

·综述 General review·

血管腔内处理 Stanford B 型主动脉夹层内脏动脉区裂口策略

沈 毓, 陆清声

【摘要】 胸主动脉腔内修复术(TEVAR)是目前 Stanford B 型主动脉夹层常规治疗方法。治疗中通常只隔绝原发裂口,即所谓近端裂口,而对远端裂口较少实施干预。随着对夹层术后主动脉重塑进一步深入研究,研究者们发现术后 25%~40%患者出现远端扩张,需再干预处理。其中腹主动脉内脏分支区裂口处理涉及重要脏器血供,治疗上存在一定特殊性。本文结合国内外研究进展,就腹主动脉内脏分支区夹层裂口常用处理方法作一综述。

【关键词】 主动脉夹层; 血管腔内; 内脏动脉区

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Endovascular repair strategy for Stanford type B aortic dissection involving visceral branches SHEN Yu, LU Qingsheng. Department of Vascular Surgery, Affiliated Changhai Hospital, Second Military Medical University, Shanghai 200433, China

Corresponding author: LU Qingsheng, E-mail: luqs@xueguan.net

【Abstract】 At present, thoracic endovascular aortic repair (TEVAR) is the routine treatment for Stanford type B aortic dissection. Usually, during the interventional treatment only the primary entry tear, i.e. so-called proximal entry tear, is to be isolated with a stent-graft, while less intervention is adopted for the distal entry tear. With the deepening of research concerning aortic remodeling after TEVAR, the researchers have found that 25%~50% of patients will develop aneurysmal dilation at the distal end of dissected aorta, which needs to be treated again. Among them, the treatment of entry tear at visceral branch area of the abdominal aorta has a certain degree of difficulty and technical particularity as the interventional management may affect the blood supply of vital organs. Referring to the research progress at home and abroad, this article aims to make a review about the common therapeutic methods for the entry tear at visceral branch area of the abdominal aorta. (J Intervent Radiol, 2018, 27: 186-189)

【Key words】 aortic dissection; endovascular repair; visceral artery area

自 1999 年胸主动脉腔内修复术(thoracic endovascular aortic repair, TEVAR)广泛应用于治疗 Stanford B 型主动脉夹层以来,相对于传统开放手术取得了巨大突破,具有创伤小、恢复快、生存率高、并发症发生率低的特点^[1-2]。治疗中对 Stanford B 型主动脉夹层通常只针对胸主动脉裂口,传统观点认为远端裂口因血流压力较小,可保守处理。然而术后随访中发现,由于对远端裂口采取旷置处理,主体支架覆盖夹层近端裂口及部分降主动脉后,支架水平假腔通常能实现血栓化,而支架以远血栓化效果较差;由于持续血流灌注,未覆盖支架的降主

动脉及腹主动脉存在瘤样扩张及破裂的风险。Kolbel 等^[3]研究发现,近端裂口治疗后约 1/3 患者发生远端假腔持续扩张,3 年随访死亡率达 36%。Zhu 等^[4]回顾性研究显示,术后覆膜支架远端存在残余裂口患者发生远期主动脉不良事件风险显著高于无远端残余裂口患者。因此,越来越多学者提出远端裂口需同时治疗。本中心 2001 年至 2016 年收治的 Stanford B 型夹层患者术后随访过程中远端扩张发生率约为 14.2%,其中再入口位于内脏分支区者约占全部患者的 1/2。

相对而言,单纯腹主动脉夹层发病率较低,占夹层患者总数的 1.3%^[5],常见于医源性、创伤性及自发性^[6]。国外一项单中心研究报道,10 例无症状单纯腹主动脉夹层患者中 2 例随访过程中出现夹

