

doi: 10.13241/j.cnki.pmb.2019.08.020

有创无创序贯通气对急性呼吸衰竭患者血糖水平及预后的影响 *

王春亚¹ 赵玉杰¹ 王小闯¹ 侯艳丽¹ 王海涛²

(1 西安交通大学第二附属医院重症医学科 陕西 西安 710004; 2 西安交通大学第二附属医院药剂科 陕西 西安 710004)

摘要 目的: 探讨有创无创序贯通气和有创机械通气对急性呼吸衰竭患者血糖水平及预后的影响。**方法:** 选取我院重症医学科2012年3月至2017年10月收治的急性呼吸衰竭患者81例,按照通气方式不同分为两组,对照组(41例)采用单纯有创机械通气治疗,观察组(40例)采用有创-无创序贯通气治疗。比较两组患者的血糖水平、临床指标、治疗时间和临床转归情况。**结果:** 两组患者治疗后血糖水平均较治疗前显著升高($P<0.05$),而观察组血糖水平显著低于对照组($P<0.05$);对照组拔管时和观察组通气3h后患者的动脉血二氧化碳分压(PaCO_2)、动脉血氧分压(PaO_2)、收缩压(SBP)和心率(HR)对比无显著性差异($P>0.05$);观察组的通气时间、住院时间与对照组相比均较短($P<0.05$),撤机成功率高于对照组($P<0.05$),再插管率、呼吸机相关肺炎(VAP)和死亡率均显著低于对照组($P<0.05$)。**结论:** 有创无创序贯通气急性呼吸衰竭患者血糖水平较低,治疗时间较短,且再插管率、VAP和死亡率较小,显著改善患者预后。

关键词: 有创无创序贯通气;急性呼吸衰竭;血糖;预后

中图分类号:R563.8 文献标识码:A 文章编号:1673-6273(2019)08-1490-04

Effect of Sequential Invasive and Non-invasive Ventilation on Blood Glucose Level and Prognosis in Patients with Acute Respiratory Failure*

WANG Chun-ya¹, ZHAO Yu-jie¹, WANG Xiao-chuang¹, HOU Yan-li¹, WANG Hai-tao²

(1 Department of ICU, The Second Affiliated Hospital of Xi'an Jiaotong University, Xi'an, Shaanxi, 710004, China;

2 Department of pharmacy, The Second Affiliated Hospital of Xi'an Jiaotong University, Xi'an, Shaanxi, 710004, China)

ABSTRACT Objective: To explore the effect of sequential invasive and non-invasive ventilation on blood glucose level and prognosis in patients with acute respiratory failure. **Methods:** 81 cases of patients with acute respiratory failure from March 2012 to October 2017 were selected, and divided into two groups according to the ventilation way, the control group (41 cases) using pure invasive mechanical ventilation treatment, observation group (40 cases) using sequential invasive and non-invasive ventilation treatment. The blood glucose levels, clinical indicators, treatment time and clinical outcomes were compared between the two groups. **Results:** Blood glucose levels were significant rise after treatment in both groups ($P<0.05$), blood glucose level was significantly lower in observation group than control group ($P<0.05$); there were no significantly difference of PaCO_2 , PaO_2 , SBP and HR between two groups ($P>0.05$); ventilation time and hospitalization time in observation group was significantly shorter than the control group ($P<0.05$), the ventilator success rate in observation group was 82.50%, significantly higher than that of control group 53.66% ($P<0.05$), reintubation rate, VAP and mortality were significantly in observation group was significantly lower than the control group ($P<0.05$). **Conclusions:** There was a low blood glucose level, shorter treatment time, and a smaller reintubation rate, VAP and mortality used sequential invasive and non-invasive ventilation in the patients with acute respiratory failure, and significantly improved the prognosis of patients.

