Published online: 2019-09-25

Original Article

Spectrum of Esophageal Motility Disorders in Patients with Motor Dysphagia and Noncardiac Chest Pain - A Single Center Experience

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Abstract

Aims and Objective: High-resolution esophageal manometry is the most important investigation for the evaluation of patients with dysphagia and noncardiac chest pain (NCCP). Chicago Classification (CC) utilizing an algorithmic approach in analyzing high-resolution manometry has been accepted worldwide, and an updated version, CC v3.0, of this classification has been developed by the International high-resolution manometry working Group in 2014. Data on the spectrum of esophageal motility disorders in Indian population are scarce as well as a newer version of CC has not been used to classify. The aim of our study is to evaluate clinical presentation and manometric profile of patients with suspected esophageal motility disorders using CC v3.0. **Methodology:** In this retrospective study, consecutive patients referred for esophageal manometry at our center from 2010 to 2015 were included in the study. High-resolution esophageal manometry was performed with 22-channel water-perfusion system (MMS, The Netherlands). Newer version of CC (CC v3.0) was used to classify motility disorders. **Results:** A total of 400 patients were included, with a mean age of 44 years and 67.5% were males. Out of these, 60% (n = 240) patients presented with motor dysphagia while 40% (n = 160) had NCCP. Motility disorder was present in 50.5% (n = 202) of the patients while 49.5% (n = 198) patients had normal manometry. Disorders of esophagogastric junction outflow were the predominant type of disorder, found in 33.75% (n = 135). About 14.25% (n = 57) of the patients had minor disorders of peristalsis while 5% (n = 20) of the patients had other major disorders of peristalsis. Achalasia was the most common motility disorder present in 30% (n = 120) patients. **Conclusion:** Dysphagia was the most common esophageal symptom followed by NCCP in our series. Achalasia was the most common esophageal motility disorder followed by fragmented peristalsis.

Keywords: *Achalasia, Chicago classification, diffuse esophageal spasm, high-resolution manometry, noncardiac chest pain*

Introduction

The high-resolution manometry (HRM) with esophageal pressure topography (EPT) characterizes both esophageal peristalsis and esophagogastric junction function.[1]

In HRM, sensors are typically spaced 1 cm apart along the length of the manometry catheter. Catheters with up to 36 sensors distributed longitudinally and radially in the esophagus allow for simultaneous pressure readings spanning both sphincters and the interposed esophagus.

EPT is a three-dimensional plotting format, incorporates pressure values between sensors to create a pressure

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Quick Response Code:

Website: www.jdeonline.in

DOI: 10.4103/jde.JDE_85_16

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How to cite this article: Bansal RK, Nasa M, Patil GK, Shah V, Choudhary NS, Puri R, *et al*. Spectrum of esophageal motility disorders in patients with motor dysphagia and noncardiac chest pain - A single center experience. J Dig Endosc 2017;8:68-71.

continuum. Pressure magnitude is converted into a color scale. In an EPT plot, time and location within the esophagus are continuous variables, and pressure magnitude is indicated at each x-y coordinate by color.

The Chicago Classification (CC) categorizes esophageal motility disorders utilizing HRM imaged with pressure topography plots. A recent update, CC v3.0, was put forward by the International HRM Working Group through an international consensus. It utilizes a hierarchical approach, sequentially prioritizing and dividing esophageal motility disorders into three groups: (i) Disorders of EGJ outflow, (ii) other major disorders of peristalsis, and (iii) minor disorders of peristalsis.[2]

Disorders of EGJ outflow obstruction are characterized by a median integrated relaxation pressure (IRP) above the limit of normal. These disorders are divided into achalasia subtypes (I, II, and III) and EGJ outflow obstruction.

Major motility disorders (never found in controls) apart from EGJ outflow obstruction are absent contractility, distal esophageal spasm (DES), and jackhammer esophagus.

Minor motility disorders, characterized by impaired esophageal bolus transit, are ineffective esophageal motility (IEM) and fragmented peristalsis (FP).

Esophageal manometry is indicated in the evaluation of motor dysphagia or noncardiac chest pain (NCCP) in patients where there is no evidence of mechanical obstruction, ulceration, or any inflammation on endoscopy and/or imaging. It is also used as an important tool in the evaluation of gastroesophageal reflux disease (GERD), both for correct placement of pH electrodes and as an essential part of preoperative evaluation before antireflux procedures.[3]

Data on the classification of esophageal motility disorders in Indian population are sparse[4,5] and no study classifying these disorders according to the version 3.0 of CC has been reported from the subcontinent. Hence, we retrospectively analyzed symptomatic spectrum and manometry findings of our patients using newer CC v3.0.

Methodology

In this retrospective study, data of 400 adult patients who underwent esophageal manometry at our center from 2010 to 2015 were analyzed. The indication for the esophageal manometry was predominantly dysphagia or NCCP.

