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· 专题研究 ·

左侧联合中间入路原位腹腔镜胰十二指肠切除术4例报告

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摘要

背景与目的: 腹腔镜胰十二指肠切除术 (LPD) 是普通外科领域技术难度最高的手术之一, 其发展历程始终充满争议, 尤其在无瘤原则的贯彻方面备受关注。原位 LPD 在遵循 “no-touch” 原则的基础上, 可用于胰腺肿瘤的治疗, 但由于操作技巧复杂, 手术的安全性仍是关键挑战。本研究旨在探讨采用左侧联合中间入路施行原位 LPD 的手术技巧, 并评估其安全性和有效性。

方法: 回顾性分析 2023 年 7 月—2023 年 11 月在复旦大学附属肿瘤医院胰腺外科和皖南医学院弋矶山医院肝胆外科接受左侧联合中间入路原位 LPD 手术的 4 例患者临床资料。

结果: 4 例患者均为女性, 平均年龄为 58 岁, 平均体质量指数 22.1 kg/m²; 2 例为胰头癌、1 例十二指肠乳头癌、1 例胆总管下段癌。患者术前白细胞、血小板、凝血酶原时间、丙氨酸氨基转移酶、天门冬氨酸氨基转移酶、白蛋白、总胆红素和直接胆红素等指标均在正常范围内。所有患者成功接受了左侧联合中间入路原位 LPD, 术中平均手术时间 385 min、平均出血量 87.5 mL。术后平均拔管时间 10.3 d、平均住院时间 10.8 d。术后发生生化漏和腹水各 1 例, 无胆道狭窄、腹泻、乳糜漏等其他相关并发症。

结论: 左侧联合中间入路原位 LPD 在遵循 “no-touch” 原则的基础上能够彻底清扫淋巴结和根治肿瘤, 其操作相对简便易掌握且术后无特殊并发症。总体而言, 该方法是安全可行的, 值得在临床上推广应用。未来的研究应该加强多中心、大样本的临床研究以进一步验证其安全性和有效性。

关键词

胰十二指肠切除术; 腹腔镜; No-Touch 原则

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In situ laparoscopic pancreaticoduodenectomy via the left-sided combined middle approach: a report of 4 cases

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Abstract

Background and Aims: Laparoscopic pancreaticoduodenectomy (LPD) is one of the most technically demanding procedures in general surgery. Its development remains controversial, particularly regarding adherence to oncological principles. In situ LPD, based on the "no-touch" principle, offers a treatment option for pancreatic tumors. However, ensuring surgical safety remains a key challenge due to its

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technical complexity. This study explored the surgical techniques of in situ LPD performed via the left-sided combined middle approach and evaluated its safety and efficacy.

Methods: A retrospective analysis was conducted on the clinical data of four patients who underwent in situ LPD using the left-sided combined middle approach between July 2023 and November 2023 at the Department of Pancreatic Surgery of Fudan University Shanghai Cancer Center and the Department of Hepatobiliary Surgery of Yijishan Hospital, Wannan Medical College.

Results: All 4 patients were female, with an average age of 58 and a mean BMI of 22.1 kg/m². Among them, two had pancreatic head cancer, one had ampullary carcinoma, and one had distal common bile duct carcinoma. Preoperative laboratory indicators, including white blood cell count, platelet count, prothrombin time, alanine aminotransferase, aspartate aminotransferase, albumin, total bilirubin, and direct bilirubin, were all within normal ranges. All patients successfully underwent in situ LPD via the left-sided combined middle approach. The mean operative time was 385 min, with an average intraoperative blood loss of 87.5 mL. After operation, the average drainage tube removal time was 10.3 d, and the mean hospital stay was 10.8 d. One patient developed biochemical leakage, and another experienced abdominal effusion, while no cases of biliary stricture, diarrhea, or chylous leakage were observed.

Conclusion: In situ LPD via the left-sided combined middle approach allows for thorough lymph node dissection and radical tumor resection while adhering to the "no-touch" principle. This approach is simple to perform and master and does not lead to significant postoperative complications. It is a safe and feasible technique with promise for broader clinical application. Future research should focus on multicenter studies with larger sample sizes to validate its safety and efficacy.

