

# 经颈部静脉旁路术治疗锁骨下静脉闭塞所致透析内瘘失功

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**摘要:** **目的** 探讨经颈部静脉旁路术治疗血液透析血管通路相关锁骨下静脉闭塞的临床效果。**方法** 回顾性分析3例锁骨下静脉闭塞所致透析内瘘失功患者的临床特点、经颈部静脉旁路术的要点及术后内瘘功能状况。**结果** 3例患者经颈部静脉旁路术均取得成功, 术后均未出现相关并发症。病例1术后随访9个月, 转位血管通畅, 内瘘功能良好; 病例2术后随访33个月, 两次因吻合口狭窄行PTA治疗, 现人工血管通畅, 内瘘功能良好; 病例3术后随访15个月, 人工血管通畅, 内瘘功能良好。**结论** 锁骨下静脉闭塞经腔内治疗等措施无法成功或风险较大时, 颈部静脉旁路术可以作为一种选择。

**关键词:** 血液透析; 动静脉内瘘; 中心静脉狭窄; 锁骨下静脉闭塞; 解剖外旁路术

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## Transjugular vein bypass for the treatment of hemodialysis arteriovenous fistula dysfunction caused by subclavian vein occlusion

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**Abstract:** **Objective** To investigate the clinical effect of transjugular vein bypass for the treatment of hemodialysis arteriovenous fistula dysfunction caused by subclavian vein occlusion. **Methods** Clinical characteristics, key points of transjugular venous bypass, and postoperative fistula function of three cases with hemodialysis arteriovenous fistula dysfunction caused by subclavian vein occlusion were retrospectively analyzed. **Results** Transjugular venous bypass was successful in all three patients, and none of them had any related postoperative complications. Patient 1 was followed up for 9 months postoperatively, with a patent transposition vessel and good arteriovenous fistula function. Patient 2 was followed for 33 months postoperatively, with PTA twice for anastomotic stenosis; the artificial blood vessel was patency and the arteriovenous fistula function was good. Patient 3 was followed up for 15 months postoperatively, with a patent artificial blood vessel and good arteriovenous fistula function. **Conclusion** Transjugular venous bypass can be an option when endovascular treatment for subclavian vein occlusion is unsuccessful or risky.

**Key words:** Hemodialysis; Arteriovenous fistula; Central vein stenosis; Subclavian vein occlusion; Extra-anatomic bypass

中心静脉狭窄(central vein stenosis, CVS)是血液透析患者血管通路的严重并发症之一, 影响血

管通路功能并引发不同程度的静脉高压和缺血症状。锁骨下静脉是CVS的好发部位。血管腔内治

疗是 CVS 的首选治疗方法,但无论单纯的经皮腔内血管成形术(percutaneous transluminal angioplasty, PTA)还是 PTA 联合支架置入都难以解决可能出现的介入导丝无法通过病变部位及处理后频繁再狭窄问题<sup>[1-3]</sup>。锁骨下静脉位置较深,直接血管搭桥术创伤性大,术后并发症及病死率高<sup>[4]</sup>,解剖外旁路术是一种可选择的治疗方式。本研究介绍 3 例锁骨下静脉闭塞导致内瘘失功患者,经腔内开通失败后采用经颈部静脉旁路术治疗,在山东第一医科大学附属中心医院肾内科分别给予颈外静脉-头静脉转位术、颈内静脉-锁骨下静脉人工血管搭桥术、颈内静脉-头静脉弓人工血管搭桥术解决闭塞问题,并取得较好临床效果,为锁骨下静脉闭塞导致的内瘘失功治疗提供参考。本研究经济南市中心医院伦理委员会审批(KY2022-007-01)。

