

• 血管介入 Vascular intervention •

腹主动脉瘤腔内修复术 22 例围手术期处理
回顾性总结

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【摘要】 目的 总结腹主动脉瘤腔内修复术(EVAR)围手术期处理的临床经验。**方法** 回顾分析 22 例腹主动脉瘤患者 EVAR 临床经过,通过术前对主要脏器功能进行评估和保护,CTA 测量近远侧瘤颈长度、直径、角度和构型,瘤体与分支动脉的关系,最低肾动脉开口至腹主动脉分叉的距离,导入途径的直径、扭曲和钙化程度。根据 CTA 测量结果,选择覆膜支架和手术方式。术时采用局麻 20 例,中转全麻 1 例,1 例通过髂总动脉重建导入途径采用硬膜外麻醉,1 例合并 Stanford A 型主动脉夹层,术时采用全麻。在支架释放前准确定位最低肾动脉位置,至少保留一侧通畅的髂内动脉,若双侧需要覆盖,分期覆盖或髂内动脉重建。支架植入后复查造影,有无内漏,正确判断内漏类型并进行相应处理。支架近端 I 内漏 2 例,球囊扩张 1 例,植入 Cuff 1 例;支架远端 I 内漏 1 例,球囊扩张时,动脉破裂,行人工血管补片修补术;Ⅲ型内漏 3 例,球囊扩张后支架植入 1 例。1 例合并 Stanford A 型主动脉夹层先行胸主动脉腔内修复术,后行 EVAR。术后 7 ~ 10 d 复查 CTA,以后每年复查 1 次。**结果** EVAR 手术全获成功。主要并发症为单侧髂肢扭转继发血栓形成,Fogarty 导管取栓并支架植入 1 例;腹壁切口裂开 1 例,清创缝合;无手术死亡,随访 6 个月 ~ 5 年,患者均存活。**结论** CTA 图像质量高、测量准确,是 EVAR 术前评估和术后随访的金标准。EVAR 是高危、高龄腹主动脉瘤患者有效的治疗方法。

【关键词】 主动脉瘤, 腹; 主动脉瘤腔内修复术; CTA; 围手术期处理

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【Abstract】 Objective To summarize the clinical experience of perioperative management in performing endovascular abdominal aortic aneurysm repair (EVAR). **Methods** EVAR was performed in 22 patients with abdominal aortic aneurysm. The clinical data were retrospectively analyzed. Before treatment the functions of main organs were evaluated and certain measures were adopted in order to protect them. Useful parameters, including the length, diameter, angle and configuration of the proximal and distal aneurysmal neck, the relationship of the aneurysm to aortic branches, the distance from the lowest renal artery to the bifurcation of abdominal aorta, and the quality of access vessels (such as diameter, tortuosity and calcification degree) were determined and assessed with CTA. According to the parameters thus obtained, the suitable stent-graft with ideal diameter and length was selected, and the optimal surgery pattern was employed. Local anesthesia was employed in 20 patients, among them the local anesthesia had to be changed to general anesthesia in one. Epidural anesthesia was carried out in one patient through the surgically-reconstructed iliac artery access, and general anesthesia was employed in one patient who had Stanford type A aortic dissection. The lowest renal artery must be accurately localized before deployment of stent-graft was started. At least one patent internal iliac artery should be reserved when bilateral internal iliac arteries needed to be covered, to be covered by stages or to be reconstructed. After stent-graft placement, angiography must be performed to find out if there was any endoleak and, if any, to determine the type of endoleak and to deal with it properly. Two cases had proximal type I endoleak, so balloon dilation was employed in one and cuff

implantation in another one. Distal type I endoleak occurred in one case, but, unfortunately, the iliac artery ruptured when

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balloon dilation was employed, therefore the patient had to receive vascular repair with prosthesis. Three cases developed type III endoleak. Balloon dilation followed by additional stent-graft placement was adopted in one case. Thoracic endovascular aortic repair with subsequent EVAR was carried out in another patient with Stanford type A aortic dissection. Re-examination with CTA was performed 7 – 10 days after the treatment, and once a year thereafter. **Results** EVAR was successfully completed in all patients. The main complications included thrombosis due to vascular kinking ($n = 1$) and disruption of abdominal incision ($n = 1$). No death due to surgery occurred. During the follow-up period of 6 month to 5 years all patients remained alive. **Conclusion** With the advantages of high imaging quality and usefulness for accurate measure of parameters, CTA is the gold standard for preoperative and postoperative evaluation. EVAR is a safe and effective treatment for abdominal aortic aneurysm in aged patients with high-risk. (J Intervent Radiol, 2010, 19: 858-861)

