

# Therapeutic Endoscopy

Color Atlas of Operative Techniques for the Gastrointestinal Tract



Nib Soehendra  
Kenneth F. Binmoeller  
Hans Seifert  
Hans Wilhelm Schreiber

Second edition,  
revised and updated



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Second edition, revised and updated

Nib Soehendra, M.D.

Professor and Director  
Department of Interdisciplinary Endoscopy  
University Hospital Eppendorf  
Hamburg, Germany

Kenneth F. Binmoeller, M.D., F.A.C.G.

Director, Interventional Endoscopy Service  
California Pacific Medical Center  
San Francisco, California, U.S.A.

Hans Seifert, M.D.

Director, Department of Gastroenterology  
Klinikum Oldenburg  
Oldenburg, Germany

Hans Wilhelm Schreiber, M.D.

Formerly Professor  
Department of General Surgery  
University Hospital Eppendorf  
Hamburg, Germany

563 illustrations by Franziska von Aspern

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“Science and art belong to the world as a whole,  
and the barriers of nationality  
vanish before them.”

*J. W. von Goethe*  
Maximen und Reflexionen, 1821

This book is dedicated to those who have contributed innovative ideas  
and experiences to the field of endoscopy. Thanks to them,  
endoscopy has attained a defined, classic role as a diagnostic and  
therapeutic modality to the benefit of many patients.

## Preface

Interventional endoscopy has made new strides since the first edition of this book six years ago. In the second edition we have incorporated novel procedures that have entered the mainstream. We have kept the same didactic format, using richly detailed color illustrations to tell the procedural story. The artist's work is accompanied by legends that elaborate on each procedural step. The book's text follows a standardized format that we hope the reader will find practical and easy-to-navigate.

This book seeks to portray the realistic therapeutic capabilities of endoscopy in its day-to-day practice. It is based on many years of professional endoscopic accomplishments, scientific studies, personal experience, and the outcome of critical interdisciplinary teamwork. It reflects the current state of diagnostic and interventional gastrointestinal endoscopy and its related responsibilities.

Each chapter covering a therapeutic procedure is categorized into the following key segments: General definition of the clinical entity, indications, prerequisites, instruments, technique, and procedural limitations and complications.

An informed and cooperative patient, a correct diagnosis and indication, and meticulous, skillful technique are

critical to the success of the endoscopic procedure. Thorough knowledge of the endoscopic anatomy and pathological conditions is also a fundamental prerequisite.

We used original anatomic-endoscopic drawings to portray the technical concepts and details of the procedure. These are didactically more informative than photos or sketches based on photos. The drawings provide a synthesis of the endoscopist's view and the technical approach and interpretation. The text is concise and the legends to the figures highly detailed. The contents of the book aspire to translate the precise spoken word into a lucid form.

Thanks and recognition are also due to our illustrator, Franziska von Aspern; her combination of subject knowledge and artistic talent made the translation of endoscopic reality into pictorial images possible. Her skill was decisive to the success of this book.

We thank Thieme Publishing Group for their continued support in making the 2<sup>nd</sup> edition possible.

Hamburg and San Francisco

*Nib Soehendra  
Kenneth F. Binmoeller*

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# 1

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## Foreign Body Extraction

## ■ General

A variety of foreign bodies may accidentally or intentionally enter the gastrointestinal (GI) tract. In about 90% of cases, however, they spontaneously pass out through the GI tract. The remaining 10% comprise sharp, pointed, or bulky objects, which can cause local trauma or chemical damage to the mucosa. Nearly all such foreign bodies can be extracted with a flexible endoscope.

## ■ Indications

An emergency indication for endoscopic extraction is an impacted foreign object. Acute obstruction of the esophageal lumen can cause aspiration pneumonitis or pressure on the esophageal wall resulting in perforation and mediastinitis. Foreign objects can become impacted in the esophagus at the three physiologic levels of narrowing: the cricopharyngeal sphincter, aortic arch, and diaphragmatic hiatus. Objects that reach the stomach and are likely to pose a risk of mechanical or toxic injury should also be removed without delay. In addition, objects that remain in the stomach for more than 72 hours should undergo early endoscopic extraction since their spontaneous passage is unlikely. A bezoar requires debulking by endoscopic fragmentation to facilitate its removal.

## ■ Prerequisites

Prior to endoscopic extraction of a foreign body, information regarding the type, form, and size of the foreign body is required to plan the strategy of removal and to select the instruments to be used.

A plain radiograph of the upper GI tract may not always adequately localize the foreign body, and therefore a contrast study may be necessary. If a perforation is suspected, a water-soluble contrast agent like Gastrografin is preferred. The colon may also require evaluation with a contrast enema study. If an esophageal foreign body is suspected, then a plain radiograph of the chest should also include the neck as it is not unusual for foreign bodies to impact at the cricopharyngeal sphincter.

Children and uncooperative adults often require general endotracheal anesthesia so that the procedure can be carried out safely and successfully.

## ■ Instruments

Apart from pediatric and therapeutic upper endoscopes, the endoscopic armamentarium should include a variety of forceps (crocodile, rat-tooth, etc.), snares, Dormia baskets, and a long overtube.

## ■ Technique

An overtube is recommended when removing pointed or sharp objects to avoid damage to the esophagus and pharynx. Small or slippery objects should also be removed through an overtube. It is safest to insert the overtube over a guidewire, using an appropriately sized bougie (generally 45-French) as an obturator. If the foreign body occludes the lumen completely and prevents guidewire placement, then the overtube can be preloaded over the endoscope and pushed into place after the endoscope has been inserted across the pharynx. In such a case, a therapeutic gastroscope should be used to reduce the step formation between the endoscope and the overtube.

