

不同机械通气在重症急性胰腺炎合并急性呼吸窘迫综合征患者中的应用

四川省成都市第二人民医院 虎琼华 张献全^{1*} 王志伟 周瑜 崔巍 徐治波 徐兵, 成都 610041

摘要 目的:分析不同机械通气方案在重症急性胰腺炎(SAP)合并急性呼吸窘迫综合征(ARDS)患者呼吸管理中的应用效果。方法:选择129例SAP合并ARDS患者,采用随机数字表将其分为A组、B组、C组,每组43例。所有患者均选择相同的控制模式、肺保护通气策略、肺复张、最低PEEP策略、俯卧位通气。3组患者分别选择有创正压通气、无创正压通气、有创和无创序贯机械通气方案辅助治疗,C组患者于ARDS得到控制后撤机行无创正压通气治疗。比较3组患者治疗前、治疗后72 h后呼吸系统顺应性、气道峰压、呼吸频率、氧分压(PaO_2)、氧合指数($\text{PaO}_2/\text{FiO}_2$)、APACHE II评分的变化,统计并比较3组患者机械通气时间、住ICU时间、无辅助通气时间、气管切开率、气压伤发生率、28 d病死率。结果:治疗前3组患者呼吸系统顺应性、气道峰压、呼吸频率、 PaO_2 、 $\text{PaO}_2/\text{FiO}_2$ 、APACHE II评分比较差异均无统计学意义(均 $P>0.05$);治疗后72 h 3组患者的呼吸系统顺应性均获改善、 PaO_2 、 $\text{PaO}_2/\text{FiO}_2$ 均显著升高,气道峰压和APACHE II评分均降低(均 $P<0.05$),且B、C组患者上述指标的改善优于A组患者($P<0.05$)。C组患者的机械通气时间、住ICU时间、无辅助通气时间、气管切开率、28 d病死率均低于A与B组,但差异均无统计学意义(均 $P>0.05$);A组气压伤发生率明显高于B组和C组(均 $P<0.05$)。结论:有创、无创序贯通气方案可降低SPA合并ARDS患者的气压伤发生率,对SAP合并ARDS患者具有一定的临床价值。

关键词 重症急性胰腺炎;急性呼吸窘迫综合征;呼吸管理;机械通气;呼吸功能;预后

中图分类号 R576

文献标识码 A

DOI 10.11768/nkjwzzzz20180215

Application of different mechanical ventilations in severe acute pancreatitis complicated with acute respiratory distress syndrome HU Qiong-hua, ZHANG Xian-quan^{1*}, WANG Zhi-wei, ZHOU Yu, CUI Wei, XU Zhi-bo, XU Bing. Sec-ond People's Hospital of Chengdu, Chengdu 610041, China

Abstract Objective: To analyze the effect of different mechanical ventilations in the management of respiratory tract in patients with severe acute pancreatitis (SAP) and acute respiratory distress syndrome (ARDS). Methods: 129 patients with SAP and ARDS were selected and divided into 3 groups (A, B and C) by the random number table (43 in each group). All patients had received the same control mode, lung protective ventilation strategy, recruitment maneuver, minimum PEEP strategy and prone position ventilation. The 3 groups were respectively treated with different mechanical ventilation modes, including invasive positive pressure ventilation, noninvasive positive pressure ventilation, invasive and noninvasive sequential ventilation. Patients in group C were immediately treated with noninvasive positive pressure ventilation after ARDS was controlled. We compared the changes of respiratory compliance, airway peak inspiratory pressure, respiratory rate, oxygen partial pressure (PaO_2), oxygenation index ($\text{PaO}_2/\text{FiO}_2$) and APACHE II score among the 3 groups before and 72 h after treatment. In addition, the mechanical ventilation time, ICU stay time, no auxiliary ventilation time, rate of tracheotomy, incidence of barotrauma and 28-day mortality in 3 groups were statistically analyzed. Results: Before treatment, there was no significant difference in respiratory compliance, airway peak inspiratory pressure, respiratory rate, PaO_2 , $\text{PaO}_2/\text{FiO}_2$ and APACHE II scores among the 3 groups ($P>0.05$). After treatment, the respiratory system compliance was all improved, PaO_2 , $\text{PaO}_2/\text{FiO}_2$ were significantly increased, and airway peak inspiratory pressure and APACHE II scores were all decreased in all 3 groups ($P<0.05$), and the improvement of above indicators in group B and group C was superior to that in group A ($P<0.05$). The mechanical ventilation time, ICU stay time and no auxiliary ventilation time were shorter, and rate of tracheotomy and 28-day mortality were lower in group C than those in group A and B, but the differences were not statistically significant ($P>0.05$). The incidence of barotrauma in group A was significantly higher than that in group B and C ($P<0.05$). Conclusion: Therapeutic regimens of invasive and noninvasive sequential ventilation can reduce the incidence of barotrauma in patients with SPA and ARDS, and have certain clinical value for patients with SAP and ARDS.

