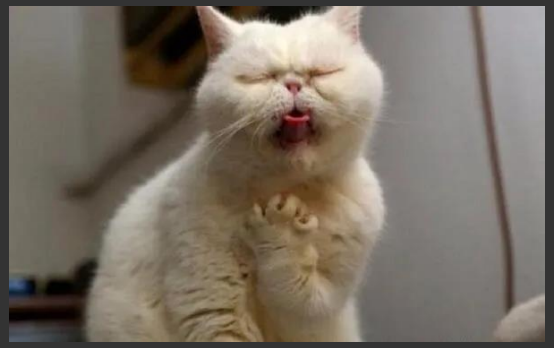


Fundoplication and LPR

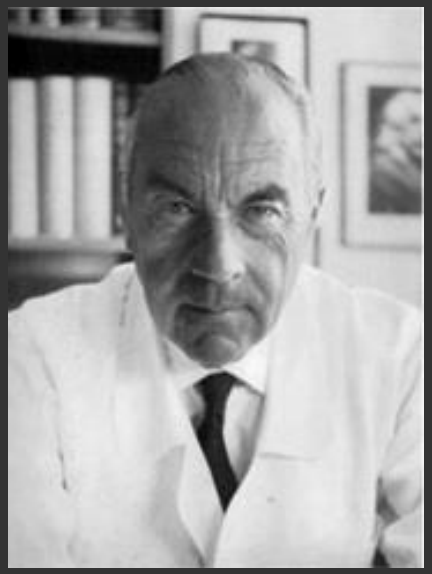
Jonathan M. Bock, MD, FACS
Professor
Division of Laryngology & Professional Voice
Department of Otolaryngology
Medical College of Wisconsin
jbock@mcw.edu

Learning Objectives

- History of fundoplication surgery
- Indications for fundoplication – GI & surgery literature
- Current data on fundoplication and LPR/atypical GERD

Fundoplication History

- ***Dr. Rudolf Nissen 1896-1981***
  - Born Neisse Germany 1896
  - Studied medicine in Munich, Marburg, and Breslau
  - Professor in Turkey 1933
  - Eventually worked in US 1939-1952 at MGH and Brooklyn Jewish Hosp
  - Shadowed Cushing at Yale
- Personal Life
  - Drafted at 20yo and wounded in WWI
  - Left Germany to Turkey in 1933 after Nazi regime ordered him to fire all Jewish workers under him
  - Operated on Albert Einstein in 1948 for aortic aneurysm
- Surgical impact
  - 30 Textbooks, 450 journal articles
  - Performed first lung lobectomy, first pneumonectomy, and first esophagectomy
  - Pioneered fundoplication surgery 1956, which caught significant favor in 1970's

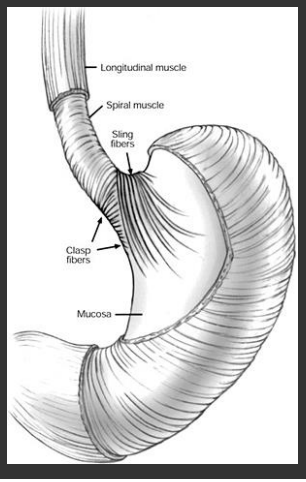


On April 2, 1933, 1 day after the "Pandemonium of the Jewish Boycott," he wrote to Sauerbruch: "many vile events are happening now, but nothing is worse than the foul insults on my personal honor. I feel personally hurt by a treacherous abuse with which not only the masses, but also professional people and colleagues of mine, fully agree… ." His decision to leave the clinic and Germany is adamant: "I separate myself from a working community which not only helped me constantly increasing my performance … but also gave me the whole meaning of life… ."

