

· 临床论著 ·

经鼻高流量氧疗在老年慢性阻塞性肺疾病急性加重期伴Ⅱ型呼吸衰竭患者中的应用

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摘要: **目的** 研究经鼻高流量氧疗(HFNC)对老年慢性阻塞性肺疾病急性加重期(AECOPD)伴Ⅱ型呼吸衰竭患者的治疗效果。**方法** 选择2022年1月至12月首都医科大学宣武医院急诊科收治的96例老年AECOPD伴Ⅱ型呼吸衰竭患者,随机分为观察组49例和对照组47例。对照组在常规抗炎、平喘治疗的基础上给予无创正压通气(NPPV)治疗,观察组患者常规抗炎、平喘治疗基础上给予HFNC治疗。比较两组患者治疗前后的pH值、动脉氧分压(PaO₂)和动脉二氧化碳分压(PaCO₂)的水平。应用调查问卷评估两组患者治疗舒适度。随访28d,比较两组患者治疗后误吸、胃胀气等并发症发生率、气管插管率及病死率。**结果** 两组治疗后pH值和PaO₂较前升高,PaCO₂较前降低($P<0.05$),但两组间pH值、PaO₂和PaCO₂比较差异无统计学意义($P>0.05$)。调查问卷显示观察组舒适度评分高于对照组(3.57 ± 0.71 vs 2.46 ± 0.83 , $t=7.020$, $P<0.01$),并发症发生率低于对照组(10.20% vs 27.65%, $\chi^2=4.798$, $P<0.05$),两组患者气管插管率和病死率差异无统计学意义($P>0.05$)。**结论** HFNC同NPPV在老年AECOPD伴Ⅱ型呼吸衰竭患者中具有相近的治疗效果,但HFNC并发症较少,舒适程度高。

关键词: 慢性阻塞性肺疾病, 急性加重期; Ⅱ型呼吸衰竭; 经鼻高流量氧疗; 无创正压通气; 气管插管

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Application of high flow nasal cannula oxygen therapy in elderly patients with acute exacerbation of chronic obstructive pulmonary disease and type II respiratory failure

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Abstract: Objective To investigate the therapeutic effect of high flow nasal cannula oxygen therapy (HFNC) on elderly patients with acute exacerbation of chronic obstructive pulmonary disease (AECOPD) and type II respiratory failure. **Methods** A total of 96 elderly AECOPD patients with type 2 respiratory failure who received treatment at Xuanwu Hospital Capital Medical University from January to December 2022 were selected and divided into observation group ($n=49$) and control group ($n=47$) randomly. On the basis of conventional anti-inflammatory and antiasthmatic treatment, control group was treated with non-invasive positive pressure ventilation (NPPV), observation group was treated with HFNC. The level of pH value, arterial partial pressure of oxygen (PaO₂) and arterial partial pressure of carbon dioxide (PaCO₂) before and after treatment were compared between two groups. The treatment comfort was evaluated with questionnaires. After 28 days of follow-up, the incidence of complications such as aspiration, bloating, tracheal intubation rate and mortality rate were compared between two groups. **Results** After treatment, pH value and PaO₂ increased, and PaCO₂ decreased in both group ($P<0.05$). However, there was no significant difference in pH, PaO₂ and PaCO₂ between two groups after treatment ($P>0.05$). The score of comfort degree of the observation group was higher than that of the control group (3.57 ± 0.71 vs 2.46 ± 0.83 , $t=7.020$, $P<0.01$), and the complication rate was lower than that of the control group (10.20% vs 27.65%, $\chi^2=4.798$, $P<0.05$). There was no significant difference between the two groups in the tracheal intubation rate and mortality rate ($P>0.05$). **Conclusion** NPPV and HFNC have similar

therapeutic effect in elderly AECOPD patients with type 2 respiratory failure, but HFNC has fewer complications and higher degree of comfort.

Keywords: Chronic obstructive pulmonary diseases, acute exacerbation; Type 2 respiratory failure; High flow nasal cannula oxygen therapy; Noninvasive positive pressure ventilation; Endotracheal intubation

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慢性阻塞性肺疾病(chronic obstructive pulmonary disease, COPD)在我国40岁以上人群中患病率高达3.7%,巨大的医疗支出给家庭和社会造成沉重的经济负担^[1]。COPD急性加重期(acute exacerbation of COPD, AECOPD)是指感染、误吸等原因使患者呼吸道症状急性恶化,是导致患者死亡的重要原因。AECOPD的治疗主要为抗感染、支气管扩张剂和糖皮质激素等药物治疗^[2]。呼吸支持是AECOPD伴Ⅱ型呼吸衰竭的重要治疗手段之一,目前无创正压通气(noninvasive positive pressure ventilation, NPPV)是首选的呼吸支持方式,可明显改善患者呼吸性酸中毒,降低呼吸频率,缓解呼吸困难症状,降低病死率等,但是NPPV容易导致患者腹胀、误吸和面部皮肤损伤等副作用,部分患者不能耐受,影响治疗效果。经鼻高流量氧疗(high flow nasal cannula oxygen therapy, HFNC)是近年来逐渐广泛应用的一种无创辅助通气方式,具有供氧浓度精确、可高浓度给氧等特点,能够有效改善氧合,患者舒适度更高^[3]。本研究探讨HFNC在老年AECOPD伴Ⅱ型呼吸衰竭患者中的应用价值。

