Are Coronal Height and the DeMeester Score Correlated to Surface Area of Hiatal Hernia Defect? A Prospective Analysis

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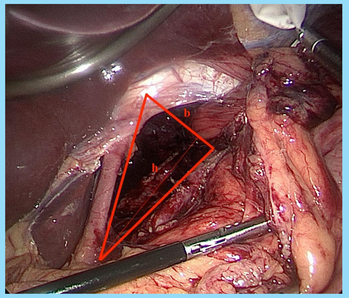
Background

The relationship between the presence of a hiatal hernia and gastroesophageal reflux disease (GERD) is complex. The presence of a hiatal hernia is commonly associated with symptomatic GERD. However, completing the preoperative workup for hiatal hernia repair varies based on the presenting symptoms.

Objective

To assess if any association exists between esophageal hiatal defect surface area (HSA), pre-operative coronal height (CHt) of hiatal hernia, and pre-operative DeMeester (DM) score in individuals diagnosed with GERD and hiatal hernia.

Novel Measurements



Esophageal HSA was measured through a method we developed that superimposes the esophageal hiatus defect to the area of a right-angle triangle: Area = (1/2) Base*Height.

Intraoperative scheme of esophageal hiatus surface area defect measurement. *b* represents the length of the defect perpendicular to the left sling of the right crus and tangential to the esophagus. *h* represents the length of the left sling of the crus from the crux of the crura to the esophagus.

Methods

Single institution prospective cohort study that recruited patients from January 2019 to February 2024

Inclusion Criteria:

- Diagnosis of GERD
- Any type of hiatal hernia
- Underwent laparoscopic hiatal hernia repair

Workup:

- pH-metry
- Maximal coronal height based on radiologic or endoscopic evidence
- Esophageal HSA

Descriptive statistics, Spearman correlation, and multivariate linear regression were performed

Results

Esophageal Hiatal HSA	
Median Hiatal HSA (cm^2)	4.5 cm^2 (3.5 – 7.0 cm^2)

		Hiatal Surface Area as Continuous		Hiatal Surface Area as Category						
Feature	Overall	Spearman Corr	p-value	<2.5cm2	2.5-3 cm2	3.1-5 cm2	5.1-7 cm2	7.1-9 cm2	9.1+ cm2	p-value
N	211 (100%)			16 (8%)	31 (15%)	67 (32%)	46 (22%)	34 (17%)	17 (8%)	
Age	61 ± 14	0.38	< 0.001	52 ± 16	58 ± 14	59 ± 13	62 ± 13	68 ± 12	71 ± 7	< 0.001
Gender (Male)	49 (23%)		0.60	5 (31%)	7 (24%)	14 (21%)	13 (28%)	3 (9%)	7 (41%)	0.11
Weight	175 ± 35	-0.03	0.71	176 ± 48	174 ± 31	178 ± 34	176 ± 35	169 ± 33	178 ± 39	0.62
BMI	28.7 ± 4.5	-0.04	0.52	27.7 ± 4.8	29.3 ± 3.8	29.1 ± 4.2	28.5 ± 4.7	28.2 ± 5.1	28.2 ± 5.3	0.50
Demeester Score	47 ± 23	0.06	0.69	51 ± 25	45 ± 22	42 ± 21	60 ± 27	57 ± 21	41 (n=1)	0.71
Pre-operative Imaging	100 (47%)		0.45	9 (56%)	14 (45%)	33 (49%)	23 (50%)	11 (32%)	10 (59%)	0.45
Coronal Height	6.2 ± 3.2	0.51	***< 0.001***	4.1 ± 2.6	4.7 ± 2.1	5.0 ± 3.1	7.6 ± 2.9	8.5 ± 2.7	7.9 ± 2.6	***< 0.001***
Pre-Operative HQRL Score	21 ± 12	-0.15	0.095	22 ± 9	23 ± 12	23 ± 11	19 ± 13	17 ± 13	23 ± 9	0.26
Change in HQRL Score	17 ± 12	-0.24	***0.011***	19 ± 8	22 ± 12	19 ± 12	13 ± 14	13 ± 14	17 ± 8	0.055

Results

Cohort of patients with HSA, Coronal Height and DeMeester score (n=45)		p-value
Median HSA	3.8 [IQR 3.0 – 4.5]	
Median Coronal Height	3.0 [2.2 – 5.0]	
Median DeMeester Score	48 [32 – 59]	
Spearman Correlation (HSA & DM)	0.06 (-0.23, 0.33)	0.69
Spearman Correlation (CHt & DM)	0.20 (-0.10, 0.47	0.19

	Estimate	Std. Error	p-value
Linear Regression (HSA, CHt, &DM)			
DM ∝ HSA	0.13	1.03	0.90
DM ∝ CHt	1.75	1.80	0.34
Adjusted R^2	0.02		0.63

Conclusions

- ❖ No significant correlation was found between HSA, DeMeester score, and coronal height
- ❖ Larger HSA was associated with a worse GERD-HQRL score

Future Steps

Our study did not measure DeMeester score in patients with larger hiatal hernias due to presenting preoperative symptomatology and workup. We are currently accruing data to measure DeMeester scores in patients with larger coronal heights to determine correlation.