

• 血管介入 Vascular intervention •

三明治技术在腹主动脉瘤累及髂总动脉腔内治疗中保留髂内动脉的疗效分析

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【摘要】 目的 分析三明治技术应用于腹主动脉瘤(AAA)累及髂总动脉腔内治疗保留髂内动脉的近期疗效。**方法** 回顾性分析重庆医科大学附属第二医院 2016 年 6 月至 2018 年 7 月采用主动脉腔内修复术(EVAR)治疗的 9 例 AAA 累及髂总动脉患者(累及单侧髂总动脉 3 例,双侧 6 例),术中均接受髂内动脉三明治重建。术后观察和随访围手术期死亡率、腔内修复效果、内漏、支架一期通畅情况及手术相关并发症发生情况。**结果** 9 例患者 EVAR 术和髂内动脉三明治重建技术均获成功,围手术期无死亡。术中即刻造影显示 9 例支架均获通畅,瘤腔均成功修复。出现 1 例 I 型内漏,2 例 III 型内漏,随访时自行消失;1 例左上肢急性缺血,再次予急诊肱动脉修复术;3 例左肱动脉切口处血肿形成,2 例右股动脉穿刺点处血肿形成。术后 1 周、3 个月、6 个月复查 CTA 分别显示支架通畅 9 例、8 例、8 例,均无肠缺血、脊髓缺血或瘫痪症状。**结论** 三明治技术在 AAA 累及髂总动脉腔内治疗中保留髂内动脉安全可行,术后臀肌跛行发生率低,近期随访支架通畅率可,值得临床推广,但远期效果尚需进一步随访及更大临床样本验证。

【关键词】 三明治技术;腹主动脉瘤;髂内动脉

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Application of sandwich technique in preserving internal iliac artery during endovascular treatment for abdominal aortic aneurysm involving common iliac artery: analysis of curative effect HE Zheng, YAN Haiyan, FU Jian, SUN Jianming. Department of Abdominal Vascular Surgery, Second Affiliated Hospital, Chongqing Medical University, Chongqing 400010, China

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【Abstract】 Objective To analyze the short-term curative effect of sandwich technique in preserving internal iliac artery during endovascular treatment for abdominal aortic aneurysm(AAA) involving common iliac artery. **Methods** The clinical data of 9 patients with AAA involving common iliac artery, who were admitted to the Second Affiliated Hospital of Chongqing Medical University of China during the period from June 2016 to July 2018 to receive endovascular aortic repair(EVAR), were retrospective analyzed. Of the 9 patients, unilateral involvement of common iliac artery was seen in 3 and bilateral involvement of common iliac artery was seen in 6. During EVAR, reconstruction of internal iliac artery by using sandwich technique was carried out in all patients. All patients were followed up. The perioperative mortality, the curative effect of EVAR, the endoleak, the primary stent patency and the procedure-related complications were recorded. **Results** Successful EVAR and reconstruction of internal iliac artery with sandwich technique were accomplished in all 9 patients. No death occurred during perioperative period. Intraoperative immediate angiography showed that the stent patency rate was 100%, and the aneurysm cavity was successfully repaired in all patients. One patient developed type I leak and 2 patients developed type III leak, which disappeared spontaneously during follow-up period. Acute ischemia of left upper limb occurred in one patient and emergency repair of brachial artery had to be carried out. Hematoma formation at the incision of the left

brachial artery was seen in 3 patients, and hematoma formation at the puncture point of the right femoral artery was seen in 2 patients. Reexamination of CT angiography was performed at one week, 3 months and 6 months after EVAR, which demonstrated that the stent patency were 9 cases, 8 cases and 8 cases respectively. No symptoms of intestinal ischemia, spinal cord ischemia or paralysis were observed in all patients.

Conclusion In performing EVAR for AAA involving common iliac artery, in order to preserve internal iliac artery the use of sandwich technique is safe and feasible. The incidence of postoperative buttock claudication is low and the short-term stent patency rate is high. Therefore, this technique is worthy of clinical promotion, although its long-term effect needs to be clarified with further follow-up observation and large-sample clinical studies. (J Intervent Radiol, 2020, 29: 449-452)

【Key words】 sandwich technique; abdominal aortic aneurysm; internal iliac artery

随着介入技术不断发展, 主动脉腔内修复术(endovascular aortic repair, EVAR)已成为腹主动脉瘤(abdominal aortic aneurysm, AAA)一线治疗方案。据统计, AAA累及一侧髂总动脉可达43%, 累及双侧髂总动脉亦有11%^[1]。因此, 植入覆膜支架时远端需要更长锚定区, 往往需覆盖髂内动脉开口至髂外动脉。但覆盖髂内动脉可能带来一系列并发症, 如臀肌跛行、性功能障碍、肠缺血、脊髓缺血等^[2]。可见, EVAR术中至少保留一侧髂内动脉显得至关重要^[3]。目前髂内动脉重建技术主要包括喇叭口技术、髂动脉分支支架技术、三明治技术等^[4]。本研究回顾性分析重庆医科大学附属第二医院采用EVAR术和髂内动脉三明治重建技术治疗9例AAA患者的临床资料, 现将结果报道如下。

