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影响结直肠腺瘤检出率相关因素的研究进展

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Factors affecting colorectal adenoma detection rate

Ying-Chao Li, Hong-Xin Chen, Wen-Tao Xu, Cheng-Kun Li, Xing-Shun Qi

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Abstract

Colorectal cancer is a kind of malignant tumors that seriously threatens the health of Chinese people, and its morbidity and mortality rank third and fifth among malignant tumors in China, respectively. High-quality colonoscopy is an effective means of preventing colorectal cancer. Adenoma detection rate (ADR) is defined as the proportion of those who have adenomas in the total number of patients undergoing colonoscopy. With the increase of ADR, the incidence rate and mortality rate of colorectal cancer gradually decrease. Previous studies have found that ADR is affected by many factors. In this paper, we describe the factors that affect ADR from the aspects of colonoscopy, doctors, and equipment, with a purpose to strengthen the understanding of endoscopists on ADR and to increase ADR during colonoscopy.

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Key Words: Adenoma detection rate; Colorectal adenoma; Colorectal cancer; Colonoscopy

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摘要

结直肠癌是严重威胁我国居民健康的一类疾病, 其发病率及死亡率分别位居我国恶性肿瘤的第3位及第5位. 高质量的结肠镜检查是预防结直肠癌的有效手

段. 腺瘤检出率(adenoma detection rate, ADR)是指接受结肠镜检查者中发现腺瘤者占总检查人数的比例. 大多数结直肠癌都是由腺瘤发展而来的, 提高ADR可降低结直肠癌的发病率和死亡率. 目前研究发现ADR受多种因素影响, 本文将主要从结肠镜术前及术中、医生和设备三方面阐述影响ADR的相关因素, 以加强内窥镜医生对ADR的认识, 从而提高结肠镜检查过程中的ADR.

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关键词: 腺瘤检出率; 结直肠腺瘤; 结直肠癌; 结肠镜检查

核心提要: 腺瘤检出率(adenoma detection rate, ADR)是衡量结肠镜检查质量的关键指标之一, 因此充分认识影响ADR的相关因素是非常必要的. 本文将主要从结肠镜术前及术中、医生和设备三方面阐述影响ADR的相关因素, 以提高结肠镜检查过程中的ADR.

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0 引言

结直肠癌是我国最常见的恶性肿瘤之一, 其发病率及死亡率分别位居我国恶性肿瘤的第3位及第5位^[1]. I期结直肠癌的5年相对生存率为90%, 而发生远处转移的IV期结直肠癌的5年相对生存率仅为14%^[2]. 通常, 结直肠癌是由腺瘤进展而来, 早期发现并切除腺瘤有利于预防结直肠癌的发生与发展. 因此, 提高结肠镜检查中的腺瘤检出率(adenoma detection rate, ADR)至关重要. ADR指接受结肠镜检查者中发现腺瘤者占总检查人数的比例. 目前, 多数指南提出结肠镜检查中ADR至少应达到15%-20%^[3,4]. 本文就影响结肠镜检查ADR的术前、术中相关因素、医生相关因素和设备相关因素加以概述, 以期加强内窥镜医生对ADR的认识.

1 术前、术中相关因素

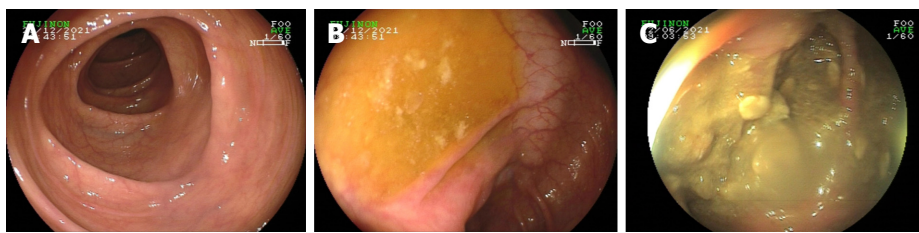
1.1 肠道准备质量 肠道准备质量与ADR相关. 肠道准备质量越高, 结肠黏膜的可视程度越高, 更有利于内窥镜医生发现腺瘤. 一项横断面研究将结肠分为右半结肠、横结肠和左半结肠, 分别探讨了各结肠段ADR与肠道准备质量关系, 结果发现, 在各结肠段中随着肠道准备质量越高, ADR越高^[5]. 总的来说, 低质量肠道准备会显著降低ADR^[6,7], 是由于肠道准备质量差时, 肠腔内会残留大量粪便及食物残渣, 它们覆盖于肠黏膜表面, 掩盖病

