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WIRE GUIDED CANNULATION: CLINICAL PERSPECTIVE

A Review of the Literature and Appraisal of the Technique



INTRODUCTION

Cannulation is the passage of a guidewire, catheter, or other device through a duodenoscope into the bile duct or pancreatic duct at Endoscopic Retrograde Cholangiography and Pancreatography (ERCP). It is the initial step in all diagnostic and therapeutic ERCP and is a major hurdle for many individuals performing this procedure. Failed cannulation is also the most common cause for failure to achieve the desired clinical outcome in patients undergoing ERCP. Cannulation techniques vary widely. There is no work that defines the optimum cannulation technique. The process of cannulation has a number of variables that will determine success including operator expertise, device selection, and patient anatomy. Additionally, it has been suggested and demonstrated in prospective trials that factors occurring at cannulation can lead to significant post ERCP pancreatitis. Over the past decade, wire guided cannulation has been advocated by some as a way to improve cannulation rates and limit complications of cannulation. It has been employed in a variety of techniques with a number of different devices. Recent advances with systems that allow physician control of the guidewire and new guidewire technologies have led to increased interest in wire guided cannulation. In the past, guidewires were stiff, without significant hydrophilic coatings, and usually manipulated by assistants. There was concern that forceful probing with these guidewires could cause ampullary trauma or pancreatic duct damage.



INTRODUCTION (cont.)

The development of hybrid guidewires with hydrophilic surfaces and nitinol cores offers a significant advantage for physician controlled wire guided cannulation. These guidewires have excellent pushability and immediate tactile feedback while maintaining a very flexible and soft tip to reduce ampullary trauma and, hopefully, post ERCP pancreatitis. While the tip is hydrophilic and slippery, the coated body of the guidewire can be easily advanced and manipulated by the physician or assistant.

LITERATURE REVIEW

A Medline search of the literature from 1966 to present using the following terms and key words: endoscopic retrograde, cholangiopancreatography, cannulation, wire-guided cannulation, ERCP. In addition, abstracts submitted to DDW from 2004 to 2006 were electronically and manually reviewed for the same terms. A review of this literature suggests that there is no definitive randomized controlled study that evaluates physician controlled wire guided cannulation for success or complication rates. Therefore, while the literature is supportive of this technique, an appropriately designed and powered study has not been completed.

DEFINITION

Wire guided cannulation is the specific use of a guidewire passed through a catheter or other device to deeply cannulate the desired ductal structure. Physician controlled wire guided cannulation describes the specific technique where the physician performing the ERCP and manipulating the endoscope also handles and advances the guidewire during cannulation attempts.

CANNULATION ISSUES AND ENDOSCOPIC RESEARCH

A thorough and complete review of cannulation issues and techniques has been recently completed by Freeman and Guda.¹ This review highlights the different devices and techniques used for cannulation at ERCP and the limitations of the published literature in this field. It defines the two major issues regarding cannulation; success rate and cannulation related complications. Success rate is defined as the rate of successful deep cannulation of the desired duct at the initial procedure. Many expert endoscopists have reported success rates with various techniques and devices of 95-98%. It

would, therefore, be difficult if not impossible to prove that wire guided cannulation can improve on these expert cannulation rates. Less experienced operators with lower success rates may benefit from physician controlled wire guided cannulation; however, this population is also difficult to carefully study. Cannulation success rates may improve with practice regardless of the type of device or technique used. Furthermore, while success rates can be measured in general terms, it is difficult if not impossible to design a well controlled randomized study to assess cannulation success rates across a number of operators. This is largely due to the fact that the native papilla can be approached only once before variables such as edema, bleeding or other micro trauma occur making a second attempt at cannulation less successful. Randomizing patients to one type of cannulation technique or another induces bias in the study due to variables in the patient population that may be difficult to quantify. A very large number of subjects would need to be randomized to eliminate any unknown allocation variables. Complications from cannulation are also difficult to track and quantify as cannulation itself is infrequently the only procedure or technique performed at ERCP. Procedures following cannulation can also lead to pancreatitis including trauma to the papilla, edema from a sphincterotomy, and guidewire perforations of pancreatic duct side branches. It is impossible to know if the resultant pancreatitis is related to the cannulation technique or the later manipulations. There is, however, evidence that multiple pancreatic duct injections with contrast are an independent risk factor for the development of post ERCP pancreatitis.^{2, 3, 4} Wire guided cannulation has been shown in one trial to reduce the incidence of post procedure pancreatitis.⁵ This reduction in post procedure pancreatitis occurred despite passage of the guidewire into the pancreatic duct on multiple occasions. The authors proposed that the reduction in pancreatitis is due to the elimination of contrast injection into the pancreatic duct and that careful guidewire manipulation of the pancreatic duct does not lead to pancreatitis. Complications such as bleeding and perforation are more likely related to additional manipulations at therapeutic ERCP and not cannulation. In summary, the literature regarding cannulation success and complications can support the use of wire guided techniques. Larger carefully designed randomized studies of physician controlled wire guided cannulation are unlikely to be completed or helpful in providing evidence to support or dismiss the technique.

PHYSICIAN CONTROLLED WIRE GUIDED CANNULATION TECHNIQUES

Physician controlled wire guided cannulation techniques have evolved with the development of short wire biliary systems that allow the physician to directly handle and manipulate the guidewire. This offers the operator a significant advantage in being able to gently manipulate the guidewire and pass it directly into the desired duct. It eliminates the communication between the operator and support staff and allows immediate responsiveness to changes in the catheter position. It allows the physician tactile feedback while cannulating that may lead to more direct and less traumatic cannulation. In addition the tools available for physician controlled wire guided cannulation have changed. The development of hydrophilic tipped guidewires with a stiff shaft has given the operator new tools for wire guided cannulation.

