



Impact of Surgery on Impacted Dentures in the GIT -Case Series and Review of Literature



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Abstract

Dentures are an important cause of impaction in the Gastrointestinal tract especially in the elderly. These impacted dentures may be frequently overlooked due to their radiolucency and are frequently not amenable for endoscopic retrieval necessitating surgery for retrieval of these foreign bodies. The aim of this study is to describe the type of impaction, site, consequences and time interval to therapeutic intervention including the type of intervention and outcomes after accidental swallowing of dentures in a tertiary care referral hospital and assess the same in published medical literature throughout the world. From our experience, it is seen that dentures impacted in the cervical esophagus present earlier than those impacted in the thoracic esophagus as they are more symptomatic. Leaks at the primary closure site are more common in the cervical than thoracic esophagus which fortunately are more self-limiting and easily managed than thoracic leaks.

Keywords: Gastrointestinal tract; Dentures; Radiolucency; Endoscopic retrieval; Foreign bodies; Medical literature; Thoracic esophagus

Introduction

Impaction of dentures occurs most commonly in elderly in the oesophagus. Though most are non-impacted and amenable to endoscopic retrieval, impacted dentures usually require surgical retrieval. Delay in diagnosis of impacted dentures occurs commonly and is associated with significant morbidity and mortality.

Methodology/Results

The study was carried in a prospectively maintained database in a tertiary care hospital in southern India (2008-2017) where there is a large inflow of such impacted cases for management. Also, a comprehensive study of databases like PUBMED was also carried out to look for such cases and the inference of the study was duly noted.

Table 1: Level of impaction in oesophagus

Sl.no	Age /Sex	Time to Presentation (days)	Level of Impaction in Oesophagus	Endoscopy Failure	Management	Post Op Complication
1	50/m	2	Abdominal oesophagus	Yes	Laparotomy /abdominal gastrostomy -dislodgement /primary closure /FJ	nil
2	53/M	4	Thoracic	Yes	Thoracotomy oesophagostomy/FB retrieval	nil
3	48/f	2	cervical	yes	Cervical oesophagostomy & retrieval	nil
4	55/m	3	cervical	yes	Cervical oesophagostomy & retrieval	Closure site leak
5	48/f	20	thoracic	yes	Thoracotomy oesophagostomy/FB retrieval	nil
6	33/m	7.5 yrs	thoracic	yes	Thoracotomy oesophagostomy/FB retrieval	nil
7	53/m	21	thoracic	yes	Thoracotomy oesophagostomy/FB retrieval	nil
8	67/m	1	thoracic	yes	Thoracotomy oesophagostomy/FB retrieval	nil
9	65/m	3 yrs	thoracic	yes	Thoracotomy oesophagostomy/FB retrieval	Bleeding -re operation
10	57/m	4	cervical	yes	Cervical oesophagostomy & retrieval	nil

11	60/f	14	cervical	yes	Cervical oesophagostomy & retrieval	Nil. Normal gastrograffin study on POD 7
12	65/m	1	thoracic	yes	Thoracotomy oesophagostomy/FB retrieval	Controlled leak -managed conservatively
13	60/m	4	cervical	yes	Cervical oesophagostomy & retrieval	Nil. Normal gastrograffin on POD 7.

Our Experience

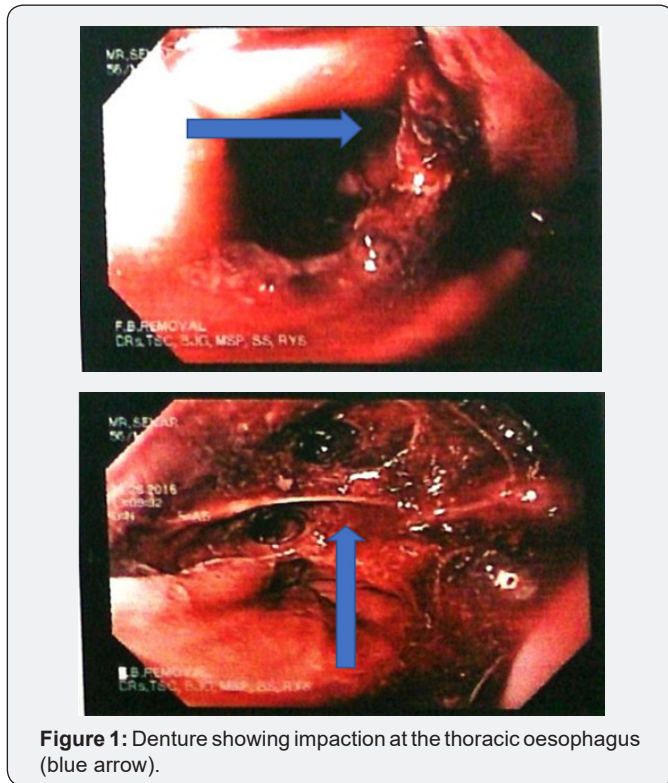


Figure 1: Denture showing impaction at the thoracic oesophagus (blue arrow).