变部位, 进而降低了ADR. 然而, 中-高质量肠道准备对ADR的影响尚无定论. 有研究发现, 中等质量和高质量肠道准备患者之间的ADR无显著差别^[7-9], 甚至中等质量肠道准备的ADR更高^[10,11]. 这可能是因为中等质量肠道准备患者中, 残留的大便可能附着在锯齿状息肉的粘液帽上, 从而提高可视化效果, 同时, 内窥镜医生对残留物的冲洗, 也会提高内窥镜医生的注意力. 相比之下, 高质量肠道准备可能会降低医生的警惕性, 从而使ADR降低(图1).

1.2 退镜时间 延长退镜时间可显著提高ADR^[9,12-14]. 一项纳入5073例行结肠镜检查患者的前瞻性队列研究发现, 延长退镜时间是ADR的独立危险因素(OR = 1.04, 95%CI = 1.02-1.06, $P < 0.001$)^[9]. 一项前瞻性观察性研究将肠道分为右侧结肠段(盲肠、升结肠和肝曲)、近端结肠段(盲肠、升结肠、肝曲和横结肠)和左侧结肠段(脾曲、降结肠、乙状结肠和直肠), 并根据各结肠段平均退镜时间分为两组, 探讨了各结肠段退镜时间与ADR之间的关系, 结果显示, 当右侧结肠段退镜时间 ≥ 2 min(33.2% vs 13.7%, $P < 0.001$)、近端结肠段 ≥ 4 min(47.4% vs 18.5%, $P < 0.001$)、左侧结肠段 ≥ 3 min(32.9% vs 14.6%, $P < 0.001$)时, ADR显著提高^[13]. 综上, 延长退镜时间可以显著提高整体和各节段结肠ADR. 然而, 对于最佳的退镜时间, 目前尚无定论. Patel等^[15]发现, 结肠镜检查的退镜时间应该达到11 min. Lee等^[14]发现, 最佳的退镜时间应该为6 min-10 min, 10 min以上的退镜时间与ADR升高无关. 欧美国国家指南建议, 未行活检和息肉切除等内镜操作的结肠镜检查的退镜时间应大于6 min^[3,4].

1.3 进镜时间 目前, 仅有少数研究探讨了进镜时间对ADR的影响, 各研究之间结果也存在差异. 两项研究根据进镜时间的四分位数将患者分为四组, 探讨了进镜时间对ADR的影响. Yang等^[16]发现ADR随进镜时间的延长而逐渐降低(36.8% vs 33.4% vs 32.7% vs 31.0%, $P < 0.01$). von Renteln等^[17]发现尽管总ADR与进镜时间无关, 但进展期ADR随着进镜时间的延长而逐渐降低(12.9% vs 10.9% vs 6.0% vs 5.0%, $P < 0.01$). 较长的进镜时间可能会导致内窥镜医生的疲劳, 从而降低ADR. 然而, Fritz等^[18]分析了1303例患者的结肠镜检查结果, 发现进镜时间与退镜时间的比值 >1 时, 腺瘤及进展期腺瘤的检出数量明显降低, 但当退镜时间足够长时, 较长的进镜时间并不会降低ADR.

1.4 体位改变 在结肠镜检查过程中, 患者通常保持一个体位(左侧卧位). 近年来, 有研究者提出退镜过程改变体位可以提高ADR^[19,20]. 一项纳入1072例进行结肠镜筛查患者的随机对照试验, 将患者分为体位改变组($n = 536$)和单一体位组($n = 536$), 探讨了体位改变对ADR的



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图1 肠道准备质量图片(图源于北部战区总医院消化内科内镜中心). A: 高质量肠道准备; B: 中质量肠道准备; C: 低质量肠道准备.