Key words Severe acute pancreatitis; Acute respiratory distress syndrome; Respiratory management; Mechanical ventilation; Respiratory function; Prognosis

¹重庆医科大学附属第二人民医院

* 通信作者:张献全, E-mail: xuanquanzhng@hotmail.com

脏器功能障碍是判断是否为重症急性胰腺炎(severe acute pancreatitis, SAP)的特征之一,另一特征是出现坏死、脓肿、假性囊肿,两种情况存在一种即可判定为SAP^[1]。SAP患者并发肺损伤的几率高达60%~70%,肺损伤至一定程度而发生急性呼吸窘迫综合征(acute respiratory distress syndrome, ARDS),病死率高达40%~70%^[2]。呼吸功能的恢复和维持是治疗的重点^[3-4]。限于SAP合并ARDS患者病情变化多端,难以实施有效的随机对照试验研究^[5]。本文前瞻性分析不同机械通气方案在SAP合并ARDS患者呼吸道管理中的效果,报道如下。

资料与方法

一般资料 选择2014年2月~2016年2月四川省成都市第二人民医院ICU收治的129例SAP合并ARDS患者,采用随机数字表法分为A、B、C3组,每组43例。3组患者性别、年龄、体重、体重指数(body mass index, BMI)、SAP合并脏器功能障碍类型、治疗前呼吸系统顺应性、气道峰压、呼吸频率、 PaO_2 、 $\text{PaO}_2/\text{FiO}_2$ 、APACHE II评分比较差异均无统计学意义($P>0.05$),见表1。

纳入与排除标准^[6] 纳入标准:①年龄18~60岁;②符合中华医学会外科学分会胰腺外科学组2009年制定《重症急性胰腺炎诊治指南》中对SAP的诊断标准,同时符合中华医学会重症医学分会2006年制定的《急性肺损伤/急性呼吸窘迫综合征诊断和治疗指南(2006)》中ARDS的诊断标准;③符合机械通气治疗指征;④预估生存期>1个月。排除妊娠期或产褥期女性,严重心脑血管疾病、神经系统、血液系统疾病者。患者及家属签署知情同意书。

方法 所有患者均行SAP合并ARDS常规对症治疗,缓解患者临床症状:①消化道:禁食、胃肠减压、应用抑酸剂;②生长抑素;③抗感染治疗:采用经验抗菌药物治疗的同时,采用抗炎药物如乌司他丁或血必净控制患者炎症状态,同时行病原菌监测,根据病原菌类型及药敏试验结果调整敏感抗菌药物治疗。在充分循证的基础上,选择机械通气相关参数,所有患者均选择容量控制模式,均未用肌松药,采用肺保护通气策略(潮气量 $\leq 7\text{ mL/kg}$ 和平台压 $\leq 30\text{ cmH}_2\text{O}$),通气过程中调节 FiO_2 使 SpO_2 维持在88%~95%, PaO_2 维持在55~80 mmHg,均在通气过程中实施肺复张,采用最低PEEP策略,均行俯卧位通气,A组患者采用有创正压通气方案,经口及经

鼻气管插管行机械通气,B组行无创正压通气治疗,采用PB840呼吸机,选择适合患者脸型的面罩,检查确保密封性良好,用软带固定,以面罩周围无明显漏气及患者自觉适宜为佳。C组采用有创和无创序贯机械通气方案:先行有创通气治疗,待患者ARDS得到控制后撤机行无创正压通气治疗。

观察指标^[6] 比较3组患者治疗前、治疗后72 h呼吸系统顺应性、气道峰压、呼吸频率、 PaO_2 、 $\text{PaO}_2/\text{FiO}_2$ 、APACHE II评分的变化,统计并比较3组患者机械通气时间、住ICU时间、无辅助通气时间、气管切开率、气压伤发生率、28 d病死率。

统计学处理 采用SPSS 18.0 统计软件,计量资料用($\bar{x} \pm s$)表示,采用方差分析,采用 q 检验,计数资料用百分数(%)表示,采用 χ^2 检验,等级计数资料采用秩和检验,以 $P<0.05$ 为差异有统计学意义。