Key words: Sequential Invasive and Non-invasive Ventilation; Acute Respiratory Failure; Blood Glucose; Prognosis

Chinese Library Classification(CLC): R563.8 **Document code:** A

Article ID: 1673-6273(2019)08-1490-04

前言

机械通气是急性呼吸衰竭患者治疗和抢救的主要手段,可保证机体气体交换量、保证供氧,从而改善细胞缺氧^[1-3]。机械通气可分为有创和无创机械通气,有创机械通气具有创伤性,容易引起呼吸机相关的肺炎、肺损伤,甚至引起呼吸机依赖和脱机困难等^[4-6]。有创无创序贯通气是患者经机械通气,在不符合

撤机条件的情况下,提前拔管,改用无创通气,是通气技术的一大改进^[7-9],目前已普遍应用于临床。

机械通气的急性呼吸衰竭患者无论其病因如何,体内出现大量的内分泌和代谢紊乱,可产生应激性血糖升高。近年来研究显示高血糖是急性呼吸衰竭患者机械通气独立的预后因子,显著影响患者的住院时间和发病率和死亡率等^[10-12]。也有研究显示高血糖水平与危重患者的死亡率和预后相关^[13,14]。高血糖

* 基金项目:陕西省科技攻关项目(2015SF-144)

作者简介:王春亚(1976-),女,硕士,主治医师,研究方向:ARDS, E-mail: wangchunya_197604@163.com

(收稿日期:2018-07-10 接受日期 2018-07-31)

对急性呼吸衰竭患者的预后是一个不利因素,在患者的治疗过程中应控制血糖水平,如血糖水平过高应采用相关治疗药物进行治疗^[15]。但目前关于不同通气方式对患者血糖水平影响及预后情况的研究较少。因此,本研究对比了有创机械通气和有创无创序贯通气对急性呼吸衰竭患者的血糖水平和其预后的影响,以期急性呼吸衰竭患者的临床治疗提供参考依据。

1 资料与方法

1.1 临床资料

选取 2012 年 3 月至 2017 年 10 月我院重症医学科收治的急性呼吸衰竭患者 81 例。纳入标准:①符合呼吸衰竭诊断标准^[16];②行机械通气。排除标准:①合并其他重大疾病者;②糖尿病患者;③烦躁不安、谵妄不能合作者。将 81 例患者按照通气方式不同分为两组,对照组 41 例,男 25 例,女 16 例;年龄 48~70 岁,平均 58.34 ± 12.06 岁;慢性阻塞性肺病急性加重 18 例,重症肺炎 14 例,肺间质纤维化 3 例,肺水肿 3 例,重症哮喘 2 例,造血干细胞移植后并发呼吸衰竭 1 例。观察组 40 例,男 26 例,女 14 例;年龄 45~70 岁,平均 55.31 ± 10.42 岁;慢性阻塞性肺病急性加重 20 例,重症肺炎 12 例,肺间质纤维化 2 例,肺水肿 3 例,重症哮喘 1 例,造血干细胞移植后并发呼吸衰竭 2 例。两组间一般资料比较差异无统计学意义($P>0.05$),具有可比性。

1.2 通气方法

根据治疗过程中所采用的通气方式不同分为对照组和观察组,对照组采用有创机械通气:气管插管后用压力控制通气,

模式为呼气末正压(PEEP)、压力支持通气(PSV)、同步间歇指令通气(SIMV),当 PSV 在 5~7 cmH₂O 并且可以自主咳痰后撤机。观察组患者采用有创-无创序贯通气:低水平压力支持(PS)为 8 cmH₂O,PEEP 为 5 cmH₂O,采用 SIMV-PS+PEEP-脱机模式撤机。密切关注患者的生命体征,待患者基本指标稳定,能自主排痰后拔管,改为无创机械通气(NIPPV),采用 BiPAP 模式,监测患者的血气指标,根据患者的病情调整吸气压力,直到完全撤机。

1.3 观察指标

①比较治疗前后患者的血糖水平,分别于治疗前后抽取患者空腹静脉血 5 mL,采用全自动生化分析仪检测空腹血糖(FPG)。②观察对照组拔管后和观察组无创通气 3h 后的临床指标,包括 PaO₂、PaCO₂、SBP 和心率 HR。③比较两组治疗时间、住 ICU 时间和临床转归(包括撤机成功率、再插管率、VAP 和病死率)。

1.4 统计学方法

采用 SPSS 20.0 进行统计学分析,计量资料用($\bar{x} \pm s$)表示,组间比较采用 t 检验;计数资料采用例和%表示,组间比较采用 χ^2 检验,以 $P<0.05$ 表示差异有统计学意义。

