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一体式分叉型覆膜支架在腹主动脉
病变腔内修复中的应用

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【摘要】 目的 探讨一体式分叉型覆膜支架腔内修复腹主动脉病变的安全性、有效性及适合人群。**方法** 回顾性分析 2016 年 8 月至 2018 年 10 月采用一体式分叉型覆膜支架行腔内修复术治疗的 11 例腹主动脉病变患者临床资料, 其中腹主动脉夹层伴髂总动脉夹层 4 例(36.4%), 腹主动脉瘤 2 例(18.2%), 腹主动脉壁内血肿伴髂总动脉夹层、腹主动脉溃疡伴髂总动脉闭塞、髂总动脉夹层、腹主动脉瘤伴髂总动脉瘤、髂总动脉瘤各 1 例。评估手术治疗效果, 术后支架变形、移位及内漏, 支架内血流通畅情况, 观察术后并发症。**结果** 11 例患者腔内修复术均获成功, 围手术期未出现严重并发症。术后 3、6 个月无支架变形或移位发生, 支架内血流通畅率均为 100%, 无一例死亡。术后 3 个月发现 I 型内漏 1 例, 术后 6 个月复查时消失。术后 1 个月 1 例出现心力衰竭, 入院治疗后好转。**结论** 一体式分叉型覆膜支架治疗腹主动脉病变安全有效, 对入路血管损伤小、支架无移位, 适合于治疗局限性腹主动脉夹层、主髂分叉处直径较小的腹主动脉瘤等病变。

【关键词】 一体式分叉型覆膜支架; 血管内修复; 腹主动脉夹层; 解剖固定

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Clinical application of unibody bifurcated covered-stent in endovascular aortic repair of abdominal aortic lesions LIU Jiacheng, XIONG Bin, ZHOU Chen, MA Jinqiang, SHI Qin, YUAN Feng, XIONG Fu, KAN Xuefeng, ZHENG Chuansheng. Department of Radiology, Affiliated Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Hubei Provincial Key Laboratory of Molecular Imaging, Wuhan, Hubei Province 430022, China

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【Abstract】 Objective To discuss the efficacy, safety and suitable population of the use of unibody bifurcated covered-stent in endovascular aortic repair(EVAR) of abdominal aortic lesions. **Methods** The clinical data of 11 patients with abdominal aortic disease, who received EVAR with unibody bifurcated covered-stent during the period from August 2016 to October 2018, were retrospectively analyzed. The lesions included abdominal aortic dissection associated with common iliac artery dissection ($n=4, 36.4\%$), abdominal aortic aneurysm($n=2, 18.2\%$), hematoma in abdominal aorta wall with common iliac artery dissection($n=1, 9.1\%$), abdominal aortic ulcer with occlusion of common iliac artery ($n=1, 9.1\%$), common iliac artery dissection ($n=1, 9.1\%$), abdominal aortic aneurysm complicated by common iliac aneurysm($n=1, 9.1\%$), and common iliac aneurysm ($n=1, 9.1\%$). The curative effect of EVAR, stent deformation, stent displacement, endoleak, and the patency of blood flow in stent were assessed, the postoperative complications were recorded. **Results** Successful EVAR was accomplished in all 11 patients, and no severe perioperative complications occurred. At 3 months and 6 months after EVAR, no stent deformation or displacement was observed and the patency rate of blood flow in stent was 100%, and no death occurred. One patient developed type I endoleak in 3 months after EVAR, which disappeared in follow-up reexamination at 6 months after EVAR. One patient developed heart failure one month after EVAR, which was improved after the patient was admitted to receive treatment. **Conclusion** In treating abdominal aortic lesions with EVAR, the use of unibody bifurcated covered-stent is safe and effect.

