

doi: 10.13241/j.cnki.pmb.2014.10.018

## 2200 例门静脉高压症患者行脾切除贲门周围血管离断术 的近期疗效观察 \*

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**摘要 目的:**总结脾切除贲门周围血管离断术治疗门静脉高压症的近期疗效。**方法:**回顾性分析我院 1999 年 6 月 -2013 年 6 月收治的 2200 例择期行脾切除贲门周围血管离断术的肝硬化门静脉高压症患者的临床资料。统计并分析手术前后的止血率、并发症及肝功能指标等。**结果:**近期随访率 78%(1716/2200);其中,上消化道出血史 88.3%(1515 例),手术止血率为 99.1%(1701 例),围术期病死率为 1.3%(22 例),主要死亡原因为感染和肝肾功能衰竭;并发症情况:发热 39.8%(683 例)、腹腔内出血 2%(34 例)、门静脉系统血栓 51%(875 例)、胸腹腔感染 3.7%(63 例)、肝脓肿 0.7%(12 例)、胃瘘 0.3%(5 例)及胰瘘 0.3%(5 例)。丙肝肝硬化脾切除抗病毒 103 例,预防手术 112 例,丙肝切脾抗病毒、预防手术围手术期无死亡;肝功能 Child 分级:术前 85%为 A 级,术后 94%为 A 级;ALB、TBil、PT 及腹水消失率均明显好转。**结论:**脾切除贲门周围血管离断术对门静脉高压症引起的上消化道出血具有积极的作用,可获得较好的近期疗效,并发症经对症处理可消除或缓解,但如何有效降低术后门静脉系统血栓的形成仍需在今后的临床实践中深入研究。

**关键词:**门静脉高压症;脾切除术;贲门周围血管离断术;近期疗效

**中图分类号:**R575.2 **文献标识码:**A **文章编号:**1673-6273(2014)10-1883-03

## Short-term Effects of Splenectomy and Esophagogastric Devascularization on the Treatment of Portal Hypertension with 2200 Case\*

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**ABSTRACT Objective:** To summarize the short-term effects of the splenectomy combined with the esophagogastric devascularization on the treatment of portal hypertension. **Methods:** A retrospective analysis was performed about the clinical data of 2200 patients who were treated by the splenectomy and esophagogastric devascularization in our hospital from June 1999 to June 2013. Then the clinical data, such as the rate of recent bleeding before and after the treatment, the incidence of complications and the liver function of patients, were collected and analyzed. **Results:** The rate of follow-ups was 78%(1716); 88.3%(1515) of the patients have the history of upper gastrointestinal bleeding, 99.1%(1701) were taken the surgical hemostasis; The peri-operative mortality was 1.3%(22) of which the main reasons were the infection, the dysfunction of liver and kidney; 39.8%(683) were in fever, 2%(34) represented the intra-abdominal hemorrhage, 51%(875) showed the portal vein thrombosis, 3.7%(63) got the abdominal cavity infection, 0.7%(12) were liver abscess, 0.3%(5) were gastric fistula and 0.3%(5) were pancreatic fistula. There were 103 cases with the hepatitis C cirrhosis undergoing the splenectomy antiviral, 112 cases were taken the preventive surgery with no one death; 85% patients were sorted to A by the Child classification of liver function before the surgery, while the percentage went to 94% when completing the treatment; The indexes of ALB, TBil, PT and the ascites have significantly improved. **Conclusion:** It is suggested that the short-term effect of the splenectomy combined with the pericardial blood vessel disarticulation on the prevention of upper gastrointestinal bleeding caused by portal hypertension with the advantages of better short-term curative effect and the postoperative complications could be eliminated or reduced by the symptomatic treatment. However, it is more easily lead to the thrombosis of patients with portal hypertension which might be required to explore more operative methods.

