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A 16-year retrospective study

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201 cases of foreign body ingestion in a Surgical Emergency Unit. A 16-year retrospective study

AIM: *The aim of this study is to analyse clinical characteristics of FB ingestion and predictive factors for complications, in order to reduce mortality and morbidity.*
MATERIALS AND METHODS: *A retrospective study of emergency surgical consultation records has been carried out from June 2005 through June 2015 yielded 201 episodes with the diagnosis of ingestion of foreign objects at the Surgical Unit of the University of Bari.*
RESULTS: *Natural Removal in 44,8% of cases; Endoscopic retrieval in 42,4%, Surgical Procedures 4,4%. Statistical analysis was based on multivariate analysis and the model R2 of the Naegelkerke value.*
DISCUSSION: *First of all, the approach to ingestion should be endoscopic. The second approach is surgical in selected cases. The most frequent site of impaction were oesophagus, stomach and right colon. An EGD proved to be the most used procedure with a no morbidity and no mortality.*
CONCLUSION: *The ingestion of foreign bodies is a frequent, complex and expensive condition to treat. Observation and endoscopy are the most appropriate procedures to be considered to manage the ingestion of FB in Emergency Surgery Unit.*

KEY WORDS: Emergency surgery, Foreign bodies, Ingestion

Introduction

Foreign bodies (FB) ingestion and oesophageal food bolus impaction are an usual common presentation in emergency surgical unit. Even if it occurs most commonly in paediatric age, with a peak of incidence between 6 months and 6 years, FB ingestion can also occurs among the adult population. Accidental ingestion is more common in adults, in patients with dental implants, mental disability and in drug addicted and it occurs while eating whereat voluntary ingestion is more frequent in psychiatric pts and among prisoners [1].
Schwarz [2] in 1976 reported that as estimated 1500 deaths/year occur for FB ingestion in upper gastrointestinal tract. Large series, from 1995 through 1998 , showed that the mortality rate reporting no deaths among 852 adults and only 1 for paediatric patients. Sometimes FB ingestion is followed by life-threatening complications (perforation, bleeding, etc) that require surgery. Fortunately, in the majority of the cases, FB pass through the gastrointestinal tract spontaneously, endoscopic procedure is required in 10-20% and surgery is necessary in 1-14 % [3]. Despite the frequency and seri-

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ousness of these diseases there are few complete studies about FB ingestion, always described as anecdotic report. The aim of this study is to analyse clinical characteristics of FB ingestion, such as type, location of impaction, and to understand predictive factors for complications, in order to reduce mortality and morbidity.

Patients and Methods

A retrospective review of emergency surgical consultation records has been carried out from June 2005 through June 2015 yielded 201 episodes with the diagnosis of ingestion of foreign objects (IFO) at the Surgical Unit of the University of Bari. Patient demographics data including age, gender, type, size and location of FB, purpose of introduction, diagnostic tools, length of hospital stay and treatments were collected in a database. The management of IFO is according to the recommendations of the American Society for Gastrointestinal Endoscopy (ASGE) [4] as shown in Fig 1. In all pts, after triage, a plain chest and abdominal x-ray was performed for the identification and localization of the FB, followed by surgical consultation. The emergency surgeon decided for endoscopical procedure or surgery, both or nothing. Some pts were first screened by otolaryngologist, psychiatrists.

The esophagoduodenoscopy (EGD) with flexible endoscopes was performed after informed consent by the emergency Endoscopy Service (7 endoscopists) under local pharyngeal anaesthesia, sedation using midazolam with the help of a nurse or general anaesthesia (propofol), in some critical patients, under anaesthesiologist control. Endoscopic devices, used for the removal of IFO, included alligator forceps, biopsy forceps, rat-tooth forceps, Dormier-type stone retrieval baskets and a net depending on type and location of IFO.

Statistical analyses were performed using SPSS Statistics (ver. 19). P value < 0.05 was considered significant.

A logistic regression model for the evaluation of relative risk of voluntary ingestion of foreign bodies and their association with variable parameters was applied.

The dependent variable included in the model is a dummy with two categories: "voluntary foreign object ingestions" versus "involuntary foreign object ingestions". The last category is used as the reference one. The independent variables evaluated in our model were demographic, socio-juridical and clinical. The selection of the variables that are considered in the analysis was guided by the findings of the literature and the availability of information in our sample.