https://www.surgjournal.com/article/S0039-6060(99)70248-5/fulltext

Fundoplication History

- History of reflux surgery
  - Hiatal hernia not recognized until early 1900's due to advent of radiologic studies
  - Early attempts at repair centered on hernia reduction and hiatal closure without formal fundoplication, but patient reflux symptoms recurred quickly
  - 1939 Rudolf Nissen improvised a fundoplication surgery to protect an esophagogastric anastomosis in a pt with a penetrating esophageal ulceration and noted that his reflux symptoms were eradicated post-op.
  - 1951 Philip Allison and Norman Barrett establish the formal causal relationship among hiatal hernia, GERD, and erosive esophagitis and developed a suture fixation of cardia of stomach to the diaphragm, but again pts recurred.
  - Nissen noted the failures of these other strategies and started a series of his own "accidental wrap" technique, and had excellent clinical outcomes – eventually publishing the series in 1956



Barrett's History

CHRONIC PEPTIC ULCER OF ŒSOPHAGUS

CHRONIC PEPTIC ULCER OF THE ŒSOPHAGUS AND 'ŒSOPHAGITIS'

By N. R. BARRETT, London

- Norman Barrett, 1950
- "...in cases of congenital short oesophagus...the bare area is larger than usual."

SURGERY

Vol. 41 June, 1957 No. 6

Original Communications

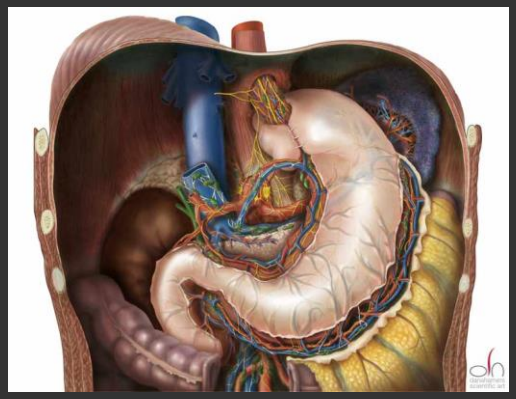
THE LOWER ESOPHAGUS LINED BY COLUMNAR EPITHELIUM

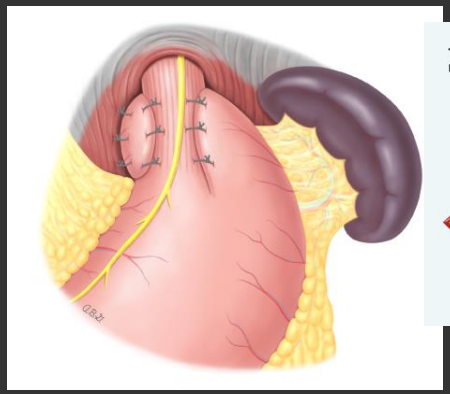
N. R. Barrett, London, England

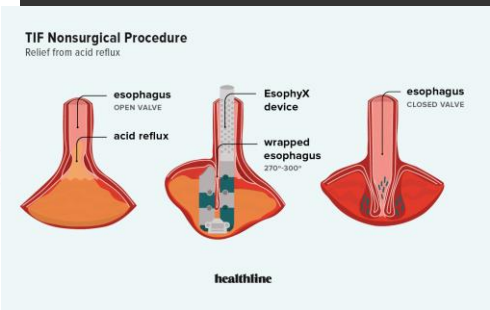
https://www.nature.com/gimo/contents/pt1/full/gimo56.html

Fundoplication Types

- Traditional Nissen fundoplication
  - Open procedure with full wrap of stomach and gastric cardia and repair of HH
  - Excellent clinical outcomes but sig dysphagia in 10-20% post op, prolonged recovery
- Laparoscopic fundoplication
  - First described in 1991
  - Quicker recovery but ongoing functional disorders post-op including 10% dysphagia rate, bloating
  - 25% of patients require EGD with dilation within 2 yrs post op
- Partial wraps – 90% success rate
  - Posterior wraps
    - Traditional Nissen
    - 270 Degree Toupet Wrap
  - Anterior wraps
    - 180-200 degree Watson or Dor wrap
  - Minimally invasive
    - LINX procedure (magnetic ring)
    - TIF procedure (transoral incisionless fundo)

