Pomen nujne endoskopije zgornjih prebavil pri odstranitvi tujkov – rezultati obdobja 1994-2008

The role of emergency endoscopy in upper git foreign body extraction

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Izvleček

Namen: *Tujki v zgornji prebavni cevi le redko povzročijo nujna stanja v gastroenterologiji. Namen raziskave je bil ugotoviti delež bolnikov, pri katerih smo ob nujni endoskopski preiskavi ugotovili tujke v zgornji prebavni cevi, oceniti uspešnost endoskopskih posegov in morebitne zaplete.*

Metode: *V raziskavo so uvrščeni bolniki, pri katerih smo v obdobju od 1. januarja 1994 do 1. maja 2008 opravili nujno endoskopsko preiskavo zgornjih prebavil.*

Rezultati: *Pregledali smo 8552 bolnikov, povprečne starosti 60,6 let SD±17,1 v razponu od 1-106 let, 3276 (38%) žensk in 5276 moških (62 %). Pri 69 bolnikih, 0,8 % vseh preiskovancev, smo ugotovili "prave" tujke požiralnika ali želodca. Skupaj smo opravili 90 endoskopskih posegov, pri 65 bolnikih, 94,2 %, smo tujke endoskopsko odstranili, pri štirih (5,8 %) pa endoskopski posegi*

Abstract

Purpose: *Foreign bodies in the upper gastrointestinal tract (GIT) rarely cause urgent problems in gastroenterology. The purpose of the study was to assess the percentage of patients in whom urgent endoscopic investigation revealed true foreign bodies in the upper GIT and to evaluate the success of emergency endoscopic procedures.*

Methods: *The study includes patients in whom urgent endoscopic investigations of the upper GIT were performed in the period 1 January 1994 to 1 May 2008.*

Results: *8552 patients were investigated, average age 60.6 years (SD±17.1 years, range 1–106 years), with 3276 (38 %) females and 5276 males (62 %). In 69 patients (0.8 %), "true" foreign bodies were detected in the esophagus or stomach. In these patients a total of 90 endoscopic investigations were performed: in 65/69 patients (94.2*

niso bili uspešni. Med tujki smo odstranili najrazličnejše kovinske in plastične predmete: kovance, ključe, vijake, kljuke, baterije, britvice, igle, dele kuhinjskega, toaletnega in pisalnega pribora, vžigalnike, gumbe in igrače. Pri bolnikih, ki so imeli uspešno endoskopsko odstranitev, nismo opazovali pomembnejših zapletov, le pri 4 bolnikih (4/69, 5,8 %) smo opazovali klinično nepomembno krvavitev v predelu ezofagogastrične stičnice.

Zaključek: *Tehnološki razvoj endoskopskih instrumentov je omogočil različne interventne posege. Metoda se je potrdila kot učinkovita pri odstranjevanju tujkov v zgornji prebavni cevi.* •

%) the foreign bodies were removed endoscopically; in 4 (5.8 %) cases the endoscopic procedures were unsuccessful. Among the foreign bodies removed were a variety metal or plastic objects, such as coins, keys, screws, hooks, batteries, razor blades, needles, lighters, buttons, and parts of kitchen, toilet or writing utensils. In patients with successful endoscopic removal of the objects, no significant complications were noted. In 4 patients (4/69, 5.8 %) mild hemorrhages from the region of the esophagogastric junction were observed.

Conclusion: *Endoscopic technologies allow successful removal of a variety of types of foreign bodies from the upper GIT.* •

Introduction

Foreign bodies (FB) in the upper gastrintestinal tract (GIT) rarely cause an urgent condition in gastroenterology (1-3). They can be "true" FB, that is, objects that accidentally enter the digestive tract, or bezoars (commonly composed of hair or vegetable matter), food, or medical protheses (4,5). Unfortunately, we do not have epidemiological data for this problem in Slovenia. In a Swedish study, the annual incidence of FB ingestion was 122 per million persons (5). Most (80–90 %) ingested FB pass through the GIT spontaneously but in 10-20 % impaction occurs and endoscopic or surgical removal is necessary (2,6).