2 结果

2.1 两组治疗前后血糖水平的比较

两组治疗后血糖水平均较治疗前后显著升高 ($P<0.05$),且观察组显著低于对照组($P<0.05$),见表 1。

表 1 两组患者治疗前后血糖水平的比较($\bar{x} \pm s$)

Table 1 Comparison of the FPG level between two groups before and after treatment($\bar{x} \pm s$)

Groups	n	FPG level (mmol/L)	
		Before treatment	After treatment
Control Group	41	6.33 $\pm$ 1.48	9.64 $\pm$ 2.65*
Observation Group	40	5.98 $\pm$ 1.57	8.26 $\pm$ 2.05**

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

2.2 两组患者临床指标的对比

对照组拔管时和观察组通气 3h 后患者的 PaCO₂、PaO₂、

SBP 和 HR 对比差异均无统计学意义($P>0.05$),见表 2。

表 2 两组患者临床指标的对比($\bar{x} \pm s$)

Table 2 Comparison of the clinical indicators between the two groups($\bar{x} \pm s$)

Groups	n	PaCO ₂ (mmHg)	PaO ₂ (mmHg)	SBP	HR
Control Group	41	45.21 $\pm$ 9.34	85.65 $\pm$ 18.34	120.38 $\pm$ 30.64	13.35 $\pm$ 3.07
Observation Group	40	48.37 $\pm$ 9.87	88.64 $\pm$ 18.91	122.85 $\pm$ 21.24	15.64 $\pm$ 3.85

Note: Compared with control group, * $P<0.05$.

2.3 两组患者的治疗时间和临床转归的比较

观察组的通气时间和住院时间显著短于对照组 ($P<0.05$),撤机成功率显著高于对照组($P<0.05$),再插管率、VAP 和死亡率均显著低于对照组($P<0.05$),见表 3。

3 讨论

呼吸衰竭是呼吸功能不全的严重阶段,PaO₂<60 mmHg 伴 PaCO₂>50 mmHg,并引起一系列损害的临床综合征。引起急性呼吸衰竭的因素很多,严重感染、外伤、大量出血、中毒性休克和大面积烧伤等引起的通气功能和换气功能障碍是引起呼吸衰竭的重要原因,也是导致患者死亡的原因^[17-19]。机械通气可增加肺泡通气、减少患者呼吸做功和改善氧合,从而改善患者的

表 3 两组患者的治疗时间和临床转归的比较($\bar{x} \pm s$)[例(%)]Table 3 Comparison of the treatment time and clinical regression between two groups($\bar{x} \pm s$)[n(%)]

Group	n	Mechanical ventilation time	ICU stay	Ventilator successfully	Reintubation	VAP	Death
Control Group	41	13.65 $\pm$ 3.57	16.65 $\pm$ 4.34	22(53.66)	12(29.27)	25(60.98)	10(24.39)
Observation Group	40	9.02 $\pm$ 2.18*	10.74 $\pm$ 4.91*	33(82.50) *	4(10.00) *	5(12.50) *	3(7.50) *

Note: Compared with control group, * $P < 0.05$.

通气状况。但相关研究表明机械通气在发挥其治疗功能的同时也会引起相应并发症的发生,这是由于长时间的机械通气可增加外源性感染源进入机体的机会,同时也会造成 VAP 的发生^[20-22]。因此,在机械通气的同时应当考虑相关并发症的发生情况。

机体在遭受急性创伤时会产生应激反应,急性生理应激反应可以通过交感神经系统的兴奋来促进胰高血糖素、儿茶酚胺和皮质醇等升血糖作用的激素生成增加,同时抑制胰岛素受体的生物活性,产生胰岛素抵抗,使得机体对糖的利用降低。本研究显示两组患者治疗后血糖水平均显著升高,但观察组血糖水平显著低于对照组,提示急性呼吸衰竭患者通气后血糖水平升高,但有创 - 无创序贯通气治疗组的血糖水平显著低于有创机械通气,可能与其提前拔管采用无创通气对患者的刺激较小有关。