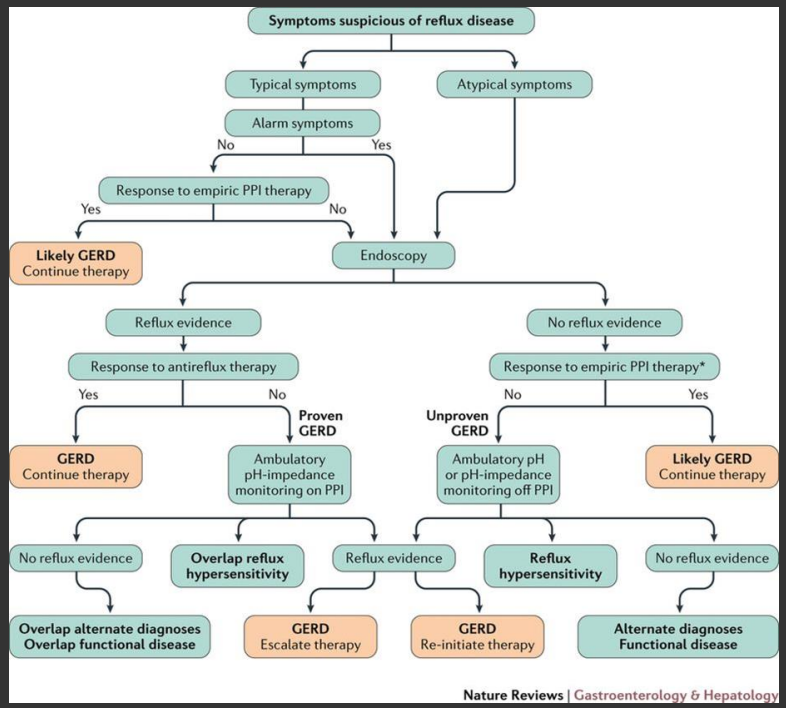






GERD Diagnosis Today

- *The Lyon Consensus Statement*, 2018
  - Empiric PPI trial:
    - sensitivity of 71%
      - specificity of only 44% c/w with the combination of endoscopy and pH-metry
      - Much lower success with “atypical symptoms” ie cough
  - Endoscopy – nl in 70%!
    - High grade esophagitis (LA C or D)
    - Barrett’s, Peptic structuring
    - Debate over role of biopsies, EoE
  - pH-metry – OFF THERAPY
    - AET < 4% normal
    - AET > 6% abnormal
    - > 80 events abnormal, < 40 nl
    - Symptom association - ?
    - Cough detector?
  - HRM – EGJ fxn, HH, motility



Gyawali CP, Kahrilas PJ, Savarino E, et al
Modern diagnosis of GERD: the Lyon Consensus
Gut 2018;67:1351-1362.

Fundoplication Indications

- Failure of medical/lifestyle management of GERD
  - 10% of patients with medically managed GERD still have breakthrough symptoms, 80% recur after stopping
  - Medication intolerance or lack of response
  - Avoidance of long-term medications (younger pts)
  - Contraindications:
    - Can't tolerate GA, hx coagulopathy, hx severe cardiopulmonary dz
    - Esophageal dysmotility syndromes/dysphagia

- Pre-operative evaluation
  - EGD for all patients with biopsies
    - Assessment of LA grade, retroflexed view of GE jxn to assess for competency
    - R/o malignancy, identify BE segments
  - 24hr pH monitoring - Bravo vs Dual pH-MII
    - Symptom association
    - "atypical symptoms" require impedance studies
    - ***Bravo cannot assess atypical symptoms/LPR well!***
  - Barium swallow
  - Manometry
    - Assess LES strength, identify motility d/o

Fundoplication and LPR

- Clear indications for surgery with GERD, much less clear with "atypical symptoms" of LPR
  - Evolving data normative pH values, symptom association
  - Careful selection of patients with sig symptom association and abnormal proximal reflux events (acid/non-acid)
  - ***Response to Alginates?***
  - No other great treatment for non-acid LPR (Dr. Johnston)
  - Cost impact over lifetime - Ability to get patients off PPI

