

**SPEAKER 1:** A 54-year-old female was referred for multiple, large bile duct stones. There were three biliary stones present, all of which were greater than 1.2 centimeters. She previously underwent attempted extraction of stones in the operating room during cholecystectomy, with an intraoperative cholangiogram.

This was followed by two ERCP attempts at an outside facility, which failed. This included extraction balloon, baskets, ampuloplasty, and an extended sphincterotomy, which had all been attempted on previous ERCP. The patient was referred to our system for possible intervention with the use of ERCP using the SpyGlass cholangioscopy DS System and electrohydraulic lithotripsy.

A cholangiogram was performed to gauge the size and location of the bile duct stones. Here you can see initial cannulation with the balloon retrieval catheter and occlusion angiogram.

The SpyGlass DS System was then inserted into the right intrahepatic system and right main hepatic duct. Upon withdrawal of the SpyGlass DS System's cholangioscope, a high definition image was captured of the first large bile duct stone. Here you can see the insertion of the SpyGlass cholangioscope up into the right intrahepatic system.

We carefully and slowly withdrew the scope, paying close attention to the details of the biliary ductile mucosa. A downward withdrawal process, heading down from the right intrahepatic system through the secondary radicals of the right system and down the right main duct, is demonstrated. Upon further withdrawal, we encountered the bifurcation of the left and right system. We then encountered the first of the large bile duct stones. Complete EHL of the bile duct stone was performed, fragmenting a larger stone into smaller pieces, which were later easily removed.

We now demonstrate electrohydraulic lithotripsy of the large bile duct stone. The most proximal stone is encountered first, and that is the first stone which we attempt to crush with electrohydraulic lithotripsy. You can see clear visualization of the stone and improved images with the Spy DS System, which allows for safe destruction of the large bile duct stone. Complete EHL destruction is achieved with the appropriate power settings.

After the stone has been appropriately fragmented, we then withdraw further and fragment additional stones. Two subsequent stones were fragmented successfully with EHL, the bile duct was swept free of stone fragments, and a post-procedure cholangiogram was captured.

Stone one has been cleared. We now position the cholangioscope and the EHL catheter for fragmentation of the second common bile duct stone. Here you can see direct visualization of the large common bile duct stone as it's fragmented by shockwave electrohydraulic lithotripsy. The stone is being seen fragmented.

We now orient ourselves for stone number three. You can see clear demonstration of complete fragmentation and destruction of the two additional large bile duct stones, done within the same session of ERCP with the use of the SpyGlass DS. We then perform biliary sweep of the remaining stone fragments and completely clear the bile duct of any additional fragments, which may have been retained, using the balloon catheter.

**Key Points.** With its improved visualization, the SpyGlass DS System increases the number of therapeutic options offered by cholangioscopy and helps improve the application of "enhanced lithotripsy." Stones greater than 1 centimeter may be more difficult to remove via mechanical lithotripsy, or may require a greater number of procedures to do so. "Enhanced lithotripsy" options include: EHL, which is electrohydraulic lithotripsy or "shockwave," as well as laser lithotripsy.

The SpyGlass DS System can be used at the end of large stone cases to ensure ductal clearance of all the fragmented sludge and stone particles have been completely removed. This may reduce the number of procedures required for the patient.

**Case Overview and Discussion.** In just one procedure, our patient was cleared of all three large bile duct stones, which measured greater than 1.2 centimeters each. The patient did not experience any complications from SpyGlass DS System from the procedure. It is well documented that each ERCP procedure carries risks of anesthesia, as well as risks of pancreatitis, infection, or other complications.

Our patient had undergone two unsuccessful ERCPs in an attempt to remove the large bile duct stones. In addition, she also had an attempt intraoperatively at the time of her cholecystectomy to eradicate her bile duct stones, which was also unsuccessful. With the use of the SpyGlass DS System and with EHL, we successfully treated her and removed all the large bile duct stones in one procedure.

If the SpyGlass DS System had not been available, electrohydraulic lithotripsy would not have been able to be performed, relegating our patient to subsequent, unnecessary ERCPs, with the hopes that mechanical lithotripsy/basket/balloon extraction would be successful. Through the use of high definition cholangioscopy using the SpyGlass DS System, bile duct stones can be directly visualized, evaluated, and fragmented with the use of electrohydraulic lithotripsy. The use of cholangioscopy using the SpyGlass DS System should be considered in the first-line treatment for complete eradication of very large or multiple large biliary stones in an attempt to complete treatment procedure in one procedure.