ORIGINAL ARTICLE

A CLINICAL STUDY OF FOREIGN BODIES OF OESOPHAGUS AND THEIR MANAGEMENT
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ABSTRACT: INTRODUCTION: A foreign body is an endogenous or exogenous substance incongruous with the anatomy of the site where it is found. Foreign body ingestion can affect persons of any age. Despite major advances in diagnostic and therapeutic modalities, foreign body ingestion still causes significant dilemmas in the diagnosis and treatment. Multiple factors play role in the lodgment of these foreign bodies in the food passage. They are diet factor, dental factor, and inebriation and age factors to name a few. Preexisting strictures of esophagus is another local cause of impaction of F.B. The signs and symptoms of foreign body ingestion are quite diverse and often very non-specific. They include complete esophageal obstruction with overflow of secretions and aspiration, to mild odynophagia or dysphagia. Esophageal foreign bodies are most frequently located at the narrowest portion of the esophagus, the level of the crico-Pharynx sphincter. Rarely serious complications of such as mediastinitis, Pneumothorax, plural effusion, lung or mediastinal abscess, or massive hemorrhage due to a vascular fistula may occur before a thorough investigation is launched. Digital X-rays in two dimensions are useful in the diagnosis. CT scanning and MRI are rarely used in the evaluation of foreign bodies in the aero digestive tract, but are indicated in the event that the object is not found during endoscopic examination and migration from the airway or esophagus is suspected. In 1936 Chevalier Jackson described endoscopic techniques for the removal of foreign bodies. Since then this has remained the safest and most trusted method of treatment. Techniques for foreign body removal employing fiber optic endoscopes have been described. The treatment of choice for foreign bodies of the upper aero digestive tract is reasonably prompt endoscopic retrieval in the operating suite under anesthesia. Endoscopy is performed as an emergency in case ingestion of disc batteries with esophageal lodging and signs or symptoms of esophageal perforation to avoid further complications and strictures. AIM: To evaluate the sensitivity and specificity of digital X-ray in detecting all foreign bodies impacted in throat and esophagus. To assess the factors leading to false positive findings in Digital X-rays in the study subjects; to evaluate the role of digital X-ray in detecting complications. MATERIALS AND METHODS: 208 patients attending Government Hospital of Kozhikode with history of foreign body ingestion are included in the study. Thorough history taking, clinical examination followed by radiography with the help of Digital X-rays to locate the foreign body is done. Fish bones being common in this part of Kerala, emphasize is made to find the specificity and sensitivity of using digital X-rays in locating fish bones in food passage. Conservative management in patients showing minimal symptoms is studied. The incidence of Complications among the patients is studied. OBSERVATIONS: The sensitivity of digital X-ray in detecting fish bone foreign bodies is 42%. The specificity is 79%. The sensitivity of digital X-ray in detecting complications was 77% in the study. Conservative
management of complications is 100% in the present study. CONCLUSIONS: The value of digital X-ray for assessment of a patient with suspected foreign body impaction is vital considering the sensitivity, specificity and easy accessibility. Although digital X-ray has its own limitations due to typical and atypical physiologic calcifications in the neck, it is still an important first line investigation with a suspected foreign body impaction in throat and esophagus.

KEYWORDS: Foreign Body, F.B. in Oesophagus, Oesophagoscopy, Dysphagia, Prevertebral widening, Perforation and Pneumonitis.

