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· 专题研究 ·

## 腹主动脉瘤腔内修复术后髂支闭塞的治疗策略 及其危险因素分析

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### 摘要

**背景与目的:** 腹主动脉瘤腔内修复术 (EVAR) 以其微创且术后恢复快的优势, 已成为腹主动脉瘤 (AAA) 的首选治疗。髂支闭塞 (ILO) 是EVAR术后常见并发症, 但其处理存在很多难点。因此, 本文探讨EVAR术后ILO的治疗策略及其危险因素。

**方法:** 回顾性分析海南省人民医院血管外科2013年8月—2022年8月间14例EVAR术后发生ILO的病例资料。以同期435例无ILO的EVAR病例作为对照, 分析EVAR术后发生ILO危险因素。

**结果:** 14例患者行腔内或杂交手术治疗的平均手术时间 (183.9 ± 32.6) min, 术中出血量 (187.1 ± 70.2) mL。10例经杂交手术取栓恢复腔内血流, 2例杂交手术失败后行双侧股动脉人造血管旁路术, 2例采用吸栓导管行经皮机械血栓清除术恢复腔内血流。清除髂支内血栓后, 对髂支及远端髂外动脉 (EIA) 残余狭窄性病变行球囊扩张及支架成形术。术后所有患者下肢缺血症状完全缓解。随访期, 所有患者未再发下肢缺血症状。单因素分析显示, EIA起始端直径 ( $P=0.045$ )、髂动脉扭曲 $\geq 60^\circ$  ( $P=0.003$ )、髂动脉狭窄 $\geq 50\%$  ( $P=0.007$ )、髂支远端锚定于EIA ( $P=0.015$ )、髂支远端放大率 $\geq 15\%$  ( $P=0.028$ ) 等因素与EVAR术后ILO的发生有关。

**结论:** 腔内或杂交手术治疗是EVAR术后ILO的首选治疗。关注ILO的危险因素, 并在EVAR方案设计和操作时积极预防。

### 关键词

主动脉瘤, 腹; 血管内操作; 手术后并发症; 移植物闭塞, 血管

中图分类号: R654.3

## Treatment strategies and risk factors for iliac limb occlusion after endovascular repair of abdominal aortic aneurysm

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**Abstract**

**Background and Aims:** Endovascular aneurysm repair (EVAR) has become the preferred treatment for abdominal aortic aneurysm (AAA) due to its minimally invasive nature and quick postoperative recovery. Iliac limb occlusion (ILO) is a common complication after EVAR, but its management poses many challenges. Therefore, this study was performed to explore the treatment strategies and risk factors for ILO following EVAR.

**Methods:** The clinical data of 14 cases of ILO that occurred after EVAR admitted to Department of Vascular Surgery, Hainan General Hospital/Hainan Affiliated Hospital of Hainan Medical University between August 2013 and August 2022 were retrospectively analyzed, and 435 EVAR cases without ILO during the same period served as a control to analyze the risk factors for developing ILO after EVAR.

**Results:** The average operative time for the 14 patients undergoing endovascular or hybrid surgery was (183.9±32.6) min, with intraoperative blood loss of (187.1±70.2) mL. Thrombus removal and restoration of intravascular blood flow were achieved through hybrid surgery in 10 cases. In two cases where hybrid surgery failed, bilateral femoral artery bypass grafting was performed. Another two cases underwent percutaneous mechanical thrombectomy using an aspiration catheter to restore intravascular blood flow. After thrombus removal from the iliac limb, balloon dilation and stent angioplasty were performed on the iliac limb and distal external iliac artery (EIA) for residual stenotic lesions. After the operation, ischemic symptoms in the lower limbs were relieved entirely in all patients. During the follow-up period, no recurrence of ischemic symptoms was observed. Univariate analysis indicated that factors such as the diameter of the proximal EIA ( $P=0.045$ ), iliac artery tortuosity $\geq 60^\circ$  ( $P=0.003$ ), iliac artery stenosis  $\geq 50\%$  ( $P=0.007$ ), the distal portion of the iliac limb graft anchoring to the EIA ( $P=0.015$ ), and the oversize rate of the distal iliac limb graft  $\geq 15\%$  ( $P=0.028$ ) were associated with the occurrence of ILO after EVAR.

