·论著·

中间入路“四步法”应用于腹腔镜结肠脾曲游离手术的安全性和可行性

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【摘要】 目的 探讨腹腔镜结直肠癌手术中采用中间入路“四步法”技术游离结肠脾曲的可行性和安全性。**方法** 采用回顾性描述性病例系列研究方法，分析2015年7月至2018年6月期间，广东省人民医院普通外科胃肠专业组在腹腔镜下按中间入路“四步法”游离结肠脾曲的157例结直肠癌患者的临床资料，包括横结肠癌17例，降结肠癌94例，乙状结肠癌25例，直肠癌21例。全组男性89例，女性68例，年龄（61.8±10.3）岁，体质指数（23.2±3.7）kg/m^2。中间入路“四步法”游离结肠脾曲操作如下：（1）处理根部血管，采用“挑拨离间”的手术技巧，拓展Toldt间隙。向外侧一直拓展至左结肠旁沟腹膜反折，向尾侧一直拓展至直肠后间隙，向头侧一直拓展至胰腺胰腺下缘。（2）游离左结肠旁沟，与后方拓展的Toldt间隙汇合。向头侧游离至降结肠脾曲，离断膈结肠韧带及脾结肠韧带，向尾侧游离至腹膜反折处。（3）游离胃结肠韧带。离断胃结肠韧带时是否进入胃大弯网膜弓内，即是否清扫第4组淋巴结，根据肿瘤部位及是否侵犯浆膜层决定。（4）游离横结肠系膜。于胰腺表面下缘切断横结肠系膜，与后方拓展的Toldt间隙汇合，外侧至胰体尾下缘与外侧左结肠旁沟游离间隙汇合。对游离结肠脾曲手术的安全性和临床短期疗效进行总结。**结果** 157例患者均在腹腔镜下按中间入路“四步法”完成结肠脾曲的游离，术中并发脏器损伤3例，为结肠损伤、脾损伤及胰腺损伤各1例，无中转开腹病例，无手术死亡病例。手术时间为（147.5±35.1）min，术中出血量为（40.8±32.7）ml，淋巴结清扫数目为（16.1±5.8）枚，其中阳性淋巴结数目为（4.0±2.3）枚，术后首次排气时间为（41.3±20.6）h，恢复流质饮食时间为（1.5±1.3）d，术后住院时间为（5.2±2.3）d。术后出现并发症8例（5.1%），均经保守治疗后好转出院。术后肿瘤病理TNM分期：Ⅰ期31例，Ⅱ期51例，Ⅲ期53例，Ⅳ期22例。**结论** 腹腔镜下中间入路“四步法”游离结肠脾曲安全可行。

【关键词】 结直肠肿瘤； 腹腔镜手术； 结肠脾曲； 安全性分析； 可行性分析

基金项目：广东省中医药局科研项目（20172001）；广东省中医药局科研项目（20171002）；广东省医学科学技术研究基金项目（B2017070）

DOI：10.3760/cma.j.issn.1671-0274.2019.07.012

Feasibility and safety of the medial approach "four-step method" in the laparoscopic mobilization of splenic flexure

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【Abstract】 Objective To investigate the feasibility and safety of the medial approach "four-step method" in the laparoscopic mobilization of splenic flexure. **Methods** A retrospective cohort study was performed. Clinical data of 157 colorectal cancer patients undergoing the medial approach "four-step method" in the laparoscopic mobilization of splenic flexure at Gastrointestinal Surgical Department of Guangdong Provincial People's Hospital from July 2015 to June 2018 were retrospectively analyzed. Of

