

Diagnostic Accuracy Of Barium Swallow For Dysphagia, Keeping Rigid Esophagoscopy As The Gold Standard

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Abstract

Objective: To determine the diagnostic accuracy of Barium Swallow in the detection of patients presenting with dysphagia.

Study Design: Cross-sectional validation study.

Study Setting & Duration: Department of Otorhinolaryngology, Head & Neck Surgery, District Headquarters Hospital Rawalpindi from 01-09- 2022 to 01-03-2023.

Materials and Methods: Approval of the study was obtained from the Hospital Ethical Committee. A total of 111 patients both male and female patients were selected. The patients suffering from dysphagia as per operational definitions and who have reported for work-up to the Department of ENT, District Headquarters Hospital, Rawalpindi, and fulfil the complete inclusion and exclusion criteria, were selected. Informed consent was obtained from all the patients. Patients were selected by consecutive non-probability sampling techniques. The data was analyzed using SPSS 24.

Results: A total of 111 patients were included in this study. The mean age of these patients was 50.79 ± 13.01 years, ranging from 28 to 70 years. The frequency distribution of females 70.27 % was found to be more than that of males 29.73 %. The majority of patients' barium swallow (74.77%) revealed pathologies, while only a small percentage of patients (25.23%) had normal barium swallow. Most of the patients (87.39%) had pathologies found during rigid esophagoscopy, while just a small number (12.61%) had normal rigid esophagoscopy. Comparing both investigating tools, esophagoscopy discovered 87.39% of pathologies while Barium swallow detected 74.77%, indicating that esophagoscopy was a more accurate procedure. Patients had oesophageal web 55 (25.2%) on barium swallow and 69 (62.2%) on the Rigid esophagoscopy. Barium Swallow had oesophageal stricture 28 (52.2) and no Pathology was detected in 28 (25.2 %) patients. As well as Rigid esophagoscopy had oesophageal growth 13 (11.7), oesophageal stricture 15 (13.5), and no Pathology was detected in 14 (12.6 %). Rigid esophagoscopy is more efficient in detecting oesophageal pathology than Barium Swallow. In Barium swallows most patients had esophageal web 55 (25.2%) than the esophageal stricture 28 (52.2) and no pathology was detected 28 (25.2). In rigid esophagoscopy most patients had oesophageal web 69 (62.2%) than the oesophageal growth 13 (11.7), oesophageal stricture 15 (13.5) and no pathology detected 14 (12.6).

Conclusion: A range of diseases associated with dysphagia can be found in patients. Two often used diagnostic methods are barium swallow and rigid esophagoscopy. Both Barium swallow and Rigid esophagoscopy are successful in the diagnosis of oesophageal cancer. The use of a Rigid esophagoscopy is still a gold standard diagnostic and therapeutic tool for upper aerodigestive tract pathologies.

Keywords: Dysphagia, Barium Swallow, Rigid Esophagoscopy, Swallowing Disorders.

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1. Introduction

With a high incidence of 15% in some groups and a higher prevalence of 30.7% in hospitalized patients, dysphagia is a highly frequently reported symptom that is more frequently reported by older patients.¹ While there are many potential causes of dysphagia, they can be broadly divided into oropharyngeal and oesophageal disorders. Oropharyngeal disorders include neurological conditions like multiple sclerosis, parkinsonism, myasthenia gravis, and motor neuron disease, as well as muscular and

anatomical defects like the Zenker diverticulum, tumours, abscesses, and external compression. Oesophageal diseases like oesophageal webs, strictures, tumours, inflammation, autoimmune disease, and spasms fall into two general categories: mechanical and neurological.² Throughout the 19th century, rigid esophagoscopy was the go-to procedure for detecting illnesses of the pharynx, oesophagus, and laryngo-tracheo-bronchial complex. Diagnosis of the causative aetiology is helped in large part by imaging, followed by direct visualization of the upper gastrointestinal tract with

or without tissue sampling. While computed tomography is the most useful imaging modality, it is not readily available in most centres and is also more expensive. In addition, it has the added effect of exposing the patient to more radiation as compared to other screening tests like barium swallow, thus the latter may be more preferred as a screening test.³ Barium procedures use has declined in recent years due to the availability of different imaging modalities, however, it remains a valuable test for the evaluation of the oesophagus.^{4, 11}