- The Data evolves…
  - 11 pts, 9 with complete data
    - All with elevated RSI
    - 24 hr MII-pH testing off PPI showing full column proximal reflux
    - Double dose PPI BID x 3 mos without response
    - Pre and post-Nissen data
    - 7/9 also with traditional GERD data
  - 6/9 patients normalized RSI
    - All GERD symptoms also resolved
  - Confusion over proximal impedance and pH data

  - *Annals ORL* Sept 2016 125(9):722-8

Article

Annals of Otology, Rhinology & Laryngology 2016, Vol. 125(9) 722–728
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DOI: 10.1177/0003489416649974
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SAGE

Nissen Fundoplication for Laryngopharyngeal Reflux After Patient Selection Using Dual pH, Full Column Impedance Testing: A Pilot Study

Thomas L. Carroll, MD[1], Kael Nahikian, MS[2], Ammar Asban, MD[3], and Daniel Wiener, MD[1]

Abstract

Objectives: Prior studies demonstrate inconsistent diagnostic strategies for laryngopharyngeal reflux disease (LPR) patients who are offered laparoscopic Nissen fundoplication (Nissen). Superior symptom resolution outcomes are demonstrated in patients with accompanying typical gastroesophageal reflux (GERD) symptoms. This study aims to evaluate the efficacy of selecting patients with LPR complaints for Nissen using full column, dual pH impedance catheters (multichannel intraluminal impedance catheters [MII]).

Methods: All patients who underwent Nissen for management of LPR symptoms refractory to at least 3 months of twice daily (BID) proton pump inhibitor (PPI) therapy with reflux symptom index (RSI) of 13 or higher and who had demonstrable reflux on MII were included. Pre- and (minimum) 16 week post-Nissen RSI scores as well as LPR-specific complaints were collected.

Results: Eleven patients met criteria. Nine subjects (5 female, 4 male) had complete data. All 9 (100%) achieved improvement in RSI. The average pre-Nissen RSI was 31.7, and average post-Nissen RSI was 10 ($P < .001$). Six (67%) subjects dropped below an RSI of 13. Seven subjects (78%) had resolution of their primary LPR symptom, and 6 (67%) subjects had resolution of all LPR symptoms.

Conclusions: Patients with LPR who are selected using dual pH and full column impedance are likely to demonstrate improvement in RSI following Nissen.

Keywords

LPR, laryngopharyngeal reflux, Nissen fundoplication, extraesophageal reflux, pH impedance, multichannel intraluminal impedance, atypical reflux

Introduction

Laparoscopic Nissen fundoplication (Nissen) is a surgical treatment modality for patients with refractory laryngopharyngeal reflux disease (LPR) symptoms who traditionally have failed empiric, high dose (twice daily [BID]) proton pump inhibitor (PPI) therapy or who do not want to take PPIs for the long term. Numerous studies have evaluated Nissen outcomes in the LPR population with mixed results.[1-6] It is difficult to interpret these results, however, as LPR remains a diagnostic dilemma. Correctly identifying patients whose symptoms are due to LPR is critical in terms of being able to evaluate the success of Nissen fundoplication in this cohort of patients.

The inconsistency in the ability to diagnose LPR on laryngoscopy and/or history is well established, and a recent survey of otolaryngologists demonstrates increased interest in adjunctive diagnostics when considering an LPR diagnosis.[8] Additionally, more evidence emerges regarding how other laryngeal pathologies offer similar/overlapping patient presentations to those often attributable to LPR.[10-12] The collective inability of many medical and surgical specialists to truly diagnose LPR exists because of the shortcomings of prior studies that relied on traditional "GERD-based" interpretation of reflux tests and equivocal diagnostic strategies such as laryngeal symptoms or signs of LPR as criteria for pre-Nissen diagnosis.

