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One-lung ventilation (OLV) is essential for many thoracic and an increasing number of non-thoracic minimally invasive procedures. Beyond the well-recognized disturbance of ventilation–perfusion matching, recent years have seen a mounting body of evidence implicating OLV in the creation of acute lung injury. After reviewing the fundamentals of OLV physiology, this article examines the evidence for altering individual ventilatory parameters toward protective OLV.

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Lung cancer remains one of the leading causes of cancer-related mortality. Surgical resection remains the mainstay of non–small cell lung cancer therapy, but an increasing number of patients receive preoperative adjuvant chemotherapy that may predispose these patients to unique organ toxicities. This chemotherapy, along with exposure to high oxygen concentrations, may combine to increase the risk of reactive oxygen species–mediated lung injury. Continued efforts are needed to improve overall outcome in these patients, including a reevaluation of our management of oxygen therapy.

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Gordon N. Finlayson and Jay B. Brodsky

The attributable morbidity from central airway obstruction is significant. Airway stenting provides a therapeutic option to manage these complex lesions. This article focuses on the relevant anesthetic considerations of airway stenting in adult patients.

**Perioperative Anesthetic Management for Esophagectomy** 293

Ju-Mei Ng

Esophageal resection is a formidable operation associated with high morbidity and mortality. Anesthetic management may contribute to the containment of respiratory failure and anastomotic leakage by the use of thoracic epidural analgesia, protective ventilation strategies, prevention of tracheal aspiration, and judicious fluid management.

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John W.W. Gothard

Anterior mediastinal tumors can cause severe airway and vascular compression, and these effects are exacerbated by general anesthesia. Tumor biopsy using a local anesthetic technique is preferable. General anesthesia for a biopsy procedure or resection of an anterior mediastinal mass should be undertaken only after a thorough preoperative assessment. Treatment protocols for surgery and anesthesia vary from institution to institution, and management remains operator dependent. Some consider the maintenance of spontaneous respiration during anesthesia optimal. Others advocate airway stenting. Cardiopulmonary bypass, instituted at the outset of surgery under local anesthetic, may be used as a fall-back technique in extreme circumstances.

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Paul M. Heerdt and Bernard J. Park

As a consequence of the general aging of the population, improved diagnostic techniques, and preoperative interventions to enhance the efficacy of surgical therapy, increasing numbers of elderly patients are presenting for pulmonary resection. Clear association between advanced age and the perioperative morbidity and mortality associated with lung cancer surgery has generated considerable interest in applying minimally invasive operative techniques in the geriatric population under the belief that this approach will improve outcome. This review examines the available data regarding video-assisted thoracoscopic lobectomy and concludes that this technique for the surgical treatment of

early-stage lung cancer may parallel conventional thoracotomy in terms of oncologic efficacy while decreasing perioperative morbidity in the elderly.

### **Prevention and Management of Perioperative Arrhythmias in the Thoracic Surgical Population**

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David Amar

Although bradyarrhythmias or malignant ventricular tachyarrhythmias have been reported in less than 1% of patients following noncardiac surgery, rapid atrial arrhythmias more frequently affect the elderly who undergo thoracic operations. This article focuses on new issues leading to the improved understanding of the pathophysiology and mechanisms of postoperative atrial arrhythmias. It discusses new risk factors and a prediction rule for postthoracotomy atrial fibrillation (AF), reviews prophylaxis and acute therapeutic interventions for postthoracotomy AF, and highlights the most recent recommendations of the American Heart Association Task Force on the management of patients who have AF with emphasis on preventing thromboembolic events.

### **Pulmonary Vasodilators—Treating the Right Ventricle**

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John Granton and Jakov Moric

Pulmonary hypertension remains a significant complication of several systemic and cardiothoracic diseases. It is important to emphasize that the hemodynamic relevance relates to the effect of pulmonary hypertension on right ventricular function and right-left ventricular interaction. The goal of pulmonary vasodilation should focus on optimizing right ventricular function and improving systemic perfusion. The properties of an optimum vasodilator include selective pulmonary vasodilation (avoiding systemic vasodilation), rapid onset of action, short half-life, and ease of administration. Inhaled nitric oxide or nebulization of traditional systemically administered agents offers the greatest clinical promise. An additional merit of selective pulmonary vasodilation consists of augmenting oxygenation by improving ventilation perfusion matching.

### **Postthoracotomy Pain Management Problems**

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Peter Gerner

Pain after thoracotomy is very severe, probably the most severe pain experienced after surgery. Thoracic epidural analgesia has greatly improved the pain experience and its consequences and has been considered the standard for pain management after thoracotomy. This view has been challenged recently by the use of paravertebral nerve blocks. Nevertheless, severe ipsilateral shoulder pain and the prevention of the postthoracotomy pain syndrome remain the most important challenges for management of postthoracotomy pain.

**Postthoracotomy Paravertebral Analgesia: Will It Replace Epidural Analgesia?**

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Niamh P. Conlon, Andrew D. Shaw, and Katherine P. Grichnik

Thoracotomy is associated with significant acute postoperative pain and a high incidence of development of chronic pain. Thoracic epidural analgesia has long been standard treatment for postthoracotomy pain, but recently there has been increased interest in alternative regional techniques, particularly paravertebral analgesia. This article compares the analgesic efficacy, side effects, complications of, and contraindications for thoracic epidural and paravertebral analgesia techniques and discusses their effects on the development of chronic postthoracotomy pain. This information will allow a more considered choice of analgesic technique after thoracotomy.

**Advances in Extracorporeal Ventilation**

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Anna Meyer, Martin Strüber, and Stefan Fischer

Mechanical ventilation remains the signature tool of critical care; however, within the past decade, a growing body of evidence suggests that positive pressure ventilation in acute respiratory failure is a double-edged sword that is associated with life-threatening complications such as nosocomial pneumonia and low cardiac performance. Essentially, solutions are required to provide adequate gas exchange and stable acid-base status while optimizing and maximizing pulmonary as well as remote organ protection. Recently, the first commercially available extracorporeal membrane ventilator was approved for clinical lung support, the Interventional Lung Assist. This article gives an overview of the potential indications for this device and the current clinical evidence in extracorporeal ventilation.

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