

# Synchronous Resection of Liver Metastasis and Rectal Cancer by ALPPS Technique

Zdravko Marić,<sup>1</sup>  
Ozren Kordić,<sup>1</sup>  
Velimir Škrbić,<sup>1</sup>  
Igor Stakić,<sup>1</sup>  
Nina Marić<sup>2</sup>

<sup>1</sup> Clinic for General and Abdominal Surgery, University Clinical Centre of the Republic of Srpska, Banja Luka

<sup>2</sup> Clinic for children diseases, University Clinical Centre of the Republic of Srpska, Banja Luka

## ABSTRACT

So far, ALPPS (Associating liver and portal vein partition ligation for staged hepatectomy) operation has been performed only as an individual procedure in big specialized centers in developed countries. ALPPS is two-stage curative hepatectomy for which indication is inadequate, the so-called, future liver remnant (FLR).

In the case report, we described the case of 63-year-old patient with verified colorectal cancer and large metastases in the liver, to whom we conducted simultaneous resection of the rectal cancer and liver metastases using the ALPPS technique with good clinical results.

**Keywords:** ALPPS, liver metastases, adenocarcinoma of the rectum

## Contact address:

Zdravko Marić  
St. Braće Čubrilovića 16a  
78000 Banja Luka  
Republic of Srpska  
Bosna and Herzegovina  
Mob/ +38765511525

(Scr Med 2016;47:71-73)

Submitted: January 15th, 2016  
Accepted: January 31th, 2016.

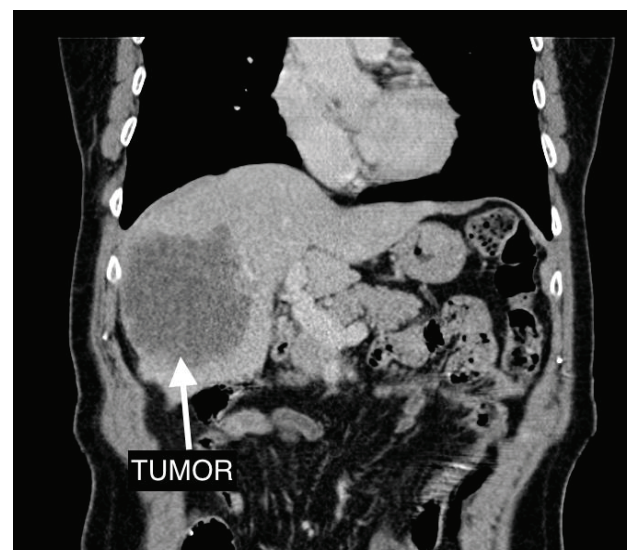
## Introduction

Extensive/bilobar liver metastases require extensive resections which can be performed when the FLR is more than 27-30% of total volume. ALPPS operation is required to achieve a certain and adequate FLR hypertrophy and safe sequential hepatectomy, that is, a complete separation of the diseased and the healthy liver parenchyma with a complete disconnection of the venous and preservation of the arterial circulation is necessary. ALPPS step 1 is a separation of the diseased liver (DL) and FLR while the step 2 is a removal of the DL between 7 - 21st day.

## Case report

Colonoscopy performed on 63-year-old man showed that he had stenotic infiltrating mass in the rectosigmoid junction that was histopathologically G2 adenocarcinoma. CT scan revealed a large metastasis in the liver, which occupied V, VI, VII, VIII and partially I, IVA and IVB segments (Figure 1.).

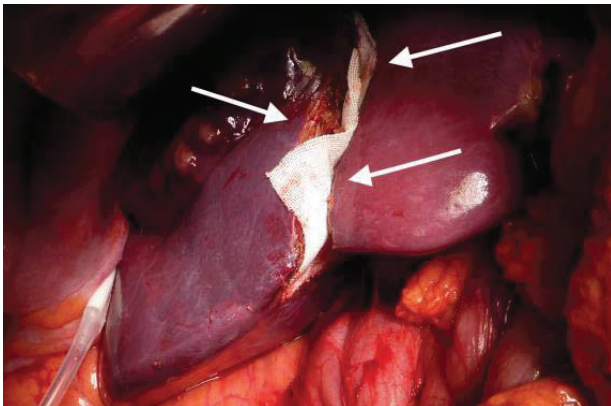
Figure 1. CT scan of a patient with liver metastases



Due to intestinal obstruction risk, oncological consilium proposed relatively immediate surgical treatment. We did the anterior proctosigmoidectomy, total mesorectal excision and stapling colorectal anastomosis.

By mobilization and exploration of the liver using intra-operative ultrasound, we found that the tumor exceeded the center line of the liver for about 1 cm in the zone of segments I and IVb, without infiltration of large vessels and small FLR. We decided to conduct ALPPS procedure, a complete separation of DL and FLR with ligation of the portal vein on the side of the tumor, hoping that FLR hypertrophy would occur and that a colorectal anastomosis would be sufficient. After cholecystectomy and resection of all accessory hepatic veins, we started to perform dissection of portal structures. The right hepatic artery and the right bile duct were preserved, and the right portal vein was ligated. The liver parenchyma was divided on the border of diseased and healthy using the "Kelly Crash" technique. Transversal middle hepatic veins and their branches were clipped and resected, and main hepatic veins were preserved (ALPPS step 1.) The surface of healthy FLR and the rest of DL were treated with hemostyptic fibrillar (Figure 2.).