也有研究认为高血糖是急性疾病的有益的适应性反应,无需进行治疗^[23-25]。但高血糖与患者的不良结局显著相关^[26,27],可促进疾病的发展并导致患者器官衰竭。有研究发现血糖控制能降低急性心力衰竭患者的住院时间和整体死亡率^[28,29]。当血糖控制在 4.4-6.1 mmol/L 时可降低相关临床并发症,改善生存率和降低死亡率^[30]。本研究发现观察组的通气时间、住院时间、撤机成功率、再插管率、VAP 和死亡率均显著优于对照组,提示有创 - 无创序贯通气治疗组的患者预后效果较好,可能与其血糖水平较低有关。高血糖可通过细胞内脱水损伤细胞功能、加重感染的机会、通过渗透性利尿引起水、电解质紊乱而影响预后。本研究中,两组患者临床指标 PaCO_2 、 PaO_2 、SBP 和 HR 对比无显著性差异,提示两种通气方式对患者通气后的临床指标影响相差不大,均就有良好的通气效果。

综上所述,有创无创序贯通气急性呼吸衰竭患者血糖水平较低,治疗时间较短,且再插管率、呼吸机相关肺炎和死亡率较小,可显著改善患者预后。

参考文献(References)

- [1] Bagchi A, Rudolph M I, Eikermann M. Mechanical ventilation mode and postoperative pulmonary complications - a reply[J]. *Anaesthesia*, 2018, 73(2): 253
- [2] Gassner M, Kemper D, Schwarz C, et al. Successful Bridging to Lung Transplantation in Patients with Need of ECMO and Invasive Mechanical Ventilation: Report of Mid-Term Outcomes [J]. *Thoracic & Cardiovascular Surgeon*, 2017, 65(S 01): S1-S110
- [3] Petrianni A, Esquinas A M. Noninvasive Mechanical Ventilation in Pneumonia: Risks of Delayed Intubation. Is This "Red Line" Well Defined and Understood? [J]. *Critical Care Medicine*, 2017, 45 (4): e465
- [4] Ismail I, Yap B W, Abidin A S Z. Evaluation of risk factors for prolonged invasive mechanical ventilation in paediatric intensive care unit (PICU)[J]. *Pertanika Journal of Science & Technology*, 2017, 25 (3): 811-824
- [5] Tadross B T, Mahmoud M, Fayed A. Prospective randomized study of the effect of nebulolol on the incidence of late invasive mechanical ventilation in ischemic heart disease patients with acute exacerbation of chronic obstructive pulmonary disease[J]. *Research and Opinion in Anesthesia & Intensive Care*, 2017, 4(2): 54
- [6] Llópez Y I M, Cañete I M G. Morbidity and mortality in patients with invasive mechanical ventilation in the Intensive Care Unit of "Celia Sánchez Manduley" Hospital[J]. *Medisan*, 2017, 21(6): 664-671
- [7] Piroddi I M, Barlascini C, Esquinas A, et al. Non-invasive mechanical ventilation in elderly patients: A narrative review [J]. *Geriatrics & Gerontology International*, 2017, 17(5): 689-696
- [8] Raurell-Torred M, EArgilaga-Molero, MColomer-Plana, et al. Optimising non-invasive mechanical ventilation: which unit should care for these patients? A cohort study [J]. *Chinese Nursing Management*, 2017, 30(4): 225-233
- [9] Hurtado E S, Castaño P G, Torres J J, et al. Ambulatory care of non-invasive mechanical ventilation in COPD patients with global decompensated respiratory acidosis[J]. *Pneumologie*, 2017, 71(S 01): S1-S125
- [10] Zhong C, Ji C, Dai Z, et al. Effect of early enteral nutrition standardized treatment on blood glucose and prognosis in acute respiratory distress syndrome patients with mechanical ventilation[J]. *Zhonghua Wei Zhong Bing Ji Jiu Yi Xue*, 2017, 29(12): 1133
- [11] Edriss H, Selvan K, Sigler M, et al. Glucose Levels in Patients With Acute Respiratory Failure Requiring Mechanical Ventilation [J]. *J Intensive Care Med*, 2017, 32(10): 578-584
- [12] Li X, Ma X. The role of heparin in sepsis: much more than just an anticoagulant[J]. *British Journal of Haematology*, 2017, 179(3): 389
- [13] Yu L, Tian J, Zhao X, et al. Bowel Perforation in Premature Infants with Necrotizing Enterocolitis: Risk Factors and Outcomes [J]. *Gastroenterology Research and Practice*, 2016, 16(3): 1-6
- [14] Pan W, Wang Y, Lin L, et al. Outcomes of dexmedetomidine treatment in pediatric patients undergoing congenital heart disease surgery: ameta analysis[J]. *Paediatr Anaesth*, 2016, 26(3): 239-248
- [15] Devriese L. Genie out of the Bottle: Social Media and the Expansion of the Public Sphere in the Arab Gulf [J]. *International Journal of Social Welfare*, 2016, 5(3): 194-201
- [16] Dombrowsky T, Kristensen M Ø, Rysgaard S, et al. Risk factors for and impact of respiratory failure on mortality in the early phase of acute pancreatitis[J]. *Pancreatology*, 2016, 16(5): 756-760
- [17] Von B V, Hultman J, Eksborg S, et al. Long-Term Survival in Adults Treated With Extracorporeal Membrane Oxygenation for Respiratory Failure and Sepsis[J]. *Critical Care Medicine*, 2017, 45(2): 164-170

