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Discussion

DR. WILLIAM C. MEYERS (Worcester, Massachusetts): Thank you, Dr. Cameron, Dr. Copeland, Members, and Guests. I agree with you, Dr. Cameron, that you've assembled the finest group of gastrointestinal surgeons in the country and the continent.

And this is a remarkable series. I think what has been done at Johns Hopkins is reproducible in other centers as well, and it sets the standard for how to manage these cases.

In a sense, we, in the Southern Surgical Association, are "responsible" for the laparoscopic bile duct injury rate because laparoscopic cholecystectomy really began in the South. It was made popular by a number of people, particularly in Nashville. We had the largest concentration of cases over the first few months and few years of its coming to life.

The academic acceptance really was led by Dr. Sawyers, Dr. Sabiston, and others. We also take on the burden of taking care of the injuries. We also have accumulated the largest series of laparoscopic repairs, and the Hopkins experience is certainly one of them.

Our experience is similar. We have surgically more than 250 cases now. Forty have been followed over five years. And we've had five reoperations, all repaired early on, reflecting our learning curve.

It's interesting how the medical-legal aspects of this have evolved. The symptoms of patients after several years are largely determined, it seems, by the presence or absence of a medical-legal lawsuit.

I'd like to ask several questions to the authors. The first is, do you have any type of a denominator with respect to referral of these patients?

We think that because many of these patients have had previous repairs that perhaps we are better—but perhaps there are a number of repairs taking place in the community that are successful? Perhaps we really may not be as good as we think we are.

The second question is, what is the real role of percutaneous dilatation? Most of the patients that we've seen who had this as a primary treatment have failed and ended up undergoing hepaticojejunostomy.

Do you have any insight into the impact of lawsuits on the assessment of symptoms after this surgery? And, finally, do you have any experience with the so-called sophisticated injury, such as the aberrant duct injury, in terms of long-term follow-up?

Thank you again for a beautiful presentation.

DR. JOHN G. HUNTER (Atlanta, Georgia): A number of articles over the last 5 years have discussed the ugly underbelly of laparoscopic cholecystectomy, common bile duct injury. I think the first question that is addressed in the manuscript, and I'd like to hear Dr. Lillemoe's response, is the changing (or perhaps the unchanging) incidence of bile duct injuries.

The referrals at Emory for bile duct injury are one half what they were 3 years ago. Larry Way at University of California at San Francisco has seen a dramatic decrease in referrals for bile duct injury as well. I am not sure that this has happened around the country, and I would like to hear the Hopkins experience, especially with the relation to the incidence of injury. When did the injuries occur? Not when did the referrals occur?

I think there are some very unique aspects to this manuscript. One aspect that I was interested in seeing was that end-to-end anastomosis occasionally works. When should one consider an end-to-end anastomosis? Do they need to be dilated postoperatively?

I think the other side of the balloon dilation question is that we were told that it worked a lot less frequently than surgery. Dr. Meyers suggested that perhaps it was not really very frequently indicated. But if you look at the data, balloon dilation works two thirds of the time. A procedure that works two thirds of the time and avoids a major operation may be a reasonable thing.

In fact, if you look further in the data, of patients who were referred more than one month after their primary repair, only 2 of 14 had to have surgery. In other words, 12 of 14 were adequately managed with balloon dilation.

So I think the question is, when do you use balloons? And when do you stop using balloons? How many dilations? One, two, three?

The other aspect is that some bile duct injuries present several years after the cholecystectomy. How are you going to handle those injuries? Are you going to balloon dilate, or are you going to rerepair?

And lastly, I would just like to query a little about the rationale for the delayed repair. I think a number of patients were referred, drained, sent home, and then brought back for repair later. I think many of us tend to repair shortly after sepsis is controlled, but I would like to get Dr. Lillemoe's thoughts on that.

Thank you very much.

DR. WILLIAM H. NEALON (Galveston, Texas): Dr. Cameron, Dr. Copeland, Members, and Guests. I also was very impressed with the data presented by Dr. Lillemoe and his group at Johns Hopkins, and I had the opportunity to review the manuscript.

The most significant piece of this work, I think, is that we now have some long-term follow-up on whether these repairs are intact.

