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主动脉综合征诊断研究进展

张　杰，张义和*

延安大学附属医院心脏外科，陕西 延安

摘　要

目的：急性主动脉综合征(ASs)是累及胸主动脉的致命心血管急症。AS是一种相对罕见的疾病，具有非特异性的体征和症状(包括躯干疼痛、晕厥、神经功能缺损和肢体缺血)，需要胸腹对比增强断层扫描血管造影(CTA)进行最终诊断和后续治疗计划。在急诊科(ED)，大多数有AS潜在体征或症状的患者最终被发现受到其他替代诊断的影响。因此，误诊和延迟诊断是AS的主要问题。方法：对于危重患者，通常可以直接决定是否进行CTA，因为检查的好处大于风险。在心电图显示st段抬高的患者、疑似原发性缺血性中风的患者和病情稳定的患者(代表最常见的ED场景)中，由于存在误诊和过度检测的风险，需要进行CTA的患者的正确筛查是很麻烦的。结果：现有研究支持了一种综合了临床概率评估、床边超声心动图和d-二聚体(如果临床概率不高)的算法。治疗管理包括对所有患者进行药物治疗，包括阿片类药物和抗冲动药物(一种受体阻滞剂和一种血管扩张剂)，目标是心率为每分钟60次，收缩压为100~120毫米汞柱。累及升主动脉的AS患者可能需要紧急手术，而复杂的B型AS (严重的主动脉扩张、即将发生或直接破裂、器官灌注不良、难愈性疼痛、严重高血压)需要评估是否需要紧急血管内治疗。

关键词

主动脉综合征，夹层，壁内血肿，主动脉溃疡

Advances in the Diagnosis of Aortic Syndrome

Jie Zhang, Yihe Zhang*

Department of Cardiac Surgery, Affiliated Hospital of Yan'an University, Yan'an Shaanxi

Abstract

Objective: Acute aortic syndrome (AS) is a fatal cardiovascular emergency involving the thoracic

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*通讯作者。

aorta. AS is a relatively rare disorder with non-specific signs and symptoms (including trunk pain, syncope, neurological deficits, and limb ischemia) that requires chest and abdominal contrast-enhanced tomography angiography (CTA) for final diagnosis and subsequent treatment planning. In the emergency department (ED), most patients with potential signs or symptoms of AS are eventually found to be affected by other alternative diagnoses. Therefore, misdiagnosis and delayed diagnosis are the main problems of AS. Methods: In critically ill patients, the decision to have a CTA is often straightforward, as the benefits of testing outweigh the risks. Proper screening of patients requiring CTA is troublesome due to the risk of misdiagnosis and over-testing in patients whose ECG shows ST-segment elevation, patients with suspected primary ischemic stroke, and patients with stable disease (representing the most common ED scenario). Results: Available studies support an algorithm that combines clinical probability assessment, bedside echocardiography, and D-dimer (if clinical probability is not high). Treatment management includes medication for all patients, including opioids and anti-impulse drugs (a beta-blocker and a vasodilator), with a target heart rate of 60 beats per minute and systolic blood pressure of 100~120 MMHG. Patients with AS involving the ascending aorta may require emergency surgery, while complex type B AS (severe aortic dilation, imminent or immediate rupture, poor organ perfusion, intractable pain, severe hypertension) requires evaluation for emergency endovascular treatment.

Keywords

1. 前言

诊断急性主动脉综合征(acute aortic syndrome, AS)是一组危及生命的血管急症，主要包括急性主动脉夹层、主动脉壁内血肿和穿透性主动脉溃疡，其共同的特点是主动脉壁的完整性受损。AS 的死亡率很高，需要尽快早期诊断，并立即进行内科或外科治疗，研究表明，对于 A 型主动脉夹层来讲，开始治疗的时间每延迟 1 h，死亡率增加 1% [1]。目前，AS 的诊断主要依靠影像学检查，近年来，随着科学技术的发展，除 CT 血管造影(CTA)、超声心动图等传统的影像学方式外，目前发展出了应用四维血流心血管磁共振(four-dimensional flow cardiovascular magnetic resonance, 4D-Flow CMR)评估 AS 的血流动力学状态，正电子发射计算机断层显像(PET)-CT、基于纳米颗粒作为对比剂的血管 CT 等检查用于评估血管壁的炎症反应，此外，越来越多的研究将机器学习用于主动脉夹层的诊断与预后评估中。

2. AS 在诊断方面的研究进展

2.1. 诊断干扰因素

性别是 AS 诊断的重要混杂因素。尽管女性受影响的频率较低，但她们的预后较差，可能是由于诊断延迟和非典型症状[2] [3]。在 IRAD 登记中，年龄 ≥70 岁和糖尿病也与延迟诊断[4]有关。在临床发现中，无痛表现(高达 15%的病例)构成了一个主要难题。其他主要干扰因素包括发热、充血性心力衰竭、呼吸困难和胸腔积液的体征/症状[2] [4] [5] [6] [7]。

