Effect of Laparoscopic Fundoplication on Lung Function and Hospitalizations in CF and ILD Patients

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CF vs ILD

Background

Microaspirations of gastric contents from reflux has been shown to allow entrance of gastric flora in the lungs, altering oropharyngeal and lung microflora when microflora immigration exceeds the patient's capacity for elimination by host defenses, cough, and microciliary clearance. Increasing reflux increases microaspiration and has been implicated in chronic lung disease exacerbations as repeated reflux leads to respiratory dysbiosis and a perpetual cycle of inflammation and microflora distortion. Reflux occurs commonly in patients with chronic lung diseases including Cystic Fibrosis (CF) and Interstitial Lung Disease (ILD) as frequent forceful coughing increases intra-abdominal pressure and the risk for recurrent reflux. Common surgical treatments for reflux include laparoscopic fundoplication.

Purpose

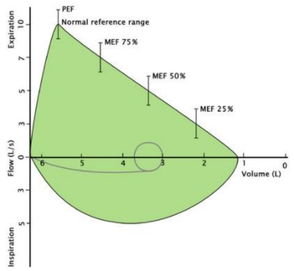
The purpose of this study was to observe the role of reflux and microaspiration on lung function and respiratory-related exacerbations and hospitalizations in patients with CF and ILD before and after laparoscopic fundoplication.

Methods

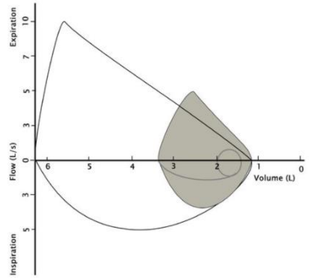
A retrospective cohort study of patients that had undergone laparoscopic fundoplication from 2009-2018 at UK was performed. Data were collected on baseline variables, lung function, days of respiratory-related hospitalization, and pharmacology used during respiratory-related hospitalizations. The patient population included patients with Idiopathic Pulmonary Fibrosis, the most common type of ILD, and CF. The results of ILD patients and CF patients were compared. The patients were examined preoperatively for positive DeMeester scores and received either laparoscopic Nissen or Toupet fundoplication. The number of hospitalizations related to pulmonary complications, antibiotic use for lung infections, and lung function were followed for one year prior and one-year post repair.

Obstructive vs Restrictive Lung Disease

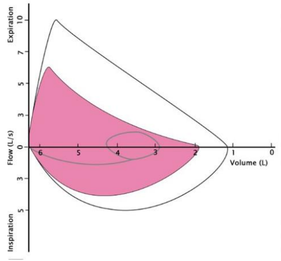
Flow-Volume Curves:



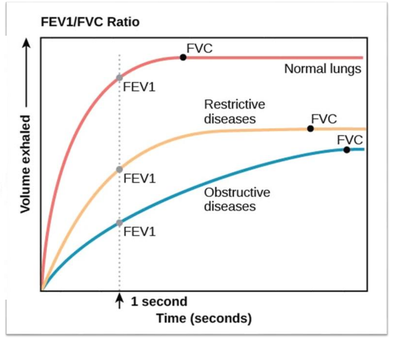
Normal



Interstitial Lung Disease



Cystic Fibrosis



Lung Volume Changes:

	Normal Values	Normal Disease Process Values:		Changes representing post-op improvement	
		Cystic Fibrosis	Interstitial Lung Disease	CF	ILD
FEV1	Varies by age, generally 3-4L	Decreased	Decreased or normal	Increased value	Increased
FEV1/FVC	>5th percentile, classically >70	Significantly Decreased	Increased or normal	Increased value	Decreased
FVC	Varied by age	Decreased	Significantly decreased	Increased value	Increased value

Results

Average Pre and Post Fundoplication Lung Function Changes:

	PRE-CF	POST-CF	PRE-ILD	POST-ILD	P-value
FEV1 (in L)	1.9	1.7	2.0	2.3	0.680
FEV1/FVC	61.3	57.5	76	74.4	0.501
FVC (in L)	3.2	3.1	2.7	3.1	0.037

Pre and Post Fundoplication Effect on the Average number of Respiratory-Related Hospitalization Days and Days on Antibiotics:

	PRE-CF	POST-CF	PRE-ILD	POST-ILD	P-value
Average hospital days	36.3	36.4	30.3	11.5	0.261
Average days requiring IV antibiotics	36	37.4	16.6	8.2	0.473
Average days requiring oral antibiotics	8.9	3.7	16.7	10.7	0.920

Discussion

Results from this study show the most commonly used measure of lung function, the FEV1/FVC ratio, worsened in the Cystic Fibrosis group, but improved in the Interstitial Lung Disease group. Other measures including the Forced Vital Capacity (FVC) showed improvement in both groups, indicating the worsening overall function measure in CF patients was due to the corresponding decrease in FEV1 after fundoplication. In both groups, oral antibiotic treatment for respiratory infections was decreased.

Conclusion

While there was no statistically significant change in respiratory function following laparoscopic fundoplication in either group, the ILD group experienced fewer respiratory related hospitalizations and IV antibiotic use following the procedure. Both groups showed a decrease in oral antibiotic use. Further research is indicated to examine to role of laparoscopic fundoplication on reducing the complications from microaspirations in patients with reflux and concomitant lung disease.

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