

# Technical Feasibility of Robotic Single Site Central Pancreatectomy with Duct-to-Mucosa Pancreaticojejunostomy in Cadaveric Experiment

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**Purpose:** Laparoscopic single site surgery is currently available, but may not be feasible for delicate and complex surgical procedures. However, computer technology embedded into robotic surgical system could provide the way to advanced laparoscopic single site surgery.

**Methods:** 86-year-old, female cadaver who died from sepsis was used for testing technical feasibility of robotic single site surgical system (the da Vinci Surgical System\_(Intuitive Surgical, Sunnyvale, CA)) in performing central pancreatectomy.

**Results:** About 4 cm×3 cm×1.5 cm sized segment of pancreatic neck portion was resected. Distal remnant pancreas was managed by two-layered, duct-to-mucosa pancreaticojejunostomy by intracorporeal suture technique. Operative procedure was completed in 150 min.

**Conclusion:** Robotic single site central pancreatectomy with pancreaticojejunostomy was technically feasible in the present cadaveric experiment.

**Keywords:** Robotic single site operation, Central pancreatectomy, Duct to mucosa

**Supplementary video file:** This article contains supplementary material (<https://doi.org/10.7602/jmis.2016.19.4.162>).

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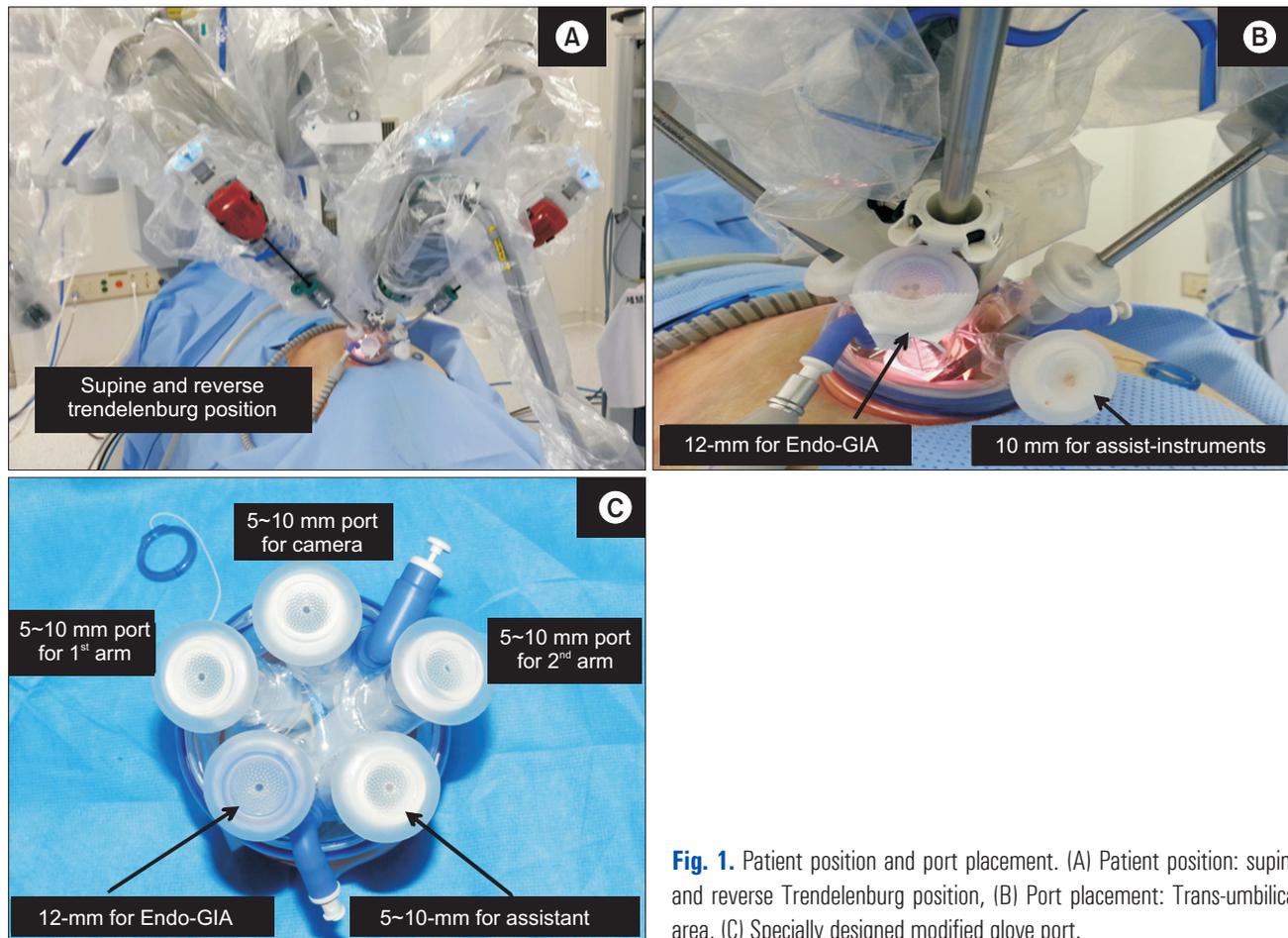
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## INTRODUCTION