Lastly, health aspects refer to the presence of physical or psychiatric diseases. In particular, in a first step of elaborations, available anamnesis data were grouped and coded as follows: intrinsic esophagus-gastric pathologies, psychiatric pathologies and ab-estrinseco compression pathologies. Due to the scarce presence of individuals affected by each type of disease (39 as a total), the three categories was unified in one that was opposed to the reference one, as to say, absence of pathologies. Written informed consent was obtained from all patients.

Demographic aspects include gender (man as reference category), and age. Socio-juridical aspects include citizenship (citizen of a non-European Union Country versus Italian, with the last one as reference category) and juridical status (prisoner versus not incarcerated, with the latter as reference category). Lastly, clinical variables included in the analysis were the presence of physical or psychiatric diseases: oesophageal or gastric pathologies, extrinsic compression and psychiatric disorders and -pathologies. Due to the scarce presence of individuals affected by each type of disease (39 as a total), the three categories was unified in one that was opposed to the reference one, as to say, absence of pathologies. Written informed consent to anonymously handle information included in clinical records was obtained from all patients.

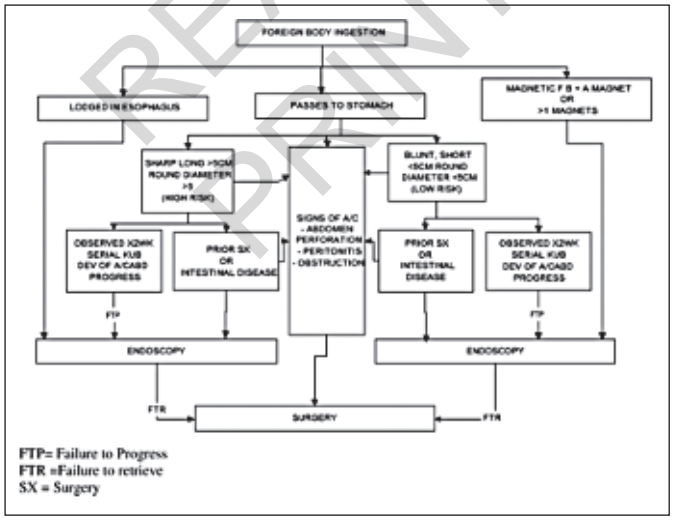

Fig. 1 Management of IFO.

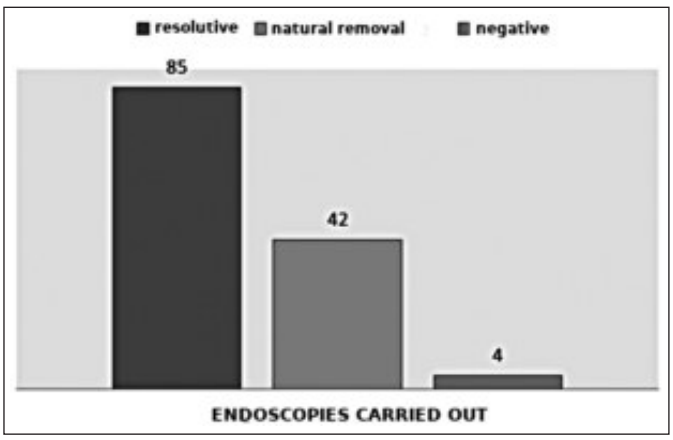

Fig. 2 Endoscopies performed (resolutive/naturally removed/negative).

Results

201 surgical consultations (73 females and 128 males) were performed with the diagnosis of IFO examined at the 3rd General Surgery Unit of the University of Bari from June 2005 to June 2015. Mean age was 45,94yrs, median age 45 (range 5-88) with 8 paediatric pts (3.9%) and 193 adults (96,1%). Concerning the juridical status, 190 pts were free citizens and 11 prisoners; 190 pts (94.5%) were Italians and 11 (5,5%) came from non-European Union Countries. Voluntary foreign object ingestion occurred in 38 pts (19%) and accidental FB ingestions occurred in 163 pts (81%). 14 pts had oesophageal or-gastric diseases: 6 peptic ulcer disease and/or related complications (5 stenosis and 1 gastric ulcer,), 3 pts had functional oesophageal disorders, 2 previous gastric surgery, 1 hiatal hernia and 1 pt with complication from oesophageal caustic ingestion, 2 pts had extrinsic compression pathologies (1 with sternocleidomastoid muscle rhabdomyosarcoma and 1 with tongue cancer). All results can be appreciated in Table I. Nineteen patients had psychiatric disorders or a history of drug addiction. After the initial surgical consultations were performed, 50 pts (24,9 %) were underwent radiological investigation and in 13 pts (6,4%) further consultations were required. All patients characteristics can be appreciated in Table I.