1 资料与方法

1.1 研究对象 选取2021年10月至2022年12月首都医科大学宣武医院急诊科收治的老年AECOPD伴Ⅱ型呼吸衰竭患者96例为研究对象,应用抽签方法分为对照组(47例)和观察组(49例)。其中男48例,女48例,年龄(73.93±7.70)岁。对照组男23例,女24例,年龄(74.02±6.94)岁。观察组男25例,女24例,年龄(73.84±8.44)岁。两组患者年龄、性别、COPD病程及合并高血压、糖尿病等比较差异无统计学意义($P>0.05$)。本研究经过医院伦理委员会备案并批准(批准号:2020087)。

1.1.1 纳入标准 (1)符合《慢性阻塞性肺疾病诊治指南(2021年修订版)》中AECOPD诊断标准^[4];(2)年龄≥60岁;(3)神志清醒,可耐受经面罩或经鼻吸氧;(4)血流动力学稳定;(5)动脉氧分压(PaO_2)<60 mmHg和动脉二氧化碳分压(PaCO_2)>50 mmHg, pH 7.25~7.35;(6)患者或家属签署知情

同意书;(7)能够积极配合治疗并同意气管插管机械通气等治疗措施。

1.1.2 排除标准 (1)呼吸微弱或无法自主呼吸;(2)恶性肿瘤;(3)合并HFNC或NPPV禁忌症;(4)伴有意识障碍或严重肝肾功能不全。HFNC或NPPV治疗中止及气管插管机械通气标准:(1)意识状态恶化,出现昏迷或躁动;(2)出现血流动力学恶化、呼吸或心脏骤停;(3)呼吸性酸中毒持续加重, pH<7.25。

1.2 研究方法 两组患者均给予常规抗炎、平喘、化痰等基本治疗,观察组同时给予HFNC治疗, HFNC(Fisher&Paykel Healthcare Airvo2, 新西兰)初始参数设置流量为40 L/min,温度为37.0℃,吸入氧浓度(FiO_2)为50%,逐步增加氧流量至血氧饱和度维持在92%以上最大流速(45~60 L/min)。治疗过程中严密观察患者呼吸情况及鼻塞佩戴的严密程度,保持闭嘴呼吸。对照组同时给予NPPV治疗(Philips Respironics V60 Ventilator, 美国),用S/T模式,初始呼气相气道正压(expiratory positive airway pressure, EP-AP)设置4~6 cmH₂O,吸气相气道正压(inspiratory positive airway pressure, IPAP)设置为10~14 cmH₂O,根据患者耐受情况逐步调整参数使血氧饱和度维持在92%以上。严密观察两组患者病情变化情况,如果出现病情恶化达到插管上机标准,立刻给予气管插管机械通气治疗。观察两组患者治疗前和治疗24 h后的pH值、 PaO_2 和 PaCO_2 的变化情况。治疗24 h后采用李克特量表(Likert scale)进行舒适度自评,具体标准为:非常舒适(5分),舒适(4分),一般(3分),不舒适(2分),非常不舒适(1分)。随访28 d,分别比较两组患者治疗后误吸及胃胀气等并发症发生率、气管插管率及病死率。

1.3 统计学方法 应用SPSS 20.0软件分析数据。符合正态分布的计量资料用 $\bar{x}\pm s$ 表示,比较采用独立样本 t 检验。计数资料以例(%)表示,组间比较采用 χ^2 检验、校正 χ^2 检验或Fisher确切概率法。 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 治疗前后血气分析指标 治疗前、后两组患者

pH 值、PaO₂ 和 PaCO₂ 比较差异无统计学意义 ($P > 0.05$)。治疗后, 两组患者 pH 值、PaO₂ 较前升高, PaCO₂ 较前降低 ($P < 0.05$)。见表 1。

2.2 舒适度、并发症发生率、插管率和病死率 观察

组舒适度评分显著高于对照组 (3.57 ± 0.71 vs 2.46 ± 0.83 , $t = 7.020$, $P < 0.01$)。观察组并发症发生率低于对照组 ($P < 0.05$)。两组患者气管插管率和病死率差异无统计学意义 ($P > 0.05$)。见表 2。

表 1 两组治疗前后血气分析指标比较 ($\bar{x} \pm s$)

