American Association for Thoracic Surgery Annual Meeting: 2018 Hot Topics Postprint

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Abstract

The 98th Annual Meeting of the American Association for Thoracic Surgery (AATS) was held in San Diego, California, USA from April 28 to May 1, 2018. This annual meeting continued the AATS tradition of novel content, diverse formats, and vigorous discussions, presenting multiple research findings centered on hot topics in thoracic surgery clinical practice and basic research. The content included partial results from international multicenter studies on early-stage lung cancer, the impact of big data research on lung cancer diagnosis and treatment guidelines, comparisons of efficacy between surgery and stereotactic radiotherapy, lung cancer immunotherapy, selection of preoperative neoadjuvant chemoradiotherapy regimens for esophageal cancer, analysis of recurrence patterns and risk factors following esophageal cancer surgery, new surgical procedures for benign esophageal diseases, experience with carinal surgery, research progress on donor lungs for lung transplantation, and the application of extracorporeal membrane oxygenation in lung transplantation, among others. This article categorizes and reports on the research findings presented at the meeting according to lung cancer surgery, esophageal surgery, tracheal surgery, and lung transplantation.

Full Text

Preamble

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Conference Dispatch

Highlights of the 2018 Annual Meeting of the American Association for Thoracic Surgery

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Abstract

The 98th annual meeting of the American Association for Thoracic Surgery (AATS) was held in San Diego, California from April 28 to May 1, 2018. This year' s conference maintained the tradition of AATS with novel contents, diverse formats, and fierce discussions. It focused on current research hotspots in thoracic surgery and released a number of research results, including an international multicenter study on early-stage lung cancer, big data research on lung cancer diagnosis and treatment guidelines, comparison of curative effect between surgery and stereotactic body radiotherapy, immunotherapy for lung cancer, neoadjuvant radiochemotherapy for esophageal cancer, postoperative recurrence patterns and risk factors of esophageal cancer, new surgical treatment for benign esophageal disease, tracheal surgery experience, lung transplantation-related research progress, and the application of extracorporeal membrane oxygenation in lung transplantation. This article collects and reports research results released at the meeting in different subgroups.

Keywords: American Association for Thoracic Surgery; lung cancer; esophageal cancer; lung transplantation

1. Lung Cancer Surgery

1.1 International Multicenter Study Results

This year' s meeting unveiled short-term results from the CALGB 140503 (ALLIANCE) study: "Mortality and Morbidity of Lobar versus Sub-lobar Resection in CALGB 140503 (ALLIANCE)." A total of 697 patients were randomized to lobectomy and 357 to sublobar resection groups, with an overall minimally invasive surgery rate of 54%. Mortality rates were 1.4% (4/357) in the sublobar group and 1.2% (6/697) in the lobectomy group, with no significant difference in perioperative mortality. Major complication rates were 15.2% in the lobectomy group and 14.2% in the sublobar group, also showing no significant difference. The study confirmed that lung cancer surgery has low mortality and complication rates in the short term, though these metrics cannot reflect long-term survival outcomes or improve oncological results. The long-term efficacy comparison between surgical techniques remains to be further studied.

A multicenter study led by the Society of Thoracic Surgeons evaluated the rationality of using 30-day mortality as the primary quality control metric for lung surgery. Considering the complexity of lung surgery and the probability of complications occurring within 30 days, the authors questioned whether 30-day mortality truly reflects surgical quality and proposed that postoperative mortality might be a more reliable standard for quality control.

1.2 Impact of Big Data Research on Lung Cancer Treatment Guidelines

Big data research was a highlight of this year' s meeting. A team from Cornell Medical College used large-sample databases including NCDB, SEER, and STS to evaluate the safety and value of lung cancer screening. Statistical analysis revealed that the lung cancer surgical cohort in the National Lung Screening Trial (NLST) had relatively low utilization rates of preoperative biopsy and PET-CT, and the perioperative management strategies and surgical skill levels might not represent current practice. The study suggested that the NLST data may have overestimated the risks of surgery for early-stage lung cancer at that time. With increased utilization of minimally invasive techniques in current practice and more local resections for screen-detected early lung cancers, related conclusions may need re-evaluation.

A team from Northwestern University explored the impact of the interval between clinical diagnosis and surgery on pathological staging in patients with pT1/2N0M0 NSCLC. According to current NCCN guidelines, surgery should be performed as soon as possible after completing clinical diagnosis and staging. The study found that 78.9% of patients (41,362/52,406) underwent surgical resection within 8 weeks of diagnosis. With longer intervals, there was a significant trend toward increased pathological stage, with similar findings in subgroup analyses of stage Ia/Ib adenocarcinoma and squamous cell carcinoma.

Another study based on the NCDB database investigated whether postoperative adjuvant radiotherapy could improve overall prognosis in surgically treated pT1/2N0M0 NSCLC patients. Among 166,768 eligible patients, only 5.8% (9,696) received postoperative adjuvant radiotherapy. After propensity score matching, adjuvant radiotherapy did not significantly improve prognosis in any group, suggesting that surgical treatment should be the preferred option for pT1/2N0M0 patients.