**Conclusion:** Endovascular or hybrid surgery is the preferred treatment for ILO following EVAR. Attention should be paid to the risk factors for ILO, and proactive prevention should be undertaken during EVAR planning and operation.

**Key words**

Aortic Aneurysm, Abdominal; Endovascular Procedures; Postoperative Complications; Graft Occlusion, Vascular

**CLC number:** R654.3

腹主动脉瘤腔内修复术 (endovascular aneurysm repair, EVAR) 以其微创且术后恢复快的优势, 已成为腹主动脉瘤 (abdominal aortic aneurysm, AAA) 的首选治疗<sup>[1-2]</sup>。同时, 随着 EVAR 治疗的普及, 其应用已拓展到更为复杂的腹主动脉及髂动脉解剖结构, 髂支闭塞 (iliac limb occlusion, ILO) 因此成为 EVAR 术后常见并发症<sup>[3-4]</sup>, 尽管多年来支架移植材料、制作工艺以及 EVAR 操作技术的不断进步, ILO 发生率仍在 3.4%~7.6%<sup>[5-8]</sup>。本研究回顾性分析海南省人民医院血管外科治疗的 EVAR 术后 ILO 病例, 探讨其危险因素及治疗策略。

## 1 资料与方法

### 1.1 一般资料

本组统计海南省人民医院血管外科 2013 年 8 月—2022 年 8 月间 AAA 分体式支架 EVAR 治疗病例, 总计 448 例, 其中 13 例 (2.9%) 术后出现 ILO, 另有 1 例为外院 EVAR, 术后 6 个月出现 ILO。本组共 14 例 ILO 病例, 均为单侧, 左侧 5 例, 右侧 9 例, 术前经计算机体层成像血管造影 (computed tomography angiography, CTA) 检查确诊。髂支远端锚定于髂总动脉 2 例、髂外动脉 (external iliac artery, EIA) 12 例。中位发生时间为 EVAR 术后 76 d, 其中急性期 ILO ( $\leq$  EVAR 术后 30 d) 6 例、慢

性期 ILO (>EVAR 术后 30 d) 8 例。下肢急性缺血症状有下肢疼痛、麻木、发绀及运动障碍，慢性缺血症状主要为间歇性跛行。各腹主动脉支架移植术使用及 ILO 发生情况有 Endurant (美国美敦力) 3.1% (11/358)、Ankura (深圳先健) 3.6% (3/82)、Minors (上海微创心脉) 0 (0/9)。以发生 ILO 的病例作为研究组，以同期非 ILO 的 EVAR 病例作为对照组，对照组髂动脉的相关测量数据以主体短腿侧作为依据。

再次 EVAR、炎性 AAA、急诊 EVAR (例如破裂 AAA) 以及非标准 EVAR，例如同期行股动脉人造血管转流、内脏区分支重建以及髂内分支重建等病例，均被排除本研究。

## 1.2 治疗方法

**1.2.1 手术治疗** (1) 杂交手术治疗：首先穿刺左侧肱动脉并置鞘，导丝引导导管头端至腹主动脉覆膜支架主体内，进行腹主动脉造影了解 ILO 及闭塞段远端髂股动脉显影情况。然后，切开患侧股动脉，导丝通过 ILO 段，沿导丝导入 Fogarty 双腔取栓导管 (美国爱德华)，透视引导下进行取栓，取栓后发现髂支内或髂支近、远端有狭窄性病变，进行球囊扩张 (必要时双侧)，并以金属裸支架 (bare metal stent, BMS) 或外周覆膜支架覆盖病变。(2) 腔内治疗：按上述方法进行腹主动脉造影，8 F Rotarex 吸栓导管 (瑞士史卓博) 经患肢股动脉穿刺鞘置入，进行经皮机械血栓清除术 (percutaneous mechanical thrombectomy, PMT)<sup>[9]</sup>，再以 Fogarty 导管探查或多角度血管造影了解髂支或髂支远端髂动脉狭窄情况，发现病变后进行球囊扩张，再以外周覆膜支架或 BMS 进行成形<sup>[10]</sup>。(3) 开放手术治疗：上述治疗失败，二期行双侧股动脉解剖外人造血管旁路术。

