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双水平气道正压通气(BIPAP)呼吸机治疗 COPD 并 II 型呼吸衰竭患者的疗效评估 *

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摘要 目的: 探讨双水平气道正压通气治疗慢性阻塞性肺疾病 (COPD) 合并 II 型呼吸衰竭的临床疗效。**方法:** 选取我院收治的 COPD 合并 II 型呼吸衰竭患者 84 例, 随机分为对照组和研究组, 每组 42 例。对照组患者给予常规治疗, 研究组患者在常规治疗基础上给予双水平气道正压通气治疗。观察并记录两组患者治疗前后动脉血气分析、肺功能变化以及临床疗效。**结果:** 研究组治疗有效率高于对照组, 差异具有统计学意义 ($P < 0.05$); 与治疗前比较, 两组患者治疗后 PaO_2 、 SaO_2 、pH 均升高, 而 PaCO_2 均降低, 差异具有统计学意义 ($P < 0.05$); 与对照组比较, 研究组治疗后 PaO_2 、 SaO_2 、pH 水平较高, PaCO_2 水平较低, 差异具有统计学意义 ($P < 0.05$); 与治疗前比较, 两组患者治疗后 FEV1、FVC、FEV1%pre 和 FEV1/FVC 均升高, 差异具有统计学意义 ($P < 0.05$); 与对照组比较, 研究组治疗后 FEV1、FVC、FEV1%pre 和 FEV1/FVC 较高, 差异具有统计学意义 ($P < 0.05$); 研究组住院时间、气管插管率均低于对照组, 差异具有统计学意义 ($P < 0.05$)。**结论:** 双水平气道正压通气(BIPAP)呼吸机治疗 COPD 并 II 型呼吸衰竭患者疗效确切, 能显著改善肺功能及动脉血气指标, 值得推广。

关键词: 双水平气道正压通气; 慢性阻塞性肺疾病; II 型呼吸衰竭

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Effects of BIPAP Breathing on the Treatment of COPD and Type II Respiratory Failure*

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ABSTRACT Objective: To investigate the effects of BIPAP breathing on the treatment of COPD and type II respiratory failure.

Methods: 84 patients with COPD and type II respiratory failure who were treated in our hospital were selected, and randomly divided into the experiment group and the control group, with 42 cases in each group. The patients in the control group were treated with the conventional method, while the patients in the experiment group were treated with BIPAP breathing on the basis of the conventional method. Then the arterial blood gas analysis, the pulmonary function and the clinical effects in the two groups were observed and compared before and after the treatment. **Results:** The effective rate of the experiment group was higher than that of the control group, and the difference was statistically significant ($P < 0.05$); Compared with before treatment, the levels of PaO_2 , SaO_2 and pH in the two groups increased after the treatment, while the levels of PaCO_2 decreased, and the differences were statistically significant ($P < 0.05$); Compared with the control group, the levels of PaO_2 , SaO_2 and pH in the experiment group were higher after the treatment, while the level of PaCO_2 was lower, and the differences were statistically significant ($P < 0.05$); Compared with before treatment, the levels of FEV1, FVC, FEV1 % pre and FEV1 / FVC in the two groups increased after the treatment, and the differences were statistically significant ($P < 0.05$); Compared with the control group, the levels of FEV1, FVC, FEV1 % pre and FEV1 / FVC in the experiment group were higher after the treatment, and the differences were statistically significant ($P < 0.05$); The hospitalization and tracheal intubation rate of the experiment group were lower than those of the control group, and the differences were statistically significant ($P < 0.05$). **Conclusion:** BIPAP breathing has better effects in the treatment of COPD and type II respiratory failure, which can significantly improve the lung function and arterial blood gas indexes.