INTRODUCTION: Although medically recorded histories are unavailable, foreign bodies in the digestive tract are as old as mankind itself. The first esophagoscopy was attempted by Bozini in 1795 and the first laryngoscopy was performed by Kirstein in 1895. Distal illumination during endoscopy was not available until the early 1900s. Chevalier Jackson in the early 20th century is credited with revolutionizing the field of broncho-esophagology with the development of instruments and techniques for foreign body removal. Jackson in 1905 reported removal of foreign bodies by the O'Dwyer technique with the patient sitting. It was the revolutionary works of Chevalier Jackson and Chevalier L. Jackson working with the Pilling Company from 1949 through 1957 that lead esophagology to get its individuality as a medical science. Penta AQ in 1948 suggested the use of electromagnets in foreign body removal. The basic principles in the evaluation and management developed by them have reduced the mortality associated with foreign body removal from more than 20% to 2%. Little change in technique occurred until the 1970s when rod-lens telescopes became available, vastly improving illumination and visualization.\(^1\) Before the mid-1850s, the most common management for suspected esophageal foreign body impaction was to attempt to push the object into the stomach. Various instruments, including curved hooks, forceps, and even a walking cane, were used. The first esophagoscope used in 1890 by Mackenzie was later improved by Jackson, Ingals and Mosher. The earliest rigid esophagoscopy for foreign body extraction by Jackson and Ingals were performed on conscious patients in sitting position. Because anesthesia risks have decreased and instrumentation for endoscopic removal of esophageal foreign bodies has improved, these procedures are now performed with the patient supine and under general endotracheal anesthesia.\(^2\) In adults some people are at higher risk to have a foreign body present, such as neurologically impaired patients, edentulous individuals, patients with certain psychiatric diagnoses, mental retardation, impairment caused by alcohol, pica, incarcerated individuals, those seeking some secondary gain with access to a medical facility and individuals at the extremes of an age.\(^3\) In adults of coastal area the most common FB is a fish bone (about 85%). The culinary habit of eating the whole fish (which has been cooked with the bone) makes it easier for this to happen.\(^4\) The signs and symptoms of foreign body ingestion or aspiration are quite diverse and often very non-specific.\(^5\) The most frequent presenting symptoms are dysphagia, drooling, retching, and vomiting and Pain. Usually odynophagia may be the major complaint which suggests an underlying mucosal lesion. Anorexia, wheezing, or chest or neck pain also may be present. Some says that they can feel the object in the throat or chest and are unable to pass it any farther. The victim often is able to localize the foreign body accurately, particularly in the upper esophagus, and should be asked to indicate the level of obstruction. Patients rarely have complaints of shortness of breath.
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or air hunger resulting from a large foreign body in the esophagus impinging interiorly and compressing the trachea. Pharyngeal foreign bodies should also be suspected in patients with undiagnosed coughing, stridor or hoarseness. The majority of foreign bodies that reach the GI tract will pass spontaneously. So in patients with normal anatomy, initial management is usually expectant, with radiographic and stool follow-up to confirm passage. However, 10% to 20% of the cases will require non-operative intervention, and 1% or less will require surgical procedures. Plain films can aid determination of the location, size, and number of foreign objects. The initial step is generally a chest radiograph and lateral cervical spine X-ray study using soft tissue technique.

MATERIALS AND METHODS: A Cross sectional study is conducted between January 2011 and June 2012 in Government Medical College, Kozhikode, Kerala t a tertiary care centre catering to the medical needs of populations from Kozhikode, Wayanad, Kannur and Malappuram districts of North Kerala. Study population included both costal belts and hilly areas. All patients with foreign body throat and esophagus reported to ENT departments are included in this study.

INCLUSION CRITERIA:
1. Patients with foreign body in throat and esophagus diagnosed clinically, radiologically and/or endoscopically.
2. Patients who have accepted and given consent to participate in this study.

EXCLUSION CRITERIA:
1. The patients aged below 12 years.
2. Patients with history of foreign bodies in larynx.
3. The patients with foreign body directly visualized by clinical examination and did not require radiological evaluation for further management.