210 FB were listed as follows: 91 food bolus impactions (whose 77 blunt bolus and 14 cutting ones); 100 objects ingestion (40 blunt objects, 60 sharp ones and 19 not specified). An ingestion multiple FB occurred in 18 pts, while a single FB ingestion occurred in 173 pts and in 19 not assessed. All collected FB can be appreciated in Table 2.The location of IFO was not specified in 120 cases (59,7%); in 18,9% in esophagus, 11,9% in stomach, 3,5% colon-rectum, 3% in small bowel and in 0,5% in liver.

Upper GI Endoscopy was performed in 131 pts (65,2%): which revealed effective (FB retrieval) in 85 pts (65%), was negative in 4 (3%) meanwhile in 42 cases (32%) the impacted bolus had spontaneously progressed in the stomach; 13 pts (18,5%) refused the procedure, (5 psychiatric and 8 prisoners). In 70 cases (34,8%), endoscopy was deemed useless, whose 44 (63%) not useful (8 pediatric pts, one ENT pt and 35 cases). For 13 pts (18,5%) clinical records did not contain adequate information (Fig. 2).

For 140 pts hospitalization was not necessary, 3 pts refused. 57 pts were hospitalized in our General Surgery Unit and one in ENT Unit. Mean hospital stay was 0,93 days (median 1; range 1-25). Concerning pts who underwent a surgical procedure, mean hospital stay was 11 (median 9, range 5-25). All other patients were hospitalized for 2-3 days (mean 0,5 and median 1).

9 pts underwent a surgical emergency procedure: 5 pts presented gastrointestinal perforation, 2 pts septic shock, 1 gastrointestinal bleeding and 1 intestinal obstruction. Surgical procedures were collected as follows: laparotomy with viscerotomy and organ repair (2 stomach, 1 duodenum and 3 ileum); right colon resection, laparoscopy with hepatic abscess drainage, incision of SCM (abscess after FB removal), laparotomy with hemostasis and toilette (second look for postoperative gastrointestinal bleeding). Intraoperative mortality and postoperative complications were 0%. There was 1 complication after endoscopy.

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TABLE 1 - *Patients' Characteristics*

Anamnesis	Number of cases
Negative	158 (78.6%)
Intrinsic Oesophago-Gastric Pathologies Esofago – Gastriche Peptic Ulcer and Outcomes: 6 (5 Cardial Stenosis + 1 Gastric Ulcer) – Functional Disturbances of the Oesophagus: 3 e (Alteration of Oesophageal Motility - Oesophageal Dyskinesia, Gerd) – Prior Oesophageal or Gastric Surgery 3 (2 Gastric Bands - Oesophago-Gastric-Repair Surgery) – Hiatal Hernia – Oesophageal Inflammation Caused by Caustic Agents	14 (7%)
Psychiatric and Dependence Pathologies of Which 1 Pt With Cognitive Issues And 3 Pts With Alcoholic Intoxication)	19 (9,45%)
Ab Extrinsic Compression Patologies Caused By 1 - Scm Rhabdomyosarcoma 1 - Carcinoma Of The Tongue	2(0,9%)

Table II - *Foreign Bodies' Characteristics*

Foreign Body	Type	Total no.
Rounded food bolus	bezoar 30 meat boli 46 non-specific boli	77 (36.37%)
Sharp food bolus	5 chicken bones 1 lamb bone 5 fish bones 3 mussel shells	14 (6.7%)
Rounded, non-food bolus	2 coins 1 ring 24 sets of false teeth 1 cigarette filter 2 batteries 1 small chain 1 wooden whistle 2 stones (one with max. dimension 5.5 cm) 6 metal objects (5 screws, one SIM card)	40 (19%)
Sharp non-food bolus	12 toothpicks 15 razor blades 3 knives 2 piercings 1 needle 2 telescopic antennae (23cm & 5cm**) 2 metallic objects (nails) 1 crucifix 6 fragments of a range of materials (6 pieces of glass & 1 of porcelain)	60 (28.6%)
Non-specified		19 (9%)

