

## HPB Surgery: The Specialty is Here to Stay, but the Training is in Evolution

Michael I. D'Angelica, MD<sup>1</sup> and William C. Chapman, MD<sup>2</sup>

<sup>1</sup>Department of Surgery, Memorial Sloan Kettering Cancer Center, New York, NY; <sup>2</sup>Department of Surgery, Washington University School of Medicine, St. Louis, MO

In our relatively short careers, hepatopancreatobiliary (HPB) surgery has unequivocally become a specialty. A number of trends have colluded to establish the necessity of the HPB surgical specialist. First, major hepatic and pancreatic operations have become safer and more accepted by the general medical community. Historically, hepatic resection was associated with massive blood loss and high mortality.<sup>1</sup> Similarly, pancreatoduodenectomy was associated with extremely high rates of perioperative mortality—to the point where the value of performing the operation at all was questioned openly in medical journals.<sup>2</sup> Now, thanks to individual surgical experience and high-volume hospitals, these operations are performed routinely with acceptable rates of morbidity and mortality.<sup>3,4</sup> Second, operations on the liver, pancreas, and biliary tract are now well-established parts of the treatment of specific diseases involving these organs. Examples include potentially curative resections of colorectal liver metastases and operations for chronic pancreatitis, which greatly improve the quality of life for patients with this otherwise crippling disease.<sup>5,6</sup> Last, in recent decades, many individual surgeons, without the benefit of specific HPB training, have successfully established themselves as specialists in this field. These individuals have done so by developing high-volume clinical practices and dedicating themselves to research in the field. Because most HPB operations are not commonly performed or taught beyond an introductory level during general surgery training, it became natural and necessary for hospital systems to develop these practices.

Most current practicing HPB specialists have evolved from training in transplantation or surgical oncology, although some were general surgeons who developed an interest and pursued specialization on their own.

What is the current argument to support fellowship training in HPB surgery? The most obvious rationale is that HPB surgery requires technical expertise in challenging operations that have significant risk of major complications. Further, an association between volume of operations performed (both by the individual and hospital) and surgical outcome has been well established in relation to operations such as major hepatic and pancreatic resections.<sup>7,8</sup> It has become evident that HPB operations should not be performed by the occasional HPB surgeon and that this kind of surgery requires experienced surgeons, hospitals, and support personnel. Although many will conclude that these volume–outcome relationships are related primarily to the technical performance of these operations, we maintain that technique is only a component of the specialty. Major HPB operations also require a complete understanding of the underlying diseases, the indications for operative intervention, and a mastery of the management of patients before and after the operation. The clinical judgment pre-, intra-, and postoperatively may be the most important part of being a successful HPB surgeon. Ultimately, the best HPB surgeons are those who combine technical excellence with superb judgment. Unfortunately, most general surgery residents graduate from training with very little exposure to major HPB operations.<sup>9</sup> For example, the median number of pancreatoduodenectomies performed by graduating chief residents in the United States in 2014 was 3.7.<sup>10</sup> It has been suggested that it takes approximately 20 cases to develop baseline proficiency in this operation and 60 to qualify as an expert in the field. The numbers are likely similar for complex hepatic

resection. Therefore, the typical graduating general surgery chief resident is not at all qualified to be an HPB surgeon.

Stated simply, HPB operations are established and important parts of the treatment strategies for disease involving these organs, yet the great majority of current general surgery residents will not receive adequate training in this specialty. Therefore, as with most of surgical training in modern times, additional training in some form is truly mandatory for HPB surgery. Although HPB fellowships have been in existence since the 1980s, until recently little attention was paid to the organization of this fellowship process. Given all of these facts, formalized HPB training in some form of fellowship is here to stay.

It is important to note that very few surgeons will be able to establish an HPB practice that completely fills their operating room schedule or clinic. Most HPB surgeons practice something else in addition to their HPB specialty.<sup>11</sup> There simply is not sufficient volume of cases in most hospitals to provide a full-time job in this specialty area. Therefore, most HPB surgeons will benefit from training in a broader specialty such as transplantation or surgical oncology. This allows the surgeon to more easily establish a practice outside of HPB-specific cases. HPB as a specialty also runs the risk of focusing on an organ and on operations rather than an underlying disease. After all, it is a specialty that only specifies organs. HPB specialists who train in transplantation or surgical oncology have studied the underlying clinical science of organ failure (transplantation) or cancer (surgical oncology). The HPB specialist who only sees the operation will be the least effective surgeon. Therefore, it is imperative that HPB specialists receive training in the underlying diseases that are critical to the best practice of this type of surgery.

Currently there are three common pathways to obtain fellowship-level HPB surgical training: through stand-alone HPB fellowships, surgical oncology fellowships, and transplantation fellowships. The different fellowship paths will all have obvious weaknesses and will not cover all parts of HPB training. Transplantation fellowships may not stress cancer biology, whereas surgical oncology fellowships may lack certain technical training (such as in vascular surgery) and may also not provide adequate exposure to benign HPB disease. The stand-alone HPB fellowships may lack diversity, in part because they will reflect the specific practice of the attending surgeons at these relatively small programs. There is therefore no ideal program for the aspiring HPB surgeon... yet.

