



# Challenges of minimally invasive distal pancreatectomy: whether to preserve or not the spleen and splenic vessel

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I appreciate so much the invitation to comment on the article of Nakata and co-workers (1). In this systematic review and meta-analysis are comparatively assessed the outcomes of minimally invasive distal pancreatectomy, with and without spleen preservation (1). Furthermore, in the subgroup of patients with spleen preservation, the outcomes of splenic vessel preservation technique were compared to those of the technique in which the splenic artery and vein are resected (1).

Nowadays, a minimally invasive approach for distal pancreatectomy has gained in popularity, particularly in experienced centers in pancreatic surgery, for both benign and malignant pathology (2). Thus, a minimally invasive approach is reported in 10.8% to 46.6% of distal pancreatectomies published worldwide (2). However, whether to preserve or not the spleen during distal pancreatectomy remains an open debate. Furthermore, preservation of the spleen during distal pancreatectomy can sometimes be technically challenging, either in open surgery or minimally invasive approach, particularly for the technique with splenic vessel preservation. Preservation of the spleen during minimally invasive distal pancreatectomy was reported worldwide in 18.2% to 60.4% of cases (2). Nevertheless, a study addressing the value of spleen preservation during minimally invasive distal pancreatectomy and splenic vessel preservation during spleen preserving distal pancreatectomy would be of great interest for pancreatic surgeons' community.

Several meta-analyses or systematic reviews have shown the potential advantages of a minimally invasive approach

in distal pancreatectomy (i.e., laparoscopic and robotic approach) (2,3). Thus, laparoscopic distal pancreatectomy for non-ductal adenocarcinoma tumor was associated with statistically significant reduced blood loss, morbidity, and hospital stay, compared to the open approach (4). Furthermore, recently the robotic distal pancreatectomy was associated with statistically significant spleen (5) or splenic vessel (6) preservation rates, lower rates of conversion to open surgery (5,6) and shorter hospital stay (5), compared to the laparoscopic approach, at the expense of significantly higher cost (5,6). Nevertheless, laparoscopic distal pancreatectomy for pancreatic adenocarcinoma was associated with statistically significant less blood loss and shorter hospital stay, compared to the open approach (7,8).

Preservation of the spleen during distal pancreatectomy was proposed for particular diseases of the pancreas aiming to reduce the potential complications related to splenectomy (9). It is widely accepted that spleen has important functions, mainly in immunity, and removal of the spleen might lead to early and long-term complications such as infections, thromboembolic events, and malignancies (9).

Previous meta-analyses including both open and minimally invasive distal pancreatectomies associated preservation of the spleen with less blood loss (10,11), shorter hospital stay (10,12), lower incidence of abscesses (10,12) or infectious complications (11), lower incidence of splenic and portal vein thrombosis (10), lower morbidity rates (11) and decreased clinically relevant pancreatic fistulae rates (10,11).

The study of Nakata and co-workers has shown that preservation of the spleen during minimally invasive approach has been associated with statistically significant lower infectious complications and clinically relevant pancreatic fistulae rates, as well as less blood loss and shorter operative time, compared to distal pancreatectomy with splenectomy (1). No differences in overall morbidity rates were observed between the groups (1).

Whether splenectomy during distal pancreatectomy is associated with increased rates of pancreatic fistulae remains controversial. It is widely accepted that after splenectomy there is a high risk to have thrombocytosis. Thrombocytosis was associated in some studies to splenic vein thrombosis and increased risk of pancreatic fistula (13). However, other studies did not associate the hypercoagulability after distal pancreatectomy with increased septic or thromboembolic events (14).

Currently, there are two techniques to preserve the spleen during distal pancreatectomy: the technique with splenic vessel preservation (15) and the technique in which the splenic artery and vein are resected (the Warshaw technique) (16). The Warshaw technique is easier to be performed but can be associated with disadvantages in the early and long-term outcomes. Conversely, the technique with splenic vessel preservation can be challenging, particularly in minimally invasive approach or when there are a particular course and hilar distribution of the splenic artery.