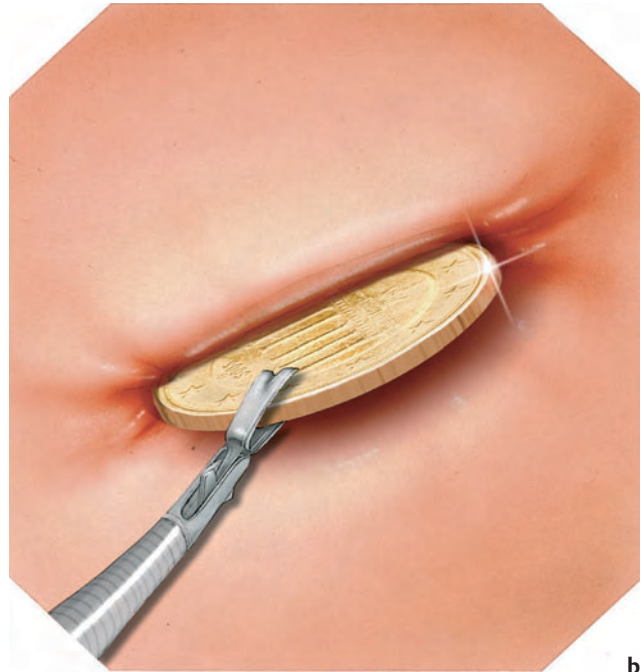
## Extraction from the Esophagus

(Figs. 1–6)



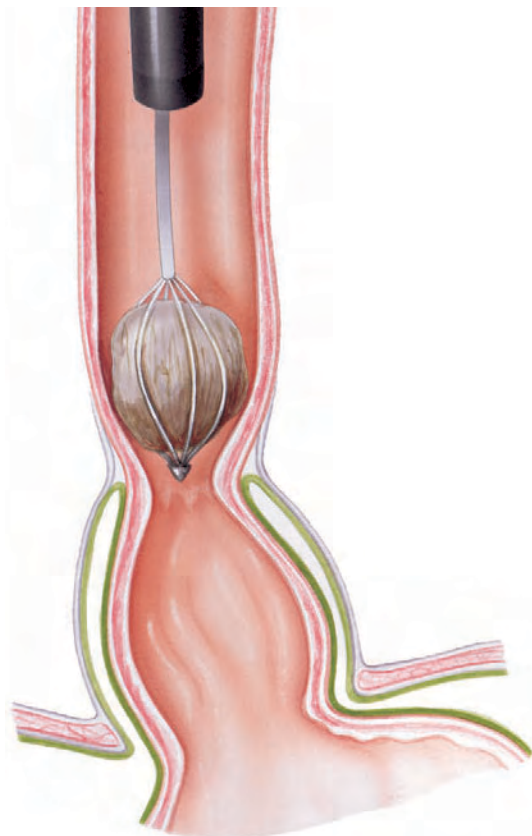
**a**

**Fig. 1a, b** Extraction of a coin from the esophagus.  
**a** In children, a coin often impacts at the level of the cricopharyngeal sphincter.