In our series, 13 patients presented (11 M:2F) (average age-54.9 yrs) with endoscopic failed retrieval of partial, radiolucent impacted dentures without clasps at a median of 4 days (range, 1day-7.5 yrs) with 7 impacted at level of thoracic oesophagus, 5 in the cervical oesophagus and 1 in the stomach. All the impacted dentures in the cervical oesophagus were symptomatic with 71% (5/7) in the thoracic oesophagus presenting with chest pain. In view of previous failure with endoscopic retrieval, all patients with dentures impacted in the cervical oesophagus underwent cervical oesophagostomy by left cervical incision along the anterior SCM, retrieval and primary closure. All endoscopically refractory dentures impacted in the thoracic oesophagus (n=7) underwent a right thoracotomy and retrieval with intercostal drainage. The denture impacted at the OG junction was retrieved by making a gastrotomy and primary closure.40%(n=2) of patients who underwent cervical oesophagotomy and retrieval, developed leak, which was managed conservatively over a mean duration of 12 days. One of those who underwent thoracotomy (14.2%) developed leak which subsided on conservative treatment of 60 days and another patient (14.2%) developed severe

bleeding after surgery necessitating a relook surgery for arresting the bleeding site. Both patients made a delayed recovery (Table 1 & Figures 1-3).

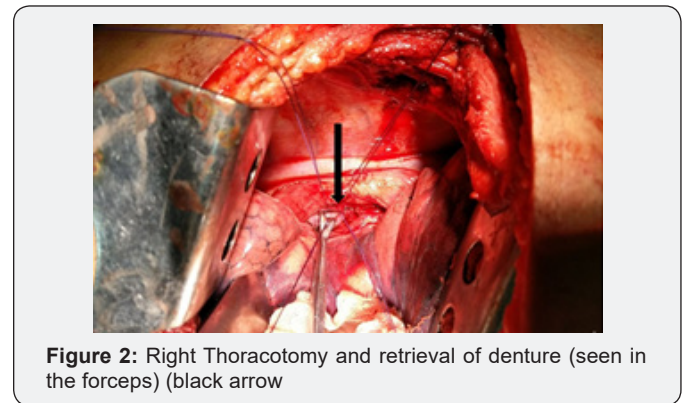


Figure 2: Right Thoracotomy and retrieval of denture (seen in the forceps) (black arrow)

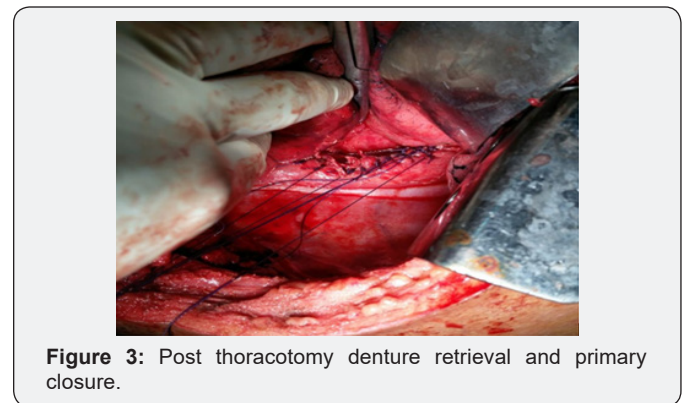


Figure 3: Post thoracotomy denture retrieval and primary closure.

Literature Review

Incidence of impacted dentures

According to current literature, the most common ingested Foreign Body (FB) in children are coins [1]. The frequency of swallowed foreign body (FB) in adults varies widely. In one study, the more commonly swallowed foreign bodies among adults are fish bones (9-45 %), bones (other than fish bones) (8-40 %), and dentures (4-18 %) [2]. Dentures are the most common FB among the elderly with a peak age incidence of 60 years [3].

The incidence of dentures as a source of impacted foreign body in the oesophagus varies widely in literature from 0.6% in a large series of over 2300 impacted oesophageal FBs to recent series which vary from 11.5% to 38.6% [4-6]. This discrepancy may be due to the sample size and reviewing of such cases from tertiary care centres only (where more difficult cases are usually referred) [7].

Dentures as foreign bodies are overlooked [8] because

- a) They are irregular and allow partial passage of food, giving a false security
- b) Radiolucent acrylic material is not picked up by conventional radiography.
- c) Though most recent dentures lack metal wires or hooks, the few that might have, may be overshadowed by other radio opaque shadows.

The emphasis is on early removal of impacted dentures due to the following reasons: a) Chance of spontaneous passage is small, b) Oedema at the local site grips the object firmly making later manipulation increasingly difficult c) Perforation of the Oesophagus and other blood vessels may be detrimental

Dentures -types

Dentures are nowadays made of acrylic radiolucent material which is a far cry from the radiopaque metallic dentures of the 1940s [9]. which has resistance to every day wear and tear [10]. They may be of two types- complete or partial, with or without metallic clasps.

The most dangerous type of denture causing impaction is the partial radiolucent acrylic denture without clasps which due to its small size (3-4 cm) [11,7], colour and radiolucency make diagnosis by endoscopy and x rays difficult. Dentures can be classified as bridges, crowns, partial dentures and others which includes cores and fractured clasps [12]. The ingested dentures are most commonly composed of crowns followed by bridges, partial dentures, metal cores and fractured clasps [12]. It is to be noted that crowns and bridges are smaller and are more amenable to endoscopic retrieval than other types of dentures. The most common dentures associated with impaction are the upper dentures though they are the ones most amenable to retrieval due to their relatively larger size [6,7].

