

一例大脑中动脉颅内支架植入术后的脑高灌注脑出血

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摘 要

脑高灌注综合征(CHS)是脑血管重建术后罕见的并发症。它表现为同侧头痛、呕吐、癫痫发作和脑出血。既往报道颈动脉内膜切除术和支架植入术后高灌注综合征较常见, 颅内支架植入术后出现的高灌注综合征则鲜有报道。一名77岁男性患者以被人发现言语不能3小时余入院。入院接受了脑血管数字减影血管造影(DSA)检查, 结果显示左侧大脑中动脉M1段闭塞。急诊行左侧大脑中动脉M1段球囊扩张 + NEUROFORMEZ 4.0 mm × 20 mm支架植入术, 术后造影见左侧大脑中动脉血流通畅, 远端血管显影良好。4天后, 患者突发意识不清加重伴双侧瞳孔不等大, 左侧瞳孔3.5 mm, 右侧瞳孔3.0 mm。头颅CT显示左侧基底节区及左侧额颞顶叶脑出血, 量约170 mL, 并脑疝形成。

关键词

脑高灌注综合征, 脑血管重建并发症, 颅内支架植入术与脑高灌注综合征

A Case of Cerebral Hyperperfusion Hemorrhage after Intracranial Stent Implantation in the Middle Cerebral Artery

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Abstract

Cerebral hyperperfusion syndrome (CHS) is a rare complication after cerebrovascular reconstruction

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surgery. It is manifested as ipsilateral headache, vomiting, epileptic seizures, and cerebral hemorrhage. Hyperperfusion syndrome was relatively common after extracranial carotid endarterectomy and stent implantation in the past, while hyperperfusion syndrome after intracranial stent implantation has been rarely reported. A 77-year-old male patient was admitted to the hospital more than 3 hours after being found unable to speak. The patient underwent digital subtraction angiography (DSA) of the cerebral vessels after admission, and the results showed occlusion of the M1 segment of the left middle cerebral artery. Emergency balloon dilation + NEUROFORMEZ 4.0 mm × 20 mm stent implantation in the M1 segment of the left middle cerebral artery was performed. Postoperative angiography showed smooth blood flow in the left middle cerebral artery and good visualization of the distal vessels. Four days later, the patient suddenly worsened in terms of clouded consciousness accompanied by unequal bilateral pupils (the left pupil was 3.5 mm and the right pupil was 3.0 mm). Head CT showed cerebral hemorrhage in the left basal ganglia region and the left frontal, temporal, and parietal lobes, with a volume of approximately 170 mL, and herniation formation.

Keywords

Cerebral Hyperperfusion Syndrome, Complications of Cerebrovascular Reconstruction, Intracranial Stent Implantation and Cerebral Hyperperfusion Syndrome

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1. 引言

虽然颈动脉内膜切除术(CEA)和颈动脉支架植入术后(CAS)的脑高灌注综合征(CHS)有很多详细的记录,但颅内支架植入术后的脑高灌注综合征(CHS)则很少有相关的报道[1]-[3]。这很大一部分原因是在颅内动脉狭窄的治疗实验表明,血管内介入治疗不如积极药物治疗后,血管内介入治疗在治疗颅内动脉粥样硬化性狭窄上基本已被放弃,美国和欧洲的指南均不推荐血管内介入治疗作为治疗颅内动脉粥样硬化性狭窄的主要方法[4][5]。然而,在我国颅内支架植入术仍被用于精心挑选的患者,效果良好[6]。脑高灌注的定义是,与基线相比,脑血流量(CBF)增加 100%,通常与术后高血压相关。CHS 的发生率估计为 1%~6.8% [7]-[9],通常表现为同侧头痛或偏头痛现象伴或不伴有恶心呕吐、癫痫发作和脑出血(ICH)。我想报告一下一例大脑中动脉(MCA)支架植入术后出现 CHS 并进展为 ICH 的病例。该病例报告已获得病人的知情同意。

2. 患者信息

2.1. 现病史

患者男性,77岁以“发现言语不能3小时余。”于2023年10月13日入住我科,患者于今晨6时起床时(2023.10.12.22:00入睡),被家人发现言语不能,右侧肢体抖动,无力,无头痛、恶心、呕吐、无肢体抽搐、无意识障碍及大小便失禁等。立即来院,门诊行脑CT示:排除出血。以“脑梗死急性期”收入院。近日来饮食、睡眠及大小便正常。

