ORIGINAL ARTICLE

DIAGNOSTIC ACCURACY OF PLAIN X-RAY LATERAL NECK IN THE DIAGNOSIS OF CERVICAL ESOPHAGEAL FOREIGN BODIES KEEPING OESOPHAGOSCOPY AS GOLD STANDARD

Sohail Ahmad Malik, Ihsan Ahmad Qureshi, Raza Muhammad
Department of ENT, Ayub Medical College, Abbottabad-Pakistan

Background: Detection of foreign body oesophagus has always been a challenge for the otolaryngologists. Among different investigations available X -ray is valuable for detection of foreign bodies as it is readily available, inexpensive and easy to operate. However, this still remains to be decided that how accurate it is? The objective of the study is to determine the diagnostic accuracy of plain X ray lateral neck in the diagnosis of foreign bodies in cervical oesophagus keeping esophagoscopy as the gold standard. **Methods** This descriptive study was conducted at department of ENT, Ayub Medical Institute (AMI) Abbottabad, from Mar to Sep 2016. A total of 290 patients were included in this study and all the patients had X-ray lateral view of neck, followed by oesophagoscopy (gold standard). Diagnostic accuracy of plain X-ray lateral view of neck was detected by determining sensitivity, specificity and accuracy. **Results:** The sensitivity, specificity and accuracy of plain X-ray lateral view of neck was 91.7%, 80%, and 89.7%, respectively. **Conclusion:** X-Ray lateral view of neck is a reliable investigation and should be advised among all the patients with history of foreign body ingestion

Keywords: Cervical oesophageal foreign bodies; Plain X- Ray Lateral Neck; Diagnostic accuracy.

Citation: Malik SA, Qureshi IA, Muhammad R. Diagnostic accuracy of plain x-ray lateral neck in the diagnosis of cervical oesophageal foreign bodies keeping oesophagoscopy as gold standard. J Ayub Med Coll Abbottabad 2018;30(3):386–88.

INTRODUCTION

Foreign body ingestion is a common problem in both children and adults.[1] It carries significant morbidity and mortality.[2] Foreign bodies in the oesophagus are considered to be a serious clinical condition, both in adults and children, due to the possible complications (oesophageal perforation, mediastinitis, fistulisation, airway obstruction) with a high mortality and morbidity.[3] All foreign bodies retained in the oesophagus should be removed as soon as diagnosed.[4,5]

The clinical approach towards the patients with ingestion of foreign body comprises a thorough history and examination followed by relevant investigations.[6] Majority of the foreign body ingestion occurs in paediatric age group followed by edentulous adults, prisoners and psychiatric patients.[7,8] Postero-anterior, lateral cervical and chest radiographs are basic radiological methods of foreign body detection. For non-opaque objects, indirect findings such as larynx and tracheal deviation, as well as computerized tomography, can aid in the diagnosis.[9] Radiolucent objects will require direct visualization or contrast radiographs for location specification.[10] A plain X-ray lateral neck (PXLN) is a helpful tool in the management of patients presenting with foreign body ingestion.[11] It has a high detection rate in hypo pharyngeal and cervical oesophageal foreign bodies than oropharynx.[12] The possible predictors of a foreign body impaction on plain X-ray lateral neck include foreign body shadow, air and soft tissue swelling.[11,12] These are usually confirmatory signs but sometimes calcifications of cricoid cartilage can mimic a foreign body so interpretation of the findings should be careful.[11,13]

In literature, some of the authors have recommended the use of plain X-ray lateral neck for foreign body diagnosis Saki N, *et al*., while others are in doubt Karnawal, *et al*.[11,14] This reflects variability in the results. Plain X-ray lateral neck is a cheap and easily available. However, its accuracy remains a matter of debate. So, there is a need to conduct a validation study that will detect the accuracy of plain X-ray lateral neck for cervical oesophageal foreign bodies.

MATERIAL AND METHODS

This descriptive study was conducted at the ENT Department, Ayub Medical Institute (AMI) from March to September 2016. All patients who presented to OPD meeting the inclusion criteria were included in the study. The inclusion criteria were patients of any age and gender having history of foreign body ingestion and patients who presented with highly suspected clinical features of foreign body ingestion (history, dysphagia, pain and regurgitation). Patients in whom the attempts for removal of foreign body were already made before the time of presentation and Patients with pre-existing oesophageal pathologies such as strictures, webs and tumours were excluded from the study. All patients who presented in OPD or ER department with history of ingestion of foreign body were included in the study.