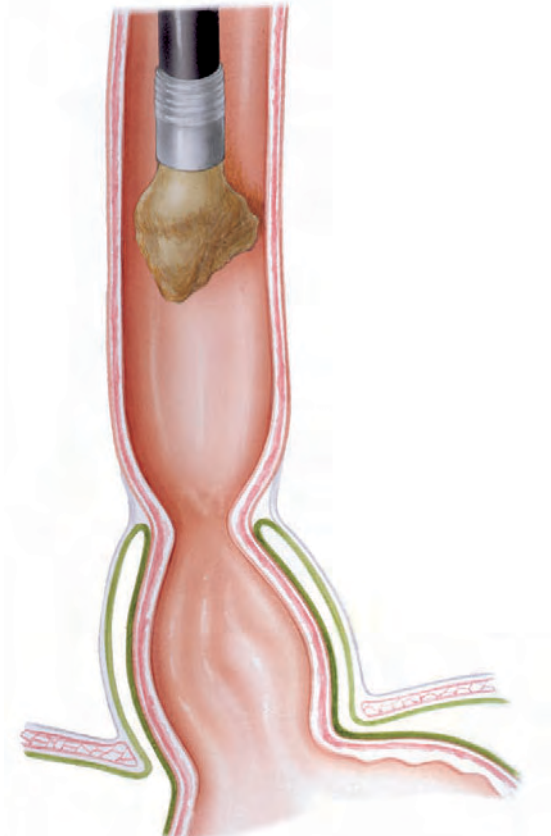


**b**

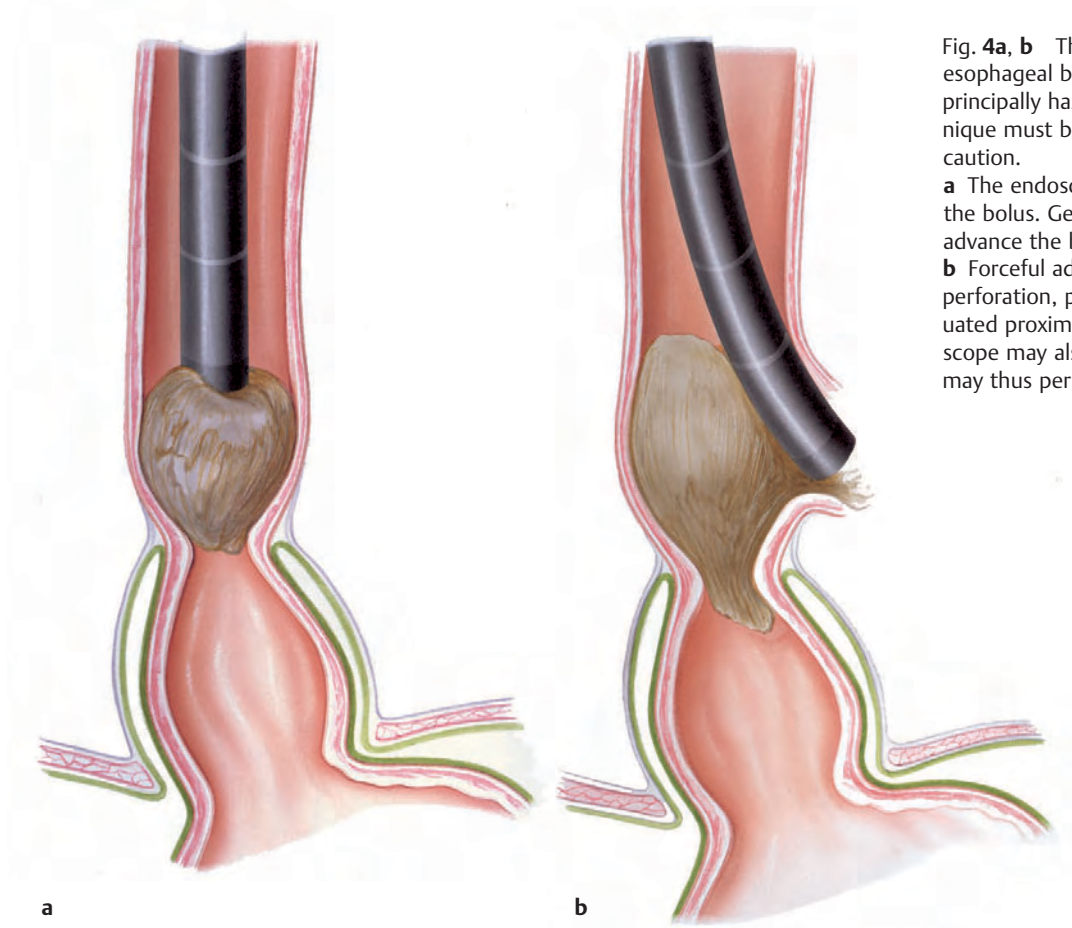
**b** A coin with an elevated edge is easy to grasp and extract with the rat-tooth forceps. Coins with a smooth edge can be grasped with rubber-coated prongs.



**Fig. 2** A solid food bolus or a fruit seed can be removed with a Dormia basket. These foreign bodies impact typically just proximal to peptic strictures.



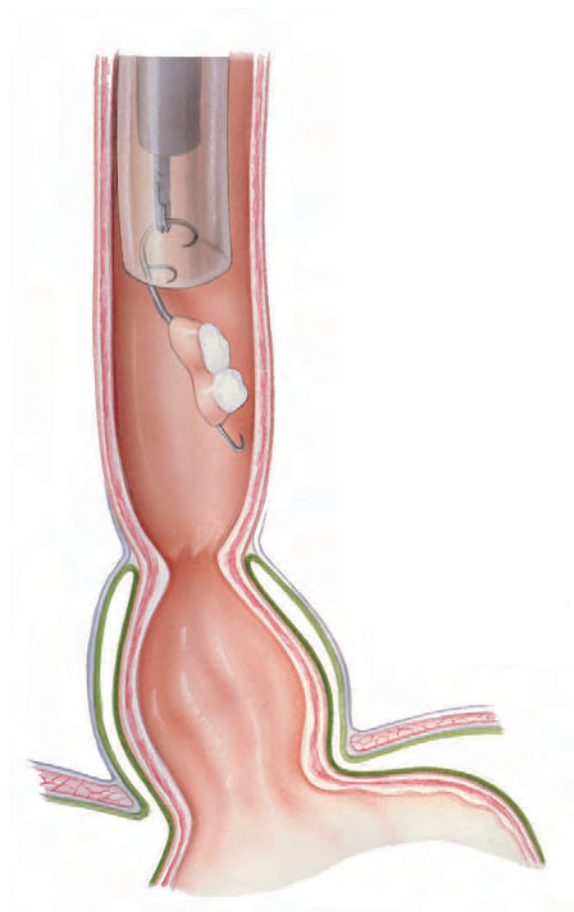
**Fig. 3** A soft food bolus (e.g., meat) can also be removed with simple endoscopic suction, which can be enhanced by applying a cylinder attachment to the tip of the endoscope (same device as used for variceal rubber-band ligation). Another alternative is to use the large-channel (6-mm) therapeutic gastroscope.



**Fig. 4a, b** The technique of pushing an esophageal bolus into the stomach is principally hazardous. If used, this technique must be performed with extreme caution.

**a** The endoscopic view is centered on the bolus. Gentle pressure is applied to advance the bolus.

**b** Forceful advancement can result in perforation, particularly if the bolus is situated proximal to a stricture. The endoscope may also be displaced laterally and may thus perforate the esophageal wall.



**Fig. 5** Dentures with sharp hooks should be removed through an overtube. A rat-tooth forceps, polypectomy snare, or Dormia basket can be used for their retrieval.

