JKBMS, Vol.1, No.1, P.34-42,2015 https://doi.org/10.56056/amj.2015.05

Esophageal Manometry Among Patients With Dysphagia Referred ToKurdistan Center For Gastroenterology And Hepatology

Mohammed O. Mohammed*
Bakhtyar F. Salim**
Ali A. Ramadhan ***

Abstract

Background and Objectives: Dysphagia is a common problem in patients with primary motor disorders of the esophagus. Esophageal manom- etry is the gold standard for diagnosis of these disorders. Introduction of high resolution manometry represented a significant improvement in data recording and diagnostic yield. The objective of the study was to assess the findings of esophageal high resolution impedance manometry in patients presenting with dysphagia in Sulaimanigovernorate.

Patients and Methods: This study extended from September, 2012 to December, 2013 and included 120 patients with dysphagia whowere referred for manometry in Kurdistan Center for Gastroenterology and Hepatology (KCGH) in Sulaimani city. All patients underwent upper endoscopy to exclude mechanical and inflammatory causes of dysphagia thenthe high resolution impedance manometry was used with liquid and viscous swallows.

Results: The mean age of the study population was 43 years. The female to male ratio was 1.5:1. The mean duration of dysphagia was 2 years. The most common esophageal motility abnormality was achalasia (N=44, 36.7%) followed by hypertensive LES (N=31, 25.8%), ineffective esophageal motility (N=9, 7.5%), hypotensive LES (N=5, 4.2%) and diffuse esophageal spasm (N=3, 2.5%). The high resolution impedance manometry was normal in 28 patients (23.3%). Of the 44 patients with achalasia, 15 patients (34%) had vigorous achalasia. Using Chica- go classification, the most common type of achalasia was type II (N=26, 59%) followed by type I (N=13, 29.6%)and then type III (N=5, 11.4%).

Conclusions: Esophageal high resolution impedance manometry has an acceptable diagnostic yield in patients with dysphagia.The most common finding is achalasia. Further studies are recommended.

Key words: dysphagia, manometry, Achalasia, KCGH.

*Department of Medicine, School of Medicine, Faculty of Medical Sciences, University of Sulaimani; Kurdistan Center for Gastroenterology and Hepatology, Sulaimani; Iraq.

** Department of Medicine, School of Medicine, Faculty of Medical Sciences, University of Duhok, Duhok; KurdistanCenter for Gastroenterology and Hepatology, Sulaimani; Iraq.

Introduction

Dysphagia is an "alarming" symptom that needs clinical evaluation to define the cause and initiate therapy (1). Its causes are broadly classified into mechanical lesions, inflammatory etiologies, motility disorders or func- tional dysphagia (2). Esophageal motility disorders can result in major morbidity and, in some cases, in an in- creased risk of cancer and death (3). Esophageal manom- etry is the gold standard for diagnosis of these disorders(4) .Introduction of high resolution manometry (HRM), represented a significant improvement in data record- ing and diagnostic yield (5,6). Recently, high resolution impedance manometry (HRIM) has combined the ben- efits of HRM and impedance-based bolus transit as- sessment. Abnormal impedance may be a sensitive in- dicator of esophageal functional abnormality (7). HRIM can detect segmental abnormalities (8) and reduce the problems of asymmetry and artifact (9) in addition to being simple to use and easy to learn (10). However, the use of HRIM may be limited because the equipment is expensive. Moreover the clinical significance of HRIM-detected esophageal dysmotility remains uncer- tain in some cases (11). Achalasia is a primary esopha- geal motor disorder of unknown etiology characterized by insufficient relaxation of lower esophageal sphincter and loss of esophageal peristalsis (12). Vigorous achala- sia represents the early stage of achalasia which may be due to loss of inhibitory neurons, but cholinergic stim- ulation continues unopposed (4). Esophageal pressure topography has allowed for the differentiation of acha- lasia into three subtypes using Chicago classification. These subtypes may have potential treatment outcome implications with subtype II having the best prognosis, whereas subtype I has somewhat worse outcome and subtype III can be difficult to treat (12).

