Large-balloon dilation of the biliary orifice for the management of basket impaction: a case series of 6 patients

Panagiotis Katsinelos, MD, PhD, Kostas Fasoulas, MD, Athanasios Beltsis, MD, Grigoris Chatzimavroudis, MD, PhD, Christos Zavos, MD, PhD, Sotiris Terzoudis, MD, Jannis Kountouras, MD, PhD

Thessaloniki, Greece

ERCP with endoscopic sphincterotomy (ES) and stone extraction remains the treatment of choice for bile duct stones[1,2]; 85% to 90% of all CBD stones can be effectively treated by ES and stone extraction by using balloon catheters or baskets.[3] Regarding the latter devices, impaction of a Dormia basket or fracture of the basket's traction wires during endoscopic mechanical lithotripsy with an entrapped stone in the distal CBD is an uncommon but well-known complication,[4-6] presenting a challenge to most endoscopists. Reported management strategies include the use of a mechanical lithotriptor to capture the impacted basket and crush the stone, extracorporeal shock-wave lithotripsy, endoscopic laser lithotripsy, or other sophisticated methods.[7-12]

This case series describes, for the first time, the safe and effective use of large-diameter balloon dilation of the biliary orifice in the management of impacted baskets in the distal CBD.

PATIENTS AND METHODS

Patients

In this retrospective, observational study carried out between June 2007 and August 2010, 6 consecutive patients with basket impaction in the distal CBD were treated with large-diameter balloon dilation of the postsphincterotomy papilla and subsequent retrieval of the impacted basket and entrapped stone. In all cases, the intervention was performed during the same session of CBD stone extraction. The median age of our patients was 81.5 years (range 68-92 years). Five patients had a previous cholecystectomy; periampullary diverticulum was present in 3 cases (in 2 patients the papilla was at the edge of the diverticulum, and in the other patient, it was intradiverticular). In 1 patient, the major papilla was ectopic, located in the beginning of the second part of the duodenum. Patients 2, 3, and 6 were considered at a high risk of open surgery because of severe comorbid disease (stroke, heart and respiratory failure). In 4 patients, the impacted basket was a Dormia (Fig. 1), and in 2 the impaction occurred when the wires leading to the basket were broken during mechanical lithotripsy (BAL-Q3; Olympus, Athens, Greece). Patient clinical data are summarized in Table 1. Written informed consent for ERCP and balloon dilation was obtained from the patients and their relatives. The study was approved for publication by the Institutional Review Board of Central Hospital.

Abbreviations: CBD, common bile duct; ES, endoscopic sphincterotomy.

DISCLOSURE: *The authors disclosed no financial relationships relevant to this publication.*

0016-5107/$36.00
doi:10.1016/j.gie.2011.01.034

Received October 5, 2010. Accepted January 17, 2011.

Current affiliations: Department of Endoscopy and Motility Unit (P.K., K.F., A.B., G.C., S.T.), Central Hospital, Thessaloniki, Greece, Department of Gastroenterology (C.Z., J.K.), Second Medical Clinic, Aristotle University of Thessaloniki, Ippokration Hospital, Thessaloniki, Greece.

Reprint requests: Jannis Kountouras, MD, PhD, Department of Gastroenterology, 8 Fanariou Street, Byzantio, 551 33, Thessaloniki, Macedonia, Greece.

Endoscopic procedure

The Dormia basket impaction was confirmed when forceful traction was applied to the basket catheter steadily while the endoscope was pushed further into the second and third parts of duodenum to straighten the axis of the basket and the bile duct, but extraction of entrapped stone was impossible. The plastic handle of the basket was cut off with a wire cutter, and the duodenoscope was removed. In 2 cases with fracture of the lithotriptor's wires, the crank handle disconnected from its metal sheath and the metal sheath and endoscope were removed, respectively. The procedure was performed using a large working channel (4.2 mm) therapeutic duodenoscope for easier passage of the devices used in the management of basket impaction. The diameter of the distal CBD and of the entrapped stone was measured after correction for the magnification by using the known diameter of the duodenoscope on the same radiograph as a reference. A 0.0035-inch hydrophilic stiff guidewire (Jagwire; Boston Scientific, Athens, Greece) was placed high in the biliary tract (Fig. 2). Balloon dilation was performed with a large-balloon catheter (CRE; Boston Scientific). The choice of the balloon's diameter was determined by the diameter of the terminal CBD, and that of the entrapped stone. Care was taken not to exceed the terminal CBD diameter to minimize the risk of bile duct perforation.

The balloon catheter was passed over the stiff hydrophilic guidewire, which positioned the deflated balloon across the postsphincterotomy main papilla with the middle portion of the balloon located at the biliary sphincter.