【Key words】 aortic aneurysm, abdominal; endovascular aortic aneurysm repair; computed tomography angiography; perioperative management

腹主动脉瘤(abdominal aortic aneurysm, AAA)是血管外科较为常见的一种疾病,有发生破裂的倾向,严重威胁患者生命。AAA 破裂的病死率 80% ~ 90%。AAA 常见发病的危险因素如高龄、吸烟史、冠状动脉疾病、高脂血症、慢性阻塞性肺疾病(COPD)等^[1],高龄、高危的 AAA 患者,无法行传统手术,或传统手术风险大、并发症多、手术病死率高。

自 1991 年 Parodi 等^[2]首次应用腔内修复术(endovascular aortic aneurysm repair, EVAR)治疗 AAA,1994 年 Dake 等^[3]率先报道以微创腔内修复术治疗 1 例胸主动脉瘤获得成功以来,主动脉扩张性疾病的治疗进入了全新的微创时代。2005 – 2009 年,我科应用 EVAR 治疗 AAA 22 例,全获成功。现总结 EVAR 围手术期处理经验。

1 材料与方法

1.1 临床资料

本组 22 例,男 19 例,女 3 例,年龄 53 ~ 82 岁,平均 72 岁。腹部可触及搏动性肿块,伴腹部疼痛不适 6 例。术前 CTA 确诊,瘤体最大直径 3.5 ~ 7.5 cm (平均 5.4 cm)。本组患者合并有高血压病 14 例;冠心病 6 例,其中曾行冠状动脉支架植入术 1 例,冠状动脉旁路移植术 1 例;心房颤动 4 例;2 型糖尿病 4 例;COPD 3 例;脑血栓病史 1 例;肾病综合征 1 例,肠系膜上动脉闭塞 1 例;Stanford A 型主动脉夹层 1 例。

1.2 方法

1.2.1 术前评估 通过 CTA 测量相关参数,包括近端瘤颈长度、直径、角度、构型,有无严重钙化和附壁血栓,最低肾动脉开口至腹主动脉分叉的距离,髂动脉锚定区直径、长度、角度及有无严重钙化(特

别是环状钙化),瘤体最大直径和瘤腔直径,导入途径的扭曲和狭窄程度,是否需要重建导入途径和覆盖双侧髂内动脉。

检查和评估患者的主要脏器功能:心电图观察是否心肌缺血,心脏彩超明确心脏功能,对心脏功能差的患者行保心治疗或降低危险因素。本组术前行冠状动脉旁路移植术 1 例,冠状动脉支架植入 1 例,窦性心动过缓术前植入临时起搏器 1 例。检测肺功能,对患有 COPD 者,术前锻炼肺功能或药物治疗。检测肾功能,肾功能不全者,改善肾功能,对于对比剂引起肾病风险的患者,包括慢性肾功能不全(肌酐 > 132 $\mu\text{mol/L}$),糖尿病肾病,年龄 > 60 岁,术前和术后进行水化。颈部血管彩超和经颅多普勒超声(TCD)明确颈动脉、椎动脉有无狭窄及狭窄程度和颅内动脉血流情况。

1.2.2 EVAR 手术采用局部麻醉 20 例,中转全麻 1 例,1 例需要通过髂总动脉建立导入途径采用硬膜外麻醉,1 例合并 Stanford A 型主动脉夹层患者采用全麻。选择合适入路,造影,测量最低肾动脉开口至腹主动脉分叉的距离和腹主动脉分叉至双侧髂总动脉分叉的距离,选择合适长度的支架。在释放支架前,准确定位最低肾动脉开口。至少保留一侧通畅的髂内动脉,以免导致盆腔脏器严重缺血,若需要覆盖双侧髂内动脉开口,备髂外、髂内动脉旁路或分期覆盖。本组双侧髂内动脉覆盖 2 例,1 例于 EVAR 术后 3 个月覆盖对侧髂内动脉,另 1 例因髂总动脉锚定区长度不足,术中同时覆盖双侧髂内动脉,均未发生盆腔脏器缺血症状。若股动脉和髂外动脉严重狭窄或环状钙化,输送系统不能通过,自髂总动脉入路。本组 1 例双侧髂动脉严重钙化,先后用直径 8 mm 和 10 mm 球囊扩张,支架输送系