Table III - *Results of Multivariate analysis.*

Variables	B	Standard Error	P value	Odds Ratio
Gender (baseline man)				
Woman	-0,80	0,41	0,13	0,31
Age (continuous variable)	-0,02	0,01	0,10	0,68
Citizenship (baseline Italian)				
Foreigner	1,54	0,56	0,06	4,68
Presence of Diseases (baseline no)				
Yes	0,66	0,20	0,02	1,94
Juridical Status (ref. non-prisoner)				
Prisoner	4,13	1,09	0,00	62,45
Constant	-6,79	1,95	0,00	0,00

haemostasis and toilette (second look for postoperative gastrointestinal bleeding). Mean hospital stay among surgical patients was 11 days (median 9, range 5-25). All other patients were hospitalized for 2-3 days (mean 0,5 and median 1).
No complications recorded after endoscopy and no postoperative complications or mortality occurred in surgical patients.
Patients' outcome can be represented as follows: Natural Removal 90 (44,8%); Endoscopic retrieval 85 (42,4%), not specified 13 (6,4%), Surgical Procedures 9 and one second look (4,4%), Negative Endoscopy 4 (2%).
The results of Multivariate analysis are shown in Table 1 and refer to a total of 201 observations, 38 of which refer to intentional foreign object ingestions. The model shows R2 of the Naegelkerke value equal to 0.421 (Table III).
The timing between the access to the Emergency to the treatment can be estimated from 1 to 4 hours.

Discussion

The ingestion of FBs can manifest with different clinical pictures as described in the literature. Early clinical manifestations range from epigastric pain (55%), vomiting (16%), dysphagia (7%), globus pharyngis (4%) or chest pain (3%). In 30% of cases, however, the ingestion of foreign bodies is characterized by an absence of symptoms [4].In particular, pediatric or psychiatric patients can present immediate symptoms of ingestion of foreign bodies, including suffocation, refusal to eat, hypersalivation, dyspnoea or respiratory distress. Many patients may remain asymptomatic for years and only show symptoms late [5]. The onset of bleeding is very rare, which may be

secondary to fistulization in large blood vessels, such as the aorta and large vessels in the neck [6]. Timely intervention is required to avoid complications such as perforation, haemorrhage, pneumomediastinum, mediastinitis, retropharyngeal abscess, extraluminal dislocation, tracheoesophageal and aorto-oesophageal fistula, sepsis and intoxication [5]. Oesophageal perforation is one of the most frequent complications of ingestion of foreign bodies, in fact it occurs in more than 20% of cases and is caused in 3-35% of cases [5]. First of all, the approach to ingestion should be endoscopic, whose timing depends on the time elapsed from the ingestion, the patient's age, clinical conditions, foreign body characteristics (size, shape, sharpness, content and location). The second approach is surgical in selected cases. This analysis shows that the ingestion of foreign bodies is much more frequent in certain categories of patients that can be defined as "at risk". The results show that FB ingestion is much more common in male patients than in females, but this result is not statistically significant. The presence of an inverse relation between the risk of intentional ingestion of a foreign object and the age of the patients (odds-ratio: 0.68) is also demonstrated. In fact, the value is almost equal and is not significant, indicating the same probability independently of age, and this effect is of low significance. Among the findings, we demonstrate that the presence of associated diseases almost doubles the risk of intentional ingestion (odds-ratio: 1.94) compared to healthy subjects. In addition, being a non-European Union citizen is strongly associated with the dependent variable (odds-ratio: 4.68): and a foreigner has 4.5 times the likelihood of ingesting a CE although this is not significant. However, the characteristic that mostly increases the risk of voluntary ingestion of foreign bodies is being inmate, which, compared to a state of free citizen, raises the risk more than 60-fold [7]. From the results of this study, it is clear that the ingestion of foreign bodies (FBs) is much more frequent in high-risk patients, such as:

– oesophageal-gastric pathologies or disorders resulting from compression from an external source preventing the passage of the bolus through the digestive tract and therefore favouring its arrest;

– psychiatric conditions or drug addictions. In such cases the ingestion of FBs may be explained by personality disorders, actual psychoses, pica and feigning or malingering.