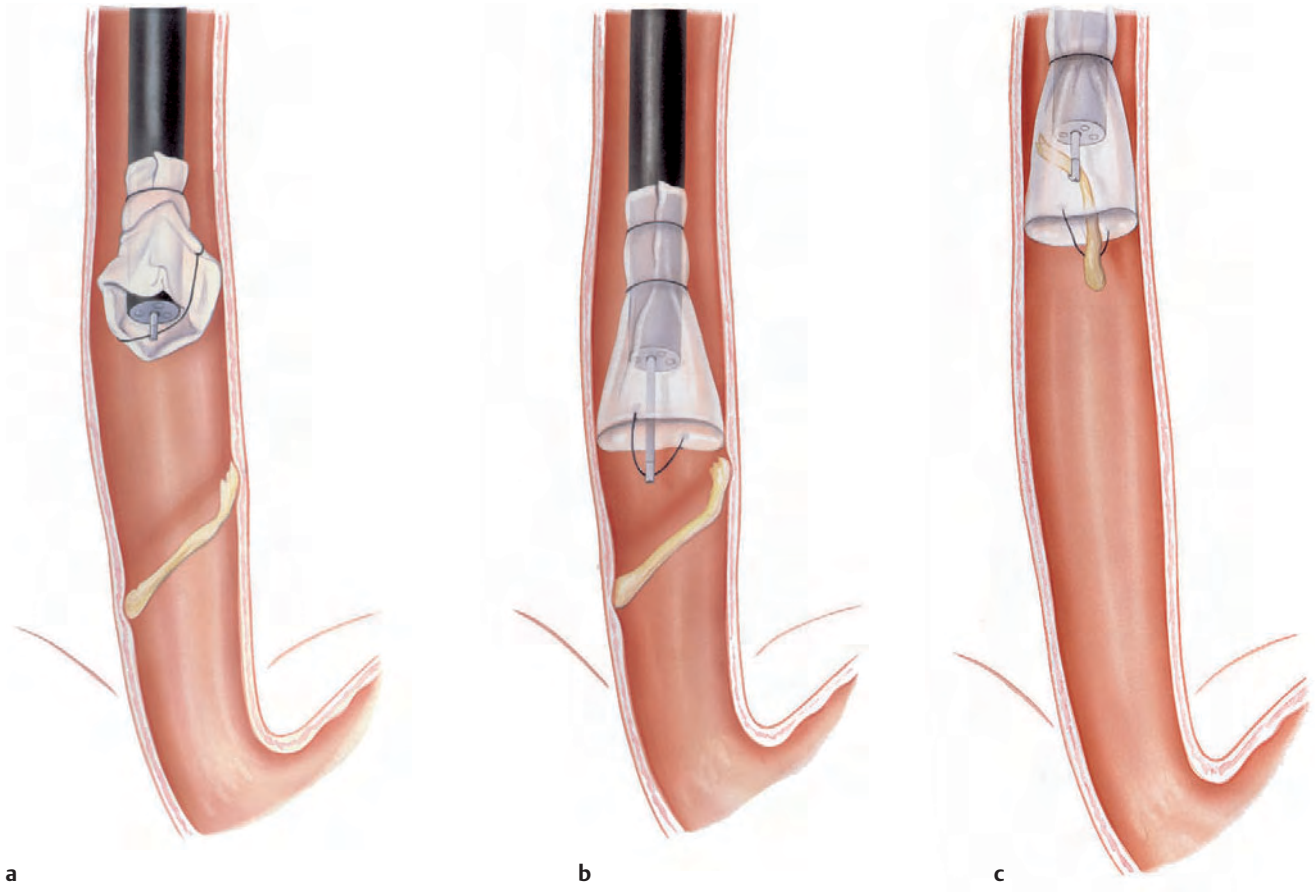


Fig. 6a–c Extraction of a bone.

**a** Chicken or fish bones tend to lodge horizontally in the esophagus. An alternative to using an overtube is to attach a plastic parachute cover (piece of latex or silicon glove) to the tip of the endoscope.

**b** The plastic parachute is opened with the aid of a thread and air insufflation.

**c** An accessible portion of the foreign body is grasped and cautiously mobilized from the esophageal wall with a forceps, retracted into the parachute, and then extracted.



## Extraction from the Stomach

(Figs. 7–16)