统仍无法通过,遂经腹膜外游离右侧髂总动脉,与直径 10 mm 人工血管吻合,建立导入途径,支架植入后切除人工血管,封闭人工血管残端。

支架植入后球囊扩张锚定区和支架连接部,复查造影注意有无内漏和肾动脉通畅情况。I 型内漏,特别是支架近端产生的 I 型内漏和支架连接部产生的 III 型内漏需要术中及时处理。I 型内漏球囊扩张或(和)加用套口(cuff),本组 2 例支架近端 I 型内漏,球囊扩张后,1 例仍存在 I 型内漏,加用 cuff 后内漏消失(图 1);1 例支架远端 I 型内漏,扩张左侧髂肢远段时,髂外动脉破裂,转全麻,腹膜外

途径行髂外动脉破口人工血管补片修补(图 2)。支架连接部产生的 III 型内漏球囊扩张,必要时植入支架,本组 3 例 III 型内漏,球囊扩张后,1 例仍存在 III 型内漏,再次覆膜支架植入。对于 II 型和 IV 型,可暂时不处理,随访观察。1 例合并肠系膜上动脉闭塞, EVAR 术后 5 d 行肠系膜上动脉球囊扩张 + 支架植入。1 例合并 Stanford A 型主动脉夹层,先行胸主动脉腔内修复术(thoracic endovascular aortic repair, TEVAR),再行 EVAR。本组植入 Zenith 覆膜支架 12 例, Talent 覆膜支架 10 例。

1.2.3 术后处理 EVAR 术后不需抗凝,注意双侧

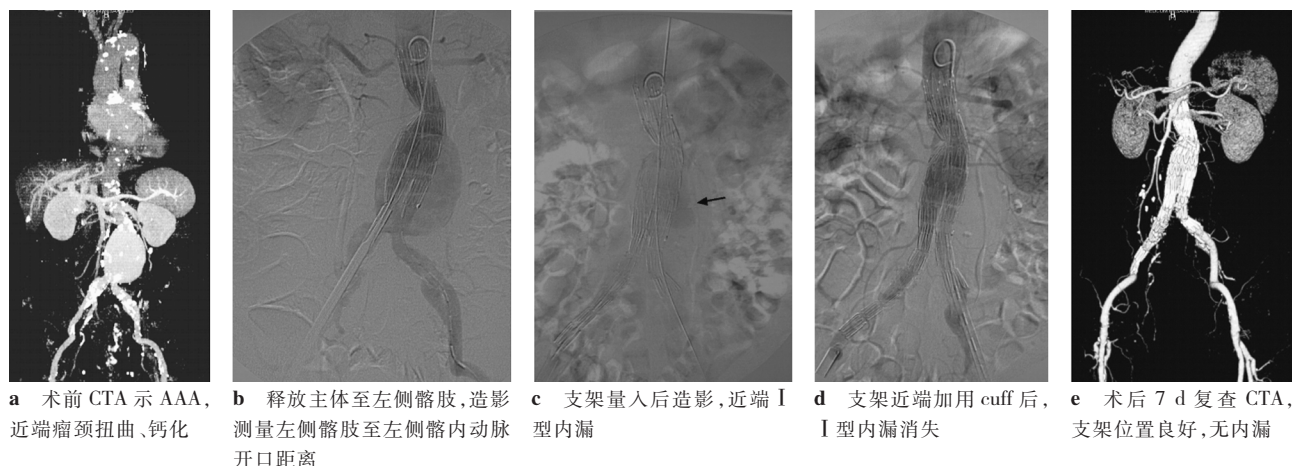


图 1 AAA 治疗前后影像



图 2 术后 7 d 复查 CT 示腹膜后血肿, 未行血肿清除

足背动脉或胫后动脉搏动。3 例主动脉腔内修复术后综合征应用激素治疗。术后 7 ~ 10 d 复查 CTA。以后每年复查 CTA 1 次。

2 结果

1 例一侧髂肢扭结继发血栓形成, 导管取栓后植入裸支架, 后股动脉假性动脉瘤, 行股动脉修补术; 经髂总动脉建立导入途径患者腹壁切口全层裂开, 重新缝合。本组手术病死率 0。随访 6 个月 ~ 5