FB usually enter the GIT when the person is eating or by mistake. Certain population groups, particularly people in custody and psychiatric patients, are more likely to swallow them intentionally, and FB ingestion is also more common in alcoholics when it occurs accidentally during acute intoxication (7) and in children, who swallow them accidentally or out of curiosity. FB most often lodge in the esophagus, the narrowest part of the GIT (8). The consequent GIT obstruction creates a typical clinical picture of acute dysphagia, odynophagia, sialorrhea and chest pain. Urgent removal is indicated because serious, even life-threatening, complications may occur (6,8–10). The evolution of endoscopic instruments, video endoscopy and devices for endoscopic procedures in the 1980s widened the scope of minimally invasive operative procedures in the GIT (11). Endoscopic retrieval is an important advance in the management of FB impaction and has become the mainstay of treatment in recent years.

The aims of this prospective study conducted at our institution were:

- to assess the percentage of patients in whom urgent endoscopy revealed "true" FB in the upper GIT,
- to evaluate the success of endoscopic procedures, and
- to assess the percentage and type of complications during these procedures.

Material and methods

The study included patients in whom urgent endoscopic investigations of the upper GIT for a variety indications were performed in the period January 1 1994 to May 1 2008 at the department of gastroenterology and endoscopy of the University Clinical Centre Maribor. The hospital offers a 24-hour endoscopy service, with an endoscopic team consisting of a doctor and a nurse. All patients/parents of children signed an informed consent prior to the procedure. All investigations were carried out with an Olympus GIF Q20/Q30 device (Olympus GmbH, Hamburg) and since 2000 with EVIS (Endoscopic Video Information System, CLV U20) system (Olympus Optical, Hamburg GmbH). Most investigations and procedures were performed in an outpatient setting. Prior to the procedure, patients received butylscopolamin 20 mg/ml (Buscopan, Boehringer Ingelheim) intravenously and the local anesthetic lidocaine as a 10% aerosol (Xylocain, Astra), usually 1–2 sprays orally; some patients also received an individually titrated dose of midazolam intravenously (Dormicum, Hoffmann La Roche) and, if necessary, the antidote flumazenil (Anexate, Hoffmann La Roche). In 2001 lidocaine use was due to reports from the literature about cardiovascular complications suspended. During the procedures all patients had their vital signs monitored with electrocardiography, noninvasive blood pressure measurement and pulse oximetry. In pediatric cases, a pediatrician or an anesthesiologist were also present. After FB extraction we endoscopically evaluated the upper GIT for possible mucosal damage. Adult patients were observed for 6–8 hours at the endoscopy unit, but children were hospitalized for observation on the pediatric ward. For the purposes of FB extraction, the original instruments provided the equipment manufacturer were used, including different types of forceps, grasping devices, snares and retrieval baskets. In cases of hemorrhage, epinephrine solution (1:10000) was used for endoscopic hemostasis. The data was analyzed with the statistics programs SPSS® for Windows (Statistical Package for Social Sciences, version 12.0.1, SPSS Inc., USA) and Medcalc® (Medcalc Software, version 5.00, F. Schoonjans, Belgium).

Results

Over the 15-year period 8552 patients were investigated, average age 60.6 years (SD±17.1 years, range 1–106 years), with 3276 (38 %) females and 5276 males (62 %). In 69 patients (0.8 %) true FB were found impacted in the esophagus or the stomach. In 53 patients (16 females and 37 males, average age 54.7 years, SD±22.2) FB were found in the esophagus, and in 16 patients (5 females and 11 males, average age 22.0 years, SD±22.3) they were lodged in the stomach. In the FB patients a total of 90 endoscopic procedures were performed. FB were endoscopically removed in 65 patients (94.2 %); in 4 cases (5.8 %) the procedure was unsuccessful, with the result that 3 patients had to be treated surgically and one was lost to follow-up.

The highest number of FB found in the upper GIT was 6 (metal objects intentionally ingested by a person in custody). The longest FB was an 18.6-cm toothbrush swallowed by a young woman trying to induce vomiting. The youngest patient was a 1-year-old boy who swalloved a battery. A variety of metal and plastic foreign objects were removed, such as coins, keys, screws, batteries, razor blades, lighters, buttons, toys and parts of kitchen, toilet and writing utensils (Fig.1). In patients with successful endoscopic removal of the objects, no significant complications were noted. In 4 patients (5.8 %) mild hemorrhage from the region of the esophagogastric junction was observed. In 3 patients (4.3 %) hemostasis with diluted epinephrine solution (1:10000, Sanofi Aventis) was required.

