

Electrogastrography based classification of functional antro-pyloric dysfunction predicts clinical response to pyloric therapies

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INTRODUCTION

Gastroparesis greatly impairs quality of life. Patient stratification towards tailor-made treatment is of utmost interest currently.

This study was done to analyse the clinical and Gastric myoelectrical activity based AI derived threshold (GMAT) scores reversal for the subtype of gastroparesis with functional antro-pyloric dysfunction (FAPD) on electrogastrography (EGG), after G-POEM, pyloric balloon dilatation or intrapyloric botulinum toxin injection. These therapies reduce pyloric spasm and reduce the pyloric pressure gradient which improve food passage and relieve symptoms.

In a study by Noar et al, the subset of gastroparesis with 3 cpm and GMAT scores above 0.59 responded to pyloric balloon dilation.¹ In another study, a similar patient selection approach was used to select patients who would benefit from laparoscopic pyloroplasty.²

AIM

To study the clinical and GMAT scores reversal for the EGG based subtype of gastroparesis with FAPD.

METHOD

This was a prospective non-randomized study. Patients with complaints of post prandial distress syndrome with EGG showing FAPD were chosen. After informed consent was taken, the patients underwent either G-POEM, pyloric balloon dilation (20 mm CRE balloon dilated twice for 1 minute each) or botulinum toxin injection (10-40 U into each quadrant of pylorus).

The ANMS GCSI-DD and LDQ score was taken before and 6 months after the procedure. EGG was repeated 6 months post procedure.

RESULTS

Among 47 patients (Balloon- 40, G-POEM- 7, Botox+G-POEM=1), GMAT scores significantly declined from 4.67±3.25 to 0.67±3.99 (p<0.001). GCSI-DD scores improved from 6.67±1.9 to 1.53±2.09 and LDQ scores from 9.92±6.40 to 3.07±4.79 (both p<0.0001). Symptoms such as nausea, early satiety, vomiting, and heartburn showed significant improvement.

Balloon therapy yielded the most consistent GMAT reduction (p=0.0001, d=1.044), while G-POEM showed a non-significant but large effect (p=0.0678, d=0.948).

Retrospective analysis showed greater response in Normal and Hypernormal subtypes.

Table 1- Patient Demographics

Basic Details	Mean ± SD	Median (IQR)	Min-Max	OR	N (%)
Age (Years)	36.37 ± 17.08	33.00 (21.25-47.00)	18.00 - 70.00		
Male		28 (60.9%)			
Female		18 (39.1%)			
Diabetes (Yes)		9 (19.6%)			
Duration Of Symptoms (Months)	21.00 ± 39.78	12.00 (4.00-12.00)	3.00 - 240.00		

Classification and GMAT score on EGG alone without gastric emptying study could be a predictor of clinical and EGG response of pyloric-directed therapies (Pyloric balloon dilation and G-POEM) in functional antro-pyloric dysfunction.

Patients experienced marked reductions in symptom severity post-therapy, as reflected in both the GCSI-DD (from 6.67 ± 1.9 to 1.53 ± 2.09) and LDQ (from 9.92 ± 6.40 to 3.07 ± 4.79) scores (p < 0.0001 for both).

A statistically significant decrease in total normogastric power post-therapy (p = 0.0003, Cohen's d = 0.747) was observed, suggesting decompression of the stomach and reduced outflow resistance.

GMAT scores significantly declined from 4.67±3.25 to 0.67 ± 3.99 (p < 0.001).