Pathophysiology of mastication with dentures

A removable denture is a foreign body in the oral cavity and an ill-fitting denture can have negative effects on swallowing by impairing sensation in the oral cavity and this in the elderly can be compounded by a stroke which drastically increase the risk of aspiration and dysphagia [13,8].

Level of impaction of dentures in the GIT

The level of impaction of dentures may be at either of the two

Physiological constrictions (most common): The most common physiological constrictions causing impaction of swallowed dentures include

- a. Hypopharynx (level of vocal cords), which is amenable to endoscopic retrieval
- b. cervical oesophagus (level of upper oesophageal sphincter which is between cricopharyngeus and thoracic inlet). This is the most common site for impaction [6], and

can be retrieved by both endoscopy and surgery (cervical oesophagotomy)

c. Thoracic oesophagus (level of aortic arch and left bronchus). Impacted dentures at this level are prone for life threatening complications as they are in the vicinity of the great vessels after esophageal perforation. These can be retrieved by either a thoracotomy or thoracoscopy

d. **Ileocaecal region:** It is the most common site for perforation [14,15], due to metallic clasps and can be managed either by laparoscopically or open surgery.

e. Sigmoid colon [16], /Rectum [17] - These [18] can be accessed either by colonoscopy or laparotomy.

Pathological strictures can also cause impaction of foreign bodies necessitating retrieval

The incidence of stricture is reported to be 66.6% for the esophageal orifice, 19% for the tracheal bifurcation, and 14.3% for the esophageal hiatus [19]. The doctrine of masterly inactivity, once the foreign body passes the physiological constrictions, the cornerstone of management of ingested foreign bodies, need not necessarily apply to dentures due to their presence of clasps, irregular shape, relatively larger size and impaction even in the distal GIT like rectum.

Clinical Features of Impacted Dentures

The need for expeditious retrieval of impacted dentures is paramount as it reported that more than 24 hrs after ingestion, the rate of complications increases from 3.2% at 24 h to as high as 23.5% after 48 hrs [20]. In a study from Nigeria, only 54.5% reported to medical centre in 48 hrs reflective of the role of late compliance as a factor in complications due to impacted dentures [6]. dentures impacted at

Cervical oesophagus

The most common clinical features of dentures impacted in the cervical oesophagus include throat pain, tenderness and pooling of saliva [6]. Other rare features include hoarseness, fever and otalgia. (< 15%). Long standing dentures in the neck can mimic malignancy and even thyroid gland [21].

Thoracic oesophagus

Most cases of impaction at the thoracic level of recent onset can present with retrosternal or back pain [7]. Dentures impacted in the thoracic oesophagus can be asymptomatic for long when they mimic a malignancy and can present suddenly with features of massive UGI bleeding due to involvement of great vessels after oesophageal perforation [22,23].

Risk Factors for Impaction of Dentures

- a) Patient factors like increased risk for aspiration, epilepsy, depression, drug intake [24], late presentation to hospital, general anesthesia [25], rapid drinking pattern of liquids [7].

- b) Worn out dentures, ill-fitting dentures due to bone resorption with age [6].
- c) Acrylic, partial dentures
- d) Strictures and spasms of the distal oesophagus [26].

Complications

Jackson [27] reported the factors that contribute to over-looked of foreign bodies:

- 1) Failure to consider the possibility of a foreign object when developing a differential diagnosis;
- 2) Absence of a history suggesting a foreign body which is common in the elderly with dentures. Factors like neurological impairment, stay alone, absence of caregivers etc. may impair an accurate history; and
- 3) mimic of other diseases as asthma, pneumonia, or tumor. especially most impacted thoracic dentures may mimic oesophageal malignancy and even rare complications due to impacted thoracic dentures like vocal cord paralysis, bronchial and aortic involvement may mimic complications due to oesophageal carcinoma [23].

Complications of impacted dentures can be described at the

Level of oesophagus

- i. Aortic erosion [22]
- ii. Broncho aortic fistula [23]
- iii. Horners syndrome [28]
- iv. Oesophageal migration with diverticulum [29]
- v. Oesophageocarotid fistula [6]
- vi. RLN palsy. which is an entrapment neuropathy due to FB induced perioesophageal fibrosis [30].
- vii. Tracheoesophageal Fistula (TEF) [31-33]

Below the level of the oesophagus

- a) Enterocolonic fistula involving small bowel and transverse colon [34].
- b) Ileal impaction and perforation [35,36].
- c) Rectosigmoid perforation [16-18].

Investigations -Impacted Dentures

Radiographs

Radioluscent dentures are rarely seen on lateral x-rays. Also, it is to be noted that there is a decrease in the size of the foreign body on radiological examination [7]. And hence, they do not significantly impact on subsequent management [7,37]. The classical findings include prevertebral soft tissue shadow (45%), and air entrapment around the denture (40 %) and wire clasps (27%) [6].

