

· 综 述 ·

心房颤动导管消融后心房食管瘘的研究概况

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【摘 要】 心房颤动(房颤)是较常见的一种心律失常,目前导管消融作为其治疗手段之一,已广泛应用于临床。心房食管瘘是房颤导管消融术的一种罕见并发症,但却是最可怕和致命的。因此,为了能降低其发生的风险,我们需要充分认识该并发症,并采取积极有效的预防措施。本文综述了心房食管瘘的发病机制、危险因素、诊断及治疗,以及目前可能有效的一些预防措施,以期临床提供参考。

【关键词】 心房颤动;导管消融;心房食管瘘

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General situation of researches on atrial esophageal fistula after catheter ablation of atrial fibrillation

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【Abstract】 Atrial fibrillation (AF) is a common arrhythmia. Currently, catheter ablation is one of the effective treatments and has been widely used in clinical practice. Atrial esophageal fistula is a rare complication of AF catheter ablation but is the most dreadful and deadly one. Therefore, to reduce the risk of its occurrence, we need to fully understand it and take active and effective preventive measures. This article reviews its pathogenesis, risk factors, diagnosis and treatment, and summarizes some of the preventive measures that may be effective at present.

【Key words】 atrial fibrillation; catheter ablation; atrial esophageal fistula

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心房颤动(房颤)是临床常见的心律失常之一,据统计,全球房颤患者至少有 3 350 万^[1]。房颤的致残、致死率高,会加重医疗负担,除内科药物治疗外,目前导管消融治疗也已得到了普遍认可,而心房食管瘘是消融术后的一种潜在的致命并发症^[2]。由于心房食管瘘发生率较低,且受样本量大小、数据选择偏倚等因素影响,其发生率各文献报道不一,大约为 0.03%~0.11%,如无手术干预,死亡率为 83%~100%^[3]。这些数据主要来源于射频消融,而冷冻消融术后心房食管瘘的发生率更低,John 等^[4]估计其发生率<0.01%。为进一步提高消融的安全性,我们不但要准确认识该并发症,还要掌握一些有效的预

防策略,笔者对此进行了综述。

1 发生机制

有研究提示,心房食管瘘一般继发于消融术中的食管损伤。心房食管瘘的可能机制主要有以下几点。(1)消融能量直接损伤了食管壁,包括射频热损伤以及冷冻低温损伤,导致食管炎性反应、坏死、穿孔,形成瘘管^[5]。(2)消融能量损伤食管的微血管,间接影响食管内皮细胞,继而引起相应部位食管黏膜层缺血、溃疡^[5]。(3)胃食管反流,可能是消融过程中损伤迷走神经,导致食管下括约肌压力降低所致^[6],术中平卧体位也可能加重酸反流。酸反流

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导致食管内胃酸浓度增高,一方面可使食管发生进行性的炎症和损伤,从而穿孔、形成瘘管;另一方面,胃酸也可干扰食管损伤后的修复机制,从而加剧损伤^[7]。(4)食管运动障碍。食管具有蠕动性,在受到热量或机械刺激时会发生移位,避开消融靶区,但消融过程会损伤神经导致运动障碍,再者术中麻醉也会导致其运动障碍,均可使这种自我保护机制受到影响^[7]。

2 危险因素

2.1 解剖学因素

食管紧贴于左心房后壁,大多靠近左侧肺静脉,该部位为消融区域,易导致食管损伤,而且食管及左房后壁都较薄,房颤患者心房扩大,左房后壁与食管接触面积增大,同样会增加食管损伤的概率;此外,食管与左房之间填充有一层厚薄不等的纤维脂肪组织,对能量传递起到一定的缓冲作用,可能有助于预防食管损伤^[8]。

2.2 手术相关因素

Halm 等^[9]研究表明,食管热损伤一般发生在食管腔内温度 $>41^{\circ}\text{C}$ 时。射频消融左房后壁时功率设定偏高、持续时间过长、导管与左房后壁接触压力过大等,可致食管温度过高,加重局部损伤^[8]。此外,术中全身麻醉会引起食管蠕动和吞咽减少、疼痛反馈缺失和食管动力下降等,从而增加食管壁损伤的风险^[10]。