1 材料与方法

1.1 一般资料

收集2016年6月至2018年7月收治的9例AAA累及髂总动脉患者临床资料, 患者均为男性, 平均年龄72(54~80)岁。其中8例有吸烟史, 6例有高血压病史; 临床症状为腹部搏动性包块6例, 腹部疼痛3例, 下肢肢体无力1例, 便血1例。9例患者术前经主动脉CTA检查, 诊断为肾下型AAA。其中累及单侧髂总动脉3例, 双侧6例, 累及髂内动脉开口2例, 髂内动脉瘤1例; AAA最大直径59~67 mm, 髂总动脉最大直径39~58 mm, 髂外动脉直径37~55 mm, 髂内动脉直径27~42.4 mm。

1.2 手术方法

局部麻醉下取双侧股总动脉和左侧肱动脉入路, 前者采用Seldinger技术作穿刺, 预埋ProGlide血管缝合器, 后者在解剖游离后直视下穿刺; 根据术前CTA评估主体支架覆盖髂总动脉长度, 经右侧股总动脉释放腹主动脉支架主体(对6例累及双侧

髂总动脉患者释放主体支架前, 均予弹簧圈栓塞右侧髂内动脉), 分别经左侧肱动脉和右侧股动脉植入分支支架至髂内动脉和髂外动脉, 同时释放支架(表1); 复查造影, 评估手术效果; ProGlide血管缝合器缝合双侧股总动脉, 修复左侧肱动脉并逐层缝合切口, 压迫止血。术后根据患者血压状况控制血压, 出院后予长期抗血小板治疗。

表1 9例患者手术治疗情况

患者	髂内动脉处理方式		分支支架及大小/mm×mm	
	左侧	右侧	髂内动脉	髂外动脉
1	三明治技术	弹簧圈栓塞	Vinban 9×100	Vinban 10×100
2	三明治技术	弹簧圈栓塞	Fluency 10×60	Fluency 10×80
3	三明治技术	弹簧圈栓塞	Fluency 10×80	Fluency 10×80
4	三明治技术	弹簧圈栓塞	Viabahn 9×50	Viabahn 9×100
5	三明治技术	弹簧圈栓塞	Fluency 10×60	Fluency 10×80
6	三明治技术	弹簧圈栓塞	Fluency 10×50	Fluency 10×80
7	三明治技术	无处理	Viabahn 9×50	Viabahn 9×100
8	三明治技术	无处理	Fluency 10×50	Fluency 10×80
9	三明治技术	无处理	Viabahn 9×50	Viabahn 9×100

1.3 术后随访

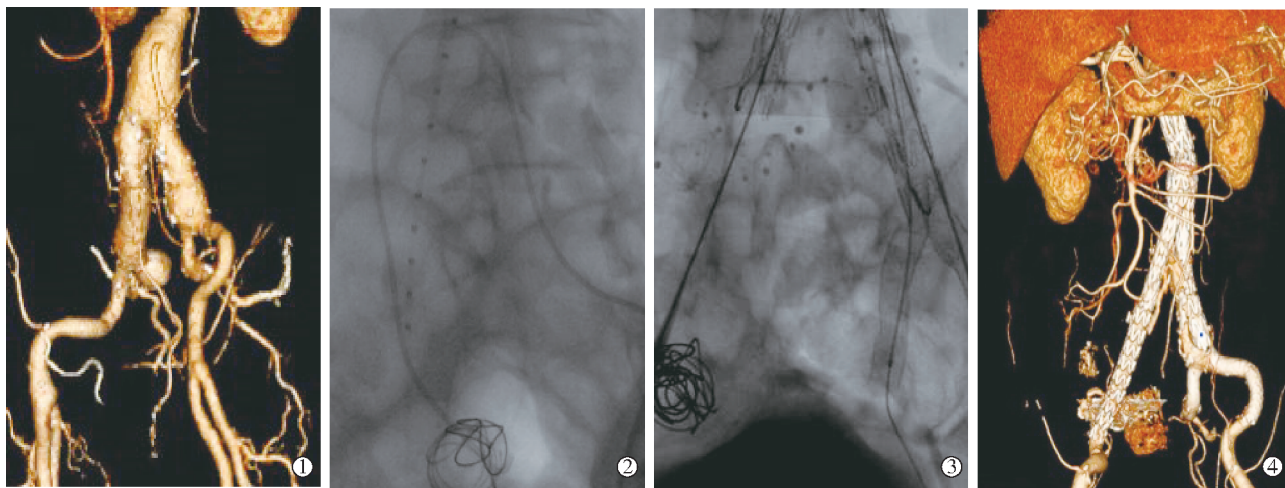
术后1周、3个月、6个月随访, 观察记录围手术期死亡率、腔内修复效果、内漏、支架一期通畅情况, 以及手术相关并发症(臀肌跛行、肠缺血、脊髓缺血、穿刺点血肿、肢体缺血等)、再次手术情况、影像学检查结果。