[1]Brigham and Women's Hospital, Boston, Massachusetts, USA
[2]Tufts University School of Medicine, Boston, Massachusetts, USA
[3]University of California San Francisco, California, USA

Corresponding Author:
Thomas L. Carroll, Brigham and Women's Hospital, 45 Francis Street, Boston, MA 02115, USA.
Email: tcarroll@partners.org

Fundoplication and LPR

- New Data from world of general surgery - UW
  - 176 patients with antireflux surgery, mean Demeester 25.5 *(GERD patients basically)*
  - Screened from 1809 total patients over 12 yrs w at least 8 week f/u and completed pre and post-op RSI
  - Pt's could have either Nissen or Toupet procedure
  - Showed sig decrease in RSI scores in all categories after fundoplication, with increases proportionally larger for higher pre-operative RSI
  - Great demonstration of long-term benefit in LPR symptoms following fundoplication surgery!
  - Higher rates of partial fundoplication and LINX procedure in LPR population?

- *Surgical Endoscopy (2022): 36:778-786*

2020 SAGES ORAL

Antireflux surgery leads to durable improvement in laryngopharyngeal reflux symptoms

Lindsay K. Hessler[1] · Yiwei Xu[1] · Amber L. Shada[1] · Morgan K. Johnson[1] · Luke M. Funk[1,2] · Jacob A. Greenberg[1] · Anne O. Lidor[1]

Received: 4 September 2020 / Accepted: 30 December 2020 / Published online: 2 February 2021

Abstract

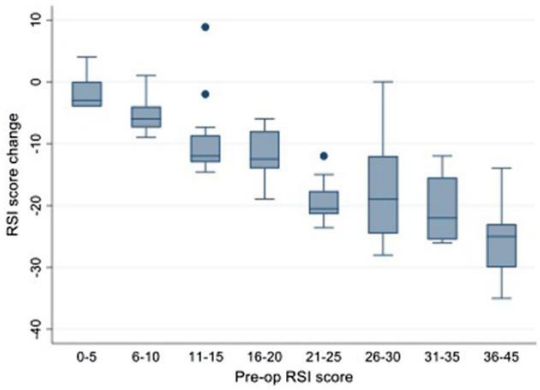
Background Laryngopharyngeal reflux (LPR) symptoms are often present in patients with Gastroesophageal reflux disease (GERD). Whereas antireflux surgery (ARS) provides predictably excellent results in patients with typical GERD, those with atypical symptoms have variable outcomes. The goal of this study was to characterize the response of LPR symptoms to antireflux surgery.

Methods Patients who underwent ARS between January 2009 and May 2020 were prospectively identified from a single institutional database. Patient-reported information on LPR symptoms was collected at standardized time points (preoperative and 2 weeks, 8 weeks, and 1 year postoperatively) using a validated Reflux Symptom Index (RSI) questionnaire. Patients were grouped by preoperative RSI score: ≤ 13 (normal) and > 13 (abnormal). Baseline characteristics were compared between groups using chi-square test or t-test. A mixed effects model was used to evaluate improvement in RSI scores.

Results One hundred and seventy-six patients fulfilled inclusion criteria (mean age 57.8 years, 70% female, mean BMI 29.4). Patients with a preoperative RSI ≤ 13 ($n = 61$) and RSI > 13 ($n = 115$) were similar in age, BMI, primary reason for evaluation, DeMeester score, presence of esophagitis, and hiatal hernia ($p > 0.05$). The RSI > 13 group had more female patients (80 vs 52%, $p = < 0.001$), higher mean GERD-HRQL score, lower rates of PPI use, and normal esophageal motility. The RSI of all patients improved from a mean preoperative value of *19.2 to 7.8* (2 weeks), *6.1* (8 weeks), and *10.9* (1 year). Those with the highest preoperative scores (RSI > 30) had the best response to ARS. When analyzing individual symptoms, the most likely to improve included heartburn, hoarseness, and choking.

Conclusions In our study population, patients with LPR symptoms achieved a rapid and durable response to antireflux surgery. Those with higher preoperative RSI scores experienced the greatest improvement. Our data suggest that antireflux surgery is a viable treatment option for this patient population.

