·临床研究·

复杂 TASC D 级髂股动脉病变的杂交手术治疗

王曰伟,李永欣,李长风,张中旺,李君,王豪夫*
(青岛大学附属医院血管外科,青岛 266003)

【摘 要】 **目的** 研究杂交手术治疗复杂泛大西洋学会共识(TASC)D 级髂股动脉病变的安全性和中期效果。**方法** 回顾性分析 2007 年 1 月至 2013 年 12 月青岛大学附属医院收治的复杂 D 级髂股动脉病变患者 27 例,根据 CT 血管成像(CTA)和 TASC 病变分级原则,C 级主髂动脉病变合并 D 级股腘动脉病变 14 例,D 级主髂动脉病变合并 C 级股腘动脉病变 7 例,D 级主髂动脉病变合并 D 级股腘动脉病变 6 例;所有患者行杂交手术同期处理主髂和股腘动脉病变。记录患者术前、术后 6、12、24 和 36 个月的踝肱指数(ABI),并分析术前、术后 12、24 和 36 个月的通畅率。计量资料组间比较采用 t 检验,通畅率采用 Kaplan-Meier生存曲线分析。**结果** 对于主髂动脉病变,术中分别或联合行主股动脉旁路、髂动脉支架植入、股股动脉旁路及内膜剥脱或取栓术;对于股腘动脉病变,术中分别或联合行股腘动脉旁路、动脉内膜剥脱、股深动脉成形、取栓、球囊扩张及支架植入。围手术期无死亡及大并发症发生。术后 6、12、24 和 36 个月的患者 ABI(0.91 ± 0.16、0.85 ± 0.14、0.82 ± 0.17、0.77 ± 0.13)比术前(0.47 ± 0.24)显著升高,差异有统计学意义(P < 0.01)。术后 12、24 和 36 个月通畅率分别为 95.7%、80.2% 和 72.9%。**结论** 杂交手术治疗复杂 TASC D 级髂股动脉病变安全,中期效果好,尤其适合于高龄、高危患者。

【关键词】 动脉硬化,闭塞性; TASC D 级; 杂交手术
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Hybrid surgery for complex TASC type D iliac and femoral occlusive disease

WANG Yue-Wei, LI Yong-Xin, LI Chang-Feng, ZHANG Zhong-Wang, LI Jun, WANG Hao-Fu*
(Department of Vascular Surgery, the Affiliated Hospital of Qingdao University, Qingdao 266003, China)

【**Abstract**】 **Objective** To determine the safety and midterm efficacy of hybrid surgery for complex Trans-Atlantic Inter-Society Consensus (TASC) type D iliac and femoral occlusive lesions. **Methods** Twenty-seven patients with complex type D iliac and femoral lesions admitted in our department from January 2007 to December 2013 were recruited in this study. According to the results of computed tomography angiography (CTA) and TASC recommendation, the patients were assigned into groups of aorto-iliac C type plus femoropopliteal D type segment lesions (n = 14), aorto-iliac D type plus femoro-popliteal C type segment lesions (n = 7), and aorto-iliac D type plus femoro-popliteal D type segment lesions (n = 6), and all of them underwent hybrid surgery for aorto-iliac and femoro-popliteal lesions simultaneously to improve the inflow and outflow. Ankle-brankial index (ABI) before and in 6, 12, 24, and 36 months after surgery, and preoperative and postoperative patency rates (12, 24, and 36 months) were recorded and analyzed. SPSS statistics 16.0 was used to perform the statistical analysis. Student's t test was employed in intergroup comparison for measurement data. Kaplan-Meier survival analysis was adopted to analyze the patency rate. **Results** For aorto-iliac lesions, aorto-femoral artery bypass, iliac artery stenting, crossover femoro-femoral bypass, and endarterectomy or thrombectomy were performed respectively or in combination. For femoro-popliteal lesions, femoro-popliteal bypass, endarterectomy, femoral profundaplasty, thrombectomy, balloon dilatation and stent implantation were chosen respectively or in combination. No peri-operative death or major complications was observed. ABI was significantly increased in 6, 12, 24, and 36 months after surgery (0.91 ± 0.16, 0.85 ± 0.14, 0.82 ± 0.17, 0.77 ± 0.13 *vs* 0.47 ± 0.24, P < 0.01). The patency rate was 95.7%, 80.2% and 72.9% respectively in 12, 24, and 36 months postoperatively. **Conclusion** Hybrid surgery is safe and has good midterm outcomes for the patients with complex type D iliac and femoral lesions, especially for high-risk older patients.