- [18] Morelli A, Del S L, Pesenti A, et al. Extracorporeal carbon dioxide removal (ECCO2R) in patients with acute respiratory failure [J]. *Intensive Care Medicine*, 2017, 43(4): 1-12
- [19] Wang M T, Tsai C L, Lin C W, et al. Association Between Antipsychotic Agents and Risk of Acute Respiratory Failure in Patients With Chronic Obstructive Pulmonary Disease [J]. *Jama Psychiatry*, 2017, 74(3): 252
- [20] Wang T, Zhang L, Luo K, et al. Noninvasive versus invasive mechanical ventilation for immunocompromised patients with acute respiratory failure: a systematic review and meta-analysis [J]. *Bmc Pulmonary Medicine*, 2016, 16(1): 129
- [21] Schwaiberger D, Karcz M, Menk M, et al. Respiratory Failure and Mechanical Ventilation in the Pregnant Patient [J]. *Critical Care Clinics*, 2016, 32(1): 85
- [22] Bhatia P, Biyani G, Mohammed S, et al. Acute respiratory failure and mechanical ventilation in pregnant patient: A narrative review of literature[J]. *Journal of Anaesthesiology Clinical Pharmacology*, 2016, 32(4): 431-439
- [23] Wallia A, M.D, Parikh N D, et al. Glycemic control by a glucose management service and infection rates folloeing liver transplantation [J]. *Endocrine Practice Official Journal of the American College of Endocrinology & the American Association of Clinical Endocrinologists*, 2016, 17(4): 546
- [24] Tamopolsky M, Katzberg H, Petrof B J, et al. Pompe Disease: Diagnosis and Management. Evidence-Based Guidelines from a Canadian Expert Panel[J]. *Canadian Journal of Neurological Sciences Le Journal Canadien Des Sciences Neurologiques*, 2016, 43(4): 1
- [25] Zafar S F, Postma E N, Biswal S, et al. Electronic Health Data Predict Outcomes after Aneurysmal Subarachnoid Hemorrhage [J]. *Neurocritical Care*, 2017(21): 1-10
- [26] Unlu M, Ozturk C, Demirkol S, et al. Thrombolytic therapy in a patient with inferolateral myocardial infarction after carbon monoxide poisoning [J]. *Human & Experimental Toxicology*, 2016, 35 (1): 101-105
- [27] Aruğ aslan E, Karaca M, Özcan KS, et al. Neurologic outcome in patients with cardiac arrest complicating ST elevation myocardial infarction treated by mild therapeutic hypothermia: The experience of a tertiary institution [J]. *Türk Kardioloji Derne ğ i ar ř ivi: Türk Kardioloji Derne ğ inin yayın organıdır*, 2016, 44(2): 100
- [28] Mogensen K M, Andrew B Y, Corona J C, et al. Validation of the Society of Critical Care Medicine and American Society for Parenteral and Enteral Nutrition Recommendations for Caloric Provision to Critically Ill Obese Patients: A Pilot Study[J]. *Journal of Parenteral & Enteral Nutrition*, 2016, 40(5)
- [29] Badiger S, Vishok M. Study of Serum Amylase and Serum Cholinesterase in Organophosphorus Poisoning[J]. *Journal of Krishna Institute of Medical Sciences University*, 2016, 5(2): 49-56
- [30] Keenswijk W, Walle J V. A 2-year-old boy with circulatory failure owing to streptococcal toxic shock syndrome: case report[J]. *Paediatr Int Child Health*, 2017, 20(4): 1-4