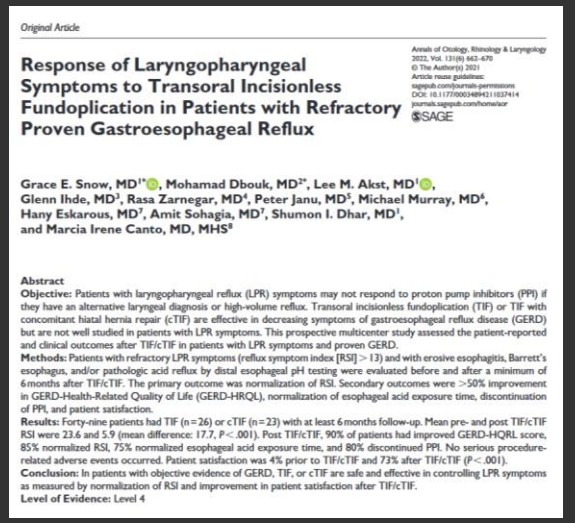
Keywords Laryngopharyngeal reflux · Atypical GERD · Antireflux surgery



Fundoplication and LPR

- New Data from Johns Hopkins group
  - 49 patients with RSI> 13 and evidence of erosive esophagitis, Barrett's, or elevated DeMeester – *GERD patients basically*
  - Evaluated before and 6 mos after TIF procedure
  - 85% normalized RSI scores
  - 75% normalized GERD-HQRL scores
  - 80% discontinued PPI
  - "In patients with objective evidence of GERD TIF is safe and effective in controlling LPR symptoms as measured by normalization of RSI and improvement in GERD QOL scores after TIF."

- *Annals ORL 2022 Jun; 131(6):662-670*



Original Article

Response of Laryngopharyngeal Symptoms to Transoral Incisionless Fundoplication in Patients with Refractory Proven Gastroesophageal Reflux

Annals of Otology, Rhinology & Laryngology
2022, Vol. 131(6) 662-670

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Grace E. Snow, MD[1*], Mohamad Dbouk, MD[2*], Lee M. Akst, MD[1], Glenn Ihde, MD[3], Rasa Zarnegar, MD[4], Peter Janu, MD[5], Michael Murray, MD[6], Hany Eskarous, MD[7], Amit Sohagia, MD[7], Shumon I. Dhar, MD[1], and Marcia Irene Canto, MD, MHS[8]

Abstract

Objective: Patients with laryngopharyngeal reflux (LPR) symptoms may not respond to proton pump inhibitors (PPI) if they have an alternative laryngeal diagnosis or high-volume reflux. Transoral incisionless fundoplication (TIF) or TIF with concomitant hiatal hernia repair (cTIF) are effective in decreasing symptoms of gastroesophageal reflux disease (GERD) but are not well studied in patients with LPR symptoms. This prospective multicenter study assessed the patient-reported and clinical outcomes after TIF/cTIF in patients with LPR symptoms and proven GERD.

Methods: Patients with refractory LPR symptoms (reflux symptom index [RSI] > 13) and with erosive esophagitis, Barrett's esophagus, and/or pathologic acid reflux by distal esophageal pH testing were evaluated before and after a minimum of 6 months after TIF/cTIF. The primary outcome was normalization of RSI. Secondary outcomes were >50% improvement in GERD-Health-Related Quality of Life (GERD-HRQL), normalization of esophageal acid exposure time, discontinuation of PPI, and patient satisfaction.

Results: Forty-nine patients had TIF (n = 26) or cTIF (n = 23) with at least 6 months follow-up. Mean pre- and post TIF/cTIF RSI were 23.6 and 5.9 (mean difference: 17.7, $P < .001$). Post TIF/cTIF, 90% of patients had improved GERD-HQRL score, 85% normalized RSI, 75% normalized esophageal acid exposure time, and 80% discontinued PPI. No serious procedure-related adverse events occurred. Patient satisfaction was 4% prior to TIF/cTIF and 73% after TIF/cTIF ($P < .001$).