Patients and methods

This study extended from September, 2012 to Decem- ber, 2013. During this period, 120 cases were collected. It included patients with dysphagia referred for esoph- ageal manometry at Kurdistan Center for Gastroenter- ology and Hepatology (KCGH). The informed consent was obtained and all patients underwent upper endos- copy before manometry.The InSIGHT high resolution impedance manome- try system (Sandhill Scientific, Inc, Highlands Ranch, Colo, USA) was used. Patients were instructed to fast for a minimum of four hours for solids and two hours for liquids and to stop medications known to affect esophageal motor function for 24 hours prior to the test (eg. beta-blockers, nitrates, calcium channel blockers, anticholinergic drugs, prokinetics, nicotine, caffeine and opiates). The equipment was checked and calibrat- ed before each study. The catheter (Comfortec®, 6.4 Fr, 60 cm, figure 1) was placed transnasally. Patients were placed in a 30 degrees semi-recumbent position and allowed to accommodate to the catheter and then the resting lower esophageal sphincter (LES) pressure was measured.A sequence of 10 wet swallows (5 ml of room-tempera- ture water per swallow) and then 10 viscous swallows (3-ml of gel per swallow) were used to examine the LES relaxation and esophageal body peristaltic activi- ty. At least 20-30 seconds were allowed between swal- lows.The esophageal motility abnormalities were classified as shown in table 1 (13, 14). Achalasia was sub-classified into classic (average esophageal body amplitude ≤40 mmHg) and vigorous (>40 mmHg) subtypes (4). The esophageal pressure topography was revised to deter- mine the three subtypes of

https://doi.org/10.56056/amj.2015.05

achalasia using Chicago classification of distal esophageal motility disorders; type-I (achalasia with aperistalsis or classic achalasia), type-II (achalasia with pan-esophageal pressurization) and type-III (achalasia with spasms or spastic achala- sia) (2,12).Analysis of data was conducted to calculate the P-val- ue using 2. Testing for differences among the means of groups was done using analysis of variance (ANOVA). For the associations or differences to be significant, the P-value should have been less than 0.05.

Results

The mean age of the study population was 43 years (95% Confidence Interval (95% CI) was 40.1 – 45.7 years) with a range of 10 – 84 years. The majority (71%, N=85) were younger than 50 years. The female to male ratio was 1.5:1. The mean duration of dyspha- gia was 2 years (95% CI = 17.6 – 29 months) with a range of 2 weeks to 15 years. Of the study population, 75% (N=90) had dysphagia for solid more than liquid. Most patients had no obvious relieving or aggravating factors. The most common clinical features associated with dysphagia were chest pain (N=50, 41.7%), regur- gitation (N=36, 30%), respiratory symptoms such as chronic cough and recurrent respiratory tract infections (N=33, 27.5%), heartburn (N=30, 25%) and weight loss (N=26, 21.7%).All the patients underwent upper endoscopy before manometry and 29 patients (24.2%) had endoscopic features suggestive of achalasia. Barium swallow study was performed in 50 patients (41.7%) and there were radiological features suggestive of achalasia in 14 pa- tients (28%). Compared with esophageal manometry, upper endoscopy had a sensitivity of 52%, specificity of 92%, positive predictive value (PPV) of 79%, negative predictive value (NPV) of 77% and "overall accuracy" of 77.5% for detecting achalasia while barium swallow had a sensitivity of 60%, specificity of 93%, PPV of 86%, NPV of 78% and "overall accuracy" of 80%.The most common esophageal motility abnormality was achalasia (N=44, 36.7%) followed by hyperten- sive LES (N=31, 25.8%), ineffective esophageal mo- tility (N=9, 7.5%), hypotensive LES (N=5, 4.2%) and diffuse esophageal spasm (N=3, 2.5%). The HRIM was normal in 28 patients (23.3%). Figure 2 clarifies the esophageal motility findings in this study. Of the 44 patients with achalasia, 15 patients (34%) had vigorous achalasia. Using Chicago classification, 13 (29.6%) pa- tients had achalasia type I, 26 (59%) had achalasia type II and 5 (11.4%) had achalasia type III.Statistical analysis was conducted for the major esoph- ageal manometric findings and is shown in table 2. There was significant statistical difference in the age of presentation (P = 0.028) with achalasia patients be- ing older than other groups and those with normal ma- nometry being the youngest. There was no significant statistical difference with regard to sex of patients (P = 0.1). Although the duration of dysphagia was not statis- tically different among the groups (P = 0.26), achalasia.