3 诊断和治疗

3.1 临床表现

心房食管瘘一般发生于术后 60 d 内,其临床表现通常无特异性,比较常见的是发热、神经系统症状(中风、癫痫发作、言语运动障碍等)、胸痛、呕血,其他还包括精神状态改变、吞咽困难、呼吸困难、恶心呕吐、咳嗽、腹痛、黑便、头痛等^[11]。

3.2 实验室及影像学检查

心房食管瘘早期比较敏感的指标是血白细胞计数升高,C-反应蛋白、降钙素原升高以及血培养阳性等也具有临床意义^[12]。脑磁共振成像(magnetic resonance imaging, MRI)检查可显示颅内栓塞病变^[13];胸部增强 CT 具有诊断价值,影像上最常见的是左心房空气和纵膈气肿,如果见造影剂从左心房进入食道或纵膈,则可确诊^[12, 14]。需要注意的是,如果高度怀疑心房食管瘘,则禁忌行内窥镜及经食管超声检查,因检查过程中的充气等措施可能会扩大瘘口或形成广泛气体栓塞,从而加重病情^[13]。

3.3 治疗方法

心房食管瘘一旦诊断明确,强调及早进行干预。治疗方法主要包括外科手术修补瘘口和置入食管覆膜支架。而多数回顾性研究表明,与置入食管支架相比,接受外科手术的患者存活率显著提高^[15]。因此,对于临床确诊病例,推荐首选外科手术治疗。

4 预防措施

4.1 围手术期左心房-肺静脉-食管成像

清晰的解剖位置图像有助于指导术者在消融左房后壁时避开与食管的重叠区域。目前常用多层螺旋计算机断层扫描(multi-slice computed tomography, MSCT)或 MRI,术前通过心脏 CT/MRI 对比增强扫描并同步吞服对比剂,采集左心房、肺静脉、食管图像,借助特殊计算软件重建食管与左房、肺静脉的三维解剖图,结合术中三维电标测系统,可准确定位消融靶点^[16]。但术前 CT/MRI 成像也有不足之处,有研究发现术中食管会发生移位,而消融前获得的三维重建图像不能准确反映术中食管位置^[17]。Kobza 等^[18]对比了 18 例患者术前 1 天的 CT 三维图像与术中实时图像,结果发现 33% 的患者术中食管平均移位超过 10 mm,最大者甚至超过 15 mm,提示即使是在消融术前 24 h 内获得的三维解剖图像,也不能确保与术中食管实时位置相符。因此,我们需要寻找能在术中实时显影食管-左心房的方法来指导消融。相较于 CT/MRI 三维成像,左心房三维旋转造影作为一种近实时性成像技术,其准确性更高,已被证实是一种安全有效的替代方法^[19, 20]。心腔内超声心动图可以提供实时连续的食管与左房后壁解剖图像,并且术中能引导房间隔穿刺,监测局部组织损伤情况,使术者及时做出调整,从而减少食管损伤^[21];但是由于它对操作者技术要求高、额外成本高以及术中探头摆放位置可能妨碍消融等,目前还难以广泛应用^[20]。

4.2 消融术中能量的控制与食管温度的监测

消融的功率大小、持续时间长短等会影响组织损伤程度,国内建议:消融左心房后壁时,功率 $<25\sim 30\text{ W}$,单个位点消融时间 $<20\text{ s}$ ^[2]。当然,也有中心采取不同策略,Winkle 等^[22]做了一项多中心回顾性研究,纳入 4 个中心共 13 974 例消融手术,术中消融左房后壁时,11 436 例功率设置为 $45\sim 50\text{ W}$,单个位点消融持续 $2\sim 10\text{ s}$,而另外 2 538 例功率则降至 35 W ,单个位点持续 20 s ,术后比较心房食管瘘发生情况,前者 1 例(发生率 0.0087%),后者 2 例(发生率 0.1200%),这表明高功率、短时间消融方法也是