157 cases, 17 were transverse colon cancer, 94 were descending colon cancer, 25 were sigmoid cancer and 21 were rectal cancer; 89 were male and 68 were female; mean age was (61.8±10.3) years and mean body mass index was (23.2±3.7) kg/m^2. The medial approach "four-step method" in the laparoscopic mobilization of splenic flexure was performed as follows: (1) The root vessels were treated with the "provocation" technique to expand the Toldt′s gap. This expansion was extended from the lateral side to the peritoneum reflex of left colonic sulcus, from the caudal side to the posterior rectal space, and from the cephalad side to the lower edge of pancreas. (2) The left colonic sulcus was mobilized, converging with the posterior Toldt′s gap. Mobilization was carried out from cephalad side to descending colon flexure, freeing and cutting phrenicocolic ligament and splenocolic ligament, and from caudal side to peritoneal reflex. (3) Gastrocolic ligament was moblized. Whether to enter the great curvature of stomach omentum arch when the gastrocolic ligament was cut, that was, whether to clean the fourth group of lymph nodes, should be according to the tumor site and whether serosal layer was invaded. (4) Transverse mesocolon was moblized and transected at the lower edge of the pancreatic surface, merging with the posterior Toldt′s gap, and from lateral side to lower edge of the pancreatic body, merging with the lateral left paracolonic sulcus. Safety and short-term clinical efficacy of this surgical procedure was summarized. **Results** All the patients completed this procedure. During operation, 3 cases were complicated with organ injury, including 1 case of colon injury, 1 case of spleen injury and 1 case of pancreas injury. No operative death and conversion to open surgery was found. The average operation time was (147.5±35.1) minutes, the average intra-operative blood loss was (40.8±32.7) ml and the average number of harvested lymph node was (16.1±5.8), including (4.0±2.3) of positive lymph nodes. The first exhaust time after surgery was (41.3±20.6) hours, the fluid intake time was (1.5 ± 1.3) days, the postoperative hospital stay was (5.2 ± 2.3) days. Eight (5.1%) cases developed postoperative complications, and all were improved and discharged after conservative treatments. According to the TNM classification system, postoperative pathology revealed that 31 patients were stage I, 51 were stage II, 53 were stage III, 22 were stage IV. **Conclusion** The medial approach "four-step method" is safe and feasible, which can effectively decrease the operation difficulty of the laparoscopic mobilization of the splenic flexure.

【**Key words**】 Colorectal neoplasms; Laparoscopy surgery; Splenic flexure; Feasibility; Safety

Fund program: Scientific Research Project of Administration of Traditional Chinese Medicine of Guangdong Province (20072001); Scientific Research Project of Administration of Traditional Chinese Medicine of Guangdong Province (20071002); Medical Science and Technology Research Foundation of Guangdong Province (B2017070)

DOI: 10.3760/cma.j.issn.1671-0274.2019.07.012

腹腔镜技术在结直肠手术的应用越来越广泛，但由于左半结肠癌发病率低、病例数少，且结肠脾曲及其周围解剖复杂，左半结肠切除术、尤其是结肠脾曲的游离一直是腹腔镜结直肠手术的难点，手术难度大，且术中胃、结肠、脾及胰腺等周围脏器损伤的并发症发生率较高[1-8]。如何安全、有效、快速地游离结肠脾曲是结直肠外科医生关注和研究的热点。笔者团队采用腹腔镜下中间入路游离结肠脾曲的方式，将结肠脾曲的游离明确细化为“处理根部血管，拓展Toldt间隙——→游离左结肠旁沟——→游离胃结肠韧带——→游离横结肠系膜”4个步骤，并将其命名为中间入路“四步法”，可高效、安全完成结肠脾曲的游离，现报道如下。

资料与方法

一、一般资料

采用回顾性描述性病例系列研究方法，分析2015年7月至2018年6月期间，在广东省人民医院普通外科胃肠专业组接受腹腔镜下结肠脾曲游离手术的157例结直肠癌患者临床病理资料。全组男性89例，女性68例，年龄（61.8±10.3）岁，体质指数（body mass index, BMI）（23.2±3.7）kg/m^2。横结肠癌17例，降结肠癌94例，乙状结肠癌25例，直肠癌21例。所有手术均由同一组手术医生使用相同腹腔镜设备及腹腔镜器械完成。本研究符合《赫尔辛基宣言》要求。

二、手术方法

手术采用气管插管全身麻醉，辅以腹横筋膜阻滞麻醉。患者取仰卧分腿位，手术采用五孔法，Trocar布置见图1A，气腹压力维持在12~15 mmHg（1 mmHg=0.133 kPa）。主刀位于患者右侧，助手位于患者左侧，见图1B。术中根据手术操作区域调整患者体位及扶镜手站位，拓展Toldt间隙及处理根部血管时患者取头低脚高、右侧斜卧位，扶镜手位于主刀左侧；游离结肠脾曲时，患者取头高脚低、右侧斜卧位，扶镜手位于主刀右侧或患者两腿之间。手术步骤人为地分为以下4个步骤。