年, 患者均存活。

3 讨论

自 Parodi 等^[2]首次应用 EVAR 治疗 AAA, 经过近 20 年时间, EVAR 越来越广泛的应用于 AAA 的治疗。3 组大样本随机对照试验评估了 EVAR 的疗效。EVAR-1 随机对照了直径大于 5.5 cm 的 AAA, EVAR 术后 30 d 病死率 1.7%, 转开放手术 4.7%, 但是 4 年以后, 尽管 EVAR 后动脉瘤相关的病死率比开放手术低 3%(EVAR 4%, 开放手术 7%), 但是所有原因引起的病死率(28%)没有差别^[4]。DREAM 试验随机比较了 351 例直径 ≥ 5 cm 动脉瘤的 EVAR 和开放手术, EVAR 术后 30 d 病死率 1.2%, 转开放手术 4.6%, 2 年的总存活率没有差别, 动脉瘤相关的病死率, 开放手术(5.7%)高于 EVAR(2.1%)^[5]。EVAR-2 试验对 338 例不适合开放手术的患者随机分为两组, 即 EVAR 组和观察组, 对于高危的患者, EVAR 是有效的^[6]。Mayo 医疗中心对 355 例开放手术或 EVAR 的 AAA 患者进行回顾性分析, 开放手术 30 d 病死率 1.1%, EVAR 为 0, 尽管更高危的患

者进行了 EVAR, EVAR 心脏和肺脏并发症(分别是 11%和 3%)低于开放手术(22%和 16%)^[7]。显然, EVAR 是治疗 AAA 的一种安全有效的方法。此外 EVAR 也成功应用于 AAA 破裂的治疗^[8]。

术前准确的影像学评估是制订手术方案和选择合适移植物的关键。常用的影像学检查包括 CTA、MRA、DSA。MRA 受血流的影响,对弯曲、狭窄血管显示不清,无法准确显示。DSA 能清楚的显示主动脉分支情况(狭窄或闭塞),但只能显示血管腔内情况,无法显示瘤体大小、瘤体与临近脏器的关系。CTA 因团注对比剂,扫描层面薄,分辨率高,图像清晰,显示 AAA 形态,有无附壁血栓,了解分支动脉情况,能够满足术前评估和术后随访的需要。通过 CTA 可以测量 AAA 瘤颈长度、直径、角度等,肾动脉开口至腹主动脉分叉及髂内动脉的距离,支架导入途径的扭曲和狭窄程度。适合 EVAR 者,确定合适的覆膜支架,包括分叉型、直管型或腹主-单髂动脉型,支架直径,支架的柔顺性和支撑力。近端瘤颈钙化或扭曲者选用近端有裸支架的覆膜支架,以更好的锚定,减少内漏发生;髂动脉严重扭曲,植入硬度较高的支架,以免发生髂肢扭结继发血栓形成、闭塞;根据瘤腔最大直径选用合适的覆膜支架等;还可以明确术中是否加延长体和覆盖髂内动脉。CTA 也是 EVAR 术后判定疗效和随访的重要检查,可显示瘤腔内血栓机化情况,瘤体的大小变化,有无内漏、支架移位、狭窄或闭塞。

术前准备好血管器械及开腹器械,随时作好中转开腹手术的准备,桡动脉穿刺动态监测动脉压,中心静脉置管。AAA 一般采用局部麻醉,备全麻。根据术前 CTA 图像选择合适的入路,测量最低肾动脉开口至腹主动脉分叉的距离和腹主动脉分叉至双侧髂总动脉分叉的距离,选择合适长度的支架。在释放支架前,准确定位最低肾动脉开口。至少保留一侧通畅的髂内动脉,以免导致盆腔脏器严重缺血,若需要覆盖双侧髂内动脉开口,备髂外、髂内动脉旁路或分期覆盖。若股动脉和髂外动脉严重狭窄或环状钙化,输送系统不能通过,可通过髂总动脉建立导入途径。若髂外动脉扭曲严重,导丝无足够的支撑力释放支架,可采用肱股导丝牵张技术^[9]。对于近端瘤颈< 15 mm 或解剖复杂的 AAA,可以选用开窗覆膜支架^[10]。内漏的处理至关重要,Ⅰ型内漏球囊扩张或(和)加用 Cuff;Ⅱ型内漏观察,栓塞,腹腔镜结扎;Ⅲ型内漏球囊扩张,再次覆膜支架植入,或中转开腹;Ⅳ型内漏随访观察。

EVAR 以其创伤小,为高龄、高危的 AAA 患者提供了治疗的可能,且是一种安全有效的治疗手段。重视围手术期的处理,对患者的主要脏器功能进行评估与保护^[11];通过 CTA 对动脉瘤进行精确测量,主要包括动脉瘤长度及近远侧锚定区长度、直径和角度等,同时要注意重要内脏动脉是否需要遮盖,从而作用决策。

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