Previous meta-analyses including both patients with open and minimally invasive spleen preserving distal pancreatectomies have shown that the Warshaw technique was associated with statistically significant increased rates of splenic infarction, subsequent splenectomy, and gastric varices, compared to the technique with splenic vessel preservation (17-20). No differences in blood loss were observed between the groups (18,19).

The study of Nakata and co-worker has shown that in the subgroup of patients with minimally invasive spleen preserving distal pancreatectomy, preservation of the splenic vessel was associated with statistically significant reduced rates of splenic infarction, subsequent splenectomy and perigastric varices, compared to the technique with resection of the splenic vessel (1). Interestingly, the Warshaw technique was associated with statistically significant decreased blood loss, compared to the splenic vessel preservation technique (1). Several other meta-analyses showed the same results (20-23). Furthermore, Yongfei and co-workers have shown that the operative time of the laparoscopic Warshaw procedure is significantly shorter, compared to the splenic vessel

preservation technique (23).

It is worth mentioning that although the Warshaw technique is associated with an increased risk of splenic infarction and perigastric varices, however, most of these patients are asymptomatic or can be conservatively managed. Furthermore, even for minimally invasive spleen and splenic vessel preserving distal pancreatectomy, there is a risk of left-sided portal hypertension if the splenic vein becomes occluded (24). The risk of poor splenic vein patency after spleen and splenic vessel preserving distal pancreatectomy appears to be higher for the laparoscopic approach, compared to the open surgery (25).

The results of the study performed by Nakata and co-workers should be carefully translated into clinical practice of a pancreatic surgeon because there is some limitation (1): no randomized study is included (all studies having a retrospective design), potential selection of the patients for minimally invasive approach, and the relatively small number of patients in each group in some studies. Furthermore, the most significant part of the analyzed series of patients is coming from highly experienced surgical centers in minimally invasive pancreatic surgery (1). Thus, case-load and achievement of expertise are also important factors to be considered for clinical decision making of any pancreatic surgeon.

In conclusion, minimally invasive spleen preserving distal pancreatectomy with splenic vessel preservation may offer some advantages for the patients if performed by experienced pancreatic surgeons.

