

seal 42 is a conventional sliding seal and is configured to allow the passage of a guide wire 50 into catheter 12. This is done by removing cap 44 and passing the tip of guide wire 50 through sliding seal 42 with sliding seal 42 sealingly closing access port 40 against fluid loss while at the same time allowing guide wire 50 to be directed into catheter 12.

The introducer for catheter 12 is a conventional introducer and is shown as a sharp pointed needle 60 having a flexible sheath 62 slidably mounted thereto. Needle 60 extends from a needle hub 61 while flexible sheath 62 extends from a sheath hub 63. Needle 60 is configured as a conventional catheter introducer such that when needle 60 forms puncture 72 through abdominal wall 71 it carries sheath 62 through abdominal wall 71. Thereafter, sheath hub 63 is held firmly in place against abdominal wall 71 while needle hub 61 is grasped and pulled to remove needle 60. Needle 60 is then discarded in a suitable receptacle. Sheath hub 63 now serves as a receiver for tip 16 when it is time to insert catheter 12 through abdominal wall 71. Thereafter sheath hub 63 is grasped and sheath 62 is retracted up the length of catheter 12 to a position adjacent strain relief 13 on connector 20 where sheath 62 is effectively out of the way of the ongoing surgical procedure.

THE METHOD

At the beginning of the surgical procedure using cholangiography catheter 10, the medical professional (not shown) assisting the surgeon (not shown) obtains cholangiography catheter 10 and attaches thereto syringe 31 which has been prefilled with the desired contrast medium. With syringe 31 securely mated to Luer fitting 29, the length of tubing 27 and dye arm 23 are charged with the contrast medium. Saline is then drawn into syringe 30 and syringe 30 is then securely mated to Luer fitting 28. Tubing 26, saline arm 22, and catheter 12 are then flushed with saline to remove all remaining air from cholangiography catheter 10.

The surgeon (not shown) then obtains needle 60 having sheath 62 slidably mounted thereon with sheath hub 63 in abutment with needle hub 61. The sharpened point of needle 60 is pressed against abdomen 71 at the preselected location in the vicinity of cystic duct 74 and pierced therethrough at puncture 72 created thereby. Sheath hub 63 is held against abdomen 71 while needle hub 61 is grasped and pulled to retract needle 60 leaving sheath 62 in place in puncture 72. Catheter 12 is then threaded through the hollow lumen of sheath 62 until catheter tip 16 thereof can be grasped by the surgeon and directed into the proper location at cystic duct 74. Sheath 62 is withdrawn from puncture 72 and slidably retracted up catheter 12 until it reaches the vicinity of strain relief 13 where it is held out of the way for the ongoing procedure. The tissue of abdominal wall 71 surrounding puncture 72 sealingly encloses catheter 12 in a leakproof relationship to prevent the loss of gas from abdomen 71. Needle 60 is no longer required and may be discarded according to conventional practice.

Catheter tip 16 is inserted into cystic duct 74 with indicia 18a-18c providing a visual indication of its depth of insertion. Thereafter, catheter 12 is sealingly clipped to cystic duct 74 to prevent leakage. The contrast medium is expelled through the hollow end 17 of catheter tip 16 (FIG. 1C) where it is directed into cystic duct 74 for the cholangiography analysis of cystic duct 74.

In the event the surgeon (not shown) encounters a blockage or other abnormality in cystic duct 74 requir-

ing the use of a guide wire, guide wire 50 (shown fragmentarily herein) is directed through sliding seal 42 until the tip thereof exits hollow end 17. Accordingly, catheter 12 not only selectively provides a saline flush from syringe 30 and a supply of contrast medium from syringe 31 but also mechanical device for mechanically probing cystic duct 74 by the judicious use of guide wire 50.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed and desired to be secured by United States Letters Patent is:

1. A catheter apparatus for laparoscopic cholangiography comprising:

a catheter having a distal end and a proximal end, said distal end being suitable for incremental insertion into the cystic duct of a patient, said catheter comprising a preselected length sufficient to pass through the abdominal wall of said patient to said cystic duct from a position external of said patient, said catheter comprising a set of indicia at said distal end and a radiopaque line along said preselected length;

an introducer for introducing said catheter through said abdominal wall;

a connector mounted to said proximal end of said catheter, said connector comprising a first interconnect for introducing saline solution into said catheter and a second interconnect for introducing dye into said catheter;

a first tubing connected at a distal end to said first interconnect;

a first check valve mounted to a proximal end of said first tubing;

a first syringe removably mountable to said first check valve, said first syringe containing saline for introducing said saline into said catheter;

a second tubing connected at a distal end to said second interconnect;

a second check valve mounted to a proximal end of said second tubing; and

a second syringe removably mountable to said second check valve; said second syringe containing dye for introducing said dye into said catheter.

2. The catheter apparatus defined in claim 1 wherein said indicia on said distal end of said catheter comprise discrete sets of bands around said catheter at sequentially spaced intervals from said distal end, a first set of bands from said distal end comprising a single band, a second set of bands adjacent said first set of bands comprising two bands, and a third set of bands adjacent said second set of bands comprising three bands.

3. The catheter apparatus defined in claim 1 wherein said connector comprises a third interconnect on said connector for introducing a guide wire into said catheter.

4. The catheter apparatus defined in claim 1 wherein said first check valve is color coordinated with said first syringe using a first color and said second check valve is color coordinated with said second syringe using a second color.