**1.2.2 术后药物治疗** 早期均采用利伐沙班 15 mg/d 抗凝治疗，后期结合 VOYAGER PAD 研究<sup>[11]</sup>结果改为利伐沙班 2.5 mg，2 次/d+阿司匹林 100 mg/d 或氯吡格雷 75 mg/d。

## 1.3 随访

患者分别在出院时或术后 1、3、6、12 个月及以后每年进行随访，随访内容包括下肢缺血症状，行走距离，行彩超或主动脉 CTA 检查观察双侧髂支移植术有无再狭窄、血栓形成，并根据患

者下肢症状、血压、血糖、血脂情况调整用药等。

## 1.4 统计学处理

采用 SPSS 21.0 软件进行数据处理，符合正态分布连续变量采用均数 ± 标准差 ( $\bar{x} \pm s$ ) 表示，偏态分布计量资料以中位数 (四分位间距) [ $M (IQR)$ ] 表示，计数资料以例数 (百分比) [ $n (%)$ ] 表示。以  $P < 0.05$  为差异有统计学意义。

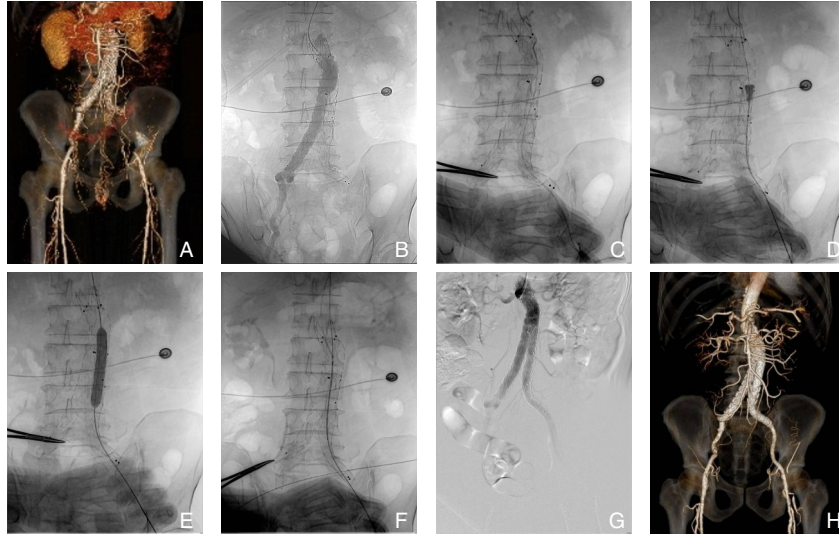
## 2 结果

### 2.1 患者的围术期情况

14 例患者 (包括 2 例二期行人造血管转流) 腔内或杂交治疗的平均手术时间 ( $183.9 \pm 32.6$ ) min，术中出血量 ( $187.1 \pm 70.2$ ) mL。10 例患者经杂交手术恢复腔内血流 (图 1)，其中 1 例仅髂支近端狭窄植入自膨式 BMS (Zilver, 美国库克) 1 枚，1 例因髂总动脉入口处狭窄植入球扩式 BMS (Omilink, 美国雅培) 1 枚，4 例因髂支远端及 EIA 病变植入自膨式 BMS (Smart flex, 美国康蒂思) 2 枚、外周覆膜支架 (Viabahn, 美国戈尔) 2 枚，另 4 例因髂支近远端多处病变植入多枚支架，包括自膨式 BMS (Zilver, Smart flex, Everflex 美国 EV3) 5 枚、球扩式 BMS (Omilink) 1 枚和外周覆膜支架 (Viabahn) 3 枚。2 例因杂交手术失败，行双侧股动脉解剖外人造血管 (Gore-Tex, 美国戈尔) 旁路术。2 例采用腔内治疗 (图 2)，8 F Rotarex 吸栓导管经患侧股动脉穿刺鞘逆行置入，进行 PMT，2 例吸栓时间分别为 60 min 和 45 min。再以 Fogarty 导管探查及多角度血管造影发现 2 例患者髂支近、远端均存在狭窄性病变，进行球囊扩张支架成形。该 2 例均在髂支近端植入自膨式 BMS (Zilver) 各 1 枚，在髂支远端植入外周覆膜支架 (Viabahn) 各 1 枚。术后，所有患者下肢缺血症状完全缓解，踝肱指数 (ankle brachial index, ABI) 较术前提高  $0.71 \pm 0.12$ ，术后复查 CTA 显示患侧髂支通畅。

