

Symposium 5. ALPPS vs. PVE

The development of "In-situ split liver resection" (a.k.a. "ALPPS")

Oncologic liver resection is sometimes limited by the volume of healthy and functional liver tissue that would remain after complete tumor resection. This means that complete resection – with the potential option for cure – would be technically possible, but cannot be done because the remaining part of the liver would be too small with a high risk of liver failure and subsequent death.

A situation like that occurred during surgery in a 49-year old patient with hilar cholangiocarcinoma (Klatskin tumor) at Regensburg University in September 2007. An extended right trisectorectomy would have been necessary, but the remaining left lateral lobe had been too small. During this operation the decision was made to proceed with the operation, but not to complete it: After no-touch preparation of the liver hilum the left hepatic duct was divided at the base of the round ligament. A frozen section showed a tumor-free resection margin and the central stump of the left duct was suture-closed. Then the liver parenchyma was completely divided directly left to the falciform ligament up to the V.cava and to the orifice of the left and middle hepatic veins; thereby segment IV was devascularized completely. Then the right liver lobe was mobilized from retroperitoneum and V.cava. The right hepatic artery was encircled by a vessel-loop and the right portal vein was divided and sutured-closed to both sides. The middle hepatic vein was divided and the right hepatic vein encircled by a vessel-loop. Finally, a Roux-en-Y hepatico-jejunostomy was performed to the left hepatic duct. After regional lymph-adenectomy a drain was placed in the liver dissection area and the abdomen was closed.

The idea behind this procedure was to await hypertrophy of the left-lateral lobe and then to complete the operation in a second session by just dividing the encircled right artery and right hepatic vein and to remove the extended right lobe en-bloc with the liver hilum and the tumor. Interestingly, a CT-scan performed after just one week showed an almost 100% increase in volume of the left lateral lobe so that the second step of the operation was performed on day 8 after initial surgery. The patient had an uneventful recovery. However, due to histological evidence of peritoneal seeding in the lesser omentum, she developed peritoneal carcinomatosis after 6 months.

Following this experience, in our center the same approach – with minor modifications – was successfully applied in two patients with colorectal liver metastases in 2008 and in two patients with intrahepatic cholangiocellular cancer in 2009. This new approach was not yet reported at conferences but was discussed informally with surgical colleagues in Germany, who also started to use this

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new technique termed “in-situ-split liver resection”. By the year 2011 the experience with this technique in a total of 25 patients from Regensburg (n=10) and 4 other German centers (Göttingen, Mainz, Tübingen, Giessen) was analyzed and reported in *Annals of Surgery* in March 2012¹. In an accompanying editorial to this article, the acronym ALPPS (“Associating Liver Partition and Portal vein ligation for Staged hepatectomy”) was proposed by the editors de Santibanes and Clavien².

In the wake of this report, an obvious hype followed and many hepatobiliary surgeons worldwide started to use this method in many cases and with a number of modifications. Interestingly, a report from a newly created “ALPPS registry” indicated that this approach was not only used for extended right hepatectomy (trisectionectomy), for which it was designed, but that it was even applied for standard right hepatectomy in about 50 % of the cases documented in the registry³. This suggests a broad extension of the indication for this method, which is actually not understandable to me. Overall, I am astonished to see the huge number of operations, in which this approach is used and is reported in the literature. In our center, performing about 200 liver resections per year, predominantly major resections, we use the “in-situ split liver resection” technique only 4–5 times per year, i.e. in about 2–3% of our (mostly complex) cases.

Meanwhile, the “in-situ split liver resection” / “ALPPS” technique has been established as a new liver resection concept, which is helpful in some (but – to my experience – rare) situations. It does definitely not replace other techniques like portal vein embolization and standard two-stage hepatectomy, but adds to the toolkit of liver resection in the hands of experienced hepatobiliary surgeons. There are clearly options to optimize and to adjust the concept in for specific situations, but the most essential decision has to be on the indication for when to use it, carefully considering the overall oncologic treatment concept of a given patient.

References

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