

Management of Vulnating Esophageal Foreign Bodies in Burkina Faso

Ibrahima Diallo^{1*}, Aboubacar Gouéta¹, Alseny Camara¹, Assoumi Anatou Biga¹,
Mama Brigitte Ouoba¹, Edi Emmanuel Martial Nao¹, Moustapha Sérémé²,
Bertin Priva Ouédraogo³, Yvette Marie Chantal Gyébré¹, Abdoulaye Keita⁴, Alpha Oumar Diallo⁴

¹ENT and HNS Department, Yalgado Ouédraogo University Hospital, Ouagadougou, Burkina Faso

²ENT and HNS Department, Bogodogo University Hospital, Ouagadougou, Burkina Faso

³ENT and HNS Department, Tengandogo University Hospital, Ouagadougou, Burkina Faso

⁴ENT and HNS Department, Conakry University Hospital, Conakry, Guinea

Email: *ibrahimamoromi@gmail.com

How to cite this paper: Diallo, I., Gouéta, A., Camara, A., Anatou Biga, A., Ouoba, M.B., Nao, E.E.M., Sérémé, M., Ouédraogo, B.P., Gyébré, Y.M.C., Keita, A. and Diallo, A.O. (2024) Management of Vulnating Esophageal Foreign Bodies in Burkina Faso. *International Journal of Otolaryngology and Head & Neck Surgery*, 13, 135-148.
<https://doi.org/10.4236/ijohns.2024.132013>

Received: January 20, 2024

Accepted: March 24, 2024

Published: March 27, 2024

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Abstract

Introduction: Esophageal foreign bodies (EFB) are a diagnostic and therapeutic emergency because of the serious complications they can cause. **Aim:** This paper aimed to study the vulnating esophageal foreign bodies in the ENT and Head and Neck Surgery departments of the Yalgado Ouedraogo and Bogodogo University Hospital. **Methodology:** This was an analytic cross-sectional study with retrospective data collection over 10 years (2012-2021). **Results:** We collected 91 cases of vulnating esophageal foreign bodies, *i.e.* 9.1 cases/year (4.7%). The mean age of the patients was 14 ± 19 years. The sex ratio was 1.6. The circumstances of occurrence were dominated by accidental ingestion of vulnating esophageal foreign bodies (98.9%). The average time to consultation was 7.5 hours. Dysphagia was the dominant symptom (64.8%). Cervico-thoracic radiography found dual contour radiopaque images in 71.4%. Esophagoscopy with rigid tube was performed in 97.8%. The average time for extraction of the vulnating esophageal foreign bodies was 8 hours. Vulnerating esophageal foreign bodies were non-organic in 84.6%. The button cell represented 64.8%. Their location was cervical in 61.5% intraoperatively. The lesion assessment found ulcerative lesions in 42.9% ($p < 0.05$). Iatrogenic trauma was noted in 3.3% of cases. Nasogastric tube placement was indicated in 58.2%. Complications were dominated by ulcero-necrotic lesions (42.9%). The average length of hospitalization was 3 days. Sequelae were dominated by esophageal stenosis (5.5%). Lethality was 1.1%. **Conclusion:** Vulnating esophageal foreign bodies are relatively frequent in our ENT practice. Although their diagnosis is often easy, their treatment is still difficult and requires multidisciplinary management. Thus, for us, prevention remains the first effective weapon.