影响, 结果显示, 体位改变组的ADR显著高于单一体位组(42.4% vs 33.0%, $P = 0.002$)^[19]. 此外, 一项纳入了6项研究的荟萃分析结果也表明, 与单一体位患者相比, 体位改变患者的ADR更高(OR = 1.36, 95%CI = 1.15-1.61, $P < 0.01$)^[20]. 体位变化可以使内窥镜医生观察到单一体位检查时容易忽略的肠道角落, 并且有利于气体撑开肠道, 增加肠道黏膜的可视性, 从而提高ADR.

1.5 双人观察模式 近期多项研究探讨了在结肠镜检查过程中不同人群参与观察对ADR的影响, 发现同事(44.8% vs 37.1%, $P = 0.02$)^[21]、护士(30.4% vs 23.0%, $P = 0.034$)^[22]及实习生(63% vs 51%, $P < 0.001$)^[23]参与观察均会显著提高ADR. 一项纳入23项研究的荟萃分析同样发现, 无论在随机对照研究中(33.9% vs 29.5%, $P = 0.004$)还是在队列研究中(38.2% vs 28.5%, $P < 0.01$), 双人观察的ADR均高于单人观察^[24]. 两名观察者互相查缺补漏, 更易发现微小病变, 可以更有效地对肠道进行观察, 也可以降低内窥镜医生因注意力不集中而遗漏腺瘤的几率, 从而提高ADR. 综上, 双人观察会提高ADR, 在有条件的医院可以应用这种检查模式.

1.6 右半结肠再次直视退镜技术与结肠镜反转技术 与左半结肠相比, 右半结肠腺瘤较平坦, 在结肠镜检查更易被忽略, 导致漏诊率更高. 再次直视退镜技术与结肠镜反转技术是提高右半结肠ADR的两种方式. 右半结肠再次直视退镜技术是指进行常规结肠镜检查后, 再次对右半结肠进行直视退镜观察; 右半结肠结肠镜反转技术是指常规结肠镜检查后, 在回盲部等位置将镜身反转, 观察直视退镜时易被忽略的肠道皱襞. 一项随机对照试验将648例患者分为再次直视退镜组($n = 332$)和内镜反转组($n = 316$), 再次直视退镜组和内镜反转组的右半结肠ADR比常规退镜分别提高了12%与9%^[25]. 此外, 一项纳入了4项研究的荟萃分析也发现, 内镜反转组(28.4% vs 22.7%, $P < 0.01$)和再次直视退镜组的右半结肠ADR比常规退镜均更高(33.6% vs 26.7%, $P < 0.01$)^[26].

2 医生相关因素

2.1 内窥镜医生的经验 内窥镜医生的经验对ADR的影响

尚有争论. 既往多数研究认为行结肠镜检查例数大于500例为经验丰富的结肠镜检查医师, 且他们有着更高的ADR^[27,28]. 然而, Yousaf等^[10]却发现行结肠镜检查例数小于500例的内窥镜医生反而有更高的ADR. 这种差异可能由以下原因造成: (1)有经验的内窥镜医生需要检查更多的患者, 且需要更迅速的完成检查任务, 这可能会导致他们更加疲劳, 从而遗漏病变; (2)经验较少的内窥镜医生在结肠镜检查过程中会进行更加仔细且广泛的检查, 因此, 他们意外发现腺瘤的几率更高.

2.2 医生的专业 内科医生与外科医生结肠镜检查的ADR不同, 多项研究结果表明内科医生要比外科医生更容易发现结直肠腺瘤^[28-30]. Muthukuru等^[30]分析了84名医生进行的4151例结肠镜检查结果, 比较了消化内科医生、结直肠外科医生和普通外科医生的ADR, 发现消化内科医生ADR最高(28.6%±1.2%), 其次是结直肠外科医生(24.3%±1.5%)和普通外科医生(18.4%±2.3%). 内外科医生ADR的差异可能是由于两者内窥镜技术培训时长、完成结肠镜检查数量、性格特点及疲劳程度不同所致^[28,29].