Key words: Bi level positive airway pressure ventilation; Chronic obstructive pulmonary disease; Type II respiratory failure

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前言

慢性阻塞性肺疾病 (Chronic obstructive pulmonary disease, COPD) 为呼吸科的常见病, 其特征为进行性不完全可逆的气流

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受限,其最终发展为呼吸衰竭,主要表现为Ⅱ型呼吸衰竭,加重患者全身症状^[2]。近年来 COPD 的发病率及死亡率不断上升^[1],因此采取措施解除 COPD 并呼吸衰竭患者缺氧状态,纠正酸中毒非常关键。目前临床多采取的常规治疗措施起效较慢,且疗效难以令人满意^[3]。随着治疗技术的不断进步,双水平无创正压通气(BiPAP)成为慢性阻塞性肺疾病(COPD)并Ⅱ型呼吸衰竭的重要治疗措施^[4]。近年来我院将双水平气道正压通气(BIPAP)呼吸机应用于 COPD 合Ⅱ型呼吸衰竭的治疗中,得到了显著的效果,现报告如下:

1 对象与方法

1.1 研究对象

选取 2013 年 3 月 -2016 年 5 月我院收治的 COPD 合并Ⅱ型呼吸衰竭患者 84 例,按随机数字表法分为对照组和研究组,每组 42 例。对照组男性 27 例,女 15 例,年龄为 53-80 岁,平均年龄(64.25± 8.59)岁,病程 7-34 年,平均病程(18.58± 8.23)年,急性加重时间为 4-11d,平均时间(6.22± 2.09)d;研究组男性 26 例,女 16 例,年龄为 55-82 岁,平均年龄(65.11± 8.44)岁,病程 8-33 年,平均病程(19.20± 8.58)年,急性加重时间为 4-12d,平均时间(6.36± 2.25)d,两组间基本资料具有可比性($P>0.05$)。COPD 诊断参照《慢性阻塞性肺疾病诊治指南 2013 年修订版》^[5],临床表现为慢性咳嗽、咳痰及呼吸困难;支气管舒张剂吸入后 FEV1/FVC<70%存在持续气流受限,除外其他疾病确诊 COPD。Ⅱ型呼吸衰竭诊断标准:静息状态、海平面大气压、呼吸空气,PaO₂<60 mmHg,PaCO₂>50 mmHg,除外心内解剖分流及原发于心排出量降低等致低氧因素。排除标准:①存在心、脑、肝、肾多脏器功能不全及不能行面罩吸氧者;②存在气胸、面部严重创伤及血流动力学不稳定者;③呼吸抑制,气道内积聚大量黏稠分泌物不易咯出者;④妊娠或哺乳期妇女,精神障碍不能正常交流患者除外。

1.2 方法

对照组予常规治疗,包括舒张支气管、低流量吸氧(2-3) L/min、广谱抗生素抗感染、糖皮质激素等,平喘化痰和营养支持,纠正水电解质平衡;研究组在常规基础上予双水平气道正

压通气呼吸机治疗,常规治疗同对照组,采用美国伟康公司 BiPAPSynchro 无创呼吸机辅助呼吸,患者取半卧位,固定鼻面罩,模式为触发/通气,参数设置吸气压力 8-20 cmH₂O,呼气压力 4-8 cmH₂O,吸氧浓度 40%-55%,呼吸频率为 12-16 次/min,使血氧饱和度维持在 90%以上,8-12 h/d,监测血气、血氧饱和度和、心率、呼吸频率等指标,适当调整呼吸机参数,病情好转,逐渐减少呼吸支持时间,疗程视病情而定。嘱患者治疗期间戒烟戒酒。

1.3 观测指标

1.3.1 临床疗效 观察并记录临床症状缓解状况,标准如下:显效为治疗后咳、痰、喘等症状明显缓解或消失,肺部听诊较前明显改善,胸片肺纹理好转,意识清,无发热,血象下降至正常;有效为治疗后咳、痰、喘等症状轻度缓解,肺部听诊稍有改善;无效为临床症状、体征及影像学检查无好转或较前加重或需气管插管治疗。有效率=(显效+有效)/总例数×100%。

