

## Laparoscopic and Minimally Invasive ALPPS. Report of the initial experience from International ALPPS Registry

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**Background** Mortality rate is still a concern for a more widespread of ALPPS procedure in some countries. Due to this fact several modifications of ALPPS has been proposed in order to decrease this procedure. Partial ALPPS, Mini-ALPPS and others. In our opinion, the best way to reduce surgical severity in general and specifically liver surgery, remains the minimal invasive approach. Laparoscopy reduces the systemic inflammatory response for all types of elective surgery including liver resection. We recently safely performed and reported a totally laparoscopic ALPPS procedure in a 69 year old woman (Machado et al Ann Surg 256:e13) and other groups have reported their experience with laparoscopic ALPPS as well (Cai X et al J Laparoendosc Adv Surg Tech A 24:883-886; Xiao L et al Surg Endosc 29:2800-2801). These preliminary reports raised the question if ALPPS can be performed laparoscopically beyond singular case reports. During the First ALPPS consensus in Hamburg last year we presented the initial results from the registry and we found only 10 cases at that time, with excellent results. We decided to perform laparoscopic ALPPS routinely since then primarily to improve outcomes of ALPPS. We completed now our 10<sup>th</sup> case but it will certainly take a longer time to recruit a significant number to draw any conclusion. We believe that we may find a significant number of cases of minimally invasive ALPPS procedures in the registry now. In the recent World Congress of IHPBA we have seen several groups presenting their minimally invasive cases, including robotics. We believe that now is the time to go forward and go beyond feasibility study.

**Objectives** The aim of the study is to analyze all cases of minimally ALPPS present in the registry and also contact some authors from China, Israel etc that are showing their cases in many meetings and are not in the registry. After this contact they will automatically become co-authors of this study, if they agree with the methods and to be included in the study.

**Methods** Primary endpoint is the feasibility of consecutive resection and safety using a purely laparoscopic approach. Safety was assessed as the occurrence of complications during hospitalization and 90-day mortality. Complications will be assessed according the Clavien-Dindo classification. Mortality will also be recorded and to add up all complication incurred after surgery and not just assess the most severe, the recently published comprehensive complication index will be used (CCI) [Slankamenac K et al Ann Surg 258:1-7] additionally. Patient characteristics such as demographics and known risk factors for adverse outcomes in ALPPS, as age, gender tumor type, need for transfusion, duration of operation, extent of resection, and volumetric FLR size and time between stages. Secondary outcomes were feasibility of the procedures, FLR hypertrophy between stages, occurrence of liver failure by ISGLS criteria and hospital length of stay.

**Impact of the findings.** The findings of this analysis would indicate if minimally invasive ALPPS can be safely performed. Another finding will be if it can reduce complications when compared with open ALPPS.