2.3 医生的性格特征 目前, 仅有两项研究探讨了医生性格特征对ADR的影响. 强迫程度高、更加仔细的内窥镜医生的ADR更高, 这可能是因为强迫程度高和更加仔细的内窥镜医生在结肠镜检查中观察更加细致, 从而可以发现更多的微小息肉^[31]. 此外, 自我调节能力越强的内窥镜医生ADR更高. 他们受各种环境因素的影响较小, 能时刻保持情绪稳定并且轻松应对内外界的各种压力, 在结肠镜检查过程中也能更加专注^[27].

2.4 医生的教育培训 部分内窥镜医生的ADR较低可能是由于其对结肠镜相关的知识和技术等方面掌握不足造成的. 因此, 对内窥镜医生进行相应的教育培训可能会提高ADR. 教育培训方式主要为组织内窥镜医生观看教学视频和参加教育讲座. 两项随机对照试验发现, 内窥镜医生接受教育培训后, ADR显著提高^[32,33]. 然而, 另一项随机对照试验发现, 虽然接受教育培训的内窥镜医生ADR由31%提高至42%, 但是未接受教育培训的内窥镜医生ADR也由36%提高至39%, 且两组间无统计学差

异, 因此无法确定教育培训是否可以提高ADR^[34]。最近, 针对这三项研究的荟萃分析证实, 培训教育是ADR的独立危险因素($OR = 1.16$, $95\%CI = 1.00-1.34$, $P < 0.05$)^[35]。综上所述, 有必要对内窥镜医生进行相应的教育培训, 从而提高ADR。

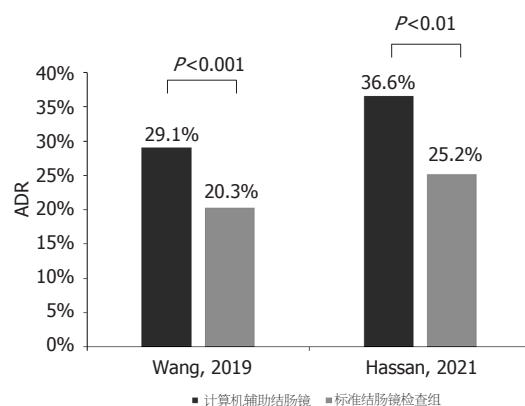
3 设备相关因素

3.1 计算机辅助结肠镜 计算机辅助结肠镜是一种安装了新型计算机辅助系统的结肠镜。当发现息肉时, 此系统会通过屏幕上的数字标识或者声音提示内窥镜医生息肉的存在, 实现息肉的自动检测^[36]。一项随机对照试验将1058例患者分为标准结肠镜检查组($n = 536$)和计算机辅助诊断组($n = 522$), 比较了两组的ADR; 结果表明, 计算机辅助诊断组的ADR显著高于标准结肠镜检查组($29.1\% vs 20.3\%$, $P < 0.001$)^[37]。同样, 一项纳入5项随机对照试验的荟萃分析也发现, 与标准结肠镜相比, 计算机辅助结肠镜ADR更高($36.6\% vs 25.2\%$, $P < 0.01$), 且不受腺瘤大小、形态和位置的影响^[38]。图2。

3.2 高清结肠镜 与标准结肠镜相比, 高清结肠镜使用了更加先进的镜头、连接硬件和显示器, 可以呈现出更高分辨率的图像, 有利于内窥镜医生对肠道进行更加细致的观察^[39]。一项纳入2468例患者的观察性研究结果表明, 高清结肠镜检查的ADR显著高于标准结肠镜检查($30.4\% vs 22.2\%$, $P = 0.02$)^[39]。此外, 一项纳入了6项随机对照试验的荟萃分析发现, 与标准结肠镜相比, 高清结肠镜不但可以提高总体ADR($40\% vs 35\%$, $P = 0.001$), 而且可以显著提高进展期ADR($9.37\% vs 6.69\%$, $P = 0.03$)和无蒂锯齿状ADR($5.06\% vs 3.39\%$, $P = 0.03$)^[40]。图3。

