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双水平气道内正压通气治疗尿毒症合并左心衰竭患者的疗效观察*

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摘要 目的:观察双水平气道内正压通气(BiPAP)治疗尿毒症合并左心衰竭患者的临床疗效。**方法:**选取 82 例确诊为尿毒症合并左心衰竭的患者,在患者进行常规的强心、利尿、扩血管、持续性肾替代治疗(CRRT)30 min 后无缓解后,立即对患者进行 BiPAP 治疗。比较患者在常规治疗 30 min 末、BiPAP 治疗后 1 h、2 h 后收缩压、舒张压、心率、呼吸频率、二氧化碳分压($PaCO_2$)、动脉血氧分压(PaO_2)等指标的变化,以及常规治疗 30 min 末、BiPAP 治疗 2h 后的血浆脑钠肽(BNP)、血乳酸(Lac)水平和临床表现的变化。**结果:**经 BiPAP 治疗后患者症状和体征缓解的有效率为 93.90%。BiPAP 治疗 1 h、2 h 后与常规治疗 30 min 末比较,患者的收缩压、舒张压、心率、呼吸频率具有显著下降(P<0.05),PaO_2 则显著升高(P<0.05),$PaCO_2$ 的变化经比较则无显著的统计学意义(P>0.05)。BiPAP 治疗 2 h 后患者的血浆 BNP、Lac 水平与常规治疗 30 min 末比较均显著下降(P<0.05)。**结论:**BiPAP 治疗尿毒症并发急性左心衰竭患者可有效改善患者的症状和体征,改善心功能,适合在临床上推广应用。

关键词:双水平气道内正压通气;尿毒症;左心衰竭

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Efficacy of Bi Level Positive Airway Pressure Ventilation in the Treatment of Uremic Patients with Left Heart Failure*

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ABSTRACT Objective: To observe the clinical efficacy of Bi level positive airway pressure ventilation (BiPAP) in the treatment of uremic patients with left heart failure. **Methods:** 82 cases of patients diagnosed as uremia with left heart failure were selected from our hospital between January 2013 and March 2016. These patients were treated with conventional strong heart, diuresis, vasodilator, continuous renal replacement therapy (CRRT), and they were immediately given BiPAP therapy when no relief were observed at 30 min after previous treatment. Record and compare the systolic pressure, diastolic blood pressure, heart rate, respiratory rate, carbon dioxide partial pressure ($PaCO_2$), arterial oxygen partial pressure (PaO_2) and other indicators at 30 min after conventional treatment and 1 h, 2 h after BiPAP therapy. The plasma brain natriuretic peptide (BNP), blood lactic acid (Lac) levels and clinical features at 30 min after conventional treatment and 2 h after BiPAP treatment were also compared and analyzed. **Results:** The effective rate of symptoms and signs of the patients was 93.90% after BiPAP treatment. The systolic blood pressure, diastolic blood pressure, heart rate, respiratory rate has decreased significantly at 1 h, 2 h after BiPAP treatment, while PaO_2 was raised remarkably, as compared with those at 30 min after conventional treatment ($P < 0.05$). Yet the $PaCO_2$ changes had no statistical significance ($P>0.05$). The plasma levels of BNP and Lac were significantly decreased at 2 h after BiPAP treatment, compared with those at 30 min after conventional treatment ($P < 0.05$). **Conclusion:** BiPAP treatment could effectively improve symptoms and signs and heart function of uremia patients complicated with acute left heart failure, so it is worth of clinical application.

Key words: Bi level positive airway pressure ventilation; Uremia; Left heart failure

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前言

左心衰竭是尿毒症患者常见的并发症之一,也是临床上导致患者死亡的主要原因之一[1]。目前对于尿毒症合并左心衰竭患者主要采取血液透析治疗[2],但在临床应用中我们发现急诊床旁透析有准备时间长、费用高的缺点。而双水平气道内正压通气(Bi level positive airway pressure ventilation,BiPAP)治疗可减少呼吸肌的疲劳,可用于左心衰竭的治疗。本研究通过观察 BiPAP 治疗在左心衰竭急性发作的尿毒症患者中的疗效,探究 BiPAP 治疗的有效性。