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This technique has little damage to the approach vessels and the stent will not be displaced, therefore, it is suitable for localized abdominal aortic dissection as well as for the small abdominal aortic aneurysms located at the aortic-iliac bifurcation.(J Intervent Radiol, 2019, 28: 734-737)

【Key words】 unibody bifurcated covered - stent; endovascular repair; abdominal aortic dissection; anatomical fixation

主动脉腔内修复术(endovascular aortic repair, EVAR)在腹主动脉病变中的应用越来越广泛,其安全性和有效性得到多个研究证实并录入多国指南推荐^[1-4]。然而分体式支架 EVAR 仍为肾下主动脉直径相对较小和腹主动脉末端狭窄患者的主要解剖学禁忌证^[5],且术后支架移位率高^[6]。一体式分叉型覆膜支架对这类患者可能更为合适。本文回顾性研究探讨一体式分叉型覆膜支架治疗腹主动脉病变的安全性、有效性及适合人群。

1 材料与方法

1.1 患者基线资料

回顾性分析 2016 年 8 月至 2018 年 10 月入组的 11 例腹主动脉病变患者临床资料。入组患者均经 CTA 确诊为腹主动脉病变,有 EVAR 适应证^[7]并接受一体式分叉型覆膜支架修复。入组患者均签署知情同意书,一般特征见表 1。

1.2 手术方法

常规消毒、铺巾,两侧腹股沟区局部麻醉,支架入路侧顺皮纹 1 cm 皮肤切口,预置 Perclose ProGlide 血管缝合器(美国 Abbott 公司)2 把,置入 14 F 血管鞘;对侧穿刺置入 6 F 血管鞘,引入 5 F 猪尾导管至腹主动脉作动脉 DSA 造影,观察病变位置和长度;经 6 F 血管鞘引入导丝和多用途导管至对侧通道,经 14 F 血管鞘置入超硬导丝,送入一体式分叉型覆膜支架(AB 支架,微创医疗器械上海公司),于腹主动脉和双侧髂总动脉释放(髂内动脉是否栓塞在腹主动脉支架植入前确定并完成),复查造影,判断是否进一步加用延长型支架(cuff);术毕血管缝合器缝合血管,皮肤切口生物胶粘合,加压包扎。

1.3 术后处理与随访

术后所有患者住院观察 8~22 d,期间复查血常规、凝血功能等指标,监测血压,予抗凝、溶栓、镇痛等对症支持治疗,控制收缩压在 120 mmHg (1 mmHg=0.133 kPa)以内^[5]。

出院后每月定期电话随访,了解患者戒烟,控制血压,生活质量和中远期并发症发生情况。术后

表 1 患者基线特征

特征	n=11
性别/n(%)	
男	9(81.8)
女	2(18.2)
年龄/岁	58.5±18.9(25~79)
CTA 诊断/n(%)	
腹主动脉夹层伴髂总动脉夹层	4(36.4)
腹主动脉瘤	2(18.2)
腹主动脉壁内血肿伴髂总动脉夹层	1(9.1)
腹主动脉溃疡伴髂总动脉闭塞	1(9.1)
髂总动脉夹层	1(9.1)
腹主动脉瘤伴髂总动脉瘤	1(9.1)
髂总动脉瘤	1(9.1)
伴发疾病/n(%)	
高血压	5(45.5)
糖尿病	3(27.3)
腹主动脉病变/mm	
最大内径	25.9±7.7
最小内径	17.7±4.1
长度	83.0±64.4
左髂动脉病变/n(%)	7(63.6)
病变长度/mm	33.1±19.9
右髂动脉病变/n(%)	6(54.5)
病变长度/mm	37.0±21.5
住院时间/d	13.7±4.9

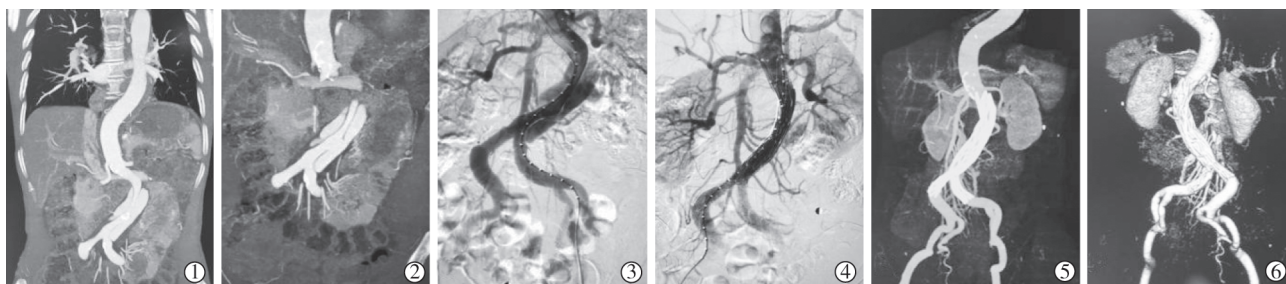
1、3、6、12 个月复查 CTA,观察支架内血流通畅情况,支架移位、变形及内漏发生情况。支架移位定义:近端锚定区和低位肾动脉间距离与基线 CTA 相比>10 mm^[5]。内漏定义:EVAR 术后残余动脉瘤囊持续灌注(分为 5 型)^[8]。