## 1 病例资料

病例 1,男,56 岁,因“血透 12 年,内瘘侧肢体肿胀 10 d”于 2023 年 2 月 20 日就诊于山东第一医科大学附属中心医院。患者双上肢多次行自体动静脉内瘘(autogenous arteriovenous fistula, AVF)手术。既往有右侧颈内静脉临时导管留置史。左前臂 AVF 震颤及杂音减弱、肢体肿胀。因左锁骨下静脉狭窄多次行 PTA 治疗(1 年内 4 次),术后仅能维持短期通畅。2023 年 2 月 20 日造影示左锁骨下静脉闭塞(图 1A)。颈外静脉血流通畅,直径约 4 mm,排除手术禁忌证,于 2023 年 2 月 22 日行左侧颈外静脉-头静脉转位术:局麻,在超声定位下游离出适当长度的颈外静脉,远端结扎,近端转位至头静脉弓

部;游离出头静脉弓,将颈外静脉与头静脉弓 6 mm 切口行端侧吻合,开放血流后,内瘘震颤及杂音增强,肢体肿胀迅速消退。术后未出现相关并发症。术后造影示转位血管通畅(图 1B)。术后 3 个月复查造影,转位血管通畅(图 1C)。术后 9 个月,内瘘功能良好,肢体无水肿。

病例 2,女,43 岁,因“血透 13 年,内瘘流量差 2 d”于 2021 年 3 月 22 日就诊于我院。患者多次行左前臂 AVF 手术。透析内瘘血流量 180 mL/min,静脉压大于 170 mmHg。既往有左侧颈内静脉导管留置史。左上肢重度肿胀,静脉迂曲扩张,内瘘震颤及杂音减弱。2021 年 3 月 26 日造影示左锁骨下静脉闭塞,迂曲侧支循环(图 2A),PTA 治疗导丝无法通过闭塞部位。患侧颈外静脉纤细,颈内静脉通畅。排除手术禁忌证,于 2021 年 3 月 29 日行颈内静脉-锁骨下静脉人工血管搭桥术:局麻,在超声定位下游离出颈内静脉并牵引控制,直径约 4 mm;游离出锁骨下静脉,直径约 4 mm,取直径 6 mm、长约 10 cm 的美国 Bard 公司 F4006 人造血管通过皮下隧道置于两血管之间,分别与颈内静脉、锁骨下静脉侧壁切口行连续端侧吻合(图 2B)。开放血流后,内瘘震颤及杂音增强,肢体肿胀减轻。术后 2 d 超声检查示内瘘血流量 791 mL/min,术后两周水肿消退。术后 6 个月又出现左前臂肿胀,造影示锁骨下静脉与人工血管吻合口狭窄(图 2C),PTA 治疗后肿胀消退。术后 14 个月患者再次出现左上肢肿胀,造影示人工血管与颈内静脉吻合口狭窄(图 2D),PTA 治疗后肿胀消退。术后随访 33 个月,经 2 次 PTA 干预,人工血管通畅,内瘘功能良好。