**Figure 2. Operational finding - ALPPS stage 1- separated diseased and healthy liver parenchyma**



The patient received two doses of whole blood on the day of surgery and one dose on the postoperative day 4.

On the postoperative day 3, CT liver volumetry was done: TLV (total volume of the liver) was 2361 cm<sup>3</sup> with TV (tumor volume) 403 cm<sup>3</sup>. The actual total liver volume (aTLV) was 1958 cm<sup>3</sup>. Left part of liver or FLR was 565 cm<sup>3</sup> or 28% of aTLV. CT volumetry on the postoperative day 10 showed a total volume of liver 1742 cm<sup>3</sup> with FLV 772 cm<sup>3</sup> or 44% of aTLV (Figure 3.).

**Figure 3. CT scan of FLR hypertrophy on postoperative day 10.**



The same surgical team performed the right hepatectomy (ALPPS step 2) on postoperative day 11. FLR had been significantly increased and had normal color. Diseased hemiliver had a little brighter color and its reduction was not detected. The pulse in the right hepatic artery was normal. The right hepatic artery, right bile duct, previously ligated right portal vein and right hepatic vein were ligated and resected, the right lobe of the liver was completely released and removed from the abdominal cavity, which was washed and drained with two Jackson Pratt drains.

The biochemical and ultrasound findings were checked on the postoperative days 1, 3, 7 and 10, when we also conducted the CT volumetry which showed FLR hypertrophy (1520 cm<sup>3</sup>) (Figure 3.). The patient was discharged on the postoperative day 21. He received the adjuvant chemotherapy. The follow-up fourteen months after surgery: patient showed no signs of local recurrence and/or metastases.

### Discussion

The first ALPPS operation report, published in April 2011, presented the experience in the treatment of 3 patients.<sup>1</sup> On December 2015, there were 148 published papers about more than 600 patients treated with the ALPPS technique.<sup>2</sup>

So far, ALPPS operation has been performed only as an individual operation in big specialized centers in developed countries. So far, it has not been advisable to combine synchronous ALPPS with other large operations.<sup>3</sup>

Early recurrence of liver metastases in 20% to 86% of cases and lungs metastases in 42% of cases, have turned away many from performing ALPPS.<sup>4</sup> Better understand-

ing of metabolic support and biliohaemostasis provide better results and wider interest for ALPPS.

On 24<sup>th</sup> November 2014, Terrence Jackson from Cleveland (Ohio) announced that he had done the first synchronous resection of rectal cancer and liver metastases using the ALPPS technique.<sup>5</sup> At the time of our operation, on 28<sup>th</sup> November 2014, we were not familiar with that report.

#### Authors' contribution

The authors performed synchronous resection of hepatic metastases and rectal cancer using the ALPPS technique only four days after the announcement that the first such operation had been performed in the world. In addition, this was the first published case in the world where the resection of rectal cancer and resection of liver metastases was performed by the same surgical team using the ALPPS technique.

#### References

1. Baumgart J., Lang S., Lang H. A new method for induction of liver hypertrophy prior to right trisectionectomy: a report of three cases. *HPB (Oxford)*. 2011;13(2):71–72.
2. Vivarelli M, Vincenzi P, Montalti R, et al. ALPPS procedure for extended liver resections: a single centre experience and a systematic review. *Bruns H., ed. PLoS ONE*. 2015;10(12):e0144019. doi:10.1371/journal.pone.0144019.
3. Schadde E., Ardiles V., Slankamenac K., Tschuor C., Sergeant G., Amacker N. ALPPS offers a better chance of complete resection in patients with primarily unresectable liver tumors compared with conventional-staged hepatectomies: results of a multicenter analysis. *World J Surg*. 2014;38:1510–1519. <http://dx.doi.org/10.1007/s00268-014-2513-3> PMID:24748319
4. Oldhafer K. J., Donati M., Jenner R. M., Stang A., Stavrou G. ALPPS for patients with colorectal liver metastases: effective liver hypertrophy, but early tumor recurrence. *World Journal of Surgery*. 2014;38(6):1504–1509. doi:10.1007/s00268-013-2401-2.
5. Jackson T., Siegel K.A., Siegel C.T. Rescue ALPPS: Intraoperative conversion to ALPPS during synchronous resection of rectal cancer and liver metastasis. *Case Reports in Surgery*. 2014;2014: 487852. doi:10.1155/2014/487852.

## Sinhrona resekcija jetrene metastaze i karcinoma rektuma ALPPS tehnikom

#### SAŽETAK

ALPPS (Associating liver partition and portal vein ligation for staged hepatectomy) operacija se do sada jedino radila u specijalizovanim velikim centrima razvijenih zemalja i to kao samostalna. ALPPS je dvostepena kurativna hepatektomija koja ima indikaciju kada je budući ostatak jetre, tzv. futur liver remnant neadekvatan (FLR).

U radu je prikazan slučaj 63-godišnjaka sa verifikovanim karcinomom rektuma i velikom metastazom u jetri, kod kojeg je ALPPS tehnikom urađena simultana resekcija karcinoma rektuma i jetrene metastaze, sa klinički dobrim rezultatom.

**Ključne riječi:** ALPPS, metastaza jetre, adenokarcinom rektuma.