CT

The findings include mildly hyperdense curvature and air around the dentures may be seen [38].

Endoscopy

Rigid endoscopy: under ETGA/muscle relaxation can be done with success rate of 80% [39]. However, it is to be noted that endoscopic retrieval of dentures is associated with lacerations of the mucosa which are prone to perforation. Endoscopy, in some cases of impacted dentures, is more or less a blind procedure as vision is obscured by edematous mucosa, hidden or perforated denture edges and imperceptible hue of denture from surrounding mucosa

Maneuvers used to cause disimpaction and increase yield of endoscopic retrieval

- a) Grasping forceps are most commonly used to retrieve dentures endoscopically [40]. In a study from Japan, Mazuno [12] described their success rate at > 90%. However, it must be noted that 13/23 (56.25%) were crowns which are smaller and amenable to easier endoscopic extraction
- b) Retrieval nets can also be used to retrieve small dentures like crowns [12]. However, it must be used judiciously since their irregular surface may injure the mucosa during retrieval
- c) Shear forceps to fragment and dislodge dentures and screw into the substance of FB to increase purchase before extraction [40].
- d) Use of overcovering plastic incubators before extraction [40]
- e) Hd YAG laser to fragment denture [41,42].
- f) Oral side balloon or transparent cap to disimpact foreign body [43].
- g) Cotton sliver soaked in saline to disimpact [44].
- h) Long rotation of scope or sounding the foreign body with cannula in case of suspicion [7].

Complications related to perforation during endoscopic instrumentation include paraesophageal abscess, mediastinitis, pericarditis, pneumothorax, pneumomediastinum, tracheoesophageal fistula, and vascular injury [41].

Flexible fibreoptic oesophagoscopy: are for use under topical anesthesia, permitting safer inspection, biopsy and photography.

The standard technique using rigid oesophagoscope are not superseded, nor are they likely to be, in the foreseeable future, for foreign body removal [8].

Fluoroscopy

Upper gastrointestinal tract radiography using a non-ionic water-soluble contrast medium may be used to rule out

perforations (especially when aspiration is a risk) [7] (Table 2).

Treatment Options

Table 2: Treatment of ingested dentures.

Non-Impacted	Impacted
Conservative	Endoscopic
Endoscopic	Surgery (open/Min Invasive)
Surgery	Others (Glucagon)

Conservative management

There is a role for conservative management in the treatment of ingested dentures. The indications include asymptomatic patients, nonimpacted dentures, preferably small (<2.5 cm in diameter, < 6 cm in length, [45], radio dense dentures without clasps or irregular edges. The exact duration for such management is unknown which may vary from 1 -6 weeks in literature [45,46]. The advantage of such an approach is the absence of morbidity due to an additional intervention which must be balanced against the need for routine confirmatory radiography and possibility of perforation during the waiting period.

Endoscopic retrieval

The range of foreign bodies able to be removed with a flexible gastroscope has expanded with the development of newer snares, cages, and forceps. Removal of a foreign body with the flexible gastroscope is more likely to be successful and atraumatic when the foreign body does not have sharp or penetrating edges.

Glucagon

Glucagon has been used in impacted oesophageal dentures which relaxes the esophageal smooth muscle effecting the transition into the stomach. Ferrucci et al, [47] reported good outcomes using this method. However, other authors have not found glucagon to be as reliable, with success rates between 29- 50%. It is believed that use of smooth muscle relaxants/promotility agents is contraindicated for removing all foreign bodies except food boluses [48].

Surgery

Cervical oesophagus

Cervical oesophagotomy

Since Markoe [49] demonstrated the feasibility of using the cervical approach for esophagotomy to remove foreign bodies from the esophagus, many articles have supported this as the gold standard in impacted cervical oesophageal foreign bodies in

general and dentures, especially in those with failed endoscopic retrieval [40,50-52]. After surgical retrieval, the oesophagostomy can be closed primarily or over a T tube in case of friable tissue [53].

Thoracic oesophagus

Posterolateral Thoracotomy over the right side is used to access the oesophagus for retrieval of impacted dentures where the oesophagus may perforate during retrieval increasing the morbidity and mortality of the procedure.

Moghissi [54] reported that ten of 39 cases with oesophagus perforation occurred during removal of the foreign body. This author reported a mortality rate of 48% in cases of thoracic oesophageal perforation. Some authors have described thoroscopic approach to access the oesophagus with reduced morbidity and mortality [56,57].

Stomach

Both open gastrotomy and laparoscopy have been tried to retrieve denture in the stomach after endoscopic failure where gastrotomy can be tried after failed laproscopic retrieval [57].

Ileocecal region/rectosigmoid

Ileocaecal region is the most frequent site of perforation especially when the swallowed object has sharp edges like clasps of a removable denture. If the dentures become impacted at these sites, urgent laparotomy and Foreign body retrieval is to be done to avoid perforation.

Prevention of Impaction

A survey of dentists in the U.S. revealed that identification and retrieval of dental prostheses are complicated by the radiolucency of the materials used in the manufacture of some devices. Radiolucency in denture materials has been addressed repeatedly by dental organizations with no standard manufacturing protocol [58,59].