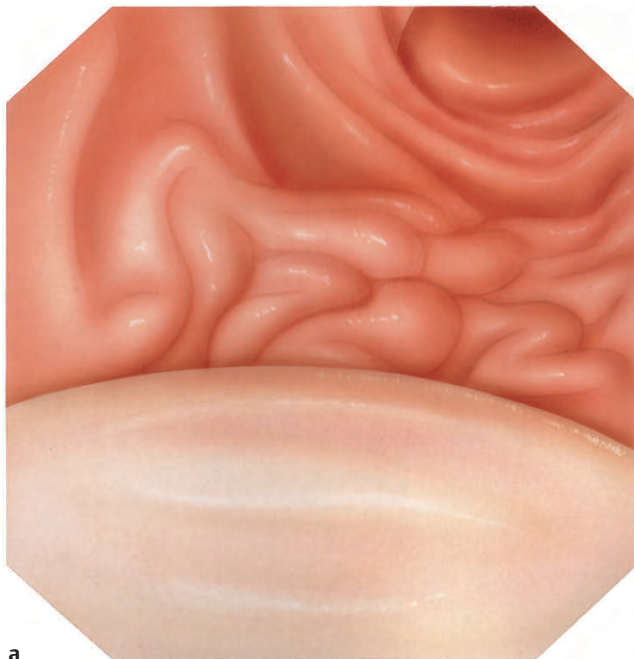
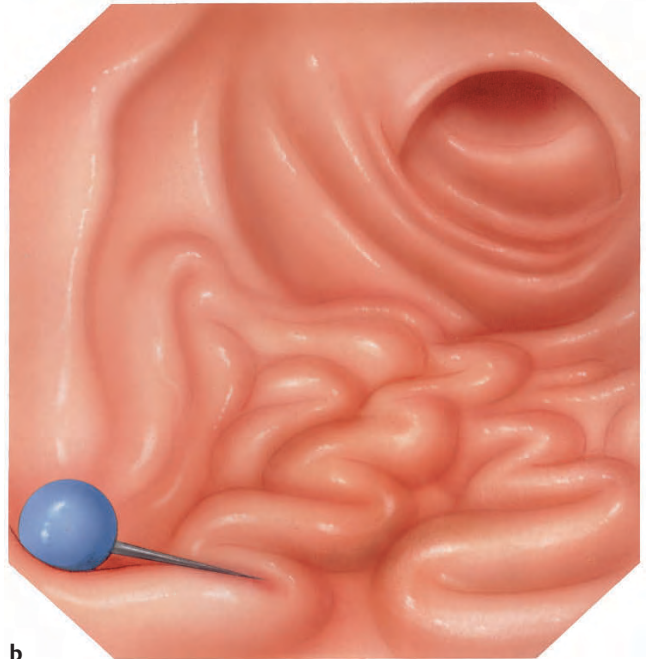
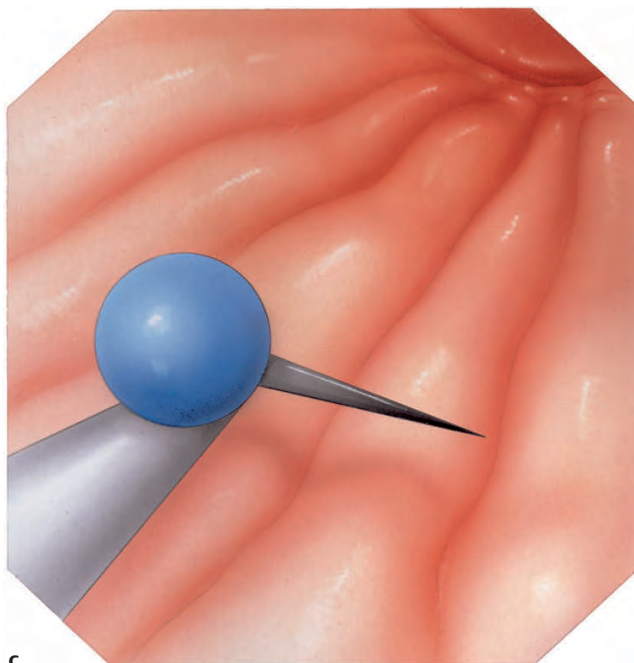
**a****b****c**

Fig. 7a–c Extraction of a pin from a stomach filled with food.

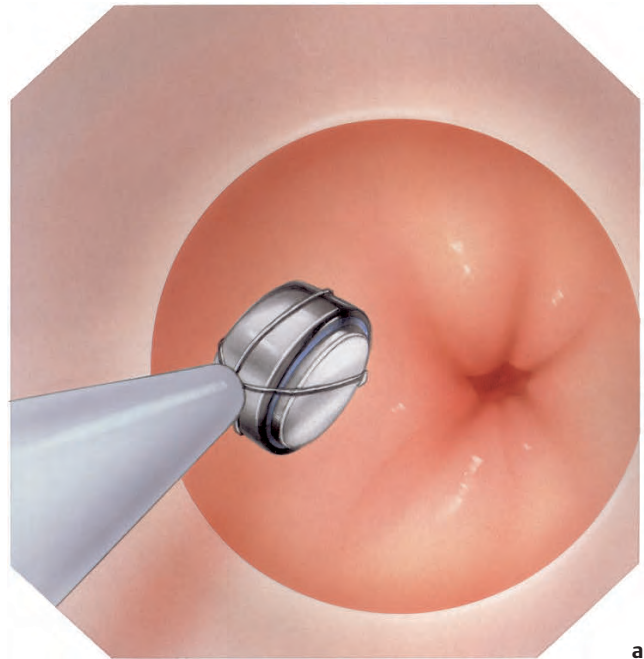
**a** The foreign body can be localized under fluoroscopy and subsequently retrieved with a foreign body forceps or a tripod grasper.

**b** An approach that can avoid the need for fluoroscopy is to first clear the stomach of food with the 6-mm-channel endoscope. Alternatively, turning the patient into the right lateral position will shift the stomach contents from the fundus to the antrum, thus enabling visualization of the pin.

