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Denture Foreign Bodies Impacted in the Thoracic Esophagus. A systematic review

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Running head: Denture impacted in esophagus

Foreign bodies impacted in the esophagus are frequently encountered in children, often related to insertion of objects into their mouths while playing. In the adult, and in particularly in the elderly, the most common foreign body is dentures (1), usually attributed to a gradual loss of sensitivity and poor control of the laryngopharynx. The ingestion of a removable partial denture, as well as its impaction into the thoracic esophagus, however, is uncommon.

This systematic review aimed to report the appropriate management of impacted removable partial denture in the thoracic esophagus.

Key words: esophagus, foreign body, perforation, endoscope, surgery, denture

MATERIAL AND METHODS

Search Strategy: An extensive electronic search of the relevant literature without limitation to the English language was carried out using Medline, Google, Scopus and "l'Institut de l'information scientifique et Technique (CNRS-France)"databases. The last electronic search was performed on April 30th, 2010. Key words used for the final search were "removable partial denture" and "thoracic (o) esophagus".

Inclusion and Exclusion criteria: All relevant studies reporting one or several cases as mentioned above and published in a peer-reviewed journal were considered for analysis. Incomplete abstracts and cases dealing with removable partial dentures that were not impacted into the thoracic esophagus were not retained. Data from editorials, letters to editors, review articles were excluded from analysis. Structured abstracts of all potentially relevant articles were screened and accepted for analysis.

End Points: The main endpoints were mortality and morbidity rates.

DATA COLLECTION AND ANALYSIS

Data available from individual studies included demographic characteristics of patients, clinical presentations, investigations to localize the foreign body, endoscopic exploration, surgical approaches, surgical techniques, complications, death and hospital stay. A descriptive analysis of the retained studies was adopted. Quantitative variables were expressed by means +/- standard deviation and for non Gaussian distributions, by median values with ranges. Comparisons between endoscopic extraction successes versus failures and between endoscopic extraction versus surgery were performed by the Mann Whitney and Fisher exact tests, as appropriate. The level of significance was set to 0.05

RESULTS

Retrieved Reports: We screened 40 reports corresponding to 43 cases. After checking the inclusion and exclusion criteria, we retained 14 studies (17 patients) (2-15) for final analysis and when we added our case we obtained a sample of 18 patients available for this systematic review of literature (figure n°1). All these studies were retrospective, published between 1988 and 2009.

DESCRIPTIVE ANALYSIS

Fifteen men and three women, mean age 48 ±18 years were culled (table n°1). Only two patients had senile dementia. The median time between ingestion and consultation was seven days (range 0 to1095 days). The ingestion of the removable partial dental prosthesis occurred during voluntary swallowing in eight cases, following a direct impact on the face in two cases,

