



# Laparoscopic versus robotic distal pancreatectomy

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Currently, there is an increased interest in the minimally invasive surgical approach. A pancreatectomy is among the most complex and challenging of abdominal operations where laparoscopy has important limitations, especially for major pancreatectomies performed in only a few centres (1,2).

Robotic surgical technologies have been introduced with the goal of improving current outcomes from laparoscopic surgery, enhancing a surgeon's dexterity in the surgical field, by means of: first, a magnified three-dimensional view; second, instruments with seven degrees of freedom; and third, intuitive hand-control movements (3).

However, the role of the robotic approach for pancreatectomies remains controversial, and the level of evidence comparing the procedure with the standard open and laparoscopy pancreatectomy surgical technique remains low. In fact, up to now, no randomized studies are available in the literature.

Given this background, the topic of this meta-analysis was selected to better clarify its current status and provide a future perspective for robotic versus laparoscopic distal pancreatectomy (4).

In this article published in the *BMC surgery*, the authors performed a systemic review and meta-analysis of studies comparing laparoscopic versus robotic distal pancreatectomies. The authors selected ten studies which met the inclusion criteria of quality including a total of 813 patients (267 robotic and 546 laparoscopic).

The first post-operative outcome analyzed by the authors is the pancreatic fistula rate. No differences among the groups have been found being 30.3% in the robotic group and 33.5% in the laparoscopic group. However, this data may be expected as in most of the cases the pancreatic

body is resected in a similar fashion in both laparoscopy and robotic approach. We can speculate that the muscle tremor filter and the 3D image which incorporates motion scaling offered by the robotic system may enhance the dexterity of performing complex tasks such as the closing of the pancreatic duct stump with a suture. However, very few groups perform this maneuver in the robotic approach, which means that this hypothesis, currently, cannot be confirmed by results.

The second data analyzed in this meta-analysis is the conversion rate which was significantly lower in the robotic group (8.2% *vs.* 21.6%). This data may be the results of the enhanced precision and vision of the robotic system which may be beneficial to solve those challenging situations where conversion is likely to occur in pancreatic surgery, such as bleeding. This data is concomitant with that presented by our series (3.3% *vs.* 19.2%;  $P=0.04$ ) (5) but opposite to another recent meta-analysis presented by Zhou *et al.* (6).

Another important advantage of the robotic approach found in this study is the preservation of the spleen. It has been showed to be higher in the robotic group (48.9% *vs.* 27%). Surgical community must be careful on defining spleen preservation as an index of quality of minimally invasive surgery because its preservation is strongly related to the nature of pancreatic malignancy. Most of the series includes both benignant and malignant tumors; and among the malignancies, different pathological disease are included, making impossible a proper comparative analysis and making difficult understand its exact indications outside from a randomized prospective study.

Even if the major morbidities were similar among

the two approaches, length of hospital stay resulted to be shorter in the robotic group (7.18 *vs.* 9.08 days) and concomitant with the meta-analysis of Zhou *et al.* (6).

In the current literature, data on oncologic outcomes after minimally invasive procedures is very few, therefore, this data could not be analysed in the study herein discussed (4). The main reason for this underreported data may be found especially in the fact that all comparative series have been published with a very short median post-operative follow up. Furthermore, as for spleen preservation, several different pathological specimens are included in the series, therefore, oncological outcomes cannot be comparable.

The high operating time still represents an issue for the robotic approach. However, this meta-analysis did not find a statistically difference between the two groups.

As reported in our previous analysis (3,5) and consistent with other authors' study (2) after a learning curve there exists a remarkable decrease in the operative time. Thus, it is obvious that experience gained in the operative procedures decreases the time taken for robotic pancreatic resection procedure.

Cost versus benefits for health care is a question to be debated whenever a new technology is introduced to a hospital. However, this data is still lacking in most of the series. In this meta-analysis only three studies reported cost analysis (4). As expected, overall cost of the robotic approach resulted to be higher compared with laparoscopy. More precisely, the authors report that each robotic procedure generally costs from 1,000 to 3,000 dollars more than laparoscopy. However, none of the three studies included the associate cost such as the costs of the post-operative period (7-9) except that of Waters (9), that, as also the authors discuss, report lower costs of laparoscopic versus robotic distal pancreatectomy (10.588 *vs.* 12.986 dollars). However, this study has an important limitation in that it was performed a decade ago, a long period of time during which robotic technology has rapidly improved, up to the latest Xi generation. Furthermore, some years ago it was a commonly held belief that the initial and ongoing maintenance costs of the robotic system would not significantly decrease in the future, given the monopoly held by the manufacturing company. But, currently some manufacturing licenses have or are about to expire and new robotic systems produced by different companies are currently in use, resulting in an expected decrease in overall costs that only in the next future we will be able to value. A recent published study from our group (Sanchinarro University Hospital, Madrid, Spain), which included also

post-operative period costs, demonstrates that overall cost of robotic versus laparoscopic distal pancreatectomies are similar (5). This result may be justified by the significantly lower period of hospital stay in the robotic group. Only an organizational model can make more effective the cost of new approaches, like the robotic system (3).

As the author of the paper we are discussing stated, this meta-analysis has some limitations due mainly to the retrospective nature of the included series (4). But, as we declared at the beginning of this editorial, no randomized comparative studies are available in the current literature.

The differences that exist between the robotic and the laparoscopic approach should also be evaluated taking into account different factors such as those relating to the quality of life, leave sick period, etc. But, it is extremely difficult to place a value on these factors, and only prospective randomized studies have the means to take them into account. Furthermore, there are some factors that are challenging to value and are extremely difficult to compare with the laparoscopy itself, such as the training efficacy that only the double robotic console can offer or the easier instrument control and more ergonomic position of the surgeon, which are all especially useful for complex procedures such as in the pancreatic field.

In conclusion, this meta-analysis confirms the excellence and similarity of the peri-operative outcomes of patients following robotic and laparoscopic pancreatic distal resection. Robotic may reduce conversion rate, splenectomy and decrease hospital stay. Further larger prospective randomized studies are needed to better clarify the real differences between robotic and laparoscopic distal pancreatectomies.

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aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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