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## References

1. Nakata K, Shikata S, Ohtsuka T, et al. Minimally invasive preservation versus splenectomy during distal pancreatectomy: a systematic review and meta-analysis. *J Hepatobiliary Pancreat Sci* 2018. [Epub ahead of print].
2. Fingerhut A, Uranues S, Khatkov I, et al. Laparoscopic distal pancreatectomy: better than open? *Transl Gastroenterol Hepatol* 2018;3:49.
3. Mehrabi A, Hafezi M, Arvin J, et al. A systematic review and meta-analysis of laparoscopic versus open distal pancreatectomy for benign and malignant lesions of the pancreas: it's time to randomize. *Surgery* 2015;157:45-55.
4. Yi X, Chen S, Wang W, et al. A Systematic Review and Meta-Analysis of Laparoscopic and Open Distal Pancreatectomy of Nonductal Adenocarcinomatous Pancreatic Tumor (NDACPT) in the Pancreatic Body and Tail. *Surg Laparosc Endosc Percutan Tech* 2017;27:206-19.
5. Guerrini GP, Lauretta A, Belluco C, et al. Robotic versus laparoscopic distal pancreatectomy: an up-to-date meta-analysis. *BMC Surg* 2017;17:105.
6. Xu SB, Jia CK, Wang JR, et al. Do patients benefit more from robot assisted approach than conventional laparoscopic distal pancreatectomy? A meta-analysis of perioperative and economic outcomes. *J Formos Med Assoc* 2018. [Epub ahead of print].
7. Gavriilidis P, Roberts KJ, Sutcliffe RP. Laparoscopic versus open distal pancreatectomy for pancreatic adenocarcinoma: a systematic review and meta-analysis. *Acta Chir Belg* 2018;118:278-86.
8. Ricci C, Casadei R, Taffurelli G, et al. Laparoscopic versus open distal pancreatectomy for ductal adenocarcinoma: a systematic review and meta-analysis. *J Gastrointest Surg* 2015;19:770-81.
9. Dumitrascu T, Dima S, Stroescu C, et al. Clinical value of spleen-preserving distal pancreatectomy: a case-matched analysis with a special emphasis on the postoperative systemic inflammatory response. *J Hepatobiliary Pancreat Sci* 2014;21:654-62.
10. Pendola F, Gadde R, Ripat C, et al. Distal pancreatectomy for benign and low grade malignant tumors: Short-term postoperative outcomes of spleen preservation-A systematic review and update meta-analysis. *J Surg Oncol* 2017;115:137-43.
11. Shi N, Liu SL, Li YT, et al. Splenic Preservation Versus Splenectomy During Distal Pancreatectomy: A Systematic Review and Meta-analysis. *Ann Surg Oncol* 2016;23:365-74.
12. He Z, Qian D, Hua J, et al. Clinical comparison of distal pancreatectomy with or without splenectomy: a meta-analysis. *PLoS One* 2014;9:e91593.
13. Kang CM, Chung YE, Jung MJ, et al. Splenic vein thrombosis and pancreatic fistula after minimally invasive distal pancreatectomy. *Br J Surg* 2014;101:114-9.
14. Hassenpflug M, Tjaden C, Hinz U, et al. Hypercoagulability after distal pancreatectomy: Just meaningless alterations? *Pancreatology* 2017;17:478-83.
15. Kimura W, Inoue T, Futakawa N, et al. Spleen-preserving distal pancreatectomy with conservation of the splenic artery and vein. *Surgery* 1996;120:885-90.
16. Warshaw AL. Conservation of the spleen with distal pancreatectomy. *Arch Surg* 1988;123:550-3.
17. Li BQ, Qiao YX, Li J, et al. Preservation or Ligation of Splenic Vessels During Spleen-Preserving Distal Pancreatectomy: A Meta-Analysis. *J Invest Surg* 2018:1-16. [Epub ahead of print].
18. Partelli S, Cirocchi R, Randolph J, et al. A systematic review and meta-analysis of spleen-preserving distal pancreatectomy with preservation or ligation of the splenic artery and vein. *Surgeon* 2016;14:109-18.
19. Sun N, Lu G, Zhang L, et al. Clinical efficacy of spleen-preserving distal pancreatectomy with or without splenic vessel preservation: A Meta-analysis. *Medicine (Baltimore)* 2017;96:e8600.
20. Yu X, Li H, Jin C, et al. Splenic vessel preservation versus Warshaw's technique during spleen-preserving distal pancreatectomy: a meta-analysis and systematic review. *Langenbecks Arch Surg* 2015;400:183-91.
21. Elabbasy F, Gadde R, Hanna MM, et al. Minimally invasive spleen-preserving distal pancreatectomy: Does splenic vessel preservation have better postoperative outcomes? A systematic review and meta-analysis. *Hepatobiliary Pancreat Dis Int* 2015;14:346-53.
22. Hou B, Xiong D, Chen S, et al. Splenic vessel preservation versus splenic vessel resection in laparoscopic spleen-preserving distal pancreatectomy. *ANZ J Surg* 2018;88:E532-E538.

23. Yongfei H, Javed AA, Burkhart R, et al. Geographical variation and trends in outcomes of laparoscopic spleen-preserving distal pancreatectomy with or without splenic vessel preservation: A meta-analysis. *Int J Surg* 2017;45:47-55.
24. Yoon YS, Lee KH, Han HS, et al. Patency of splenic vessels after laparoscopic spleen and splenic vessel-preserving distal pancreatectomy. *Br J Surg* 2009;96:633-40.
25. Yoon YS, Lee KH, Han HS, et al. Effects of laparoscopic versus open surgery on splenic vessel patency after spleen and splenic vessel-preserving distal pancreatectomy: a retrospective multicenter study. *Surg Endosc* 2015;29:583-8.

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