**Key words:** Portal hypertension; Esophagogastric devascularization; Splenectomy; Short-term effect

**Chinese Library Classification(CLC):** R575.2 **Document code:** A

**Article ID:** 1673-6273(2014)10-1883-03

\* 基金项目:北京市科技计划首都临床特色应用研究专项(Z131100004013041)

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(收稿日期:2013-10-28 接受日期:2013-11-20)

## 前言

门静脉高压症(Portal Hypertension)是指门静脉系统血流动力学发生异常变化导致静脉内压力持续性增高而引起的一组综合症,临床表现主要为脾大、脾亢进、食道胃底静脉曲张、破裂、肝性脑病及腹水等<sup>[1-3]</sup>。外科手术是治疗门静脉高压症最有效方法之一,目前临床普遍采用门体静脉分流和贲门周围血管离断术两种手术方法治疗门静脉高压症,该术式能够在降低出血率的同时改善患者的肝脏功能,但术后易出现多种并发症,影响手术效果及患者的生存质量<sup>[4-6]</sup>。因此,对门静脉高压患者行脾切除贲门血管离断术后的并发症发生情况进行分析,探讨正确的处理方法,尽可能地避免或减少术后并发症的发生。为了深入研究脾切除贲门血管离断术对门静脉高压症的治疗效果,本文对2200例门静脉高压症患者的临床资料进行回顾性分析,具体如下:

## 1 资料和方法

### 1.1 一般资料

选取我院1999年6月至2013年6月收治的肝硬化门静脉高压症患者的临床资料,纳入标准:有出血史、食管静脉曲张中-重度;肝功能分级为Child-A(1867例)、Child-B(333例)。排除标准:肝癌或胆管癌等恶性肿瘤患者,肝功能分级为Child-C。入选的2200例患者中,包括男1450例,女750例,年龄分布在12-73岁,平均年龄为51.6岁。其中,乙型肝炎肝硬化1780例,丙型肝炎肝硬化249例(单纯切脾抗病毒103例),酒精性肝硬化68例,原发性胆汁性肝硬化48例,特发性肝硬化55例。2097例行脾切除加贲门周围血管离断术,103例行单纯脾切除术。

### 1.2 方法

1.2.1 术前检查 分别于术前、术后1周、2周、3月抽血化验肝功能、血清白蛋白、总胆红素及凝血酶原延长时间。应用日本ALOKA和德国SIEMENS多普勒超声测量仪分别于术前、术后1天、3天、5天、7天、14天及3月行腹部多普勒超声检查、

胃镜检查及CT或核磁共振成像分析等监测门静脉系统血栓、胸腹水情况,测量前患者禁食2小时,取仰卧位。

1.2.2 手术方法<sup>[7]</sup> 病人在全身麻醉状态下采取仰卧位,左腹直肌18-25 cm长切口。自胃网膜右经脉与胃网膜左经脉之间无血管区向胃底打开胃大弯及部分胃后组织,此时能在胰腺上缘触到脾动脉搏动,在脾动脉鞘内分离出脾动脉,双7#线结扎或生物夹夹闭脾动脉,然后将脾脏周围韧带及二级脾蒂逐个分离并结扎,直至完全离断脾脏。脾切除后,逐个离断胃后及胃底血管分支,同样方法处理胃小弯侧血管分支,直至贲门上方8~10 cm。对于反复出血(3次以上)或胃镜下食管胃底经脉重度曲张的患者,行食管横断再吻合术。彻底止血之后,脾窝放置引流管。

### 1.3 疗效判定

观察患者术后3个月内的出血情况、尿微量蛋白水平(ALB)、胆红素含量(T-BIL)、凝血酶原时间(PT)、呕血或黑便等胃肠道反应、肝功能分级及腹水消失率等生化指标的变化情况。

### 1.4 统计学处理

采用SPSS19.0软件进行统计分析,计量资料以均数±标准差表示,数据采用t检验,计数资料采用卡方检验,等级比较根据符号秩和检验,以P<0.05为差异具有统计学意义。

## 2 结果

近期随访资料1716例,围术期病死率为1.3%,手术止血率为99.1%。手术并发症以发热、门静脉系统血栓发生率最高,血栓可分布于主干、肠系膜上静脉、及左右分支,其中有两例发生急性门静脉主干完全栓塞,但无肠坏死发生,一例出现大量腹水行经皮肝穿刺门静脉取栓、溶栓,术后门静脉再通无血栓,恢复良好;而且我们发现门静脉血栓发生于术后很短时间内(1-2天),随时间推移,有的血栓自行溶解。肝功能Child分级A级患者比率由术前入院未经治疗85%增加至术后94%(P=0.24),其它肝脏功能指标如ALB、TBil、PT以及腹水消失率都明显好转(P<0.24)。见表1。