TECHNIQUES

A number of wire guided devices are available for physician controlled wire guided cannulation. No comparison studies or other investigations are available that define a single superior technique. In addition, factors such as papilla appearance or anatomy may have a significant effect on the success of a technique or approach. Below is a technique that has been adopted with significant success:

1. Physician controlled wire guided cannulation using a sphincterotome and a hydrophilic tipped guidewire with a nitinol core.

The combination of the 20 or 30 mm cutting wire and short straight tipped guidewire seem to be the ideal tools for this task. The 20 mm cutting wire offers more acute angulation of the sphincterotome tip than the 30 mm wire. It allows operation close to the papilla but maintains stability of the device. A sphincterotome pre-loaded with a guidewire is prepared and passed through the



*Technique 1
Sphincterotome with
hydrophilic tipped guidewire*

endoscope and below the major papilla. The guidewire is stripped from the insertion point to a point on the sphincterotome just above the operating channel port to allow manipulation by the physician operator. The guidewire is advanced to the end of the catheter and the sphincterotome is flexed until the tip is in alignment with the perceived orientation of the bile duct. Gently, the guidewire is advanced into the papillary orifice and, under fluoroscopic guidance, manipulated into the bile duct. If prompt and resistance free passage into the bile duct does not occur, the guidewire is withdrawn and the angle of approach is changed by manipulating the flex on the sphincterotome or changing the elevator or scope position. On further attempts, the guidewire advances beyond the ampulla and can then be gently advanced further to determine the ductal structure entered. The guidewire is not forcefully manipulated and if any concern about the location of the guidewire develops the sphincterotome can be gently advanced over the guidewire and a small amount of contrast injected to delineate the anatomy. Once the guidewire is positioned into the desired duct, it is locked in place and the procedure continued.

2. Physician controlled wire guided cannulation with the sphincterotome placed in the ampullary orifice. This technique is similar to number 1 above with the exception that the sphincterotome is placed directly into the ampullary orifice as would be done in an attempt to achieve deep cannulation with the catheter. Instead of lifting and advancing the catheter, the assistant applies some flex to the sphincterotome and the physician slowly and gently advances the guidewire until free cannulation is obtained. If the guidewire does not advance easily into the desired duct, the flex of the sphincterotome can be varied until cannulation is achieved. Care is taken with this technique to avoid catheter trauma to the ampulla.



*Technique 2
Sphincterotome placed
in ampullary orifice*





3. Wire guided cannulation with staff assistance. Some physicians are uncomfortable manipulating the guidewire in addition to the catheter and scope. In this setting, the physician may position the sphincterotome below the papilla and have the assistant slowly advance the wire into the papillary orifice. Careful and clear communication between the physician and assistant while monitoring the fluoroscopic and video images can lead to successful cannulation of the desired duct. Once the duct is cannulated, the guidewire is locked into place and the procedure continued.

4. Rarely, cannulation of the common bile duct is not easily obtained and the guidewire selectively enters the pancreatic duct on each attempt. Guidewire placement into the pancreatic duct to facilitate wire guided cannulation of the common bile duct has been studied.^{6, 7} The

technique basically consists of leaving the initial guidewire placed in the main pancreatic duct. This guidewire is locked in place. The sphincterotome is removed and reloaded with another guidewire. The sphincterotome is then advanced through the operating channel of the duodenoscope beside the original guidewire. The tip of the sphincterotome is placed below the ampullary orifice and the second

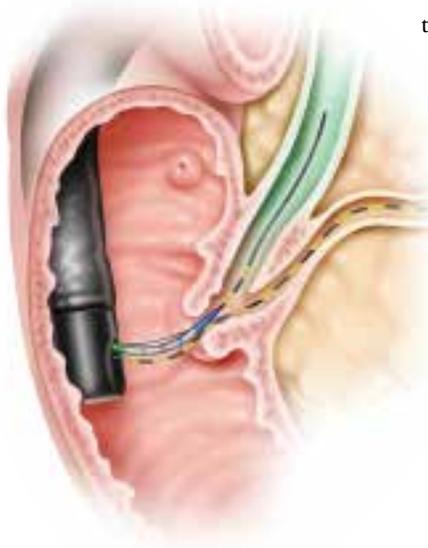
guidewire is manipulated by the physician approaching the orifice from the right of the guidewire and directing the cannulation attempt superior to the initial guidewire. Gentle advancement of the guidewire usually leads to free cannulation of the bile duct. It is thought that the guidewire in the pancreatic duct helps maintain orientation of the common channel facilitating cannulation of the bile duct with the second guidewire.

COMPLICATIONS

Wire guided cannulation should have a similar or lower complication rate when compared to other methods of cannulation. Anecdotal reports of pancreatic duct injury can be eliminated or greatly reduced by physician controlled wire guided cannulation and limiting the advancing force placed on the guidewire. It has been suggested that manipulation of the ampullary orifice with a guidewire is less traumatic than contrast injection or forceful manipulation with a catheter. Prospective studies of physician controlled wire guided cannulation will be necessary to define the true complication rate of this technique.

CONCLUSION

Physician controlled wire guided cannulation is an evolving technique that has been facilitated by the development of new tools to aid cannulation. It is a technique that should be known and available for all physicians performing ERCP. Further study is needed to determine if it is a superior technique for cannulation and if it should be used as the initial cannulation technique in all cases.



*Technique 4
Double wire technique*

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