DENTURE IMPACTION IN THE OESOPHAGUS: CORRELATION OF SITE AND DURATION OF IMPACTION WITH SEQUELAE

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ABSTRACT

Background: Denture restores aesthetic and function of missing teeth. Accidentally swallowed denture is an otorhinolaryngology emergency. The types of denture base and oesophageal anatomy influence the site of impaction.

Objective: To review the site of denture impaction and factors associated with site of impaction. To correlate site and duration of denture impaction before removal with associated sequelae.

Method: A retrospective study of 27 patients managed in the Otorhinolaryngology Department of University College Hospital Ibadan, Nigeria for oesophageal partial denture impaction, between August 2006 and September 2016. The demographic and clinical data of the patients were extracted from the hospital records, and statistical tables were used to illustrate the data.

Results: A total of 27 patients; 14 (51.9%) males and 13 (48.1%) females, (M: F, 1.1:1) were studied. The age ranged from 24 to 77 years (mean age 49.0 ± 14.2 years). Dentures were worn for 3 to 30 years (mean 3.8 ± 2.3 years) without follow-up visit to the dentist and 85.2% were upper dentures. All patients had history of accidental ingestion of denture, and the mean site of impaction was 18.2 ± 3.2 cm from the upper incisor, typically at the upper cervical oesophagus in elderly patients and in the lower oesophagus in females. There was no association between site of denture impaction, duration of denture impaction and operative findings.

Conclusion: Advanced age and female gender are associated with site of denture impaction. Late hospital presentation significantly promotes sequelae associated with management of impacted dentures. It is recommended that fundamental changes in denture designs, education on regular follow-ups and avoidance of ill-fitting dentures would reduce the prevalence of denture impaction.

Keywords: Denture impaction, Health education, Oesophagus, Oesophagoscopy and Nigeria

INTRODUCTION

Missing teeth can compromise pronunciation, chewing with associated poor quality of life. The desire to restore function and aesthetics has resulted in the wearing of dentures. Etruscans was the first to make partial dentures. Acrylic dentures are removable teeth-replacement options which are made from a radiolucent polymethylmethacrylate material.

Denture impaction in the oesophagus is a common otolaryngology emergency with management challenges. Patients usually present with dysphagia, throat pain, odynophagia and pooling of saliva in the pyriform sinuses. Factors responsible for dislodgement of dentures from the alveolar ridge and subsequent impaction in the esophagus are: poor fit of the denture at insertion, prolonged usage, and failure of dental clinic follow-up evaluations especially when the denture becomes loose.

In addition, the insulating nature of acrylic dentures reduces sensitivity of the oral cavity. The large surface area of the dentures and their pointed edges encourages impaction in the aerodigestive tract. Impacted dentures are typically found at anatomically narrow areas of the oesophagus: the cricopharyngeal sphincter, the level of the aortic arch, left bronchus, left atrium and at the lower oesophageal sphincter.

Oesophageal denture impaction ranges between 1.3% - 38.6% in clinical practice, and the management outcome depends on: site of impaction, shape and size of the denture, duration of impaction, premorbid...
medical conditions of the patient, the surgeon’s expertise and availability of appropriate instruments, especially in resource limited countries.

Historically impacted oesophageal foreign bodies are removed through rigid esophagoscope\(^\text{12}\), currently both flexible and rigid esophagoscopy are used for removal of oesophageal foreign bodies, with varying degree of success and mortality rates.\(^\text{13,14}\) Other methods includes; cervical oesophagotomy, the use of Foley’s catheter under fluoroscopic guidance\(^\text{15}\) and the use of flexible esophagoscopy with polypectomy snare.\(^\text{16}\) Delay in removal of the impacted denture in oesophagus increases the risk of complications such as oesophageal obstruction, pressure necrosis, oesophageal perforation, pulmonary aspiration, sepsis and mediastinitis.\(^\text{17}\)

Evaluating the local pattern of denture impaction and related sequelae will provide relevant data to boost patient-doctor communication, health promotion and public health education on the risks associated with denture and failure of routine denture evaluation at clinics.

This study evaluated site of denture impaction and likely factors responsible for impaction at those sites, it also correlated the sites of denture impaction and associated sequelae.