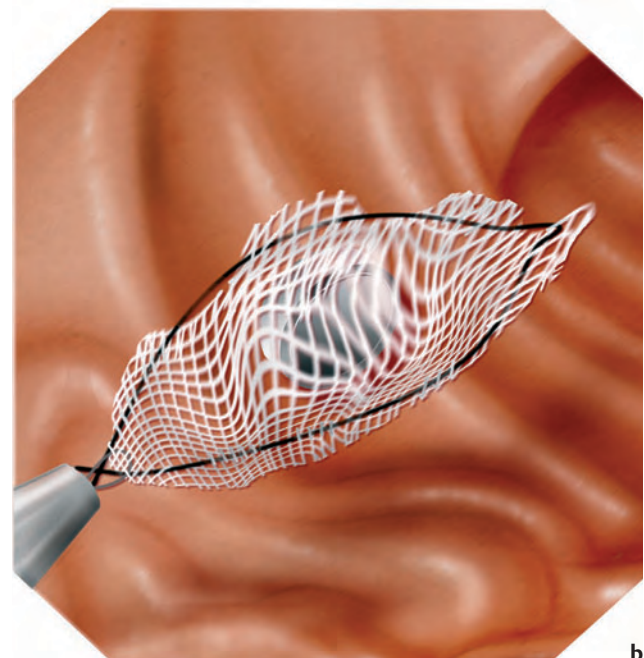
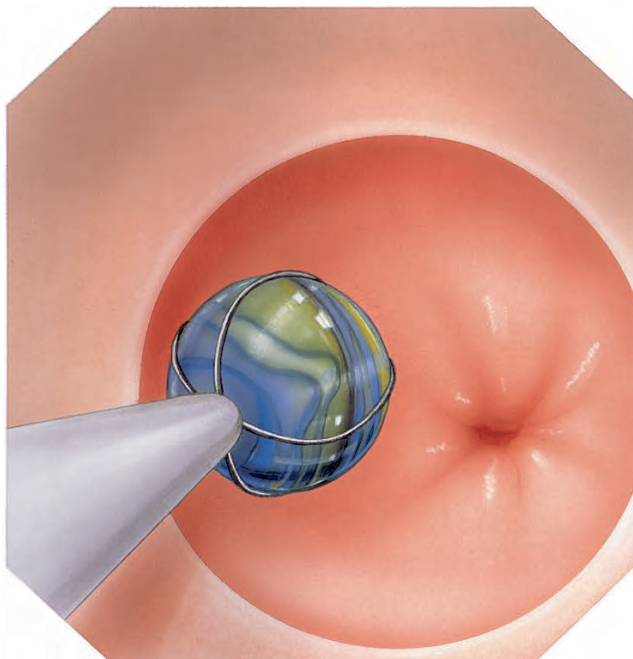
**c** The pin is grasped directly below the head with the polypectomy snare.



**Fig. 8** Short pins can be removed without an overtube. The snare should be extended a good distance from the endoscope to allow sufficient mobility of the pin during removal, minimizing the risk of laceration. A small Dormia basket can also be used for this maneuver.



**a**



**b**

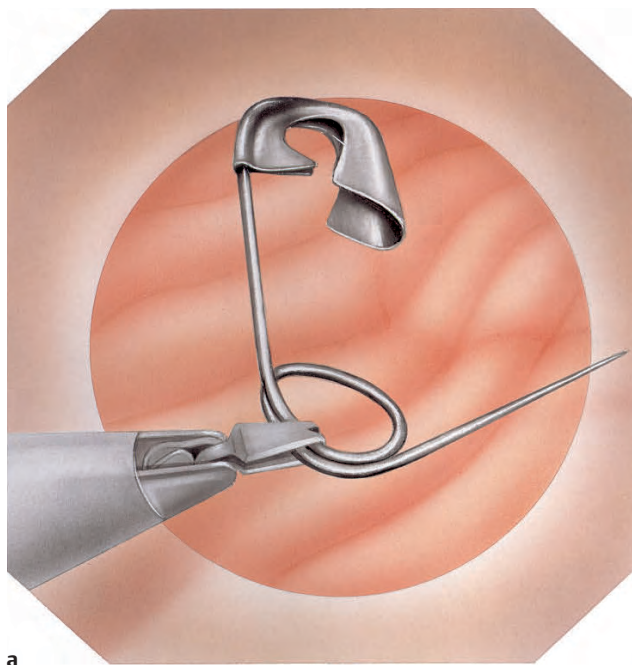
**Fig. 9a, b**

**a** Small batteries warrant immediate removal because of the high risk of local and systemic toxicity. The smooth surface can be grasped with a basket. An overtube should be used since the battery may dislodge during passage through the hypopharynx and lodge in the trachea.

**b** Alternatively, a retrieval net is used.

◁ **Fig. 10** Marbles necessitate prompt removal because of the toxicity of their color coating. The Dormia basket is used to engage spherical objects like marbles.





**a**

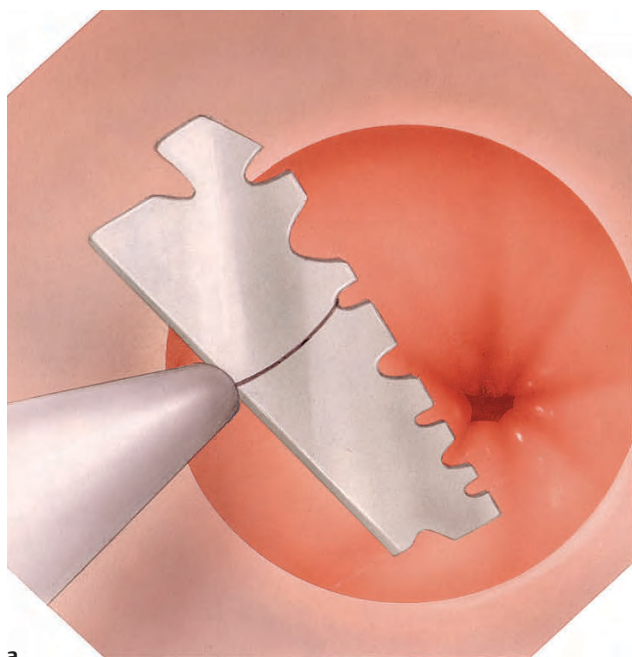


**b**

**Fig. 11a, b** Prisoners sometimes swallow open safety pins together with food (e.g., bread) as a manipulative measure for secondary gain.