表1 患者手术前后的肝功能指标变化

Table 1 Changes of liver function of patients in the two groups before and after the operation

|        | Child-pugh  |            | ALB       | T-BIL      | PT       | Ascitic fluid |
|--------|-------------|------------|-----------|------------|----------|---------------|
|        | A           | B          | (g/L)     | (umol/L)   | (s)      | (case)        |
| Before | 1457(84.9%) | 259(15.1%) | 28.8± 6.9 | 29.5± 15.3 | 2.6± 1.9 | 966(56.3%)    |
| After  | 1620(94.4%) | 96(5.6%)   | 36.5± 4.8 | 23.8± 10.2 | 1.5± 1.1 | 107 (6.25%)   |
| P      | 0.24        |            | P<0.01    | P<0.01     | P<0.01   | P<0.01        |

## 3 讨论

### 3.1 近期止血率

肝静脉压力过高导致的静脉丛曲张或破裂发生致命性大出血是威胁肝硬化门脉高压患者生命的因素之一<sup>[8]</sup>。据研究证实,贲门周围血管离断术联合脾切除术治疗门脉高压术后再出血率减少至10%<sup>[9]</sup>。我们通过总结2200例病例资料发现患者的近期再出血率低于1%。在15例发生再出血的患者中,3例胃

黏膜出血由胃滞留所致,3例因进食硬物或刺激性食物引起出血,另外9例无明确诱因,但经胃镜检查发现其中1例伴有胃黏膜病变,8例伴有重度静脉曲张。我们经过分析认为产生上述问题的原因是手术断流不彻底,但经胃镜下硬化剂治疗后均获得缓解。因此,在对患者实施脾切除贲门周围血管离断术时应注意术中彻底断流,术后叮嘱患者术后注意饮食,定期复查胃镜,静脉曲张重度,需行胃镜下或辅以治疗,从而降低术后再出血的发生率,提高临床疗效<sup>[10]</sup>。

### 3.2 手术并发症

**3.2.1 再出血** 本研究显示,34例患者术后发生腹腔内出血,其中胰背小动脉出血1例,胃小弯血管断端结扎线松动出血1例,肝活检出血1例,腹腔引流管穿破腹壁曲张静脉出血1例,脾蒂出血18例,另有12例经再次开腹未见明确的活动性出血发生,但经对症治疗均痊愈出院。我们认为,门静脉高压患者术后腹腔内出血是可以预防的,具体为:术前明确手术指征、术中游离时应尽量靠近脾脏、避免脾蒂大束结扎、关闭后腹膜创面时可用Proline线缝合以防止渗血<sup>[11]</sup>。

**3.2.2 术后感染** 胸腹腔感染是脾切除贲门周围血管离断术常见的并发症,多与手术创伤、胸腹水及患者机体抵抗力有关<sup>[12]</sup>。本研究显示,13例明确发生胸腹腔感染的患者在脾切除后的短期内出现免疫功能下降的现象。此外,在22例围手术期死亡的患者中,1例明确诊断为肝脓肿,其余患者术前肝功指标均显示正常,术后3天较稳定,之后急剧恶化,主要表现为凝血功能恶化、胆红素升高,血象明显升高等。结果表明,脾脏切除术对门脉高压症患者的机体淋巴细胞再生具有促进作用,可以改善或调节其免疫系统的功能<sup>[13]</sup>。我们分析认为,自身机体抵抗力较差的肝硬化患者行脾切除术后短时间内会出现免疫功能下降的现象,临床应根据具体情况及时更换强效抗生素及适当延长用药时间,避免胸腹腔感染、肝脓肿等因机体免疫力下降而引起的并发症发生<sup>[14]</sup>。

**3.2.3 胃痿、胰痿** 本组共发生5例胃痿,其中1例发生在术后第4天发生,但经二次手术获得痊愈;另外4例发生在术后第10天左右,经保守治疗2-3月后痊愈。其中1例存在反复发热的症状,经穿刺引流逐渐恢复;其余4例经影像学检查发现胰尾有包裹,无明显症状,未做特殊处理,术后1-2个月逐步机化缩小。我们认为,术后早期发生的胃痿可能与手术操作有关,而术后10天出现胃痿可能与胰痿、胃黏膜糜烂有关。因此,术中应注意胃壁浆膜化以避免胰痿,术后需加强胃黏膜保护,早发现早治疗,使患者的痛苦降至最低<sup>[15,16]</sup>。