**MATERIALS AND METHODS**

A retrospective review of all patients managed for oesophageal denture impaction, in the Department of Otorhinolaryngology, University College Hospital, Ibadan, between August 2006 and September 2016.

| Table 1: Clinical and socio-demographic features of the patients |
| --- |
| **Age (years)** | **Male** | **Female** | **Total** |
| **Age (years)** | n = 14 (51.9%) | n = 13 (48.1%) | n = 27 (100.0%) |
| 20-30 yrs | 1 (3.7%) | 0 (0.0%) | 1 (3.7%) |
| 31-40yrs | 1 (3.7%) | 7 (25.9%) | 8 (29.6%) |
| 41-50yrs | 3 (11.1%) | 1 (3.7%) | 4 (14.8%) |
| 51-60yrs | 2 (7.4%) | 2 (7.4%) | 4 (14.8%) |
| 61-70yrs | 4 (14.8%) | 3 (11.1%) | 7 (25.9%) |
| 70-81yrs | 3 (11.1%) | 0 (0.0%) | 3 (11.1%) |

| **Socioeconomic status** | **Low** | **Middle** | **High** |
| --- | 6 (22.2%) | 7 (25.9%) | 1 (3.7%) |
| **p** = 0.135 | 10 (37.0%) | 3 (11.1%) | 1 (3.7%) |
| **Type of denture** | **Upper** | **Lower** | **Total** |
| **p** = 0.02 | 10 (37.0%) | 4 (14.8%) | 23 (85.2%) |
| **Duration of usage of denture without visit to dentist** | **≤10 years** | 6 (22.2%) | 4 (14.8%) | 9 (37.0%) |
| **11-20 years** | 2 (7.4%) | 1 (3.7%) | 3 (11.1%) |
| **21-30 years** | 2 (7.4%) | 0 (0.0%) | 2 (7.4%) |
| **Duration not stated in the hospital record** | 4 (14.8%) | 8 (29.6%) | 12 (44.5%) |

| **Distance of impaction to upper incisors (cm)** | **16cm** | **18cm** | **20cm** | **22cm** | **24cm** | **25cm** | **26cm** | **30cm** | **32cm** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 (11.1%) | 2 (7.4%) | 4 (14.8%) | 3 (11.1%) | 0 (0.0%) | 2 (7.4%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| **p** = 0.04 | 0 (0.0%) | 1 (3.7%) | 7 (25.9%) | 2 (7.4%) | 1 (3.7%) | 1 (3.7%) | 1 (3.7%) | 1 (3.7%) | 1 (3.7%) |
The hospital records of the patients were retrieved, socio-demographic and clinical data were extracted. The clinical information included duration of denture impaction before presentation, the radiographic findings, surgical operation findings, status of the oesophageal mucosa after denture extraction, duration of hospital stay after surgical intervention, and the management outcome. The socio-economic status was determined by using the patient’s occupation, and the pensioners were classified based on their last job before retirement. The data was analysed using IBM-SPSS 20 and results were presented in descriptive forms using tables. Statistical significance was set at p < 0.05

RESULTS

There were 27 patients with denture impaction, 14(51.9%) males and 13(48.1%) females, with M: F ratio of 1.1:1. The age of the patients ranged from 24-77years (mean age 49.72 years ±14.2) and 16(59.3%) of them were from low-socioeconomic class as shown in table I. The majority 15(55.5%) of the patients presented within 48 hours of denture ingestion, and a patient presented after 6 weeks of denture impaction. The dentures had been worn for a period of 3 to 30 years (mean 3.8 ± 2.3years) without follow-up visit to dentist (Table 1). All the patients had history of accidental ingestion of the partial dentures, throat pain, and dysphagia at presentation. Plain soft tissue radiograph of the neck showed air entrapment and increased pre-vertebral soft tissue shadow in 19 (70.4%) of the patients, while the dentures were confirmed at surgery in 8 (29.6%) cases. The impacted dentures were at 16-32 cm from upper incisor. Most of the dentures 11(40.7%) were impacted at 20 cm from upper incisor which is around the left bronchus, while 3(11.1%) were at the cricopharyngeal sphincter, as shown in Table 1. The findings at surgery included, pooling of saliva, hyperemic oesophageal mucosa, and oedema of oesophageal mucosal as shown in Table 2. The dentures were removed by rigid oesophagoscopy, with the aid of foreign body grasping forceps, except in two patients that had oesophagotomy and denture extraction due to failed oesophagoscopy. The number of teeth on the denture varied between 1-4 teeth, and upper denture constituted 85.2 % of the impacted dentures. The female gender was associated with distal impaction of the denture in the oesophagus (p = 0.03) after excluding age as a