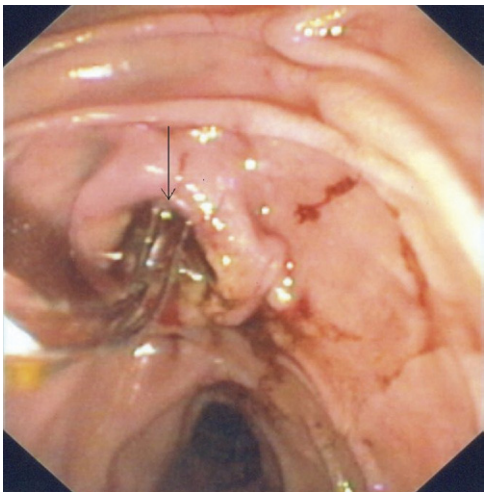

Figure 1. Endoscopic view of an impacted basket (*arrow*).

The balloon was then gradually filled with diluted contrast medium (1:1 with sterile water) under endoscopic and fluoroscopic guidance to observe the gradual disappearance of the waist in the balloon (Fig. 3). Once the waist disappeared, the balloon remained inflated for 60 seconds and then was deflated and retracted. The fractured lithotriptor's wires or the basket catheter were grasped by alligator forceps (FG-7L-1; Olympus) near the level of the papilla and steady traction was applied, resulting in the simultaneous release of the impacted basket and entrapped stone (Fig. 4). The procedure time was recorded, according to the screen recording time, starting with the cutting of the plastic handle of the basket or disconnection of the crank handle of the lithotriptor until the release of the impacted basket.

RESULTS

A total of 937 ESs for choledocholithiasis were performed from June 2007 to August 2010 at our institution. Basket impaction with an entrapped stone in the CBD occurred in 6 patients (0.64%). In 2 cases of Dormia basket impaction, the ESs and removal of CBD stones were performed by a trainee under the supervision of a consultant. In the remaining 2 cases of Dormia basket impaction, as well as in the 2 cases of rupture of the basket traction wire during mechanical lithotripsy, the ESs and basket impactions were done by a consultant. The median terminal CBD diameter was 15.35 mm (range 12.7-20 mm). The median diameter of the entrapped stone was 11.5 mm (range 10.4-14.5 mm). The biliary orifice was dilated with a 12-mm balloon in 4 patients, and 15- and 18-mm diameters in 2 patients, respectively. The median time required for an impacted basket's removal was 10.5 minutes (range 9-12 minutes). Retrieval of the impacted basket and the entrapped stone was achieved in all patients on the first attempt. All patients were under sedation with meperidine and midazolam, but no additional sedation was required for the disimpaction procedure. No complications were encountered after papillary dilation, except in 1 patient who presented minor bleeding (oozing). He was successfully treated with an 3-mL injection of epinephrine (1:10,000) into the upper edge of the dilated papilla using a 23-gauge sclerotherapy needle. The details of the procedures are summarized in Table 2. All of the dilations were performed by an experienced pancreaticobiliary endoscopist (P.K.) on an outpatient basis, and patients were observed for 6 hours before discharge. The patients were all asymptomatic at follow-up, and no patient required further interventions.

DISCUSSION

Although the incidence of a basket impaction with an entrapped stone was reported in 5.9% patients[7,13]; because of the developments in the therapeutic techniques for CBD stones, this incidence has been decreased to 0.8%,[14] comparable to the rate observed in our case series (0.65%). Despite its low incidence, impaction of a basket with an entrapped stone in the distal CBD may cause cholestatic jaundice accompanied by acute suppurative cholangitis, acute pancreatitis, sepsis,[15] and even death, particularly in patients with comorbid diseases, thereby usually requiring open surgery or specialized endoscopic interventions.[7-12] However, some of those "rescue" procedures are not widely available in many parts of the world, and most require considerable expertise to achieve a successful outcome. Moreover, as in our case series, patients with severe comorbid diseases are considered at a high risk of open surgery. Based on the experience that large-balloon dilation of the postsphincterotomy biliary orifice is a safe and effective technique for the extraction of large or difficult CBD stones,[16-21] we hypothesized that a similar method will facilitate the release of an impacted basket. Indeed, the introduction of this technique was successful in all our patients. The simplicity of this technique makes it worth attempting it as a first-line salvage treatment for distal CBD basket impaction, particularly in patients with severe comorbid diseases, before proceeding to high-risk open surgery or more complicated methods. The advantage of this method is that it can be performed with equipment found in the armamentarium of every pancreaticobiliary endoscopist and during the same session with few adverse events and no excessive hospitalization, as demonstrated by this study; therefore, it appears to be a cost-effective technique.

Regarding the postprocedure complications, we observed only slight bleeding, and none of our patients experienced pancreatitis or perforation. Postprocedure hemorrhage seemed to be an uncommon complication in patients undergoing large-diameter balloon dilation after ES for removal of large CBD stones, with rates ranging from 0% to 2% in most series,[16-19] with the exception of 2