Key words

Pancreaticoduodenectomy; Laparoscopes; No-Touch Principle

CLC number: R657.5

1994年 Gardner等^[1]在国际上首次报道了腹腔镜胰十二指肠切除术 (laparoscopic pancreaticoduodenectomy, LPD), 我国最早由卢榜裕等^[2]于2003年报道。经过30年的发展, LPD手术已逐步走向成熟, 并被广大外科医生所接受^[3-4]。LPD手术是普通外科最为复杂、风险最高、难度最大的手术之一, 也是外科医生最具挑战的手术之一, 俗称外科界的“珠穆朗玛峰”^[5-6]。LPD手术操作复杂、切除脏器多、手术时间长, 对于术者的技术要求较高^[7-8]。有学者^[9]的前瞻性研究就因为LPD手术死亡发生率高而被迫终止。近10年, 随着LPD手术的流程化、标准化得到重视和完善, LPD手术的安全性越来越高而被外科医生广泛接受^[10-11]。但既往LPD手术在游离胰头与十二指肠区域时容易对肿瘤造成挤压, 存在导致肿瘤细胞脱落入血播散的风险。基于此, 近些年国内有学者开始探索原位LPD手术, 旨在减少手术器械对胰头、十二指肠组织的触碰和挤压, 引起肿瘤播散

和转移, 即在不触碰肿瘤的前提下安全完成LPD手术, 这一过程也被称为“no-touch”原则^[12-15]。然而, 如何在“no-touch”原则下实现胰头、十二指肠的安全切除仍然是外科医生的一个难题。国内, 谭志健团队^[16]率先采用横结肠下区入路施行了原位LPD手术。笔者在前期大量LPD实践基础之上探索出左侧联合中间入路原位LPD手术, 真正实现原位胰头、十二指肠切除, 现报告如下。

1 资料与方法

1.1 一般资料

回顾性收集2023年7月—2023年11月在复旦大学附属肿瘤医院胰腺外科和皖南医学院弋矶山医院肝胆外科接受左侧联合中间入路原位LPD手术的4例患者临床资料。患者均为女性; 平均年龄58岁; 体质量指数 (BMI) 22.1 kg/m²; 2例为胰头癌、1例十二指肠乳头癌、1例胆总管下段癌。所

有患者术前白细胞、血小板、凝血酶原时间、丙氨酸氨基转移酶、天门冬氨酸氨基转移酶、白蛋白、总胆红素和直接胆红素等指标在正常范围内,照美国麻醉医师协会(American Society of Anesthesiologists, ASA)分级Ⅱ级,可以耐受手术。

1.2 伦理声明

该研究是回顾性研究,所有患者均被告知胰腺手术相关风险,亦被告知腹腔镜手术的相关风险,征得患者同意后,实施LPD。获得了皖南医学院第一附属医院弋矶山医院伦理委员会[批号:2020伦审国研第(05)号]以及复旦大学附属肿瘤医院浦东院区伦理委员会批准(批号:1712179-9),患者知情同意予以豁免。

1.3 左侧联合中间入路原位LPD过程

麻醉满意后,常规留置胃管、尿管,采用“人”字形体位。五孔法操作,首先探查腹腔,查无明确转移病灶后,悬吊肝脏,切除胆囊,再离断胃结肠韧带,左侧至胃大弯侧无血管区,右侧至横结肠肝曲,解剖胰腺下缘,显露肠系膜上静脉(superior mesenteric vein, SMV),离断副右结肠静脉(right colic vein, RCV),充分显露胰头和十二指肠,不做Korch切口游离,解剖Helen干并离断(图1A);离断胃,于胰颈体部离断胰腺(图1B),顺势解剖出胃十二指肠动脉(gastroduodenal artery, GDA)予以结扎后离断(图1C),并清扫肝动脉周围淋巴结,游离出脾静脉(splanchnic vein, SV)起始部。期间如遇分支血管,予以结扎后离断,沿SMV、门静脉(portal vein, PV)右侧游离,离断胰十二指肠下动脉(inferior pancreaticoduodenal artery, IPDA)(图1D),再转向中间入路,打开SMV、肠系膜上动脉(superior mesenteric artery, SMA)之间的疏松间隙(图1E),沿SMA前方和左侧解剖,显露结肠中动脉、左肾静脉(left renal vein, LRV)(图1F)。如遇胰背动脉,予以结扎后