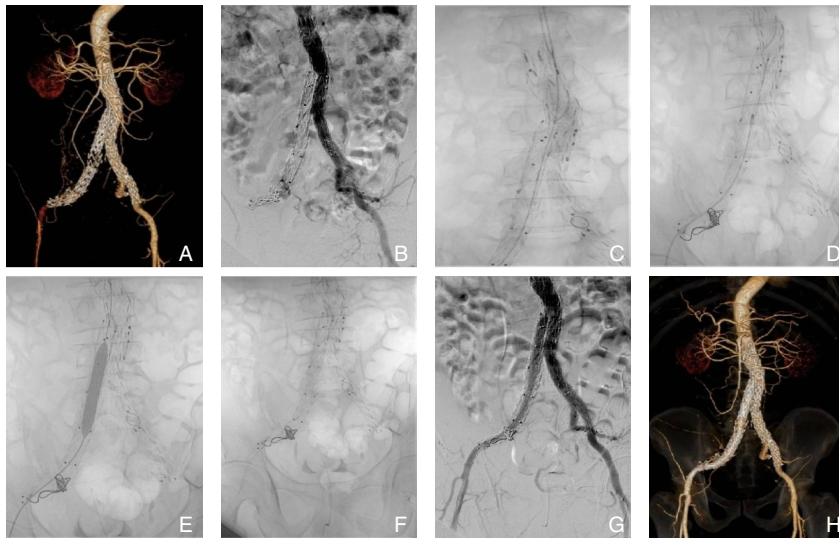
### 2.2 随访结果

14 例患者均通过门诊定期随诊，目前均已超过 1 年，中位随访时间 62.5 (13~114) 个月，随访期间，所有患者均无明显下肢缺血症状，彩超或主动脉 CTA 检查显示支架或人造血管均血流通畅，无死亡病例。



**图1 男性患者, EVAR术后6个月出现左侧下肢间歇性跛行, 考虑左侧ILO** A: 术前腹主动脉CTA; B: 术中腹主动脉造影; C: 导丝导管通过左侧ILO段; D: 5.5 F Fogarty取栓, 导管通过髂支近端时受压变形, 提示髂支近端重度狭窄; E: 对髂支内病变段进行球囊扩张; F: 髂支近端植入自膨式BMS; G: 造影显示左侧髂支恢复正常血流; H: 出院时复查主动脉CTA显示腹主动脉双侧髂动脉管腔无明显狭窄

**Figure 1 A male patient presented with intermittent claudication in the left lower limb 6 months after EVAR, indicating left-sided ILO** A: Preoperative abdominal aortic CTA; B: Intraoperative abdominal aortic angiography; C: Guidewire catheter passing through the left-sided ILO segment; D: 5.5 F Fogarty thrombectomy catheter being compressed and deformed when passing through the proximal iliac limb, indicating severe stenosis at the proximal iliac limb; E: Balloon dilation of the diseased segment in the iliac limb; F: Self-expanding BMS implanted in the proximal iliac limb; G: Angiography showing normal blood flow in the left iliac limb; H: Abdominal aortic CTA before discharge showing no significant stenosis in the lumens of both iliac arteries



**图2 男性患者, EVAR术后3个月出现右侧下肢间歇性跛行, 考虑右侧ILO** A: 术前腹主动脉CTA; B: 术中腹主动脉造影; C: 导丝通过右侧ILO段; D: 8 F Rotarex导管进行PMT; E: 对髂支内及EIA病变段进行球囊扩张; F: 髂支近端植入自膨式BMS, 远端植入外周覆膜支架; G: 造影显示右侧髂支恢复正常血流; H: 出院时复查主动脉CTA显示腹主动脉双侧髂动脉管腔无明显狭窄

