ORIGINAL RESEARCH PAPER

Gastroenterology

KEY WORDS: High Resolution Esophageal Manometry, Achalasia Cardia, Refractory Gerd, Ineffective Esophageal Motility

ESOPHAGEAL MANOMETRY PROFILE IN PATIENTS OF UPPER GASTROINTESTINAL SYMPTOMS IN WESTERN INDIA: A RETROSPECTIVE COHORT STUDY

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ABSTRACT

INTRODUCTION: High-resolution esophageal manometry (HREM) is a technique to determine the pressure pattern which is a function of esophageal musculature and integrity of LES. The indications for HREM evaluation include evaluation of nonobstructive dysphagia, symptoms of regurgitation and noncardiac or atypical chest pain unexplained by endoscopic evaluation **AIM:** To analyse profile of esophageal motility disorders in patient presenting with refractory gastroesophageal reflux disease (GERD), dysphagia and atypical chest pain in tertiary care centre in Western India **METHODS:** We enrolled patient presented with refractory GERD, dysphagia and atypical chest pain from Jan 2020 to March 2022 at Department of gastroenterology, National Institute of Medical College & R, Jaipur. Upper GI endoscopy and high-resolution esophageal manometry was done in all patients **RESULTS:** Ineffective esophageal peristalsis, achalasia cardia, hypercontractile esophagus, fragmented peristalsis and esophagogastric junction outflow obstruction were common diagnosis made by high resolution esophageal manometry **Conclusion:** In our study ineffective esophageal motility most common and achalasia cardia second most common diagnosis identified on esophageal manometry

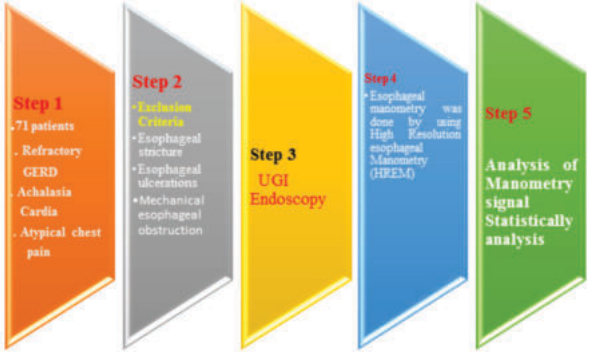
INTRODUCTION:

High-resolution esophageal manometry (HREM) is a technique to determine the pressure pattern which is a function of esophageal musculature and integrity of LES. Esophageal manometry assesses the motility by measuring the amplitude of the contractile events within the esophagus1,2. The Chicago Classification is used to categorized esophageal motility disorders by using metrics from esophageal high-resolution manometry (HRM) Chicago classification version 4.0 (CCV4.0) provides the current updated criteria for diagnosis and classification of esophageal motor disorders3. The Chicago Classification categorizes esophageal motility disorders via an algorithmic scheme using metrics from esophageal high-resolution manometry (HRM) disorders. The indications for HREM evaluation include evaluation of nonobstructive dysphagia, symptoms of regurgitation and noncardiac or atypical chest pain unexplained by endoscopic evaluation4

The aim of this study is to analyse profile of esophageal motility disorders in patient presenting with refractory gastroesophageal reflux disease (GERD), Dysphagia and atypical chest pain in tertiary care centre in Western India

MATERIALS & METHODS:

Figure Flow chart of study



We enrolled patient presented with refractory GERD, dysphagia and atypical chest pain from Jan 2020 to March 2022 at Department of gastroenterology, National Institute of Medical College & R, Jaipur (Fig 1). Patients with history of esophageal stricture, esophageal ulcerations and mechanical esophageal obstructions were excluded from study. This study was approved by the Institutional Ethical Committee-National Institute of Medical Science and Research (IEC-No NIMSUNI/IEC219/22) and informed consent was taken. Baseline characteristics, relevant clinical and laboratory data was taken from all patients. All patients underwent upper GI endoscopy either in the study Centre or elsewhere. HRM was done by using standard high-resolution esophageal manometry

High Resolution Esophageal Manometry Procedure (HRAM):

In present study we used water perfused manometry system (The Royal Melbourne Hospital high resolution manometry & 16 channel water perfusions system) in which HRAM system contains a manometry catheter which is connected to series of pressure transducer. Catheter with the lower 8 sensors placed 1 cm apart and the rest at 3 cm apart, covering a total length of 31 cm length was used. This was water perfused at 0.15 mL/minute/channel using the AMS system.

