

# 心房颤动射频消融术后复发的相关因素研究

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**【摘要】** 心房颤动(房颤)的射频消融术已成为治疗药物难治性房颤的首选方法,但术后可能复发,确定射频消融术后房颤复发的因素有重要意义。研究发现,高血压、左心房扩大、持续性房颤、缺少上腔静脉隔离、较长的手术时间及左房低电压等因素在房颤术后的早期复发中起到一定的作用;而晚期复发可能与心肌不完全透壁损伤、代谢综合征、心电图的某些特征及房颤的类型等相关;心房纤维化、左心房扩大、心肌组织及电传导通路的重构等均可导致极晚期复发。

**【关键词】** 心房颤动;导管消融;复发

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心房颤动(房颤)的射频消融治疗已成为药物难治性房颤的一线治疗方案,但术后复发率可高达 33%~60.7%<sup>[1]</sup>。目前房颤的发生机制仍不完全明确,关于房颤射频消融治疗指征、手术过程及操作、随访模式等方面尚欠缺标准化,这些因素均可影响到消融的效果。

## 1 房颤复发的定义及类型

房颤射频消融术后的前 3 个月定义为空白期,消融成功是指在空白期之后未应用抗心律失常药物的情况下无房性快速心律失常(房颤、房扑或房速)的发生,若记录到 1 次持续 30 s 以上的房性快速心律失常应视为消融失败<sup>[2]</sup>。早期复发发生于消融术后 3 个月内。晚期复发通常是发生于术后 1 年内<sup>[2-3]</sup>。术后 1 年后的复发则是极晚期复发。不同类型的复发有不同的机制,干预措施也不相同。

## 2 复发机制及预测因素

Balk 等<sup>[4]</sup>综合分析了 2 169 篇关于房颤射频消融术后复发相关因素的文献,将重点集中在患者术前的特征,如房颤类型、房颤持续时间、左室射血分数、左房直径、性别、年龄、是否存在结构性心脏病和高血压。但经 meta 分析显示,几乎没有一个指标可以作为预测房颤复发的因素,只有房颤类型与复发有一定的潜在联系,即持续性房颤和长程持续性房颤更易复发。该研究否定上述因素为复发因素可能是由于文献的质量和条件限制,并不是这些

因素与房颤复发真的没有关联。

### 2.1 早期复发

大部分患者在射频消融术后会发生早期复发,Bertaglia 等<sup>[5]</sup>随访发现,前 3 个月心房快速性心律失常的发生率可达 38%~46%,早期复发多在消融术后近期内发生,而后期的发生率有下降趋势<sup>[6]</sup>。早期复发并不代表最终结果的失败<sup>[7]</sup>,可能与消融后炎症、水肿和愈合有关<sup>[8]</sup>,其机制尚未明确。消融时高频热量对心肌造成损伤,使交感神经和副交感神经之间出现短暂的不平衡,导致了心律失常早期复发<sup>[9-10]</sup>。有研究证实心肌的损伤是渐进过程,在术后早期尚未形成完整的透壁损伤<sup>[10-11]</sup>。早期复发的另一种可能机制是消融后心房结构和电重构<sup>[12]</sup>。

Bertaglia 等<sup>[5]</sup>发现患者存在的结构性心脏病和肺静脉未完全隔离是房性快速性心律失常早期复发的预测因素。高血压、左心房扩大、持续性房颤以及缺少上腔静脉隔离等因素可作为消融术后房颤早期复发的预测因子<sup>[13]</sup>。房颤的持续时间越长,则复发的风险越大<sup>[14]</sup>。这些研究表明,结构性心脏病或某些可以导致左房重构和左房扩大的高危因素可能参与了房颤早期复发。Chang 等<sup>[15]</sup>研究发现,19%的患者会在射频消融术后的 48 h 内复发房颤,较长的手术时间<sup>[16]</sup>和左房低电压可能是 48 h 内复发的独立预测因素。

### 2.2 晚期复发

研究表明,在消融术 6 个月以后的复发是由于先前孤立的肺静脉的重新连接造成,即消融术后,

导致房性快速心律失常的肺静脉与左心房之间的电传导重新恢复<sup>[17]</sup>。还有一种复发直接表现为房颤,可能是因为消融不彻底<sup>[18]</sup>,为避免此类复发,应尽量保证在手术操作过程中彻底消融。此外,在消融区外的非肺静脉病灶也可能促进房颤发生<sup>[19]</sup>,如一些与房颤相关的电传导系统及解剖重建,也可能与多次消融、心肌纤维化和缺乏有活性的心肌组织相关。

在消融术 6 个月以后的房颤复发可能是由于肺静脉电传导重新连接或者射频能量不足,造成心肌不完全透壁损伤<sup>[20]</sup>。还有研究提出肥胖、代谢综合征和房颤的早期复发是房颤最终复发的独立预测因素<sup>[21]</sup>。Koyama 等<sup>[22]</sup>发现在消融后 48 h 以内复发的患者晚期复发率较低,而在 48 h 以后复发的患者晚期复发率较高。Themistoclakis 等<sup>[13]</sup>也得出了相似的结果,与 1 个月内复发的患者相比,48 h 内复发的患者最终的复发率较低。在 1 个月内复发是最终复发的最强预测因素<sup>[23]</sup>。另外,心电图的某些特征也可作为房颤复发的预测因素,在 aVF 和 V1 导联中的低振幅 f 波与消融后房颤晚期复发有关<sup>[24]</sup>。右心房扩大、左房内径 > 43 mm、手术次数超过 2 次等因素也可作为消融后房性心律失常复发的预测因素<sup>[25]</sup>。房颤类型可作为预测消融最终结果的因素,持续性房颤及长程持续性房颤的复发风险可高达 60%<sup>[4]</sup>。

### 2.3 极晚期复发

在消融术后 1 年或更长时间之后的复发,应考虑为心房组织恶化的结果。心房进一步纤维化、左心房扩大、心肌组织及电传导通路的重构均可导致极晚期的复发<sup>[26-27]</sup>。对于极晚期复发还需要进一步的探索。

有研究显示,术后 1 年以后的复发与高血压、左心房扩大有关<sup>[28]</sup>。在极晚期的复发中,右心房的病灶也起到了一定的作用<sup>[29]</sup>。Weerasooriya 等<sup>[30]</sup>的长期随访发现瓣膜性心脏病和非缺血性心肌病是极晚期复发的预测因素。因此,极晚期复发是一种新的复发类型,它不依赖于早期的触发点(如肺静脉),而很可能是由于心房其他部位存在结构重构。

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