【**Key words**】 arteriosclerosis obliterans; TASC type D; hybrid surgery

Corresponding author: *WANG Hao-Fu*, *E-mail*: *wanghf2003@126.com*

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通信作者: 王豪夫, E-mail: wanghf2003@126.com

随着人口老龄化和代谢异常导致的发病率增高,下肢动脉硬化性闭塞症(arteriosclerosis obliterans,ASO)已成为老年人突出的问题,其中 >70 岁的老年人患病率达 20%[1]。动脉闭塞引起下肢缺血症状,轻则间歇性跛行,重则静息痛、肢体坏疽,严重影响患者生活质量。严重肢体缺血(critical limb ischemia,CLI)患者 1 年截肢率 27%,5 年死亡率 46%[2]。对于 ASO 的治疗,泛大西洋学会共识(Trans-Atlantic Inter-Society Consensus, TASC) Ⅱ[3] 根据病变的部位、程度和范围进行了分级,并推荐了相应的治疗原则,A 级、B 级和高危 C 级病变首选血管腔内治疗,D 级病变首选手术治疗。随着腔内技术和器材的发展,如支架植入、斑块旋切、血栓抽吸、准分子激光消融、药物涂层球囊[3-7],目前腔内治疗已成为 D 级病变的重要手段,但尚未有大数据支持和指南推荐 D 级病变首选腔内治疗。而对于复杂 D 级病变,即主髂动脉或股腘动脉 D 级病变分别合并流出道或流入道 C 级以上病变,病变广泛复杂,需要同期处理主髂动脉和股腘动脉病变,改善流入道或流出道。单纯腔内治疗成功率低,操作复杂,单纯手术创伤大,患者难以耐受,因此,对于该类患者尤其还多合并基础疾病和全身血管病变的患者进行治疗乃是血管外科医师比较纠结的临床问题。我科根据病变部位、类型和患者身体状况,采取手术和腔内联合方式共治疗复杂 D 级髂股动脉病变 27 例,取得良好效果,报道如下。

1 对象与方法

1.1 研究对象

回顾性分析 2007 年 1 月至 2013 年 12 月期间我院接收的 27 例复杂 TASC D 级病变患者,男性 25 例,女性 2 例;年龄 62 ~ 89(75.1 ± 7.3)岁;患者 Rutherford[3] Ⅲ、Ⅳ、Ⅴ级分别有 10、12 和 5 例,合并症包括高血压 19 例,冠心病 9 例,2 型糖尿病11 例,脑栓塞 5 例,高脂血症 9 例,吸烟 15 例。入组患者均为复杂 D 级髂股动脉病变,即 D 级主髂动脉病变合并 C 级或 D 级股腘动脉病变或 D 级股腘动脉病变合并 C 级主髂动脉病变。

1.2 方法

所有患者术前行 CT 血管成像(computed tomography angiography, CTA),根据 TASC 病变分级原则,将患者分为 C 级主髂动脉病变合并 D 级股腘动脉病变 14 例,D 级主髂动脉病变合并 C 级股腘动脉病变 7 例,D 级主髂动脉病变合并 D 级股腘动脉病变 6 例。因为患者均是复杂 D 级病变,合并流出道或流入道 C 级以上病变,我科根据病变类型和患者身体状况采取个体化治疗,选择创伤较小的手术方式;记录术前、术后 6、12、24 和 36 个月踝肱指数(ankle-brankial index, ABI),并分析术前及术后随访 12、24 和 36 个月的通畅率。

1.3 统计学处理

采用 SPSS 16.0 软件对数据进行分析,计量资料采用均数 ± 标准差($\bar{x} \pm s$)表示,组间比较采用 t 检验。通畅率采用 Kaplan-Meier 生存曲线进行分析。$P < 0.05$ 为差异有统计学意义。