1.3.2 动脉血气分析 治疗前后抽取股动脉血,置于抗凝管中,防止血标本与空气接触,标本置于冰水中保存,在 30 min 内检测,采用雷度 ABL800 全自动血气分析仪复查 PaO₂、SaO₂、PaCO₂、pH 等指标。

1.3.3 肺功能测定 治疗前后采用全套肺功能分析仪(美国森迪斯公司)测定所有患者的肺功能状态,包括 FEV1、FVC、FEV1%pre 和 FEV1/FVC 等指标,测定均在 8:00-12:00 时进行。

1.3.4 转归 观察并统计两组间住院时间、气管插管率及病死率。

1.4 统计学分析

采用 SPSS17.0 软件对数据分析,正态性计量资料采用($\bar{x} \pm s$)表示,动脉血气、肺功能水平对比予以 t 检验,临床疗效予以 RxC 卡方检验, $P<0.05$ 存在统计学意义。

2 结果

2.1 两组间治疗期间临床疗效对比

研究组治疗有效率高于对照组,差异具有统计学意义($P<0.05$)。见表 1。

表 1 两组临床疗效对比(例,%)
Table 1 Comparison of the clinical efficacy between two groups(n, %)

Groups	n	Excellent	Effective	Invalid	Clinical efficacy rate
Control group	42	17(40.48%)	12(28.57%)	13(30.95%)	69.05%
Experiment group	42	22(52.38%)	15(35.71%)	5(11.91%)	88.09%*

Note: Compared with the control group, $X^2=4.525$, $*P<0.05$.

2.2 两组动脉血气分析比较

与治疗前比较,两组患者治疗后 PaO₂、SaO₂、pH 水平均升高,而 PaCO₂ 水平均降低,研究组 PaO₂、SaO₂、pH 高于对照组,而 PaCO₂ 低于对照组,差异具有统计学意义($P<0.05$)。见表 2。

2.3 两组治疗前后肺功能比较

与治疗前比较,对照组治疗后 FEV1、FEV1%pre 和 FEV1/FVC 水平升高,研究组治疗后 FEV1、FVC、FEV1%pre 和

FEV1/FVC 水平升高,研究组治疗后 FEV1、FVC、FEV1%pre 和 FEV1/FVC 水平高于对照组,差异具有统计学意义($P<0.05$)。见表 3。

2.4 两组治疗转归状况对比

研究组 6 例(14.29%)二氧化碳潴留未见明显改善转有创通气行气管插管治疗,2 例(4.76%)死亡,住院时间(13.52± 7.14)d;对照组 15 例(35.71%)行气管插管治疗,6 例(14.29%)

死亡,住院时间(22.47 ± 6.75)d,研究组住院时间、气管插管率 上均低于对照组,差异具有统计学意义($P < 0.05$)。

表 2 两组治疗前后动脉血气分析结果比较($\bar{x} \pm s$, $N=42$)

Table 2 Comparison of the arterial blood gas analysis between two groups between and after treatment($\bar{x} \pm s$, $N=42$)

Groups	Time points	pH	PaO ₂ (mmHg)	PaCO ₂ (mmHg)	SaO ₂ (%)
Control group	Before treatment	7.18± 0.05	49.67± 3.12	80.23± 7.35	73.26± 9.54
	After treatment	7.35± 0.07*	57.72± 4.55*	67.74± 6.62*	84.49± 10.68*
Experiment group	Before treatment	7.20± 0.06	50.08± 3.21	79.69± 7.29	72.84± 10.07
	After treatment	7.47± 0.09**	65.84± 5.28**	55.35± 6.21**	95.53± 11.37**

Note: Compared with before treatment, * $P < 0.05$; Compared with the control group after treatment, ** $P < 0.05$.