The latter is the most frequent, ingestion being voluntary and the patient can reiterate the act, ingesting multiple objects or accompanying the ingestion with other attempts at self-harming. Usually these patients refuse endoscopy and ask for voluntary discharge without any diagnostic procedure being performed. In our series, 13 patients refused diagnostic procedures and 5 of them were psychiatric pts. In these cases, often the ingestion is not real and psychiatric reports showed ingestion of non-radiopaque FBs (very difficult to detect with X-Ray). For alcoholics there is a greater risk of voluntary ingestion and in our sample 3 patients were subject to alcohol intoxication. Prison inmates are at much greater risk than the rest of the population and there has been an increase in the incidence of the ingestion of foreign bodies in the prison population [7]. Usually, detainees either simulate or reiterate the gesture. In the case of simulation, which in most cases is reported as an ingestion of razor blades, the patients reject the EGD, as observed in 8 patients in our sample. In the case of actual ingestion on the other hand, they take special precautions, such as wrapping the FB in cotton wool to avoid complications.

This behaviour seems to be explained by a desire to break the daily monotony by spending a few days away from prison. Reported data agree with international studies. Smooth-edged, non-sharp indigestible boluses were those most ingested, then smooth-edged indigestible boluses, followed by sharp indigestible boluses. Of these, meat-based boluses, dentures, razor blades and toothpicks were the most numerous. The most frequent site of impaction of FB were oesophagus, the stomach and the right colon. An EGD proved to be the most used procedure with 131 endoscopies being performed, and in 65% of cases was successful, with a no morbidity and no mortality.

Surgical intervention was required in only 4.9% of the patients, perforation being the most frequent indication for surgery (5 patients). According to the American guidelines, when pts refer an ingestion occurred 3 o 4 days before, FBs need to be removed endoscopically or surgically [8]. In literature, less than 20 cases of a combined laparoscopic and endoscopic technique were described [9,10]. Fetti et al consider laparo-endoscopic approach to perform diagnostic and gastrotomy with extraction of the FB with good results in terms of hospital stay and return to normal activities [10]. Other interesting cases report an open approach due to a huge trichobezoar from gastric lumen to second duodenum in 25yrs old psychiatric pt. In this case gastrotomy, extraction and suture repair were performed according to traditional open technique with good result with discharge in 7th post-operative day [11].

Improper admissions and stays in a surgical Unit entail high costs, both for National Health Service itself. The burdens are varied and include hospital costs such as those for access to the Emergency Unit (medical, nursing and auxiliary staff), laboratory and instrumental diagnostics requirements, various specialist consultations (surgery, psychiatry, ENT etc.), the costs of endoscopy (medical personnel and nursing) and operating room use (medical, nursing, auxiliary, materials, etc.) as well as hospitalization in a Surgical Unit or at the secure facilities required when treating prison inmates. Moreover, this reduces the beds available in general Surgery wards, altering the turnover. As far as prison detainees' stays are concerned, security costs must be added [12].

Conclusions

The ingestion of foreign bodies is a condition that is frequent, complex and expensive to treat. In most cases it is accidental and voluntary ingestions only occur in certain specific patient categories. Observation and endoscopy are the most appropriate procedures to be implemented in the absence of complications. Surgery is necessary in a small number of cases. Morbidity and mortality are absent. Recommendations can be useful to improve the approach to FB ingestion: in a large hospital such as the University Hospital of Bari the establishment of an Emergency Endoscopic Service in A&E would be desirable, in order to reduce costs and time and reserve admission to General Surgery to those patients needing to undergo emergency surgery. The foreseeing of a brief hospital stay in the emergency room would reduce the number of beds occupied in the other Operating Units. For patients voluntarily ingesting foreign bodies, especially those that are recidivist, psychiatric counselling should be provided. Furthermore, prevention strategies should be implemented involving the identification of those at risk, reducing access to dangerous or potentially dangerous objects, re-evaluating psychiatric therapies and/or intensifying the psychotherapeutic support. Stricter observation of prison patients or those suffering from a propensity to self-harm should be implemented. In conclusion, by improving the diagnostic procedure and patient management, costs to the State health services could be reduced and the community could be better served.

