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钝性脑血管损伤的筛查及诊疗进展综述

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摘　要

钝性脑血管损伤(Blunt Cerebrovascular Injury, BCVI)包括钝性颈动脉和钝性椎动脉损伤，是一种相对少见但可能产生灾难性后果的损伤。由于钝性脑血管损伤的临床表现多样，且损伤往往合并有多脏器系统损伤，临床医生往往难以初步识别。随着筛查方法以及CT血管造影(CTA)等检查工具的使用，钝性脑血管损伤的发病率和死亡率都在增高。钝性脑血管损伤的许多方面仍然存在争议，包括筛选标准、诊断方法以及不同类型损伤的最佳治疗方案。本文将从BCVI发病机制、筛查、诊断和治疗等方面进行综述。

关键词

钝性脑血管损伤，卒中，脑梗塞，外伤

Review on Screening, Diagnosis and Treatment of Blunt Cerebrovascular Injury

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Abstract

Blunt cerebrovascular injury (BCVI), which includes blunt carotid and blunt vertebral artery injuries, is a relatively rare but potentially catastrophic injury. Due to the variety of clinical manifesta-

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tions of blunt cerebrovascular injury and the fact that the injury is often associated with multiple organ and system injuries, clinicians are often difficult to preliminarily identify. With the use of screening methods and testing tools such as CT angiography (CTA), the incidence and mortality of blunt cerebrovascular injury are increasing. Many aspects of blunt cerebrovascular injury remain controversial, including screening criteria, diagnostic methods, and the best treatment for different types of injury. This paper will review the pathogenesis, screening, diagnosis and treatment of BCVI.

Keywords

Blunt Cerebrovascular Injury, Stroke, Brain Infarction, Trauma

1. 引言

钝性颈动脉损伤和钝性椎动脉损伤统称为钝性脑血管损伤，因其临床症状多样，症状及体征的延迟出现而具有一定隐匿性，早期的研究显示其发病率低至 0.08% [1]，随着积极的筛查以及 CTA 的广泛使用，在创伤患者中 BCVI 的发生率估计为 1.00%~3.00% [2] [3] [4] [5]，在严重头部损伤患者中发病率高于 9.0% [6]。脑卒中是 BCVI 较为严重的结果之一，发病率在 9.2%~19% [4] [5] [6] [7]。严重的脑血管损伤进展速度快，风险高，尽管采用积极的治疗，其预后仍较差，患者的总体死亡率为 16.1% [7]，在严重的 BCVI 的患者中死亡率可高达 33% [6]。近年来越来越多的证据表明，相当比例的 BCVI 患者症状会延迟出现，即在潜伏的无症状期之后出现缺血性事件。抗血栓药物治疗显示可以显著降低创伤后卒中的发生率，并改善最终的神经症状，因此，我们强调积极的筛查有助于 BCVI 的早期诊断及治疗，改善患者预后，降低卒中发生率。本文系统回顾了目前关于 BCVI 的发病机制、筛查、诊断和治疗的文献。

2. 钝性脑血管损伤发病机制

颈动脉和椎动脉的钝性损伤(BCVI)被认为是罕见的，外伤是其最常见的病因，导致 BCVI 损伤的主要机制包括颈椎过度旋转和过伸、直接钝性血管损伤、口腔内损伤以及骨折碎片直接撕裂伤[8]。BCVI 通常始于内膜或中膜，形成内膜撕裂或壁内血肿，它可发生在血管的任何位置，颅外节段血管更容易受伤，因为它们的位置更浅表，靠近骨性结构且具有更大的活动性[9] [10]。颈动脉损伤最常见于颅外段的颈内动脉远端，损伤与头部过度伸展和向对侧旋转导致 C1-C3 椎体被拉伸有关[8] [11]，也有报道[10] [12] [13]表明在颈部过度屈曲时颈内动脉也可能在下颌骨或舌骨和颈椎之间受压而损伤。此外颅底骨折移位的碎骨片也可能导致颈内动脉的直接损伤。椎动脉损伤最常见的部位是 V2 及 V3 段，常由横突处骨折损伤血管或椎动脉过度拉伸造成[14]。颈动脉或椎动脉损伤处血小板聚集或血管壁内血肿导致管腔狭窄或闭塞，从而导致低流量缺血性梗死，从而产生一系列的神经系统症状。