离断,提起近端空肠,距十二指肠悬韧带15~20 cm处予以切割闭合器离断,沿SMA左侧解剖出空肠第1支血管,予以结扎后离断(图1G),顺势解剖出IPDA,予以结扎后离断(图1H)。继续沿SMA清扫海德堡三角区淋巴结缔组织,直至显露腹腔干、肝总动脉(common hepatic artery, CHA)、脾动脉起始部,至此,胰腺钩突及系膜、十二指肠完全从SMA、SMV以及腹腔干上游离,顺势沿着腹主动脉(abdominal aorta, AA)和下腔静脉(inferior vena cava, IVC)游离(图1I)。清扫16组淋巴结,实现原位LPD和规范的淋巴结清扫(图1J)。最后,依次行胰管空肠、胆管空肠和胃空肠吻合重建,放置引流管,术毕。

1.4 胰瘘的诊断及相关概念

根据2016年国际胰瘘小组胰瘘的诊断标准^[17],分为生化漏、术后B级和C级胰瘘;生化漏指术后第3天或以后引流液淀粉酶超过正常值3倍,已不属于胰瘘范畴,而是一种胰瘘前状态,无临床相关治疗进程改变;临床相关胰瘘(clinically relevant pancreatic fistula, CR-POPF)指术后B级和C级胰瘘。

2 结果

2.1 手术结果

所有患者成功接受了左侧联合中间入路原位LPD,无1例术中中转开腹。平均手术时间385 min、术中出血量87.5 mL;平均清扫淋巴结21.5枚。术后平均拔管时间为10.3 d、术后平均住院时间10.8 d。术后均顺利出院。