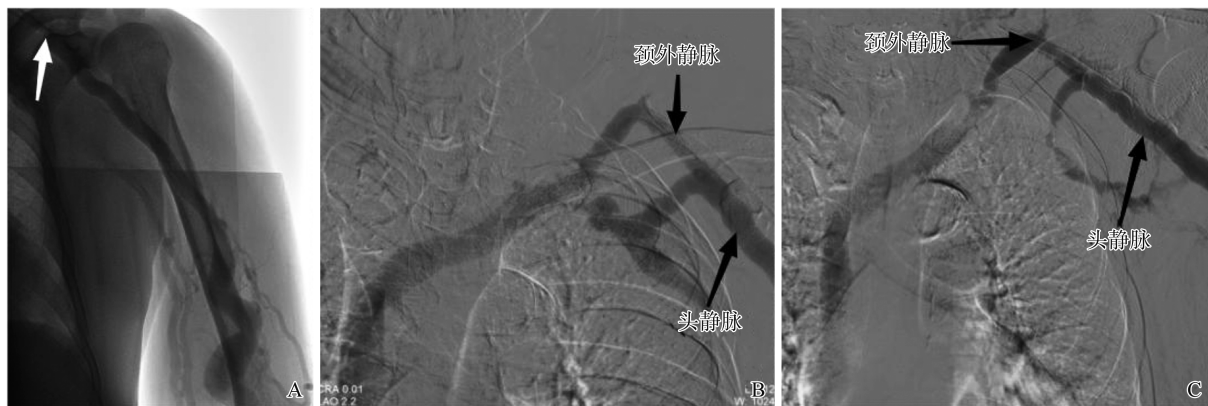


图 1 病例 1 术前及术后造影图片

A: 术前造影示左侧锁骨下静脉闭塞;B: 术后 2 d 造影示转位血管通畅;C: 术后 3 个月造影示转位血管通畅。

Figure 1 Preoperative and postoperative angiographic images of case 1

A: Preoperative angiogram showed occlusion of the left subclavian vein; B: Angiography 2 days after surgery showed that the transposition vessel was patency; C: Angiography 3 months after surgery showed that the transposition vessel was patency.

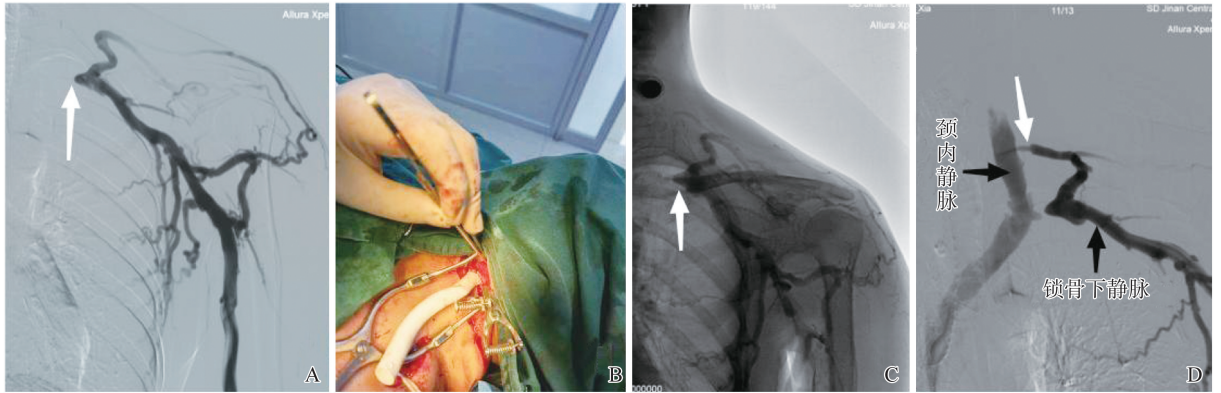


图2 病例2术前、术后造影及术中图片

A: 术前造影示左锁骨下静脉闭塞,迂曲的侧支循环;B: 术中照片;C: 术后6个月造影示锁骨下静脉与人工血管吻合口狭窄;D: 术后14个月造影示人工血管与颈内静脉吻合口狭窄。

Figure 2 Preoperative and postoperative angiographic images and intraoperative images of case 2

A: Preoperative angiogram revealed occlusion of the left subclavian vein and a tortuous collateral circulation; B: Intraoperative image; C: Angiography 6 months after the operation showed stenosis of the anastomosis of the subclavian vein to the artificial blood vessel; D: Angiography 14 months after the operation showed stenosis of the anastomosis of the artificial blood vessel to the internal jugular vein.

病例3,男,54岁,因“血透2年,右上肢肿胀3个月”于2022年8月3日就诊于我院。患者多次行双上肢动静脉内瘘手术。右上肢重度肿胀(图3A),内瘘搏动增强及杂音减弱。2022年8月3日造影示右锁骨下静脉闭塞(图3B),患者于外院多次行PTA治疗失败。2022年8月3日超声示病变累及颈外静脉开口,患侧颈内静脉通畅,直径约5 mm;排除手术禁忌证,于2022年8月5日行右颈内静脉-头静脉弓人工血管搭桥术;局麻,于右肘部游离出内瘘头静脉,阻断血流,超声定位下游离出颈

内静脉,直径约5 mm;肩部游离出头静脉弓部,直径约5 mm;取直径6 mm、长约10 cm的美国Bard公司F4006人造血管通过皮下隧道置于两血管之间,分别与头静脉弓、颈内静脉侧壁行连续端侧吻合(图3C)。开放血流后,内瘘震颤及杂音增强,肢体肿胀减轻,无活动性出血。术后2 d正常行血液透析,肢体肿胀逐渐消退。10 d后复查造影示人工血管通畅(图3D)。患者术后随访15个月,人工血管通畅,内瘘功能良好。