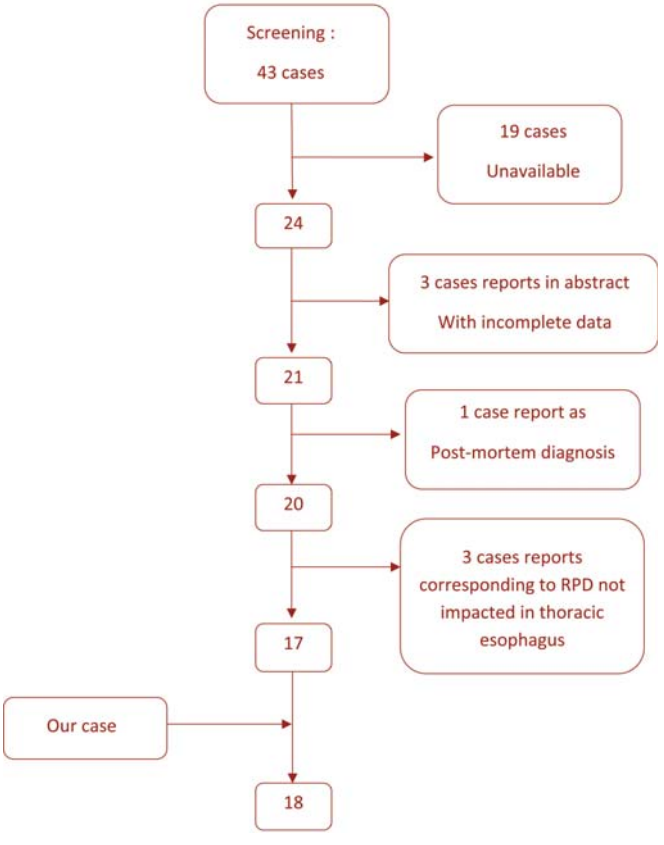

Figure 1: **Flow chart showing screening process of relevant articles**

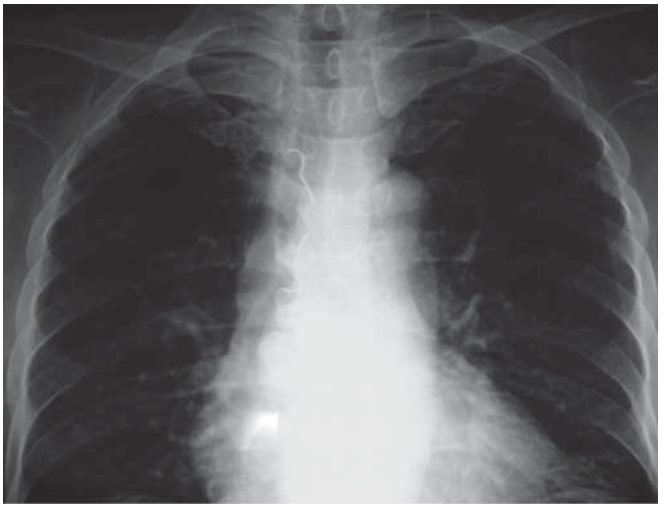

Figure 2: **chest X ray showing metal hooks of denture (our case in Charles Nicolle hospital of Tunis – Tunisia)**

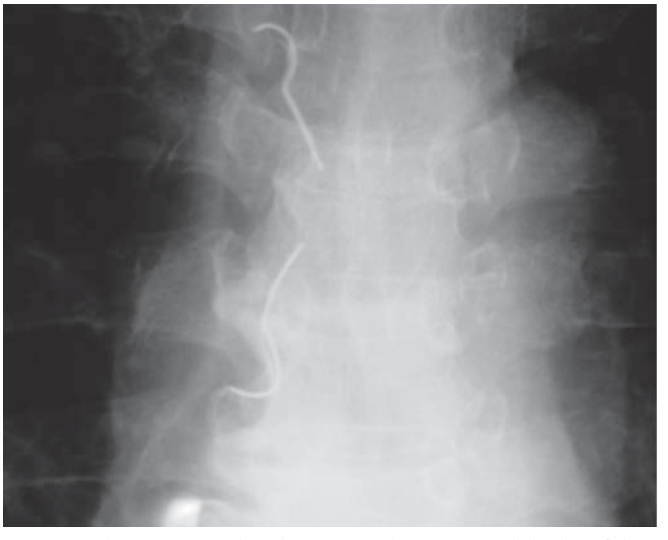

Figure 3: **chest X ray with enlargement showing metal hooks of denture (our case in Charles Nicolle hospital of Tunis – Tunisia)**

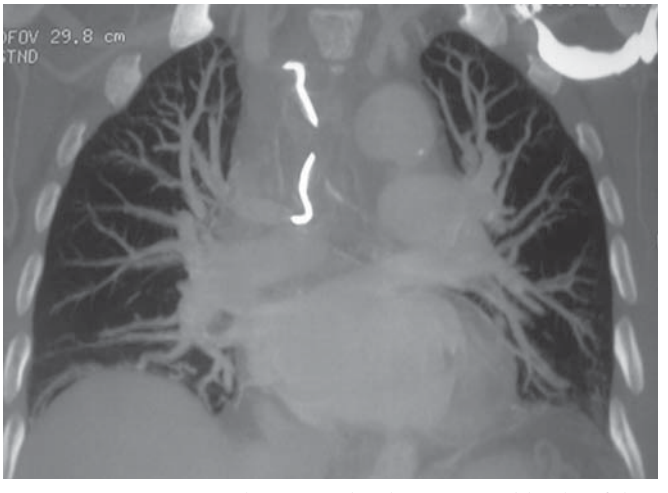

Figure 4: **Front computed tomography showing metal hooks of denture (our case in Charles Nicolle hospital of Tunis – Tunisia)**