Conclusion: In patients with objective evidence of GERD, TIF, or cTIF are safe and effective in controlling LPR symptoms as measured by normalization of RSI and improvement in patient satisfaction after TIF/cTIF.

Level of Evidence: Level 4

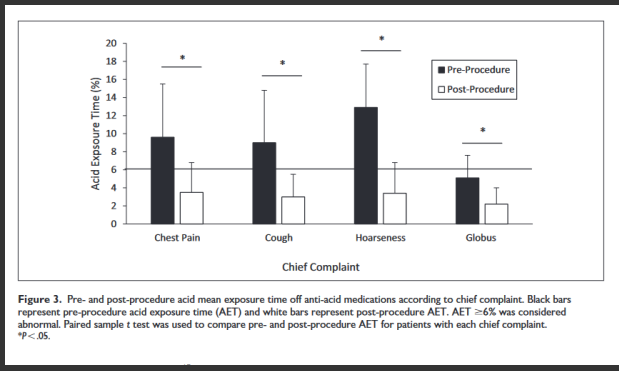
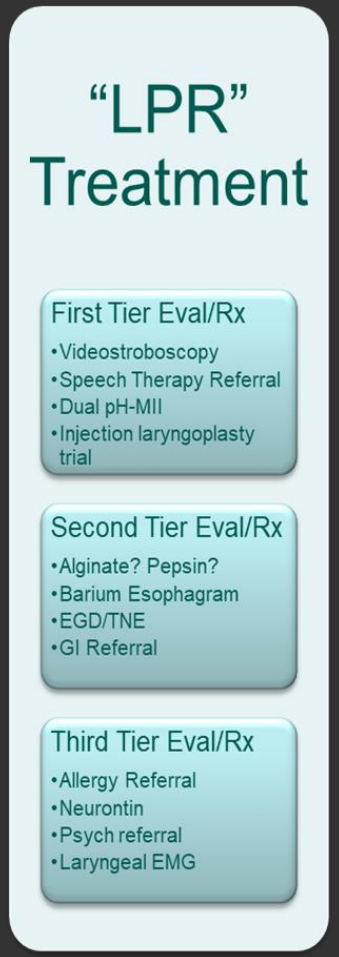


Figure 3. Pre- and post-procedure acid mean exposure time off anti-acid medications according to chief complaint. Black bars represent pre-procedure acid exposure time (AET) and white bars represent post-procedure AET. AET ≥6% was considered abnormal. Paired sample *t* test was used to compare pre- and post-procedure AET for patients with each chief complaint.
*$P < .05$.

Jonnie Bock's LPR Rx™

- First Tier
  - Most common issues if non-responsive to PPI are due to glottic closure issues
  - Address laryngeal pathology
  - Treat functional dysphonia
  - Trial of injection laryngoplasty – consider early
  - Dual pH-MII testing if strong GERD symptoms or history
- Second Tier
  - Esophagram – esophageal motility, mucosa
  - More thorough workup of possible reflux with TNE/EGD/Manometry – GI Referral?
  - Pepsin testing or alginates
- Third tier – Neurologic, allergic, psychologic
  - EMG to confirm paresis
  - Neurontin for sensory neuralgias
  - Psych referral for history of anxiety, panic disorder – ASK
  - Allergy referral/testing



Summary

- Do
  - Implement pH-Impedance testing and manometry for your patients with LPR symptoms
  - Consider surgical referrals for fundoplication for patients with LPR sxs and abnormal acid exposure
  - Consider trial of alginate suspension for non-acid LPR/atypical reflux symptoms
  - Consider other more common causes of LPR symptoms

Summary

- Do not:
  - Recommend PPI treatment without a specific endpoint
  - Utilize Bravo pH testing to assess LPR symptoms (good for GERD tho!)
  - Forget about generalized lifestyle recommendations for reflux treatment
  - Forget about glottic competence issues!