In a study conducted by Ishii involving 38 patients with achalasia, the diagnostic examination sensitivities were determined. The Barium swallow test and chest CT scan showed sensitivities exceeding 80%.⁵ however for type III achalasia the sensitivity is approximately 25%.⁶ Blonski et al who gave the barium swallow had a sensitivity and specificity to be a high 94% and 71% respectively; with a diagnostic accuracy of close to 100% for specific causes of dysphagia.^{7, 12}

Dysphagia is a frequently reported symptom, particularly in hospitalized patients, and some cases necessitate a careful assessment. Although barium swallow is a frequent, inexpensive, and safe procedure for evaluating these individuals, its diagnostic significance is seriously questioned as evidenced by the contradictory research mentioned above. This study will assist in assessing the value of this imaging technique for identifying the causes of dysphagia, enabling early and affordable case diagnosis and prompt management implementation that will lower morbidity, mortality, and financial costs.

2. Materials & Methods

This Cross-sectional validation study was conducted in the Department of Ear, Nose, and Throat, Rawalpindi Teaching Hospital from September 2022 to March 2023, after approval from the Hospital Ethical Committee, and informed consent for the study was also obtained from all the patients. The study was conducted on both male and female patients. Patients aged between 18 and 70 years of age were included. 111 Patients who suffered from dysphagia as per operation definitions for more than one month were included.

Patients who had a perforation of the oesophagus, as demonstrated by pneumomediastinum on plain chest x-

ray, those at risk of aspiration, or those who had a chemical injury of the esophagus based on history, patients who were suffering from gastro-intestinal obstruction, patients suffering trauma or those who had undergone surgery to the head and neck region within the past one month, patients with a history of hemorrhagic diathesis. Patients who did not give consent, patients unable or unwilling to undergo barium swallow or rigid esophagoscopy, and patients who were allergic to the contrast medium were not included in this study.

Patients were selected by consecutive non-probability sampling. All participants were evaluated with a thorough medical history and clinical examination on enrollment in the study. All patients underwent barium swallow in the Department of Radiology, Rawalpindi Teaching Hospital, Patients were asked to swallow the entire dose of Barium in a single go which was followed by intermittent fluoroscopic evaluation using a Siemens Artis Zee Multi-purpose system.

Spot films were taken of the larynx, laryngopharynx and esophagus from the anterior, lateral and bilateral oblique projections in erect and supine positions. Motion recordings at 5 frames per second from front and lateral projections during swallowing, during which swallowing and motility of the esophagus were also studied.

All barium swallows were reported by a consultant radiologist. All patients subsequently underwent rigid esophagoscopy under anaesthesia where the condition of the pharynx, larynx and esophagus were studied and reported by a consultant ENT, in the Operation Theater of Rawalpindi Teaching Hospital.

All data were collected using Predesigned proforma. Patients were documented for age, gender, body mass index, history of smoking, history of tobacco use, duration of dysphagia, whether barium swallow was normal or not, whether rigid esophagoscopy was normal or not, type of abnormality seen on barium swallow (if any), type of abnormality seen on rigid esophagoscopy (if any) and location of the abnormality.

All information was collected by the researcher personally to reduce selection bias and to maintain the quality of data.

3. Results

A total of 111 patients were included in this study. The mean age of these patients was 50.79 ± 13.01 years, ranging from 28 to 70 years as shown in Table 1.