2 结 果

2.1 术中所见

C 级主髂动脉病变合并 D 级股腘动脉病变 14 例。其中 8 例行髂动脉支架植入、股深动脉成形、股腘动脉旁路;C 级主髂动脉病变包括单侧髂外动脉长段狭窄(3 例)及单侧髂外动脉闭塞累及髂内动脉或股总动脉近端(5 例),D 级股腘动脉病变是股浅动脉全程闭塞,股深动脉狭窄且膝关节动脉网存在。髂动脉支架植入后行股深动脉成形、股腘动脉人工血管旁路,其中 3 例直视下顺行穿刺股总动脉吻合口近端前外侧壁,置入导管鞘于人工血管内,行下肢动脉造影、膝下动脉球囊扩张(图 1)。其余 6 例行髂动脉取栓、支架植入、股腘动脉人工血管旁路;C 级主髂动脉病变表现为髂外动脉闭塞累及股总动脉,D 级股腘动脉病变表现为股浅动脉全程闭塞;术中发现股总动脉血栓,切开股总动脉,行髂动脉导管取栓、球囊扩张、支架植入,后行股腘动脉人工血管旁路,其中 2 例术中穿刺股总动脉,行膝下动脉球囊扩张(图 2)。

D 级主髂动脉病变合并 C 级股腘动脉病变 7 例。D 级主髂动脉病变是患侧髂及髂外动脉闭塞,其中对侧髂动脉狭窄 1 例, 髂动脉瘤 1 例; C 级股腘动脉病变是股浅动脉多发狭窄和闭塞。双侧腹股沟切口,游离股动脉,若对侧髂动脉正常,直接行股股动脉人工血管旁路;若对侧髂动脉狭窄,先行髂动脉支架植入,再行股股动脉人工血管旁路,后直视下顺行穿刺患侧股总动脉吻合口近端前外侧壁,行股浅动脉球囊扩张、支架植入(图 3)。

D 级主髂动脉病变合并 D 级股腘动脉病变 6 例。其中 2 例单侧髂总动脉远段和髂外动脉全程闭塞,胫后动脉受累 1 例,胫前动脉和腓动脉同时受累 1 例;游离患侧股动脉,先用取栓导管取出髂动脉血栓,若取栓导管无法通过髂动脉闭塞段,导管、导丝通过后,再交换取栓导管,残余闭塞和狭窄支架植入,

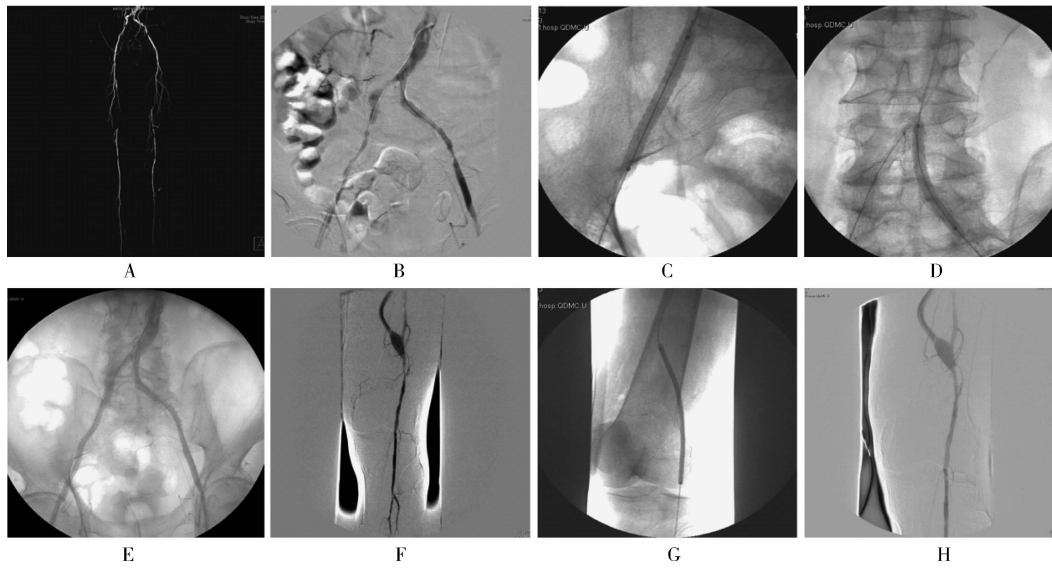


图1 C级主髂动脉病变合并D级股腘动脉病变杂交手术

Figure 1 Hybrid surgery of type C aorto-iliac lesion and type D femoro-popliteal lesion