安全有效的。食管热损伤与术中食管温度直接相关,尤其当食管腔内温度超过 41℃ 时,温度每升高 1℃,损伤概率增加 1.36 倍^[9]。因此,为了能更加及时、精准地控制消融能量输送,减少食管损伤,很多中心常采取的方法是监测食管温度。通常是在食管腔内放置温度监测探头,当管腔内温度较基线水平升高 1℃~2℃ 或温度达 39℃~40℃ 时停止放电^[23]。部分研究者还使用了食管冷却技术,即当监测温度超过 39℃ 时,向食管内注射冷却剂^[24]。然而,传统的食管温度监测方法也存在着一些局限性:其一,由于温度探头与食管壁之间的距离不定,可能会低估食管壁内组织的真实温度;其二,不同种类的温度探头感知温度变化的灵敏度存在差异^[23,25]。Gianni 等^[26]和 Tschabrunn 等^[27]分别比较了 2 种不同类型的温度探头,结果发现,不管是测得的峰值温度还是温度达峰时间,两者均存在显著差异。Daly 等^[28]采用了一种更精确的食管温度监测方法,即体内高分辨率红外热成像技术,研究发现,目前经常采用的终止输送能量的临界温度(38℃~41℃)在消融期间其实是很常见的,但只有温度超过 50℃ 时才会发生食管损伤,作者认为该方法除了能预防食管损伤,还能减少不必要的中断放电。但该项研究样本量较小,此项技术的安全性和有效性还需进一步验证。

4.3 消融术中机械性食管移位

食管与左房后壁解剖位置相近,这是导致心房食管瘘的危险因素之一^[9],因此食管机械移位似乎是一种可行的预防手段。Mateos 等^[29]的一项前瞻性研究发现,通过食道超声探头可以实现术中机械性食管移位,范围在 4.0~9.1(5.9±0.8) cm 之间,大多足以避开消融区域,且术后无食管相关并发症。Palaniswamy 等^[30]研究同样证实了该方法的安全性,但该研究发现,术中食管需侧向偏离消融线>20 mm 才能有效预防食管损伤。然而,该措施也存在不足之处,如操作及器械本身会损伤食管、移位程度受多因素限制等^[29],需要进一步评价其风险与获益。

4.4 消融技术及设备的改进

与传统的手动消融相比,远程磁导航系统(remote magnetic navigation, RMN)的导管稳定性好、可操作性强,结合导管接触传感技术的应用,能实时监测并反馈接触压力,让术者更精准地控制导管与组织的贴靠程度、力度及方向等,可有效降低并发症发生率^[31,32]。但其缺点也很明显,如不适用于体内有金属植入物者、须与 CARTO 三维标测系统联合应用、价格高等。

4.5 术后预防性使用质子泵抑制剂

心房食管瘘的发生发展可能为双重因素的作用,即初始的热损伤以及随后的胃酸反流促使病灶进行性扩大,这一观点通过 Yokoyama 等^[33]进行的犬模型研究得到了证实。Martinek 等^[34]进行了一项关于射频消融对食管远端酸度急性影响的研究,结果显示 19.2% 的患者术后出现新发的酸反流。因此,预防性给予质子泵抑制剂抑酸治疗是值得推荐的,尤其是对存在胃食管反流的患者,建议使用高剂量(奥美拉唑或泮托拉唑),用药至少 4 周^[2,35]。

5 小结

心房食管瘘是房颤导管消融术后罕见并发症之一,死亡率高,他的发生发展多源于术中各种因素造成的食管损伤、溃疡。由于其缺乏特异性的临床表现,心房食管瘘的早期诊断很困难,胸部增强 CT 扫描是主要确诊依据。对于确诊患者,首选外科手术治疗,这能极大地降低死亡率。有关心房食管瘘的预防措施研究很多,但这些方法的临床应用仍然存在着一些局限性。鉴于及早诊断及治疗对患者预后影响极大,除了强化临床医师对该疾病的认识外,我们更应该加强对患者围手术期的管理:首先,要对患者及家属健康宣教,告知其危害性及相关症状,警惕术后一切可疑信号;其次,强调术后规律随访的重要性,包括常规门诊随访以及远程医疗随访,这不仅有助于疾病的早期发现,还有助于指导患者术后规范用药、监测房颤复发等。

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