2.2. 体格检查

发育正常,营养良好,神志清楚,精神良好,自主体位,正常面容,步入病房,偏瘫步态。全身皮肤粘膜色泽正常,无皮下结节。毛发分布正常,无肝掌及蜘蛛痣。皮肤弹性正常。全身浅表淋巴结无肿大。

头颅大小正常, 无畸形。眼睑正常, 结膜正常, 眼球正常, 巩膜无黄染, 双侧瞳孔等大等圆, 直径约 3 mm。对光反射灵敏, 集合反射灵敏。耳廓无畸形, 外耳道无异常分泌物, 乳突无压痛。鼻通畅、鼻中隔无偏曲, 无异常分泌物, 鼻窦区无压痛。口唇红润, 口腔无异味, 咽腔无充血, 双侧扁桃体无肿大, 无脓性分泌物。颈部对称, 无畸形, 无颈强直, 颈静脉无怒张, 气管居中, 双侧甲状腺无肿大。胸廓正常, 胸骨无压痛, 胸壁无压痛, 双侧乳房对称, 无红肿。双侧呼吸运动对称, 触觉语颤正常, 双侧叩诊呈清音, 双肺呼吸音清, 未闻及干湿性啰音。心前区无隆起, 心尖搏动最强点位于左侧第 5 肋间锁骨中线内 0.5 cm, 心尖部未触及震颤及抬举样搏动, 无心包摩擦感, 心界叩诊在正常范围内, 心率 60 次/分, 心音正常, 心律齐, 各瓣膜听诊区未闻及病理性杂音。腹部外形正常, 无腹壁静脉曲张, 无胃肠型及蠕动波, 腹壁柔软, 无压痛, 无反跳痛, 无液波震颤, 无振水音, 未触及异常包块, 肝脾肋下未触及, Murphy 氏征阴性, 双肾区无叩痛, 移动性浊音阴性, 肠鸣音正常, 3~4 次/分, 无气过水声。肛门外生殖器未见异常。脊柱呈生理性弯曲, 活动度正常。四肢无畸形, 活动自如, 双下肢无凹陷性水肿。生理反射存在, 病理反射未引出。

2.3. 既往病史

3 月前“左侧顶叶脑梗死”, 后遗右侧肢体无力。口服“阿司匹林肠溶片、抗栓丸、阿托伐他汀钙”治疗; NIHSS 评分: 3 分, MRS 评分: 2 分。“肝囊肿、肾囊肿、肺结节”病史; “高血压”病史 3 月; 否认有糖尿病、冠心病等病史; 否认有肝炎、结核等急慢性传染病史; DSA 示: 左侧大脑中动脉 M1 段重度狭窄。否认有外伤、输血史; 否认有药物、食物过敏史, 已全程接种新冠疫苗。

2.4. 检验及检查

患者入院后完善相关检查, 部分结果如下总胆固醇: 2.90 mmol/L, 甘油三酯: 0.73, 高密度胆固醇: 1.09, 低密度胆固醇: 1.58, 载脂蛋白 A1: 1.06 g/L, 载脂蛋白 B: 0.52, 载脂蛋白 E: 27.4 mg/L, 脂蛋白 a: 131 mg/L, 糖化血红蛋白: 5.4%。纤维蛋白原降解产物: 1.10 ug/mL, 国际标准化比值 0.99, 活化部分凝血活酶时间 29.0 sec, 纤维蛋白原含量 2.98 g/L, 凝血酶原活动度 103%, 凝血酶时间 15.10 sec, 凝血酶原时间 11.5 sec, D-二聚体 0.21 ug/mL。颅脑 CT: 1) 左侧额叶软化灶形成; 2) 双侧半卵圆中心、双侧基底节区及双侧侧脑室旁多发梗死灶; 3) 脑白质变性; 4) 脑萎缩, 右侧额部硬膜下少量积液。DSA 示: 左侧大脑中动脉 M1 段重度狭窄。