Discussion

FB in the upper GIT rarely cause gastroenterological emergencies. Most often they are found in the esophagus and stomach and seldom in the small or large intestine or the anus (5,7–9). The esophagus is the narrowest part of the digestive tract, and the most common sites of FB impaction are at the physiological narrowings and pathological strictures. The first such area is at and just distal to cricopharyngeus,

Figure 1. *True foreign bodies found and extracted from the upper gastrointestinal tract during emergency endoscopy. The ruler illustrates the dimensions of the foreign bodies.*

the second is at the level of the aortic arch, the third is at the level of tracheal bifurcation and the last is at the esophagogastric junction or the lower esophageal sphincter (10). In our patient population, pathological stenosis is most often the result of progressive gastroesophageal reflux disease and rarely from tumors, developmental anomalies or other organ changes such as fibrotic rings (Schatzky ring), mucosal foldings or diverticula. The most frequent diverticula are a Zenker's diverticulum in the proximal part of esophagus and parabronchial and epinephric diverticula (7,8). Other areas of FB impaction in the GIT are the duodenum, ileocecal valve, Meckel's diverticulum and anus (4-6).

Typically, FB enter the GIT during eating or by mistake (3,5). Certain patient groups, such as those in custody, ingest them intentionally. Other high risk groups include psychiatric patients, alcoholics (who usually swallow them during acute periods of intoxication) (5,9,10) and children (who ingest FB, such as the smaller parts of toys, while playing) (5,9), particularly children younger than 5 years of age who, out of curiosity, swallow colorful smaller toys or parts of toys. A variety of articles may be ingested: parts of kitchen utensils, spoons, forks, needles, thimbles, pieces of wire, razor blades (usually broken in half), coins, batteries, buttons, toothbrushes, nail clippers, hairpins, rings, safety pins, screws. among many others (1,5,7,9,10). In the elderly, loose or broken dentures or poorly chewed or undigested food can present as "FB" (5,9,11).

Complications, such as GIT perforation, regularly occur with impacted chicken or fish bones, and complications following ingestion of toothpicks or sharp, metal objects have also been described (11–14). Especially in the Far East (Japan, China, Korea, Hong Kong) impacted fish bones may cause complications, a result of local dietary habits (15). During different medical procedures or interventions, ruptured tubes, dental instruments, drills, endoprotheses and surgical instruments may lodge in the digestive tract (5,8,10,13).

FB we rarely encounter in our patient population are trichobezoars, phytobezoars and phytotrichobezoars, which are conglomerates composed of different substances in the gastric lumen (5–7,10–13). Trichobezoars, or hairballs, involve ingested hair or nails and are commonly found in younger women. Fruits such as peaches, apricots or cherries, as well as oranges, figs, dates, coconuts, peanuts and cabbage, may predispose people to the formation of phytobezoars. They occur especially in individuals with hypomotility of the stomach and impaired gastric emp-

tying, such as after vagotomy or partial gastrectomy. In the literature, recently recognized types of bezoars are lactobezoars (derived from milk products) and concretions composed of medicines, sand, cement or even chewing gum (6,8,11–13). Lactobezoars are primarily found in low-birth-weight infants fed a concentrated formula partly composed of milk products. Numerous medications, primarily antacids, aluminum hydroxide, cholestyramine, sucralfate, slow-release theophylline, long-acting nifedipine and enteric-coated aspirin, have been implicated in the formation of bezoars (6,9,10).

A new problem with FB has been created in the last decades by drug smuggling and the use of body orifices to conceal illegal drugs, such as cocaine, marijuana and heroin (6). Drugs are placed in condoms, balloons or plastic bags that are ingested or inserted into the rectum or vagina. Possible complications include fatal intoxication from leakage of the drug or bowel obstruction.

Endoscopy is the most effective method for FB removal from the GIT (5,8–10,15,17). Technological advancements in the instrumental accessories used for manipulation have facilitated their wider use and a high success rate for the method. Modern instruments have two working channels, usually 2.6–3.2 cm wide, to allow the introduction of forceps and specially designed accessories into the gastrointestinal lumen. These accessories include magnets, alligator and rat-tooth forceps, Dormia-type baskets and polypectomy snares. For removing sharp objects there are specially designed overtubes, which are placed over the endoscope and protect the mucosa.