Riassunto

L'ingestione di corpi estranei è facilmente osservabile nei reparti di chirurgia d'urgenza. Nonostante questi casi si presentino più frequentemente in età pediatrica, con un picco di incidenza tra i sei mesi e i sei anni, l'ingestione di corpi estranei può avvenire anche nella popolazione adulta, distinguendo un'ingestione involontaria, che è più comune in pazienti con impianti dentali, disabilità mentali e nei tossicodipendenti e avviene durante l'ingestione di cibo ed una volontaria, che invece è più frequente nei pazienti psichiatrici e tra i detenuti. Schwarz nel 1976 ha stimato, negli USA, circa 1500 decessi per anno, dovuti all'ingestione di corpi estranei. Lo studio della American Society for Gastrointestinal Endoscopy (ASGE) non ha evidenziato alcun decesso tra gli 852 pazienti adulti ed ha riportato solo un caso tra i pazienti pediatrici. A volte l'ingestione di corpi estranei è seguita da complicanze potenzialmente pericolose per la vita del pz, come la perforazione o l'emorragia digestiva che richiedono un procedura chirurgica in regime di emergenza o urgenza.
Fortunatamente, nella maggior parte dei casi i corpi estranei passano attraverso il tratto gastrointestinale spontaneamente, il trattamento endoscopico è necessario nel 10-20% dei casi e quello chirurgico solo nel 1-14% dei casi. Obiettivo del nostro studio osservazionale è analizzare l'incidenza, le caratteristiche l'ingestione dei CE nell'ambito dei pazienti che afferiscono al Pronto Soccorso dell'Azienda Ospedaliero-Universitaria Policlinico di Bari ed al reparto di Chirurgia d'Urgenza nel periodo 2005-2015 ed anche valutare eventuali fattori predittivi per eventuali complicanze per poter ridurre mortalità e morbilità.
Lo studio dei registri delle consulenze chirurgiche d'emergenza ha evidenziato 201 episodi con diagnosi di ingestione di corpi estranei, occorsa in 194 pazienti esaminati presso la U.O. di Chirurgia di Urgenza dell'Università di Bari.La maggior parte dei pazienti sono adulti e solo 8 pazienti pediatrici sono stati ammessi in reparto per mancanza di letti o di endoscopisti nell'ospedale pediatrico locale. I dati demografici dei pazienti includono età, sesso, tipo, misura e posizione dei corpi estranei, scopo del ricovero, strumenti diagnostici, durata della degenza ospedaliera e trattamenti. L'iter diagnostico- terapeutico è basato sulle linee guida internazionali e sul management aziendale per cui è stata condotta una consulenza chirurgica dopo il triage e successiva identificazione e localizzazione radiografica dei corpi estranei. Molti pazienti sono stati sottoposti anche a diagnostica di II livello (TC) e a consulenze specialistiche ulteriori (consulenza otorinolaringoiatrica, psichiatrica, etc a seconda dei casi). Il chirurgo d'emergenza successivamente ha deciso per il trattamento chirurgico, endoscopico, entrambi o nessuno di questi. Dai risultati del nostro studio, si evince che l'ingestione dei corpi estranei è molto più frequente in alcune categorie di pazienti, definite a rischio: nei pazienti con patologie di vario tipo, come patologie esofago-gastriche o patologie da compressione ab estrinseco, che impediscono il passaggio del bolo attraverso il tratto gastrointestinale favorendone l'arresto; nei pazienti con patologie psichiatriche o tossicodipendenza: in questi casi l'ingestione di CE può essere spiegata da disturbi della personalità, psicosi p.d., pica e simulazione (malingering). Nel nostro campione 13 pazienti hanno rifiutato le procedure diagnostiche e di questi 5 psichiatrici. In questi casi quasi sempre l'ingestione non è reale e riferiscono di aver ingerito corpi estranei radiopachi per cui difficilmente obiettivabili. I detenuti di solito o simulano oppure reiterano il gesto. La procedura endoscopica si è rivelata quella più utilizzata. Sono state condotte 131 endoscopie, risolutive nel 65% dei casi, con bassa morbilità e assenza di mortalità. La complicanza più frequente risulta essere la perforazione gastrointestinale, avvenuta in 5 casi. L'indicazione all'intervento chirurgico c'è stata solo nel 4,9% dei pazienti. In conclusione, l'ingestione dei corpi estranei è frequente e compless da gestire.
Osservazione clinica ed endoscopia rappresentano il primo approccio cui segue l'intervento chirurgico conducibile per via tradizionale o laparoscopica o in combinata

laparo-endoscopica in casi selezionati. È mandatorio che sussista un'Unità di Endoscopia di Emergenza in un Presidio Ospedaliero per poter gestire questi pazienti anche per poter ridurre i costi ed il tempo di degenza.

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