**Figure 2 A male patient presented with intermittent claudication in the right lower limb 3 months after EVAR, indicating right-sided ILO** A: Preoperative abdominal aortic CTA; B: Intraoperative abdominal aortic angiography; C: Guidewire passing through the right-sided ILO segment; D: 8 F Rotarex catheter performing PMT; E: Balloon dilation of the diseased segments in the iliac limb and EIA; F: Self-expanding BMS implanted in the proximal iliac limb, and a peripheral covered stent implanted in the distal segment; G: Angiography showing normal blood flow in the right iliac limb; H: Abdominal aortic CTA before discharge showing no significant stenosis in the lumens of both iliac arteries

### 2.3 EVAR术后ILO的危险因素分析

ILO组与对照组比较, 差异有统计学意义的因素有: EIA起始端直径 ( $P=0.045$ )、髂动脉扭曲 $\geq 60^\circ$  ( $P=0.003$ )、髂动脉狭窄 $\geq 50\%$  ( $P=0.007$ )、髂支远端锚定于EIA ( $P=0.015$ )、髂支远端放大率 $\geq 15\%$  ( $P=0.028$ ), 提示与EVAR术后ILO发生有关(表1)。

表1 ILO组与对照组相关临床指标比较

Table 1 Comparison of relevant clinical variables between the ILO group and the control group

项目	ILO组 (n=14)	对照组 (n=435)	P
年龄(岁, $\bar{x} \pm s$ )	71.0 $\pm$ 5.4	70.1 $\pm$ 7.3	0.910
男性[n(%)]	12(85.7)	310(71.3)	0.240
高血压[n(%)]	14(100)	367(84.4)	0.110
冠心病[n(%)]	5(35.7)	136(31.3)	0.720
高脂血症[n(%)]	10(71.4)	261(60.0)	0.390
糖尿病[n(%)]	2(14.3)	76(17.5)	0.760
慢性阻塞性肺病[n(%)]	3(21.4)	103(23.7)	0.850
慢性肾功能衰竭[n(%)]	2(14.3)	96(22.1)	0.490
外周动脉疾病[n(%)]	3(21.4)	65(14.9)	0.510
脑血管疾病[n(%)]	2(14.3)	48(11.0)	0.700
吸烟[n(%)]	6(42.9)	130(29.9)	0.300
抗血小板治疗[n(%)]	1(7.1)	21(4.8)	0.690
瘤颈直径(mm, $\bar{x} \pm s$ )	20.3 $\pm$ 3.4	21.8 $\pm$ 4.5	0.510
瘤颈长度(mm, $\bar{x} \pm s$ )	25.2 $\pm$ 3.6	23.0 $\pm$ 5.5	0.470
瘤颈角度( $^\circ$ , $\bar{x} \pm s$ )	47.2 $\pm$ 15.1	39.1 $\pm$ 19.6	0.160
瘤体最大直径(mm, $\bar{x} \pm s$ )	51.3 $\pm$ 7.1	52.5 $\pm$ 8.0	0.870
瘤体长度(mm, $\bar{x} \pm s$ )	105.5 $\pm$ 10.9	98.4 $\pm$ 12.3	0.750
腹主动脉末端直径(mm, $\bar{x} \pm s$ )	17.0 $\pm$ 4.7	19.2 $\pm$ 6.1	0.060
髂总动脉直径(mm, $\bar{x} \pm s$ )	13.2 $\pm$ 8.4	15.1 $\pm$ 5.9	0.220
髂总动脉长度(mm, $\bar{x} \pm s$ )	64.3 $\pm$ 7.0	68.4 $\pm$ 11.9	0.560
EIA起始端直径(mm, $\bar{x} \pm s$ )	7.3 $\pm$ 1.2	8.9 $\pm$ 2.6	0.045
髂动脉扭曲 $\geq 60^\circ$ [n(%)]	11(78.6)	168(38.6)	0.003
髂动脉狭窄 $\geq 50\%$ [n(%)]	8(57.1)	109(25.1)	0.007
主体交叉腿[n(%)]	3(21.4)	97(22.3)	0.940
髂支总长度(mm, $\bar{x} \pm s$ )	155.3 $\pm$ 32.2	145.6 $\pm$ 36.5	0.560
同侧使用2枚及以上髂支[n(%)]	9(64.3)	190(43.7)	0.130
髂支远端锚定于EIA[n(%)]	12(85.7)	230(52.9)	0.015
髂支远端放大率 $\geq 15\%$ [n(%)]	9(64.3)	155(35.6)	0.028