A: CT angiography shows occlusive lesions of the iliac and femoral artery; B: stenosis and occlusion of the bilateral iliac artery (DSA); C: balloon dilation of the right iliac artery after stenting; D: balloon dilation of the left iliac artery after stenting; E: the patent iliac artery after stenting (DSA); F: severe stenosis of the popliteal artery distal to the anastomosis after femoro-popliteal bypass and endarterectomy (DSA); G: balloon dilation of the popliteal artery; H: the patent popliteal and peroneal artery (DSA). DSA: digital subtraction angiography

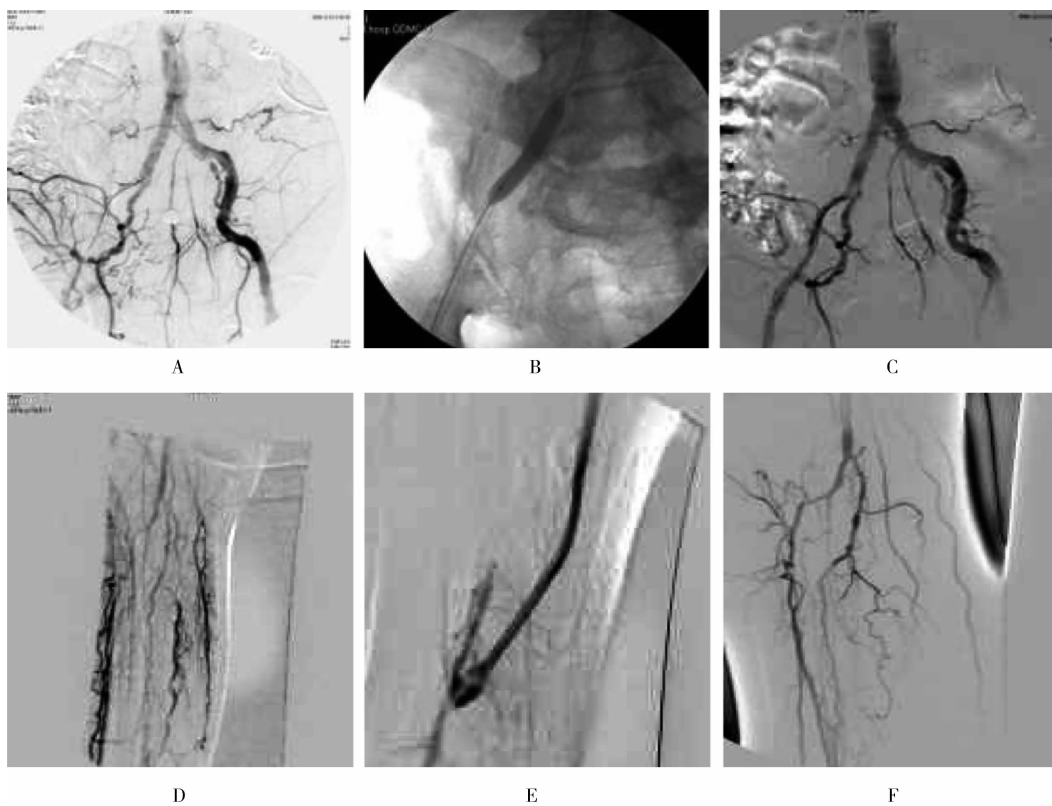


图2 C级主髂动脉病变合并D级股腘动脉病变杂交手术

Figure 2 Hybrid surgery of type C aorto-iliac lesion and type D femoro-popliteal lesion

A: occlusive lesion of the right iliac artery involving the common femoral artery (DSA); B: balloon dilation of the iliac artery after thrombectomy of the iliac artery; C: the patent right iliac artery after stenting (DSA); D: extensive occlusive lesions below the knee after femoro-popliteal bypass (DSA); E: the patent popliteal artery after balloon dilation (DSA); F: the patent arteries bellow the knee (DSA). DSA: digital subtraction angiography