**a** Endoscopic extraction requires the use of a long overtube.

**b** The safety pin is grasped with the rat-tooth forceps. The endoscope is withdrawn together with the pin into the overtube and removed.



**a**



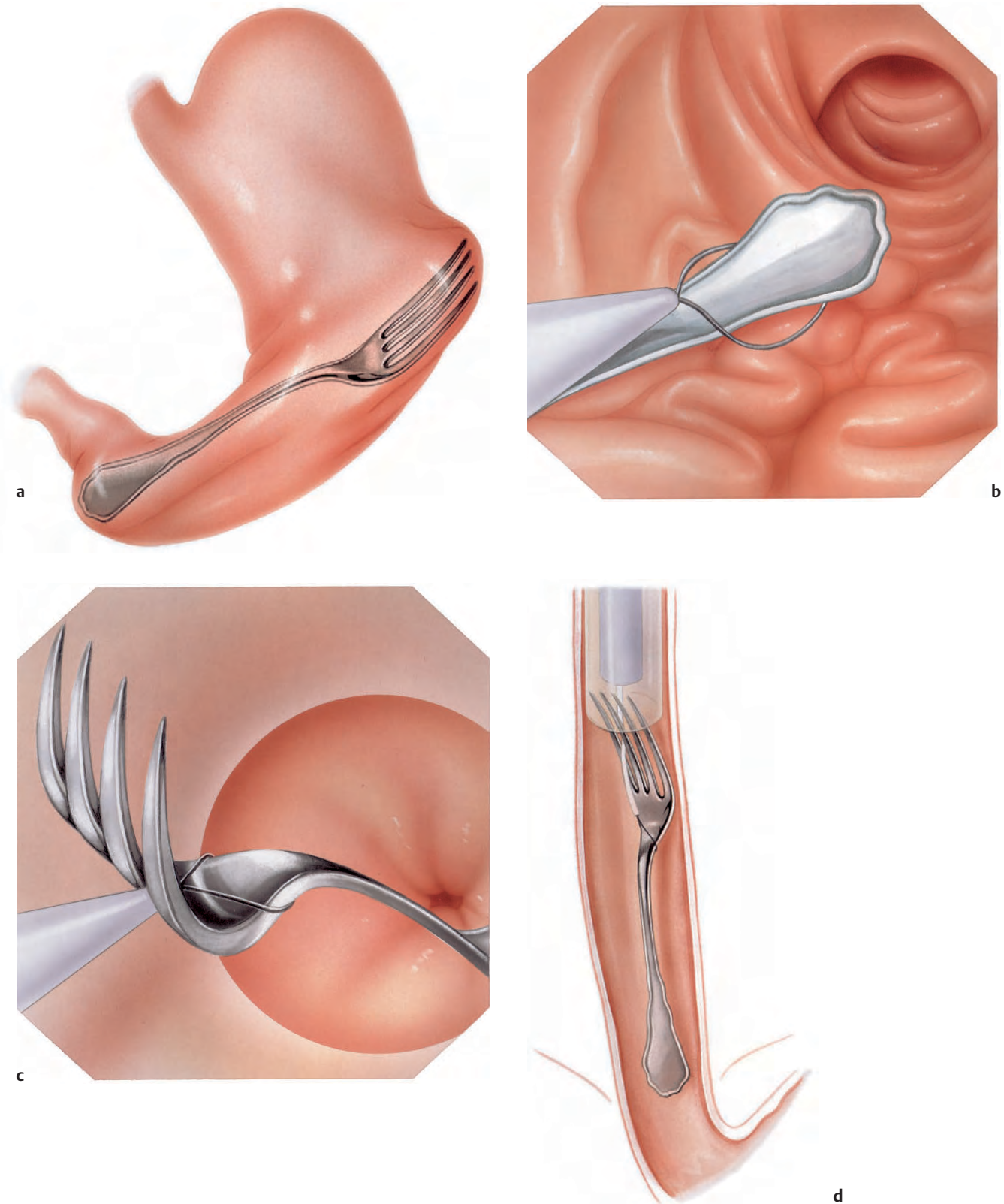
**b**

**Fig. 12a, b** Razor blades (usually broken in half) are commonly swallowed by prisoners, psychotic or mentally retarded people.

**a** Extraction is performed with an overtube to protect the esophagus.

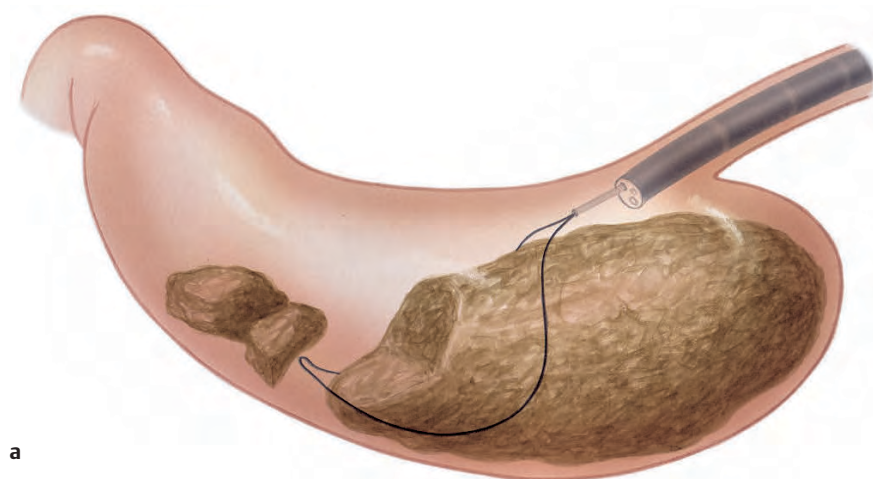
**b** The blade is securely grasped with a rubber-coated forceps.



