Commentary

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The Art and Science of Surgery

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Description

Lung volume reduction surgery (LVRS) is a well-established, palliative surgical treatment for severe emphysema that has shown to significantly improve pulmonary function, exercise capacity, quality of life, and survival in selected patients.

Lung volume reduction surgery

Highly satisfactory clinical results have been reported by bilateral LVRS performed through median sternotomy and unilateral or bilateral LVRS performed through Video-Assisted Thoracic Surgery (VATS) or thoracotomy. Unfortunately, none of these approaches has minimized the significant morbidity and long hospitalization that are commonly associated with this surgical procedure. As a result, questions have been raised as to the cost-effectiveness of LVRS, eventually leading to a dramatic reduction in the number of procedures that are performed yearly. In an attempt of avoiding shortcomings of LVRS, novel surgical and endoscopic lung volume reduction methods are being actively investigated.

Because morbidity can be negatively affected by both the need of general anesthesia and the deep resection of lung tissue in LVRS, we have developed an awake nonresectional method that respects the basic principles of resectional LVRS but adds theoretic advantages, including the possibility of being performed through sole thoracic epidural anesthesia in fully awake patients.

Preliminary findings from our group have suggested that awake nonresectional LVRS can be easily performed and optimally tolerated, and can offer clinical improvements that can be superior to those achieved by the standard resectional method. Moreover, in a recent study comparing nonresectional LVRS performed by awake or nonawake anesthesia, a shorter hospital stay and reduced costs were observed in the awake group. The current prospective randomized study comparatively assesses the outcomes of awake nonresectional versus nonawake resectional LVRS performed by unilateral VATS.

The primary outcome measure was hospital stay. For this purpose, criteria for discharge were standardized. Removal of chest tubes was allowed when daily fluid drainage was less than 200 mL and air leaks stopped. In patients with minimal air leak and 1 chest tube remaining, a Heimlich valve was connected to the tube, and if this proved well tolerated by the patient and did not interfere with radiologically assessed complete lung expansion, discharge was allowed 24 hours later provided acceptance of a 48-hour–based outpatient clinical control program. Secondary outcome measures included 90-day mortality, ratio of arterial oxygen tension to fraction of inspired oxygen (Pao2/Fio2), and arterial carbon dioxide tension (Paco2), assessed at 3 fixed time points (T1 = preoperative in lateral decubitus, T2 = end operative, and T3 = 1 hour after completion of the operation and weaning).

Video-Assisted Thoracic Surgery

The primary outcome measure was forced expiratory volume in 1 second (FEV1). The secondary outcome measures were plethysmographic residual volume (RV), forced vital capacity (FVC), exercise capacity assessed by both the 6-minute walking test (WT) and the maximal incremental treadmill test, dyspnea graded according to the Modified Medical Research Council scale, and health-related quality of life physical functioning domain scored according to the 36-Item Short Form questionnaire. All clinical measures were assessed at 6 months and every 6 months thereafter.

During follow-up, the need of contralateral treatment was considered a failure event as death. Contralateral LVRS was performed according to strict objective criteria, including loss of benefit in FEV1 or RV back to baseline values. Thoracic epidural catheterization was performed between T4 and T5 to achieve somatosensory and motor block between the T1 and T8 level while preserving diaphragmatic motion. In the operating room, patients received a continuous infusion of ropivacaine 0.5% and sufentanil 1.66 μg/mL into the epidural space. During the procedure, patients breathed oxygen through a Venturi facemask to keep oxygen saturation greater than 90%.

Surgical pneumothorax was created by insertion of the first flexible trocar; if lung hyperinflation persisted despite the intrapleural atmospheric pressure environment, an EndoPaddle (Covidien, Norwalk, Conn) was gently applied onto the lung to minimize lung movements during spontaneous ventilation and improve surgical maneuvering, particularly when dealing with pleural adhesions, which could be easily cut whenever necessary. The most severely destroyed target areas were identified and pushed downward while redundant lung edges were grasped by 2 ring forceps. Subsequently, both lung edges were grasped together by 1 ring forceps and a 45-mm, non-

cutting endostapler (Endopath 45NK; Ethicon Endosurgery, Pomezia, Italy) was fired on the plicated lung region starting at the lung apex and continuing by firing 2 other cartridges, 1 ventrally and 1 dorsally to perform a linear, interrupted suture and reducing the lung volume by 20% to 30%.

As the professional society representing cardiac surgeons in Canada, the Canadian Society of Cardiac Surgeons (CSCS) recognizes the importance of maintaining a stable cardiac surgical workforce. The current reactive approach to health human resource management in cardiac surgery is inadequate and may result in significant misalignment of cardiac surgeon supply and demand. The availability of forecasting models and high quality, consistent data on productivity, workload, utilization, and demand is a prerequisite for our profession's capacity to predict and plan for changes in health human resources. The CSCS recognizes that improved workforce management is a key component to providing optimal cardiac surgical care for Canadians in the future and has developed the recommendations in this document as a call to action to interested stakeholders and policymakers to bring substantial improvements to health human resource management in cardiac surgery.

Thirteen senior cardiothoracic surgeons participated in a 2day Senior Tour Meeting. Of 12 simulators, each participant focused on 6 cardiac (small vessel anastomosis, aortic cannulation, cardiopulmonary bypass, aortic valve replacement, mitral valve repair, and aortic root replacement) or 6 thoracic surgical simulators (hilar dissection, esophageal anastomosis, rigid bronchoscopy, video-assisted thoracoscopic surgery lobectomy, tracheal resection, and sleeve resection). The participants provided critical feedback regarding the realism and utility of the simulators, which served as the basis for a composite assessment of the simulators.