https://doi.org/10.56056/amj.2015.05

Figures and tables:

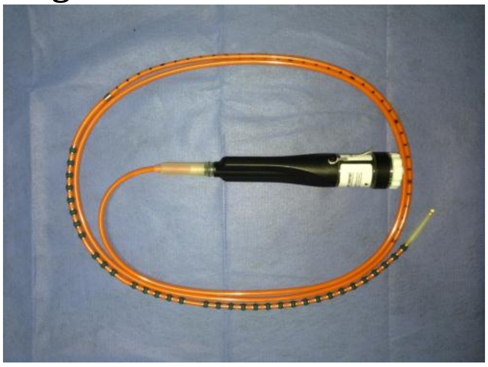


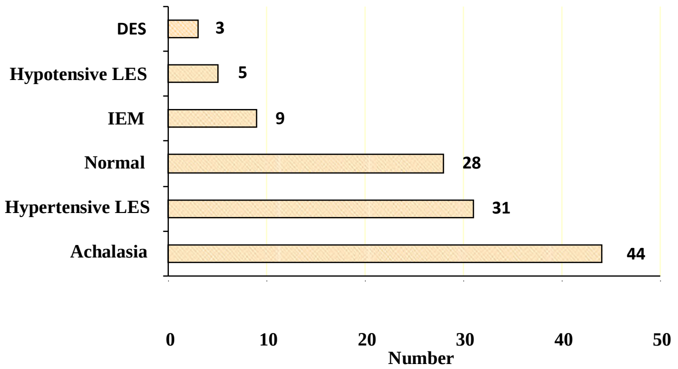
Figure (1): High resolution impedance manometrycatheter.

and IEM patients had a mean duration of more than 2 years. Dysphagia for solid more than liquid was sig- nificantly different among the groups (P < 0.000) be- ing more likely in patients with achalasia (88.6%) than in other groups. The course of dysphagia; its location; relieving or aggravating factors; association with chest pain, weight loss or heartburn; being smoker or alcohol drinker and mean body mass index were not statistical- ly significantly different among the analyzed groups (P > 0.05).

Discussion

Esophageal HRIM is an important development in esophageal function testing (6,15) . The lack of local data was the impetus for the current study. To our knowl- edge, this study is the first in Iraq that uses HRIM to study the esophageal motility abnormalities in dyspha- gia. We included patients presenting with dysphagia because it is the primary and the most cost effective in- dication for esophageal motility disorder (16). The mean duration of dysphagia in this study was 2 years which is consistent with that reported in literature (2, 17) but we had cases of dysphagia with duration ranging from 2 weeks to 15 years in whom the manometry was useful. Dysphagia for solid and liquid is the hallmark of esoph- ageal motility disorders (2) which was also observed in our study. Early in the course of disease, dysphagia may be intermittent but then becomes persistent or progres- sive with the advance of disease (2). In almost half of our cases (45.8%), the course was slowly progressive (over 2 years) which could imply a more advanced stage of disease in this study.

https://doi.org/10.56056/amj.2015.05



Figure(2): Esophageal motility findings (N = 120)