I'm going to make one comment on the timing of operative intervention. I happen to agree with Dr. Lillemoe and the group at Johns Hopkins that there is no rush to repair for these patients. When we have an opportunity to control the biliary tree both internally with PTC or with endoscopic access as well as externally via drainage of perihepatic fluid collections, bile leaks, et cetera, we are afforded the luxury of stabilizing the patient, obtaining diagnostic information, and proceeding to surgery when all circumstances have been optimized. I believe this strategy is supported by the fact that 54 of these patients were operated on with attempted repair prior to being sent to this institution for repeat operation, and the fact that three of the four failed operative repairs at this institution were performed on patients who had a previous attempt at a repair.

At the time that the original surgeon recognizes the injury, simple drainage with control of the biliary tree is more favorable than attempting a broader repair.

I have two questions. Regarding timing again, I was interested by the choice of timing of placing the PTC. In this paper, all patients immediately are accessed with drainage and visualization of the proximal biliary tree.

This intervention is often used in patients who have had their injury for some time and therefore already have some proximal dilatation. I'd like to ask Dr. Lillemoe if there has been any time at which he has had a patient with a relatively small biliary tree because of the policy of early placement of the PTC and

whether this small caliber of the biliary tree has caused the operative management to be technically more difficult.

I was also interested in the timing of stent removal. This is one of the age-old questions. As we know, historically, stents were thought to be best left in place perhaps for life in a patient with a complex biliary injury because of the failure to have reasonable access once those stents were removed.

As we all know now with PTC and endoscopic accessing, it is certainly easier to get back into the biliary. And I, and I think many, have taken to leaving stents in for a much shorter time. I was wondering if Dr. Lillemoe can give any observations on his timing for stent removal.

Finally, I wanted to mention interventional radiology. And, obviously, we would have no prayer to have the advances we've made in these kinds of injuries and management without the interventional radiologist. I do, however, worry at times, and the data suggests, that surgery was more effective than interventional techniques as a definitive therapeutic option. Although John Hunter is right in saying two thirds of these have been effective, we have very aggressive interventionalists at our institution with great skill.

I have been impressed with how often these patients with so-called successful treatment have gone many months with repeated dilatations and repeated cholangiograms, and have had readmissions because of stent or catheter occlusion and cholangitis.

To me, although on paper these may look like one success versus another, operative success, we all know, has, I think, the advantage of a very short period of recovery from operation, after which the patient stays symptom free and well, as opposed to many months of repeated procedures.

Could Dr. Lillemoe give me any more precise information about the successes with the interventional techniques, how many procedures were had, how many rehospitalizations, and such.

I thank the Society for the privilege of the floor.

DR. DUANE G. HUTSON (Miami, Florida): About thirteen or fourteen years ago now, we presented our early experience with this particular type of operation. Obviously, it was a configuration designed to allow the radiologist to repeatedly and easily access the biliary tree for the purpose of repeat dilatations.

During this period of time we used it for a number of different problems, but we collected 30 cases of iatrogenic injuries, 5 of which were laparoscopic. You can essentially summarize this by saying that we have never had to reoperate on bile duct stricture in the last 15 years in Miami.

None of these 30 patients have had to be reoperated on. They have had to be dilated, but the interval between dilatations in all of these patients is very reasonable. And as far as I'm concerned, the recurrent strictures associated with bile injuries and repairs is basically a radiological problem.

Now this sounds a little bit radical. The final statement is that I firmly believe that every patient who has a bile duct stricture repair should be prepared in whatever manner you want to use, and if you don't like the looks of this, do it whatever you want, but prepare them for the fact that your operation is going to fail and that it can be simply taken care of by dilatation, not repeat operation.

DR. KEITH D. LILLEMÖE (Closing Discussion): I would like to thank the discussants. These individuals have all made major contributions to our understanding of these injuries. Bill Meyers and his group at Duke and now at Massachusetts have really defined the important mechanisms of injury, and Dr. John Hunter has tried to teach us how to avoid these injuries. Dr. Hutson and Dr. Nealon have both made contributions to the management of strictures. Their comments are very much appreciated.

Dr. Meyers, the denominator is unknown. As we are all aware, there are a number of these injuries repaired outside of major institutions that go unreported. Although these repairs are more apt to fail, we do not know the exact number of successes versus failures. Stewart and Way were able to gather data from a number of different sources and found that there was a high incidence of failures performed outside of major centers, particularly in those cases performed when the cholangiographic data was not complete. There was almost a 100% failure in that situation. So, clearly if someone outside of a major center plans to repair these injuries, it is important that they follow the techniques of identifying the proximal anatomy to know what they are getting into.