3. 钝性脑血管损伤丹佛筛查标准及分级系统

许多 BCVI 患者在受伤当时可能没有神经学症状，症状表现为一种延迟的方式，即在潜伏的无症状期之后出现缺血性事件，BCVI 引起的卒中可发生在最初损伤的 1 周后[15] [16] [17]。相关研究表明，在那些没有症状的人群中，积极的筛查可使卒中的发病率大大降低，早期诊断并接受抗血栓治疗可使患者

的总体卒中率从20%降到不到1% [15] [16] [18]。因此早期识别和治疗是非常重要的。筛查对BCVI的早期诊断和无症状期的治疗起着重要作用，可能预防不良结果，如果损伤没有及早发现和治疗，患者可能会出现不可逆转的神经症状。依据丹佛医学中心修订后的丹佛标准(见表1)筛查无症状患者是被研究和应用最多，也是最被认可的[9]。后来的研究表明，根据修改后的丹佛标准筛查，有近20%的BCVI病例漏诊[16] [19]。1999年丹佛医学中心的Biffl等提出了BCVI分级量表(见表2)，随着分级的增加，中风风险增加，预后变差。

Table 1. Expanded screening criteria for BCVI of Denver
表1. 扩展的丹佛BCVI筛查标准[4]

BCVI的症状及体征	BCVI的危险因素
潜在的动脉出血(颈部、鼻腔或口腔)	存在以下几种高能传递机制：
颈部杂音(患者年龄 ＜50岁)	LeFort II或III型骨折
扩大的颈部血肿	下颌骨骨折
颅脑CT或MRI提示中风	颅底骨折累及颈动脉管
局灶性神经缺损：TIA、轻偏瘫、椎基底动脉症状、Horner综合征	颈椎椎体任何层面的骨折、半脱位或韧带损伤；C1-C3骨折
神经功能缺损与颅脑CT结果不一致	严重创伤性脑损伤(TBI)，GCS评分 ＜6分
	严重的缺氧性脑损伤
	前颈晒衣绳型损伤或安全带磨损，伴有明显肿胀、疼痛或精神状态改变
	上肋骨骨折
	胸部血管损伤
	钝性心脏破裂
	头皮撕脱伤

Table 2. Blunt cerebrovascular injury grading scale
表2. 钝性脑血管损伤评分量表[39]

损伤分级	
I级	血管壁不规则或存在夹层、壁内血肿，狭窄率 ＜25%
II级	血管壁内血栓、夹层、壁内血肿，狭窄率 ＞25%
III级	假性动脉瘤
IV级	血管闭塞
V级	血管离断

4. BCVI的筛查方法

4.1. 数字减影血管造影(DSA)

BCVI评估可通过CT血管造影(CTA)、MR成像/磁共振血管成像(MRA)或数字减影血管造影(DSA)进行。DSA长期以来被视为诊断的金标准，但其具有一定的局限性，耗费时间长及具有侵入性，目前DSA大多是在BCVI有干预计划的情况下进行[20]。此外，DSA不能提供血管壁的相关信息，因此在描述血管壁血肿方面受到限制[8] [21]，并且有1%~3%的病例存在血管夹层和血栓栓塞等相关并发症[9]。因此，DSA在很大程度上已经被CTA所取代。

4.2. CT 血管造影(CTA)

早期的研究显示，与 DSA 相比单排和四排 CT 扫描对 BCVI 的灵敏度仅为 45%~70% [22] [23]。然而，随着 CT 技术的发展，16 排或更高排数的 CT 对 BCVI 诊断的敏感性和特异性都接近 100% [24] [25]。由于 CTA 具有快速、无创、易得、空间分辨率高等优点，同时可评估骨性和软组织损伤，因此被认为是 BCVI 筛查的首选技术[2] [21] [26] [27] [28]，随着计算机断层扫描技术的发展，其作用将继续扩大，实现更快速的扫描并获得分辨率更高图像。