层破裂,占 20%^[7]。因此,对单纯腹主动脉夹层患者也应重视。

远端裂口的存在是造成假腔持续通畅和主动脉重塑不良的主要因素。通过有效的干预措施减少假腔内压力能改善患者预后。然而目前对于全主动脉腔内治疗的观念尚存在不少争议,多数研究者认为长段覆膜支架覆盖会增加截瘫风险。但近年也有不少研究者提出,通过阶段性治疗进行逐段覆盖病变血管可减少脊髓缺血概率^[8]。根据本中心经验,大部分术后截瘫患者在随访期间也能够恢复大部分功能。就目前治疗而言,对于腹腔干动脉开口以上及肾动脉开口以下的裂口,可通过覆膜支架直接覆盖,而内脏分支区裂口因需同时考虑重要脏器血供,难以通过常规方法进行处理。因此,如何权衡利弊还需根据患者临床情况及术者临床经验。近年研究者们通过探索,提出了很多行之有效的办法。现根据本中心经验及文献查阅,就腹主动脉内脏分支区夹层裂口常用处理方法总结如下。

1 复合手术

复合手术是在血管腔内治疗基础上,通过开放手术对分支血管进行改道来拓展锚定区。通常将内脏分支动脉嫁接到升主动脉或单侧髂动脉上,再通过覆膜支架隔绝腹主动脉裂口。该去分支技术能有效拓展锚定区范围,但动脉旁路术带来的创伤较大,术后并发症率较高,如截瘫(8.3%)、内脏缺血(20.8%)、心肌梗死(12.5%)、切口感染(16.6%)、肺部感染(29.1%)等^[9]。此外,Quinones-Baldrich 等^[10]报道采用复合手术治疗 20 例患者,术后半年死亡率达 20%。随着各种腔内技术及器材进步,内脏分支区夹层裂口处理方法越来越多,复合技术应用已逐步减少。

2 开窗技术

内脏分支区由于存在分支血管,用覆膜支架完全覆盖会引起重要脏器缺血。支架开窗技术是治疗该区主动脉扩张性病变行之有效的方法。Park 等^[11]于 1996 年最先将体外开窗技术用于腹主动脉瘤治疗,认为该技术在有效隔绝瘤腔的同时可保留分支血管血供。但是台上开窗耗时长、对术者技术要求高,不能广泛开展,而定制支架存在费用高、周期长、期间有夹层破裂风险。2003 年,McWilliams 等^[12]根据针刺破膜方法提出了原位开窗概念。随后激光破膜、射频消融方法提出,使得开窗技术在治疗上

有了更多选择^[13];降低了手术难度,使手术成功率达到 96%以上,并发症发生率低于 7%。开窗技术成为紧急情况处理及重要的补救手段^[14]。

3 分支技术

分支技术常用于复杂腹主动脉瘤治疗,在累及内脏分支区夹层的治疗中应用较少。Oikonomou 等^[15]采用分支技术治疗夹层术后远端扩张患者,手术成功率达 93.5%,术后无内脏缺血、截瘫等并发症出现。但该治疗方式对术者技术和经验要求较高,且对于真腔受压明显患者,分支支架通过性较差,不利于定位和通道建立,因此相对于分支技术,不少研究者更倾向于开窗型支架治疗内脏分支区裂口^[16]。值得一提的是,国内张宏鹏等^[17]在国际上率先提出逆向分支技术,通过双侧髂动脉支架上建立逆向分支供血双侧肾动脉,取得了初步成功。

4 烟囱技术

烟囱技术也称平行支架技术,通过将支架一端植入分支血管内,另一端与主体支架并行方式维持重要分支的血供。根据分支血管血流方向,分为顺向烟囱和逆向烟囱(亦称潜望镜)两种。最初用于夹层累及弓上分支血管的治疗,因具有拓宽锚定区作用而作为保留弓上分支血管的重要手段^[18]。在腹主动脉内脏分支区应用中,最早作为肾动脉被主体支架覆盖后的补救措施^[19]。通过技术拓展,逐步应用于肠系膜上动脉、腹腔干及双侧髂内动脉。Adovasio 等^[20]报道应用烟囱技术的手术成功率达 100%,支架 3 年通畅率为 88%。烟囱技术无需定制支架,可采用常规外周支架,但烟囱支架并不固定于主体支架,术后存在移位风险,且烟囱支架与主体支架之间的“沟槽”增加了内漏发生率,相关研究报道再次手术率达 3%~28%^[21]。