Keywords

Foreign Bodies, Esophagus, Vulnerable, Management, Sequelae

1. Introduction

Esophageal foreign bodies (EFB) are a diagnostic and therapeutic emergency due to the serious complications they can cause [1] [2]. They can occur at any age, but are more frequent in children [3] [4]. Their location and nature can make their removal by endoscopy a matter of urgency. Some of the most damaging are button batteries, needles, sharp blades, dentures with hooks, springs, pieces of glass, fish bones, spikes [5] [6] and magnets [7]. According to many authors, accidental ingestion of button batteries is potentially serious because of the caustic lesions and burns they cause [8]. They are relatively common. Diagnosis of EFB is based on clinical and paraclinical findings [5]. Rigid-tube endoscopy is both diagnostic and therapeutic. It allows extraction without complication [9]. It must be performed under general anaesthetic by a trained operator using suitable equipment [10] [11]. Cervicotomy is sometimes performed if endoscopy fails. Prevention remains the best treatment [10]. The main risk associated with the presence of EFB is the occurrence of esophageal ulceration, which can be complicated by esophageal perforation, esophageal hemorrhage, chemical burn, esophageal-tracheal fistula, esophageal stenosis and inhalation bronchopneumopathy [8] [11]. Esophageal perforation is the most frequent complication, representing a mortality rate of 15% to 30%, especially in relation to rapidly extensive septic complications [12].

Our aim is to share our experience in the management of vulnating esophageal foreign bodies in Burkina Faso.

2. Methodology

This was a cross-sectional analytical study with retrospective data collection over 10 years from January 01, 2012 to December 31, 2021. We included all cases of vulnating esophageal foreign bodies that were managed. All incomplete records and patients who did not agree to participate in the study were excluded. We proceeded to an exhaustive recruitment. Data sources were patients' clinical records, operative report registers, discharge records and the collection form. We studied the following parameters: epidemiology (frequency of vulnating EFB, age, sex) and management (diagnosis, treatment and evolution). Data were collected from data sources (patients' clinical records, operative report registers and discharge records) and mentioned on the collection form. Data were entered and analyzed using Epi-Info software version 7.2.2. Univariate and multivariate cross-tabulations were performed. To compare proportions, we used Pearson's chi-square statistical test. This test is significant if $p \leq 0.05$. The Odd-Ratio was used to assess patients' risk of exposure. $OR < 1$ was considered insignificant.

OR ≥ 1 was considered significant. To measure the performance or validity of a test, we evaluated the following criteria: sensitivity (Se), specificity (Sp), positive predictive value, negative predictive value and accuracy.

Sensitivity (Se): refers to the probability of obtaining a positive test on an individual carrying the disease. It is calculated according to the formula: true positives out of patients. The closer it is to 1, the more sensitive the test, and the fewer false negatives it produces.

Specificity (Sp): measures a test's ability to give a negative result when the hypothesis is not verified. It is calculated according to the formula: true negatives on healthy subjects. A specific test gives few false positives.

Positive predictive value: corresponds to the probability that a subject will actually be ill when the test is positive. It is calculated according to the formula: PPV = True Positives out of Total Positives.

Negative predictive value: corresponds to the probability that a subject is really not ill when the test is negative. A low negative predictive value leads to false reassurance. Anonymity and confidentiality of data were respected. The results obtained were used for purely scientific purposes.

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3. Results

Epidemiological data

Over 10 years (2012-2021), we identified 91 vulnating esophageal foreign bodies (EFB), representing a frequency of 9.1 cases/year (4.7%). In 2021, we recorded 37 cases of oesophageal foreign bodies. **Figure 1** shows the distribution of patients by year of admission. The mean age of patients was 14 ± 19 years, with extremes of 1 month and 70 years. Children under 10 years of age accounted for 63 cases (69.2%). The patients were male in 56 cases (61.5%) and female in 35 cases (38.5%). The sex ratio was 1.6. Patient residence was urban and rural in 59.34% and 40.66% respectively.