DES, Diffuse Esophageal Spasm; LES, Lower Esophageal Sphincter; IEM, Ineffective Esophageal Motility.The most common esophageal motility abnormality in this study was achalasia (36.7%) followed by hyperten- sive LES (25.8%) while HRIM was normal in 23.3% of patients. The manometric findings in dysphagia pa- tients have been variable. A study done by Dumitraşcu et al (18) reported achalasia as the most common finding followed by diffuse esophageal spasm (DES). In anoth- er study done in India by Misra et al (4), the most com- mon finding was also achalasia followed by normal manometry and DES. While in a study done by Dekel et al (19), the most common finding in dysphagia was normal manometry followed by IEM and then achala- sia. This variability in the findings might be attributed to differences in the type of manometry used, selection of cases and referral patterns although a real geograph- ical difference cannot be excluded.In this study, the clinical manifestations associated with achalasia were dysphagia for solid more than liquid (88.6%) and association of dysphagia with regurgi- tation (54%) and respiratory symptoms (48%). Chest pain, weight loss and heartburn were present in 34%, 32% and 18% respectively. Dysphagia for both solid and liquid has been reported in up to 90% of achalasia cases (20). Other symptoms including chest pain, heart- burn, regurgitation, and weight loss were reported in up to 60% of patients (20). Both upper endoscopy and barium swallow study had low sensitivities for detect- ing features of achalasia (52% and 60% respectively) which will result in missing of achalasia cases if we use them as the "only" diagnostic studies. Endoscopy has a poor sensitivity and specificity in the diagnosis of achalasia and its primary role in the workup of acha- lasia is focused on ruling out a mechanical obstruction or pseudoachalasia (17). Videofluroscopy has an overall sensitivity of 80–89% and specificity of 79–91% for di- agnosing esophageal motility disorders (eg. achalasia) and is useful for identifying pre-clinical disease relapse(17, 21).Vigorous achalasia was identified in 34% of achalasia patients in the current study. The reported frequencies vary from 1.5% to 31% (18). In our study, the most common achalasia type was type II

https://doi.org/10.56056/amj.2015.05

(N=26, 59%) fol- lowed by type I (N=13, 29.6%) and then type III (N=5, 11.4%). This is comparable to the results of the two largest studies in this regard which were done by Salva- dor et al (22) (N= 246 patients with rates of 51.6%, 39%, and 9.4% for type II, I, and III respectively) and Rohof et al (23) (N= 176 patients with rates of 64.7%, 25.1%,and 10.2% for type II, I, and III by the acid as a protective mechanism (24). Unrecognized GERD may partly explain this high rate in our study as 35% of these patients had dyspha- gia associated with heartburn. Ineffective esophageal motility and hypotensive LES were observed in 7.5% and 4.2% respectively. The reported rates of these two findings range from 0 to 27% (4, 15, 19). The clinical sig- nificance, association with symptoms and appropriate management of these manometric findings have not been established (25). We had only three cases of DES (2.5%). This is slightly lower than that reported by other studies which ranged 4-9% (4, 15, 19). An important issue is that DES may be associated with incomplete LES relaxation, in which case it is likely a variant of achalasia. Studies have shown that DES may progress over time to

respectively). Hypertensive LES was the second most common manometric finding in our study (25.8%). This is much higher than that reported by Tutuian et al (1%) (15), Misra et al (3.6%) (4) and Dekel et al (7%) (19). There is a paradoxical association between hypertensive LES and GERD which has been attributed to stimulation of LES contraction classic achalasia (26). This suggests that if DES is a distinct motor disorder, it is certainly rare and traditional manometric criteria have oversimplified it, resulting in over-diagnosis of the entity (27).In conclusion, esophageal high resolution impedance manometry has an acceptable diagnostic yield in pa- tients with dysphagia. The most common finding was achalasia of type II using Chicago classification. Further larger scale randomized studies are advised to study the factors associated with esophageal motility disorders. Acknowledgements: Our thanks go to Ms. Ashna Khafwr for her kind help in performing the manometry studies. Many thanks should be given to the patients involved in the study without their help it was not pos- sible to conduct this study.

References:

1. Javle M, Ailawadhi S, Yang GY, Nwogu CE, Schiff MD, Nava HR. Palliation of Malignant Dysphagia in Esophageal Cancer: A Literature-Based Review. J Sup- port Oncol 2006; 4: 365–373.

2. Kahrilas PJ, Pandolfino JE. Esophageal Neuromus- cular Function and Motility Disorders. In: Feldman M, Friedman LS, Brandt LJ Editors. Sleisenger and Fordtran’s gastrointestinal and liver disease: patho- physiology, diagnosis, management. 9th Ed. Philadel- phia: Elsevier. 2009, PP 677-704.

3. Massey BT. Esophageal Motor and Sensory Disor- ders: Presentation, Evaluation, and Treatment. Gastro- enterol Clin N Am 2007; 36: 553–575.

