Inferior Meatus Maxillary Antrostomy: Time to Revisit a Previously Abandoned Surgical Technique?

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Abstract

Background: A small subset of patients have dysfunctional maxillary sinus mucosa. These patients require more aggressive surgical treatment to allow for gravity dependent mucous drainage, intra-operative and office debridements, and the delivery of irrigations and topical treatments. The aim of this study is to examine the use of inferior meatus maxillary antrostomy (IMMA) in combination with traditional maxillary antrostomy, in this challenging patient population.
Methods: We performed a retrospective study from February, 2008 until April, 2014 with a 118 patients undergoing a total of 128 IMMA procedures. Data was gathered regarding patient demographic, prior therapy, post-operative medical therapy, IMMA patency, SNOT-22 scores, Lund Mackay score, and the presence of disease recurrence.
Results: 118 patients (mean age 53) underwent 128 IMMA procedures. The mean length of follow-up was 1.6 years, and 66 % of patients had previous sinus surgery. 62 operations were for recalcitrant maxillary sinus disease, 36 for recalcitrant polyp disease, 6 for maxillary fungal disease, 4 for mucosal disease and 20 for odontogenic infections. 49 patients completed both pre and post-operative SNOT-22 scores, and the mean scores were 39 and 21, respectively. At 3 months post-operatively, we found that patients undergoing revision surgery and patients with nasal polyposis had the greatest SNOT-22 improvement. Males had 64% less SNOT-22 improvement compared to women at 3 months post operatively. In addition, 18% of patients did not experience any symptomatic improvement at 3 months post-operatively. With regards to post-operative medical therapy, men were more likely to have been prescribed steroid irrigations and antibiotics. Patients with fungal sinusitis had the greatest need for post-operative steroids. In addition, increased age correlated to fewer post-operative steroid courses. Out of 202 total inferior windows, 197 were patent post-operatively. There were 9 patients requiring revision surgery for maxillary sinus disease following IMMA, and patients requiring revision had the poorest outcomes.
Conclusion: Inferior meatal windows prove to be efficacious in patients with mucocillaray dysfunction without disrupting the normal mucociliary flow pattern. The inferior turbinate is also preserved, which may be a less destructive alternative to a mega antrostomies. We have determined that IMMA is a safe and successful procedure for chronic maxillary sinus pathology.

Materials and Methods

With IRB approval, we performed a retrospective chart review of a subset of patients who underwent IMMA for chronically dysfunctional maxillary mucosa from February, 2008 to April, 2014.

- **Data collection:** diagnosis, comorbidities, age, previous sinus surgery, SNOT-22 scores, length of follow-up, post-operative complications, patency of pre and post-operative CT scans, pre operative Lund-Mackay score, and post-operative medical therapy.
- **Postoperative success:** patency of the inferior window, SNOT-22 improvement, and requirement of revision surgery for irresolvable maxillary sinus disease.
- **Patient diagnoses:** recalcitrant CRS with or without nasal polyposis, maxillary fungal disease, mucosal disease, or odontogenic infection.
- **Exclusions:** patients with inverted papilloma or other oncogenic condition.

Table 1. Demographics	
Patients in study	118
Male	69
Female	49
Age, mean ± SD	52.7 ± 13.8
Follow-up (years), mean ± SD	1.6 ± 1.5
Previous sinus surgery, % (No)	66 (78/118)
Total Inferior windows	233
Bilateral procedures	105
Unilateral procedures	23

Table 1. Patient demographics are shown, in addition to the total number of inferior windows created in a total of 128 procedures.

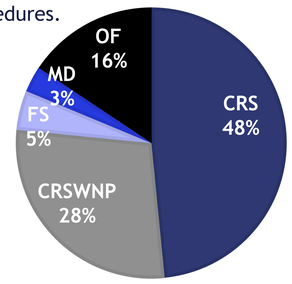

Figure 1. Patient Diagnoses. 118 patients underwent 128 IMMA procedures: 62/128 operations were for CRS (maxillary chronic rhinosinusitis), 36/128 for CRSWNP (CRS with nasal polyposis), 6/128 for FS (fungal sinusitis), 4/128 for MD (mucosal disease), and 20/128 for OF (oroantral fistula).

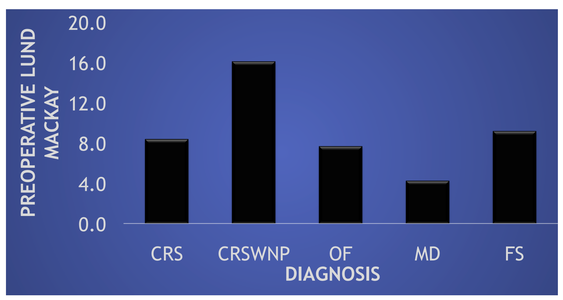

Figure 2. Pre-operative Lund-Mackay scores. Scans were scored with Lund-Mackay scoring system. The average score for the entire population was 10.4 ± 6.7.