Diagnostic data

Accidental ingestion of vulnating esophageal foreign bodies was noted in 98.9% of patients. It occurred during play in 63.3% of cases. The circumstance of discovery was symptomatology in 60.4% of cases, and complications in 38.6%. In terms of risk factors for ingestion of a vulnating esophageal foreign body, 47 cases were male. The correlation between the risk factor associated with male sex and the circumstances of foreign body ingestion was significant ($p = 0.01$). The average consultation time was 7.5 hours \pm 17 hours, with extremes of 30 minutes and 3 months. Seventy-one point four percent (71.4%) consulted within 24 hours. Dysphagia accounted for 64.8% of the reasons for consultation (**Table 1**). General examination revealed clear consciousness in all patients (100%). ENT examination revealed hypersialorrhea in 51.6% of cases. Sensitivity to anterior cervical mobilization and painful anterior cervical swelling accounted for 7.7%

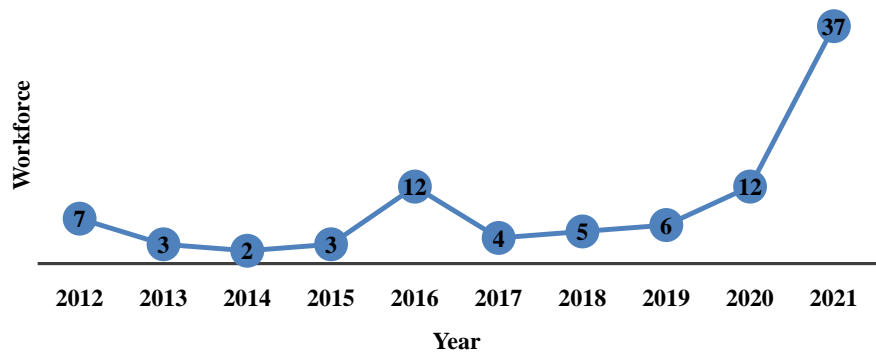


Figure 1. Distribution of patients by year of admission (N = 91).

Table 1. Distribution of patients by functional signs.

Functional signs	Number	%
Dysphagia	59	64.8
Hypersialorrhea	44	48.4
Odynophagia	18	19.8
Vomiting	16	17.6
Chest pain	2	2.2
Cervical swelling	2	2.2
Cervicalgia	2	2.2

and 2.2% of cases respectively. Cervico-thoracic radiography was performed in all patients (100%). It revealed dual contour radiopaque button battery (**Figure 2** and **Figure 3**) and radiopaque denture like images in 71.4% and 11.0% respectively (**Table 2**). CT-scans were performed on 2 patients. It found a hyperdense linear left laterocervical oblique foreign body seated in the vascular axis (1.1%) and a hyperdense rounded foreign body seated in the thyroid compartment (1.1%).

Treatment data

Rigid-tube esophagoscopy and cervicotomy were performed in 97.8% and 2.2% of cases respectively. According to intraoperative findings, foreign bodies were non-organic in 84.6% of cases. Button cells accounted for 64.8%. 61.5% of foreign bodies were located in the cervical region. Ulcero-necrotic lesions were present in 39 cases (42.9%). Intraoperative accidents and incidents, iatrogenic trauma was noted in 3.3% of cases. The average delay in the management of vulnating EFB was 8 hours, with extremes of 3 hours and 4 days. The appearance of mucosal lesions secondary to vulnating EFB was statistically significant ($p = 0.05$; OR = 2.1) beyond 6 hours without extraction. Complications were managed with nasogastric tube (**Figure 4**) placement and esophageal dilatation in 58.2% and 4.4% respectively. The mean time to indwelling of the nasogastric tube was 12 days \pm 2 days, with extremes of 7 days and 21 days. There was a significant correlation between nasogastric tube placement and simple postoperative



Figure 2. Cervicothoracic X-ray (Face and Profile) showing a double-contour radiopaque image opposite C6-C7 in favor of a button cell.



Figure 3. Vulnerable button-battery-type esophageal foreign bodies extracted by rigid-tube esophagoscopy.



Figure 4. Patient at D1 post rigid esophagoscopy + foreign body extraction with nasogastric tube feeding.

recovery ($p = 0.02$). The period from 8 to 14 days represented 48.4%. Post-operative care was represented by adjuvant treatment (100%). Antibiotics and analgesics were prescribed in 94.5% and 93.4% respectively.