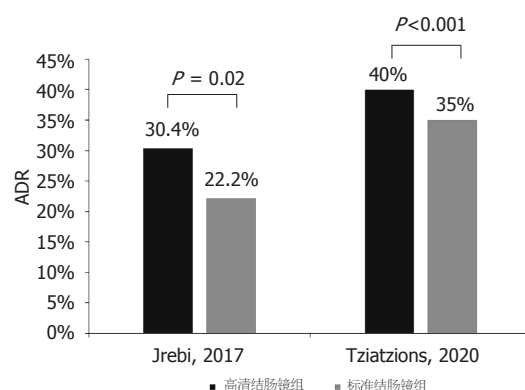
3.3 Endocuff辅助结肠镜 Endocuff辅助结肠镜(endocuff-assisted colonoscopy, EAC)是一种安装在结肠镜远端的辅助装置, 由一个软塑料袖带和侧面的八个指状突起组成; 退镜时, Endocuff侧面的突起会向后拉伸结肠黏膜皱襞, 使黏膜皱襞充分展开, 有助于内窥镜医生发现在常规结肠镜检查中容易忽视的微小病变^[41]。最近, 一项纳入2058例患者的随机对照试验比较了标准结肠镜检查与EAC检查的ADR, 结果表明, 接受EAC检查患者的ADR要高于接受标准结肠镜检查患者($39.2\% vs 29.4\%$, $P < 0.001$)^[42]。既往一项纳入了12项随机对照试验的荟萃分析也发现, 与标准结肠镜相比, EAC组的ADR更高($41.3\% vs 34.2\%$, $P = 0.003$) (图4), 且使用EAC不影响操作时间和回盲部到达率, 总体操作也较为安全, 值得在临床应用^[43]。

3.4 G-EYE气囊内镜 G-EYE气囊内镜是在标准结肠镜的远端安装一个可重复使用的充气气囊, 它可以展平肠褶皱并减少肠滑脱。退镜时, 充气气囊也可以使光线集中, 增强结肠黏膜的可视化^[44]。一项随机对照试验将



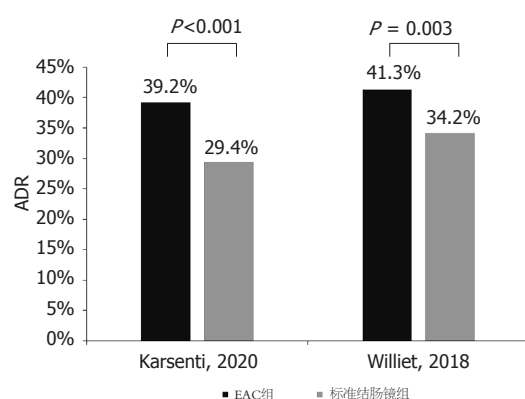
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图2 计算机辅助诊断组与标准结肠镜检查组ADR比较。ADR: 腺瘤检出率。



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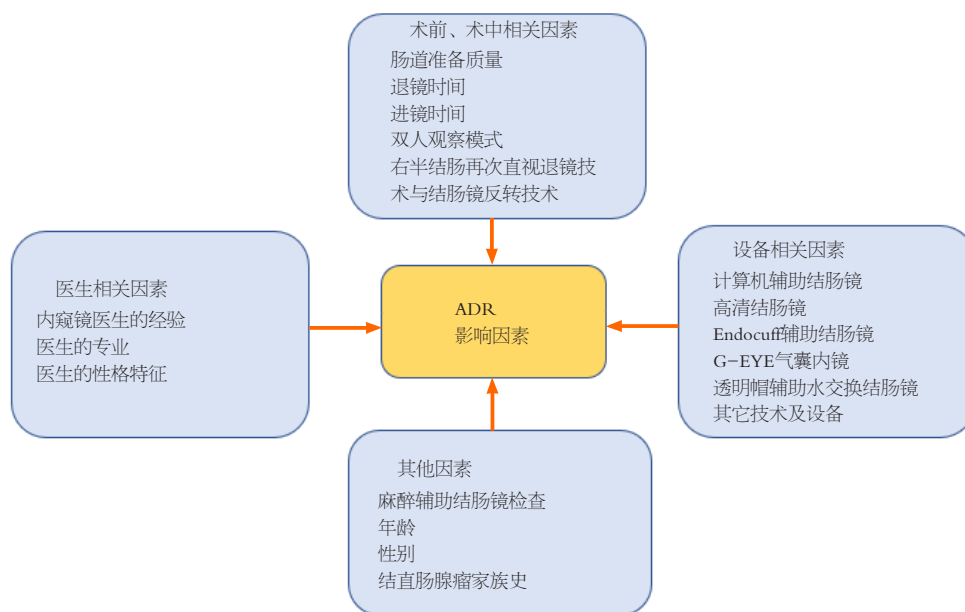
图3 高清结肠镜组与标准结肠镜组ADR比较。ADR: 腺瘤检出率。