(上接第 1458 页)

- [16] Liu WH, Song FQ, Ren LN, et al. The multiple functional roles of mesenchymal stem cells in participating in treating liver diseases[J]. *J Cell Mol Med* 2015, 19: 511-520
- [17] De Miguel MP, Fuentes-Julián S, Blázquez-Martí nez A, et al. Immunosuppressive properties of mesenchymal stem cells: advances and applications[J]. *Curr Mol Med* 2012, 12: 574-591
- [18] Zheng K, Chen Y, Huang W, et al. Chemically Functionalized Silk for Human Bone Marrow-Derived Mesenchymal Stem Cells Proliferation and Differentiation [J]. *ACS applied materials & interfaces*, 2016, 8(23): 14406-14413
- [19] Shi D, Zhang J, Zhou Q, et al. Quantitative evaluation of human bone mesenchymal stem cells rescuing fulminant hepatic failure in pigs[J]. *Gut*, 2017, 66(5)
- [20] Ma H C, Shi X L, Ren H Z, et al. Targeted migration of mesenchymal stem cells modified with CXCR4 to acute failing liver improves liver regeneration [J]. *World Journal of Gastroenterology*, 2014, 20(40): 14884-14894
- [21] Dongliang L, Jingjing F, Xiuhua H, et al. Therapeutic effect comparison of hepatocyte-like cells and bone marrow mesenchymal stem cells in acute liver failure of rats[J]. *Int J Clin Exp Pathol*, 2015, 8(1): 11-24
- [22] Cai Y, Zou Z, Liu L, et al. Bone marrow-derived mesenchymal stem cells inhibits hepatocyte apoptosis after acute liver injury [J]. *International Journal of Clinical & Experimental Pathology*, 2015, 8 (1): 107-116
- [23] Huang B, Cheng X, Wang H, et al. Mesenchymal stem cells and their secreted molecules predominantly ameliorate fulminant hepatic failure and chronic liver fibrosis in mice respectively [J]. *Journal of Translational Medicine*, 2016, 14(1): 45
- [24] 陈卫平, 刘涛, 王灿晖, 等. 热瘀相搏是重型肝炎病理变化的关键探析[J]. *中医药理学*, 2003, 21(8): 1240-1241
- [25] 徐山凌. 清热解毒凉血化瘀法联合骨髓间充质干细胞移植治疗急性肝衰竭模型大鼠及其机制的初步研究[D]. 四川医科大学, 2015
- [26] Curran TA, Jalili RB, Farrokhi A, et al. IDO expressing fibroblasts promote the expansion of antigen specific regulatory T cells [J]. *Immunobiology*, 2014, 219(1): 17-24
- [27] Milosavljevic N, Gazdic M, Simovic Markovic B, et al. Mesenchymal stem cells attenuate acute liver injury by altering ratio between interleukin 17 producing and regulatory natural killer T cells[J]. *Liver Transpl*, 2017, 23: 1040-1050
- [28] Meisel R, Zibert A, Laryea M, et al. Human bone marrow stromal cells inhibit allogeneic T-cell responses by indoleamine 2, 3-dioxygenase-mediated tryptophan degradation[J]. *Blood* 2004, 103: 4619-4621
- [29] 韩夫, 王耀军, 王耘川, 等. 吲哚胺 2, 3- 双加氧酶基因修饰 BMSCs 在大鼠同种异体复合组织移植免疫排斥反应中的作用研究[J]. *中国修复重建外科杂志*, 2014, 28(06): 745-751
- [30] 何跃. 吲哚胺 2,3- 双加氧酶转染骨髓间充质干细胞诱导移植免疫耐受的实验研究[D]. 第三军医大学, 2015