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1 资料与方法

1.1 一般资料

选取 2013 年 1 月 ~2016 年 3 月于本院进行就诊且确诊为尿毒症合并左心衰竭急性发作且行常规急性左心衰竭治疗无缓解的患者 82 例，其中男 53 例，女 29 例，平均年龄（52.68± 11.02）岁。所有患者均符合尿毒症和急性左心衰竭的诊断标准[3,4]。纳入标准：既往已确诊为尿毒症，且已接受过血液透析治疗；有急性肺水肿的临床表现和影像学表现；低氧血症；血浆脑钠肽（brain natriuretic peptide，BNP）＞400 ng/L。排除标准：患有器质性心脏病或合并慢性心功能不全；患有慢性阻塞性肺疾病、肺大泡、气道分泌物异常或过多；意识障碍无法配合研究的患者。本研究经本院伦理委员会批准，患者或其家属均已签署知情同意书。

1.2 治疗方法

患者急性左心衰竭发病入院后，行常规的强心、利尿、扩血管、持续性肾替代治疗（continuous renal replacement therapy，CRRT），30 min 后症状无改善，立即施行 BiPAP 治疗（BiPAP vision 呼吸机，美国伟康公司生产），使用口鼻面罩或鼻罩连接，模式为自主 / 控制自动切换呼吸模式（S/T 模式），呼气相压初始为 4 cm H_2O（1 cm H_2O=0.098kPa），上限 8 cm H_2O；吸气相压力初始为 8 cm H_2O，上限 20 cm H_2O；可根据患者即时末梢血氧饱和度水平和其对呼吸机的耐受情况每隔 10 min 上调 1~2 cm H_2O。氧流量 5~10 L/min，呼吸频率 10~15 次 /min，氧浓度 60%。确保患者的末梢血氧饱和度＞90%。

1.3 观察指标

检测患者分别在常规治疗 30 min 末、BiPAP 治疗后 1、2 h 后收缩压、舒张压、心率、呼吸频率、二氧化碳分压（$PaCO_2$）、动脉血氧分压（PaO_2）等指标的变化；以及在常规治疗 30 min 末、BiPAP 治疗 2 h 后分别取患者静脉血 2 mL 测定血浆脑钠肽（BNP）、血乳酸（lactic acid，Lac）水平的变化情况，同时注意观察患者的临床症状是否得到改善。

1.4 疗效判断

BiPAP 治疗后 2 h 对患者进行疗效的判断：① 显效：端坐呼吸、大汗淋漓、面色苍白、急性面容、烦躁不安等临床症状显著缓解或完全缓解，患者两肺的哮鸣音和湿啰音减轻或消失，能平卧，心率、呼吸、血氧分压、血压等恢复至正常值。② 有效：上述症状和体征较治疗前有所改善，肺部啰音减少超过 50%，可半卧位，心率、呼吸、血氧分压、血压等接近正常值。③ 无效：患者的症状和体征未见减轻，未达到有效标准。

1.5 统计学方法

组间比较采用 t 检验，以 P＜0.05 表示差异有统计学意义。

2 结果

2.1 临床疗效

给予 BiPAP 治疗 2 h 后，显效的患者有 29 例，有效的患者有 48 例，无效的患者有 5 例，总有效率为 93.90%。

2.2 患者生命体征、血气分析水平的变化

所有患者在接受 BiPAP 治疗后患者的血压、心率、呼吸频均较未接受治疗前呈现下降趋势，PaO_2 呈上升趋势，$PaCO_2$ 则无明显变化。BiPAP 治疗后 1 h、2 h 分别与常规治疗 30 min 末比较，患者的舒张压、收缩压、心率。呼吸频率均显著降低（P＜0.05）与 PaO_2 则显著升高（P＜0.05）；$PaCO_2$ 的变化经比较则无统计学意义（P＞0.05）（表 1）。

表 1 患者生命体征、血气分析水平的变化

Table 1 The changes of vital signs and blood gas analysis

Time	Systolic pressure (mmHg)	Diastolic pressure (mmHg)	Heart rate(n/min)	Respiratory rate (n/min)	PaO_2(mmHg)	$PaCO_2$(mmHg)
30 min after conventional treatment	175.21 ± 12.02	101.74± 9.41	105.24± 13.74	25.47± 2.51	80.98± 8.62	36.14± 5.01
1 h after BiPAP	158.20± 13.25	92.84± 8.98	99.17± 12.55	20.49± 4.25	85.62± 9.43	35.01± 4.64
T_1	8.610	6.196	2.954	9.136	3.289	1.498
P_1	<0.001	<0.001	0.004	<0.001	0.001	0.136
2 h after BiPAP	145.84± 15.68	96.18± 9.25	87.74± 15.91	18.27± 4.85	95.68± 13.24	35.54± 6.45
T_2	13.461	3.816	7.538	11.939	8.426	0.665
P_2	<0.001	0.001	<0.001	<0.001	<0.001	0.507