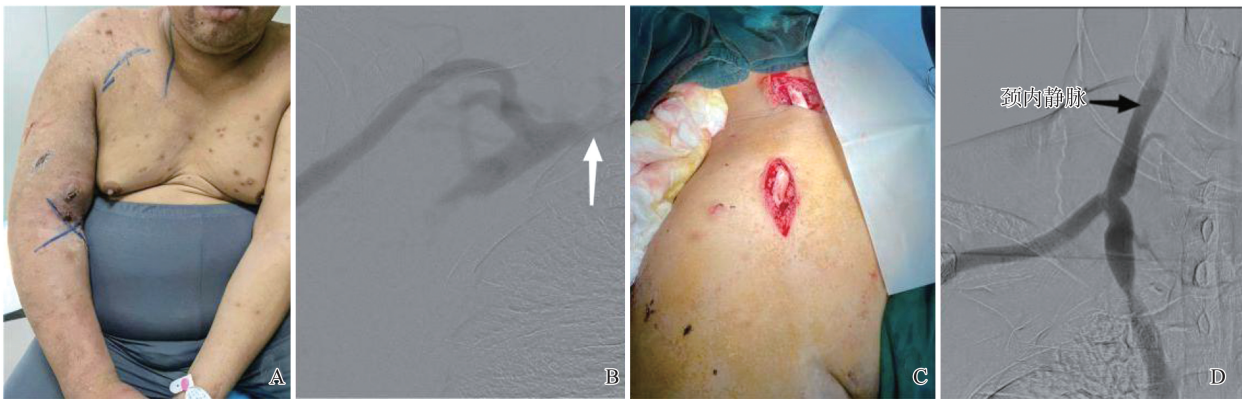


图3 病例3术前、术后及造影图片

A: 右上肢肿胀;B: 术前造影示右侧锁骨下静脉闭塞;C: 术中照片;D: 术后10 d造影示人工血管通畅。

Figure 3 Preoperative, postoperative, and angiographic images of case 3

A: Swelling of the right upper limb; B: Preoperative angiogram showed occlusion of the right subclavian vein; C: Intraoperative image; D: Angiography 10 days after the operation showed that the artificial blood vessel was patency.

## 2 讨论

CVS是导致血管通路功能障碍及通路耗竭的最常见原因之一,常与中心静脉导管、心脏起搏器导

线置入及同侧动静脉内瘘建立等相关<sup>[4]</sup>。CVS常导致明显的同侧内瘘静脉高压、血管通路功能障碍,可表现为同侧手臂、胸壁、乳房水肿,静脉曲张,透析不充分等,晚期甚至出现呼吸损害、神经症状<sup>[5-6]</sup>。静脉造影为CVS诊断的金标准。本研究3例患者

均有中心静脉导管置入史,且有明显临床症状,造影示锁骨下静脉闭塞。

CVS 的治疗难度大、风险高<sup>[7]</sup>,腔内治疗是目前 CVS 的一线治疗。PTA 治疗具有成功率高(>70%)、并发症少、创伤小、易于操作等优势,缺点是需反复干预维持通畅<sup>[8-12]</sup>。紫杉醇涂层球囊延长再次干预时间仍缺乏大样本随机实验研究证据<sup>[13-14]</sup>。弹性病变可联合支架置入,覆膜支架通畅率高、再次干预风险低,但有可能覆盖重要中心静脉侧支<sup>[5,13]</sup>。腔内治疗应谨慎进行,反复 PTA 引起的内皮损伤可加速静脉狭窄进程,导致进一步干预<sup>[10]</sup>;腔内治疗需使用较多高值介入材料,多次干预费用高昂。腔内治疗成功的关键是导丝顺利通过病变部位,锐性开通技术的发展提高了腔内治疗的成功率,但仍有 5.4%~14.9% 的患者,导丝无法通过其闭塞部位,且可能带来静脉破裂、心包穿孔、血胸等并发症<sup>[13,15-16]</sup>。对于腔内治疗失败的 CVS 患者,国内透析中心多采用 AVF 结扎术以减轻水肿,导致患肢失去作为血管通路使用的机会。对于腔内治疗失败的 CVS 患者,外科手术是挽救患侧血管通路的最后选择,但国内较少开展。虽然解剖外旁路术相较于腔内治疗创伤较大、住院时间相对延长,但延长了血管通路使用时间<sup>[17-20]</sup>,Wisselink 等<sup>[21]</sup>研究发现外科手术治疗的远期通畅率更高,Dammers 等<sup>[22]</sup>研究发现外科手术与 PTA 通畅率相当。

