The DIP Score: Describing Your Nasal Exam

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Origin of Interest

FDA Efficacy

• Baseline decrease in symptom specific outcome scores with surgery alone
• Need: separate out an intervention in the presence of surgical treatment

Disclosure

• Consultant for IntersectENT
• Minor Stockholder

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University of California, San Francisco School of Medicine
Visual Assessments

Visual Grading Score

Post operative surgical condition

Diagnosis of Sinusitis

- History
  - Symptom specific questionnaires

- CT imaging
  - Staging scores

- Physical Examination
  - Endoscopy scores

Success = History

- How do we assess success in the treatment of sinus disease?
  - Symptom specific validated surveys
    - SNOT-22
    - RSDI
    - CSS
    - RSI
  - Global health assessment questionnaires
    - SF-36
Patient Example: SNOT-22

Long-term Utility Outcomes in Patients Undergoing Endoscopic Sinus Surgery

Luke Rudmik, MD; Jess Mace, MPH; Zachary M. Soler, MD, MSc; Timothy L. Smith, MD, MPH

Objectives/Hypothesis: To define long-term health-state utility outcomes in patients undergoing endoscopic sinus surgery (ESS) for refractory chronic rhinosinusitis (CRS).

Study Design: Prospective, longitudinal, cohort study.

Methods: The short-form (SF)-12 survey was issued to the 168 patients who were enrolled in an initial study evaluating short-term utility outcomes following ESS. SF-12 responses were converted into SF-6D utility scores using the University of Sheffield algorithm. The primary outcome was mean overall long-term utility level following ESS. Secondary outcomes evaluated annual utility level following ESS and utility outcomes for different subgroups of patients with CRS.

Results: A total of 83 patients provided long-term health-state utility outcomes. The mean overall long-term utility level was 0.80 at a mean follow-up of 5.2 years after ESS. Compared to the baseline (0.67) and short-term follow-up (0.75) utility levels in this group, there was a significant improvement at the long-term period (P = 0.002). A total of 54% (45/83) of patients achieved long-term postoperative utility scores higher than the United States norm of 0.81. There was a significant improvement in utility scores for all subsequent years after ESS compared to preoperative responses (all P < 0.028). All subgroups of CRS received significant long-term utility improvements (all P < 0.001), and those undergoing revision ESS demonstrated continued improvement past the short-term postoperative period.

Conclusions: This study has demonstrated that patients with refractory CRS achieve stable mean long-term utility levels following ESS and often return to a health state comparable to US population norms.

Key Words: Utility, quality of life, chronic rhinosinusitis, sinusitis, endoscopic sinus surgery.

Level of Evidence: 2b.
Imaging Assessments

• Lund-Mackay (recommended by AAO/HNS)
  – 0-2 scale
  – Left and Right separated
  – Regional Assessment
    • Anterior ethmoid
    • Posterior ethmoid
    • Maxillary
    • Frontal
    • Sphenoid
    • OMC (0,2)
  – Zinreich modification- volume quantification

Zinreich Imaging Modification: Volume

Annals, May, 2004

• 0 = 0% volume opacification
• 5 = 100% volume opacification

• 1 = 1-25%
• 2 = 26-50%
• 3 = 51-75%
• 4 = 76-99%

Lund-Mackay 2, Zinreich 5
(Right Maxillary Sinus)
• **Staging Systems**  
  - Lund  
  - Kennedy  
  - Harvard  

**Objective and Subjective Outcomes in Surgery for Chronic Sinusitis**  
Kennedy, Wright, Goldberg, Laryngoscope; March, 2009;110, S94, p. 29-31

- Symptom improvement in rhinosinusitis does not correlate with endoscopic resolution of mucosal abnormalities or preoperative CT stage. Conversely, endoscopic resolution of disease at 18 months after surgery correlated with the absence of the need for further surgery.

- There is strong evidence that endoscopic examination of the sinonasal cavity postoperatively provides prognostic information concerning the potential for subsequent development of symptomatic chronic sinusitis. This information is independent of the subjective reporting of symptoms by patients at 18-month follow-up. Therefore, in addition to the subjective survey of patient symptoms, it is recommended that nasal endoscopy be included in outcomes studies of chronic sinusitis as a direct, easily available, and predictive measure following surgery.

- Although implied by the study, further evaluation of patients with chronic sinusitis is warranted to determine whether aggressive treatment of mucosal changes in the early (18-month) postoperative period, before the development of overt symptoms, may avert the need for subsequent revision surgical intervention and otherwise have an impact on treatment outcome.
Tools for Endoscopic Evaluation

- Lund-Kennedy Endoscopic Score (LKES)
  - Oto/HNS Supplement, 1997, S39
  - Annals, 1995
  - Score left and right
  - 0,1,2

- Polyp
- Edema
- Discharge
- Scarring
- Crusting

LKES

**LUND-KENNEDY ENDOSCOPY SCORE**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>R</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyp</td>
<td>Polyp (0 = none, 1 = confined to middle meatus, 2 = beyond middle meatus)</td>
<td></td>
</tr>
<tr>
<td>Discharge</td>
<td>Discharge (0 = none, 1 = clear and thin, 2 = thick and purulent)</td>
<td></td>
</tr>
<tr>
<td>Edema</td>
<td>Edema</td>
<td></td>
</tr>
<tr>
<td>Scarring</td>
<td>Scarring (0 = absent, 1 = mild, 2 = severe)</td>
<td></td>
</tr>
<tr>
<td>Crusting</td>
<td>Crusting</td>
<td></td>
</tr>
<tr>
<td><strong>Total Points</strong> =</td>
<td></td>
<td></td>
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</table>

POSE


“In comparing the two endoscopic scales, the POSE and LKES correlated highly (R > 0.70; P < .001) both in terms of absolute score and change in score. There is some evidence that the POSE score may be more sensitive to change than the LKES, and the POSE scores did correlate more strongly with symptom scores than the LKES, although both endoscopic scores correlated only weakly with symptom scores.”
Endoscopy Evaluation is Important!