1.3 Early Lung Cancer Screening and Small Pulmonary Nodule Localization

Regarding risks of early lung cancer screening, a team from the University of Pennsylvania used near-infrared imaging technology and indocyanine green dye to assist in localizing small metastatic lesions during surgery. Utilizing the fluorescent agent' s affinity for tumor tissue, the study achieved an 89.1% detection rate for known metastatic lesions, though undetected lesions all exceeded 2.0 cm

in depth. This technique may be particularly helpful for locating deep-seated occult nodules.

Another study from Japan used bronchoscopic multi-point staining virtual imaging technology to assist in determining surgical margins during sublobar resection, ensuring gross observation of tumor-free margins greater than 5 mm or greater than tumor diameter. This innovative technique was shown to be safe and reliable.

1.4 Autologous Lung Transplantation Surgery

For locally advanced lung cancer treatment, autologous lung transplantation may improve patient outcomes. A team from the University of Florida reported a case of autologous lung transplantation for locally advanced lung cancer. Combining lung transplantation techniques with thoracic oncology, autologous lung transplantation can maximally avoid pneumonectomy and may improve prognosis. A team from Kyoto University reported a case of salvage autologous lung transplantation after definitive chemoradiotherapy.

1.5 Comprehensive Treatment of Lung Cancer

Researchers from Memorial Sloan Kettering Cancer Center compared neoadjuvant versus adjuvant chemotherapy in completely resected cT2-4N0-1M0 NSCLC patients. The study enrolled patients receiving neoadjuvant chemotherapy (47%) and adjuvant chemotherapy (53%). Compared to the adjuvant group, neoadjuvant chemotherapy patients had larger tumors, higher standardized uptake values, later clinical stages, and were more likely to receive full-dose, full-cycle chemotherapy with lower toxicity. Disease-free survival (DFS) and overall survival (OS) showed no significant difference between groups.

Regarding immunotherapy application, a research team from Johns Hopkins University School of Medicine and Memorial Sloan Kettering Cancer Center presented short-term surgical outcomes of PD-1 nivolumab neoadjuvant therapy for resectable stage IB-IIIA NSCLC. Among 37 cases, 33 underwent thoracoscopic surgery, including wedge resection, lobectomy, and complex lobectomy. The study demonstrated that PD-1 antibody neoadjuvant therapy was safe and effective, with 30% of patients showing pathological downstaging.

The comparison of surgical efficacy between surgery and stereotactic body radiotherapy (SBRT) remains a research hotspot. A team from MD Anderson Cancer Center compared both methods for colorectal lung metastases. After wedge resection, the local recurrence rate at the resection margin was 5.8%, while SBRT had a 12.3% probability of in-field tumor recurrence. After case matching, SBRT showed higher recurrence rates than wedge resection, particularly for poorly differentiated carcinomas, suggesting SBRT should only be an alternative for patients who cannot undergo surgery.

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2. Esophageal Surgery

Benign esophageal diseases such as hiatal hernia and achalasia are prevalent. This meeting featured numerous clinical and basic research studies focused on these conditions. Researchers from Cleveland Clinic reported their experience with peroral endoscopic myotomy (POEM) in achalasia patients. POEM is a safe and effective treatment for achalasia that can relieve symptoms and improve esophageal emptying. The procedure offers potential advantages of minimally invasive treatment, faster postoperative recovery, and quick return to daily activities and work, particularly suitable for frail patients. However, attention must be paid to potential long-term complications such as reflux esophagitis or esophageal stenosis.

Maimonides Medical Center in New York reported a case of using POEM combined with thoracoscopic surgery to treat epiphrenic esophageal diverticulum. Compared with traditional myotomy, this combined approach has unique technical advantages for epiphrenic diverticulum.

Professor Matthew Harwig from Duke Medical Center reviewed new treatment methods for gastroesophageal reflux disease, including local radiofrequency therapy at the cardia and magnetic sphincter augmentation (LINX), which may become alternatives to various fundoplication procedures for patients with moderate reflux symptoms or poor general condition.

Regarding neoadjuvant chemoradiotherapy for esophageal cancer, researchers from Massachusetts General Hospital compared cisplatin/5-FU versus carboplatin/paclitaxel regimens for pathological complete response (pCR). The study found that the cisplatin/5-FU regimen achieved higher pCR rates, but no significant DFS or OS advantage was observed. The conclusion may be influenced by selection bias, as cases receiving the carboplatin/paclitaxel regimen had relatively later stages.

Researchers from Memorial Sloan Kettering Cancer Center analyzed tumor recurrence patterns and risk factors in esophageal cancer patients after neoadjuvant chemoradiotherapy and surgery. Despite achieving pCR, 1/3 of esophageal cancer cases still experienced tumor recurrence. Multifactorial analysis identified only tumor poor differentiation as an independent risk factor for recurrence (HR=2.12, 95% CI: 1.10-4.11, P=0.03), suggesting that even patients with negative margins but residual positive lymph nodes after neoadjuvant therapy should receive more aggressive adjuvant treatment.