结 果

呼吸功能 PaO_2 、 $\text{PaO}_2/\text{FiO}_2$ 、APACHE II评分 治疗后72 h 3组患者的呼吸系统顺应性均获改善、 PaO_2 、 $\text{PaO}_2/\text{FiO}_2$ 均显著升高,气道峰压和APACHE II评分均降低,3组患者上述指标治疗前、后差异具有统计学意义(均 $P<0.05$),但B、C组患者上述指标的改善均优于A组患者,见表2。

3组患者出ICU相关指标比较 患者出ICU时,C组患者的机械通气时间、住ICU时间、无辅助通气时间、气管切开率均低于A、B组患者,但差异无统计学意义($P>0.05$),见表3。

预后 C组患者28d病死率均低于A、B组患者,但差异无统计学意义($P>0.05$);A组气压伤发生率明显高于B组和C组($P<0.05$),见表4。

讨 论

SAP合并ARDS是临床高危疾病,患者病情复杂,变化较快,大部分患者还伴随其它脏器功能障碍,病死率较高^[7]。患者进入ICU治疗最为关键的是改善患者的呼吸功能,降低因呼吸功能障碍所致的其它并发症,延缓或者改善一系列血气指标的危象^[8,9]。机械通气是SAP合并ARDS患者呼吸道管理最为重要的方式^[10]。在2016版《急性呼吸窘迫综合征机械通气指南(试行)》中对这些问题一一进行了列举,但真正能归属到A级证据的措施或者方法非常少,大量的意见集中在C级^[11]。而在众多国外文献中,对于ARDS患者的机械通气研究最多的仍然是如何设置各种参数和各种模式的选择^[12-14]。

表 1 3 组患者临床基线资料比较

组别	例	性别(例)		年龄(岁)	体重(kg)	BMI(kg/m ²)	SAP 合并脏器功能障碍(例)			
		男	女				肾功能不全	胃肠功能不全	肝功能不全	心血管功能不全
A 组	43	26	17	52.5 ± 3.8	62.9 ± 6.7	23.1 ± 2.1	3	2	2	2
B 组	43	27	16	51.8 ± 3.9	63.4 ± 6.6	23.3 ± 2.0	2	2	3	2
C 组	43	26	17	52.4 ± 3.8	63.6 ± 6.6	22.8 ± 2.2	2	1	3	3

组别	例	呼吸系统顺应性(CrsSO/kg)	气道峰压(cmH ₂ O)	呼吸频率(次/min)	PaO ₂ (mmHg)	PaO ₂ /FiO ₂ (mmHg)	APACHE II 评分(分)
A 组	43	6.5 ± 0.6	34.3 ± 2.4	29.1 ± 2.3	62.1 ± 5.1	142.1 ± 11.8	25.4 ± 4.2
B 组	43	6.6 ± 0.5	34.6 ± 2.3	28.8 ± 2.4	61.8 ± 5.0	142.4 ± 11.6	25.7 ± 4.0
C 组	43	6.5 ± 0.7	34.4 ± 2.4	29.3 ± 2.2	61.7 ± 5.2	141.1 ± 11.7	25.4 ± 4.3

表 2 3 组患者治疗前、治疗后 72 h 呼吸功能指标比较

(x̄ ± s)

治疗前							
组别	例	呼吸系统顺应性(CrsSO/kg)	气道峰压(mmHg)	呼吸频率(次/min)	PaO ₂ (mmHg)	PaO ₂ /FiO ₂ (mmHg)	APACHE II 评分(分)
A 组	43	6.5 ± 0.6	34.3 ± 2.4	29.1 ± 2.3	62.1 ± 5.1	142.1 ± 11.8	25.4 ± 4.2
B 组	43	6.6 ± 0.5	34.6 ± 2.3	28.8 ± 2.4	61.8 ± 5.0	142.4 ± 11.6	25.7 ± 4.0
C 组	43	6.5 ± 0.7	34.4 ± 2.4	29.3 ± 2.2	61.7 ± 5.2	141.1 ± 11.7	25.4 ± 4.3