2.2 术后并发症

术后发生生化漏与腹水各1例(25%);无1例术后B级或者C级胰瘘,无1例术后胆瘘,无术后胆道狭窄、腹泻及乳糜漏等相关并发症的发生。

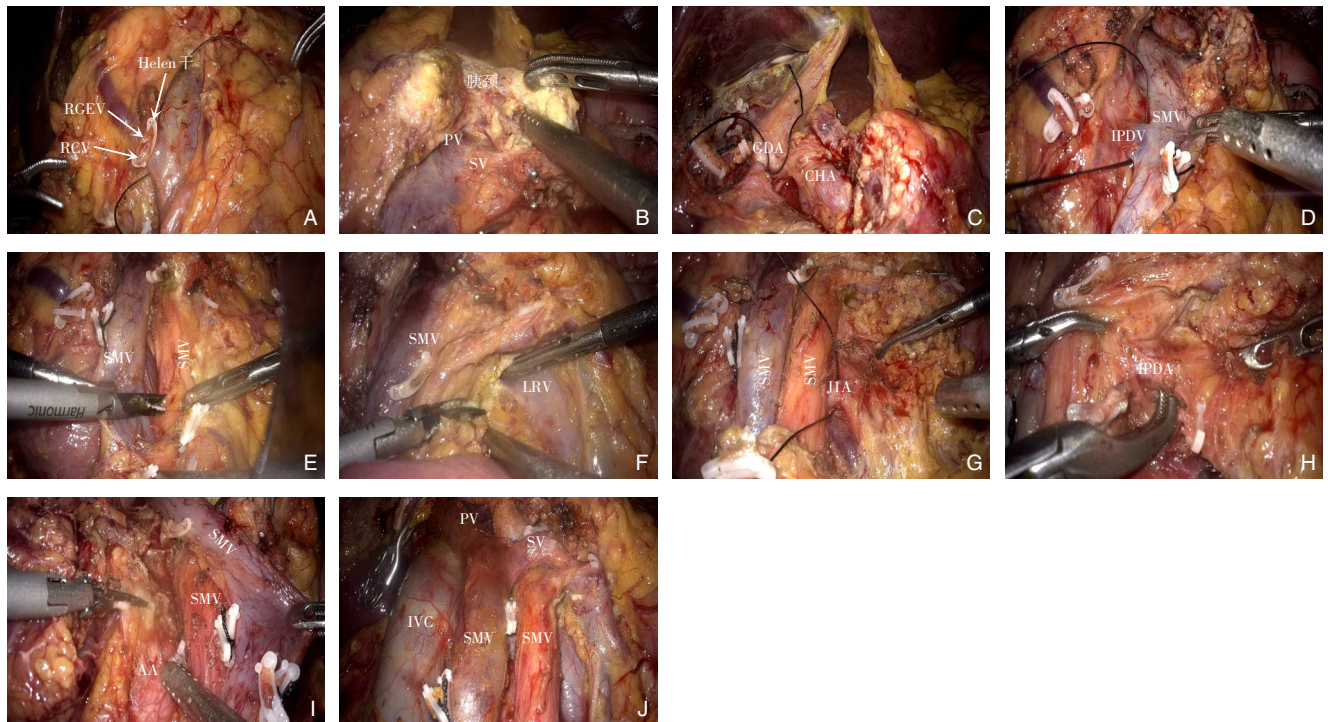


图1 左侧联合中间入路原位LPD手术 A: 游离Helen干; B: 沿胰颈左侧离断胰腺, 显露后方PV和SV; C: 结扎GDA; D: 游离胰十二指肠下静脉(IPDV); E: 中间入路—超声刀打开SMV、SMA之间疏松间隙; F: 沿SMA根部左侧显露LRV; G: 解剖出空肠血管第1支(J1A); H: 游离IPDA; I: 沿AA、IVC前方清扫, 原位切除胰头十二指肠; J: 术区血管骨骼化展示

Figure 1 In situ LPD via the left-sided combined middle approach A: Dissection of the gastrocolic trunk (Helen trunk); B: Transection of the pancreas along the left side of the pancreatic neck, exposing the posterior PV and SV; C: Ligation of the GDA; D: Dissection of the inferior pancreaticoduodenal vein (IPDV); E: Middle approach—opening the loose space between the SMV and SMA using an ultrasonic scalpel; F: Exposure of the left renal vein (LRV) along the left side of the SMA root; G: Identification of the first jejunal artery (J1A); H: Dissection of the inferior pancreaticoduodenal artery (IPDA); I: Clearance along the anterior surfaces of the AA and IVC, in situ resection of the pancreatic head and duodenum; J: Skeletonization of the vascular structures in the surgical field

3 讨论

3.1 原位LPD手术开展意义

70年前, Whipple^[18]开展了开腹胰十二指肠切除术, 后Child^[19]完善了吻合方式: 先胰肠, 再胆肠, 最后胃肠吻合。LPD随着腹腔镜技术的出现应运而生。然而, 早期LPD受限于腹腔镜技术的不成熟, 操作难度大。随着腹腔镜技术的进步和手术器械的改进, LPD逐渐得到推广。特别是牟一平等^[20]提出的“easy first”和“no back”原则, 为LPD的普及奠定了基础。LPD相比开腹手术具有住院时间短、术后疼痛轻、恢复快的优势^[21-24]。这些优势不仅提升了患者的生活质量, 也缩短了治疗周期, 减轻了医疗负担^[25-26]。但是, LPD能否完整切除肿瘤并实现规范化的淋巴结清扫以及手术过

程中是否会导致肿瘤细胞的脱落和种植转移, 一直是讨论的焦点。在此基础之上, 有学者^[12]提出“no-touch”原则, 即在不触碰肿瘤的情况下切除肿瘤, 从而减少肿瘤细胞脱落机会, 避免种植转移。由此衍生出一种全新的原位LPD手术方式, 国内最早实施原位LPD手术的是谭志健团队^[16], 自创了谭氏动脉入路和谭氏悬吊法, 推动了原位LPD手术的发展。随后亦有多位学者^[27-31]尝试了原位LPD手术以及不同的手术入路, 旨在提高肿瘤学根治效果。