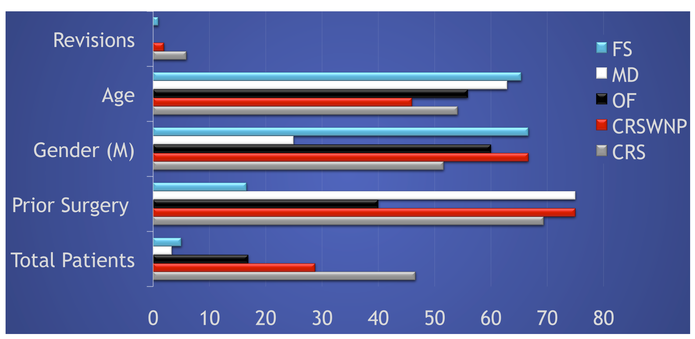

Figure 3. Patient demographics by diagnosis. Total patients with each diagnosis are shown as a percent of the total population of 118 patients. Gender and prior surgery are represented as a percent of patients with a specific diagnosis.

Results

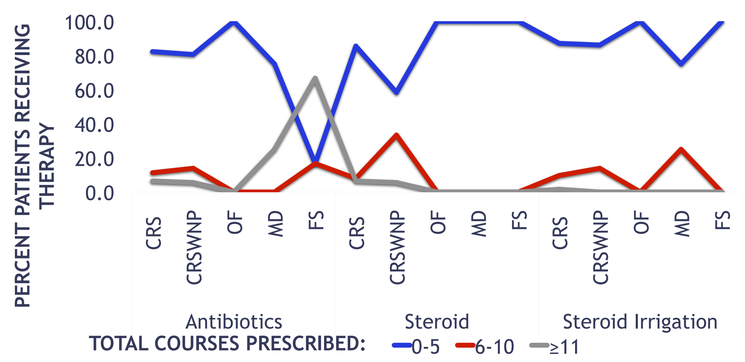

Figure 4. Post-operative medical therapy. The total number of antibiotic, steroid and steroid irrigation courses prescribed were tracked for each patient post-operatively. Data is reported as percent of patients per diagnosis receiving between 0-5, 6-10, or ≥ 11 courses. Patients with oroantral fistulas (OF) received fewer courses of antibiotics, steroids, and steroid irrigations ($p < 0.001$). On 16 of 128 occasions, patients required no post-operative medical therapy.

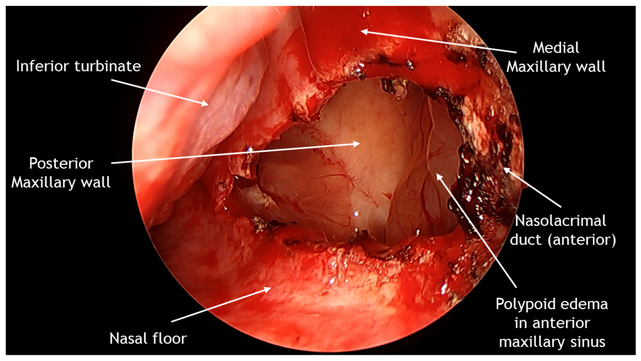

Figure 5. Endoscopic view of inferior window. Out of 202 individual inferior windows, 197 were patent post-operatively (97.5%) (Table 2). Of the 118 patients, 9 patients (7.6 %) required recurrent surgery for maxillary sinus disease following IMMA, and 108 patients had postoperative clinical resolution. The average time to revision was 18 months, ranging from 5 months to 50 months (Table 2). Age, gender, diagnosis and previous sinus surgery had no statistically significant impact on likelihood of revision.

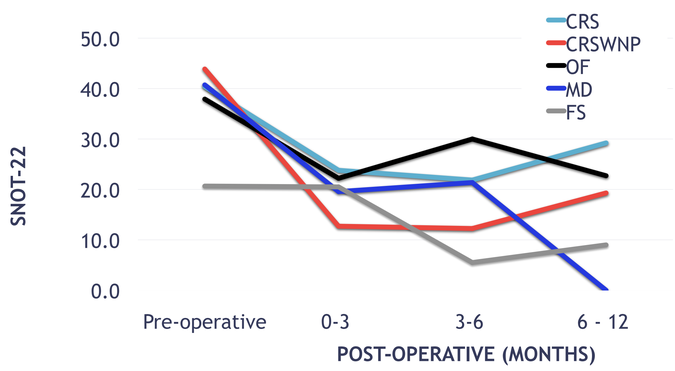

Figure 6. SNOT-22 scores. Patient outcomes were measured with the SNOT-22 score for a total of 49 patients who completed both pre and post-operative SNOT-22 scores. Post-operative SNOT-22 scores were measured between 0-3 months, 3-6 months, and 6-12 months follow-up.