Table 2. Distribution of patients according to results of cervico-thoracic radiography.

Results of cervico-thoracic radiography	Number	%
Double contour opaque button cell radio image	65	71.4
Denture-like opaque radio image with hook	10	11
Fishbone-like linear filiform radiopaque image	6	6.6
Esotracheal fistula	3	3.3
Esophageal stenosis	3	3.3
Linear needle-like radiopaque image	2	2.2
Earring-like radiopaque image	2	2.2
Meat-bone-like radiopaque image	1	1.1
Miningeroid sign	1	1.1
Semicircular, spring-like radiopaque image	1	1.1

Progression data

The average hospital stay was 3 days \pm 4 days, with extremes of 1 day and 21 days. Hospitalization of 7 days or less accounted for 92.3%. The post-operative course was complicated in 51.6% of cases and straightforward in 48.4%. Ulcer-necrotic lesions accounted for 42.9% ($p < 0.05$), as shown in **Table 3**. The correlation between the different post-operative periods and complications was significant ($p = 0.05$). The sensitivity (Se) and specificity (Sp) of complications were 82.97% and 72.78% respectively. The risk of sequelae was greater than 2 ($OR > 2$). In our series, 87.9% were discharged without sequelae and 7 patients had sequelae. Esophageal stenosis (**Figure 5**) and esotracheal fistula accounted for 5.5% and 2.2% respectively ($p = 0.001$). Lethality was 1.1% due to inhalation bronchopneumopathy.

4. Discussion

In the present series, the difficulties were essentially at two (02) levels. The records were incomplete (the inadequacy concerned the operative report and post-discharge monitoring data), and few studies were devoted to this subject in the African setting in the bibliographical review we carried out. As a result, we feel that we have not impeded the quality of the data collected, which has led to this discussion.

Vulnating esophageal foreign bodies are a relatively frequent but highly morbid entity [2] [5]. We found a frequency of 9.1 cases/year (4.7%) of vulnating esophageal foreign bodies (EFB). Our result is higher than that of Ouedraogo RW-L [2], who noted a frequency of 5.7 cases/year of vulnating EFB. We believe that our result is underestimated due to incomplete data and the existence of other management structures. The EFB can occur at any age, but is most common in children. In our series, the mean age was 14 years. This age is close to that reported by Ouedraogo RW-L [2] and Togo S. [3], who reported 12 and 13 years respectively. The risk of foreign body ingestion is high in children [1] [4].

Table 3. Correlation between complications secondary to vulnating EFB and different postoperative periods.

Complications	Post-operative periods	Immediate n (%)	Secondary n (%)	Late n (%)
Ulcer-necrotic lesion		39 (42.9)	8 (8.8)	0
Esophageal stenosis		9 (9.9)	5 (5.5)	5 (5.5)
Oesotracheal fistula		5 (5.5)	3 (3.3)	2 (2.2)
Esophageal perforation		2 (2.2)	2 (2.2)	0
Migration		0	2 (2.2)	0
Lung disease		0	1 (1.1)	0
P-value/Odds Ratio (OR)		p = 0.05 OR = 2.2	p < 0.001 OR = 2.1	p = 0.001 OR = 2.8

**Figure 5.** an Oesogastroduodenal Transit showing extensive tight stenosis of the cervical esophagus secondary to a button cell oesophageal foreign body.

The carelessness and naivety characteristic of this period of life expose these children to great risks of accidents, sometimes unusual [2]. For Ouoba [4], the incident most often occurs in males. Indeed, we noted a predominance of males (61.5%). Several authors have found a male predominance, as illustrated in **Table 4** comparing results.

This is related to the boy's recklessness and boisterousness, with his enterprising spirit and boisterous play [1] [14].