METHODOLOGY: A detailed history and a thorough examination of vitals, ENT areas, abdomen and respiratory system are done in all cases. In a patient with history of foreign body impaction in throat and esophagus, digital X-ray of soft tissue neck - AP and lateral views are taken. X-ray chest, X-ray abdomen and CT scan of neck and chest are taken if further information is required. All patients who are suspected to have foreign body impaction clinically or radiologically underwent endoscopic evaluation. Sensitivity and specificity of digital X-ray is analyzed. CT scan is taken in patients with extra-luminal foreign bodies, suspicious esophageal perforation and negative findings in endoscopy with suspicion of foreign body in X-ray. Also the factors that contributed to false positive results are assessed which were confirmed by CT scan. Those patients who came with minimal symptoms of pain and foreign body sensation after foreign body ingestion underwent conservative management. Presuming that the foreign body might have passed spontaneously into the stomach; in its course caused superficial mucosal injury resulting in persistence of symptoms. Regular follow up clinically and radiologically is undertaken up to 12 days for these patients. Among them if presented with persistent or progressive symptoms or with radiological changes then they are subjected to endoscopic evaluation. All patients who need
endoscopic evaluation are admitted in ward before the procedure. All patients with suspected complication are evaluated with repeat X-ray followed by CT scan. Stable patients with complications kept under conservative management under strict observation. Unstable patients with dangerous complications are directly taken up for surgical removal of the foreign body. Conservative management included large bore intravenous access, supplemental oxygen and cardiopulmonary monitoring in a critical care setting. Patient are kept nil per oral route. Broad spectrum intravenous antibiotics are instituted as early as possible and given for minimum of 10 days. Adequate analgesia including narcotic analgesia is provided to control pain and discomfort. If signs and symptoms of sepsis during the course of conservative management occurred immediate surgical intervention is considered. Success rate of conservative management in complications are evaluated. All endoscopic evaluations are done with rigid endoscope using either hypopharyngoscope or esophagoscope or both. 1. Endoscopic drainage: for retropharyngeal abscess. Using rigid esophagoscope, the site of maximum bulge was palpated and a linear incision was given to drain the abscess. A Ryle’s tube was inserted and patient started on antibiotics and analgesics. 2. External drainage (lateral extra oral approach): Under general anesthesia, Incision given along the anterior border of sternomastoid and retropharyngeal space is entered through the parapharyngeal space. Finger dissection is done to remove loculi and corrugated rubber drain is inserted. Patients are started on parenteral antibiotics and analgesics. Drains are removed on the second day. 3. Thoracotomy: done in case of Pneumo-mediastinum in thoracic esophageal perforation. A standard Thoracotomy incision is used. All the procedures done, findings, outcome, hospital stay, complications, etc; are noted in the proforma.

Ethical issues: Cases were included only after getting proper consent. They were allowed to withdraw from this study at any stage which did not affect their further treatment.

OBSERVATIONS: Data is entered into MS-Excel spreadsheet and analysis done using SPSS statistical package. Totally 208 patients are included in the present study, out of them 162 patients are treated as inpatients and 46 patients as outpatients. Out of 162 endoscopic procedures, 149 cases are done under local anesthesia and 13 cases under general anesthesia. 62 foreign bodies removed by endoscopic procedure and 2 cases of migrated foreign bodies were removed by external approach.

| Digital X-ray | Endoscopy                      |
|---------------|--------------------------------|
|               | Foreign body detected | No Foreign body |
| +             | True positive 34 (55%)  | False positive 24 (24%)  |
| -             | False negative 28 (45%)  | True negative 76 (76%)  |

Table 1: Showing the results of Radiology in foreign body throat and esophagus

Among the total of 208 patients included in this study 162 patients presented with history of definite symptoms of foreign body impaction and underwent both radiological and endoscopic evaluation. Out of 162 endoscopies, in 62 (38%) patients foreign bodies are retrieved. Out of 62
patients, 34(55%) demonstrated foreign bodies in digital X-ray. In remaining 28(45%) patients foreign bodies are radiolucent and hence could not be visualized in digital X-ray (Table 1). In 100 patients who underwent endoscopic after X-ray evaluation foreign bodies are not retrieved. Out of these 76 patients (76%) did not demonstrate any foreign bodies in X-ray also. But in 24(24%) patients digital X-ray are mistakenly interpreted as foreign bodies due to calcification or ossification of various laryngeal cartilages and ligaments which are confirmed by CT scan. In 2 cases foreign bodies could not be retrieved in endoscopy due to migration of foreign body into soft tissues of neck. So 24% cases demonstrated false positive results in digital X-ray. The overall specificity of digital X-ray in detecting foreign bodies was 76%, and negative predictive value was 73%.

Sensitivity of digital X-ray to detect fish bone was analyzed separately since it is the most common foreign body retrieved on endoscopy in the present study. Out of 62 cases of retrieved foreign bodies, 38(61%) cases are fish bone. Out of the 38 patients, 16(42%) demonstrated foreign bodies on digital X-ray; whereas 22(58%) did not show F.B (Table 2). That is 58% cases are radiolucent foreign bodies in X-ray. 5(13%) cases demonstrated indirect evidence of foreign bodies in X-ray. So the sensitivity of digital X-ray in detecting fish bone foreign bodies is 42%. The specificity is 79%. The positive predictive value is 59% and the negative predictive value is 66%.

| Fish type     | Number |
|---------------|--------|
| Flat fish     | 7      |
| Sardine       | 6      |
| Mackerel      | 7      |
| Cyanoglossus  | 2      |
| **Total**     | **22** |

Table 3: Showing the incidence of types of Fish

| Type of fish | Number |
|--------------|--------|
| Shark        | 4      |
| Arios        | 5      |
| Pomfret      | 7      |
| **Total**    | **16** |