Our philosophy with respect to percutaneous dilatation is that any patient who presents with a stricture following a previous repair and if the cholangiographic appearance and clinical situation is favorable, is to attempt percutaneous dilatation. The results of our study would suggest that the more established strictures, those strictures that are present following a repair a number of months ago, do have a pretty good result. On the other hand, in those patients with an active bile leak who have not undergone surgery because of the nature of the classic injury defined by Bill Meyers and his group, this is not an option and surgical reconstruction is the required treatment.

We recognize the impact of lawsuits on the outcome, and therefore, clearly defined a success versus a failure. Failures were defined as the need for another procedure, whether it be dilation or surgery. There are a lot of patients that do have vague symptoms that seem to persist. Some of these symptoms may be affected by their lawsuit status but we chose to define results clearly by the need for another procedure.

Dr. Meyers spoke of injuries regarding an aberrant insertion of the right hepatic duct. In his report and in our experience, these injuries often present as isolated bile leaks. We had five of these injuries in our series with one failure. All five were managed with the same technique. That is, after recognition, we obtained percutaneous access of what is usually the right posterior ductal system with a silastic catheter. The reconstruction to this isolated duct was then completed with a Roux-en-Y loop anastomosed to the isolated duct and stented with a silastic stent. This injury can create somewhat of a problem and fool the clinician because many times the ERCP appearance will actually show what appears to be a normal bifurcation. There is usually, however, a paucity of ducts in one of the major segments in the right lobe of the liver. One should recognize in this situation that the bile leak likely comes from the transection an aberrant right segmental duct.

Dr. Hunter, our data would suggest that we continue to see these injuries in 1996. Not all of these injuries have occurred

during these last few months, but may represent late referrals. We are hoping that the message will get out and that we will be seeing more of these patients in tertiary medical centers with less of them undergoing an initial attempt at repair in the community.

The only real objective numbers that exist in the literature concerning the change in incidence of these injuries over time comes from studies by Wherry published in *Annals of Surgery* reflecting the military experience. In these two publications they looked at their early experience and then in late 1996 reported what they called their steady-state appearance. Those results would suggest that the incidence has remained the same over time at about 0.4%. Dr. Hunter, with respect to your question concerning balloon dilatation, we do feel that the results are excellent in established strictures presenting late after a repair. Therefore, we feel that dilation is the optimal treatment in these cases. This technique does not seem to work quite as well in those patients referred with early anastomotic leaks but it still may be worth a try if biliary-enteric continuity is intact.

Our plan for the management of any late strictures that occur in our series will be as we have done with those we have seen already, and that is to attempt percutaneous dilatation. Our initial success in three of the four cases of failure at our institution would suggest that this is clearly worth a try.

The question was raised concerning our rationale for delaying repair in patients with an active bile leak. We feel strongly that the time to not operate on these patients is in the setting of acute inflammation associated with a bile leak. There has also been some suggestion that the nature of the injury may change as time passes and therefore the level of injury may go higher as fibrosis and stenosis occurs. By delaying the repair you may allow some of these changes to pass.

To respond to Dr. Nealon's question about the role of percutaneous transhepatic cholangiography, I would like to say that we have an excellent group of radiologists who are usually able to

get access to these small nondilated ductal systems. Most of these patients do have an ongoing leak and we feel that it is essential to get control of this leak early to control sepsis and peritonitis. The two deaths in our series were examples of patients who never really had their sepsis controlled and went on to develop multisystem organ failure before transfer to our institution.

In the manuscript, we reported the analysis of data with respect to the length of postoperative stenting. There was no real difference between those patients stented for an intermediate period, which was four to nine months, or for a period of longer than nine months. For the last few years, we have tended to shorten the period of stenting. We now base the decision on the cholangiographic appearance and also do take into account some objective data from biliary pressure manometric studies, the so-called biliary Whittaker test, and a short clinical trial with stents placed above the anastomosis.

I would again like to give credit to our interventional radiologists. When they are referred a patient, they immediately get one of the surgeons involved so that we can provide early input into the management of the patient. This cooperation ensures that patients do not linger for months without surgical input into their management. Perhaps the high rate of failure of dilatation seen in our series was because the surgeon said enough was enough and advised the patient to have surgery earlier. Again, I cannot emphasize strongly enough how important the role of the radiologists are at our institution and they certainly deserve credit for the success for both the patients managed by dilatation as well as surgical repair.

In closing to Dr. Hutson, we are certainly aware of your excellent results and your modifications allowing external access to the Roux-en-Y limb. This is certainly a valuable technique, and we feel it is a good alternative in many patients.

I would like to thank the Association very much for the opportunity to present this work.