4. Misra A, Chourasia D, Ghoshal UC. Manometric and symptomatic spectrum of motor dysphagia in a tertiary referral center in northern India. Indian J Gastroenterol 2010; 29(1): 18-22.

5. Kahrilas PJ, Sifrim D. High-resolution manometry and impedance-pH/manometry:

https://doi.org/10.56056/amj.2015.05

valuable tools in clin- ical and investigational esophagology. Gastroenterolo- gy 2008; 135: 756-769.

6. Fox MR, Bredenoord AJ. Oesophageal high-reso- lution manometry: moving from research into clinical practice. Gut 2008; 57(3): 405–423.

7. Koya DL, Agrawal A, Freeman JE, Castell DO. Im- pedance detected abnormal bolus transit in patients with normal esophageal manometry. Sensitive indica- tor of esophageal functional abnormality? Dis Esopha- gus 2008; 21: 563-569.

8. Fox M, Hebbard G, Janiak P, Brasseur JG, Ghosh S, Thumshirn M, et al. High-resolution manometry predicts the success of oesophageal bolus transport and identifies clinically important abnormalities not detect- ed by conventional manometry. Neurogastroenterol Motil 2004; 16: 533-542.

9. Ghosh SK, Pandolfino JE, Zhang Q, Jarosz A, Shah N, Kahrilas PJ. Quantifying esophageal peristalsis with high-resolution manometry: a study of 75 asymptomat- ic volunteers. Am J Physiol Gastrointest Liver Physiol 2006; 290: 988-997.

10. Clouse RE, Staiano A, Alrakawi A, Haroian, L. Ap- plication of topographical methods to clinical esoph- ageal manometry. Am J Gastroenterol 2000; 95(10): 2720–2730.

11. Roman S, Pandolfino J, Mion F. High-resolution manometry: a new gold standard to diagnose esopha- geal dysmotility? Gastroenterol Clin Biol 2009; 33(12): 1061-1067.

12. Vaezi MF, Pandolfino JE, Vela MF. ACG Clinical Guideline: Diagnosis and Management of Achalasia. Am J Gastroenterol 2013; 108 (8): 1238-1249.

13. Wang A, Pleskow DK, Banerjee S, Barth BA, Bhat YM, Desilets DJ, et al. Esophageal function testing. Gastrointest Endosc 2012; 76 (2): 231-243.

14. Spechler SJ, Castell DO. Classification of oesoph- ageal motility abnormalities. Gut 2001; 49: 145 – 151.

15. Tutuian R, Castell DO. Combined multichannel in- traluminal impedance and manometry clarifies esopha- geal function abnormalities: study in 350 patients. Am J Gastroenterol 2004; 99: 1011-1019.

16. Johnston PW, Johnston BT, Collins BJ, Collins JS,

17. Love AH. Audit of the role of oesophageal manometry in clinical practice. Gut 1993; 34: 1158-1161.

18. Pohl D, Tutuian R. Achalasia: an overview of diag- nosis and treatment. J Gastrointestin Liver Dis 2007; 16(3): 297–303.

19. Dumitraşcu DL, Blaga TS, David L. Esophageal Achalasia – Manometric Patterns. Rom J Intern Med 2009; 47(3): 243–247.

20. Dekel R., Pearson T, Wendel C, De Garmo P, Fen- nerty MB, Fass R. Assessment of oesophageal motor function in patients with dysphagia or chest pain — the Clinical Outcomes Research Initiative experience. Ali- ment Pharmacol Ther 2003; 18: 1083–1089.

21. Francis DL, Katzka DA. Achalasia: update on the disease and its treatment. Gastroenterology 2010; 139: 369–374.

22. Carucci LR, Lalani T, Rosen MP, Cash BD, Katz DS, Kim DH, et al. ACR Appropriateness Criteria: dys- phagia. Available from: www.acr.org/~/media/ACR/ Documents/AppCriteria/.../Dysphagia.pdf [Accessed March, 2014].

23. Salvador R, Costantini M, Zaninotto G, Morbin T, Rizzetto C, Zanatta L, et al. The preoperativemanomet- ric pattern predicts the outcome of surgical treatment for esophageal achalasia. J Gastrointest Surg 2010; 14: 1635-1645.