Thankfully, as evidenced in the summative review by Jeyarajah et al. of the HPB surgery training consensus conference, the HPB community is dedicated to improving training.<sup>12</sup> Established educators from the worlds of general surgery, transplant surgery, surgical oncology, and stand-alone HPB fellowships have come together to discuss

and, we hope, implement strategies that will enhance HPB training. Although no major recommendations have been made, a few critical starting points have been established. It is obvious and worth repeating that no ideal fellowship currently exists. How will the stand-alone HPB fellowships ensure that their graduates will be able to practice something other than HPB surgery? How will transplantation HPB fellows learn the nuances of oncology? How will surgical oncology HPB fellows obtain expertise in organ failure and benign HPB diseases? The collaboration between the three involved specialty societies (Americas Hepato-Pancreato-Biliary Association, Society of Surgical Oncology, and ASTS) is clearly an excellent start, and we applaud this initial attempt to collaborate with a common goal of establishing the best HPB training possible. It is likely that coordination among fellowship programs with differing strengths and weaknesses may become an important part of the future of HPB training. As an example, our fellows (combined surgical oncology/HPB at Memorial Sloan Kettering Cancer Center and combined transplantation/HPB at Washington University) each spend a month as a fully privileged fellow at the other institution, gaining experience in what may be lacking at their own program. Our fellows have found this to be an important and valuable part of their training.

What are going to be the critical factors in producing the best HPB surgical training? First and foremost, fellowships must produce practicing surgeons who are experts in the underlying diseases and not just in technical operations. We must not allow the specialty to become one that is purely focused on technique. Second, this specialty demands technical excellence, and an adequate volume of operations during training is critical. Third, collaboration between institutions and fellowship programs may be critical. If we want to produce well-balanced HPB trainees, collaboration is likely going to be necessary. Last, we must counsel our fellows from the beginning that they are unlikely to have a practice in HPB surgery alone. Thoughtful mentoring must be part of our fellowships. HPB surgery as a specialty and as a training paradigm is here to stay, and this review by Jeyarajah et al. of the consensus conference provides obvious evidence that the dedication and will to establish the best possible training is well underway.<sup>12</sup>

**CONFLICT OF INTEREST** The authors declare no conflict of interest.

## REFERENCES

1. Foster JH, Lawler MR Jr, Welborn MB Jr, Holcomb GW Jr, Sawyers JL. Recent experience with major hepatic resection. *Ann Surg.* 1968;167:651–66.

2. Crile G Jr. The advantages of bypass operation over radical pancreatoduodenectomy in the treatment of pancreatic carcinoma. *Surg Gynecol Obstet.* 1970;130:1049–53.
3. Kingham TP, Correa-Gallego C, D'Angelica MI, et al. Hepatic parenchymal preservation surgery: decreasing morbidity and mortality rates in 4152 resections for malignancy. *J Am Coll Surg.* 2015;220:471–9.
4. Ball CG, Dixon E, Vollmer CM, Howard TJ. The view from 10,000 procedures: technical tips and wisdom from master pancreatic surgeons to avoid hemorrhage during pancreaticoduodenectomy. *BMC Surg.* 2015;15:122.
5. Tomlinson JS, Jarnagin WR, DeMatteo RP, et al. Actual 10-year survival after resection of colorectal liver metastases defines cure. *J Clin Oncol.* 2007;25:4575–80.
6. Hartmann D, Friess H. Surgical approaches to chronic pancreatitis. *Gastroenterol Res Pract.* 2015;2015:503109.
7. Begg CB, Cramer LD, Hoskins WJ, Brennan MF. Impact of hospital volume on operative mortality for major cancer surgery. *JAMA.* 1998;280:1747–51.
8. Nathan H, Cameron JL, Choti MA, Schulick RD, Pawlik TM. The volume–outcomes effect in hepato-pancreato-biliary surgery: hospital versus surgeon contributions and specificity of the relationship. *J Am Coll Surg.* 2009;208:528–38.
9. Sachs TE, Ejaz A, Weiss M, et al. Assessing the experience in complex hepatopancreatobiliary surgery among graduating chief residents: is the operative experience enough? *Surgery.* 2014;156:385–93.
10. Accreditation Council for Graduate Medical Education. Case logs statistical reports. <https://www.acgme.org/acgmeweb/tabid/274/DataCollectionSystems/ResidentCaseLogSystem/CaseLogsStatisticalReports.aspx>.
11. Minter RM, Alseidi A, Hong JC, et al. Training in hepatopancreatobiliary surgery: assessment of the hepatopancreatobiliary surgery workforce in North America. *Ann Surg.* 2015;262:1065–70.
12. Jeyarajah DR, Berman RS, Doyle M, et al. Consensus Conference on North American Training in Hepatopancreatobiliary Surgery: a review of the conference and presentation of consensus statements. *Ann Surg Oncol.* 2016. doi:10.1245/s10434-016-5111-9.