**3.2.4 门静脉血栓** 门静脉系统血栓是脾切除贲门周围血管离断术后较为严重的并发症,影响患者的手术效果和生活质量。急性门静脉系统血栓形成主要表现为不明原因发热、腹膜炎、大量腹水、肠缺血或坏死。慢性门静脉系统血栓形成会造成门静脉入肝血流减少,肝功能受损甚至衰竭<sup>[17,18]</sup>。本组病例中,门静脉血栓的总发生率为51%。提示我们,术中应尽量消除脾切除术后形成的脾静脉盲端,近端脾静脉结扎术,还有通过肝素、阿司匹林、右旋糖酐等药物来预防血栓的形成。目前临床上关于脾切除术后形成门静脉系统血栓的危险因素尚未形成统一论。我们分析认为,门静脉系统血栓的形成与门静脉内径、血流速度、脾脏质量、血清总胆红素及血小板数量有关。因此,但有研究认为,门静脉系统血栓的形成可能与门静脉内径、门静脉血流速度、脾脏质量相关,但与门静脉血流速度、血清总胆红素及术后血小板数量无关<sup>[19]</sup>。这一问题我们需在今后的临床实践中进一步研究证实。

### 3.3 对肝功能的影响

本研究显示,患者术后肝功能Child分级、ALB、TBil、PT以及腹水消失率都明显好转。我们考虑与以下几方面有关:①断流术阻断了门奇静脉分流,使营养物质集中流向肝脏,肝动

脉灌注增加,供氧更加充足。②肝动脉与门静脉共同汇入肝血窦,术后门静脉血流量减少使肝血窦压力降低。③脾脏切除使脾功能亢进得到改善,免疫功能获得提高。近年研究表明,脾脏本身通过合成TGF- $\beta$ 1及PDGF等可参与调节肝硬化的发生及发展,脾切除使促肝硬化生长因子减少、血小板数量提高,从而改善肝功能<sup>[20]</sup>。

综上所述,脾切除贲门周围血管离断术近期止血确切,术后并发症以发热、门静脉系统血栓为主,但经对症治疗均获得不同程度的缓解,术后肝功能有所改善,是治疗门静脉高压的有效方法之一。此外,我们在今后的治疗中应改进操作技术、加强围手术期管理以避免或减少并发症的发生几率,保证手术成功率,从而提高患者的临床疗效和生活质量。

### 参考文献(References)

- [1] 余灵祥,李志伟,郭晓东,等.脾切断流术对肝硬化门静脉高压症患者肝功能的影响[J].现代生物医学进展,2013,13(5):950-953  
Yu Ling-xiang, Li Zhi-wei, Guo Xiao-dong, et al. The Effect of liver function in patients with Cirrhosis and Portal Hypertension after Splenectomy and Pericardial Blood Vessels Disarticulation [J]. Progress in Modern Biomedicine, 2013,13(5):950-953
- [2] 毕振华,郭晓东,任波,等.脾切断流术围术期患者外周血淋巴细胞的变化及免疫功能的研究[J].现代生物医学进展,2013,13(6):1100-1103  
Bi Zhen-hua, Guo Xiao-dong, Ren Bo, et al. Peripheral blood lymphocytes in patients with splenectomy and the study of immune function [J]. Progress in Modern Biomedicine, 13(6):1100-1103
- [3] 余灵祥,李志伟,郭晓东,等.脾切除术对肝炎后肝硬化患者肝癌发生的影响[J].现代生物医学进展,2013,13(10):1959-1961  
Yu Ling-xiang, Li Zhi-wei, Guo Xiao-dong, et al. The Effect of Splenectomy on Liver Cirrhosis in Patients with Hepatocellular Carcinoma Incidence[J]. Progress in Modern Biomedicine, 2013,13(10):1959-1961
- [4] Tan J, Chu Y, Tan Y, et al. Stapleless laparoscopic splenectomy with individual vessel dissection in patients with splenomegaly[J]. World J Surg, 2013, 37(10):2300-2305
- [5] Zhou J, Wu Z, Wu J, et al. Laparoscopic splenectomy plus preoperative endoscopic variceal ligation versus splenectomy with pericardial devascularization (Hassab's operation) for control of severe varices due to portal hypertension[J]. Surg Endosc, 2013, 27(11):4371-4377
- [6] Hassab MA. Gastroesophageal decongestion and splenectomy. A method of prevention in treatment of bleeding esophageal varices associated with bilharzial hepatic fibrosis: preliminary report [J]. J Int Coll Surg, 1964, 41:232-248
- [7] Zhe C, Jian-wei L, Jian C, et al. Laparoscopic versus open splenectomy and esophagogastric de vascularization for bleeding varices or severe hypersplenism: a comparative study [J]. J Gastrointest Surg, 2013, 17(4):654-659
- [8] Sugiura M, Futagawa S. A new technique for treating esophageal varices[J]. J Thorac Cardiovasc Surg, 1973, 66:677-685
- [9] Kinjo N, Kawanaka H, Akahoshi T, et al. Risk factors for portal venous thrombosis after splenectomy in patients with cirrhosis and portal hypertension[J]. Br J Surg, 2010, 97(6):910-916
- [10] Jin ZX, Ma YY, Wang XY, et al. Treatment selection for gastric cancer with portal hypertension: clinical management[J]. Gastric Cancer, 2013, 28