2.2. 超声评估

直接而局部地显示主动脉可以提高疑似 AS 的概率评估[8] [9] [10]。为了在最佳状态下进行 POCUS，患者必须仰卧位或左侧卧位，并由训练有素的医生使用以下视图：左/右胸骨旁、胸骨尖、胸骨上、肋下、腹部、颈动脉和髂/股动脉视图[11] [12]。当应用聚焦心脏方案时，POCUS 可局限于左胸骨旁和肋下视图。AS 的直接超声征象是：内膜瓣、IMH (主动脉壁圆形/新月形增厚 5 毫米)和 PAU (主动脉壁呈锯齿状边缘的弹坑状外袋)。间接征象有：胸主动脉扩张(任何水平处直径 ≥ 4 cm)，心包积液/填塞，主动脉瓣返流至少中等[9] [10]。ED 研究显示，AD-A 经胸超声心动图的 Sens/Spec 为 88%~91%/56%~100%，AD-B 的 Sens/Spec 为 51%~82%/60%~83% [11] [13] [14] [15] [16]。其他 AS 类型的诊断准确率甚至更低。在 AD-B 中，椎旁入路可将 Sens 提高到 81%，但技术可行性有限，且缺乏 ED 验证。建议的试验已经证实，即使与 ADD-RS 结合，POCUS 也没有足够的灵敏度(94%)和失败率(2%)，无法最终排除[13] [17] [18]。然而，在这项试验中，约 1/20 的低 p 患者表现出直接的 AS 迹象，揭示了需要立即进行 CTA。在 29%的低磷患者中发现间接 POCUS 征象，但规格较低。因此，在低 p 水平的患者中，直接体征的识别需要紧急 CTA，而单独存在间接 POCUS 体征则需要逐案推理。

2.3. 血液检测

AS 与白细胞计数增加、中性粒细胞与淋巴细胞比值增加、血小板计数减少、血小板与淋巴细胞比值增加和纤维蛋白原水平降低有关。变化最大的是 AD-A。这些发现的诊断准确性是有限的，即使结合起来。然而，在临床概率较低的患者中，它们可用于改进测试前概率评估[19]。在中国的一项大型研究中，血浆 sST2 对 AS 具有较高的准确性。然而，随后的一项 ED 研究应用了一种商业分析法，未能证实这一数据[19] [20]。乳酸脱氢酶、肌钙蛋白和 c 反应蛋白的诊断准确性可以忽略不计。相反，它们是器官灌注不良、心肌灌注不良和继发性炎症的标志物[21] [22]。例如，据报道，在 27%的 AD 患者中肌钙蛋白升高与短期死亡率增加有关。d-二聚体是交联纤维蛋白的降解产物，广泛应用于肺栓塞的排除生物标志物。多项研究表明，在 AS 中 d-二聚体水平显著升高[1] [23] [24] [25]。目前，唯一有效的 AS d-二聚体截止值为 500 ng/mL FEU，而年龄调整截止值仅提供了初步数据[23] [26] [27]。d-二聚体的特征是高灵敏度和低至中等规格，这是因为随着年龄、癌症和鉴别诊断中的几种疾病(如心包炎、胸膜炎、肺炎、败血症、肺栓塞)而非特异性增加。d-二聚体在非常早期或晚期的呈现者、小的 imh 和病灶解剖中可能呈假阴性[26] [29]。为了实现最佳的感觉，d-二聚体必须应用于低 p 水平的患者，以提供可接受的低假阴性率[24]。

2.4. 胸部 X 线摄影

胸部 X 光片(CR)是躯干疼痛患者的常规检查。除了为 AS 提供替代诊断(例如，肺炎、气胸、膈下游离空气、肋骨或椎体骨折)，CR 还可以部分显示胸主动脉并发现病理发现，如纵隔增大(主动脉旋翼水平 ≥ 80 mm 或纵隔/胸比 0.25)或更多罕见的体征：双主动脉旋节，主动脉轮廓不清/不规则，主动脉壁钙化物移位(>10 mm)，右侧气管移位，鼻胃管移位，左侧胸腔积液，心包积液，左侧根尖不透明。然而，CR 与 AS 的低灵敏度(60%)和低规格(85%)相关，仅对诊断决策有轻微影响。对建议研究的二次分析表明，CR 与 ADD-RS ≤ 1 的相关性为 69%，因此绝不能用于决定性的 AS 排除[17] [29]。综上所述，近年来，随着影像学技术的发展，AS 的诊断方式更为多样，除了传统的形态学诊断，目前基于血管动力学及血管壁炎症的影像学方式也得到了发展，这对精准评估 AS 危险分层意义重大，但这些研究数目相对较少，未来需进一步研究。

2.5. 先进的成像

晚期主动脉成像的详细描述可以在其他地方找到[16]。在急诊科，关键的高级成像检查是 CTA，由于其出色的诊断性能(Sens/Spec 98%~100%)，广泛的可用性，快速的执行和广泛的鉴别诊断能力。只要可能，CTA 应与心脏门控一起进行，以减少可能的伪影[30]。在没有 AS 和怀疑 CAD 或肺栓塞的患者中，应考虑合并冠状动脉和/或肺 CTA，如果双/三重排除[11]。磁共振成像也具有高灵敏度/规格，加上没有辐射暴露，但由于扫描时间长和可用性有限，不适用于 ED 使用。最后，TEE 也具有出色的诊断准确性(Sens 98%, Spec 95%)，是术中主动脉瓣评估的基础，但由于鉴别诊断能力不足，需要训练有素的医生，TEE 在急诊科的应用有限[16] [31]。在急诊科，该工具主要适用于不稳定的患者和 CTA 不确定的患者。

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