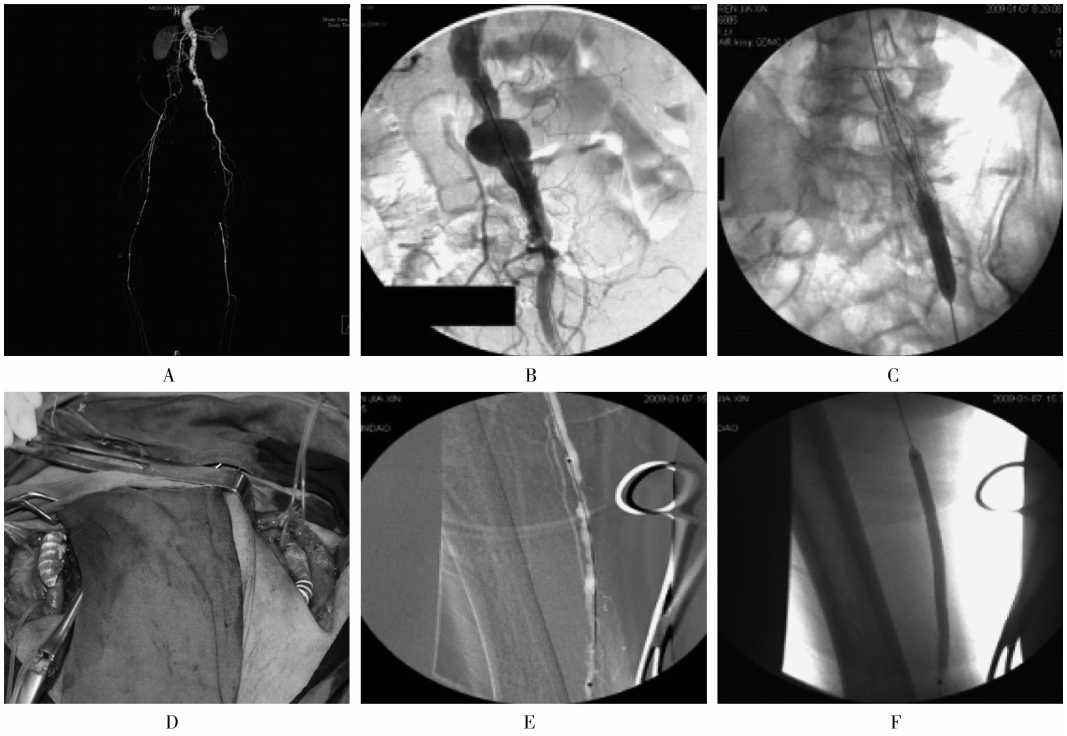


图 3 D 级主髂动脉病变合并 C 级股腘动脉病变杂交手术

Figure 3 Hybrid surgery of type D aorto-iliac lesion and type C femoro-popliteal lesion

A: CT angiography shows occlusive lesions of the iliac and femoral artery associated with the left iliac atrey aneurysm; B: the left iliac artery aneurysm and occlusive lesion of the right iliac artery(DSA); C: balloon dilation after stent-graft of the left iliac artery; D: femoro-femoral bypass with prosthesis; E: stenosis and occlusion of the right femoral artery(DSA); F: balloon dilation of the femoral artery. DSA: digital subtraction angiography

后行股腘动脉人工血管旁路,再直视下顺行穿刺股动脉,置入导管鞘于人工血管内,行膝下动脉球囊扩张。2 例患侧髂动脉全程闭塞,对侧髂动脉狭窄,行对侧髂动脉支架植入、股股动脉人工血管旁路、股腘动脉人工血管旁路,其中 1 例行股深动脉成形、膝下动脉球囊扩张。2 例主髂动脉闭塞,行腹主动脉切开取栓、闭塞侧股动脉切开取栓,再行主股动脉人工血管旁路。直视下顺行穿刺吻合口近侧股动脉前外侧壁,行下肢动脉造影、球囊扩张、股动脉支架植入(图 4)。术中主髂动脉病变经肱动脉穿刺建立通路 4 例;髂动脉植入覆膜支架 8 例,其中 Fluency 3 例,Viabahn 5 例;股股动脉旁路人工血管为 8 mm×40 cm外支撑环(巴德),股腘动脉旁路人工血管为 6 mm×50 cm 袖状碳涂层(巴德),股动脉内膜剥脱 9 例,腘动脉内膜剥脱 6 例。

2.2 围手术期情况

围术期并发症:1 例股动脉穿刺点假性动脉瘤,行修补术;1 例左侧臀部血肿,行臀下动脉栓塞术;无死亡病例。随访 9~43(25.48±9.4)个月,失访 2 例,死亡 2 例。

2.3 患者 ABI 及通畅率

患者 6、12、24 和 36 个月 ABI(0.91±0.16、0.85±0.14、0.82±0.17、0.77±0.13)比术前(0.47±0.24)均显著升高,差异有统计学意义($P<0.01$);术后 ABI 有下降趋势,但差异无统计学意义($P>0.05$)。术后 12、24、36 个月通畅率分别为 95.7%、80.2%、72.9%(图 5)。