| Age group (years) | Distance of impaction to upper incisors | TOTAL |
|-------------------|----------------------------------------|-------|
|                   | 16cm | 18cm | 20cm | 22cm | 25cm | 30cm | 32cm |
| 21-30             | 0(0.0%) | 0(0.0%) | 0(0.0%) | 1(3.7%) | 0(0.0%) | 0(0.0%) | 0(0.0%) | 1(3.7%) |
| 31-40             | 0(0.0%) | 0(0.0%) | 2(7.4%) | 2(7.4%) | 2(7.4%) | 1(3.7%) | 1(3.7%) | 8(29.6%) |
| 41-50             | 0(0.0%) | 0(0.0%) | 2(7.4%) | 2(7.4%) | 2(7.4%) | 0(0.0%) | 0(0.0%) | 4(14.8%) |
| 51-60             | 0(0.0%) | 0(0.0%) | 2(7.4%) | 0(0.0%) | 2(7.4%) | 0(0.0%) | 0(0.0%) | 4(14.8%) |
| 61-70             | 3(11.1%) | 0(0.0%) | 4(14.8%) | 0(0.0%) | 0(0.0%) | 0(0.0%) | 0(0.0%) | 7(25.9%) |
| 71-80             | 0(0.0%) | 2(7.4%) | 1(3.7%) | 0(0.0%) | 0(0.0%) | 0(0.0%) | 0(0.0%) | 3(11.1%) |
| Total             | 3(11.1%) | 2(7.4%) | 11(40.7%) | 5(18.5%) | 4(14.8%) | 1(3.7%) | 1(3.7%) | 27(100.0%) |

Table 2: Site of denture impaction and the age of the participants

| Clinical findings                                      | Throat/ anterior neck pain | Pooling of saliva | Drioling of saliva | Odynophagia | Dysphagia |
|--------------------------------------------------------|---------------------------|-------------------|-------------------|-------------|-----------|
| Mucosal bruises                                        | 7(25.9%)                  |                   |                   |             |           |
| Mucosal rent/laceration                                | 3(11.1%)                  |                   |                   |             |           |
| Oesophageal perforation                                | 1(3.7%)                   |                   |                   |             |           |
| Hyperemia of mucosal                                   | 12(44.4%)                 |                   |                   |             |           |
| Excessive secretions                                   | 19(70.3%)                 |                   |                   |             |           |
| Excessive primary hemorrhages                          | 19(70.3%)                 |                   |                   |             |           |
| Oedematous mucosal                                     | 21(77.7%)                 |                   |                   |             |           |

Table 3: Distribution of clinical findings associated with denture impaction

Some patients had more than one factor
The prevalence of denture impaction
23
This study revealed that
21
et al. 6,21
19,21,22
7
This might be due to
21,22
et al.

health insurance for all the populace will reduce
patients, poor socioeconomic status of the patients
consultation fee, delays in attending to follow up
up visit may also be due to high cost of hospital
from follow up appointments. Non-dental clinic follow
likely complications that may arise if patient default
on the need for follow-up clinic attendants, and the
communication between the dentist and the patients,
environment.

the dentist, similar to the earlier report from this
previous studies.

The age of the patients falls within the reported 21-
75 years age range of patients with denture impaction
in this environment. 19,21,22 This study revealed that
denture impaction was commoner in the 31-40 age
groups, which is different from report by Onatai et al.7,
in which the denture impaction was commoner in the
21-30 age groups. Also Adedeji et al.6 reported that
denture impaction is commoner in the 61-70 age
groups. The reason for variation in the age groups is
beyond this study, but might be related to patient’s
appitude to personal health care. All the patients in the
study swallowed their dentures accidentally (p = 0.04) and the denture impaction in this category of
people were at the upper oesophagus (Table 3). Complications observed were mucosa lacerations
3(11.1%) and excessive primary hemorrhages in
2(7.4%) cases and oesophageal perforations in 1(3.7%).
All the patients had good clinical outcome, except 1
patient that died from thromboembolism.

DISCUSSION
The age of the patients falls within the reported 21-
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groups. The reason for variation in the age groups is
beyond this study, but might be related to patient’s
attitude to personal health care. All the patients in the
study swallowed their dentures accidentally which is
similar to other reports. 21,22 This might be due to
instability of the denture due to progressive remodeling
of bone or alveolar ridge resorption resulting in poor
stability of the denture over time with risk of denture
impaction. 23 The prevalence of denture impaction
among the females (48.1%) in this study is higher than
previous studies. 21,23

Majority of our patients had worn their dentures for
a long period of time without any follow-up visits to
the dentist, similar to the earlier report from this
environment. 20 This attitude may be due to poor
communication between the dentist and the patients,
on the need for follow-up clinic attendants, and the
likely complications that may arise if patient default
from follow up appointments. Non-dental clinic follow
up visit may also be due to high cost of hospital
consultation fee, delays in attending to follow up
patients, poor socioeconomic status of the patients
and poor educational background. The provision of
health insurance for all the populace will reduce
individual spending on health related matters and
improve clinics attendance. The use of short messaging
service (SMS) to remind patients of the clinic-
appointment will improve the follow-up clinic
attendant. 24

