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Background: Long term morbidity and mortality in lung transplant patients is mostly related to chronic lung allograft rejection (CLAD). A common type of chronic rejection is bronchiolitis obliterans phenotype (CLAD-BOS). Gastroesophageal reflux disease (GERD) has been strongly linked to the development of bronchiolitis obliterans. The Stretta procedure is an endoscopic approach to reduce gastroesophageal reflux, developed as an alternative to fundoplication surgery. The efficacy of the Stretta procedure to reduce reflux has not been described in patients post lung transplant. We present a case series describing our experience with the Stretta procedure and its efficacy to reduce reflux in patients after lung transplant at our institution.

Methods: Eleven Stretta procedures have been performed after lung transplant surgery at our institution. All patients underwent the Stretta procedure between the years of 2016-2017. Laparoscopic fundoplication surgery was not being performed at our institution for these patients during this time frame. Stretta was therefore the first non-medical treatment for GERD at our institution for patients after lung transplant. Indication for the procedure was confirmed GERD on 24hr pH/Impedance monitor with documented decline in lung function or reflux symptoms not controlled with medications. Routine 3-month post Stretta GERD workup was completed to assess response to the procedure. Patients were followed for pulmonary outcomes until July 1st, 2019, death or subsequent fundoplication surgery. This study was conducted with approval from our institutional review board.

Table 1. Demographics			
Age	Median 61 (28-70)	Sex	n
Transplant indications	n	-Male	6
- COPD	5	-Female	5
- Bronchiectasis	2	Immunosuppressive medications	n
- Idiopathic pulmonary fibrosis	2	-Prednisone	10
- Cystic fibrosis	1	-Mycophenolate	8
- Alfa 1 antitrypsin deficiency	1	-Tacrolimus	10
Baseline lung function		-Azathioprine	1
- Median FEV1 post Txp	2.5 (1.2–3.8)	Type of Transplant	n
- Median %FEV1 post Txp	84.5 (41-97)	-Bilateral lung transplant	7
DeMeester score pre-Stretta		-Unilateral lung transplant	3
-Median 64.45	Range 33.2-169.8)		

Table 2. Esophagram results	pre-Stretta (n =10)	post-Stretta (n=8)
Reflux of contrast	9	8
- to lower esophagus	1	1
- to mid esophagus	4	6
- to upper esophagus	3	1
Esophageal dysmotility	4	2
- mild	0	0
- moderate	3	2
- Severe	1	0
Stricture	1	0
Hiatal hernia	5	3

Figure 1.