- ch with fatty liver animal model [J]. Pharm J Chin PLA. 2005, 21(5): 374-376
- [5] Sherif S. Nonalcoholic Fatty Liver Disease and Obesity[J]. Nutrition in Clinical Practice, 2007, 22(1): 1-10
- [6] Vuppalanchi R, Chalasani N. Nonalcoholic fatty liver disease and non-alcoholic steatohepatitis: selected practical issues in their evaluation and management[J]. Hepatology, 2009, 49(1): 306-317
- [7] 黄红革, 宗彦宏, 赵晓云. 非酒精性脂肪肝生化指标分析[J]. 河北医药, 2013, 35(7): 1001-1002  
Huang Hong-ge, Zong Yan-hong, Zhao Xiao-yun. Biochemical index analysis of nonalcoholic fatty liver disease [J]. Hebei Medical Journal, 2013, 35(7):1001-1002
- [8] 黎瑶, 童南伟. 过氧化物酶增殖物激活受体  $\alpha$  与脂代谢[J]. 中华糖尿病杂志, 2005, 13(2):159-160  
Li Yao, Tong Nan-wei. Peroxisome-proliferator-activated receptor- $\alpha$  with lipid metabolism[J]. Chin J Diabetes, 2005, 13(2):159-160
- [9] Li L, Beauchamp MC, Renier G. Peroxisome proliferator-activated receptor alpha and gamma agonists upregulate human macrophage lipoprotein lipase expression[J]. Atherosclerosis, 2002, 165(1):101-110
- [10] Minnich A, Tian N, Byan L, et al. A potent PPAR $\alpha$  agonist stimulates mitochondrial fatty acid beta-oxidation in liver and skeletal muscle [J]. Am J Physiol Endocrinol Metab, 2001, 280(2): 270-279
- [11] Yoosoo Chang, Seungho Ryu, Eunju Sung, et al. Higher Concentrations of Alanine Aminotransferase within the Reference Interval Predict. Nonalcoholic Fatty Liver Disease [J]. Clinical Chemistry, 2007, 53(4): 686-692
- [12] Adeghe E, Adem A, Hasan MY, et al. Medicinal chemistry and actions of dual and pan PPAR modulators[J]. Open Med Chem J, 2011, 5(2): 93-98
- [13] Wan CW, Wong CN, Pin WK, et al. Chlorogenic acid exhibits cholesterol lowering and fatty liver attenuating properties by up-regulating the gene expression of PPAR- $\alpha$  in hypercholesterolemic rats induced with a high-cholesterol diet[J]. Phytother Res, 2013, 27(4): 545-551
- [14] Mandrup S, Lane MD. Regulating adipogenesis [J]. J Biol Chem, 1997, 272(28): 53-67
- [15] Savas U, Machemer DE, Hsu MH, et al. Opposing roles of peroxisome proliferator-activated receptor alpha and growth hormone in the regulation of CYP4A11 expression in a transgenic mouse model [J]. J Biol Chem, 2009, 284(24): 16541-16552
- [16] Monsalve FA, Pyarasani RD, Delgado-Lopez F, et al. Peroxisome proliferator-activated receptor targets for the treatment of metabolic diseases[J]. Mediators Inflamm, 2013, 43(2): 549-627
- [17] Alejandra V. Contreras, Nimbe Torres, Armando R. Tovar. PPAR- $\alpha$  as a Key Nutritional and Environmental Sensor for Metabolic Adaptation[J]. American Society for Nutrition, 2013, 4(2): 439-452
- [18] Horowitz JF, Leone TC, Feng WQ, et al. Effect of endurance training on lipid metabolism in women: a Potential role for PPAR $\alpha$  in the metabolic response to training[J]. Am J Physiol Endocrinol Metab, 2000, 279(34): E348-355
- [19] Jeong S, Yoon M. Swimming's prevention of ovariectomy-induced obesity through activation of skeletal-muscle PPAR $\alpha$  [J]. Int J Sport Nutr Exerc Metab, 2012, 22(1):1-10
- [20] 史仍飞, 袁海平, 刘学, 等. 不同强度运动对大鼠脂质代谢的影响及机理探讨[J]. 中国运动医学杂志, 2003, 22(5): 509-510  
Shi Reng-fei, Yuan Hai-ping, Liu Xue, et al. Different intensity exercise influence on lipid metabolism in rats and its mechanism[J]. Chin J Sports Med, 2003, 22(5):509-510
- [21] 张玥, 姜宁, 苏丽, 等. PPAR $\alpha$  与运动改善脂质代谢的关系[J]. 中国康复医学杂志, 2008, 23(6): 495-504  
Zhang Yue, Jiang Ning, Su Li. PPAR $\alpha$  in the process of exercises improving lipid metabolism [J]. Chinese Journal of Rehabilitation Medicine, 2008, 23(6):495-498