表 3 两组间治疗前后 FEV₁、FVC、FEV₁%pre 和 FEV₁/FVC 测定($\bar{x} \pm s$, $N=42$)

Table 3 Comparison of the FEV₁, FVC, FEV₁%pre and FEV₁/FVC treatment between two groups before and after treatment($\bar{x} \pm s$, $N=42$)

Groups	Time points	FEV ₁ (L)	FVC(L)	FEV ₁ %pre	FEV ₁ /FVC(%)
Control group	Before treatment	0.86± 0.28	1.53± 0.57	27.01± 6.26	47.75± 6.13
	After treatment	1.11± 0.35*	1.64± 0.48	30.65± 7.35*	52.33± 6.15*
Experiment group	Before treatment	0.84± 0.25	1.52± 0.63	26.82± 6.25	47.32± 6.18
	After treatment	1.31± 0.33**	2.05± 0.50**	35.50± 7.34**	57.24± 6.39**

Note: Compared with before treatment, * $P < 0.05$; Compared with the control group after treatment, ** $P < 0.05$.

3 讨论

慢性阻塞性肺疾病具有不可逆性发展的特点,急性加重期常引起通气及换气功能障碍加重,并发呼吸衰竭,尤以Ⅱ型呼吸衰竭为主^[6-8]。研究显示 COPD 合并Ⅱ型呼吸衰竭患者气道阻力增加,气流受限和过度通气,导致内源性呼气末正压^[9]。慢性阻塞性肺疾病的发病率及病死率均较高,因此采取及时有效的治疗可以改善患者的通气状况,单纯低流量吸氧、呼吸兴奋剂等治疗手段具有局限性。双水平无创正压通气具有操作简便、患者易于接受等优点,成为 COPD 并Ⅱ型呼吸衰竭的首要治疗手段^[10]。相比传统的气管插管,其可以避免侵入性操作导致的疼痛、感染等,逐渐被大部分患者接受,且疗效显著。相关研究表明,双水平无创呼吸机安全性高、可操作性强,根据患者吸入氧浓度及呼吸频率等进行个性化调节,可以保证患者呼吸肌得到充分的休息与恢复,对于 COPD 合并Ⅱ型呼吸衰竭治疗效果明显^[11,12]。本研究结果显示,经双水平无创呼吸机辅助治疗后患者临床有效率显著提高,说明双水平无创呼吸机辅助治疗可防止 COPD 并Ⅱ型呼吸衰竭患者肺泡萎陷,改善患者通气/血流比值,改善呼吸衰竭,进一步提高无创通气的临床治疗效果。

由于呼吸衰竭导致的肺性脑病、低氧血症成为多脏器功能衰竭而死亡的重要原因之一。无创通气广泛在呼吸衰竭的治疗中得到应用,减少建立人工气道造成的痛苦,可以明显改善血气及肺通气功能状况^[13,14]。本研究结果显示,经双水平无创呼吸机辅助治疗后患者 PaO₂、SaO₂、pH 水平较高,PaCO₂ 水平较低,说明双水平无创呼吸机辅助治疗可防止 COPD 并Ⅱ型呼吸衰竭患者显著改善动脉血气变化,缓解呼吸衰竭状态,提高预后。

有研究表明,早期应用 BiPAP 通气能迅速改善 COPD 并Ⅱ型呼吸衰竭患者的肺通气状态,纠正缺氧保持内环境稳定而

改善预后^[15-17]。还有研究显示,双水平无创呼吸机可以增加肺泡通气量,改善肺内不均匀气体分布状态,促进肺泡氧向血液弥散,防止肺泡萎陷,使弥散功能得到改善,达到治疗目的^[18-20]。本研究结果显示,经双水平无创呼吸机辅助治疗后,所有患者肺功能指标 FEV₁、FVC、FEV₁%pre、FEV₁/FVC 相对于对照组的改善程度更为显著,说明双水平无创呼吸机辅助治疗显著,改善肺功能,可有效改善 COPD 患者的症状。

综上所述,双水平气道正压通气呼吸机治疗 COPD 并Ⅱ型呼吸衰竭的临床疗效确切,能够显著改善患者的肺功能及动脉血气分析结果,值得临床推广应用。

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