Table 4: Showing types of Fish with Positive in X-ray
Fish bones which are radiolucent (false negative) and radio opaque (true positive) in digital X-ray are studied. The fishes like flat fishes, sardine, mackerel, Cyanoglossus were radiolucent in digital X-ray (Table 3). On the other hand, fishes like shark, Arius, Pomfret are radio opaque in digital X-ray (Table 4).

| Etiology for false positive results | No. of patients | Percentage | Vertebral Level in X-ray |
|------------------------------------|----------------|------------|--------------------------|
| Cricoid cartilage calcification/ ossification | 11 | 46% | C5-C6 |
| Thyroid cartilage calcification/ ossification | 6 | 25% | C5 |
| Calcification of ligament in pre vertebral space | 2 | 8% | C6 |
| Vertebral body osteophytes | 3 | 13% | C6 |
| Migrated foreign body | 2 | 8% | C5 |

Table 5: Showing the Etiology and False positive result in X-ray

The etiological factors which contributed to false positive X-ray findings are studied. Most common cause is calcification and/or ossification of laryngeal cartilages. In 11(46%) cases false positive result is due to cricoid cartilage calcification. In 6(25%) cases it is due to thyroid cartilage calcification (Table 5). Few cases of false positive results are reported due to calcification of ligaments in pre vertebral space and vertebral body osteophytes. In 2 patients, though foreign bodies are present, they could not be retrieved by endoscopy due to extra luminal migration. Surgical extractions of migrated foreign bodies are done by lateral pharyngotomy approach.

| Result | Number of patients | Percentage |
|--------|--------------------|------------|
| Success | 46 | 54.7% |
| Failure | 38 | 45.3% |
| FB detected failed cases | 2 | 2.5% |
| Complications | 0 | 0% |

Table 6: Showing the incidence of Patients undergoing Conservative management

| Result | 2nd day | 6th day | 12th day |
|--------|---------|---------|----------|
| Success | 30 | 13 | 3 |
| Failure | 30 | 7 | 1 |

Table 7: Showing the Duration of conservative treatment

Out of 208 patients, 84 patients underwent conservative management. The patients showing with minimal symptoms like foreign body sensation and mild throat pain are managed.
conservatively for few days of observation. They underwent regular follow up by clinical and radiological examination. Patients with persistent symptoms or progressively worsening symptoms after conservative management underwent endoscopic evaluation (Table 6). Out of 84 cases, in 46 cases (54%) the conservative management is successful. In the remaining 38 cases (46%) the conservative management is a failure and they underwent endoscopic evaluation (Table 7). Only 2(3%) foreign bodies are retrieved in failed conservative cases. In the rest, endoscopy demonstrated healing ulcers, mucosal injuries, edema and congestion of mucosa. No foreign bodies are detected during this procedure. Out of 84 patients who underwent conservative treatment, no complication occurred in the present study. 30 Patients (65%) of successful conservative management became completely symptom free within 2 days, 13 cases (28%) became symptom free within 6 days, while 3 cases (12%) had got symptom relief only after 12 days. 30 patients (78%) of failed conservative management came back with persistence of symptoms within 2 days. Out of these, 2 patient's foreign bodies are retrieved. 7 patients (18%) came after 6 days. Only 1 patient had persistence of symptoms after 12 days and was labeled as globus hystericus.

| Type of foreign body | No. of patients | Percentage |
|----------------------|----------------|------------|
| Fish                 | 38             | 61%        |
| Chicken              | 15             | 24%        |
| Beef bone            | 4              | 7%         |
| Food bolus           | 2              | 3%         |
| Denture              | 2              | 3%         |
| Pin                  | 1              | 2%         |

Table 8: Showing the types of foreign bodies in endoscopic retrieval

The types of foreign bodies retrieved by endoscopy have been studied. Most common foreign body retrieved is fish bone, in 38(61%) cases. Chicken bone in 15(24%) cases, beef bone in 4(7%) cases, food bolus in 2(3%) cases, denture in 2(3%) cases, pin in 1(2%) case (Table 8).

| Site of foreign body | No of patients | Percentage |
|----------------------|----------------|------------|
| Cricopharynx         | 31             | 50%        |
| Pyriform fossa       | 18             | 29%        |
| Cervical esophagus   | 9              | 14%        |
| Mid esophagus        | 3              | 5%         |
| Lower esophagus      | 1              | 2%         |