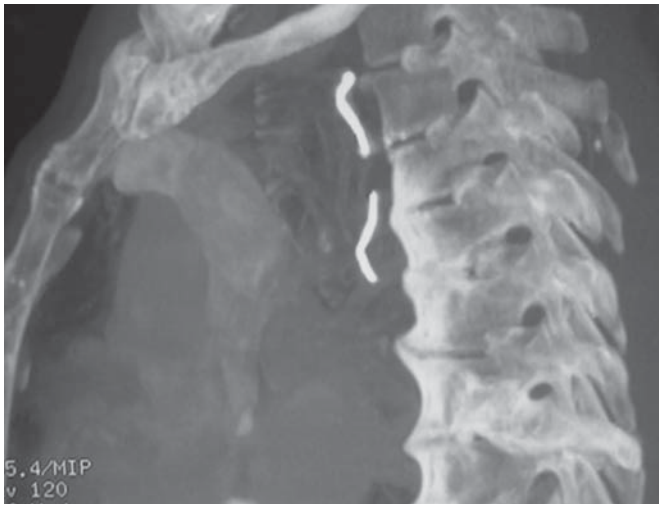

Figure 5: **Computed tomography in profile showing metal hooks of denture (our case in Charles Nicolle hospital of Tunis – Tunisia)**

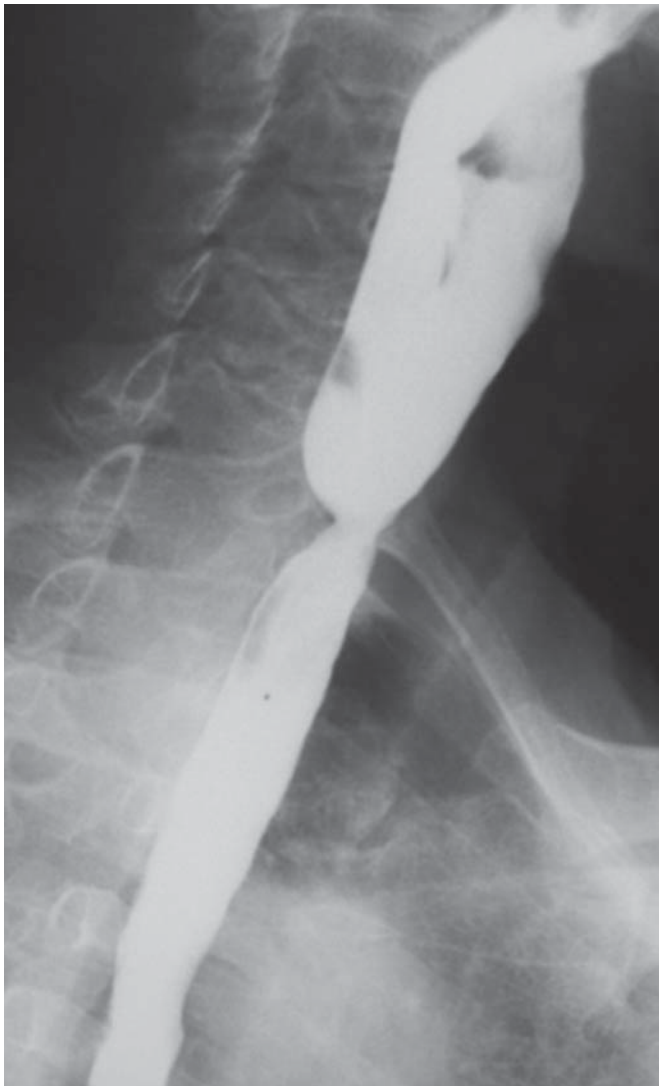

Figure 6: **Barium swallowing showing infraclinical mild stenosis of cervical esophagus (our case in Charles Nicolle hospital of Tunis – Tunisia)**

