Improved postoperative lung function in patients with moderate to severe airway obstruction after robotic-assisted thoracoscopic tracheobronchoplasty

Objective: To examine change in pulmonary function and quality of life following VATS robotic assisted tracheobronchoplasty (R-TBP) for severe tracheobronchomalacia in patients with different severities of obstructive airway disease.

Methods: Retrospective review of prospectively collected data for all patients that underwent R-TBP between 2013 and 2020 at our institution. The Institutional Review Board approved the study protocol.

Results: One hundred-eighteen patients underwent R-TBP during the study period. The median age was 66.9 years (60.5-72.5 years). Median BMI was 30.0 (27.0-34.5). Comorbid conditions included COPD (n=87, 73.7%), obstructive sleep apnea (n=69, 58.5%), asthma (n=95, 80.5%), GERD (n=82, 69.5%), hypertension (n=60, 50.9%), coronary artery disease (n=21, 17.8%), diabetes (n=26, 22.0%), and chronic kidney disease (n=4, 3.4%). Twenty-nine patients (24.6%) had previous chest surgery.

Pre- and postoperative pulmonary function test (PFT) results were available for 108 patients (91.5%). Postoperative PFTs at a median of 16 months (IQR: 5-29 months) demonstrated a significant increase in percent predicted FEV1 [preop: 75.98% predicted, postop: 81.60% predicted, **p=0.003], and a trend toward an increase in FVC [preop: 79.19% predicted, postop: 82.30% predicted, p=0.13]. There was no difference in PEF [preop: 81.75% predicted, postop: 79.97% predicted, p=0.65]. Sixty-four patients (54.2%) completed pre- and postoperative St. George Respiratory Questionnaires (SGRQ) with a significant decrease in total score postoperatively [preop: 59.45, postop: 39.93, ***p<0.001] at a median of 7 months (IQR:3-16 months). Patients with pre- and postoperative PFTs were separated by GOLD classification. There were 52 GOLD 1, 46 GOLD 2, 9 GOLD 3, and 1 GOLD 4 patients. R-TBP resulted in a statistically significant increase in postoperative FEV1 in GOLD 2 [preop: 63.74, postop: 72.22, **p=0.0015] and GOLD 3 [preop: 43.9, postop: 60.51, **p=0.0068] patients. GOLD 2 patients had improved FVC [preop: 68.16, postop: 76.28, **p=0.0037]. PEF was significantly decreased in GOLD 1 patients [preop: 99.97, postop: 90.36, *p=0.0495].

Pre- and postoperative SGRQ scores were available for 33 GOLD 1, 26 GOLD 2, 4 GOLD 3 and 1 GOLD 4 patients. R-TBP resulted in a statistically significant decrease in SGRQ score in GOLD 1 [preop: 59.88, postop: 36.92, ****p=0.0001] and GOLD 2 [preop: 56.40, postop: 43.01, *p=0.0334] patients.

Conclusions: Minimally invasive surgical stabilization of the central airways, R-TBP, improved postoperative FEV1 in our cohort. Significant FEV1 improvement was seen in patients with GOLD 2 and GOLD 3 obstructive disease. In addition, R-TBP provides a significant quality of life improvement to these patients. Minimally invasive surgical stabilization of the central airways can improve quality of life and pulmonary function in patients with severe symptomatic tracheobronchomalacia and severe COPD who might not be candidates for thoracotomy or have alternative treatment options.