Tab. 1 Comparison of blood-gas analysis indicators before and after treatment between two groups ($\bar{x} \pm s$)

| 组别 | 例数 | pH 值 | | PaO ₂ (mmHg) | | PaCO ₂ (mmHg) | |
|------------|----|-----------|------------------------|-------------------------|-------------------------|--------------------------|-------------------------|
| | | 治疗前 | 治疗后 | 治疗前 | 治疗后 | 治疗前 | 治疗后 |
| 对照组 | 47 | 7.27±0.02 | 7.39±0.02 ^a | 55.83±2.25 | 66.82±3.11 ^a | 76.17±2.49 | 62.13±3.74 ^a |
| 观察组 | 49 | 7.28±0.03 | 7.38±0.03 ^a | 56.41±1.64 | 65.83±2.54 ^a | 76.40±1.65 | 63.76±4.91 ^a |
| <i>t</i> 值 | | 1.929 | 1.929 | 1.438 | 1.711 | 0.531 | 1.824 |
| <i>P</i> 值 | | 0.057 | 0.057 | 0.154 | 0.090 | 0.597 | 0.071 |

注:与治疗前比较,^a $P < 0.05$ 。

表 2 两组并发症发生率、气管插管率和病死率比较 [例(%)]

Tab. 2 Comparison of complications, tracheal intubation and mortality rate between two groups [case(%)]

| 组别 | 例数 | 并发症 | 气管插管 | 病死 |
|------------|----|-----------|----------|----------|
| 对照组 | 47 | 13(27.65) | 5(10.63) | 4(8.51) |
| 观察组 | 49 | 5(10.20) | 6(12.24) | 5(10.20) |
| χ^2 值 | | 4.798 | 0.061 | 0.004 |
| <i>P</i> 值 | | 0.029 | 0.805 | 0.948 |

3 讨论

AECOPD 伴 II 型呼吸衰竭是老年 COPD 患者的严重并发症,是导致患者死亡的常见原因^[5]。治疗上除抗炎、平喘和化痰等基础治疗外,NPPV 是患者首选的呼吸支持方式。NPPV 可明显降低患者 PaCO₂ 和呼吸频率,改善呼吸性酸中毒,缓解呼吸困难症状,降低气管插管率和病死率等^[6]。但是 NPPV 需要患者配合度较高,同时有面罩压伤、胃胀气和误吸风险,因此临床应用受到一定的限制^[7]。

HFNC 是近年广泛应用的呼吸支持技术,与传统的常规氧疗相比,HFNC 能够提供精确的吸氧浓度,保持恒定的温度和湿度,改善气道黏膜功能,使患者有更好的舒适度^[8-9]。本研究显示,在老年 AECOPD 伴 II 型呼吸衰竭患者中,应用 NPPV 和 HFNC 均可使 pH 值、PaO₂ 较治疗前升高,PaCO₂ 较前降低,与国内一些研究结果一致^[10-11]。本研究结果显示治疗后两组患者 pH 值、PaO₂ 和 PaCO₂ 比较差异无统计学意义,考虑 HFNC 在 AECOPD 伴 II 型呼吸衰竭的治疗中有与 NPPV 相近的治疗价值,这与卢健聪等^[12] 研究结果一致。但也有研究认为 NPPV 在 AECOPD 伴 II 型呼吸衰竭的治疗中优于 HFNC,王胜奇等^[13] 对 105 例 AECOPD 伴 II 型呼吸衰竭患者进行研究发现,NPPV 和 HFNC 治疗 24 h 后都可以使患者 pH 值升

高,PCO₂ 下降,但是 NPPV 治疗组变化幅度大于 HFNC 组,认为 NPPV 治疗效果优于 HFNC。

本研究发现观察组的舒适度评分高于对照组,并发症发生率低于对照组,与国内外一些文献研究一致^[14]。NPPV 是 AECOPD 患者首选的呼吸支持方式,能够明显改善患者呼吸困难症状,降低心率和呼吸频率。但是 NPPV 需要面罩与患者面部紧密接触,长时间应用容易导致皮肤损伤。同时 AECOPD 患者痰液较多,应用 NPPV 易导致胃胀气和误吸,NPPV 在治疗过程中还需要患者密切配合,如果配合不佳会导致人机对抗,这些都会导致患者舒适度降低,从而影响治疗效果^[15]。HFNC 利用鼻塞实施氧疗,不影响患者呼吸和进食等,并发症发生率低,患者舒适度较高。HFNC 能够对气体加温加湿,促进痰液排出,降低呼吸功^[16]。本研究发现随访 28 d 两组患者的气管插管率和病死率差异无统计学意义,考虑 HFNC 在改善患者的舒适度同时并不会增加气管插管率和病死率。

综上所述,在老年 AECOPD 伴 II 型呼吸衰竭的患者中,应用 HFNC 和 NPPV 治疗均有较好的效果,可有效改善血气分析指标,缓解呼吸困难症状,因此对于那些轻度呼吸性酸中毒患者或者不能耐受 NPPV 的患者应考虑给予 HFNC,以有效改善呼吸困难症状。同时在应用 HFNC 过程中应严密观察患者生命体征、症状和血气分析情况,如病情恶化及时气管插管进行机械通气。

利益冲突 无

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