A team from the University of Tennessee conducted a propensity score-matched cohort study based on the NCDB database and found that postoperative adjuvant chemotherapy improved prognosis in esophageal adenocarcinoma patients with lymph node metastasis confirmed by pathology after neoadjuvant chemoradiotherapy, increasing 5-year survival from 20.2% to 27.9%. This contradicts current guideline recommendations for observation only in such patients.

In basic esophageal cancer research, Dr. Ma Haibo' s team from Henan Cancer

Hospital presented a study on "Tumor Associated Macrophage is Associated with Angiogenesis in Human Esophageal Squamous Cell Carcinoma," exploring the correlation between macrophages and tumor angiogenesis and its impact on patient prognosis.

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3. Tracheal Surgery

Massachusetts General Hospital reported their 27-year experience with tracheal carinal surgery. The hospital completed 74 carinal procedures with a median follow-up of 49.8 months. Procedures included carinal reconstruction (30%), carinal pneumonectomy (48%), and left carinal pneumonectomy (20%). Nine cases (12%) received preoperative neoadjuvant chemotherapy, two cases (3%) received preoperative radiotherapy, and nine cases (12%) were assisted by extracorporeal membrane oxygenation (ECMO) or cardiopulmonary bypass. There was no intraoperative mortality, though 20% of patients developed postoperative complications including acute respiratory distress syndrome and sepsis. Postoperative events were mostly related to anastomotic complications, smoking, and pulmonary embolism with right heart failure.

Researchers from the European Institute of Oncology in Milan, Italy, reported surgical outcomes and long-term survival after carinal resection following induction therapy in patients with tumor involvement of the carina. Induction therapy did not affect complication occurrence, and carinal resection surgery proved a feasible treatment option with acceptable long-term survival results.

Dr. Richard Lazzaro from Lenox Hill Hospital in New York explored the safety and feasibility of robot-assisted tracheobronchoplasty (R-TBP), sharing relevant experience. A team from Icahn School of Medicine at Mount Sinai reported using a novel 3D-printed tracheal implant wrapped with small intestinal submucosa extracellular matrix, which demonstrated good implant integration and reduced granulation tissue formation.

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4. Lung Transplantation

The University of Toronto lung transplant team investigated the impact of withdrawal time from life support to cardiac arrest in donation after cardiac death (DCD) donors on transplant outcomes. Current DCD donor requirements specify a withdrawal-to-cardiac-death interval within 60 minutes. Using single-center data, the team studied how this interval affects recipient short- and long-term outcomes. Among 131 DCD donors with available data, the average and median times were 16 minutes and 13 minutes respectively, with 17 cases (13%) exceeding 30 minutes. Prolonged withdrawal time did not affect recipient outcomes.

The team further studied the impact of donor type differences on recipient outcomes, comparing 2007 lung transplants from DCD donors versus brain-dead donors. All donors underwent ex vivo lung perfusion (EVLP) before use. The incidence of primary graft dysfunction (PGD) was 15.4% (24/156) in DCD donors and 17.7% (177/998) in brain-dead donors at 24 hours, and 14.1% (22/156) and 9.0% (90/998) at 72 hours respectively. There was no significant difference in total hospital stay, ICU stay, or mechanical ventilation time between groups.

A study from West Virginia University based on the UNOS/OPTN database evaluated the impact of preoperative mechanical ventilation (MV) on lung transplant outcomes. Among 1,783 lung transplant recipients, 664 were in the control group, 1,129 in the MV group, and 19 in the MV+ECMO group. Compared with controls, the MV+ECMO group had higher risks of requiring postoperative ventilation >48 hours, dialysis, and reintubation, with significantly longer hospital stays. However, in-hospital mortality in the MV+ECMO group has significantly decreased in recent years, suggesting ECMO can serve as a bridge to lung transplantation.

A research team from Washington University in St. Louis explored the impact of reviewer subjectivity on PGD grading after lung transplantation. The International Society for Heart and Lung Transplantation (ISHLT) classification system primarily relies on oxygenation index and chest imaging. The study confirmed that PGD Grade 3 classification based on chest radiographs was significantly affected by reviewer subjectivity. For similar imaging evaluation issues, the team proposed that CT might be more suitable for donor lung evaluation, helping identify cases unsuitable for donation due to emphysema or alveolar hemorrhage despite borderline oxygenation indices.

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5. Summary

The 2018 AATS annual meeting presented numerous latest research findings in lung cancer surgery, esophageal surgery, tracheal surgery, and lung transplantation. Key highlights included partial results from international multicenter lung cancer studies, the impact of big data research on lung cancer treatment guidelines, lung cancer immunotherapy, comparison of surgery and stereotactic radiotherapy efficacy, selection of neoadjuvant chemoradiotherapy regimens for esophageal cancer, analysis of postoperative recurrence patterns and risk factors in esophageal cancer, treatment of benign esophageal diseases, tracheal carinal surgery experience, donor lung-related research in lung transplantation, and ECMO application. The research methodologies and findings are worthy of reference for domestic colleagues.

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Note: Figure translations are in progress. See original paper for figures.