The mandatory incorporation of radiopaque material in dental resins is still not feasible, as they cannot match the physical properties, appearance and the ease of handling of currently used radiolucent dentures. The incorporation of heavy metal salts or glass fillers not only is unsightly, but also weakens the material, thereby increasing the risk of fracturing and swallowing a fragment [5]. Use of 12% barium fluoride [60] which maintains the mechanical and aesthetic properties and radiopaque wires have not seen widespread use [5, 61-84] (Table 3).

Table 3: Cases of impacted dentures reported

Sl.no	Author (Year of Publication)	No.of Cases	Level of Impaction in Oesophagus	Management /Complications
1)	Nwafo [40]	3	Thoracic (3)	Thoracotomy (3)
2)	Singh [22]	1	Thoracic	Aortic erosion -Death
3)	Delince [62]	3	Thoracic (3)	Thoracotomy (3)
4)	Peter [24]	1	Cervical	Endoscopic

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5)	Payne [63]	1	Thoracic	Endoscopic
6)	Beaumont [46]	1	Thoracic	Conservative (6 wks)
7)	Tahaa [23]	1	Thoracic	Aortic,bronchial erosion, vocal cord palsy--death
8)	Rajesh [31]	1	Thoracic-TEF	TEF, Thoracotomy with TEF repair
9)	Brunello [64]	1	Thoracic	Endoscopic
10)	Tzou [65]	1	-	Conservative
11)	Lam [42]	1	Thoracic	Laser dislodgement and endoscopic gastric retrieval.
12)	Abdullah [5]	21	Thoracic	16-endoscopic, 5-Conservative
13)	Dhingra [8]	2	Thoracic	Endoscopic
14)	Stiles [60]	1	Cervical	Cervical oesophagomyotomy
15)	Ghori [16]	1	Sigmoid perforation	Laprotomy
16)	Ngwaro [66]	1		Endoscopic
17)	Wagholikar [32]	1	Thoracic-TEF	Subtotal oesophagectomy with cervical anastomosis
18)	Rahden [53]	1	cervical	Ttube with drainage
19)	Firth [9]	1	cervical	Endoscopic
20)	Furihata [57]	1	stomach	Lap gastrotomy, retrieval and closure
21)	Hashmi [67]	3	2-cervical, 1-stomach	2-cervical oesophagotomy, 1-gastrotomy
22)	Nwaorgu [6]	22		17- endoscopic, 3-cervical oesophagotomy, 1-conservative, 1-death
23)	Ekanem [68]	1	Thoracic	Aortic erosion -Death
24)	Gu [69]	1	ileal perforation	Laparotomy /retrieval and closure
25)	Chua [50]	1	Cervical	Cervical oesophagomyotomy
26)	Samasaram [33]	1	Thoracic-TEF	TEF, Thoracotomy with TEF repair with flap
27)	Palanivelu [55]	1	Thoracic	Thoracoscopic retrieval (prone)
28)	Vivaldi [51]	2	Cervical	Cervical oesophagomyotomy
29)	Akinpelu [28]	1	Cervical	Cervical oesophagomyotomy
30)	Yadav [52]	5	Cervical	Cervical oesophagomyotomy
31)	Adhikari [70]	1	Cervical	Cervical oesophagomyotomy
32)	Rashid [71]	1	ileal perforation	Ileocecal resection and retrieval
33)	Imam [72]	1	Cervical	Cervical oesophagomyotomy
34)	Ratha PK [73]	1	Thoracic	Endoscopic
35)	Tanrikulu [36]	1	Illeal impaction	Laprotomy -
36)	Fang [74]	6	Cervical	Cervical oesophagomyotomy
37)	Dalvi [75]	1	Thoracic	Thoracoscopic retrieval (left lateral position)
38)	Repanos [76]	1	Cervical	Cervical oesophagomyotomy
39)	Gallas [14]	1	Cervical	Endoscopic
40)	Webester [15]	1	Cervical	Endoscopic
41)	Sahaa [77]	3	2-thoracic,1-cervical	2-thoracotomy, 1-cervical oesophagomyotomy
42)	Toshima [3]	3	Cervical	Cervical oesophagomyotomy
43)	Kumar [78]	1	Cervical	Endoscopic
44)	Orji T [79]	20		11-Endoscopic, Cervical oesophagomyotomy-1, Thoracotomy -6, conservative-2

45)	Lee [80]	1	Pharynx	Endoscopic
46)	Singh [81]	1	Gastro oesophageal junction oesophagus	THE
47)	Adelji [82]	14		11-Endoscopic, 2-Conservative
48)	Abe K [83]	1	Impacted cecum	Colonoscopic retrieval
49)	Dar [84]	1	cervical	Endoscopic
50)	Sarvesh [55]	1	Thoracic	Thoracosopic retrieval
51)	Gachabayov M [11]	2	1-Ileal impaction	1-laprotomy, 1-conservative
52)	Chawla [33]	4	Cervical	Cervical oesophagomyotomy
53)	Bandhopadhya [7]	45		44-endoscopic, 1-cervical oesophagotomy
54)	Mizuno [12]	23		
55)	Yamamoto [17]	2 simultaneous denture fragments	1-hypopharynx	Endoscopic
			1-rectum	Rectal excision and retrieval

Conclusion

A careful clinical history and a radiologic examination is paramount in a suspected case of ingestion though it might not be very useful. Partial radiolucent dental prostheses without metal clasps, though not as common as those metal clasps to get impacted, present a diagnostic challenge. Impacted dentures the esophagus for greater than 24 hours cause oesophageal damage necessitating rapid intervention to avoid perforation. Endoscopic retrieval can be tried as first method for extraction. If the impacted foreign body cannot be removed endoscopically, surgical removal should be undertaken. Preventing the ingestion of dental prostheses involves patient education (61) regarding the potential risks of wearing broken or defective dentures.