Esophageal pressure is converted to electrical signals, data usually presented as spatiotemporal esophageal pressure tomography which plotted against time and distance (Fig)1) .Patient fasted for at 4-6 hrs. before procedure. The study begins in supine position. After catheter placement, 60 seconds of quiet rest for adaptation, catheter position confirmed by three deep inspirations, then baseline 30 seconds was captured for anatomical landmarks and esophago-gastric junction morphology. After baseline recording ten 5ml swallow of normal temperature saline was given at least 30 seconds interwal to avoid deglutition inhibition. Patient then changed to upright position, a minimum 60seconds for adaptation and a baseline 30 seconds recording performed. Then five 5 ml wet swallow was given at 30 seconds interwal 3

Diagnostic Thresholds and Definitions:

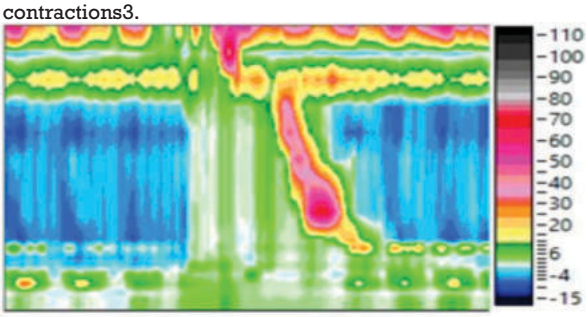
EGJ morphology on HREM is defined as follows5,6:

- **Type 1:** No separation between the LES and the crural diaphragm
- **Type 2:** Minimal separation (>1 and <2 cm) making a double-peaked pressure profile, which, however, is not indicative of a hiatus hernia
- **Type 3:** More than 2-cm separation between the LES and the crural diaphragm at inspiration so that two high-pressure zones can be clearly identified

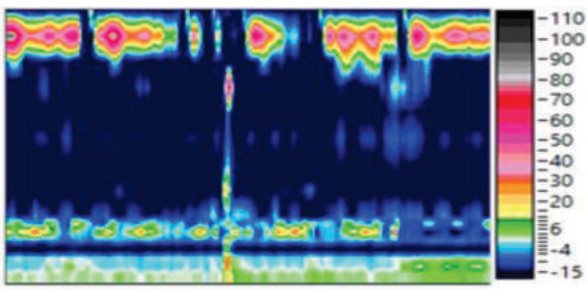
Type 3a: Respiratory inversion point distal to the LES
Type 3b: Respiratory inversion point proximal to the LES.

Median IRP threshold is 15 mm Hg in supine position is considered normal.

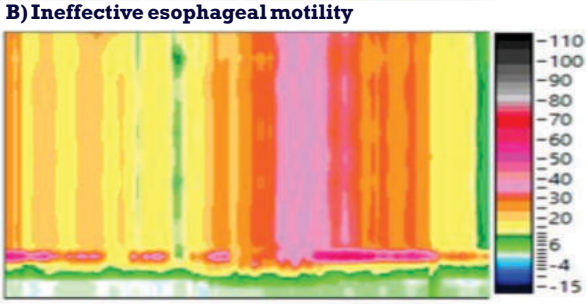
Distal contractile integral (DCI) between 450 mm Hg.s.cm to 8000 mmHg.s.cm is considered normal, DCI < 100 mmHg.s.cm indicate failed peristalsis, DCI between 100 mmHg.s.cm to 450 mmHg.s.cm indicate weak peristalsis, DCI more than 8000 mmHg.s.cm considered hypercontractile7. A distal latency less than 4.5 sec was considered as premature contractions3.



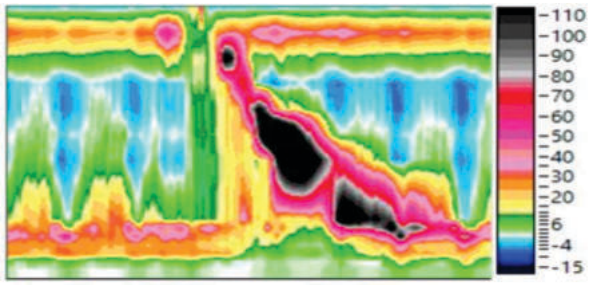
A)Normal esophageal manometry



B) Ineffective esophageal motility



C)Type III Achalasia Cardia



D) Hypercontractile exophagus

Fig 1. High resolution esophageal manometry of the representative patients. A) Normal esophageal manometry B) Ineffective esophageal manometry C) Type III Achalasia cardia D) Hypercontractile esophagus

STATISTICAL ANALYSIS:

Continuous variables were summarized using means and standard deviations for normally distributed data. The medians and inter-quartile ranges were used to describe non-nominal data. Statistical analysis was performed using SPSS version 20.0(IBM Corp, Armonk, NY, USA).

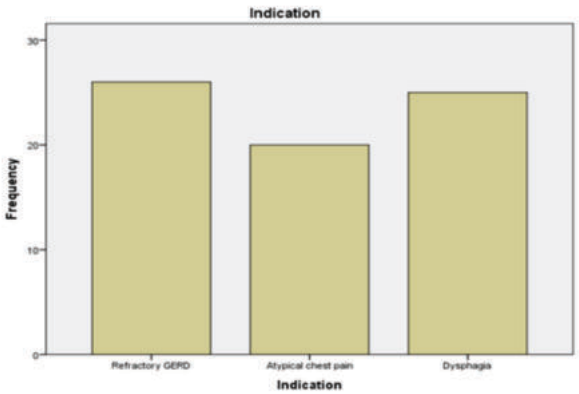
RESULTS:

A total 71 patients underwent esophageal manometry during the study period. Mean age of patients was 46.85 ± 17.6 years (range, 7-71 years). The cohort included 31 (43.7%) males and 40 (56.3%) females. Indications of esophageal manometry was refractory GERD in 26 (36.6%), dysphagia in 25 (35.2%) and atypical chest pain in 20 (28.2%) patients (Table1 & Fig 2).