Table 1 Age in years

Age in years	Mean	St. Deviation	Range
	50.79	13.01	28_70

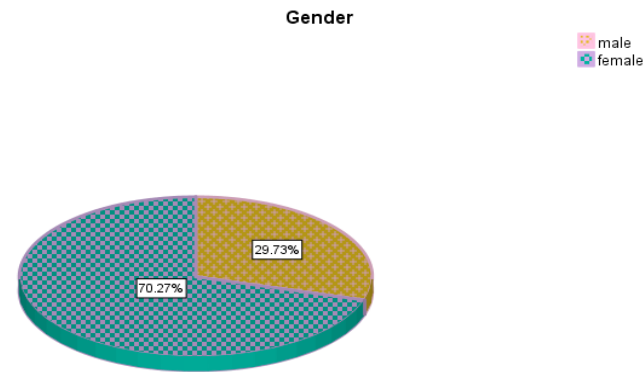


Figure-1 Frequency distribution of gender

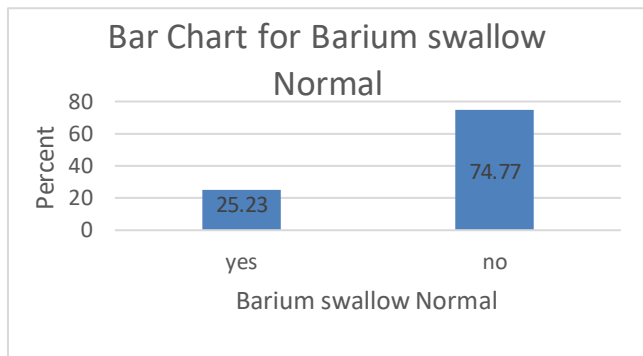


Figure-2 Frequency distribution of Barium swallow Normal

As indicated in Figure 2, the majority of patients' barium swallows (74.77%) revealed pathologies, while only a small percentage of patients (25.23%) had normal barium swallows. As indicated in Figure 3, the majority of patients (87.39%) had pathologies found during rigid esophagoscopy, while just a small number (12.61%) had normal rigid esophagoscopy. Comparing Figures 2 and 3 reveals that although Esophagoscopy discovered 87.39% of pathologies, Barium swallows detected 74.77%, indicating that Esophagoscopy was a more accurate procedure. Regarding Findings on Barium Swallow, Most patients had esophageal web 55 (25.2%) and the Rigid Esophagoscopy had 69 (62.2%). Barium Swallow had esophageal stricture 28 (52.2) and no Pathology was detected in 28 (25.2 %) patients. As

well as Rigid Esophagoscopy had esophageal growth 13 (11.7), esophageal stricture 15 (13.5), and no Pathology was detected in 14 (12.6 %) as shown in Table 2. Table 2 shows that Rigid Esophagoscopy is more efficient in detecting esophageal pathology than Barium Swallow. In Barium swallows most patients had esophageal web 55 (25.2%) than the esophageal stricture 28 (52.2) and no pathology was detected 28 (25.2) as shown in Figure 4. In rigid esophagoscopy most patients had esophageal web 69 (62.2%) than the esophageal growth 13 (11.7), esophageal stricture 15 (13.5) and no pathology detected 14 (12.6) as shown in Figure 5. Figures 4 and 5 demonstrate that rigid esophagoscopy is more effective at identifying esophageal pathology.