The purpose and benefits of the study were explained to all patients and a written informed consent was obtained. All patients were subjected to complete history and clinical examination after admission in the ward and were subjected to plain X ray lateral neck to detect absence or presence of cervical oesophageal foreign body. After that patients underwent rigid oesophagoscopy to detect the absence or presence of cervical oesophageal foreign body. All the plain X rays lateral neck were done from hospital's radiology department and were reported by radiologist. All the oesophagoscopies were performed by the ENT consultant having minimum of five years of teaching experience.

Data was collected using the approved *pro forma* designed for the purpose. Data was entered on SPSS version 16. Sensitivity, specificity, positive predictive value and negative predictive and was determined for plain X-ray by taking esophagoscopy as gold standard.

RESULTS

A total of 290 patients were included in the study over a period of six months from March 2016 to September 2016. The results were compared and analysed regarding age, sex, foreign body on plain X-ray neck lateral view and oesophagoscopic findings.

The mean age of the patients was 12.43±8.09 years. Majority of patients were in the 1st decade (52.8%) followed by 2nd decade (Table-1). There were 169 (58.3%) males and 121 (41.7%) females with male to female ratio of 1.6:1. The X-ray neck was positive in 240 patients and among these 220 were confirmed on esophagoscopy so were labelled as true positive. While rest of the 20 patients were labelled as false positive. X-ray neck was negative in 60 patients and among these 20 were positive on esophagoscopy (false negative) and 40 were also negative on esophagoscopy (true negative). (Table-2) The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of plain X – ray neck lateral view for diagnosis of foreign body in cervical oesophagus was 91.7%, 80%, 95.6%, 66.7% and 89.7%, respectively. (Table-3)

Table-1: Frequency of different variables at presentation

Age	Frequency	Percentage
Below 11 years	153	52.8
11-20years	91	31.4
21-30years	20	6.9
31-40 years	11	3.8
41-50 years	5	1.7
51-60 years	3	1
61-70 years	6	2.1
71-80 years	1	0.3
Sex		
Male	169	58.3
Female	121	41.7

Table-2: Comparison of plain X-ray lateral neck versus endoscopic findings (n=290)

Radiographic Findings	Endoscopic Findings (Gold Standard)		Total
	Positive	Negative	
Positive	220 (TP)	10 (FP)	230
Negative	20(FN)	40 (TN)	60
Total	240	50	290

TP: True positive, FP: False positive, FN: False negative, TN: True negative

Table-3: The diagnostic accuracy of plain X-ray lateral neck

Sensitivity	$= \frac{220}{220 + 20} \times 100 = 91.7\%$
Specificity	$= \frac{40}{40 + 10} \times 100 = 80\%$
Positive Predictive Value	$= \frac{220}{220 + 10} \times 100 = 95.6\%$
Negative Predictive Value	$= \frac{40}{40 + 20} \times 100 = 66.7\%$
Accuracy	$= \frac{220 + 40}{220 + 40 + 10 + 20} \times 100 = 89.7\%$

DISCUSSION

In the literature foreign body ingestion is reported as one of the otolaryngology emergencies. In our study foreign bodies ingestion was more common in younger age group, i.e., 1–5 years and coin (56%) was the most common ingested foreign body. Most of the times, esophagoscopic removal was the solution.

The mean age of the patients in the study was 12.43±8.09 years [range 1–77]. Majority of the patients in our study who ingested the foreign bodies were children, i.e., 52.8%. This finding is comparable with the study of Hussain G, *et al*[15]., Saki N, *et al*.[16] and Gilyoma JM, *et al*.[17] 60% patients of Hussain G, e*t al*[15] 65% patients of Saki N, *et al*.[16] and 88.8% patients of Gilyoma JM, *et al*.[17] were children. Higher incidence of foreign body ingestion in children indicate the explorative nature of the children.

There were 58.3 % male and 41.7% female patients in our study and the female to male ratio was 1:1.4 which are consistent with the study of Hussain G, *et al*.[15] Gilyoma *et al*.[17] and Iseh KR[18]. However, Saki N, *et al*.[16] showed a higher frequency of male population with male to female ratio was 3:1, quite higher than any other study.

The sensitivity and diagnosis of x-ray later view neck was 91.7% and 89.7%, respectively in our study. In study by Saki N, *et al*.[16] the plain X-ray lateral necks were suggestive of foreign body in 98% patients and also proved at the time of esophagoscopy. The sensitivity and specificity of conventional radiographs in the diagnosis of an ingested foreign body were 100% and 84.2%, respectively.

Wu IS, *et a*.[12] in their study had a sensitivity of 57.4% and a specificity of 76.1% of plain X-ray neck when compared with esophagoscopy which was lower than our study. But this sensitivity and specificity was recorded for the whole length of the oesophagus. Türkyilmaz A, *et al*.[19] studied the records of 188 inpatient cases that had x-ray cervical neck followed by rigid endoscopy for detection of foreign body oesophagus. X-ray could detect foreign bodies in 77.1%. and among these 79.2% were located in the hypopharynx and cervical oesophagus.