### 3 讨论

既往研究<sup>[12-14]</sup>显示EVAR术后再干预率约为每年10%, 其中ILO在所有并发症中列第3位。AAA瘤体的解剖特点、腹主动脉支架结构特性及手术者操作技能与ILO的发生关系密切<sup>[15]</sup>。经过二十多年

发展, 支架结构设计上的改进和术者操作技能的提高有效降低了ILO发生, 但是EVAR在复杂解剖条件AAA的应用导致ILO等相关并发症的发生率并未下降<sup>[16-17]</sup>。

ILO相关症状包括间歇性跛行、静息痛、急性下肢缺血等。无论临床表现如何, 多数情况下, ILO需要通过手术、腔内或杂交方法重新干预。尽管这些方法很有效, 但显然这一并发症, 应该在初次进行EVAR术中积极预防<sup>[7]</sup>。术前如何根据术者可使用的腹主动脉覆膜支架及动脉瘤瘤体解剖条件, 为患者制定合理的手术流程尤为重要。

急性期发病的ILO, 临床症状较重, 往往通过血管造影进行影像学评估, 结合文献<sup>[18-21]</sup>发现ILO主要危险因素有: (1) 瘤颈角度过大、向前扭曲, 或瘤体后壁偏心性斑块压迫, 致髂支近端入口处狭窄; (2) 髂支远端髂股动脉重度狭窄; (3) 髂支通过髂总动脉处, 因斑块压迫或支架扭曲所致狭窄; (4) 髂动脉(尤其EIA)扭曲成角( $\geq 60^\circ$ ), 导致支架打折或髂支远端恰好锚定于髂动脉扭曲处, 致管腔狭窄; (5) 髂支远端口径放大率 $\geq 15\%$ , 致支架接口处远端EIA狭窄。

针对上述危险因素, EVAR术中以下细节<sup>[22-24]</sup>, 有助于减少ILO发生: (1) 在支架移植物植入前, 处理宿主髂股动脉狭窄; (2) 存在髂支可疑狭窄, 及时进行髂支内球囊扩张, 必要时对吻扩张; (3) 髂总动脉开口成角较大可采用主体交叉腿技术; (4) 髂动脉扭曲严重可选择柔顺性更好的髂支或外周覆膜支架, 也可用BMS加强径向支撑力; (5) 最终造影时撤除硬导丝、不同角度造影, 及时发现狭窄性病变等。有报道<sup>[25]</sup>称, EVAR操作完成, 撤出输送器后, 通过股动脉鞘进行测压以及彩超测量髂支内收缩期峰值流速可以预测ILO的发生风险。

慢性期起病的ILO, 术前往往往通过主动脉CTA进行影像学评估, 除上述急性期ILO考虑的危险因素以外, 患者不恰当的体位、EVAR术后髂支远端髂股动脉狭窄性病变继续加重, 或髂支不能适应盆腔血管的走行, 其远端与宿主EIA长期相互作用导致髂支远端与自体血管接口处狭窄等, 都是ILO的病因<sup>[26-28]</sup>。

针对急性或慢性期ILO治疗, 笔者早期均采用杂交手术。切开患侧股动脉, 导丝通过髂支病变段, 沿导丝导入取栓导管进行取栓, 取栓后在

Fogarty 球囊充盈的情况下探查整个髂支内是否存在狭窄性病变,如有,则进行球囊扩张支架成形等相应处理。本组最近2例ILO采用PMT治疗,以8 F Rotarex 导管抽吸血栓后,造影显示髂支内仍有附壁血栓,以5.5 F Fogarty 导管将髂支内血栓拉至髂支下段,再植入外周覆膜支架并将支架远端延伸至髂支远端EIA,同时也将血栓隔离于外周覆膜支架与髂支之间,以避免血栓脱落造成垃圾脚。该方法最大的优点是微创,这是股动脉切开所无法比拟的<sup>[29]</sup>。对于杂交手术或腔内治疗不成功或患者因身体、经济、意愿等原因不能接受,解剖外途径血管旁路术依然是可靠的候选措施<sup>[30]</sup>。本组2例经杂交手术失败后,二期行左右股动脉人造血管旁路术。