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图4 EAC组与标准结肠镜组ADR比较。EAC: Endocuff辅助结肠镜; ADR: 腺瘤检出率。

803例患者分为气囊内镜组($n = 407$)和标准结肠镜组($n = 396$), 探讨了气囊内镜对ADR的影响, 结果表明, 气囊内镜组ADR明显高于标准结肠镜组($48.0\% vs 37.5\%$, $P = 0.0027$), 并且气囊内镜可以显著增加进展期腺瘤($109 vs 67$, $P = 0.033$)、扁平腺瘤($85 vs 35$, $P < 0.0001$)和无蒂



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图 5 ADR 的影响因素。ADR: 腺瘤检出率。

锯齿状腺瘤或息肉(20 vs 3, $P = 0.0026$)的检出数量^[45]。此外, 另一项纳入126例患者的随机对照试验发现, 虽然两组间的ADR无显著差异, 但气囊内镜组腺瘤漏检率更低(7.5% vs 44.7%, $P = 0.0002$)^[44]。

3.5 透明帽辅助水交换结肠镜 透明帽辅助结肠镜是指在结肠镜前端安装一个透明的塑料帽, 有利于退镜时结肠黏膜的暴露, 增加结肠黏膜的可视性^[46]。水交换结肠镜是指在结肠镜检查过程中向肠腔内注入温水替代空气或二氧化碳, 可以增加患者的舒适度^[46]。既往研究已证明, 两种肠镜均可提高ADR^[47]。近期两项随机对照研究探讨了两种肠镜联合应用对ADR的影响, 结果发现, 与标准结肠镜组相比, 透明帽辅助水交换结肠镜组有更短的进镜时间, 更低的疼痛评分以及更高的ADR^[46,48]。综上, 透明帽辅助水交换结肠镜不仅可以使盲肠插镜时间缩短, 减轻患者痛苦, 还可以提高ADR, 临床应用价值很高。

3.6 其它技术及设备 增强成像技术(染色内镜、窄带成像、智能分光比色技术、蓝激光成像)以及增加视野的新型内镜(全谱内镜、超广角内镜、共聚焦内镜)均可能影响ADR。一项纳入了74项研究的荟萃分析发现, 与高清结肠镜检查组相比, 增强成像技术结肠镜检查组ADR显著更高($OR = 1.21$, 95%CI = 1.09-1.35, $P < 0.05$), 但增加视野的新型内镜($OR = 0.98$, 95%CI = 0.79-1.21, $P > 0.05$)与提高ADR无关^[47]。然而, 一项研究回顾了3998例行结肠镜检查患者的数据, 发现增加视野的新型内镜检查组ADR显著高于普通结肠镜检查组^[49]。随着科学技术的发展进步, 新型结肠镜设备层出不穷, 但是他们提高ADR

的效果还有待进一步的临床验证。

4 其他因素

除上述因素外, 其他因素也可能影响ADR, 如麻醉辅助结肠镜、年龄、性别、结直肠癌家族史等。一项纳入了24795例结肠镜检查的回顾性研究发现, 麻醉辅助结肠镜是ADR独立风险因素($OR = 1.45$, 95%CI = 1.00-2.10)^[50], 但另一项纳入了48838例结肠镜检查的回顾性研究却发现, 麻醉辅助结肠镜检查的ADR与普通结肠镜检查之间并无差别(13.0% vs 12.44%, $P = 0.337$)^[51]。因此, 麻醉辅助结肠镜检查能否提高ADR尚有争议。目前研究发现, 50岁以上人群的ADR要显著高于50岁以下人群^[10,52]。这可能是由于年龄越大, 暴露在各种危险因素中(如吸烟, 饮酒等)的时间越长, 因此增加了结直肠癌的发生几率^[53]。男性的ADR要显著高于女性^[52], 这是由于雌性激素作用于β雌激素受体可阻滞G1期细胞周期, 从而抑制结肠癌细胞的增殖^[54]。此外, 有结直肠癌家族史人群的ADR要显著高于整体人群^[52,55]。这可能与一些遗传易感基因改变有关, 如染色体8 q 24区域rs6983267基因位点的变异会显著增加结直肠癌的发生风险^[56]。综上, 与整体人群相比, 年龄较大、男性、有结直肠癌家族史的人群更应该定期进行结肠镜检查, 从而降低结直肠癌的发病率及死亡率。