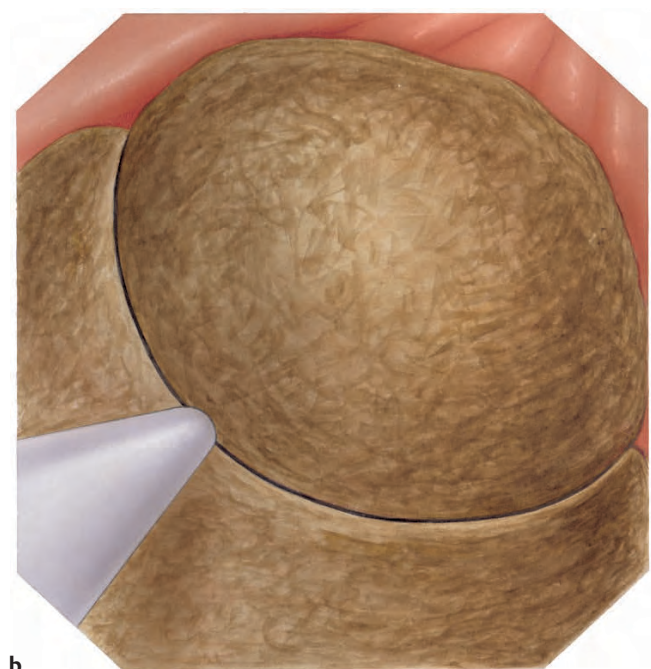


**Fig. 13a–d** Cutlery items are also commonly swallowed by prisoners and psychotic patients. Spoons are sometimes used to induce vomiting during which they are accidentally swallowed. **a** A fork is horizontally lodged in the stomach. The prongs press into the stomach wall.

**b** It is easier to approach the fork from the handle end, then to slide the snare up to the prongs.  
**c, d** The pronged end of the fork is pulled into the overtube for safe removal.



a



b



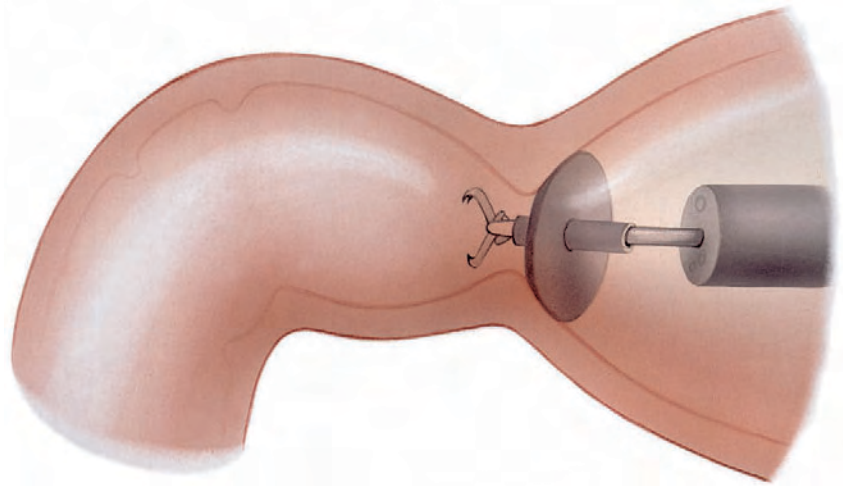
c

Fig. 14a–c Piecemeal reduction of large phytobezoar. A large snare is used to fragment the bezoar into smaller pieces so that these can pass spontaneously. Trichobezoars are more difficult to remove. Clumps of hair are removed with a rat-tooth forceps. Preliminary placement of an overtube will avoid repeated intubation of the cricopharynx.

Fig. 15 Body packers may smuggle illicit drugs by swallowing them in plastic wrappings or tubes. Such packets can be removed with a snare, cautiously to avoid damaging the wrapping.



Fig. 16 The buttress of a percutaneous endoscopic gastrostomy (PEG) can get lodged in the pylorus or the duodenum. Extraction is possible with a snare or rat-tooth forceps (shown here).



## Extraction from the Rectum

(Figs. 17)



Fig. 17 Foreign bodies inserted into the rectum (carrots, cucumbers, vibrators) can usually be removed with a large snare.

## ■ Complications

Perforation is the most serious complication that can result from endoscopic foreign body extraction. This usually occurs when removal is difficult or requires excessive force. As a rule, objects obstructing the esophageal lumen should not be pushed into the stomach. Sharp or pointed objects that can lacerate the mucosa should always be removed through an overtube.

Injury to the GI wall, whether due to pressure necrosis, a tear, or a difficult extraction, should be promptly investigated with a radiographic contrast study using a water-

soluble contrast agent to rule out a perforation. The possibility of a delayed perforation caused by tissue necrosis should also be kept in mind. Dietary restrictions and acid-suppressive or mucosa-protective drug therapy may be indicated, and the patient (or responsible next of kin) should be informed about the risk of delayed perforation.

The risk of a foreign body aspiration during extraction also deserves emphasis. Apart from using an overtube, endotracheal intubation is recommended for patients at increased risk for aspiration. This also includes the patient who is not fasting and particularly if intravenous sedatives are administered prior to the endoscopic procedure.