本组14例ILO病例的治疗均取得较好的临床效果,未出现严重并发症,在清除血栓的同时发现潜在的基础病因,为后续的腔内治疗创造条件。术后分析ILO的病因,1例考虑为瘤颈扭曲同时伴有瘤体后壁斑块压迫导致髂支近端狭窄,术中前后位造影未能提前发现病变。1例考虑为患侧髂总动脉开口处狭窄。2例行解剖外人造血管旁路术的患者考虑为髂支远端放大率 $\geq 15\%$ ,1例外院病例将远端13 mm的髂支锚定于EIA,所以干预时越置入支架越堵。4例为髂支远端及EIA的闭塞,原因主要为髂支远端锚定于EIA扭曲处或EIA狭窄性病变。有6例考虑髂支近远端均存在狭窄的病例,主要病因应该还是髂支远端病变,术中用Fogarty球囊探查整个髂支的管腔通畅性,发现其他位置也存在狭窄,所以一期处理,减少后期再干预率。

综上所述,腔内或杂交治疗是EVAR术后ILO的首选治疗。随着AAA患者基数增加,EVAR相关并发症亦逐年增多,关注ILO的危险因素,并在EVAR方案设计和操作时予以考虑并积极预防,是保证EVAR治疗质量的重点。

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## 本刊对来稿中统计学处理的有关要求

1. 统计研究设计: 应交代统计研究设计的名称和主要做法。如调查设计(分为前瞻性、回顾性或横断面调查研究); 实验设计(应交代具体的设计类型, 如自身配对设计、成组设计、交叉设计、正交设计等); 临床试验设计(应交代属于第几期临床试验, 采用了何种盲法措施等)。主要做法应围绕4个基本原则(随机、对照、重复、均衡)概要说明, 尤其要交代如何控制重要非试验因素的干扰和影响。

2. 资料的表达与描述: 用 $\bar{x} \pm s$ 表达近似服从正态分布的定量资料, 用 $M(IQR)$ 表达呈偏态分布的定量资料; 用统计表时, 要合理安排纵横标目, 并将数据的含义表达清楚; 用统计图时, 所用统计图的类型应与资料性质相匹配, 并使数轴上刻度值的标法符合数学原则; 用相对数时, 分母不宜小于20, 要注意区分百分率与百分比。

3. 统计分析方法的选择: 对于定量资料, 应根据所采用的设计类型、资料所具备的条件和分析目的, 选用合适的统计分析方法, 不应盲目套用 $t$ 检验和单因素方差分析; 对于定性资料, 应根据所采用的设计类型、定性变量的性质和频数所具备条件以分析目的, 选用合适的统计分析方法, 不应盲目套用 $\chi^2$ 检验。对于回归分析, 应结合专业知识和散布图, 选用合适的回归类型, 不应盲目套用简单直线回归分析, 对具有重复实验数据的回归分析资料, 不应简单化处理; 对于多因素、多指标资料, 要在一元分析的基础上, 尽可能运用多元统计分析方法, 以便对因素之间的交互作用和多指标之间的内在联系进行全面、合理地解释和评价。

4. 统计结果的解释和表达: 当 $P < 0.05$  (或 $P < 0.01$ ) 时, 应说明对比组之间的差异有统计学意义, 而不应说对比组之间具有显著性(或非常显著性)的差别; 应写明所用统计分析方法的具体名称(如: 成组设计资料的 $t$ 检验、两因素析因设计资料的方差分析、多个均数之间两两比较的 $q$ 检验等), 统计量的具体值(如 $t=3.45$ ,  $\chi^2=4.68$ ,  $F=6.79$ 等)应尽可能给出具体的 $P$ 值(如 $P=0.0238$ ); 当涉及总体参数(如总体均数、总体率等)时, 在给出显著性检验结果的同时, 再给出95%置信区间。

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