5 封堵器

国外研究者最早于 2003 年提出应用封堵器治疗可有效隔绝夹层裂口^[22]。国内赵珺等^[23]2010 年开始采用封堵器治疗位于内脏分支区的夹层裂口,手术成功率达 83.3%,术后无截瘫、重要脏器缺血等并发症。虽然该技术取得了一定的疗效,但采用封堵器治疗夹层裂口主要以病例报道呈现,存在随访时间短、病例数不足问题,尚缺乏循证医学证据,对血流动力学、主动脉重构的影响尚不明确;夹层破口形态通常为不规则型,应用该技术前需仔细评估选择合适

的封堵器,过小达不到隔绝裂口效果,过大则会损伤内膜片,适得其反^[24]。此外,有研究在近年随访中发现封堵器治疗夹层裂口存在中远期移位风险^[25-26]。

6 多层裸支架技术

Henry 等^[27]2008 年首次报道采用多层裸支架治疗肾动脉瘤患者取得成功,提出多层裸支架具有良好的血流调节作用,即恢复瘤腔内乱流为层流,因此也称作多层血流调节装置;随后临床研究中多层裸支架技术用于治疗胸腹主动脉瘤,术后随访发现该技术不仅能促进主动脉更好地塑形,还能保持分支血管通畅。Chocron 等^[28]2010 年首次采用该技术成功治疗 1 例腹主动脉夹层,认为多层血流调节装置可促进主动脉真腔整体更好地重构,保证远端血供,压缩假腔,在促进假腔血栓化的同时还保证内脏重要分支血供。但也有研究者提出,裸支架本身并不能隔绝夹层本身,对于尺寸较大、血流灌注多的远端裂口及远端残留裂口数较多患者,该技术常不能达到理想疗效。

7 裸支架联合弹簧圈/生物蛋白胶

Hofferberth 等^[29]提出在裸支架治疗基础上辅以弹簧圈或生物蛋白胶进行栓塞治疗,能起到较好效果。国内 Lu 等^[30]采用裸支架联合弹簧圈栓塞治疗裂口位于腹主动脉内脏分支区夹层患者,在不影响分支血供情况下有效降低了假腔内流量和流速,促进了假腔血栓化进程。但由于该处假腔持续血流对手术操作精度要求极高,若弹簧圈等栓塞材料顺血流方向冲入远端,甚至分支血管导致异位栓塞,将造成严重后果。此外,对假腔管腔较大患者,封堵效果往往不理想,治疗费用也较高。

8 点支架技术

Bel 等^[31]2012 年提出点支架技术(spot stenting),用于治疗来自内脏分支动脉的反流性夹层,即通过 1 枚外周覆膜支架建立腹主动脉真腔至靶血管血流通路,远端锚定在内脏分支血管内,隔绝分支动脉反流血,降低假腔内压,促进假腔血栓化形成。此外,有研究者提出在覆膜支架内植入 1 枚自膨式裸支架,可加强覆膜支架支撑力和锚定效果^[3]。点支架技术相对技术要求较低,但应用范围较窄,仅适用于主要裂口位于分支动脉上的反流性夹层,且要求裂口距分支开口 $>5\text{ mm}$ ^[32]。

9 八爪鱼技术

八爪鱼技术(octopus technology)是将腹主动脉支架置于内脏分支区近端,1 条分支接远端腹主动脉或髂动脉,另 1 条分支内通过植入并行的外周血管覆膜支架用于重建内脏分支区动脉血供^[33]。Anderson 等^[34]2016 年首次报道采用八爪鱼技术治疗腹主动脉内脏分支区夹层患者,并取得初步成功。同年,Xiong 等^[35]报道采用该技术治疗 1 例夹层术后远端扩张患者,6 个月随访见假腔内完全血栓化,内脏分支区血运良好。虽然该技术取得了满意效果,但目前还是以病例报道形式呈现,尚缺乏循证医学证据。此外,应用该技术支持治疗夹层操作相对复杂、技术要求高,推广难度较大。

主动脉夹层腔内治疗的目的是隔绝假腔、促进真腔更好地重塑,从而降低远期不良事件发生。然而根据不同裂口位置及现有技术手段特点,要实现主动脉夹层全腔内治疗仍然有很长的路要走。因此,通过国内外先进技术学习交流,可使临床介入医师掌握更多安全有效的治疗方式,从而根据患者病情特点施行个体化治疗,达到最理想疗效。

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