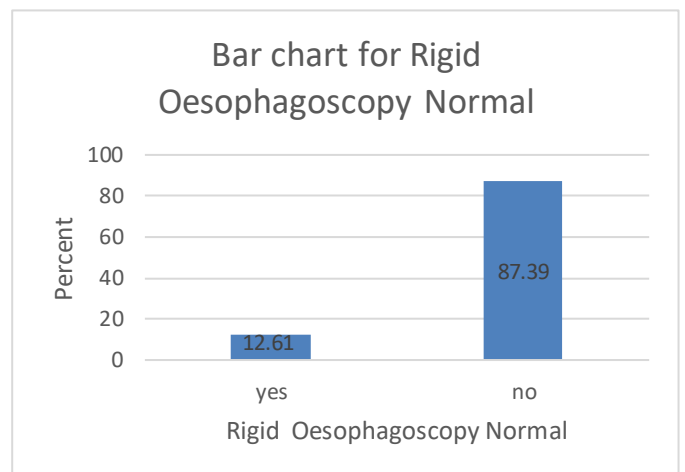


Figure-3 Frequency distribution of Rigid Esophagoscopy Normal

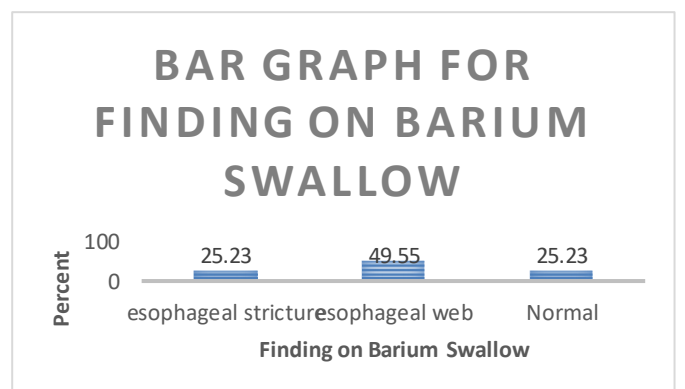


Figure-4 Frequency distribution of Findings on Barium Swallow

Table 2 Finding on Barium Swallow vs. Finding on Rigid Esophagoscopy

Pathology on Barium Swallow			Pathology on Rigid Esophagoscopy			
Esophageal stricture	Esophageal web	No Pathology	Esophageal growth	Esophageal stricture	Esophageal web	No Pathology
Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
28 (25.2)	55 (49.5)	28 (25.2)	13 (11.7)	15 (13.5)	69 (62.2)	14 (12.6)

5. Discussion

According to my study results total of 111 patients were included in this study. The mean age of these patients was 50.79 ± 13.01 years, ranging from 28 to 70 years. Frequency distribution of females 70.27 % was found to be more than that of males 29.73 %. the majority of patients' barium swallow (74.77%) revealed pathologies, while only a small percentage of patients (25.23%) had normal barium swallows. the majority of patients (87.39%) had pathologies found during rigid esophagoscopy, while just a small number (12.61%) had normal rigid esophagoscopy. Comparing Figures 2 and 3 reveals that although Esophagoscopy discovered 87.39% of pathologies, Barium swallow detected 74.77%, indicating that Esophagoscopy was a more accurate procedure. Regarding findings on Barium Swallow, most patients had esophageal web 55 (25.2%) and the Rigid Esophagoscopy had 69 (62.2%). Barium Swallow had esophageal stricture 28 (52.2) and no Pathology was detected in 28 (25.2 %) patients. As well as Rigid Esophagoscopy had esophageal growth 13 (11.7), esophageal stricture 15 (13.5), and no Pathology was detected in 14 (12.6 %). Rigid Esophagoscopy is more efficient in detecting esophageal pathology than Barium Swallow. In Barium swallow most patients had esophageal web 55 (25.2%) than the esophageal stricture 28 (52.2) and no pathology was detected 28 (25.2). In rigid esophagoscopy most patients had esophageal web 69 (62.2%) than the esophageal growth 13 (11.7), esophageal stricture 15 (13.5) and no pathology detected 14 (12.6). Figures 4 and 5 demonstrate that rigid esophagoscopy is more effective at identifying esophageal pathology.

Findings from rigid esophagoscopy and radiological testing in patients with dysphagia, Kavita Sachdeva and Veenit Kaul had a Rigid Esophagoscopy and a barium swallow. Rat tail appearance rates in barium swallow were highly correlated in both studies.

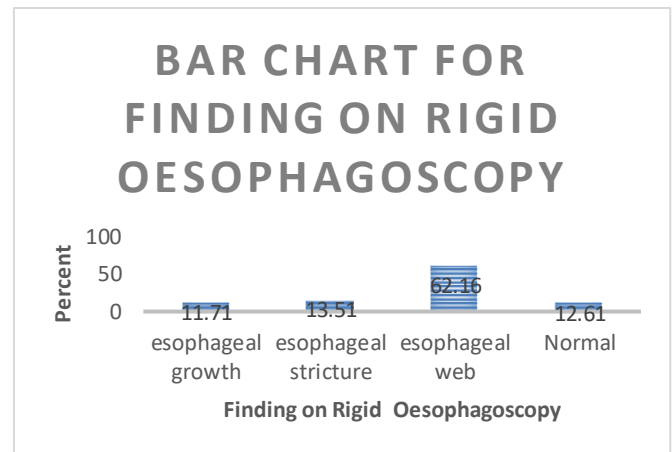


Figure-5 Frequency distribution of Finding on Rigid Esophagoscopy

Additionally, esophagoscopy diagnostic indicated the presence of an esophageal web of about 6.98%.⁸ 44.4% of the lesions were in the cervical esophagus, followed by 25.9% in the upper thoracic region, according to Perna Mandowara's study on the use of rigid esophagoscopy in the diagnosis and treatment of esophageal disorders. 7.4% in the lower thoracic region and 22.9% in the mid-thoracic area.⁹