Clinical profile

All the patients were evaluated for predominant complaints, i.e., motor dysphagia or NCCP. Some patients had overlapping features, but patients were categorized according to their predominant complaints. Other symptoms such as regurgitation and retrosternal burning were also recorded. NCCP, in our study, was defined as recurrent chest pain that could not be distinguished from ischemic heart pain after a reasonable cardiac workup[6,7] which includes electrocardiogram, two-dimensional echo, and cardiac enzyme troponin I.

Upper gastrointestinal endoscopy (UGIE) findings were recorded where available.

Esophageal manometry was performed after an overnight fast using a 22-channel water-perfusion system (MMS, The Netherlands). Once the manometric catheter was positioned, the patient underwent a 10-swallow protocol in the supine position with each swallow using 5 mL of water.

Although upright and provocative swallows with viscous and solid food challenges can be added to the basic protocol, there are currently few validated metrics to determine the significance of swallow patterns associated with these challenges.[8]

Statistical analysis

Continuous unpaired data were analyzed using unpaired *t*-test. Categorical variables were analyzed using χ^2 tests, with Yates' correction as applicable. $P < 0.05$ was considered statistically significant.

Results

Total number of patients were 400 with mean age 44 (range 29–59) years, 67.5% (n = 270) male.

Clinical manifestation

Sixty percent (n = 240) of our patients had dysphagia as presenting features while rest 40% (n = 160) had NCCP.

Twenty-two percent (n = 88) of patients also had retrosternal burning while 15% (n = 60) of patients had regurgitation also along with primary complaints [Table 1].

UGIE was available in 91% (n = 364) of the patients, in which 78.25% (n = 313) had normal findings while 12% (n = 48) had features suggestive of achalasia, as evidenced by the presence of dilated esophagus and resistance during crossing GE junction. 0.75% (n = 3) had mega esophagus.

Esophageal manometry

Motility disorder was identified in 50.5% (n = 202) of the patients. 49.5% (n = 198) patients had normal esophageal manometry.

Disorders of EGJ outflow was the predominant type of esophageal motility disorder, found in 33.75% (n = 135)

of the total patients. 14.25% (n = 57) of the patients had minor disorders of peristalsis while 5% (n = 20) were found to have other major disorders of peristalsis.

Among the disorders of EGJ outflow tract, achalasia type II was the most common disorder, reported in almost half of the patients. Achalasia I was present in seen in 39% (n = 52), achalasia II in 48% (n = 65), achalasia III in 2% (n = 3), and EGJ obstruction in 11% (n = 15) of patients with EGJ outflow disorder [Figure 1].

In other major disorders of peristalsis, absent peristalsis was seen in 55% (n = 11), DES in 30% (n = 6), and 15% (n = 3) had jackhammer esophagus.

In minor disorders of peristalsis group, IEM was seen in 61% (n = 22) of the patients while 39% (n = 35) had FP.

Table 1: Clinical presentation of patients in patients with esophageal motility disorder

	Motor Dysphagia	Chest pain	Retro-sternal burn	Regurgitation	Total
Achalasia I	48	4	0	12	52
Achalasia II	42	23	2	6	65
Achalasia III	3	0	0	3	3
EGJ outflow Obstruction	5	10	2	2	15
Absent contractility	4	7	0	0	11
DES	1	5	3	0	6
Jackhammer esophagus	1	2	1	1	3
IEM	4	18	15	4	22
FP	6	29	21	6	35
Normal manometry	126	62	44	26	198
Total	240	160	88	60	

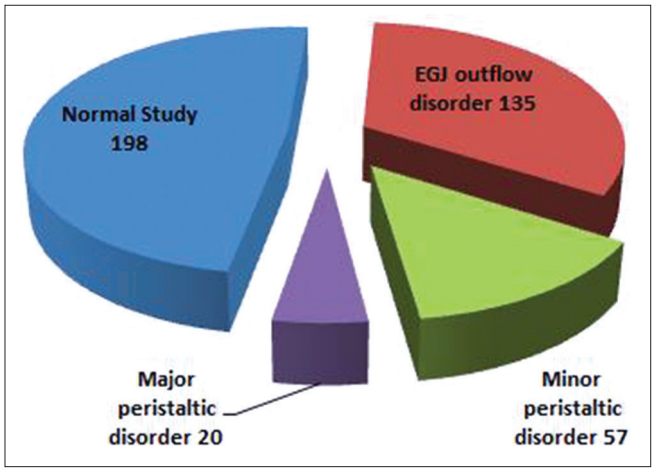

Figure 1: Breakup of patients with abnormal manometry in major groups

In patients with motility disorders (n = 202), achalasia type II was the most common motility disorder (33%) followed by Achalasia type I (26%) and FP (18%) [Figure 2].