during sleep in two cases , and in six cases, the circumstances remained unclear (table n°2). Dysphagia was the main symptom in 10 cases, general discomfort in two cases, odynophagia with neck pain in three cases and there was no clinical signs in three cases (table n°2). Physical examination was normal in 16 patients (table n°2). To assess the position of the foreign bodies in the esophagus, investigations included a frontal chest X ray in 17 cases (figures n°2 and 3), computed tomography in 16 cases (figures n°4 and 5), an esophageal swallow study in three cases, endoscopic examination in 14 cases and laryngoscopic investigation in two cases. The average distance from the dental arcade, specified in seven patients, was 21.5 ± 3.8 cm (table n°3). As initial treatment, 14 patients underwent endoscopic extraction and four patients had surgery. The endoscopic treatment succeeded in seven cases and failed in seven cases routinely leading to surgery (table n°4). The surgical approach was thoracotomy alone in three cases, cervicotomy in three cases, laparotomy in two cases, combined thoracotomy and cervicotomy in two cases, and combined thoracotomy, laparotomy and cervicotomy for a bipolar esophageal exclusion in one other case (table n°5). The postoperative course was uneventful in 16 cases, one patient died secondary to post-operative nosocomial pneumonia and another patient who had mediastinitis with esophageal fistula recovered and was discharged after 40 days of hospitalization (table n°6). As concerns our case, this patient had a full recovery after extraction through esophagotomy followed by hand sewn closure, mechanical bipolar exclusion and jejunostomy. A barium swallow, performed on postoperative day 77 showed a residual stricture (figure n°6), corresponding to dysphagia, which was successfully dilated endoscopically under general anesthesia 94 days after operation. The median hospital stay for the 18 patients was 14.5 days with ranges from 3 to 49 days.

Univariate analysis did not identify any factors predicting failure of endoscopic extraction and did not find any statistical difference between endoscopic versus surgery groups.

Table 1: **Patient characteristics**

Authors		Countries	Sex/age (years)	Medical records
Rathore	(2)	India	Man/37	none
Rizzatti	(3)	Brazil	Man/39	none
Chen	(4)	Taiwan	Women/89	arterial hypertension+diabetes mellitus and stroke
Rajesh	(5)	England	Man/39	none
Philips	(6) *	USA	Man/19	none
Philips	(6) *	USA	Man/67	none
Nimmo	(7)	USA	Man/64	none
Birkholz	(8)	USA	Man/21	senile dementia
Hashmi	(9) **	England	Man/46	senile dementia
Hashmi	(9) **	England	Man/60	none
Hashmi	(9) **	England	Man/57	none
Treska	(10)	USA	Man/28	none
Chua	(11)	Singapore	Man/36	none
Imam	(12)	Pakistan	Woman/46	none
Adhikari	(13)	Nepal	Man/60	none
Tamatey	(14)	Ghana	Man/45	none
Singh	(15)	Himalaya	Woman/57	none
Our case		Tunisia	Man/69	none

* Philips reported two cases
** Hashmi reported three cases

Table 2: **Clinical data**

Authors		Circumstances	Delay (days)	Fonctional signs	Physical examination
Rathore	(2)	NR	180	dysphagia	normal
Rizzatti	(3)	wrong pipe	0	dysphagia	normal
Chen	(4)	NR	7	poor appetite	cervical lymph nodes
Rajesh	(5)	wrong pipe	540	coughing spells	normal
Philips	(6)	facial trauma	0	dysphagia	normal
Philips	(6)	facial trauma	0	none	normal
Nimmo	(7)	wrong pipe	0	dysphagia	normal
Birkholz	(8)	NR	7	dysphagia	normal
Hashmi	(9)	wrong pipe	2	dysphagia	normal
Hashmi	(9)	NR	NR	dysphagia	normal
Hashmi	(9)	wrong pipe	NR	dysphagia	normal
Treska	(10)	wrong pipe	NR	some discomfort	normal
Chua	(11)	sleeping	NR	odynophagia+pain in the neck	normal
Imam	(12)	NR	18	odynophagia+pain in the neck	tenderness over the neck
Adhikari	(13)	wrong pipe	NR	odynophagia+pain in the neck	normal
Tamatey	(14)	NR	1095	dysphagia	normal
Singh	(15)	wrong pipe	12	dysphagia	normal
Our case		sleeping	2	none	normal

NR : not reported Delay : ingestion-admission (day)

DISCUSSION

This systematic review of the literature, involving 18 patients reported between 1988 and 2009, showed that men outnumbered women by 5 to 1, that mean age was younger than previously reported, age 48, and that, contrary to common beliefs, senile dementia accounted only for two cases. The incident of prosthesis ingestion occurred most often during voluntary swallowing, more rarely during sleep. Dysphagia was the most often reported symptom and medical examination was usually not contributive. Endoscopic investigation was of value for diagnosis in all cases and can be therapeutic in one of two cases, precluding surgery.