4.3. 多普勒超声检查

对于 BCVI 的筛选不推荐使用多普勒超声检查[25]。约 90%的病变在超声检查探及不到的位置，并且超声检查依赖于操作者，灵敏度较低，更容易漏诊夹层动脉瘤[8]。

4.4. 磁共振血管成像(MRA)

MRA 提供了全面的血管影像，不需要注射造影剂因而无肾毒性，可同时评估韧带、脊髓损伤，也能提供卒中的更多信息。然而，MRA 需要更长的时间来获取，这可能会导致严重损伤患者诊治的延迟，且不是所有医疗机构都能轻易获得 MRA 影像资料，同时 MRA 对急性壁内血肿敏感性较低[8] [21]。指南[25]不建议将 MRA 作为 BCVI 的单一诊断技术，但可以起到补充作用。

5. 钝性脑血管损伤的治疗

BCVI 的最佳治疗一直存在许多争议，相关指南[25] [28]指出应根据损伤部位、程度及患者症状，进行抗血栓治疗(ATT)、手术修复和血管内治疗等相应的治疗策略。BCVI 分级量表被用于衡量损伤的严重程度和指导不同等级损伤的治疗[29]，如果没有禁忌症，ATT 适用于所有 I 级和 II 级患者，接受 ATT 治疗的患者中风率明显降低[4] [16] [22] [30]。II 级患者如出现病情进展，则可能需要进行外科手术或血管内治。指南[25] [28]推荐使用肝素抗凝，因为与抗血小板相比，它是可逆的。抗血小板药物(氯吡格雷 75 mg/d，阿司匹林 325 mg/d)在预防中风方面与肝素同等有效[31] [32] [33]，如果患者有肝素的禁忌症，可在紧急情况下使用抗血小板药物。存在抗血栓治疗禁忌如活动性出血、蛛网膜下腔及颅内出血等，一旦病情稳定，也可从早期的抗血栓治疗中获益，而不会增加出血并发症的发生率[34] [35]。III-V 级损伤很少单纯进行抗血栓治疗，应根据患者损伤部位、程度及神经症状选择手术或血管内治疗，对于有早期神经功能缺损和可触及颈动脉病变的患者，应考虑手术或介入修复以恢复血流，如伴有严重的神经功能缺损，手术和抗凝治疗都不能改善预后[36]。血管内支架置入术主要应用于较高级别的病变，其适应症包括 1) 进行性严重血管狭窄、初始神经症状进展或假性动脉瘤扩大(>1.0 cm)；2) 卒中；3) 存在抗血栓治疗禁忌症；4) 手术无法触及的 V 级病变[25] [37] [38]。支架植入术后需要几个月的双重抗血小板治疗，这带来了更高的出血风险，需要更谨慎的使用。在 V 级(血管离断)损伤中必须立即干预控制出血(直接按压止血、外科手术等)并尝试恢复血流，V 级损伤的死亡率和卒中发生率非常高，有报道表明在严重 BCVI 患者中死亡率可高达 33% [6]。

丹佛医学中心[4]及相关指南[25] [28]认为 I 级和 II 级损伤在 7~10 天内通常会完全愈合或者形成假性动脉瘤，建议密切医学观察 7~10 天后复查 CTA，如果损伤愈合则可以考虑停止使用抗血栓治疗，如果 CTA 提示损伤仍然存在，ATT 治疗可能会进一步持续 3~6 个月。部分 II 级和 III-V 级的损伤则应根据具体情况决定抗血栓治疗、外科手术或血管内治疗，丹佛医学中心扩大的 BCVI 筛查及治疗流程[4]在其线路流程图中被非常直观的展现出来。

6. 结论

尽管 BCVI 的诊断和治疗取得了进展，但对于目标人群的筛查仍存在争议。BCVI 是卒中的一种潜在的原因，由于其临床表现多样，症状及体征的延迟出现，BCVI 的预测、筛查仍然是一个持续的挑战，鉴于此，建议对所有存在危险因素的患者进行 CTA 筛查。BCVI 的治疗是根据受伤程度来决定的，在无使用禁忌情况下，早期抗血栓治疗已被证明是安全有效的，能显著降低卒中风险。使用扩展的丹佛筛查标准和 CTA 快速识别 BCVI 对治疗急性缺血性卒中是至关重要的。

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