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## Getting going: Incorporating ultrasound into an HPB practice

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### ABSTRACT

The incorporation of ultrasound into a hepatopancreatobiliary surgical practice is both exciting and potentially intimidating. Although it is relatively straightforward to obtain detailed intraoperative ultrasound training from a small variety of formal programs, didactic curriculum, and mentorship experiences, seamless integration of this new knowledge into a hepatopancreatobiliary practice can be more challenging than expected. Although this is particularly true when a graduate begins a new practice, it is also relevant when incorporating hepatopancreatobiliary ultrasound into a mature group practice environment. This review outlines knowing your environment, certification and competency, credentialing and privileging, transition to independent practice, and maintaining competence.

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The incorporation of ultrasound into a hepatopancreatobiliary (HPB) surgical practice is both exciting and potentially intimidating. Although it is relatively straightforward to obtain detailed intraoperative ultrasound training from a small variety of formal programs (eg, Americas Hepato-Pancreato-Biliary Association [AHPBA] HPB Ultrasound and Advanced Technology Post-Graduate Course; American College of Surgeons Advanced Hepato-Pancreato-Biliary Ultrasound Post Graduate Course; AHPBA HPB Ultrasound Fellows' Course), printed sources (eg, *Surgery Open Science* supplement to the AHPBA HPB Ultrasound and Advanced Technology Course), and/or one-on-one mentorship experiences, seamless integration of this new knowledge into an HPB practice can be more challenging than expected [1,2]. Although this is particularly true when a graduate begins a new practice, it is also relevant when incorporating HPB ultrasound into a mature group practice environment.

It is clear that intraoperative ultrasound is a central requirement of modern HPB surgery [2–9]. In fact, numerous global HPB societies, consensus guidelines, and large volume centers believe the contemporary practice of HPB surgery is simply not possible without up-to-date intraoperative ultrasound skills. These techniques focus on both diagnosing liver, pancreas, and biliary diseases (oncology, inflammatory, traumatic) as well as therapeutic treatments (thermal ablation, alcohol injection) for hepatic tumors. Although open and minimally invasive ultrasound methodologies differ within numerous domains, HPB surgeons must be facile with both. Incorporation of these tools into an HPB practice has the potential to improve patient clinical care, offer previously

unavailable treatments, enhance efficiencies, and generate additional revenue.

### KNOW YOUR ENVIRONMENT

Introducing a new technology and/or systematic process into a surgical practice typically includes a number of key elements that include, but are not limited to, (1) agreement and enthusiasm from current and future partners, (2) formal approval by the new technologies/innovation committee(s) within your hospital system, (3) funding for the technology itself (purchase of a contemporary ultrasound unit and various probes), (4) a plan to integrate ultrasound training among additional partners who may not currently possess this skill set, and (5) an understanding of how the introduction of this new technology will impact the current clinical workflow and revenue-generating practices of your department as well as others.

Although each of these requirements appears straightforward on the surface, the nuanced details and emotions associated with each may be quite unpredictable. Examples might include a senior surgeon who is resistant to the introduction of new technologies, an inability of the hospital system to purchase the ultrasound unit and fund the required maintenance, and/or concern from the radiology department regarding potential lost revenue associated with ultrasound-guided percutaneous ablation of hepatic tumors. Each of these challenges can be surmounted by a thoughtful consideration of local traditions; sage advice from senior colleagues in navigating rough waters; and, perhaps most importantly, support from the administration group within your hospital system. In general, intraoperative ultrasound is not only a skill that has become standard within modern HPB surgery but one that will also increase

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revenue for your hospital system. In other words, the payoff is worth the effort.

## TRAINING AND COMPETENCY

Training from a well-recognized program with its accompanying documentation is often adequate evidence of surgical ultrasound preparation and competence for many hospital systems [1,9]. The AHPBA HPB Ultrasound and Advanced Technology Course is an annual postgraduate course for practicing surgeons and surgical fellows. This daylong course includes both didactic and hands-on skills labs. The AHPBA HPB Ultrasound Fellows' Course is the annual US training pathway for AHPBA-Fellowship Council HPB fellowships, which includes didactic and hands-on skills training at the start of the fellowship year followed by supervised volume and content requirements over the fellowship year(s) (ie, evaluated by HPB training faculty and program directors). This year-long "coursework" culminates with a hands-on skills practicum prior to graduation [3,4]. Other fellowship training programs offered by the American Society of Transplant Surgeons and Complex General Surgical Oncology Accreditation Council for Graduate Medical Education are well-recognized routes to HPB surgical practices [10–12]. Although these 3 pathways in HPB surgery training offer very different content in an effort to achieve the same broad goal, formal intraoperative ultrasound training within these fellowships displays a wide variation in methodology, formality, content, and final requirements [10–12]. The model of instruction and assessment of the HPB Fellows' Ultrasound Course can be applied to other training programs. Without this training, as a result of inadequacies in some HPB ultrasound training pathways, additional postfellowship training may also be required. This will depend on the individual applicant's ultrasound competence as well as on the hospital system ultrasound credentialing mandates [12].