To our knowledge, this review is the first systematic review on the topic. All previously published articles concerned case reports except one Japanese publication (16) concerning 41 cases with denture foreign bodies in the oropharyngeal junction and upper digestive tract collected over 21 years in a single institution: the otolaryngology department of medical School, Iwate Medical University of Morioka. The male: female ratio was 2 to 1. Thirty seven dentures out of 41 were impacted in the esophagus. In 29 cases, the design of denture itself was incriminated in the mechanism of the impaction. For the remaining 12 patients, physical function was deficient, including cerebrovascular disease in five patients and geriatric dementia for three patients. No patient needed external esophagotomy

Data of our collected sample from literature are in accordance with the Japanese data concerning male predominance, senile dementia. Endoscopic removal succeeded in all Japanese cases without need to esophagotomy, whereas in our systematic review endoscopic removal failed in seven patients out of 14.

CONCLUSION

Denture foreign bodies impacted in the thoracic esophagus are a rare but urgent situation. This oc-

Table 3: **Investigations**

Authors		Chest X ray	CT scan	Barium swallow	Upper endoscopy	Laryngoscopy	Level of FB in esophagus(cm)
Rathore	(2)	√		√	√		22
Rizzatti	(3)	√					NR
Chen	(4)	√	√		√		NR
Rajesh	(5)	√		√			NR
Philips	(6)	√			√		22
Philips	(6)	√			√		NR
Nimmo	(7)	√			√		NR
Birkholz	(8)	√				√	NR
Hashmi	(9)	√			√		NR
Hashmi	(9)	√			√		NR
Hashmi	(9)	√			√		NR
Treska	(10)	√			√		NR
Chua	(11)	√			√		24
Imam	(12)	√			√		22
Adhikari	(13)	√			√	√	16
Tamatey	(14)			√			NR
Singh	(15)	√			√		27
Our case		√	√		√		17

NR : not reported FB : Foreign Body

Table 4: **Treatment options**

Authors		Endoscopic extraction	Result of endoscopic treatment	Surgical extraction
Rathore	(2)	√	success	
Rizzatti	(3)	√	success	
Chen	(4)	√	failure	√
Rajesh	(5)			√
Philips	(6)	√	success	
Philips	(6)	√	success	
Nimmo	(7)	√	failure	√
Birkholz	(8)	√	success	
Hashmi	(9	√	success	
Hashmi	(9)	√	success	
Hashmi	(9)			√
Treska	(10)	√	failure	√
Chua	(11)	√	failure	√
Imam	(12)	√	failure	√
Adhikari	(13)			√
Tamatey	(14)			√
Singh	(15)	√	failure	√
Our case		√	failure	√

Table 5: **Surgical approaches, procedures**

Authors		Thoracotomy	Cervicotomy	Laparotomy	Surgical procedure
Rathore	(2)				
Rizzatti	(3)				
Chen	(4)	√			gastrotomy
Rajesh	(5)	√	√		excision and repair of tracheo-esophageal fistula containing RPD
Philips	(6)				
Philips	(6)				
Nimmo	(7)	√			esophagotomy and suture
Birkholz	(8)				
Hashmi	(9)				
Hashmi	(9)				
Hashmi	(9)			√	gastrotomy
Treska	(10)	√	√		esophagotomy and suture
Chua	(11)		√		esophagotomy and suture
Imam	(12)		√		esophagotomy and suture
Adhikari	(13)		√		esophagotomy and closing by dressing applied
Tamatey	14)			√	esophagotomy and colon by-pass
Singh	(15)	√			suture of esophagus
Our case		√	√	√	esophagotomy, suture, double exclusion of esophagus, jejunostomy

RPD : Removal Partial Denture

Table 6: **Treatment options**

Authors		Complications	Death	Stay (days)
Rathore	(2)			3
Rizzatti	(3)			7
Chen	(4)	pneumonia infection	√	15
Rajesh	(5)			NR
Philips	(6)			NR
Philips	(6)			NR
Nimmo	(7)	mediastinitis + esophageal fistula		40
Birkholz	(8)			NR
Hashmi	(9)			NR
Hashmi	(9)			NR
Hashmi	(9)			NR
Treska	(10)			NR
Chua	(11)			7
Imam	(12)			7
Adhikari	(13)			14
Tamatey	(14)			49
Singh	(15)			17
Our case				38

NR : Not reported

curs more often in males, and not always in the elderly. According to our systematic review, endoscopy is valuable for diagnosis in all cases and leads to therapeutic success in 50% of cases. Surgery has to be performed in case of failure or when endoscopy is not performed.

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