In research for a rigid esophagoscopy academic training program, Gabriel J. Tsao, MD, and Edward J. Damrose, MD, reported an esophageal perforation rate of 2.6 per cent in complications of esophagoscopy.¹⁰

Findings from esophagoscopy and barium swallow in patients with dysphagia 49.05% barium swallow sensitivity was reported by Kavita Sachdeva and Veet Kaul. The roles of esophagoscopy vs. barium swallow in diagnosing benign peptic oesophageal strictures by Gerald A. Hiatt found that 11 patients had significant strictures at esophagoscopy, and the study retrospectively examined the correlation between

esophagoscopy and radiographic diagnosis of benign peptic oesophageal stricture in 52 patients. When administered 1 to 8 months before an esophagoscopy, the barium swallow reading ranged from 40% to 34.1% as being positive for stricture. After the diagnosis from the esophagoscopy, none of the 10 individuals who underwent a barium swallow were found to have a stricture. These findings suggest that esophagoscopy should be routinely used when dysphagia is a symptom and that radiography cannot be completely relied upon to diagnose esophageal pathologies.

5. Conclusion

The most often used diagnostic tools for dysphagia patients are barium swallow and rigid esophagoscopy, which can both identify several diseases linked to the condition. Both methods are excellent in diagnosing esophageal cancer. In ENT, rigid esophagoscopy is still the gold standard for diagnosing esophageal dysphagia. Barium swallow and Rigid Esophagoscopy findings show a strong association. This study demonstrates that rigid esophagoscopy is more effective at identifying oesophageal pathology.

CONFLICTS OF INTEREST- None

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Potential competing interests: None to report

Contributions:

A.U.A - Conception of study

A.U.A, A.K, S.N, A. - Experimentation/Study Conduction

S.C, S.M - Analysis/Interpretation/Discussion

A.U.A - Manuscript Writing

S.C, S.M - Critical Review

S.C, A.K, S.N, A.M - Facilitation and Material analysis

References

- [1] Wilkinson JM, Codipilly DC, et al. Dysphagia: Evaluation and Collaborative Management. *Am Fam Physician*. 2021 Jan 15;103(2):97-106.
- [2] Spronk PE, Spronk LEJ, Lut J, et al. Prevalence and characterization of dysphagia in hospitalized patients. *Neurogastroenterol Motil*. 2020 Mar;32(3):e13763.
- [3] Azer SA, Kshirsagar RK. Dysphagia. [Updated 2020 Nov 18]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-.
- [4] Debi U, Sharma M, et al. *IJRI*. 2019; 29(2): 141-154
- [5] Ishii T, Akaishi T, et al. *Tohoku J Exp Med*. 2019 Jan;247(1):41-49.
- [6] Sanagapalli S, Plumb A, et al. *Neurogastroenterology and motility*. 2023.
- [7] Blonski W, Kumar A, et al. Timed barium swallow: Diagnostic role and predictive value in untreated achalasia, esophagogastric junction outflow obstruction, and non-achalasia dysphagia. *Am J Gastroenterol*. 2018 Feb;113(2):196-203.
- [8] Zakir MF, Karim S, et al., Endoscopic evaluation of patients presenting with dysphagia at a tertiary care hospital in Karachi, Pakistan *Rawal Medical Journal*: Vol. 47, No. 2, Apr-Jun 2022
- [9] Prerna Mandowara. Role of Rigid Esophagoscopy in diagnosis and treatment of Esophageal conditions. 2020 Jan; 63(3):128-132.
- [10] Gabriel J. Tsao MD, Edward J. Plummer-Vinson Syndrome. *Journal of Oral Health Research*. 2013 Oct;4(4):13-18
- [11] Levine MS, Rubesin SE. History and Evolution of the Barium swallow for Evaluation of the Pharynx and Esophagus. *Dysphagia*. 2017 Feb;32(1):55-72
- [12] Sassi FC, Medeiros GC, et al. Screening protocol for dysphagia in adults: comparison with Videofluoroscopic findings. *Clinics (Sao Paulo)*. 2017 Dec; 72(12): 718-722.