Table 9: Showing the sites of foreign body impaction on endoscopy

The location of foreign body impaction in throat and esophagus is studied radiologically and in correlation with endoscopy. Out of 62 patients of retrieved foreign bodies by endoscopy, most common site of foreign body impaction is at cricopharynx (50%). Other sites are pyriform fossa (29%), cervical esophagus (14%), thoracic esophagus (5%) and 1(2%) in lower esophagus (Table 9).
Patients, who are managed for impacted foreign bodies, are followed up to study the complications of the same. It was found that complications occurred in 22 cases. 7 cases presented with complication itself after foreign body impaction whereas in 15 cases the cause was iatrogenic. All the 7 patients who presented with complications itself in our emergency department are reported after few days of foreign body impaction. Out of 7, 3(42.8%) cases presented with retropharyngeal abscess, 2 cases (28.5%) presented with migrated foreign bodies, 1(14.3%) case with surgical emphysema of neck and 1(14.3%) case with Pneumo mediastinum after denture impaction at mid esophagus (Table 11). In 15 cases the complications were iatrogenic in origin. Out of this, 7 cases (46.6%) were surgical emphysema due to perforation at cervical esophagus, 6 cases (40%) were retropharyngeal cellulitis and 2(13.4%) cases were mediastinitis due to cervical esophageal perforation (Table 12).

| Type of complication | Number of Complication | Percentage |
|----------------------|------------------------|------------|
| Surgical emphysema   | 8                      | 36.5%      |
| Retropharyngeal cellulitis | 6                  | 27.4%      |
| Retropharyngeal abscess | 3                   | 13.6%      |
| Mediastinitis        | 2                      | 9%         |
| Pneumo mediastinum   | 1                      | 4.5%       |
| Migrated foreign body| 2                      | 9%         |
| **Table 10:** Showing total complications in the study |

| Type of complication         | Number of Complication | Percentage |
|------------------------------|------------------------|------------|
| Retropharyngeal abscess      | 3                      | 42.8%      |
| Surgical emphysema           | 1                      | 14.3%      |
| Pneumo mediastinum           | 1                      | 14.3%      |
| Migrated foreign body        | 2                      | 28.6%      |
| **Table 11:** Showing incidence of complications due to foreign body impaction |

| Type of complication         | Number of Complication | Percentage |
|------------------------------|------------------------|------------|
| Retropharyngeal cellulitis   | 6                      | 40%        |
| Surgical emphysema           | 7                      | 46.6%      |
| Mediastinitis                | 2                      | 13.4%      |
| **Table 12:** Showing the incidence of complications due to endoscopic procedure |
The sensitivity of digital X-ray in detecting complication was studied. All patients with suspected complication are evaluated with repeat X-ray followed by Contrast enhanced CT scans for confirmation. Out of 22 cases, 17 cases (77%) of complications diagnosed in digital X-ray itself. All cases of complication are confirmed with CECT. The sensitivity of digital X-ray is detecting complications was 77% in the present study (Table 13).

| Site of Perforation  | Number | Percentage |
|----------------------|--------|------------|
| Cervical esophagus   | 8      | 36%        |
| Cricopharynx         | 9      | 41%        |
| Mid esophagus        | 1      | 5%         |
| Pyriform fossa       | 4      | 18%        |

Table 14: Showing the incidence of site of perforation

In the present study the cervical esophagus is seen perforated in 8(36%) of the patients coming with complications, followed by cricopharynx 9(41%) and mid esophagus (5%) 1 (Table 14).

| Type of complication  | Total | Conservative | Surgery |
|-----------------------|-------|--------------|---------|
| Retropharyngeal cellulitis | 6     | 6            | 0       |
| Surgical emphysema    | 8     | 8            | 0       |
| Retropharyngeal abscess | 3     | 0            | 3       |
| Mediastinitis         | 2     | 2            | 0       |
| Pneumo mediastinum    | 1     | 0            | 1       |
| Migrated foreign body | 2     | 0            | 2       |