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- [11] Bhavsar MS, Vora HB, Khiria LS, et al. Portal hypertension: effect of early splenic artery ligation on platelets count during splenectomy[J]. Saudi J Gastroenterol, 2012, 18(6):380-383
- [12] Lu YF, Li XQ, Han XY, et al. Peripheral blood cell variations in cirrhotic portal hypertension patients with hypersplenism[J]. Asian Pac J Trop Med, 2013, 6(8):663-666
- [13] Makdissi FF, Herman P, Pugliese V, et al. Long-term results of esophagogastric devascularization and splenectomy associated with endoscopic treatment in schistosomal portal hypertension[J]. World J Surg, 2010, 34(11):2682-2688
- [14] Liu Y, Li Y, Ma J, et al. A modified Hassab's operation for portal hypertension: experience with 562 cases [J]. J Surg Res, 2013, 185(1): 463-468
- [15] Bhavsar MS, Vora HB, Khiria LS, et al. Portal hypertension: effect of early splenic artery ligation on platelets count during splenectomy[J]. Saudi J Gastroenterol, 2012, 18(6):380-383
- [16] Zhou J, Wu Z, Wu J, et al. Transjugular intrahepatic portosystemic shunt (TIPS) versus laparoscopic splenectomy (LS) plus preoperative endoscopic varices ligation (EVL) in the treatment of recurrent variceal bleeding[J]. Surg Endosc, 2013, 27(8):2712-2720
- [17] Liao X, An Cheng JY, Zhou QJ, et al. Therapeutic effect of autologous bone marrow-derived liver stem cells transplantation in hepatitis B virus-induced liver cirrhosis [J]. Hepatogastroenterology, 2013, 60(123):406-409
- [18] Zhao S, Lv T, Gong G, et al. Outcome of laparoscopic splenectomy with sandwich treatment including pericardial devascularization and limited portacaval shunt for portal hypertension due to liver cirrhosis [J]. J Laparoendosc Adv Surg Tech A, 2013, 23(1):43-47
- [19] Xin Z, Qingguang L, Yingmin Y. Total laparoscopic versus open splenectomy and esophagogastric devascularization in the management of portal hypertension: a comparative study[J]. Dig Surg, 2009, 26(6): 499-505
- [20] Wang Y, Zhan X, Zhu Y, et al. Laparoscopic splenectomy in portal hypertension: a single-surgeon 13-year experience [J]. Surg Endosc, 2010, 24(5):1164-1169