2 结果

9例患者EVAR术和髂内动脉三明治重建技术均获成功。围手术期无死亡, 术中即刻造影显示支架通畅率100%, 瘤腔均成功修复。出现1例Ⅰ型内漏, 2例Ⅲ型内漏, 未予特殊处理, 后期随访时自行消失; 1例左上肢急性缺血, 再次予急诊肱动脉修复术, 术后未出现肢体坏死和功能受限; 3例左侧肱动脉切口处血肿形成, 2例右侧股动脉穿刺点处血肿

形成。术后未出现臀肌跛行、肠缺血和瘫痪患者。术后 1 周、3 个月、6 个月复查 CTA 分别显示支架通畅 9 例、8 例、8 例;1 例术后 3 个月发现左侧髂内动脉

分支支架狭窄堵塞,有臀肌跛行症状和性功能障碍;患者均无肠缺血和脊髓缺血或瘫痪症状。典型病例见图 1。



①术前 CTA 示 AAA 累及双侧髂总动脉、右侧髂内动脉;②弹簧圈栓塞右侧髂内动脉;③三明治重建技术释放髂内动脉及髂外动脉分支支架;④术后 1 个月复查 CTA 示瘤腔修复

图 1 EVAR 术和髂内动脉三明治技术治疗 AAA 影像

3 讨论

髂内动脉是经骶髂关节前方由髂总动脉分出的一支重要血管,与腹主动脉一些分支如腰动脉、骶正中动脉等吻合,形成丰富的侧支循环,共同供血臀肌和盆底脏器。EVAR 手术时一些吻合支会被覆膜支架所覆盖,而髂内动脉对盆底脏器血供起着重要作用。以往对 AAA 累及髂总动脉患者通常直接选择栓塞或覆膜支架覆盖髂内动脉,封闭一侧或双侧髂内动脉可引起臀肌缺血、生殖系统缺血、肠系膜下动脉缺血、脊柱缺血等,从而导致跛行、性功能障碍、便血、瘫痪等一系列并发症发生^[5]。文献报道 EVAR 术封闭髂内动脉患者中约 28% 出现臀肌跛行,约 16% 臀肌跛行症状持续时间超过 1 年^[6]。为避免这种情况发生,三明治技术、喇叭口技术、髂动脉分支支架技术、潜望镜技术得以发展应用。

国外文献报道 EVAR 术中通过三明治技术重建髂内动脉以维持盆腔血运的经验以来,该技术在国内亦有所发展和应用,但相关文献报道甚少。Ricci 等^[7]报道 7 例髂总动脉瘤经三明治技术重建髂内动脉患者,随访 1 年无明显支架闭塞和内漏发生。Derubertis 等^[8]报道 22 例患者,技术成功率约 88%,支架通畅率约 95%;术中造影发现 2 例Ⅲ型内漏,2 例Ⅱ型内漏,1 例Ⅰ型内漏,其中Ⅲ型内漏随访中逐渐消失;2 例发生腹股沟血肿,2 例 2 周内发生支架闭塞,其余平均随访 7.2 个月未发现明显支

架闭塞;9 例栓塞一侧髂内动脉者中有 4 例出现同侧臀肌跛行。Pang 等^[9]报道随访 13 例患者,技术成功率 100%,4 例术后 1 个月发生Ⅰ型内漏,其中 3 例自行消失,1 例经弹簧圈栓塞后消失。

三明治技术在 AAA 累及髂总动脉腔内治疗中保留髂内动脉,符合人体生理解剖,顺向血流不改变血流动力学;操作简便,应用范围广,性价比高。然而,该技术有一定的缺点和局限性,如髂内和髂外动脉需有足够直径才能容纳覆膜支架,否则可能引起支架打开不完全,产生皱褶,甚至闭塞可能;连接部位与重叠部分紧密程度较为重要,以减少连接部位Ⅰ型内漏发生率^[10]。需要重视的是,与传统 EVAR 术不同,三明治技术需要在原有基础上增加一条肱动脉通路,肱动脉直径偏小或存在病变不适合该技术;术中通常需要解剖游离出肱动脉,动脉修复、伤口缝合、压迫等措施可能增加术后伤口感染、肱动脉穿刺点血肿、出血、急性上肢缺血坏死等并发症发生。本组有 1 例术后出现急性上肢缺血,再次肱动脉修复术后无明显肢体坏死和功能受限,因此操作过程中需要警惕。