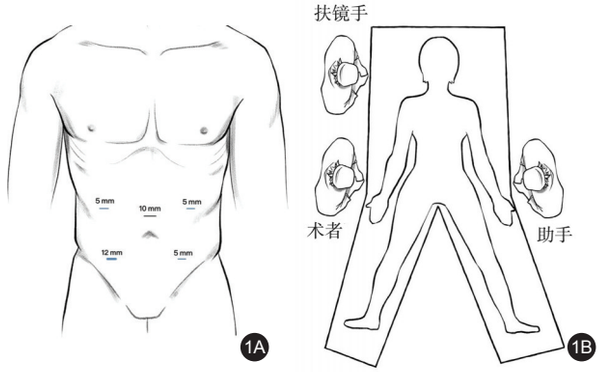

图1 腹腔镜下中间入路“四步法”游离结肠脾曲手术准备示意图（吕泽坚绘） 1A.Trocar布置；1B.术者站位

1.处理根部血管，拓展Toldt间隙：患者取头低脚高、右侧斜卧位。助手提拉直肠系膜及肠系膜下动脉，主刀于骶骨岬“黄白交接线”切开第一刀，寻找并拓展Toldt间隙。对于肠系膜下血管的处理，如是否保留直肠上动脉或左结肠动脉，根部淋巴结的清扫，如是否清扫第253组淋巴结，均视具体手术而定，见图2A。拓展Toldt间隙采用“挑拨离间”的手术技巧，既助手双手反手操作，往腹壁方向“挑起”结肠系膜，主刀通过钝性分离和锐性分离相结合的“拨”方法分离间隙，向外侧一直拓展至左结肠旁沟腹膜反折并留置纱条标识，向尾侧一直拓展至直肠后间隙，向头侧一直拓展至胰腺下缘并留置纱条标识，见图2B。

2.游离左结肠旁沟：助手往头侧及内侧牵拉结肠，主刀沿左结肠旁沟“黄白交接线”切开腹膜反折，与后方拓展的Toldt间隙汇合。向头侧游离至降结肠脾曲，离断膈结肠韧带及脾结肠韧带，向尾侧游离至腹膜反折处，见图2C。

3.游离胃结肠韧带：助手右手及主刀左手往头侧及腹壁方向牵拉胃结肠韧带上方，助手左手往尾侧及腹膜后方向牵拉胃结肠韧带下方形成张力，主刀切开胃结肠韧带进入网膜囊并向两侧游离切断胃结肠韧带及脾结肠韧带，见图2D。离断胃结肠韧带时是否进入胃大弯网膜弓内，即是否清扫第4组淋巴结，根据肿瘤部位及是否侵犯浆膜层决定。

4.游离横结肠系膜：于胰腺表面下缘切断横结肠系膜，与后方拓展的Toldt间隙汇合，外侧至胰体尾下缘与外侧左结肠旁沟游离间隙汇合，见图2E。至此，完成结肠脾曲游离，见图2F。

三、观察指标及随访方法

主要观察指标为术中并发脏器损伤情况；次要

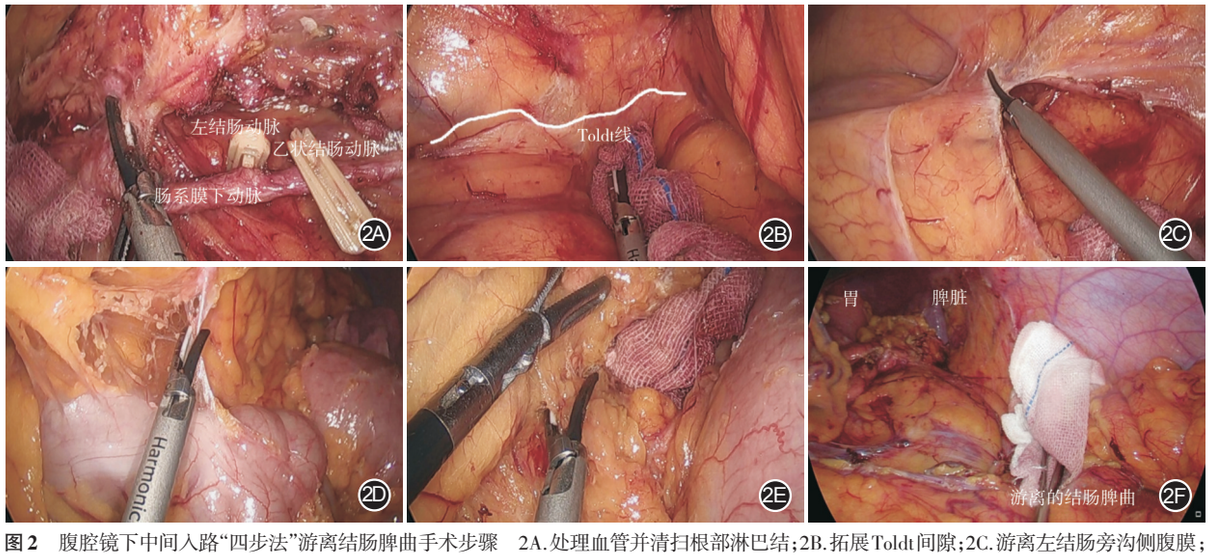

图2 腹腔镜下中间入路“四步法”游离结肠脾曲手术步骤 2A.处理血管并清扫根部淋巴结；2B.拓展Toldt间隙；2C.游离左结肠旁沟侧腹膜；2D.游离胃结肠韧带；2E.游离横结肠系膜；2F.完成结肠脾曲游离

