

MEDICAL INSIGHTS

Laparoscopic liver resection

Single-center prospective randomized comparison of high-pressure waterjet and ultrasonic aspirator

Background

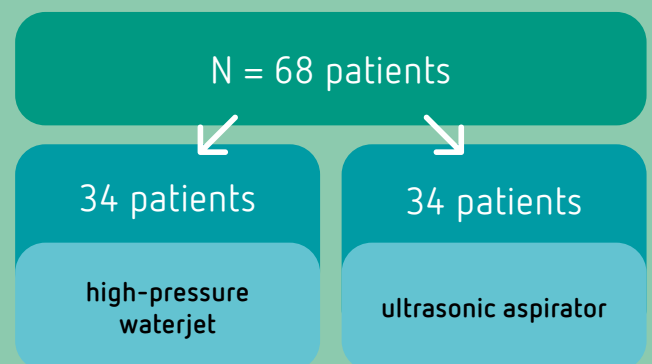
At the 14th world congress of the International Hepato-Pancreato-Biliary Association (IHPBA) 2020, Prof. Efanov from Moscow Clinical Research Center presented data from a single-center randomized prospective trial (poster presentation PG04-04). The title of the presentation was *A Single-Center Prospective Randomized Study for Comparison of Water Jet Dissector and Ultrasonic Aspirator in the Division of the Liver Parenchyma during Laparoscopic Resection*.

The adoption of laparoscopic liver resection in clinical daily practice is ongoing and the quality is increasing with the learning curve¹.

For parenchyma transection, different selective and non-selective techniques have been described. Ultrasonic aspirator and high-pressure waterjet belong to the selective modalities that are frequently used². Comparative data on both these techniques is lacking.

Challenges and goals

Efanov et al. aimed to evaluate safety and feasibility of selective parenchyma transection in laparoscopic liver resection in this investigator-initiated trial.



Method

The working group, led by Prof. Efanov, conducted a two-arm prospective randomized single-center trial (clinicaltrials.gov: NCT03208192). 68 patients were included (↑).

All patients underwent a laparoscopic liver resection for benign or malignant conditions. The parenchyma transection was conducted either using ultrasonic aspiration or high-pressure waterjet.

Primary endpoint was the intraoperative blood loss. It was measured as absolute volume and calculated in relation to the liver resection surface.

Results and key findings

There were no differences in patient-related and surgical characteristics.

The intraoperative blood loss did not differ significantly between the groups. Transection duration, Pringle maneuver time, complication rate and hospital stay also were not significantly different. A significantly higher

total bilirubin level on the second post-operative day was observed in the ultrasonic aspirator group.

There was a significant difference in the costs per operation in favor of high-pressure waterjet transection.

	High-pressure waterjet	Ultrasonic aspirator	p-value
Blood loss in volume per resection area (ml/cm ²)	3.8 (0.2-10.6)	3.4 (0.8-10.0)	0.555
Absolute blood loss in ml	186 (10-400)	206 (50-600)	0.897
Transection duration in minutes per resection area (min/cm ²)	2.3 (0.5-6.4)	2.6 (0.6-7.2)	0.525
Absolute transection duration in minutes	107 (19-305)	99 (20-300)	0.714
Total pringle maneuver time in minutes	12 (0-59)	11 (0-48)	0.908
Hospital stay in days	7.9 (5.0-19.0)	8.3 (4.0-15.0)	0.240
Costs per surgery in €	1003 (982-1057)	2529 (2505-2585)	<0.001

Implications and recommendations

High-pressure waterjet and ultrasonic aspirator have similar efficacy and safety in parenchyma transection in laparoscopic liver resection. In this study, no significant difference in parenchyma transection time was found. Another single-center, retrospective study was able to identify a quicker dissection of the waterjet compared with the ultrasonic aspirator in open parenchyma transection of living organ donors. The authors concluded that prospectively randomized data from multiple centers would be needed to objectively confirm this observation³. In their publication, Hamaoka et al. stress the short learning curve when using the ERBEJET® 2³.

The relatively small groups and the single-center involvement of the study of Efanov et al. limit the transferability to other patient populations.

Products

ERBEJET® 2 was used with an effect setting of 35–40. Further, the straight laparoscopic applicator with integrated suction (No. 20150-038) was used. The ESM 2 was operated with -100 mbar suction.

References

1. Swaid F, Sucandy I, Tohme S, Marsh JW, Bartlett DL, Tsung A, Geller DA. Changes in Performance of More Than 1000 Minimally Invasive Liver Resections. *JAMA Surg.* 2020 Aug 26;155(10):986–8. doi: 10.1001/jamasurg.2020.2623
2. Rau HG, Duessel AP, Wurzbacher S. The use of water-jet dissection in open and laparoscopic liver resection. *HPB (Oxford).* 2008;10(4):275–80. doi: 10.1080/13651820802167706
3. Hamaoka M, Kobayashi T, Kuroda S, Okimoto S, Honmyo N, Yamaguchi M, Yamamoto M, Ohdan H. Experience and outcomes in living donor liver procurement using the water jet scalpel. *J Hepatobiliary Pancreat Sci.* 2019 Aug;26(8):370–376. doi: 10.1002/jhbp.643.

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▷ Laparoscopic liver resection with ERBEJET® 2



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