Table 15: Showing the different methods of management of complications

The role of conservative management in dealing with complications is studied. All iatrogenic complications are detected in immediate post-operative period itself. The patients with retropharyngeal cellulitis, surgical emphysema, and mediastinitis had been treated conservatively and the success rate is 100% (Table 15). 72% of complications due to perforation are treated successfully by conservative management. 28% cases underwent surgery. 2 cases of retropharyngeal abscess are managed by endoscopic incision and drainage. One case needed lateral pharyngotomy approach for drainage. 2 patients with migration of foreign bodies are retrieved by lateral pharyngotomy approach. Only one case of reported Pneumo mediastinum due
to denture impaction at thoracic esophagus directly underwent surgery by Thoracotomy approach and repair of the defect (table 16). The patient is followed up with contrast CT scan. The result was successful. The average hospital stay in complicated cases is 7 days.

| Type of Complication      | Endoscopic drainage | Pharyngotomy | Thoracotomy |
|---------------------------|---------------------|--------------|-------------|
| Retropharyngeal abscess   | 2                   | 1            |             |
| Pneumo mediastinum        |                     |              | 1           |
| Migrated foreign body     |                     | 2            |             |

Table 16: Showing the type of surgery in management of complication

Limitations of the present study: Radiological investigations were not standardized as it was interpreted by different ENT surgeons. 1. Clinical symptoms in patients taken for conservative management were not standardized. 2. Procedures done were not standardized as it was performed by different surgeons and 3. Laryngeal foreign bodies not included in this study.