3 讨 论

D 级髂股动脉病变的特点是闭塞段长,多部位、多节段性病变,合并流出道和流入道病变,其术后通畅率要低于其他类型病变。流出道差是动脉重建后再狭窄的独立危险因素[8],通过杂交治疗能够改善流出道和流入道[9]。因此,对于 D 级髂股动脉病变,要同期开通流入道或流出道,解决血流的高阻力,维持远期通畅。随着器材发展和腔内技术进步,D 级病变开通成功率提高,文献报道其通畅率不亚于旁路手术,且并发症少于传统手术,提出修正 TASC Ⅱ[10],但是缺乏大数据和随机对照试验支持,因此我们遵循 TASC Ⅱ 推荐,根据病变部位、程度和患者状况,选择合适的个体化治疗方案。患者术后 1、2 和 3 年通畅率分别达到 95.7%、80.2% 和 72.9%,溃疡肢体愈合,静息痛消失,生活质量得到改善。

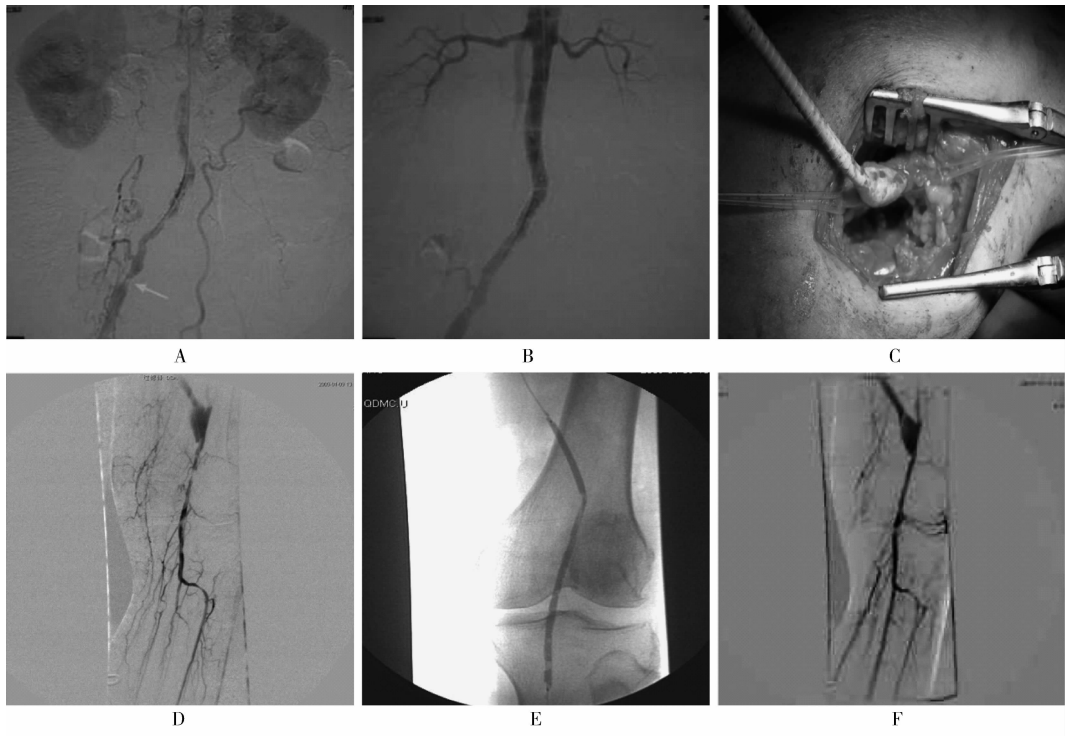


图4 D级主髂动脉病变合并D级股腘动脉病变杂交手术

Figure 4 Hybrid surgery of type D aorto-iliac lesion and type D femoro-popliteal lesion

A: stenosis of the abdominal aortic and right iliac artery, occlusion of the left iliac artery(DSA); B: the patent abdominal aortic and right iliac artery after stenting(DSA); C: the anastomosis of the popliteal artery of femoro-popliteal bypass; D: severe stenosis of the popliteal artery distal to the anastomosis (DSA); E: balloon dilation of the popliteal artery; F: the patent popliteal and peroneal artery after balloon dilation(DSA). DSA: digital subtraction angiography