During preparation for endoscopic removal of a FB the following factors must take into consideration: the form, type, number and size of the FB; the anatomy of the portion of the GIT where the FB is lodged; and the level of experience of the investigator and the assisting nurse (6,9,19,16,18). Some FB, such as button batteries, are potentially dangerous because of corrosive and toxic actions following disintegration by stomach acid; others, such as pieces of wire, screws, nails and other pointed objects, can cause serious, even life-threatening, complications while passing through the GIT (17) including mucosal edema, bleeding, pressure necrosis and ulcers, perforations, fistula formation, abscesses or inflammation (mediastinitis, peritonitis) (6,8,15,18). Complications may occur also during endoscopical extraction of the FB, for example, when the FB slips and causes airway obstruction (5,10,16,17). The complication rate can be greatly reduced by using appropriate safety measures, such as overtubes or latex hoods, while retrieving sharp objects (6,8,9). The use of Foley catheters is still debated but most authors recommend against it.

We achieved a 94 % success rate at FB extraction from the esophagus and stomach during emergency endoscopy. Included were only "true" FB, not food boluses, retained sutures or bezoars. Our results are comparable with other data from the literature, although certain specialized endoscopic units have a success rate of up to 99% with a complication rate of 0.2-0.4% (10,17–20,23). The effectiveness of the procedure depends on the skill of the endoscopic team, the availability modern equipment and the number of all endoscopic procedures performed (6,10,21-23). Meticulous preparation followed by patient, competent execution of the procedures resulted in a low complication rate in our study. However, the literature describes serious complications of endoscopic manipulations, with GIT perforation being the commonest (6,10,17,21). Extraction of impacted FB requires not only prudence but often imagination (3,22). For example, in an earlier paper we described use of the Sengstaken tube to remove an impacted FB (a large chicken bone) in the esophagus (22).

For sedation during the procedure, different authors recommend different drugs, mostly benzodiazepines (such as midazolam or diazepam) and analgesics (such as pethidine or pentazocine); after the procedure, the antagonists flumazenil and naloxone can be used if required (6,8,16,23–25). In recent years, some endoscopic centers have begun using the induction agents propofol and ketamine, the opioid analgesics piritramid, fentanyl, remifentanil or alfentanil, and the nonsteroidal antinflammatory drugs metamizol and parecoxib (26–28). The choice of sedatives and

analgesics is influenced by the duration and type of endoscopic procedure and whether the procedure is done in a hospital or in an outpatient setting (29). Especially in children with a FB impacted in the middle or lower third of the esophagus, some investigators recommend glucagon intravenously to induce relaxation of the esophageal smooth muscles. Unfortunately glucagon has side effects, particularly nausea and vomiting. When the impacted FB has been in place for longer than 24 hours in young children, endotracheal intubation and endoscopic removal under general anesthesia is advised (6,8,16,27).

A problem we often encounter involves people in custody who repeatedly ingest FB or ingest multiple FB at once, some of whom refuse endoscopic extraction and demand surgical treatment. In these situations choosing the most appropriate treatment is no longer a straightforward matter of medical debate but involves ethical and legal dilemmas.

In conclusion endoscopic intervention is the most effective method for the extraction of true FB from the upper GIT. It is advisable to repeat the procedure after better preparations rather then proceede with surgical treatment following an unsuccesful first attempt. Better preparation involves a thought-out strategy for the endoscopic procedure, use of more suitable or adjusted accessories and consideration of short-term general anesthesia.

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***Table 1**: Foreign bodies extracted during emergency endoscopy in a 15-year period (1994-2008)*

Number of all patients undergoing emergency endoscopy	8552
Sex male (%) female (%)	 62 38
Patients with foreign bodies in the upper digestive tract: number (%)	69 (0.8)
Average age of patients (in years, ± SD)	47.1 (± 24.2)
Sex: male/female	48/21
Location of the foreign bodies: esophagus: number upper esophagus: number (%) mid esophagus: number (%) distal esophagus: number (%) stomach: number	 53 8/53 (15.1) 15/53 (28.3) 30/53 (56.6) 16
Sedation used during endoscopy: number (%)	21/69 (30.4)
Efficacy of endoscopic removal: number (%)	65/69 (94.2)
Average number of endoscopic procedures	1.3 [1]
Complication following endoscopic procedures: number (%)	4/69 (5.7)

[1] *This number does not included control endoscopies performed to evaluate possible mucosal injuries immediately after foreign body extraction.*

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