

CANNULA AND CLAMP DEVICE

BACKGROUND OF THE INVENTION

Operative cholangiography has been undergoing an evolution since Mirizzi first advocated the routine use of operative cholangiography in *Surg. Gynecol. Obstet.*, 65, 702 (1937). A variety of cannulas, clamps and catheters have been recommended for this purpose. Since the techniques to fasten the cannula to the cystic duct involve cumbersome manipulation, and frequently allow dye leakage or bubble injection, surgeons have been reluctant to employ this intraoperative diagnostic modality routinely during biliary surgery.

The objective in operative cholangiography is to inject radiopaque dye into the cystic duct of the gall bladder so that it passes into the common bile duct to opacify it to x-rays to facilitate detection of stones, tumors, strictures, anomalies and the like, during biliary surgery. The operative cavity is 10-15 centimeters in depth and it is difficult and time-consuming to effect a tie around the cystic duct to contain and seal a catheter for injection of dye.

The characteristics of an ideal cannula for operative cholangiography should satisfy such criteria as (1) insertion should be readily achieved; (2) the mechanics should not obscure vision during cannulization; (3) the method of securing the cannula should not be cumbersome or time-consuming; (4) there should be no significant resistance to flow of dye during injection; (5) connections should not leak; (6) surrounding delicate vital structures should not be endangered; and (7) no opaque foreign material should appear on the x-rays other than dye.

In *Am. J. Surg.*, 123, 741 (1972) there is reported the use of a Fr. 5 Lehman radiopaque catheter fixed in position with a hemoclip. Such clips may interfere with future diagnostic modalities such as computerized radiographic or electro-magnetic tomography. More recent efforts to advance techniques and provide improved cannula and clamp devices for operative cholangiography are described in *Arch. Surg.*, 111, 608 (1976); *Arch. Surg.*, 112, 340 (1977); *Arch. Surg.*, 113, 729 (1978); *Arch. Surg.*, 114, 749 (1979); *Arch. Surg.*, 115, 229 (1980); *Am. J. Surg.*, 137, 826 (1979); *JAMA*, 246(4), 380 (1981); *Medical Radiography and Photography*, 57(1), 18 (1981); and references cited therein.

Several hundred thousand patients undergo biliary surgery annually in the United States. Many experienced surgeons agree that cholangiography should be performed routinely. There remains a need for improved means for operative cholangiography.

Accordingly, it is an object of the present invention to provide a novel surgical device which is adapted for cholangiography.

It is another object of this invention to provide a cannula and clamp device for operative cholangiography which is constructed substantially of radiolucent material.

It is a further object of this invention to provide a cannula and clamp device for operative cholangiography which can be applied and removed rapidly with single hand manipulation.

Other objects and advantages of the present invention shall become apparent from the accompanying description and drawings. Applications for angiography are

contemplated with modified version of the same invention.

U.S. Pat. Nos. of general interest with respect to the present invention include 611,038 (1898); 2,234,686; 3,019,790; 3,166,819; 3,500,820; and 3,814,080.

SUMMARY OF THE INVENTION

One or more objects of the present invention are accomplished by the provision of a cannula and clamp device adapted for operative cystic duct cholangiography comprising (1) a first jaw member with an extended shaft; (2) a second jaw member which is coextensive and movably connected to said first jaw member wherein the gripping ends of the jaw members in contacting proximity form an annular open-ended cross-section; (3) biasing means for urging said jaw members into contacting proximity; and (4) a cannula which is attached to and inwardly supported by the first jaw member, wherein the injection end of the cannula is positioned and centered in the annular cross-section formed by the gripping ends of the jaw members, and the feed end of the cannula extends rearwardly and outwardly from the first jaw member. The jaws are designed to seal tightly around various sizes of ducts.

In a particularly preferred embodiment of the cannula and clamp device, the jaw members and extended shafts are constructed of radiolucent material.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a preferred embodiment of a present invention cannula and clamp device with the jaw members and the extended shafts angled in a nonlinear configuration;

FIG. 2 is a side elevation of the same cannula and clamp device being hand operated for insertion of the rigid cannula injection end into a cystic duct stump; and

FIG. 3 is a side elevation of the FIG. 2 cannula and clamp device after hand operated release of the spring-controlled jaw member to close the clamp and effect a gripping seal between the cystic duct stump and the cannula end, prior to injection of a fluid dye medium. Instead of a spring type of bias means, an elastic band may be employed to encircle and close the jaw members as shown in FIG. 7.

FIG. 4-FIG. 7 are side and front elevations of various gripping end configurations and the jaw members of a present invention cannula and clamp device.

DETAILED DESCRIPTION OF INVENTION EMBODIMENTS

A present invention cannula and clamp device, for purposes of intraoperative cholangiography, can vary in length dimension in a range between about 5-20 centimeters. The annular open-ended cross-section of the closed jaw members must be of suitable diameter to encompass the combined annular cross-section of the cystic duct and inserted cannula injection end, e.g., an open-ended diameter of about 2-6 millimeters.

The annular open-ended cross-section of the jaw members in contacting proximity can be either circular or non-circular. An important consideration is the accommodation of cystic duct stumps of different diameters and tissue textures, and concomitantly the achievement of a gripping seal between the cystic duct stump and the inserted cannula end.

In FIG. 4, the gripping ends of the jaw members are matching incomplete semi-circles relative to the open-ended cross-section that they form.