观察指标包括手术时间、术中出血量、清扫淋巴结数目、阳性淋巴结数目、术后首次排气时间、术后恢复流质饮食时间、术后住院时间及术后并发症发生情况等。

术后30 d患者返院门诊复查或由责任护士电话随访。

四、统计学方法

采用SPSS 19.0软件对数据进行统计分析，正态分布的计量资料用$\bar{x}\pm s$描述，计数资料用例(%)描述。

结　果

所有157例患者均在腹腔镜下按中间入路“四步法”完成结肠脾曲的游离，无中转开腹或死亡。术中并发脏器损伤3例(1.9%)，分别为结肠损伤、脾损伤及胰腺损伤各1例，无脾脏切除或胰腺切除，无输尿管和生殖血管等腹膜后脏器损伤。全组手术时间为(147.5±35.1) min，术中出血量为(40.8±32.7) ml，淋巴结清扫数目为(16.1±5.8)枚，其中阳性淋巴结数目为(4.0±2.3)枚。

术后首次排气时间为(41.3±20.6) h，恢复流质饮食时间为(1.5±1.3) d，术后住院时间为(5.2±2.3) d。术后出现并发症8例(5.1%)，包括3例不完全性肠梗阻，2例伤口感染，2例肺部感染，1例吻合口漏，均经保守治疗后好转出院。术后肿瘤病理均为腺癌；术后TNM分期：Ⅰ期31例，Ⅱ期51例，Ⅲ期53例，Ⅳ期22例。术后30 d所有患者均恢复良好，无手术相关死亡病例。

讨　论

由于结肠脾曲的供血系统和淋巴引流系统位于肠系膜上血管和肠系膜下血管这两套血管系统的交界处，解剖相对复杂，故结肠脾曲的游离在手术入路、手术技巧等方面一直存在争议，尤其是对结肠脾曲高、肥胖及腹腔粘连患者，游离结肠脾曲操作难度大、手术耗时长、术中及术后并发症多[9-10]。因此，很多关于腹腔镜结直肠手术的大型临床研究，均把需要游离结肠脾曲的左半结肠癌排除在外[11-14]。

结肠脾曲的彻底游离，可归纳为以下4个部分的游离：结肠系膜后方Toldt间隙、结肠旁沟(包括膈结肠韧带)、胃结肠韧带(包括脾结肠韧带)、横结肠系膜。目前，游离结肠脾曲的手术入路主要有中间入路、外侧入路和头侧入路，以及部分改良术式，如“三路包抄”法[15-16]和横向入路[17]等。不同入路的区别主要体现在对上述4个部分游离顺序的不同。研究表明，外侧入路法术中并发症及术后并发症均较高[18]；中间入路法具有操作方便、并发症少、术后恢复快等优点[19]。

与传统中间入路法相比，笔者团队采用的中间入路“四步法”游离脾曲技术操作方便，在整个手术操作过程中，患者只需变换一次体位，而主刀和助手无需变换站位。手术先在天然的融合平面Toldt间隙里操作，彻底拓展间隙后，其余操作只是打开膜状结构，方便不同操作平面的会合，由此也可减少周围脏器的损伤风险。此外，中间入路“四步法”在肠系膜下血管根部寻找并拓展Toldt间隙过程中，要求优先处理血管及根部淋巴结，更符合优先结扎血管、不接触肿瘤等肿瘤根治原则。本研究中，所有病例均按照既定手术方式完成结肠脾曲的游离，无中转开腹或死亡病例，且术中并发症发生率低(1.9%)，无脾脏切除或胰腺切除，无输尿管和生殖血管等腹膜后脏器损伤。本研究在拓展Toldt间隙至胰腺下缘时，并未直接切开横结肠系膜进入网膜囊，目的是减少从后方切开横结肠系膜时对胃后壁造成的医源性损伤，尤其是胃后壁与胰腺和横结肠系膜粘连的患者。

对左半结肠癌手术而言，游离结肠脾曲是肿瘤根治的需要，应根据肿瘤部位而定是否清扫胃网膜弓淋巴结[20-21]；对部分乙状结肠和直肠手术而言，游离结肠脾曲是为了保证足够的肿瘤切缘和近远端肠管的无张力吻合，降低吻合口漏发生的风险[22-25]。本研究中，46例乙状结肠和直肠手术接受了结肠脾曲游离，术后均没有发生吻合口漏。

综上，腹腔镜下中间入路“四步法”技术在游离结肠脾曲操作方便、安全、可行，可有效解决腹腔镜下结肠脾曲游离困难问题，具有较好的应用前景，值得临床推广。

利益冲突　所有作者均声明不存在利益冲突

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(收稿日期:2019-03-22)
(本文编辑:朱雯洁)