Table 2. Data Analysis			
SNOT-22	**Estimate**	**Significance**	**CI**
Prior surgery	2.13	$p < 0.001$	1.663, 2.760
Age	0.98	$p < 0.001$	0.965, 0.988
Oroantral fistula	0.29	$p < 0.001$	0.143, 0.516
CRS with nasal polyposis	0.43	$p < 0.001$	0.325, 0.553
SNOT-22 3 month F/U	**Estimate**	**Significance**	**CI**
Age	1.01	$p < 0.001$	1.005, 1.016
Gender (M)	0.64	$p < 0.001$	0.567, 0.721
Oroantral fistula	0.60	$p = 0.003$	0.426, 0.838
CRS with nasal polyposis	0.79	$p = 0.001$	0.690, 0.914
Fungal sinusitis	0.08	$p < 0.001$	0.044, 0.155
Prior surgery	0.77	$p < 0.001$	0.672, 0.884
Antibiotics	**Estimate**	**Significance**	**CI**
Oroantral fistula	0.17	$p < 0.001$	0.092, 0.307
Gender (M)	2.45	$p = 0.045$	1.019, 5.867
Steroids	**Estimate**	**Significance**	**CI**
Age	0.98	$p < 0.001$	0.976, 0.991
Oroantral fistula	0.10	$p < 0.001$	0.046, 0.217
Fungal sinusitis	26.10	$p = 0.004$	2.853, 249.789
Steroid Irrigation	**Estimate**	**Significance**	**CI**
Gender	1.39	$p = 0.022$	1.048, 1.844
Age	1.06	$p = 0.004$	1.020, 1.111
Prior surgery	0.35	$p = 0.049$	0.126, 0.994
Oroantral fistula	0.20	$p < 0.001$	0.090, 0.436
Mucosal disease	2.02	$p = 0.037$	1.044, 3.926

Table 2. Poisson regression and zero-inflation Poisson regression were used to analyze the data. Statistical significance was considered at $p < 0.05$. CI - confidence interval.

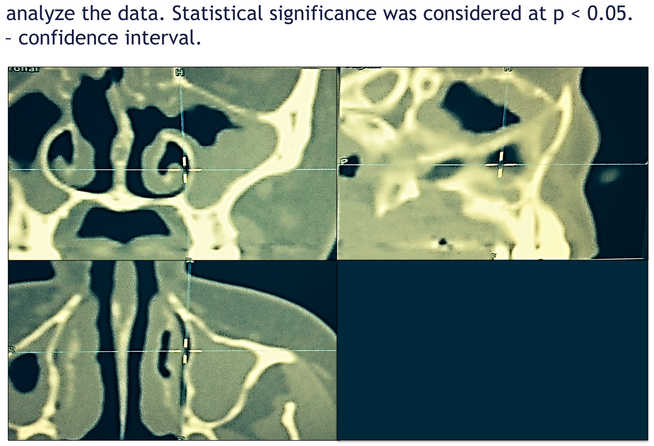

Figure 7. Intraoperative navigation with a the cross hairs depicting the location of the inferior window

Table 3. Outcome measures	
SNOT-22 data (n=49)	
Pre-operative SNOT-22, mean ± SD	39 ± 22
Post-operative SNOT-22, mean ± SD	20 ± 19
Revision rate, % (No)	7.6 % (9/118)
Chronic rhinosinutis (CRS)	6/9
CRS with nasal polyposis	2/9
Fungal sinusitis	1/9
Post-operative inferior window patency, % (No)	97.5% (197/202)
Average time to revision, months ± SD	18 ± 14

Table 3. SNOT-22, revision rate and post-operative inferior window patency were our primary outcome measures. In addition we calculated average time to revision for the 9 patients requiting a revision surgery.

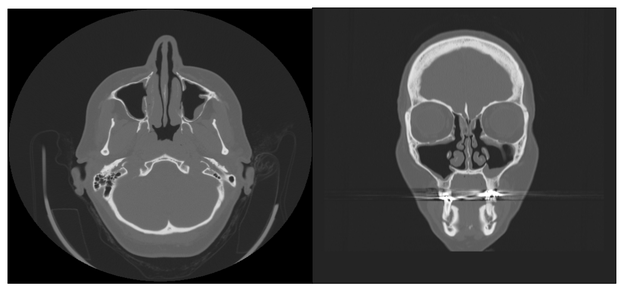

Figure 8. Post-operative sinus CT scans.

Acknowledgements

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