Endoscopy and manometry correlation

UGIE was available in all the patients with motility disorder, i.e., 202 patients. Patients with achalasia Type II, EGJ obstruction, minor and major disorder of peristalsis found to have a normal endoscopy. 48 out of 52 patients with achalasia Type I had an abnormal endoscopy as evidenced by the presence of dilated esophagus and moderate to severe resistance during crossing GE junction, rest four had normal endoscopy. Three patients had sigmoid esophagus on endoscopy as evidenced by grossly dilated esophagus with lots of food residue within it and subsequently they are found to have achalasia type III.

Discussion

This is the one of the large retrospective study of the esophageal motility disorders reported in literature. The study is based on the latest version of CC, CC v3.0.

The patients included in this study either had dysphagia or NCCP similar to the study by Dekel *et al*.[9] while the study by Misra *et al*. included only patients with dysphagia. As motility disorder can either present as motor dysphagia or chest pain, both the symptoms are necessary to evaluate motility disorders.

NCCP can be due to gastrointestinal (GI) or non-GI-related disorders. Among the GI causes of NCCP, GERD is the most common contributing factor. Chest pain is included in the atypical manifestation of GERD. Among the other causes of NCCP, esophageal motility disorders, and functional chest pain of presumed esophageal origin are the main underlying mechanisms for symptoms.

In a study by Locke *et al*., NCCP is more common in patients (37%) who experience heartburn symptoms at least weekly, as compared with 30.7% in with infrequent heartburn (less than once a week) and 7.9% of those without any GERD symptoms.[10] In another study,

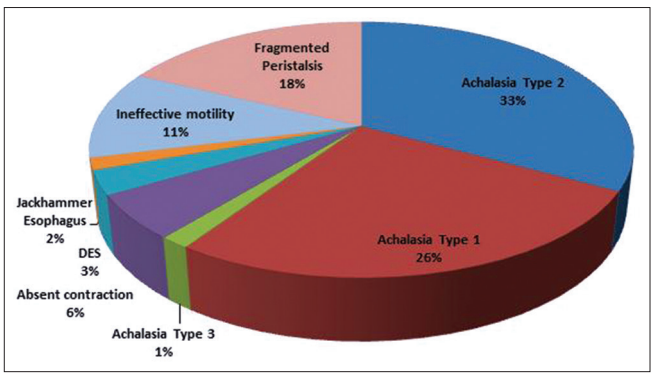

Figure 2: Distribution of patients with motility disorders

more than half of all patients with NCCP experienced heartburn and acid regurgitation.[11]

Dysphagia and regurgitation were more common in patients with achalasia while NCCP and retrosternal burn were more frequently reported in patients with normal esophageal manometry. Motor dysphagia is a classical symptom of achalasia. The fermentation of food residue in dilated esophagus in patients with achalasia can explain regurgitation. Chest pain and retrosternal burning sensation are the symptoms commonly seen in patients with GERD in which esophageal manometry can be normal.

Our study revealed that almost half of the patients had motility disorders, while study by Misra *et al*., reported 85% of patients to have motility disorder. The probable reason for this difference might be due to the fact that some of motility disorders reported in earlier classification have been removed from the current updated version of classification. The most common type of motility disorder in this study was achalasia, similar to the study by Misra *et al*., while Dekel *et al*. reported ineffective peristalsis as the most common esophageal motility disorder in their study.

In our series, achalasia type II was the most common in comparison to study by Misra *et al*. in which Type I was the most common. Neither UGIE nor barium esophagogram are sensitive to make certain diagnosis of achalasia. Barium esophagogram may be nondiagnostic in up to 30% of the patients while on endoscopy about one third of patients have findings supporting the diagnosis of achalasia.[12] Endoscopy can correlate very well in patients with achalasia type III, in contrary to type II where it mostly found normal. In patients with type I, substantial proportion of patients had finding suggestive of achalasia. Esophageal manometry can confirm achalasia at an early stage rather than development of full blown disease, so that might be the reason for getting the more cases of achalasia type II as manometry was performed at early stage of symptom onset.

The CC v3.0 incorporates recent advances in the understanding of esophageal motility disorders imaged in HRM with pressure topography plots. As compared to the previous version, the evaluation of the EGJ at rest is now defined in terms of morphology and contractility. The key metrics of interpretation, the IRP, DCI, and DL remain unchanged. New components included in CC v3.0 are fragmented contractions (large breaks in the 20-mmHg isobaric contour), IEM, and several minor adjustments in nomenclature and defining criteria. CFV and small breaks in the 20-mmHg isobaric contour are absent in CC v3.0.

The strength of our study was: first, it is one of the largest study; second, it is based on latest version of CC. Drawbacks of this study were: first, it is a retrospective study; second, follow-up data on clinical outcome of patients with motility disorder is still not complete.

Conclusion

This is the one of the largest retrospective study of the esophageal motility disorders reported in literature. Dysphagia was the most common esophageal symptom followed by NCCP. Achalasia was the most common esophageal motility disorder followed by fragmented peristalsis.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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