References

- Cheng W, Tam PK (1999) Foreign body ingestion in children: experience with 1,265 cases. *J Pediatr Surg* 34(10): 1472-1476.
- Ambe P, Weber SA, Schauer M, Knoefel WT (2012) Swallowed foreign bodies in adults. *Dtsch Arztebl Int* 109(50): 869-875.
- Toshima T, Morita M, Sadanaga N, Yoshida R, Yoshinaga K, et al. (2011) Surgical Removal of a Denture with Sharp Clasps Impacted in the Cervicothoracic Esophagus: Report of Three Cases. *Surg Today* 41(9): 1275-1279.
- P Nandi, Ong GB (1978) Foreign body in the oesophagus: review of 2394 cases. *Br J Surg* 65(1): 5-9.
- Abdullah BJ, Teong LK, Mahadevan J, Jalaludin A (1998) Dental prosthesis ingested and impacted in the esophagus and orolaryngopharynx. *J Otolaryngol* 27(4): 190-194.
- Nwaorgu OG, Onakoya PA, Sogebi OA, Kokong DD, Dosumu OO (2004) Esophageal impacted dentures. *J Natl Med Assoc* 96(10): 1350-1353.
- Bandyopadhyay SN (2014) Impacted dentures in the oesophagus. *The Journal of Laryngology & Otology* 128(5): 468-474.
- PL Dingra, Bansal R (1998) Overlooked Impacted Dentures and Their Unusual Complications. *IJO & HNS* 50(3): 277-279.
- Firth AL, Moor J, Goodyear PWA, Strachan DR (2003) Dentures may be radiolucent. *Emerg Med J* 20: 562-563.
- Rehmann P (2013) Treatment outcomes with reversible partial dentures. A retrospective analysis. *Int J Prosthodont* 26(2): 147-150.
- M Gachabayov, Isaev M, Orujova L, Isaev E, Yaskin E, et al. (2015) Swallowed dentures. Two cases and a review. *Annals of Medicine and Surgery* 4(4): 407-413.
- Mizuno K (2016) Endoscopic Removal of Ingested Dentures and Dental Instruments: A Retrospective Analysis. *Gastroenterology Research and Practice* 5.
- Son DK (2013) The Effects of Removable Denture on Swallowing *Ann Rehabil Med* 37(2): 247-253.
- Gallas M (2012) Unnoticed swallowing of a unilateral removable partial denture. *Gerodontology* 29(2): e1198-e1200.
- Webster PJ, Peckham-Cooper A, Lansdown M (2011) Small bowel perforation secondary to accidental dental plate ingestion. *Int J Surg Case Rep* 2(7): 218-220.
- Ghori A, Dorricott NJ, Sanders DS (1999) A lethal ectopic denture: an unusual case of sigmoid perforation due to unnoticed swallowed dental plate. *JR Coll Surg Edin* 44(3): 203-204.
- Ryosuke Yamamoto (2017) Two swallowed dentures found in the hypopharynx and rectum of an elderly Japanese woman simultaneously. *Acta Oto-Laryngologica Case Reports* 2(1): 43-46.
- Cleator IG, Christie J (1973) An unusual case of swallowed dental plate and perforation of the sigmoid colon. *Br J Surg* 60(2): 163-165.
- Nijhawan S, Shimpi L, Mathur A, Mathur V, Roop Rai R (2003) Management of ingested foreign bodies in upper gastrointestinal tract: Report on 170 patients. *Indian J Gastroenterol* 22(2): 46-8.
- Khan MA, Hameed A, Choudhry AJ (2004) Management of foreign bodies in the esophagus. *J Coll Physicians Surg Pak* 14(4): 218-220.
- Carson GG, Schneider LG (1982) Lump in the throat. *Oral Surg* 54: 253.
- Singh B, Puri ND, Kakar PK (1978) A fatal denture in the oesophagus. *J Laryngol Otol* 92(9): 829-831.
- Taha AS, Nakshabendi I, Russell RI (1992) Vocal cord paralysis and oesophago broncho-aortic fistula complicating foreign body-induced oesophageal perforation. *Postgrad Med J* 68(798): 277-278.
- Peters TE, Racey GL, Nahman BJ (1984) Dental prosthesis as an unsuspected foreign body. *Ann Emerg Med* 13(1): 60-62.
- Neustein S (2007) Ingestion of a Fixed Partial Denture During General Anesthesia. *Anesth Prog* 54(2): 50-51.
- Tibbling L, Stenquist M (1991) Foreign bodies in the esophagus. A study of causative factors. *Dysphagia* 6(4): 224-227.