## CREDENTIALING AND PRIVILEGING

Although training from a well-recognized ultrasound training program (eg, AHPBA) remains the centerpiece of confirming both knowledge and technical performance, obtaining formal credentials and privileges for intraoperative ultrasound (both diagnostic and therapeutic [ablation] skills) can be extremely variable between health care systems. Many hospitals require proof of training, such as a certificate of ultrasound course completion. Others do not. Furthermore, some systems mandate an extensive number of mentored cases prior to releasing the junior surgeon from their probationary period (ie, into a fully privileged practice). Others may require a detailed fellowship case log as evidence of competence. Given the striking variability between centers, it is important for the applicant to determine the expected local pathway to full credentialing and ensure that they have completed each step.

## TRANSITION TO INDEPENDENT PRACTICE

Transitioning into independent practice is a challenging topic to discuss. Numerous studies have reported a decreased readiness for independent practice at both the postresidency and postfellowship levels [13]. This has also been evaluated within HPB surgical fellowships across numerous specific procedures and diagnoses [14,15]. Intraoperative ultrasound is a procedural skill with similar didactic knowledge and technical experience requirements to many other "surgical" procedures. As a result, high-volume ultrasound experiences in mature and dedicated HPB fellowship programs are clearly beneficial in regard to ensuring comfort, safety, and competence among junior faculty [14–16].

It is also important for all junior faculty to reconsider the tremendous value of a local senior surgeon who is willing to assist in mentoring as they begin their HPB surgical careers. The assistance offered by these invested and experienced partners cannot be overstated in regard to intraoperative ultrasound and to complex HPB surgical procedures in

general. Prior to accepting an exciting HPB job at a new hospital, ensure that this support is available and enthusiastic. It must also be remembered that in the context of today's real-time ultrasound capability, mentors from around the globe are often available to engage in urgent intraoperative consultations via virtual platforms (ie, smart phone). Although this has been best exemplified in cases of resuscitating severely injured patients [17] as well as diagnosing high-grade pancreas injuries [18,19], the time-of-day realities of scheduled elective HPB cases make this possibility easily accessible. Perhaps even more helpful in a support capacity is ensuring a good working relationship with the institutional interventional radiology colleagues. Although particularly important for challenging hepatic ablation cases, these partnerships can benefit both patients and clinicians alike on diagnostic cases as well. Keen interventional radiologists often love to learn more about surgical techniques.

All HPB surgeons must remember that, similar to surgical procedures, repetition and case volume typically result in improved performance and technical excellence within the ultrasound domain as well. More specifically, junior faculty should attempt as many intraoperative ultrasound interrogations of the liver, pancreas, and biliary tree as possible. Memorizing "normal" as well as "variant" anatomy will greatly enhance the accuracy and relevance of subsequent abnormal disease states. Operating with partners is also an early key to minimizing complications and flattening the learning curve in HPB surgery and intraoperative ultrasound. As a result, operate and image with your partners as often as possible [20]. It is time well spent.

## MAINTAINING COMPETENCE

Given the frequent use of intraoperative diagnostic ultrasound in modern HPB surgery, maintaining competence is rarely an issue within a busy practice. In some institutions, however, therapeutic ablation endeavors may be primarily limited to the interventional radiology group. This reality may lead to an erosion of advanced targeting and ablation skills for the HPB surgeon that requires intermittent refreshers. As a result, it is important that HPB surgeons are honest in their self-assessments as their careers progress. It is also critical that, in the context of intraoperative ultrasound-guided ablation, HPB surgeons maintain a detailed understanding of all ablation technologies prior to use. In many cases, this can be achieved by continuing medical education courses offered through various societies and/or the structured introduction of new technologies by more recently trained junior faculty. For example, further training in ablation can be obtained through the newly offered AHPBA Advanced Tumor Ablation Course, which focuses on technologies, techniques, outcomes, and pitfalls in ablation.

## SUMMARY

In conclusion, competent and experienced intraoperative ultrasound techniques are central to the contemporary practice of HPB surgery. Training in HPB ultrasound through a well-recognized organization, such as AHPBA, is an increasingly common and mandatory requirement for local privileging. These processes vary widely across both ultrasound training programs and subsequent hospital systems. Transition to independent practice issues remain similar for intraoperative ultrasound and reinforce the need for a well-designed training program and a clearly understood pathway to obtaining HPB credentials for potential applicants.

## Author Contribution

Dr Ball wrote and edited all components of this manuscript.

## Conflict of Interest

Dr Ball has no conflicts of interest to declare.

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