2.5. 诊疗经过

一位 77 岁男性以被家人发现言语不能 3 小时入院。急诊行脑 CT 提示: 1) 左侧额叶软化灶形成; 2) 双侧半卵圆中心、双侧基底节区及双侧侧脑室旁多发梗死灶; 3) 脑白质变性; 4) 脑萎缩, 右侧额部硬膜下少量积液。颅脑 DWI 示: 左侧基底节区脑梗死急性期。再入院后行 DSA 见: 左侧大脑中动脉 M1 段闭塞; 右侧大脑前动脉 A1-2 阶段性轻 - 中度狭窄, 左侧大脑前动脉 A2 段狭窄 90%, 左侧椎动脉 V4 段闭塞, 全脑毛细血管期染色良好, 血液循环时间正常, 双侧静脉窦发育正常, 颅内血管走行略显僵硬, 有动脉硬化表现。于当日行左侧大脑中动脉球囊扩张 + 支架植入术。在全麻下, 将 1.5 mm × 15 mm 球囊放置到左侧大脑中动脉闭塞处, 接压力泵, 将压力打到 8 个气压后, 造影见: 左侧大脑中动脉 M1 段残余狭窄约 50%, 将 2.0 mm × 15 mm 球囊放置到左侧大脑中动脉狭窄处, 接压力泵, 将压力打到 6 个气压后造影见动脉狭窄程度改善, 撤出球囊, 选 NEUROFORMEZ 4.0 mm × 20 mm 支架置于左侧大脑中动脉 M1 段狭窄处, 造影见左侧大脑中动脉血流通畅。远端血管显影良好, 为预防支架内血栓形成静脉泵入替罗非班。观察 20 分钟后再次造影见支架内血流通畅, 手术顺利。术前 TIC1 分级: 0 级, 术后 TIC1

分级: 3 级。术后 1 小时评估: 患者意识呈全麻未清醒状态, 双侧瞳孔等大等圆, 直径约 2.5 mm, 对光反射灵敏。右侧巴氏征阳性, 脑膜刺激征阴性。术后第二天患者意识较前好转, 呼唤可睁眼, 可遵医嘱比划数字。予以改善循环、抗炎、抑酸、增强免疫等综合治疗。球囊 + 支架植入术后 24 小时再次评估, 患者出现意识嗜睡, 完全性运动性失语。复查头颅 CT 未见明显异常(如图 1(a), 图 1(b)所示)。术后第 4 天, 患者意识清醒, 言语不能, 可遵医嘱比划数字。术后第 5 天患者突发意识模糊、恶心、烦躁、出汗, 立即测血压 120/84 mmHg。急查头颅 CT 示: 左侧基底节区及左侧额颞顶叶脑出血, 量约 170 mL, 并脑疝形成(如图 1(c), 图 1(d)所示)。立即向患者家属告知病情, 患者预后极差, 建议立即急诊行开颅手术治疗, 增加保命几率。家属考虑手术风险大, 预后不良, 拒绝手术治疗并签字要求出院, 患者于出院后 1 周内去世。此例患者既往高血压病史 3 月, 最高压 172/84 mmHg, 3 月前“左侧顶叶脑梗死”, 后遗右侧肢体无力。患者术前颅脑 CT 未见明显异常, 且入院后血压控制可, 无自发性脑出血征象, 无颅脑外伤史。患者术后左侧基底节区及左侧额颞顶叶脑出血, 量约 170 mL, 并脑疝形成, 血压不高 120/84 mmHg, 不考虑高血压导致的脑出血, 且左侧基底节区及左侧额颞顶叶脑出血为左侧大脑中动脉灌注区, 考虑术后出血为高灌注导致的脑出血。