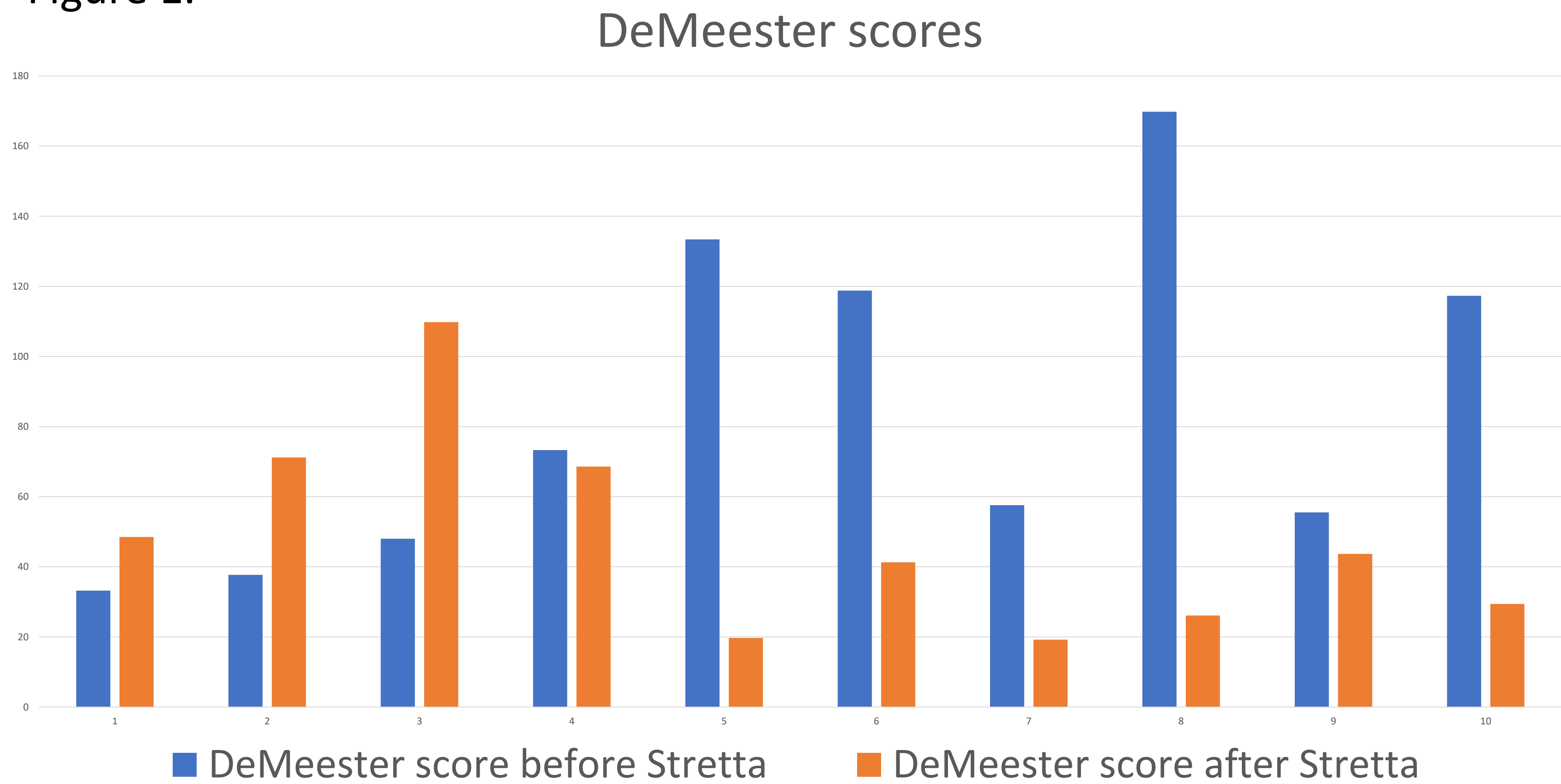


Figure shows DeMeester scores for each patient (n=10) before and after Stretta

Results: One of eleven patients refused post Stretta follow up and died within 1 year due to progressive respiratory failure. Median time from transplant to Stretta was 11 months (range 4-25). All patients were taking some form of immunosuppressive medications (Table 1). Six of 11 patients had symptoms of reflux with >90% correlation with reflux on 24hr pH/impedance study. The most common symptom was cough (n=5) while heartburn (n=3), regurgitation (n=3) and bloating (n=3) were less common. Esophagram results and DeMeester scores pre- and post Stretta are shown in table 2 and figure 1. No difference in pre- or post Stretta reflux was noted although post Stretta DeMeester score trended towards improvement (65.5 vs 42.5, p=0.14). Pre- and post Stretta 24 hr pH studies revealed a median number of acid reflux events 31.5 and 26 respectively (p=0.95). Seven patients went on to have laparoscopic fundoplication surgery performed due to continued reflux. Median time from Stretta to fundoplication surgery was 11 months (range 5-31). No difference was observed between pre-Stretta, 3- and 12-month post Stretta pulmonary function tests. Median percent of predicted forced expiratory volume at 1 second (FEV1%) was 84% pre Stretta vs 77% and 71% at 3-months and 1-year post Stretta respectively (p=0.18 and p=0.14). Two patients had diagnosed CLAD-BOS before Stretta (one with grade 1 and one with grade 4). At the end of pulmonary outcome follow up (median 18 months, range 4-25 months), four patients had CLAD-BOS (two with grade 1, one with grade 3 and one with grade 4).

Conclusion: The Stretta procedure did not provide expected results at our institution after lung transplant surgery. One possible reason is that the intended inflammatory response from the Stretta procedure was dampened by the immunosuppressive medications these patients were taking. Based on these results we have switched to doing laparoscopic fundoplication surgery for all patients requiring surgery for GERD after lung transplant.