5 结论

随着人们健康意识的提高以及消化道早癌筛查观念的普及, 主动接受消化内镜检查的居民数量显著增加。然

而,我国各地区的社会经济水平存在差异,医疗资源分布配置不平衡,制约了我国基础医疗水平的提升,也使结肠镜检查质量存在差异。ADR是衡量结肠镜检查质量的关键指标之一,因此充分认识影响ADR的相关因素并且从这些方面着手提高ADR是非常必要的。保证充足的肠道质量,适当的进、退镜时间,同时结合不同的退镜方式和改变患者体位是提高ADR的有效手段。此外,有条件的医院可以通过安排第二人参与观察、加强对内窥镜医生的教育培训和应用新型的结肠镜检查设备等方式,提高结肠镜检查过程中的ADR(图5),为结直肠癌防治工作做出更大的贡献。

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• 消息 •

《世界华人消化杂志》正文要求

本刊讯 本刊正文标题层次为 0 引言; 1 材料和方法, 1.1 材料, 1.2 方法; 2 结果; 3 讨论; 4 参考文献. 序号一律左顶格写, 后空 1 格写标题; 2 级标题后空 1 格接正文. 以下逐条陈述: (1) 引言 应包括该研究的目的和该研究与其他相关研究的关系. (2) 材料和方法 应尽量简短, 但应让其他有经验的研究者能够重复该实验. 对新的方法应该详细描述, 以前发表过的方法引用参考文献即可, 有关文献中或试剂手册中的方法的改进仅描述改进之处即可. (3) 结果 实验结果应合理采用图表和文字表示, 在结果中应避免讨论. (4) 讨论 要简明, 应集中对所得的结果做出解释而不是重复叙述, 也不应是大量文献的回顾. 图表的数量要精选. 表应有表序和表题, 并有足够具有自明性的信息, 使读者不查阅正文即可理解该表的内容. 表内每一栏均应有表头, 表内非公知通用缩写应在表注中说明, 表格一律使用三线表(不用竖线), 在正文中该出现的地方应注出. 图应有图序、图题和图注, 以使其容易被读者理解, 所有的图应在正文中该出现的地方注出. 同一个主题内容的彩色图、黑白图、线条图, 统一用一个注解分别叙述. 如: 图 1 萎缩性胃炎治疗前后病理变化. A: ...; B: ...; C: ...; D: ...; E: ...; F: ...; G: ... 曲线图可按●、○、■、□、▲、△顺序使用标准的符号. 统计学显著性用: $^aP<0.05$, $^bP<0.01$ ($P>0.05$ 不注). 如同一表中另有一套 P 值, 则 $^cP<0.05$, $^dP<0.01$; 第 3 套为 $^eP<0.05$, $^fP<0.01$. P 值后注明何种检验及其具体数字, 如 $P<0.01$, $t = 4.56$ vs 对照组等, 注在表的左下方. 表内采用阿拉伯数字, 共同的计量单位符号应注在表的右上方, 表内个位数、小数点、±、- 应上下对齐. “空白”表示无此项或未测, “-”代表阴性未发现, 不能用同左、同上等. 表图勿与正文内容重复. 表图的标目尽量用 $t/\min$, $c/(\text{mol/L})$, p/kPa , V/mL , $t/^\circ\text{C}$ 表达. 黑白图请附黑白照片, 并拷入光盘内; 彩色图请提供冲洗的彩色照片, 请不要提供计算机打印的照片. 彩色图片大小 $7.5\text{ cm} \times 4.5\text{ cm}$, 必须使用双面胶条黏贴在正文内, 不能使用浆糊黏贴. (5) 志谢 后加冒号, 排在讨论后及参考文献前, 左齐.



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