27. Brooks JW (1972) Foreign bodies in the air and food passages. *Ann Surg* 175(5): 720-734.
28. Akinpelu OV, Amusa YB, Eziyi JA, Haastrup AA, Ameye SA (2007) Oesophageal denture impaction producing Horner's syndrome: a case report. *J Laryngol Otol* 121(9): e17.
29. Olak J, Jeyasingham K (1991) Cervical oesophageal diverticulum associated with an impacted denture. *Can J Surg* 34(6): 614-617.
30. von Haacke NP, Wilson JA (1986) Missing denture as a cause of recurrent laryngeal nerve palsy. *Br Med Journal (Clin Res Ed)* 292(6521): 664.
31. Rajesh PB, Goiti JJ (1993) Late onset tracheo-oesophageal fistula following a swallowed dental plate. *Eur J Cardiothorac Surg* 7(12): 661-662.
32. Wagholikar GD, Sikora SS (2001) Impacted denture causing Tracheo oesophageal fistula. *Indian J Gastroenterol* 20(4): 159-160.
33. Samarasam I, Chandran S, Shukla V, Mathew G (2006) A missing denture's misadventure! *Dis Esophagus* 19(1): 53-55.
34. Sejdinaj I, Powers RC (1973) Enterocolonic fistula from swallowed denture. *JAMA* 225(8): 994.
35. Goodacre CJ (1987) A dislodged and swallowed unilateral removable partial denture. *J Prosthet Dent* 58(1): 124-125.
36. Yusuf Tanrikulu, Serap Erel, Kemal Kismet, Mefaret Sahin, Evren K Ortac, et al. (2009) Accidental swallowing of partial denture: a case report. *Cases Journal* 2: 9363.
37. Jones NS, Lanningan FJ, Salaama NY (1991) Foreign bodies in the throat: a prospective study of 388 cases. *J Laryngol Otol* 105(2): 104-108.
38. Chawla A (2015) Imaging findings of swallowed dentures: a case series. *Emerg Radiol* 22(6): 717-721.
39. Hans S, Kayhan B, Dural K, Koçer B, Sakinci U, et al. (2005) A new and safe technique for removing cervical oesophageal foreign body. *Turk J Gastroenterology* 16(2): 108-110.
40. Nwafo DC, Anyanwu CH, Egbue MO (1980) Impacted esophageal foreign bodies of dental origin. *Ann Otol Rhinol Laryngol* 89(2): 129-131.
41. Stack LB, Munter DW (1996) Foreign bodies in the gastrointestinal tract. *Emerg Med Clin North Am* 14(3): 493-4521.
42. YH Lam (1997) Laser-Assisted Removal of a Foreign Body Impacted in the Esophagus. *Lasers Surg Med* 20(4): 480-482.
43. Jeen YT (2001) Endoscopic retrieval of sharp foreign body impacted in the oesophagus. *Endoscopy* 33(6): 518-522.
44. Fang R (2010) Endoscopic retrieval of oesophageal impacted dentures. *Ann Oto Rhin Laryngol* 119(4): 249-251.
45. Abusamaan M, Giannobile WV, Jhawar P, Gunaratnam NT (2014) Swallowed and Aspirated Dental Prostheses and Instruments in Clinical Dental Practice: A Report of Five Cases and a Proposed Management Algorithm *JADA* 145(5): 459-463.
46. Beaumont RH (1987) Retrieval of a swallowed casting 6 weeks after ingestion: a case report. *Oral Surg Oral Med Oral Pathol* 64(3): 287-288.
47. Ferrucci JT, Long JA (1977) Radiologic treatment of esophageal food impaction using intravenous glucagons. *Radiology* 125(1): 25-28.
48. Chin RY (2009) Dysphagia After Emergency Intubation: Case Report and Literature Review. *Dysphagia* 24: 105-108.
49. Markoe TM (1886) Esophagotomy for foreign bodies lodged in the tube. *Ann Surg* 4: 193-207.
50. Chua YKD, See JY, Ti TK (2006) Oesophageal-impacted denture requiring open surgery. *Singapore Med J* 47(9): 820.
51. Vivaldi C, D Vallböhmer, M Hölscher, AH Hölscher (2008) Akzidentell ingestierte Zahnprothesen. *Zentralbl Chir* 133(1): 82-85.
52. Rajkumar Yadav, Gaurav Mahajan, Rajendra Mohan Mathur (2008) Denture plate foreign body of esophagus. *IJT CVS* 24: 191-194.
53. Rahden BH von, Feith M, Dittler HJ, Stein HJ (2002) Cervical esophageal perforation with severe mediastinitis due to an impacted dental prosthesis. *Dis Esophagus* 15(4): 340-344.
54. Moghissi K, Pender D (1998) Instrumental perforations of the oesophagus and their management. *Thorax* 43(8): 642-646.
55. Palanivelu C, Rangarajan M, Parthasarathi R, Senthilnathan P (2008) Thoracoscopic Retrieval of a "Smiling" Foreign Body from the Proximal Esophagus An Impacted Denture. *Surg Laparosc Endosc Percutan Tech* 18(3): 325-358.
56. Sarvesh C (2015) Unusual presentation of an Ingested Denture. *International Journal of Advanced Research* 3(3): 55-57.
57. Furihata M, Tagaya N, Furihata T, Kubota K (2004) Laparoscopic removal of an intragastric foreign body with endoscopic assistance. *Surg Laparosc Endosc Percutan Tech* 14(4): 234-237.
58. Whitesides LM, Dreesen E (1997) Fortuitous discovery of an aspirated denture flange during bronchoscopy. *J Oral Maxillofac Surg* 55(4): 408-410.
59. Bloodworth KE, Render PJ (1992) Dental acrylic resin radiopacity: literature review and survey of practitioners' attitudes. *J Prosthet Dent* 67(1): 121-123.
60. Coombe EC (1972) Further studies in radio-opaque denture-base material. *J Dent* 1(2): 93-97.
61. Stiles BM (2000) Denture esophageal impaction refractory to endoscopic removal in a psychiatric patient. *The Journal of Emergency Medicine* 18(3): 323-326.
62. Delince P, Amiri-Lamraski MH (1984) Perforating injury of the thoracic esophagus caused by a dental prosthesis. *Acta Chir Belg* 84(1): 13-17.
63. Payne SDW (1984) Radiolucent dentures impacted in the oesophagus. *BJS* 17(4): 318.
64. Brunello DL, Mandikos MN (1995) A denture swallowed. Case report. *Aust Dent J* 40(6): 349-351.
65. Tzou YW, Hwang SJ, Yu FK, Liou CS, Chang YT, Ho ST (1995) Swallowing of fixed denture following general anesthesia - a case report. *Acta Anaesthesiol Sin* 33(2): 133-136.
66. Ngeow WC (2001) Ingested denture. *Br Dent J* 191: 41
67. Hashmi S, Walter J, Smith W, Latis S (2004) Swallowed partial dentures. *J R Soc Med* 97(2): 72-75.
68. Ekanem VJ, Obuekwe ON, Unuigbo A (2005) Death from ingestion of removable partial denture: a case report. *Niger Postgrad Med J* 12(1): 65-66.
69. Gu YC, Yuan JM (2006) Case report of enterobrosis and diffuse peritonitis caused by a swallowed removable partial denture. *Shanghai Kou Qiang Yi Xue* 15(4): 446-448.
70. Adhikari P (2008) Impacted Denture in the Oesophagus: Case report and review of Literature. *The Internet Journal of Otorhinolaryngology. Cases J* 8(2): 392.
71. Rashid F (2008) Swallowed dental bridge causing ileal perforation: a case report. *Cases J* 1(1): 392.
72. Imam SZ, Ikram M, Fatimi S, Iqbal M (2009) Cervical oesophagotomy for an impacted denture. A case report. *ENT Journal* 88(3): 833-834.
73. Rathore PK, Raj A, Sayal A, Meher R, Gupta B (2009) Prolonged foreign body impaction in the oesophagus. *Singapore Med J* 50(2): e53-54.