RESULTS

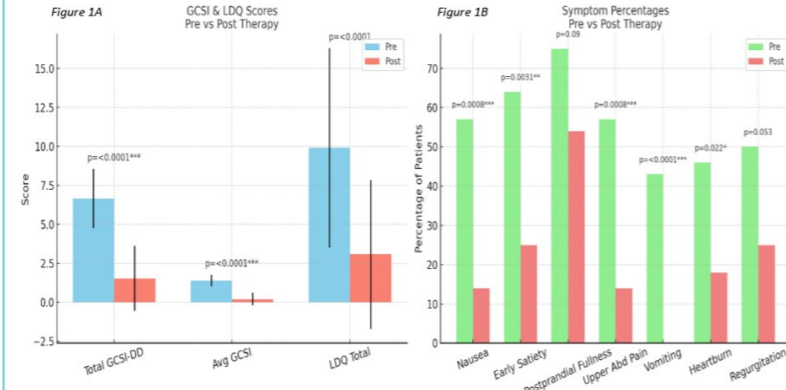
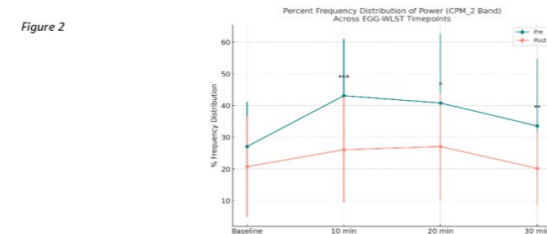


Figure 1A : Pre- and Post-therapy scores for Total GCSI-DD (Gastroparesis Cardinal Symptom Index – Daily Diary), Avg GCSI, and Total LDQ (Leeds Dyspepsia Questionnaire)- All statistically significant.

Figure 1B : Significant reductions were observed in upper gastrointestinal symptoms post therapy



Percent Frequency Distribution (cpm_2 i.e. normogastric range 2.5 - 3.75cpm) – Pre vs Post

Figure 2 Line plot showing median IQR ± SD of percent frequency distribution of power (normogastric 2.5 - 3.75cpm) across baseline and post-WLST timepoints. Post-therapy values show a significant decrease at 10, 20, and 30 minutes, indicating reduced gastric outflow resistance and normalization of myoelectrical activity. Asterisks denote statistical significance: *p<0.05, **p<0.01, ***p<0.001.

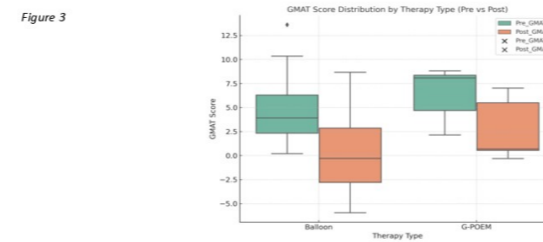


Figure 3: Box plot showing GMAT scores before and after therapy across treatment types. Balloon shows strong GMAT reduction (p = 0.0001, Cohen's d = 1.044); G-POEM shows a large effect (Cohen's d = 0.948).

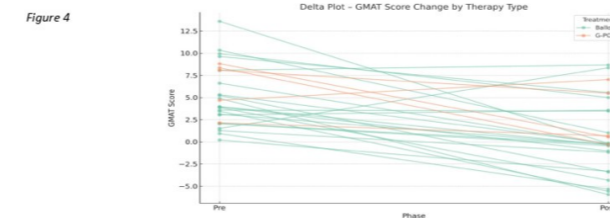


Figure 4: Delta plot depicting individual patient trajectories of GMAT score change by treatment type. Most patients show a decrease in GMAT post-therapy.

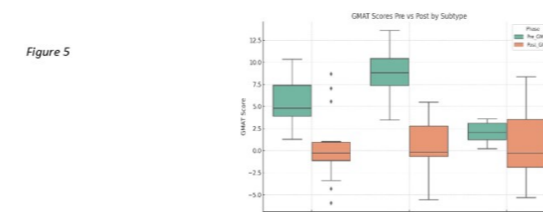


Figure 5: GMAT score changes pre- and post-therapy. Significant reductions were observed in the Hypernormal (p = 0.0014, Cohen's d = 2.120) and Normal (p = 0.0005, d = 1.231) groups, indicating robust therapeutic response. The Hypo-normal group showed minimal change (p = 0.4744, d = 0.288), suggesting limited reversibility possibly due to underlying neuromuscular impairment or irreversible ICC dysfunction.

CONCLUSION

Classification and GMAT score on EGG alone without gastric emptying study could be a predictor of clinical and EGG response of pyloric-directed therapies in functional antro-pyloric dysfunction.

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