DISCUSSION: Patients with foreign bodies in throat and esophagus require prompt diagnosis and therapy. The first aim is to determine the type of F.B., the time since ingestion, the location of the F.B. and the associated complications. Besides history and clinical examination, radiological investigation is an important diagnostic tool, to identify the foreign body and its location. A postero-anterior, lateral cervical and chest radiograph are basic radiological methods of foreign body detection. For non-radio opaque objects, indirect findings such as retropharyngeal bulge, surgical emphysema and fluid collection and gas bubble formation in X-ray may be helpful. Radiolucent object will require direct visualization like rigid endoscopy. In the present study, 208 patients are evaluated with radiographic study, 162 patients also by endoscopically. Those patients who needed endoscopic evaluation are treated as inpatients (IP). All 62(97%) foreign bodies except 2(3%) migrated foreign bodies retrieved endoscopically. A result of 85 to 100% was also seen in studies of Bigler et al, Campbell J et al, Aginaldi et al, Ong T et al and Mc Guirt W et al in endoscopic removal of foreign bodies. The sensitivity of digital X-ray in detecting foreign bodies in throat and esophagus is 55% and the specificity is 76%. The percentage of false positive results in this study was 22%. Studies have found that plain film is false negative in 30 to 55% of cases and false positive in 24% cases. 5(8%) cases showed indirect evidence of foreign bodies in digital X-ray in this study. Lowinger DSG et al in 1995 recommended looking for secondary changes providing clue to foreign body when foreign body is not seen radiologically. The bone density of fish and chicken bone is often incomplete making them radiolucent on plain films. In the present study, 61% foreign bodies retrieved endoscopically are fish bone. 24% foreign bodies are chicken bone. 2(3%) cases are food bolus which had given false negative results in X-ray. 2 cases are dentures. One type of denture which had metallic clips gave true positive result in X-ray, but the other one is radiolucent (false negative) in X-ray. Polymethyl methacrylate, the plastic from which most dentures are made is radiolucent in X-ray. All metallic foreign bodies like pins were radio opaque. Studies state that although a plain X-ray may not identify a swallowed denture, the investigation has been recommended to exclude Pneumo mediastinum - gas within mediastinum. The sensitivity and
specifyfity of fish bone presenting as foreign body was evaluated since it was the most common F.B. comprising 61% of retrieved foreign bodies. The sensitivity of digital X-ray was 42% and the specificity was 79%, the positive predictive value was 59% and the negative predictive value was 66%. Most of the common fishes like sardine and Mackerel are found radiolucent. Radiological opacity is not uniform even within one species. This is also observed in the study of Evans et al, Watanae et al, Eli and Palme. According to Palme, they detected 25 to 55% cases of fish bones in X-ray. 42% of fish bones were detected by X-ray in the present study. 13% cases showed indirect evidence of foreign body in digital X-ray in this study. Derwe A, Ophir D in 1994 found that there is variable sensitivity ranging from 34 to 55% due to variable lucency in different species of fish bone and also in same species. In this study 20% cases had given false positive result. Another study by Evans (1992) gave 86% specificity for plain X-ray. In this study the specificity was 79%. The deference may be due to observer variability in detecting false positive case in digital X-ray. The location of foreign bodies was studied radiologically in correlation with endoscopy. Out of 62 retrieved foreign bodies, most common site of foreign body impaction was at cricopharynx (50%), in pyriform fossa it was 29%, cervical esophagus 14%, thoracic esophagus 5% and in lower esophagus 2%. Same study results were reported previously by many authors. The etiological factors that contributed to false positive result in digital X-ray had been studied. All the false positive X-rays were evaluated by endoscopy and confirmed by CT scan. A total of 22(22%) cases reported as false positive. The entire age group reported false positive in this study were above 30 years. Fish bones typically appear as an area of slender radio opaque shadow that is much less opaque than human vertebrae. Out of 22 cases, 11 cases (45%) were due to calcification of cricoid cartilage at level of C5-C6, 25% cases due to ossification of thyroid cartilage at C5 level. 2 cases (8%) which gave false positive result at C6 level were due to ossification of anterior longitudinal ligament in the pre vertebral space. 3 cases (11%) were due to marginal vertebral body osteophytes at C6 level. 2(9%) cases were due to extra luminal foreign bodies which could not be detected endoscopically. A study by Salman, Kiney LA found that laryngeal cartilages may undergo calcification or endochondral ossification or both, and become visible radio graphically. The entire age groups reported false positive are above the age of 30 years in this study. A study by Muralidhar M, Vappal Pitti found that it is unusual to find ossification of superior margin of lamina or superior cornua of thyroid cartilage in isolation at an early age. Cricoid calcification typically follows that of thyroid cartilage. In adults thyroid calcification seems like a foreign body at C5-C6 level. Similarly the Cricoid cartilage calcification at C6-C7 level appears as a F.B. The calcification may be patchy or diffuse. Marginal vertebral osteophytes and ossification of anterior longitudinal ligament may be mistaken for a foreign body in X-ray. Typically osteophytes are located at inferior or superior margin of vertebral bodies and may extend vertically or obliquely anterior to disc space. Most of the cases there will be other changes in vertebral bodies. Overall 84 cases (46%) underwent Conservative management. Conservative management is successful in 54% of patients. Conservative management failed in 46% of patients. Similar studies were conducted by Wang YT (1992) and Chung ECH in 1994 which says that in the absence of frank clinical or radiological sign a short period of home observation followed by elective endoscopic evaluation in failed cases, which may be beneficial to allow natural selection (spontaneous dislodgement of impacted foreign body,
healing of abrasion and inflammation).^{21} Conservative treatment for foreign body reaching stomach was suggested by Mirhej et al recommends that, in the absence of frank clinical radiologic sign, observation and elective endoscopy up to 6 days did not result in complications so that we can reduce endoscopy defaulting rate. In the present study, in 54% cases conservative management was successful. In these patients endoscopic evaluation is avoided due to uncertain radiological evidence. Out of 46% of patients in whom conservative management underwent endoscopic evaluation only in 2(3%) and foreign bodies are retrieved. These patients came back with progressive symptoms on the 2\textsuperscript{nd} day of conservative management. No complications were reported in those patients who underwent conservative management. Complications can occur due to impaction of a foreign body in throat and esophagus. Impaction causes edema, weakening of walls of esophagus and throat. Complications can also occur during endoscopic retrieval of foreign bodies from throat and esophagus. In the present study, 5 patients (out of 62 retrieved foreign bodies) presented with complications due to foreign body impaction itself. In these patients X-ray did not demonstrate foreign body (radiolucent), but showed indirect evidence in the form of complication due to foreign body impaction and they underwent endoscopic retrieval of foreign body and managed the complications accordingly. Out of 5 complicated patients, 3(43%) patients came with retropharyngeal abscess due to foreign body impaction. 1(14.5%) patient with subcutaneous emphysema. 1(14.5%) patient with Pneumo mediastinum due to denture impaction at mid esophagus. 2(28.5%) patients of migrated foreign bodies are also reported which could not be detected by endoscopy. Most common complication observed due to foreign body impaction is retropharyngeal abscess which was also observed by Hung W et al.\textsuperscript{(22)} In a study by Okten I, Cangir AK one 2001, says that if cervical esophageal perforation was suspected lateral soft tissue neck X-ray should be taken. In cases of thoracic and intra abdominal esophageal perforations chest radiograph AP/ lateral view should be taken. Subcutaneous emphysema is typically seen in cervical esophagus perforation. This study also showed that all the patients of subcutaneous emphysema, the site of perforation are at the region of cervical esophagus. Out of 162 endoscopies, 15(9%) cases of iatrogenic complication are reported. Most common was subcutaneous emphysema (46.6%) due to cervical esophageal perforation. Subcutaneous emphysema were the most common complication in cervical esophageal perforation due to endoscopic procedure in previous other studies also. X-ray showed air in pre vertebral soft tissue plane. In one case X-ray demonstrated air extending to chest wall also. Other complications were retropharyngeal cellulitis, retropharyngeal abscess, and mediastinitis due to perforation in cervical esophagus and cricopharynx. In few cases, the site of perforation was at the level of pyriform fossa. 17(77%) of complications are diagnosed by digital X-ray alone. 23% of patients demonstrated indirect evidence of complication.\textsuperscript{(23)} Studies by Mosca S, Manes G, and Martino et al say that radiographic abnormalities may be detected in up to 90% of patients such as subcutaneous emphysema, Pneumo mediastinum, mediastinal widening, pleural effusion or pulmonary infiltrate. Radiographic changes may not be present in the first few hours after the perforation. Patients with suspected perforation should have contrast radiographic studies performed. All the complications due to foreign body impaction and iatrogenic perforations are detected in immediate postoperative period itself.\textsuperscript{(24)} According to Cameron JL, Keiffer RF, Hendrix TR study states that patients with small, well defined tears and minimal extra esophageal
involvement may better be managed by non-operative treatment if following conditions satisfied: 1) early or delayed diagnosis with contained leak, 2) perforation not in the abdomen, thorax 3) content of perforation draining back to esophagus 4) absence of sepsis. In this study, most of the complicated cases, perforations occurred at cricopharynx (40%) and cervical esophagus (36%). In 1 case the site of perforation was at thoracic esophagus which is treated with emergency Thoracotomy and repair of perforation of thoracic esophagus was done. Major prognostic factors determining mortality are the time of detection and location of the injury. 2 cases of retropharyngeal abscess are treated by endoscopic incision and drainage. In one patient of retropharyngeal abscess the patient underwent external drainage by lateral pharyngotomy approach. 2 patients of migrated foreign bodies are also removed by lateral pharyngotomy approach and 1 patient of thoracic perforation is treated by Thoracotomy approach. So 28% of complications are managed by surgery and the rest of complications (72%) are treated by conservative approach, under strict observation for worsening of symptoms. All cases had successful outcome. All cases of retropharyngeal cellulitis, subcutaneous emphysema of neck and chest, 2 case mediastinitis due to perforation in cervical esophagus are treated with conservative management successfully. The interval from perforation to the initiation of treatment is a crucial determinant of successful outcome. The average hospital stay for uncomplicated patients is 2.3 days and 7 days in complicated cases. The mortality is zero percentage. The overall sensitivity of digital X-ray in detecting foreign bodies in throat and esophagus in this study is 55% and the positive predictive value was 58%. In 5(8%) cases digital-X ray demonstrated indirect evidences of foreign bodies.

