Percutaneous endoscopic laser lithotripsy of retained stones in the left hepatic duct

The role of the surgeon

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Summary. A 35-year-old woman with a retained stone in a branch of the left hepatic duct was referred to us. The stone was discovered on the postoperative T-tube cholangiogram. A flexible ureteroscope was introduced into the duct, under fluoroscopic and direct endoscopic vision and the pulsed dye laser was used successfully to disintegrate the calculus. The postoperative course was uneventful. We suggest that in certain selected cases, the pulsed dye laser might be useful in disintegrating stones sited in difficult positions.

Key words: Choledocholithiasis - Lithotripsy - Choledochoscopy

Despite our endeavors to improve intraoperative diagnostics, retained or missed stones still occur [1]. Surgery remains the treatment of choice in the majority of cases of biliary stone disease despite the recent introduction of extracorporeal shock-wave lithotripsy and percutaneous instillation of dissolving agents into the gallbladder. The incidence of missed stones can be significantly improved by employing better stone discovery and retrieval techniques. Using video choledochoscopy, the incidence of missed stones can be decreased to 3% [2]. If an appropriate T-tube tract is created, 95% of this small number of retained calculi can be retrieved successfully as an outpatient procedure. Thus only a small number of patients will require another procedure, such as endoscopic papillotomy or reoperation for retained calculi.

Laser lithotripsy has recently been used in the management of intrahepatic and choledochal calculi [4]. However, we found that this type of laser (CW Nd YAG) drilled a hole through the stone instead of disintegrating it. The new flash pump-dye laser has been employed successfully in the management of ureteral and renal calculi and has also been applied in the biliary tract (Candela Laser, Wayland, Mass.). We previously reported a case of a large retained stone (20 mm) in the distal common bile duct, which was difficult to retrieve by retrograde endoscopic means. A flexible choledochoscope was introduced through the T-tube tract and the stone was successfully disintegrated using laser lithotripsy [3]. We would like to report another case successfully treated using laser, but the stone was situated in a more delicate anatomical location.

Case report

A 35-year-old healthy woman developed cholecystitis and cholangitis and underwent surgery for cholelithiasis and choledocholithiasis. Multiple stones were removed from the common bile duct. A completion operative cholangiogram was performed, which showed a stone-free system. However, the postoperative cholangiogram showed a small calculus (4–5 mm) in the main branch of the left hepatic duct. The patient who was asymptomatic at the time had an indwelling T-tube, which was spigoted. Her biochemical profile was normal except for an elevated alkaline phosphatase. The patient was afebrile (Figs. 1, 2). Eight weeks after surgery, a repeat cholangiogram showed the stone in the same position. We decided therefore, to attempt removal or disintegration of this calculus.

In the Radiology Department, intravenous analgesics were administered and the area of skin around the T-tube was surgically prepared and draped. Under sterile conditions, a guide wire was introduced through the T-tube tract into the hepatic duct. Its position was verified by fluoroscopy and the T-tube removed. An angiocatheter was introduced over the guide wire and the floppy guide wire was removed and replaced with a torque wire. The tip of the torque wire was advanced and manipulated into the branch of the left hepatic duct beyond the stone. At this stage, a small flexible ureteroscope (Karl Storz endoscopy-America, Los Angeles, Calif.) with an outer diameter of 3.7 mm and a 1.7 mm instrument channel, was advanced over the wire to lie near the stone. The scope was attached to a television camera and simultaneous videotape recordings were obtained. The stone was clearly visible—a multilobulated yellowish calculus measuring approximately 4–6 mm. The guide wire was withdrawn and the laser transmitting quartz fiber (200 μm in diameter) was advanced until it touched the stone. The pulsed dye laser was triggered and within 10 s, the small calculus had disintegrated. A minute fragment (0.5–1 mm) was observed in the extrahepatic biliary system. The scope was slowly withdrawn from the branch to the left duct itself. The proximal hepatic ducts and the distal common bile duct were inspected. No other calculi or large...
fragments were found. A drain tube (Fr 14) was reinserted into the common bile duct and affixed to the skin. A cholangiogram clearly showed complete filling of the previously blocked branch (Figs. 3–6). Three days later, a repeat cholangiogram was performed to make sure that the hepatic ductal system was clear. The drain tube was removed. This stone disintegration was performed as an outpatient procedure. The patient had an uneventful recovery.

Discussion

We strongly advocate that the general surgeon, who is not an endoscopist, becomes familiar with intraoperative and postoperative choledochoscopy to decrease the incidence of missed stones. The recent introduction of the video choledochoscope has made it easier for the surgeons to learn this technique the learning curve is shorter. If a surgeon has performed a long and difficult dissection of the common bile duct and then undertakes choledochoscopy, he may have difficulty adapting from the bright well-illuminated operative field to the small, monocular and relatively dim image seen down the endoscope. This is not the case using the video choledochoscope. The surgeon can see the enlarged image binocularly from a convenient distance and, therefore, the problems with delayed or interfered perception and adaptation are eliminated and the procedure is faster.

For proper stone extraction, four hands are required. During intraoperative biliary endoscopy the surgeon introduces the video choledochoscope and the assistant advances the basket balloon or laser fiber. Both work together under visual control in a coordinated fashion to entrap the calculus and retrieve it into the incision. In the postoperative period, if a T-tube has been inserted and a missed calculus is later discovered, the fastest and safest method of removing the stone is through the T-tube tract. The same video choledochoscope that is used in the intraoperative phase can be employed postoperatively through the T-tube tract. The same surgeon should perform the procedure together with an interventional radiologist.

Combined endoscopic and fluoroscopic stone retrieval is more accurate than fluoroscopic technique alone because