In this study, fifteen (55.5%) of the patients were seen
within 48 hours of denture impaction, unlike 71.4%
of patients that presented within 24 hours of denture
impaction in the study by Adedeji et al.21 The difference
in the period of presentation may be due to delay in
referral to Otolaryngologist by the general practitioners
who saw the patients first. In addition the variation in
severity of oesophageal symptoms following denture
impaction could be responsible for differences in the
period of presentation at the hospital, and this was
responsible for delayed presentation for up to 6 weeks
by one of the patients. This finding was similar to report
by Akinpelu et al.22

The soft tissue neck radiograph was useful in diagnosis
of oesophageal denture impaction in this study, however
it cannot be simply relied upon because the
dentures may not be visible in the oesophagus in some
cases and may constitute a diagnostic challenge due to
radiolucent materials used in dentures fabrication. 25
Another limitation of the soft tissue neck x-ray is that
the dentures may be impacted beyond the cervical
oesophagus, as it was observed in this study in which
dentures were impacted in the mid-oesophagus and
lower oesophagus, which were beyond the reach of
cervical x-ray. Previous studies 6,21 had reported the
limitation of cervical soft tissue radiograph and the
need for additional barium swallow to determine the
level of oesophageal denture impaction. However
barium swallow has its limitations: it coats the entire
radiolucent object, thus limiting the visualization of
the denture, and dentures may be mistaken for tumors
in contrast studies. 5,8,26

Pledget of cotton wool soaked in barium and
swallowed by patients can be used, instead of barium
swallow to determine the level of denture impaction.
The denture will arrest the descent of the pledget and
thus serves as a marker of the position of the
denture. 6

Upper partial denture impactions were mostly
encountered in this study similar to the report by
Arigbede et al.29 Upper dentures are more likely to be
accidentally dislodged and swallowed than lower
dentures because the wide coverage in upper dentures
reduces the sensation, and the dislodging effect of
gravity is more effective in upper denture than lower
denture. Majority of the impacted dentures in this study
were between the cricopharyngeal sphincter of the
esophagus and thoracic inlet, a finding similar to earlier
The denture impaction in upper third of oesophagus in the elderly patients in this study may be due to presence of cervical osteophytes that hindered the migration of the denture. Osteophytes occurs with advancing age and mechanical compression of oesophagus or hypopharynx, by anterior cervical osteophytes is possible. Osteophytes can also cause obstruction by precipitating an inflammatory reaction around the oesophagus or a compression neuropathy. Osteophytes often occurs in males between C3- C6 than females. This gender difference may account for denture impaction at a lower level in females than males. After excluding age as a confounding factor the female gender was statistically significantly associated with distal impaction of the denture in the oesophagus. Another factor for the gender differences for the site of denture impaction may be due to increase contractility and peristaltic movement in females’ oesophagus compare to the males, which may propelled the dentures further into distal oesophagus. Dantas et al. has reported that the duration of oesophageal contractility is greater in females than males.

High successful extraction rate (92.5%) of impacted denture with rigid oesophagoscopy was observed in this study which is similar to previous reports. Oesophagotomy, an open surgical approach in the oesophagus is needed if there is failed oesophagoscopy, and two of the patients had this procedure after failed esophagoscopy due to the degree of impaction, oesophagoscopy can also fail if the foreign body is inadvertently dislodged into the stomach.

The complication rate observed (22.2%) in this study is lower than 85% reported by Adedeji et al. and higher than the earlier report of 8.7% from our center. The dissimilarity in the rate of complication may be due to the differences in the site of denture impaction in the oesophagus and the expertise of the attending surgeon. Complications were observed in patients that had oesophageal denture impaction in middle third and lower third of esophagus, while those with denture impaction in the upper part of oesophagus had short hospital stay with negligible complications. All complications were successfully managed conservatively. The patients with late hospital presentation had more complications (p = 0.02), similar to previous report. This is probably due to pressure effect of the impacted denture on the oesophagus leading to pressure necrosis or mucosal oedema which can cause poor visualization of the denture with greater risk of iatrogenic injuries to the oesophagus.

Mortality was recorded in a patient on the fifth day post extraction of the denture, due to thromboembolism, its therefore important that early ambulation should be encouraged post operatively and appropriate cautions should be taken in patients preoperatively and post-operatively to prevent mortality or morbidity. A limitation of this study is its retrospective nature, which prevents proper assessment of risk factors for accidental swallowing of the denture and correlation of oropharyngeal indices to oesophageal denture impaction.

CONCLUSION
Advanced age and female gender are associated with site of denture impaction. Late hospital presentation significantly promotes sequelae associated with management of impacted dentures. It is recommended that fundamental changes in denture designs, education on regular follow-ups and avoidance of ill-fitting dentures would reduce the prevalence of denture impaction.

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