**CONCLUSIONS:** The value of digital X-ray for assessment of a patient with suspected foreign body impaction is vital considering the sensitivity, specificity and easy accessibility. The visibility of digital X-ray in fish bone foreign body varies with species to species and will depend on its ossification status. Endoscopic evaluation is considered superior to CT scan because it is diagnostic as well as therapeutic so that unnecessary radiation exposure to the patient can be avoided. In the absence of frank clinical or radiological signs, a short period of conservative management before proceeding to elective endoscopic procedure is advisable. This type of expectant management has the advantage of avoiding unnecessary instrumentation as well as being cost effective. A surgeon or physician should be aware of various calcifications and ossification of normal structures in soft tissue neck lateral view which may mimic a foreign body. Occurrence of this may result in the excessive investigation of the patient and wastage of manpower and resources. An impacted foreign body and its sequelae may go unrecognized due to over estimation of various physiological calcification seen in digital X-ray which may contribute to increased patient morbidity and mortality. Although digital X-ray has its own limitations due to typical and atypical physiologic calcifications in the neck, it is still an important first line investigation with a suspected foreign body impaction in throat and esophagus. If the radiograph is positive, unnecessary delay in further management of the patient can be avoided. Even though complications due to perforation are a dangerous condition, it depends on time of diagnosis, site of perforation and condition of the patient. In stable patients, complications due to perforation can be safely managed by conservative approach.
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