总之,三明治技术在 AAA 累及髂总动脉腔内治疗中保留髂内动脉安全可行,术后臀肌跛行发生率低,近期随访支架通畅率可,值得临床推广,但远期效果尚需进一步随访及更大临床样本验证。

[参考文献]

- [1] Bleyn J, Schol F, Vanhandenhove I, et al. Side - branched modular endograft system for thoracoabdominal aortic aneurysm repair[J]. J Endovasc Ther, 2002, 9: 838-841.
- [2] Bratby MJ, Munneke GM, Belli AM, et al. How safe is bilateral internal iliac artery embolization prior to EVAR? [J]. Cardiovasc Intervent Radiol, 2008, 31: 246-253.
- [3] 包俊敏, 景在平, 赵志青, 等. II C 型腹主动脉瘤腔内隔绝术中髂内动脉的处理[J]. 介入放射学杂志, 2003, 12: 14-17.
- [4] 陈宏宇, 戴贻权, 郭平凡. EVAR 中保留髂内动脉的腔内手术技术[J]. 血管与腔内血管外科杂志, 2015, 1: 27-31.
- [5] 谷涌泉, 刘一人, 郭连瑞, 等. 主动脉腔内修复术中髂内动脉保留技术[J]. 介入放射学杂志, 2017, 26: 184-187.
- [6] Donas KP, Torsello G, Pitoulis GA, et al. Surgical versus endovascular repair by iliac branch device of aneurysms involving the iliac bifurcation[J]. J Vasc Surg, 2011, 53: 1223-1229.
- [7] Ricci C, Ceccherini C, Cini M, et al. Single-center experience and 1-year follow-up results of “sandwich technique” in the management of common iliac artery aneurysms during EVAR[J]. Cardiovasc Intervent Radiol, 2012, 35: 1195-1200.
- [8] Derubertis BG, Quinones - Baldrich WJ, Greenberg JI, et al. Results of a double-barrel technique with commercially available devices for hypogastric preservation during aortoiliac endovascular abdominal aortic aneurysm repair[J]. J Vasc Surg, 2012, 56: 1252-1259.
- [9] Pang H, Chen Y, He X, et al. Selection of stents by calculation of arterial cross-sectional area in modified sandwich technique for complex aortoiliac arterial lesions[J]. Ann Vasc Surg, 2019, 58:108-114.
- [10] 杨 剑, 郭 伟. Chimney 技术在主动脉腔内修复的研究现状[J]. 转化医学杂志, 2013, 2: 178-181.

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•病例报告 Case report•

海绵窦段动脉瘤破裂致颈内动脉海绵窦瘘 1 例

贺西亮, 潘 源, 王 宇, 于召虎, 李雅强, 辛 涛

【关键词】 海绵窦段动脉瘤; 颈内动脉海绵窦瘘; 神经介入

中图分类号:R739.41 文献标志码:D 文章编号:1008-794X(2020)-05-0452-02

Internal carotid cavernous fistula formation caused by ruptured aneurysm located at cavernous sinus segment: report of one case HE Xiliang, PAN Yuan, WANG Yu, YU Zhaochu, LI Yaqiang, XIN Tao.
Department of Neurosurgery, No.971 Hospital of Navy of Chinese People's Liberation Army, Qingdao, Shandong Province 266071, China

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【Key words】 aneurysm of cavernous sinus segment; internal carotid cavernous fistula; neurointervention

临床资料

患者男, 62 岁。因“突发头痛 16 h”入院。查体: 神志清楚, 左侧眼睑上提受限, 左侧眼球内收、上翻、下翻受限, 患侧视力下降。左侧眶周听诊未闻及明显血管杂音。

颅脑 CT 显示: 左侧海绵窦内出血。DSA 示: 左侧海绵窦内动脉瘤, 合并海绵窦瘘, 高速血流通过同侧岩下窦向静脉引流。治疗方案: 球囊辅助弹簧圈栓塞+球囊封堵颈内动脉

辅助 ONYX 胶注入+LVIS 支架植入术。具体步骤如下: 氯吡格雷 300 mg 联合阿司匹林肠溶片 300 mg 双抗, 2 h 后全身麻醉, 常规 6 F 通路以 Synchron 2 微导丝导引 Echlon-10 微导管进入动脉瘤, 充盈 ev3 HyperGlide 球囊, 弹簧圈填塞动脉瘤(图 1), Echlon 微导管造影显示瘘仍存在, 充盈球囊保护颈内动脉后经 Echlon 微导管注入 ONYX 胶, 植入 LVIS 支架 4.5 mm×20 mm, 术后造影显示动脉瘤及颈内动脉海绵窦