

Symposium 5. ALPPS vs. PVE

ALPPS for fibrotic/cirrhotic liver: The University of Hong Kong experience

Since the initial experience described by Schnitzbauer and co-workers on the application for ALPPS for a series of patients with non-cirrhotic liver tumors in 2012(1, 2), there has been a surge in the interest on this novel procedure globally. Our ALPPS program was started in December 2013 in a 62-year old patient with hepatitis-B related hepatocellular carcinoma. It was a 13cm right lobe HCC with a left liver measuring 26% of the estimated standard liver volume (ESLV). After the ALPPS procedure, the left liver hypertrophied to 33.5% ESLV and an extended right hepatectomy was performed 10 days after the stage I procedure(3). The patient remained well until this day with no evidence of tumor recurrence. The indications for ALPPS in our center are as follow: 1) hepatocellular carcinoma or colorectal liver metastasis, 2) preoperative future liver remnant (FLR) volume < 30% ESLV, 3)central-locating tumor in right liver with sizeable non-tumorous liver to be sacrificed in a right hepatectomy, 4)Child A cirrhosis, 5)indocyanine green clearance rate < 20% at 15 minutes, 6) platelet count $\geq 100 \times 10^9/L$, 7)absence of complete right portal vein (RPV) thrombosis (although partial RPV thrombosis is regarded as a good indication for ALPPS as portal vein embolization in this situation would have a chance to induce thrombus dislodgement into the left/main portal vein upon catheterization of the RPV). Since the success of the first adult case in our center, the ALPPS program has expanded to include 42 patients. Among them, 38 patients (90%) had HCC (hepatitis B = 36, hepatitis C = 1, fatty liver = 1) and all of them underwent both stage I & II operation. Our initial report indicated that the FLR gained volume by 48.7% to induce an increment of FLR/ESLV ratio from 24.2% to 38.5% over a median of 6 days(4). The 90-day mortality rate was 7.1% (n=3) and the cause of death was liver failure. When compared with portal vein embolization (PVE), the benefits of ALPPS are several folds:

Clinical

- 1) A complete portal flow diversion to contralateral liver is guaranteed surgically and avoids the chance of incomplete occlusion that could be encountered in PVE. As such, the chance of FLR augmentation is optimised
- 2) A direct visual assessment of the quality of liver parenchyma in stage I procedure accompanied by a liver biopsy for histological grading of cirrhosis became possible
- 3) Measurement of portal hemodynamics in stage I to predict the risk of post-hepatectomy liver failure and flow modulation by splenic artery ligation if necessary
- 4) The entire treatment procedure is completed within one hospitalization in a timely manner.

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Patient

- 1) Shorter duration of patient anxiety and psychological stress while waiting for FLR hypertrophy

Logistics

- 1) Surgeon-led service and relieve the burden on interventional radiology service

Although the degree of FLR hypertrophy in fibrotic/cirrhotic liver is somewhat less substantial than that in non-cirrhotic, non-cholestatic livers(5, 6) probably due to the quality of the liver parenchyma, our experience showed that the ALPPS procedure remained an effective approach for FLR augmentation in patients with hepatitis-related HCC.

References

1. Schnitzbauer AA, Lang SA, Goessmann H, Nadalin S, Baumgart J, Farkas SA, et al. Right portal vein ligation combined with in situ splitting induces rapid left lateral liver lobe hypertrophy enabling 2-staged extended right hepatic resection in small-for-size settings. *Annals of surgery.* 2012;255(3):405-14.
2. de Santibanes E, Clavien PA. Playing Play-Doh to prevent postoperative liver failure: the "ALPPS" approach. *Annals of surgery.* 2012;255(3):415-7.
3. Chan AC, Pang R, Poon RT. Simplifying the ALPPS procedure by the anterior approach. *Annals of surgery.* 2014;260(2):e3.
4. Chan AC, Poon RT, Chan C, Lo CM. Safety of ALPPS Procedure by the Anterior Approach for Hepatocellular Carcinoma. *Annals of surgery.* 2016;263(2):e14-6.
5. Alvarez FA, Ardiles V, de Santibanes M, Pekolj J, de Santibanes E. Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy Offers High Oncological Feasibility With Adequate Patient Safety: A Prospective Study at a Single Center. *Annals of surgery.* 2014.
6. Schadde E, Ardiles V, Robles-Campos R, Malago M, Machado M, Hernandez-Alejandro R, et al. Early survival and safety of ALPPS: first report of the International ALPPS Registry. *Annals of surgery.* 2014;260(5):829-36; discussion 36-8.