Editorial on Techniques and Innovations in Liver Surgery

How could we image the future in hepatic surgery

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On June 1952, 11 years before the first liver transplantation by Thomas Starzl and 40 years before the first use of a partial graft from a living donor, Jean Louis Lortat Jacob, in his publication reporting the first anatomic right hepatectomy, anticipated that "*once the problems of tolerance to tissue grafts and their rejection have been solved, this procedure might be indicated for some hepatic diseases…*". The idea to use a partial graft in patients with "hepatic diseases" will then open the concept of the minimal liver function required to survive using its unique potential of regeneration, even under immunosuppression. Anatomic resection with primary control of both inflow and outflow pedicles leaving an autonomous remnant parenchyma allowed the standardization of major hepatectomies. This approach of liver surgery ushered the modern era of hepatic resectional surgery, which aims at defining the optimal plan of resection with minimal blood loss (1).

Once the feasibility of major liver resection was established, the following years mainly focused on improving the safety of liver resections. In this setting, three main advances, played a critical part, including: (I) preoperative portal vein embolization in order to enhance the hypertrophy of the future liver remnant; (II) maintenance of a low central venous pressure to decrease backflow bleeding; and (III) intraoperative ultrasonography to achieve a better location of intraparenchymal tumors and a clear delimitation of the vascular plans. Other technical improvements, such as the hanging maneuver in order to facilitate the anterior approach; the ultrasonic dissector to achieve a rapid and precise parenchymal transection and the peritoneal patch to easily provide an immediate and safe vascular graft, should only be considered as incremental innovations. In the same line, the next logical step allowing significant improvement of the postoperative course will be to develop an efficient coating to suppress the risk of biliary leakage (2).

Obviously, overcoming the risk of small for size syndrome would represent a dramatic advance. Yet, we should avoid being blinded by misleading and spectacular volumetric figures. Basic functional principles should always be kept in mind and recall us that, like a man without a social structure is not a human, a hepatocyte without any support is useless. Hence, rather than focusing on a purely quantitative hypertrophy, future strategies should probably aim at achieving a more qualitative regeneration.

A large approach with wide exposure was one of the turning points that ensured the safety of major resections. Since then, ongoing efforts to minimize abdominal wall trauma have led to popularize the use of the laparoscopic approach (3). This allowed to decrease postoperative pain and several complications resulting in lower hospital stays and accelerated recovery. It is therefore not surprising that laparoscopy has been accepted as the approach of choice for left lateral sectionectomy and we can expect that major hepatectomies will meet a similar fate within years from now. Rather than attempting to define indications for laparoscopy, we should therefore now accept its principles and focus on defining its contraindications. Of course, the expansion of laparoscopic hepatectomies to more complex resections, such as extended right hepatectomies or anatomical resections involving segments VII and VIII will require a certain degree of training and we can expect a stable rate of conversion for several years. In this context, we believe that the classical notion of learning curve should be abandoned until a true expertise has been achieved.

Likewise, while surgeons focus on the feasibility of these laparoscopic resections, they should also keep on following basic oncological principles and never sacrifice surgical margin width or lymphadenectomy in the name of a mini-invasive technical achievement. In the same line, while the use of high-tech devices will always be appealing, we should avoid their inherent pitfalls and retain only those aiming at ensuring patient's safety rather than improving surgeons' comfort. In this setting, current hepatic robotic surgery still lacks demonstrated benefits in terms of surgical quality and postoperative complications. Altogether, while there is no doubt that the future of liver surgery will be played on a screen, it is currently difficult to precisely predict if this will be a laparoscopic or a robotic screen (4).

Finally, it is likely that the refinement of surgical indications will represent the only true future less invasive innovation. Increasing non-surgical policies for benign lesions should be expected and adaptive strategies based on the natural history of malignant diseases will avoid futile surgeries such as some multiple CRLM controlled by chemotherapy (5). In the end, surgeons should never forget that a justified non-operative approach will always be less invasive than the least invasive surgical approach.

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Footnote

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