3.2 左侧联合中间入路原位LPD手术的操作要点

笔者团队对前期实施的左侧联合中间入路原位LPD手术的4例患者回顾性分析发现, 采取该入路可以实现原位胰头、十二指肠切除时无须翻动横结肠, 不仅手术区域视野暴露良好, 明显缩短

手术时间,还能规范进行淋巴结清扫。视野的良好暴露、手术时间缩短以及安全性是评价手术术式最有效、直接的指标^[32]。左侧联合中间入路原位LPD术式主要技术要领如下:(1)胃结肠系膜游离充分,左侧至胃大弯无血管区,右侧至横结肠肝区,沿十二指肠、横结肠系膜融合筋膜游离横结肠和升结肠系膜,直至完全显露十二指肠水平部和C环。(2)距离胰颈左侧离断胰腺,然后离断GDA,充分暴露SV、PV以及后方的海德堡三角区。(3)沿SV起始部下缘开始解剖,显露SMA左侧以及后方的LRV。(4)中间入路解剖SMV、SMA之间的疏松结缔组织,显露胰背动脉以及SMV、PV发往钩突的分支,必要时离断空肠第1支静脉和胃左静脉。(5)转向左侧入路,牵拉空肠起始段,显露空肠动静脉第1支,沿该平面解剖空肠系膜,细小分支予以结扎后离断。(6)环绕SMA解剖,分离出IPDA,必要时离断J1A。(7)将胰腺钩突往右侧牵拉,分离后腹膜脂肪结缔组织,将肿瘤从下腔静脉和腹主动脉上剥离,清扫16组淋巴结,最后离断胆管,移除标本。

4例患者平均手术时间385 min,术中出血量87.5 mL,术后发生生化漏及腹水各1例,未见术后胆道狭窄、腹泻等其他相关并发症,也无胰腺术后最危险并发症术后相关胰瘘发生。同时,此手术入路术中可以实现360°显露SMA,保证了原位LPD的实施,对手术区域视野暴露以及周围淋巴结清扫带来方便,具有一定的创新性。

3.3 左侧联合中间入路原位LPD手术的临床意义

LPD手术的难点是胰腺钩突的切除以及周围淋巴结结缔组织的规范化清扫,尤其是海德堡三角区和16组淋巴结结缔组织的清扫^[32]。原位LPD在不挤压胰头肿瘤的前提下,实施胰腺钩突的切除,需要充分显露SMA、SMV,先处理SMV周围的分支血管,再围绕SMA做环周360°解剖,显露IPDA和J1A,使得胰头钩突切除更加从容,也提高了淋巴结清扫质量。在本组4例原位LPD手术过程中,平均清扫淋巴结数量达到21.5枚,高于指南推荐的12枚。此外,左侧联合中间入路的方式也符合国内很多学者^[33-35]强调的LPD手术宜采用动脉优先路径理念,这一入路不仅增加了手术的可切除性和安全性,也提高了肿瘤的根治性和淋巴结清扫的彻底性。

左侧联合中间入路实施原位LPD手术具有视

野暴露良好有效减少术中出血、缩短手术时间、规范清扫淋巴结等优势,同时适用于十二指肠乳头癌、胆管下段癌以及胰头癌早期均有良好的效果,术中对周围脏器的干扰较小,术后恢复快。但是左侧联合中间入路原位LPD对术者要求较高,需要有扎实的腹腔镜基本功以及熟练掌握胰头周围血管解剖。因此,外科医生需加强学习曲线、提升技术水平,发挥多学科门诊诊疗优势,术前充分利用影像学对周围解剖结构进行合理评估。

综上所述,左侧联合中间入路可以实现LPD切除,不仅减少了手术过程中器械对肿瘤的触碰,也提高了肿瘤清扫的彻底性,且无须翻动横结肠,有助于节省手术时间,值得临床推广应用。然而,本研究开展例数较少,仍需要进一步扩大病例数以论证。

作者贡献声明:钱道海直接参与文献选题和设计,撰写文章初稿并负责按编辑部的修改意见进行核修,对学术问题进行解答;吴伟顶负责文献选题与设计,审阅论文并最终同意论文发表。

利益冲突:所有作者均声明不存在利益冲突。

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