74. Fang R (2010) Endoscopic removal of oesophageal impacted dentures. *Ann Oto Rhinol Laryngol* 119(4): 249-251.
75. Dalvi AN, Thapar VK, Jagtap S, Barve DJ, Savarkar DP, et al. (2010) Thoracoscopic removal of impacted denture. *Journal of Minimal Access Surgery* 6(4): 119-121.
76. C Repanos, O Hughes, J Waldron (2010) Management of ingested dentures. *Emerg Med* 27: 723.
77. Saha S (2011) Perils of Prolonged Impaction of Oesophageal Foreign Bodies. *ISRN Surgery*.
78. Kumar S, Srinivasan S, Peh WC (2012) Clinics in diagnostic imaging (142). Cervical oesophagus impacted partial denture. *Singapore Med J* 53(10): 690-692.
79. Orji FT, Akpeh JO, Okolugbo NE (2012) Management of Esophageal Foreign Bodies: Experience in a Developing Country. *World J Surg* 36(5): 1083-1088.
80. Lee MJ (2013) Delayed diagnosis of impacted partial denture in a patient with mental retardation. *Singapore Med J* 54(9): e190-e192.
81. Singh P, Singh A, Kant P, Zonunsanga B, Kuka AS (2013) An Impacted Denture in the Oesophagus- An Endoscopic or A Surgical Emergency-A Case Report. *J Clin Diagn Res* 7(5): 919-920.
82. Adedeji TO, Olaosun AO1, Sogebi OA2, Tobih JE (2014) Denture impaction in the oesophagus experience of a young ENT practice in Nigeria. *Pan Afr Med J* 18: 330.
83. Abe K, Miki A, Okamura T, Shimada K, Yamamoto T (2014) Endoscopic removal of a denture with clasps impacted in the ileocecum. *Clin J Gastroenterol* 7(6): 506-509.
84. Dar GA, Ganie FA, Ishaq M, Jan K, Ali ZS, et al. (2015) Prolonged Impacted Denture in the Esophagus: A Case Report and Review of the Literature. *Bull Emerg Trauma* 3(1): 32-35.



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