Need:
- Simple
- Intuitive
- Valid
- Applicable
  - Pre Surgery
  - Post Surgery

The DIP Score!

DIP Score
0-10

- Discharge
- Inflammation
- Polyp
- Crusting
- Turbinate position
- Scarring
- Frontal Sinus
- Sphenoid Sinus

Methods

- Retrospective cohort study
- Population
  - 29 subjects who underwent FESS
- Inclusion criteria
  - Age > 18
  - History of CRS with or without polyposis for which bilateral or unilateral FESS was performed
  - Post-operative video of endoscopy
  - SNOT-20
Methods

- De-identified videos (48 total)
- Comparison to existing scores and SNOT-20
  - 3 rhinologists graded each endoscopy video, blinded, using LKES, POSE, DIP
  - Pearson correlation coefficients calculated
- Inter-rater reliability
  - Intra-class correlation coefficient (ICC) calculated for LKES, POSE, and DIP
- Test-retest reliability

DIP correlates to POSE and LKES

Results: Correlations Between Scores

<table>
<thead>
<tr>
<th></th>
<th>LKES</th>
<th>POSE</th>
<th>DIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNOT-20</td>
<td>0.17</td>
<td>0.22</td>
<td>0.24</td>
</tr>
<tr>
<td>LKES</td>
<td>0.80 (p&lt;0.001)</td>
<td>0.78 (p&lt;0.001)</td>
<td></td>
</tr>
<tr>
<td>POSE</td>
<td>0.90 (p&lt;0.001)</td>
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</table>

LKES to DIP

POSE to DIP
Inter-rater Reliability

Test-Retest Reliability

Advantages of DIP Score

• Not limited to post-operative period
• Does not include surgical factors
  – Adhesions
  – Turbinate position
• Quick and easy
• Correlates well with score systems
• Good inter-rater and test-retest reliability

Limitations

• Does not correlate to SNOT-20
  – Nor does LKES or POSE
• Single institution study
• Did not assess content validity or ability to sense change
**Key Point**

- Endoscopy scores can easily be incorporated into your practice:
  - Discharge: 0-10
  - Inflammation: 0-10
  - Polyp: 0-10
- Endoscopy scores have some importance with regard to patient outcomes

**Key Point = KISS Principle**

- SNOT-22
- Lund-MacKay
- DIP

If you incorporate these measures into your practice, you will have a state of the art practice!

If you have an electronic medical record, it is simpler than ever!

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**Scope of the Problem: Sinusitis**

- 16% of Adults in the U.S.A.
  - 17% U.K.
  - 13.5% Canada
- 4.8 missed days of work/year
- $1539 per patient per year
- Annual per patient medication cost: $1200
- 250,000 ethmoidectomies/year
**Study Design**

- **8 patients with CRS with Nasal Polyps**
  - Undergo FESS with recurrence/persistence

- **Pre-treatment Data**
  - SNOT 20
  - POSE
    - Peri-operative sinus endoscopy score
    - Synechia category deleted
  - VAS

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**Carboxymethylcellulose and Triamcinolone**


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**Limitations**

- Subjective nature of endoscopic scoring as an endpoint
  - Validated scoring scales
- CMC foam itself may be so beneficial that adding steroid to it will not elevate its effect beyond using it as designed
  - Clinical impression is otherwise
  - If this is so, then it is helpful to know that we should not utilize the product in this way
Causes of FESS Failure

• Recurrent inflammation
• Recurrent polyps
• Adhesion/synechia formation
• Middle turbinate lateralization
• Stenosis of surgically created ostia

Bioabsorbable Steroid-Eluting Stent Device

• Stent
  – Spring-like design
  – Polylactide-co-glycolide
• Mometasone Furoate
  – Gradually released over approximately 30 days
  – 370 micrograms
  – FDA approved spray
  • 100 micrograms/day
  • 200 micrograms/day
• Polyps

Example of Stent Placement

Efficacy Assessment

• Inflammation graded on 10 cm VAS
• Middle Turbinate Position
  – 4 point scale
  1. Medialized
  2. Normal
  3. Partially lateralized
  4. Lateralized
• Adhesion Formation
  – 5 point scale
  1. None
  2. Small/non obstructing
  3. Obstructing/easily separated
  4. Dense/obstructing/difficult to separate
  5. Severe complete adhesion of MT to LNW
• Polypoid Mucosal Change
  – 5 point scale (Meltzer/Hamilos)
Efficacy Assessment Form

<table>
<thead>
<tr>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inflammation</strong> (0-10)</td>
<td>0</td>
</tr>
<tr>
<td><strong>P箪iopoid Change</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Middle Turbinate Position</strong></td>
<td>Mediastinal</td>
</tr>
<tr>
<td><strong>Adhesions / Synchiae</strong></td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>

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Figure 3. Representative endoscopic grading form. NM = middle meatus. Inflammation VAS (not to scale in figure) is anchored as 0 = none and 10 = severe, involving significant erythema and edema and/or hypertrophy and/or polypoid change. Polypoid change is graded as 0 = none, +1 = small amount of nasal polype (NP) confined to NM, +2 = multiple N箪s confined to NM, +3 = NP extending beyond NM and +4 = NP completely obstructing nasal cavity. Adhesions are graded as None, Small but non-obstructing, Obstructing but easily separated, Dense and obstructing and separation is difficult. Severe with complete adhesion of the middle turbinate to lateral nasal wall.