In benign and borderline malignant tumor of the pancreas, function-preserving minimally invasive pancreatectomy is ideal approach.<sup>1,2</sup> Laparoscopic single site surgery is currently available, but may not be feasible for delicate and complex surgical procedures.<sup>3,4</sup> However, computer technology embedded into robotic surgical system could provide the way to advanced laparoscopic single site surgery.<sup>5</sup>

## MATERIALS AND METHODS

86-year-old, female cadaver who died from sepsis was used for testing technical feasibility of robotic single site surgical system (the da Vinci Surgical System\_(Intuitive Surgical, Sunnyvale, CA)) in performing central pancreatectomy. Patient was supine position on the surgical table with 15° reverse Trendelenburg position (Fig. 1A). Trans-umbilical skin incision for trocar was made by the approximately 3 cm skin incision in the umbilicus area (Fig. 1B) and specially designed



**Fig. 1.** Patient position and port placement. (A) Patient position: supine and reverse Trendelenburg position, (B) Port placement: Trans-umbilical area, (C) Specially designed modified glove port.

and modified glove port<sup>6</sup> (NELIS, Bucheon, Gyeonggi-do) [not commercialized] with 5 fingers was inserted (Fig. 1C). The first arm of the robot was located on the right side of the patient and the second arm was positioned on the left side of the patient. And the camera was positioned in the middle of the two arms. Two 300 mm-curved cannula was used, and specially designed port was applied for facilitating operative procedure, which makes it possible for assist surgeon to freely adjust length of robotic arm, introduce Tri-staple technology 600 mm medium/thick Endo-GIA Universal stapler, suture materials, and gauze without additional accessory port. Tributary vessels around pancreas were dissected and controlled by using crocodile grasper, mono-polar hook, dissector, and hem-o-lock clips.

## RESULTS

About 4 cm×3 cm×1.5 cm sized segment of pancreatic neck portion was resected. Distal remnant pancreas was managed by two-layered, duct-to-mucosa pancreaticojejunostomy by intracorporeal suture technique. Operative procedure was com-

pleted in 150 min.

## DISCUSSION

The first central pancreatectomy (CP) performed in 1982 by Dagradi and Serio in patients with insulinoma of the pancreatic neck. After then, in 2004, Giluianotti et al.<sup>7</sup> performed a robotic assisted CP. According to pervious article we have published,<sup>1</sup> more than 10 studies have been published on minimally invasive CP, and about 60 patients have undergone minimally invasive CP, suggesting the technical feasibility and safety.<sup>1,7</sup> According to robotic technology and instruments have continuously developed, recently, there have been attempted single site robotic surgery.<sup>4,5</sup>

Nowadays, there has been single site laparoscopic surgery is performed in various abdominal surgery.<sup>8,9</sup> But, especially in pancreatic surgery there is no single site laparoscopic surgery. Because the minimally invasive pancreatic surgery is needed more technically demanding procedure. In this aspect, robotic technology and instruments is useful for minimally invasive pancreatic surgery. But, some expert laparoscopic

pancreatic surgeons think that laparoscopic approach for pancreatic disease is enough but robotic surgery is helpless for pancreatectomy. However, for some pancreatic surgeons who want to perform laparoscopic pancreatectomy without enough laparoscopic skills, robotic surgery can enable them to access pancreatic operation more easily. And in spite of lacks the endo-wrist technology current DaVinci robotic single site system is acceptable for the CP. In this regard, robotic surgery can enable them to access single site laparoscopic CP easily.

In conclusion, robotic single site central pancreatectomy with pancreaticojejunostomy was technically feasible in the present cadaveric experiment. Instrumental development, such as multifunctional single port and articulating robotic instruments will make this surgical technique much easier and feasible even in real human patients with benign and borderline malignant tumor near the neck of the pancreas.<sup>1,10</sup>

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