Esophageal foreign bodies are usually accidental, occurring during play or eating. It usually occurs in individuals with normal development. It may be favored by a particular terrain: psychiatric disorder, Down's syndrome or any other psychomotor disability [15]. In almost all cases (98.9%), the onset was accidental, and 63.3% occurred during play. We also noted one case of deliberate ingestion of a piece of iron in a patient with psychiatric disorders. Our findings corroborate those of the literature. In the series by Lakdhar-Idrissi M. [16] and Ashraf O. [5], they were accidental in 92.4% and 96.3% respectively. However,

Table 4. Male predominance in the literature.

Auteurs	Sex-ratio	Country
Ille S <i>et al.</i> [1]	2.19	Niger
Boko E <i>et al.</i> [11]	1.9	Togo
Togo S <i>et al.</i> [3]	1.75	Mali
Ouedraogo RW-L <i>et al.</i> [2]	1.28	Burkina Faso
Amana B <i>et al.</i> [9]	1.16	Togo
Marini H El <i>et al.</i> [13]	1.1	Maroc
Our result	1.6	Burkina Faso

the accident is wrongly trivialized by parents or uninformed nursing staff, leading to a delay in diagnosis [14]. Early discovery of vulnating EFB is desirable, as early management reduces morbidity [5]. We noted an average consultation time of 7.5 hours. This result is lower than that of Togo S. [3], who found 12 hours. Ouedraogo RW-L [2] found an average delay of 12 days. Our result is one of the earliest. It reflects the early admission of patients to the department, given the notion of emergency, thanks to the improvement of the health referral system in Burkina Faso. However, foreign bodies can remain embedded in the oesophagus, causing symptoms such as cervical or retrosternal pain, odynophagia, hypersialorrhoea, coughing or respiratory distress, as noted in some of our results. For Lakdhar-Idrissi M. [16], however, the child may remain asymptomatic, even in the presence of an oesophageal foreign body. This leads to a delay in diagnosis in our context.

Physical examination is usually normal [5] [16]. However, pharyngeal trauma and the presence of subcutaneous neck emphysema, suggestive of esophageal perforation, should be sought. Signs of respiratory obstruction should also be carefully sought [16]. Complementary examinations are the rule. Not only do they enable a positive diagnosis to be made, they also determine the nature of the foreign body, which plays a decisive role in its management [2]. Cervico-thoracic radiography highlights radio-opaque foreign bodies projecting into the esophageal or digestive tract area [16]. Most foreign bodies are radiopaque [1] [3]. Moreover, we found the majority of radiopaque foreign bodies with a dual contour in favor of button batteries (71.4%). Our findings are in line with those of Nao [17] and Keita [18]. As for Ouedraogo [2], dentures (43.86%) predominated, followed by button cells (33.33%) in his series. Because of their corrosive nature, button batteries cause damage to the esophageal mucosa [17]. Three (03) phenomena explain the occurrence of local complications. Firstly, the rupture of the battery casing releases its corrosive contents into the esophagus, causing the mucosa to burn. Secondly, the button cell creates a local electric current in the esophageal mucosa, encouraged by an electrochemical reaction between its ions and those of the blood. Finally, the pressure exerted by the battery on the mucosa is capable of causing lesions through ischemia [17] [19]. Ulceration and ne-

crisis occur rapidly, at 4 and 6 hours respectively. Progression leads to the formation of an oesotracheal fistula [2] [17] [20]. Our patients had twice the risk of complications from the 6th hour onwards (OR = 2.1; $p < 0.05$). Apart from these corrosive local complications, button cells also have systemic toxicity due to the mercury they contain [17].