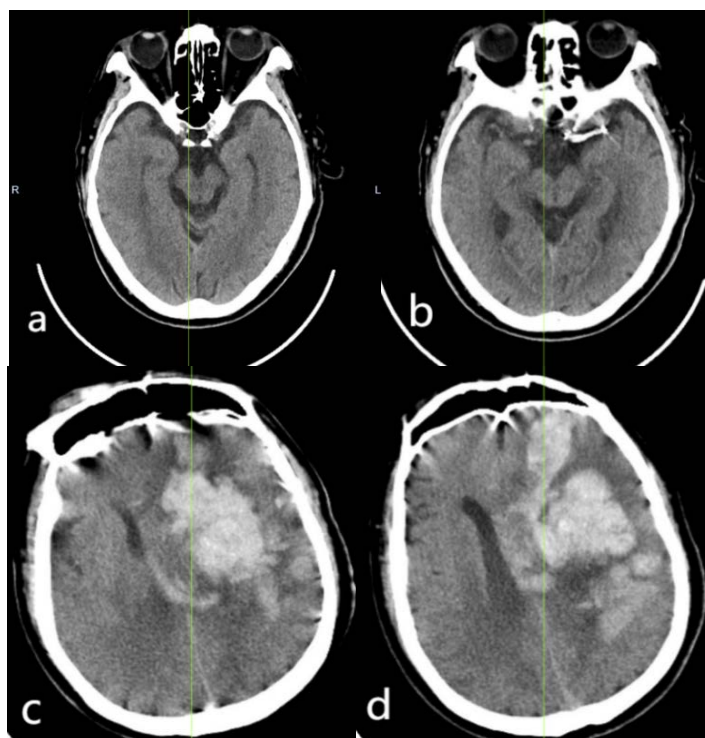


Figure 1. (a) and (b) show the CT scan on the first day after right middle cerebral artery stent implantation in the patient, indicating that the stent was well implanted and no other abnormalities were found in the intracranium. (c) and (d) show the follow-up CT scan on the fourth day after stent implantation, and the patient suffered a fatal cerebral hemorrhage

图 1. (a)和(b)显示患者右侧大脑中动脉支架植入术后第一天 CT, 显示支架植入良好, 颅内未见其他异常。(c)和(d)显示了支架植入术后第四天复查 CT, 患者出现致命性脑出血

3. 讨论

目前研究认为, CHS 的发病机制之一为在颅内血管狭窄相关区域, 由于长期处于低灌注状态, 微血管床为维持血液供应而呈现扩张状态。长此以往, 脑血管的自我调节机制因持续异常工作而功能衰退, 致使其调节能力下降; 支架植入后, 相关区域血流量显著上升, 压力也随之增大。微血管床难以承受这

种变化, 进而引发脑组织水肿。在严重情况下, 甚至会出现血管破裂出血的症状[10]-[12]。此外, 部分患者狭窄血管的供血区域存在梗死病灶, 这些梗死区域的血-脑脊液屏障尚未完全修复。在支架植入后, 血流压力增大, 使得原本脆弱的梗死区域难以承受, 进而引发水肿, 甚至出现出血现象[10][13]。解剖病理学研究发现, 由 CHS 引发的脑组织病理变化, 与恶性高血压所致情形相仿, 主要体现为小动脉内皮损伤以及纤维素样坏死, 以及病变区域内的组织出现肿胀现象[12]。CHS 的主要危险因素包括女性、慢性肾功能衰竭、手术时间、年龄增长、左侧颈动脉治疗、严重的颈内动脉狭窄、对侧严重颈动脉狭窄或闭塞、近期脑梗死和高血压等, 及时识别和管理 CHS, 是降低长期神经系统发病率的必要条件[3][14][15]。此外, 狭窄的动脉被打通后导致的缺血区域再灌注可导致“再灌注损伤”, 其中氧化剂的产生、补体的激活和微血管通透性的增加会导致血脑屏障受损、脑水肿和脑出血。CHS 是一种毁灭性的并发症, 因为与该疾病相关的致残率和致死率接近 60%~80%[16]。由于 CHS 的高致残率和致死率, 在脑血运重建术后, 除非其他明确的非 CHS 导致的神经精神功能异常的诊断, 否则一旦脑血运重建术后出现严重头痛、癫痫发作或局灶性神经功能缺损应推测为 CHS, 当怀疑患者患有 CHS 时, 应立即严格控制血压并将这些患者被放置在一个监测单位, 血压应严格限制到的收缩压 < 120~140 mmHg, 治疗应持续至患者脑血管自我调节能力基本恢复为止[3][17]-[20]。TCD 研究有助于监测颅内动脉收缩期峰值流速的升高, 可作为即将发生的 CHS 的标志[21]。在约 15% 的患者中, TCD 信号可能会受到骨窗情况不良的干扰。在这类患者中, 近红外光谱学(NIRS)可能是监测 CBF 的一个有用的选择[22][23]。

声 明

该病例报道已获得病人的知情同意。

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