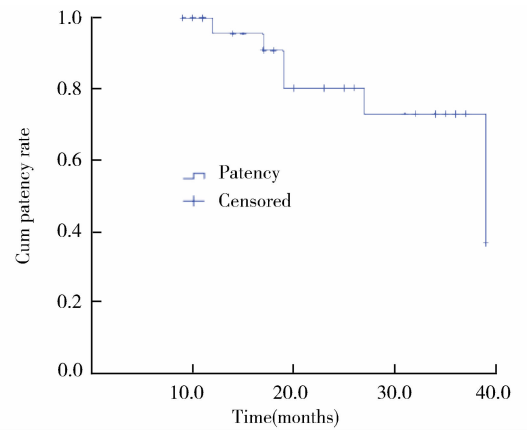


图5 D级髂股动脉病变患者术后通畅率

Figure 5 The patency rate of type D iliac and femoral lesions after operation

对于D级主髂动脉病变,尽管主股动脉旁路通畅率高于腔内治疗和解剖外旁路(包括股股动脉旁路,腋股动脉旁路),但是创伤大,并发症多,死亡率高,不能及早恢复日常活动,本组病例为多节段D级病变,其他脏器血管如心、脑和肾存在不同程度病变,多不能耐受主股动脉旁路。因此,高龄、高危D级病变多选择单侧髂动脉支架置入、股股动脉旁路。部分C级、D级病变是动脉狭窄或闭塞基础上继发了血栓形成,缩小了动脉管径,增加了病变段长度,造成一种假象,应先行导管取栓,将其转变为B级,甚至A级病变,再行球囊扩张或支架植入。对于髂外动脉闭塞累及股总动脉的病变,行股动脉内膜剥脱。文献报道髂动脉闭塞杂交手术(髂动脉支架、股动脉内膜剥脱)住院时间短,并发症少,与开放手术相比,早期和远期效果类似,对于高危手术患者应当考虑杂交手术[11,12]。同时警惕髂动脉取栓、球囊扩张导致破裂可能,因此对于环状钙化,取栓过程中取出动脉内膜,首选植入覆膜支架[13]。

对于D级股腘动脉病变,首选股腘动脉旁路,大隐静脉作为旁路移植物远期通畅率高于人工血管,但是部分患者缺乏合适静脉移植物,创伤较大,且针对膝关节以上水平,人工血管通畅率达到了静脉移植物水平,因此我们采用袖状接头碳涂层人工血管,远端吻合口位于膝关节以上。对于合并膝下动脉病变,单纯股腘动脉旁路无法保证高的通畅率,需要同期开通膝下动脉,至少保证一条通畅的流出道血管[14,15]。吻合口处腘动脉严重狭窄,行内膜剥脱,吻合口远端腘动脉球囊扩张。股浅动脉闭塞,股深动脉开口或近段狭窄,导致通过侧支循环的血流

减少,影响手术的通畅率,因此需行股深动脉成形来作为主髂动脉手术的流出道或股腘动脉旁路的流入道,其适用于股深动脉开口及近段狭窄、膝关节动脉网存在的患者。我们采取的手术方式是根据股深动脉狭窄长度,自股浅动脉开口以远切断,剥脱内膜,将股总、股深、股浅动脉"人"字形剖开,股深动脉成形,扩大股深动脉开口及起始段,增加股深动脉供血,通过其侧支提高肢体远端血流灌注压力,维持肢体存活的重要血供来源。

此外,术中直视下穿刺股动脉,为血管腔内治疗提供了便利,避免了邻近组织的损伤,减少穿刺引起的并发症。抗凝治疗至关重要,复杂D级病变合并流入道和流出道病变,流入血流慢,流出血流高阻力,导致血流淤滞,极易形成血栓,术中、术后均需要肝素抗凝治疗,预防血栓形成。若术中造影发现残存血栓,留置导管鞘、溶栓导管,泵入尿激酶,择期复查造影、二期处理。

复杂D级髂股动脉病变累及主髂动脉和股腘动脉,是多节段病变,需要同期处理流入道和流出道,以获得远期通畅。根据TASC Ⅱ推荐的治疗原则,术前评估患者的基础状态和病变的位置、范围、程度,选择合适的杂交治疗,降低麻醉和手术的打击,相对安全,中期效果好,尤其适合于下肢严重缺血、高龄、高危患者。

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