WHITE PAPER ON UNMET MEDICAL NEEDS & CHALLENGES

3 Dimensional (3D) Modeling of Liver Anatomy that Integrates Images of Vessels and Tumors for Surgical Planning

Vijay P Khatri, MBChB, FACS
Professor of Surgery
Dept of Surgery

Hepatic resection has evolved historically from an imprecise removal of portions of liver frequently accompanied by extensive hemorrhage to a controlled anatomical procedure that represents a major advance in modern surgery. The liver is made up of 8 separate segments and more recently, segment-oriented liver resection, has enhanced the technical repertoire of the hepatobiliary surgeon. Intraoperative use of high-resolution ultrasonography facilitates performance of segmental and sectoral hepatic resections.

Preoperative diagnostic imaging is invaluable in management of hepatic malignancies particularly for surgical planning. Similar to lung resection, hepatic resection has become highly dependent on understanding of the segmental anatomy of liver and determining the relationship of the tumors to the portal venous inflow and hepatic venous outflow to conduct safe resection along intersegmental avascular planes. Despite these advances the surgeon is left with evaluating 2D images of CT scan or MRI to perform a 3-dimensional operative procedure. This can result in intraoperative surprises after evaluating the vessels and tumor relationships by ultrasound.

Hence one of the important unmet needs in performing safe liver surgery remains the availability of 3D reconstruction of the blood vessels within the liver and their relationships with tumor. Availability of such a Computer Generated 3D Imaging derived from a real human CT data set would be invaluable to the surgeon in planning the extent of the removal and developing a precise pathway of resection before ever going into the operative room.

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