术前应评估患者的血管条件,个体化选择手术方式。病例 1 多次 PTA 治疗后锁骨下静脉闭塞,预计开通困难,决定行经颈部静脉旁路术;术前超声评估颈外静脉直径约 4 mm,颈外静脉开口在病变部位内侧,选择患侧颈外静脉作为流出静脉,且颈外静脉长度符合手术要求,故行颈外静脉-头静脉转位术。颈外静脉相较于颈内静脉的位置表浅,周围无重要神经及血管,手术难度及风险较低。病例 2 与病例 3 腔内治疗失败,且其预期寿命长,因保护血管资源的需要,决定行经颈部静脉旁路术挽救患肢血管通路。病例 2 颈外静脉纤细,无法与人工血管吻合;病例 3 闭塞部位堵塞颈外静脉开口,故选择颈内静脉作为流出静脉。因取大隐静脉作搭桥血管的创伤性大,病例 2 与病例 3 均拒绝,故选择经颈内静脉人工血管搭桥术。颈内静脉为颈部深静脉,其周围有颈总动脉、神经分布,术中要注意避免损伤周围神经及血管。

本研究 3 例患者行经颈部静脉旁路术均取得成功,术后患者临床症状迅速缓解,内瘘功能良好,挽救了患肢血管通路。与对侧肢体或者下肢重新建立

内瘘相比,本术式术后可立即透析,无需等待新瘘成熟,从而避免新瘘成熟期间使用透析导管带来的相关并发症。此外,经颈部静脉旁路术也存在相应并发症。一方面,术后吻合口可能出现狭窄,PTA 是定期维护首选,但导丝通过狭窄的吻合口比穿过闭塞病变位置更易实现。病例 2 术后随访 33 个月,两次因吻合口狭窄行 PTA 治疗,现人工血管仍通畅,经原 AVF 行血液透析。另一方面,颈内静脉存在瓣膜,并且通过颈前静脉和甲状腺静脉与对侧静脉沟通<sup>[23-24]</sup>,所以颈内静脉作为流出静脉引起颅内静脉淤血是非常罕见的。患者术后未出现相关症状及体征,术后静脉造影未见颈内静脉血液反流,所以颈内静脉作为流出通道是安全的。最后,该术式可能出现血肿压迫气管、损伤神经及感染等并发症,手术均由高年资、手术经验丰富的医师主刀。彩色多普勒超声具有无创、简单、经济、依从性好的特点<sup>[25]</sup>,为术后随访首选,同时测定阻力指数,并监测透析血流量、静脉压、肢体肿胀情况等,必要时造影检查,及时评估,做出相应干预,以延长旁路血管通畅时间。本研究 3 例患者观察时间较短,但通畅时间均已超过 PTA 治疗的最低要求。经颈部静脉旁路术的远期通畅率及并发症仍有待评估,目前 3 例患者旁路血管均通畅,我们将继续随访观察。

综上所述,锁骨下静脉闭塞经腔内治疗等措施无法成功或风险较大时,经颈部静脉旁路术可以作为一种选择。通过对本研究患者的临床特点、经颈部静脉旁路术的要点及术后内瘘功能状况的分析,希望为难治性锁骨下静脉闭塞的治疗提供参考。但目前该手术病例较少,对于其远期通畅率和并发症仍需长期随访,尚需大样本、多中心、长周期的对比研究。

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