2.3 患者血浆 BNP、Lac 水平的变化情况

患者行 BiPAP 治疗 2 h 后的血浆 BNP、Lac 水平与常规治疗 30min 末对比有显著降低，差异经比较具有显著统计学差异（P＜0.05）（表 2）。

3 讨论

尿毒症主要表现为代谢性酸中毒、水和电解质紊乱和其他系统的并发症，是慢性肾功能不全进入终末阶段发生的一系列临床变现[5]。尿毒症患者的心脏易发生器质性病变，心脏功能往往发生不可逆的改变，可能与患者的原发病有关，也可能与尿毒症病程中患者的血流动力学的改变、代谢异常产物的潴留有关[6,7]。Egbe 等[8]的研究发现，约 50%的尿毒症患者死于心功能不全、高血压、代谢异常、心肌病等心血管病变。目前血液透析是治疗尿毒症患者急性左心衰竭的主要办法，但有研究表明常规的血液透析比维持性血液透析更容易导致患者心脏结构与功能的恶化[9]，且血液透析的技术设备要求高，操作存在延后

表 2 患者血浆 BNP、Lac 水平的变化情况

Table 2 The changes of plasma BNP and Lac levels of patients

Time	BUP(μg/L)	Lac(mmol/L)
30 min after the conventional treatment	2846.15± 512.28	6.01± 1.26
2h after BiPAP	1759.58± 805.91	3.25± 1.28
T	10.304	14.066
P	<0.001	<0.001

性,某些病情危重的患者不宜搬运至设备旁接受治疗,难以在基层医疗中得到广泛的应用。

本研究着力于探究 BiPAP 在治疗急性左心衰竭发作的尿毒症患者中的作用。BiPAP 有操作简单、作用确切、对患者副作用少且易耐受等的优点,可帮助患者客服气道阻力、增加潮气量、减少心肌及呼吸肌做功量,利于肺换气,在临床治疗慢性阻塞性肺疾病[10]和急性左心衰竭等得到广泛应用。本研究发现,在 BiPAP 治疗 1 h、2 h 后患者的生命体征和气血分析均比急救治疗前和常规治疗 30 min 末有显著改善,BiPAP 治疗 2 h 后患者的 BUP、Lac 水平均比常规治疗 30 min 末显著降低至正常水平,差异均有统计学意义(P＜0.05),BiPAP 治疗的有效性达到 93.90%,与国内的研究报道结果一致[11,12]。其原因可能是呼、吸双向持续正压通气可使患者气道内和肺泡内压力呈正值,气道内的泡沫破碎,肺毛细血管的渗出缓解,改善了肺水肿状态,有利于气体交换和流通。而且呼气相正压有利于提高胸腔内压力值,降低心脏前负荷,可以增加心输出量和降低心脏做功量[13,14]。

BNP 是由心室细胞合成和分泌的一种多肽[15],具有利尿、扩血管、拮抗肾素 - 血管紧张素 - 醛固酮系统的功能。其分泌量与心室室壁的张力和舒张末压有密切关系,正常情况下的分泌量极少, 但当心室压了增大和容量增大时其分泌量可大大增加。BNP 是目前诊断、治疗和疗效检测心力衰竭的重要客观指标之一[16-18]。本研究中 BiPAP 治疗 2h 后 BNP 显著降低,其可能原因是持续性气道正压导致左心室的骑跨压降低,降低了左心室的舒张末压,BNP 的分泌即减少。

Lac 是缺氧情况下的无氧呼吸产物,其增高可出现在机体休克、肺功能不全、循环功能不全等机体低灌注且缺氧的情况下。国外有研究表明[19,20], Lac 水平可作为判断危重患者预后诊断指标。本研究中患者接受 BiPAP 治疗 2 h 后的 Lac 水平显著下降,表明 BiPAP 治疗可改善患者的缺氧情况,缓解心功能不全情况,可降低患者的心血管危险事件的发生的可能性。

综上所述,BiPAP 治疗尿毒症并发急性左心衰竭患者具有确切疗效,是一种安全、有效的办法,适合在临床中推广应用。

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