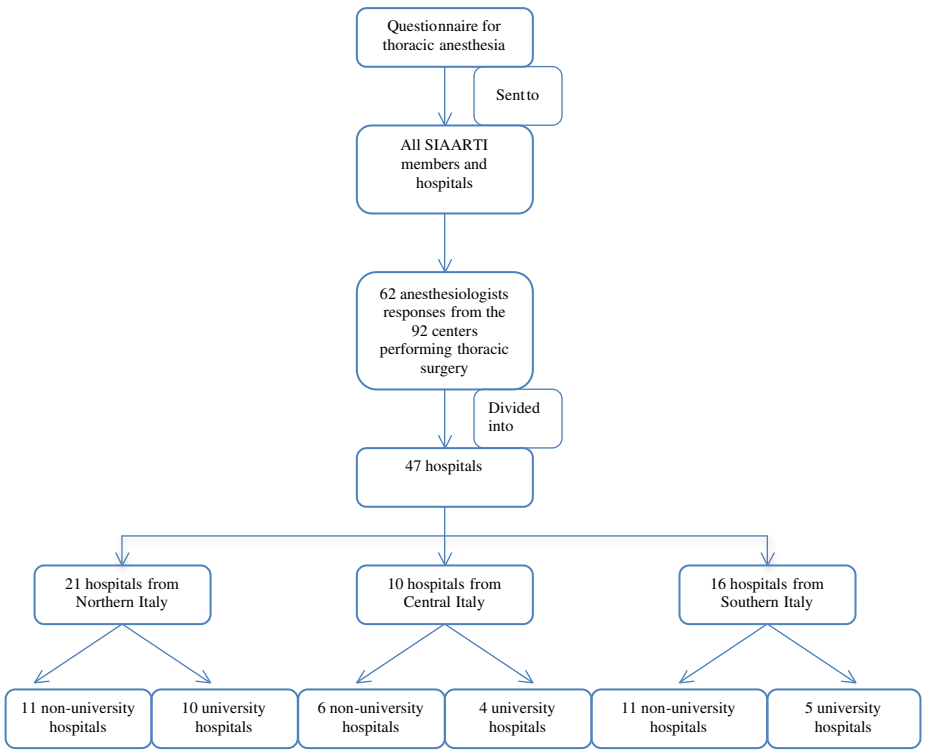

Fig 1. Study workflow.