CONCLUSION

X-Ray lateral view of neck is a reliable investigation among patients with suspicion of foreign body ingestion. Its use is recommended in all the patients who present with history of foreign body ingestion. The patients in whom foreign body is detected on plain X – ray lateral view of neck must undergo esophagoscopy for the removal of foreign body.

AUTHORS' CONTRIBUTION

SAM: Conceptualization of study design, literature review, data collection, write-up. IAQ & RM: Data collection, proof reading. TBT: Data collection and data analysis.

REFERENCES

1. Shivakumar AM, Naik AS, Proshanth KB, Hongal GF, Chaturvedy G. Foreign bodies in upper digestive tract. Indian J Otolaryngol Head Neck Surg 2006;58(1):63–8.
2. Adhikari P, Shrestha BL, Baskota DK, Sinha BK. Accidental Foreign Body ingestion: analysis of 163 cases. Intl Arch Otorhinolaryngol 2007;11(3):267–70.
3. Pelucchi S, Bianchini C, Ciorba A, Pastore A. Unusual foreign body in the upper cervical oesophagus: case report. Acta Otorhinolaryngol Ital 2007;27(1):38–40.
4. Weisberg D, Refaely Y. Foreign bodies in the esophagus. Ann Thorac Surg 2007;84(6):1854–7.
5. Naidoo RR, Reddi AA. Chronic retained foreign bodies in the esophagus. Ann Thorac Surg 2004;77(6):2218–20.
6. Ashraf O. Foreign body in the esophagus: a review. Sao Paulo Med J 2006;124(6):346–9.
7. Khan MA, Hameed A, Chaudary AJ. Management of foreign bodies in esophagus. J Coll Physician Surg Pak 2004;14(4):218–20.
8. T-Ping C, Nunes CA, Guimaraes GR, Vieira JP, Weekx LL, Borges TJ. Accidental ingestion of coins by children: management at the ENT department of Joao XXIII Hospital. Vraz J Otorhinolaryngol 2006;72(4):470–4.
9. Han S, Kayhan B, Dural K, Kocer B, Sakinci U. A new technique for removing cervical esophageal foreign body. Turk J Gastroenterol 2006;16(2):108–10.
10. Degghani N, Ludemann JP. Ingested foreign bodies in children: BC Children Hospital Emergency Room Protocol. BC Med J 2008;50:257–62.
11. Karnwal A, Ho EC, Hall A, Molony N. Lateral soft tissue neck X-rays: are they useful in management of upper aero-digestive tract foreign bodies? J Laryngol Otol 2008;122(8):845–7.
12. Wu IS, Ho TL, Chang CC, Lee HS, Chen MK. Value of lateral neck radiography for ingested foreign bodies using the likelihood ratio. J Otolaryngol Head Neck Surg 2008;37(2):292–6.
13. Laguna D, González FM. Calcification of the posterior cricoid lamina simulating a foreign body in the aerodigestive tract (2005:11b). Eur Radiol 2006;16(2):515–7.
14. Saki N, Nikakhlagh S, Tahmasebi M. Diagnostic accuracy of conventional radiography for esophageal foreign bodies in adults. Iran J Radiol 2008;6(1):199–204.
15. Hussain G, Iqbal M, Ihsanulla, Hussain M, Ali S. Esophageal foreign bodies: an experience with rigid esophagoscop. Gomal J Med Sci 2010;8(2):218–20.
16. Saki N, Nikakhlagh S, Safai F, Peyvasteh M. Esophageal foreign bodies in children. Pak J Med Sci 2007;23(6):854–6.
17. Gilyoma JM, Chalya PL. Endoscopic procedures for removal of foreign bodies of the aerodigestive tract: The Bugando Medical Centre experience. BMC Ear Nose Throat Disord 2011;11:2.
18. Iseh KR, Oyedepo OB, Aliyu D. Pharyngo-oesophageal Foreign Bodies: Implications for Health Care Services in Nigeria. Ann Afr Med 2006;5(1):52–5.
19. Türkyilmaz A, Aydin Y, Yilmaz O, Aslan S, Eroğlu A, Karaoğlanoğlu N. Esophageal foreign bodies: analysis of 188 cases. Ulus Travma Acil Cerrahi Derg 2009;15(3):222–7.

Received: 1 June, 2018	*Revised: 8 June, 2018*	*Accepted: 8 June, 2018*

Address for Correspondence:

Sohail Ahmad Malik, Department of ENT, Ayub Medical College, Abbottabad-Pakistan
Cell: +92 332 093 5714
Email: msohailmalik088@gmail.com