2 结果

11 例患者 EVAR 术均获成功,术中共植入 AB 支架 11 枚。支架主体直径 20~26 mm,分支直径 12~14 mm,支架总长度为 180~200 mm。2 例(18.2%)患者加用延长型支架各 1 枚,3 例(27.3%)患者加用髂内动脉型延长支架共 5 枚,3 例(27.3%)患者接受弹簧圈一侧髂内动脉封堵。1 例患者支架上缘(裸区)略超过低位肾动脉开口,余 10 例支架上缘均位于低位肾动脉以下,低位肾动脉开口距支架上缘

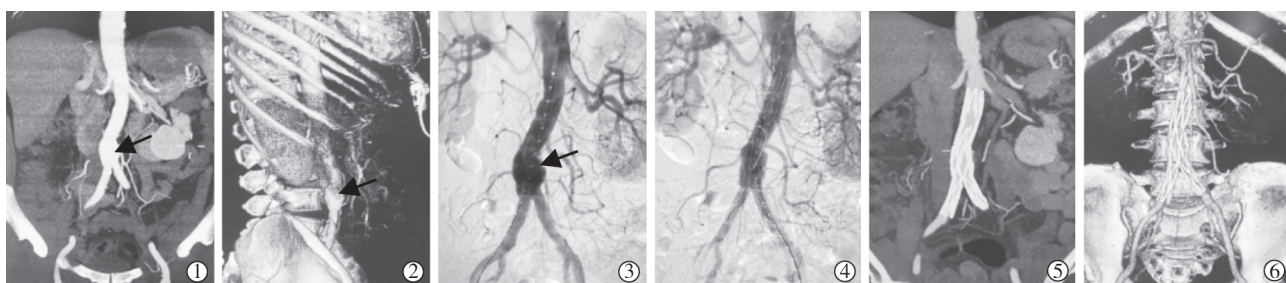
平均距离为 (7.6 ± 6.2) mm。主支架直径平均值为 (20.9 ± 2.1) mm, 腹主动脉近端锚定区平均直径为 (18.8 ± 4.0) mm。围手术期患者均未出现心肌梗死、

肾衰竭、呼吸衰竭等严重并发症,有 4 例(36.4%)出现腹部不适、发热等支架植入后综合征表现,对症处理后转归正常。(图 1、2)



患者女,59岁:①②术前CTA检查示腹主动脉、髂总动脉夹层;③DSA造影示腹主动脉、髂总动脉夹层;④一体式分叉型覆膜支架植入后造影示支架位置满意;⑤⑥术后3个月支架内血流通畅,支架未见移位、变形,未见内漏发生

图1 一体式分叉型覆膜支架治疗腹主动脉、髂总动脉夹层影像



患者女,67岁:①②术前CTA示腹主动脉瘤;③DSA造影示腹主动脉瘤;④一体式分叉型覆膜支架植入后造影示支架位置满意;⑤⑥EVAR术后6个月支架内血流通畅,支架未见移位、变形,未见内漏发生

图2 一体式分叉型覆膜支架治疗腹主动脉瘤影像

术后3、6个月所有患者支架内血流通畅,通畅率均为100%,无一例死亡;所有支架未发生变形或移位。术后3个月发现I型内漏1例(9.1%),术后6个月复查时消失,未发现其它类型内漏。术后1个月1例(9.1%)出现心力衰竭,入院治疗后好转。