Table1. Indications & endoscopic findings in study patients

Indication & Endoscopy	Patients (N=71)	Percent (%)
Refractory GERD	26	36.6
Atypical Chest Pain	20	28.2
Dysphagia	25	35.2
Normal endoscopy	46	64.8
Hiatus hernia	25	35.2

Fig 2. Different indications of esophageal manometry



Endoscopy was normal in 46 (64.8%) patients, and hiatus hernia was present in 25 (35.2%) patients. Type I EGJ morphology in 42 (59.2%) patients, Type 2 in 24 (33.8%) patients and Type 3 in 5 (7%) patients were present (Fig 3)

Fig 3. Different EGJ morphology

Esophageal manometry was normal in 28 (39.4%) patients, Ineffective esophageal peristalsis in 18 (25.4%), achalasia cardia in 11 (15.5%), EGJ outflow obstruction in 6 (8.5%), hypercontractile esophagus in 4 (5.6%), fragmented peristalsis in 4 (5.6%) patients were identified. (Table 2 & Fig 4). Type III achalasia was present in all achalasia patients

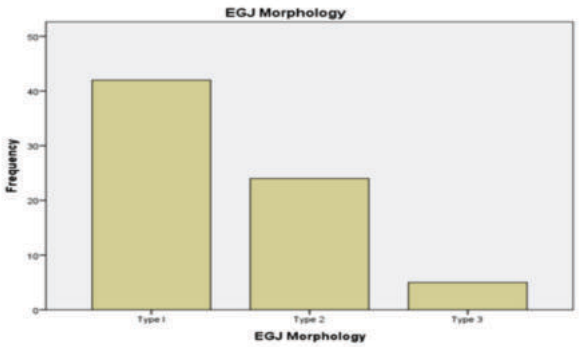


Table 2. Different diagnosis by esophageal manometry (N=71)

Diagnosis	Patients (N=71)	Percent (%)
Normal	28	39.4
Ineffective esophageal motility	18	25.4
Achalasia cardia	11	15.5
EGJ outflow obstruction	6	8.5
Hypercontractile esophagus	4	5.6
Fragmented peristalsis	4	5.6

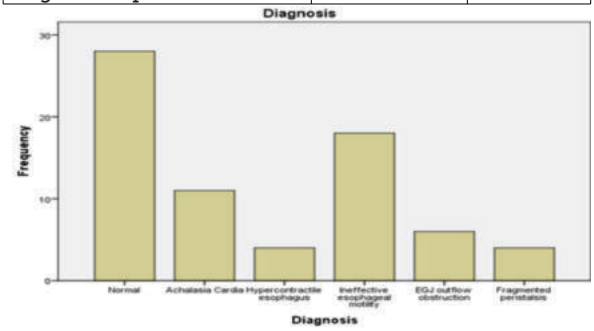


Fig 4. Different diagnosis by esophageal manometry

DISCUSSION:

This is the study to discuss manometry findings in Tertiary care centre from Western India by using high resolution topography. A total of 71 patients underwent high resolution esophageal manometry with wide range of age. Most prominent symptoms were refractory GERD followed by dysphagia and atypical chest pain was in almost equal patients. Many manometry findings were observed including ineffective motility, achalasia, absent contractility, EGJ outflow obstruction, jackhammer esophagus and normal findings.

The most common was ineffective motility followed by achalasia cardia. A study by Serrano et al. who observed in 71 patients that 45% of the patients in the study were females and 55% were males, with a mean age of 61.5± 16.2 yrs. (range 20–87 years old). Many cases presented mainly by dysphagia 85% of cases) with some patients complained of reflux (45% of cases) (n = 31), chest pain (23% of cases) (n = 13), heartburn (13% of cases) (n = 9), weight loss (6% of cases) (n = 4) and cough (4% of cases) (n = 3)8. Achalasia was described as a common symptom by Rehman et al. (35.6% of 202 patients)9and Cisternas et al. (31.2% of 426 patients)10. A study by Ray E. Closue et al. in 210 patients were referred for esophageal manometry. The major reason for referral was to evaluate the cause for chest pain (with or without heartburn) in 72 patients (34%), dysphagia (with or without chest pain or heartburn) in 91 patients (43%), and heartburn alone in 14 patients (7%). Eighteen patients (9%) were referred to clarify the presumed diagnosis of achalasia, and 15 (7%) were referred for various other reasons11.So as in other studies the common indications of esophageal motility disorders are dysphagia, reflux, atypical chest pain and refractory GERD. Most common disorders which are diagnosed by esophageal manometry are achalasia cardia, ineffective esophageal motility and hypercontractile esophagus. 12-15

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Ethics statement: The authors declare that the study was performed in a manner to conform with the Helsinki Declaration of 1975, as revised in 2000 and 2008

Conflict of interest: None

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