In our series, rigid tube esophagoscopy was performed in 97.8% of cases. Our result is close to that of Ouedraogo [2], who found 94.7% endoscopic extraction. In fact, endoscopic extraction is best performed using an endoscopic column and optics. It enables a precise lesion assessment to be carried out from an endoscopic viewpoint, to better detect and assess complications. Surgical excision accounted for 2.2% of cases. Ouedraogo [2] noted 5.3% surgical removal of vulnating EFB. We agree with Ouedraogo [2] that surgical removal is, and should remain, an alternative treatment when endoscopic removal fails. While extraction of the foreign body remains paramount in this pathology, the management of inherent complications is also a major concern, given their high frequency and severity [2] [5] [19]. However, these complications can be considerably reduced by early extraction of vulnating foreign bodies. The cervical esophagus is the elective site for foreign bodies [14]. Indeed, this location was observed in 61.5% of cases in our series. Our result is close to those reported in the series by Ouedraogo RW-L [2] (56.4%) and Ille S [1] (69.97%). This preferential location would be linked not only to the narrowing of the esophageal mouth, but also to the weakness of peristalsis in this part of the esophagus [5] [14]. But whatever the location of the FB (cervical or extra-cervical esophagus), its extraction is urgently required [14]. In our series, the delay in foreign body management ranged from 3 hours to 4 days, with an average of 8 hours. Kabore's team [19] found a foreign-body management time of between 24 hours and 5 days. Our average management time is close to that of Togo S. [3], who noted 7h30mn. We consider these times to be fairly long. Vulnerable esophageal foreign bodies, particularly button batteries, which come into contact with the esophageal mucosa after 6 hours, lead to ulcero-necrotic lesions and esophageal-tracheal fistulas ($p < 0.05$). We are convinced that this delay could be further shortened by perfect collaboration with the anesthetic team to extract the vulnating EFB early. Ulcero-necrotic lesions were treated with a nasogastric tube (12 days). This allowed progressive healing. This type of management has been successfully applied by Kabore [19] and Ouedraogo [2]. We noted the persistence of an oesotracheal fistula after removal of the nasogastric tube. Esophageal stenosis was treated by esophageal dilatation with candles. Without success, pediatric surgery took over.

Indeed, the significant predictive factors of morbidity attributable to vulnating esophageal foreign bodies are: delay in management, vulnating character (pointed, sharp), nature of the FB (a button cell), advanced age of the patient and impact of the foreign body on a pathological esophagus [1] [17]. In the present series, complicated operative sequelae were present in 51.6% and dominated by ulcero-necrotic lesions 42.9% ($p < 0.05$). Our result is close to those of

Kabore [19], Nao [17] and Ouedraogo [2], who found these same lesions in 100%, 66.66% and 19.30% respectively. These lesions are particularly linked to the electrochemical nature of button cells. Prolonged contact of the button cell with mucous membranes and, above all, extravasation of its contents (composed of lithium and hydroxide) cause caustic lesions that progress to necrosis and esophageal stenosis [19]. Prompt management of button batteries embedded in the esophagus, *i.e.* before the onset of necrotic lesions, would enable a favorable evolution [5] [19]. It should be noted that esotracheal fistula is the cause of additional manifestations, namely false alimentary routes, with their corollary of inhalation bronchopneumopathy and almost permanent, urgent coughing [19] [20] [21].

We observed a short hospital stay (3 days on average). Several authors have reported similar results [2] [5]. Vulnerable esophageal foreign bodies require special monitoring after removal. Their morbidity remains high and not negligible. Any delay in management exposes the patient to medium- or long-term sequelae [22]. These sequelae were esophageal stenosis and esophageal-tracheal fistula in our series ($p = 0.001$). Our findings corroborate those reported in the literature. Indeed, Nao [17] and Ouedraogo [2] reported comparable results. Mortality was 1.1% in our series. This was attributable to inhalation bronchopneumopathy secondary to an oesotracheal fistula, observed in a patient who did not benefit from nasogastric tube placement after extraction of the vulnating esophageal foreign body. Improved technical facilities and experienced practitioners are key factors in the safe endoscopic extraction of vulnating foreign bodies. Looking at the literature, this rate has improved compared to the work of Ouedraogo [2] in 2015. However, some ENT facilities in sub-Saharan Africa are under-equipped in terms of both technical facilities and ENT human resources. This is a good opportunity to call on the public authorities to qualify and equip ENT structures for the benefit of the population.