3 讨论

1991年临床上首次应用EVAR治疗腹主动脉瘤以来,该技术改进持续开展。一项多中心对照研究表明EVAR治疗肾下型腹主动脉瘤与开放手术相比,术后2年生存率相同,术后30d病死率较低^[9]。EVAR能够减少失血和并发症发生,加快患者恢复,减少住院时间^[10]。EVAR手术成功需有合适的近端和远端锚定区,以便植入支架固定并完全密封于血管壁。各种植入物具有不同的固定至血管壁方法,近端固定方法分为肾上和肾下固定。研究表明肾上固定较肾下固定有高于3倍的肾梗死风险^[11]。

肾下固定覆膜支架包括分体式分叉型和一体式分叉型。与分体式分叉型覆膜支架相比,应用一体式分叉型覆膜支架可缩短手术时间,减少I型内

漏和支架移位发生,更适于困难瘤颈,其EVAR适应证扩大^[12]。一体式分叉型覆膜支架模仿人体腹主动脉解剖学形态,可直接固定于腹主动脉分叉处,被称作“解剖学固定”。这种通过主支架末梢固定可有效防止近端锚定区内漏,并有效抵消动脉血流造成的冲击力,防止支架远处移位。本组患者术后3、6个月均未发生支架变形和移位,支架内血流通畅率为100%;术后3个月发现I型内漏1例(9.1%),但于术后6个月消失。

腹主动脉EVAR成功的关键,在于准确评估其解剖学特征,提前规划支架释放;支架近端锚定区不应覆盖肾动脉或腹主动脉其它分支开口,一般选择支架的直径比腹主动脉近端锚定区直径大10%~20%^[13]。本组患者术前均通过CTA和DSA检查评估肾动脉开口距主动脉分叉处距离,且选择合适的支架规格——腹主动脉近端锚定区平均直径为 (18.8 ± 4.0) mm,主支架平均直径为 (20.9 ± 2.1) mm,支架直径均值比腹主动脉锚定区直径均值大11.2%;低位肾动脉开口距支架上缘平均距离为 (7.6 ± 6.2) mm,随访期间所有患者均未出现肾动脉

缺血和相关并发症。

尽管越来越多腹主动脉病变患者接受 EVAR 治疗,但受诸多解剖因素如腹主动脉直径过小或未稍狭窄限制,部分患者不适用于传统支架植入治疗。如果远端主动脉腔直径小于支架直径,植入对侧肢体的分体式支架可能由于血管壁挤压而无法展开,这种解剖学情况下即便支架植入成功,也很容易导致支架变形和支架内血栓形成,比如在单纯腹主动脉夹层。本组腹主动脉夹层患者有 4 例,组中比例最高。目前文献报道中一体式支架主要应用于动脉瘤,鲜见用于腹主动脉夹层。文献报道可应用主动脉内置分体式支架的髂动脉最小直径至少为 8 mm,主动脉分叉最小直径至少为 18 mm^[14]。因此对于髂动脉直径<8 mm,腹主动脉直径<18 mm 患者,不推荐应用分体式分叉型覆膜支架。但一体式分叉型覆膜支架不存在此类限制。本组患者腹主动脉最小直径均值为(17.7±4.1) mm,接受一体式分叉型覆膜支架手术均获成功,术后复查造影未出现内漏和肾动脉开口堵塞。

本组患者术后 3、6 个月无一例死亡,围手术期未发现严重并发症,随访期间仅发现 1 例(9.1%)心力衰竭,入院治疗后好转。可见,一体式分叉型覆膜支架治疗腹主动脉和髂动脉病变后内漏和并发症发生率较低,且对入路血管损伤较小、支架无移位,适用于局限性腹主动脉夹层、主髂动脉分叉处直径小的腹主动脉瘤等病变,是一项安全有效的治疗方法。手术操作过程中尚需注意根据影像学资料提前规划支架选择和植入,如果患者两侧髂动脉角度过大甚至呈 180°,须将支架偏向近心端植入,避免支架植入后扭曲挤压变形,影响血流通畅。

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