24. Rohof WO, Salvador R, Annese V, Bruley des Va- rannes S, Chaussade S, Costantini M, et al. Outcomes of treatment for achalasia depend on manometric sub- type. Gastroenterology 2013; 144: 718-725.

25. Gad El-Hak NA, Mostafa M, AbdelHamid H, Hal- eem M. Hypertensive

https://doi.org/10.56056/amj.2015.05

Lower Esophageal Sphincter (HLES): Prevalence, Symptoms Genesis and Effect of Pneumatic Balloon Dilatation. Saudi J Gastroenterol 2006; 12(2): 77-82.
26. Bodger K, Trudgill N. BSG Guidelines in Gastroen- terology: Guidelines for oesophageal manometry and pH monitoring. 2006 Available from: www.bsg.org.uk/ pdf_word_docs/oesp_man.pdf. [accessed July, 2012].
27. Prabhakar A, Levine MS, Rubesin S, Laufer I, Katzka D. Relationship Between Diffuse Esophageal Spasm and Lower Esophageal Sphincter Dysfunction on Barium Studies and Manometry in 14 Patients. Am J Roentgenol 2004; 183(2): 409-413.
28. Pandolfino JE, Kahrilas PJ. AGA Technical Re- view on the Clinical Use of Esophageal Manometry. Gastroenterology 2005; 128: 209–224.

Table (1): Criteria for diagnosing esophageal motility abnormalities.

Functional defect	Diagnosis	Manometric findings
Aperistalsis	Achalasia	Absent distal peristalsis, incomplete lower esophageal sphincter(LES) relaxation, increased LES pressure (>45 mm Hg)
Uncoordinated motility	Diffuse esophageal spasm (DES)	>=20% simultaneous contractions, repetitive contractions (>3 peaks), prolonged duration of contractions, incomplete LES relaxation
Hypercontractile	Nutcracker esophagus	Increased amplitude (>180 mm Hg), increased peristaltic duration
	Hypertensive LES	Resting LES pressure >45 mm Hg, incomplete LES relaxation
Hypocontractile	Ineffective esophageal motility(IEM)	> 30% non-transmitted peristalsis, peristaltic amplitude < 30 mm Hg
	Hypotensive LES	Resting LES pressure <10 mm Hg

https://doi.org/10.56056/amj.2015.05

Table (2): Statistical analysis of the major esophageal manometric findings.

Parameters	Achalasia (N=44)	HypertensiveLES (N=31)	Normal (N=28)	IEM (N=9)	P-value
Age (mean ± SD)	47.7 ± 17.3	41.6 ± 17.9	37 ± 8.5	38.2 ± 11.6	*0.028*
Male sex	17	7	15	4	0.10
Duration in months (mean ± SD)	28.8 ± 23.5	14.9 ± 24.1	21.7 ± 36.7	29.4 ± 58.5	0.26
Dysphagia for solid more than liquid	39	26	21	1	*0.000*
Progressive course	19	20	10	4	0.14
Retrosternal location	32	24	19	9	0.27
Relieving with liquid	16	8	10	1	0.40
Aggravation by stress	8	2	1	1	0.20
Association with chest pain	15	18	12	2	0.12
Association with regurgitation	24	6	4	2	*0.000*
Association with respiratory symptoms	21	10	1	1	*0.000*
Association with heartburn	8	11	5	4	0.14
Association with weight loss	14	9	2	1	0.06
Current smoking	2	4	4	3	0.08
Alcohol drinking	1	1	3	1	0.35
Body mass index (mean ± SD)	24.5 ± 4.8	23.4 ± 3.4	26.1 ± 6	26.7 ± 4.7	0.10
Resting LES pressure (mean ± SD)	48.3 ± 24.8	41.7 ± 21.7	23.5 ± 8.3	8.5 ± 11.7	*0.000*
LES relaxation pressure (mean ± SD)	26.1 ± 15	16.2 ± 5.4	4.8 ± 2.6	1.1 ± 12.1	*0.000*
Distal esophageal amplitude (mean ±SD)	24.2 + 71.1	82.4 ± 27.6	77.3 ± 25.7	35 ± 13	*0.000*

https://doi.org/10.56056/amj.2015.05