5. Conclusion

Esophageal foreign bodies are relatively common in our ENT practice. Despite being under-diagnosed, they deserve special attention because of their potential severity. They can occur at any age, but are more frequent in children. Their occurrence is often accidental. While their diagnosis is straightforward, their management is no less delicate. Endoscopic extraction is the most common procedure, and must be carried out with the best possible technical facilities and experienced hands. Sometimes, cervicotomy remains the last resort when the FB is blocked in the esophagus. Some vulnating esophageal foreign bodies are particularly serious: button batteries carry a high risk of morbidity and mortality, especially if extraction is delayed (more than 6 hours). Early treatment is therefore a matter of urgency. Otherwise, sequelae such as esophageal stenosis and esotracheal fistulas are omnipresent, and are the dreaded fate of the ENT practitioner. When they occur, they require multidisciplinary management (ENT,

pediatric and visceral surgeons, anesthesiologist and nutritionist). In view of the high morbidity and mortality associated with the management of vulnating esophageal foreign bodies, we believe that prevention remains the essential weapon. We therefore appeal to all those involved—parents, educators and healthcare staff—to change their behavior.

Conflicts of Interest

This manuscript presents no conflict of interest.

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Collection Sheet

Fiche number: Date of entry:/...../20.....

1) General Information:

Age: Sex: Occupation: Residence:

Level of education: Primary Secondary Higher Literacy None

2) Diagnostic aspects:

➤ Questioning:

Circumstances of occurrence:

Voluntary Accidental (Eating Playing Other:

Circumstance of discovery:

Relative Surrounding Patient reported Other:

Risk Factors: None Male Stenosis Neuromuscular disease Mental retardation Psychiatric illness Ankylosing spondylitis Use of dentures

Other factors:

➤ Reasons for consultation:

Dysphagia Odynophagia Hypersialorrhea Foreign body ingestion

Chest pain Fever Vomiting Other: Evolution:

➤ Physical exam:

General Exam: General condition: Good Fairly good Poor

Consciousness: Integument and conjunctiva: Malnutrition
Dehydration

Parameters: O° =°C Weight: Kg Respiration rate: cycle/mn
Pulse: pul/mn

ENT and Head and Neck exam:

Mucosal examination (oral cavity and pharynx – nose):

Skin of the face and neck:

Otoscopy:

The rest of the ENT examination:

The rest of the examination:

➤ Further examinations:

Cervico-thoracic X-ray:

CT-scan:

Other check-ups:

➤ Diagnosis:

Time of ingestion of FB: Time of ingestion: Time of arrival: Time of ingestion of FB:

Site: Cervical esophagus Thoracic esophagus Abdominal esophagus

Nature of FB: Button cell Denture with hook Fish bone Needle
Sharp blade Spring Pieces of glass Magnet Other hazardous
FB:

3) Therapeutic aspects:

Surgical treatment:

Foreign body removal time: (in hours)

Rigid tube esophagoscopy Bougirage Foley probe Thoracotomy
Laparotomy

Operative debriefing:

Nature of FB: FB Headquarters:

Mucosal status: Normal Hemorrhagic Perforation Ulceration

Inflammatory Necrosis Stenosis Fistulae Other:

Incidents/Accidents: Trauma Perforation Hemorrhage Other:

Nasogastric tube placement: (Yes/No)

Post-operative care: Analgesic/Antipyretic Antibiotic Corticosteroids
NSAID

Other:

4) Progressive aspects:

Evolution: Favorable Complications (specify:))

Operative follow-up:

Immediate: Simple Complicated (specify:))

Secondary: Simple Complicated (specify:))

Late: Simple Complicated (specify:))

Exit Status: Recovery Death Sequelae Other:

Date of discharge:/...../..... Length of hospitalisation: days