治疗后 72 h							
组别	例	呼吸系统顺应性(CrsSO/kg)	气道峰压(mmHg)	呼吸频率(次/min)	PaO ₂ (mmHg)	PaO ₂ /FiO ₂ (mmHg)	APACHE II 评分(分)
A 组	43	7.1 ± 0.6 *	32.3 ± 2.2 *	24.1 ± 2.5 *	85.7 ± 4.2 *	189.3 ± 13.4 *	21.6 ± 2.9 *
B 组	43	7.4 ± 0.6 **	29.6 ± 2.1 **	21.6 ± 2.6 **	94.6 ± 4.1 **	231.3 ± 18.4 **	19.5 ± 2.5 **
C 组	43	7.9 ± 0.7 **	29.3 ± 2.4 **	20.2 ± 2.7 **	98.3 ± 3.7 **	239.4 ± 18.6 **	18.9 ± 2.5 **

注:与本组治疗前比较,*P<0.05;与 A 组治疗后 72 h 比较,**P<0.05

表 3 3 组患者出 ICU 相关指标比较

组别	例	住 ICU 时间(d)	机械通气时间(h)	无辅助通气时间(h)	气管切开率(%)
A 组	43	19.9 ± 2.6	244.6 ± 8.4	204.6 ± 11.3	6(13.95)
B 组	43	19.2 ± 2.3	239.4 ± 10.1	213.5 ± 11.2	6(13.95)
C 组	43	18.1 ± 2.3	235.5 ± 9.9	217.8 ± 10.2	5(11.63)

表 4 3 组患者预后比较 [例(%)]

组别	例	28d 病死率	气压伤发生率
A 组	43	25(58.14)	14(32.56)
B 组	43	24(55.81)	8(18.60) *
C 组	43	21(48.84)	7(16.28) *

注:与 A 组比较,*P<0.05

说明在临床实际过程中需要根据 ARDS 疾病本身以及其原发疾病的情况,选择合适的机械通气方案^[15],使患者最大可能获益。

SAP 患者中,有 60% ~ 70% 的患者并发肺损伤,肺损伤进一步发展成 ARDS,两种临床危急重症同时发生在一个患者身上,患者的预后普遍不良。有创无创序贯组患者的机械通气时间、住 ICU 时间、无辅助通气时间、气管切开率均低于单纯的无创或者有创通气组患者,但差异无统计学意义($P > 0.05$)。单纯有创通气组气压伤发生率明显高于无创组和序贯组患者($P < 0.05$),但无创组和序贯间

的气压伤发生率比较差异无统计学意义($P > 0.05$)。上述结果说明,有创无创序贯机械通气对于延缓 SAP 合并 ARDS 患者的病情及改善预后具有一定的优势,但在病死率方面无统计学意义,但其气压伤的发生率明显降低,说明其远期病死率可能会低于有创通气治疗患者。但限于本方案未能完整跟踪到出 ICU 患者的后续情况,也不能做出肯定的推论。

综上所述,有创、无创序贯通气方案可降低 SAP 合并 ARDS 患者的气压伤发生率,还应对远期预后结果做进一步研究,以得出三种方案的确切优劣以指导临床机械通气方案的选择。

参考文献

- 1 谢红,李园.早期机械通气及全氟化碳气吸入对重症胰腺炎患者炎症因子水平影响[J].重庆医学,2013,(30):3599-3600,3603.

(下转第 157 页)

- 10 Scirica BM. Therapeutic hypothermia after cardiac arrest[J]. *Circulation*, 2013, 127(2):244-250.
- 11 Donnino MW, Miller J, Goyal N, et al. Effective lactate clearance is associated with improved outcome in post-cardiac arrest patients [J]. *Resuscitation*, 2007, 75(2):229-234.
- 12 MacLellan CL, Davies LM, Fingas MS, et al. The influence of hypothermia on outcome after intracerebral hemorrhage in rats [J]. *Stoke*, 2006, 37(5):1266-1270.
- 13 Darwazeh R, Yan Y. Mild hypothermia as a treatment for central nervous system injuries: positive or negative effects[J]. *Neural Regen Res*, 2013, 8(28):2677-2686.
- 14 Soleimanpour H, Rahmani F, Safari S. Hypothermia after cardiac arrest as a novel approach to increase survival in cardiopulmonary cerebral resuscitation: a review[J]. *Iran Red Crescent Med J*, 2014, 16(7):e17497.
- 15 Li ES, Cheung PY, Lee TF, et al. Return of spontaneous circulation is not affected by different chest compression rates superimposed with sustained inflations during cardiopulmonary resuscitation in newborn piglets[J]. *PLoS One*, 2016, 11(6):e0157249.
- 16 Gräsner JT, Meybohm P, Lefering R, et al. ROSC after cardiac arrest —the RACA score to predict outcome after out-of-hospital cardiac arrest[J]. *Eur Heart J*, 2011, 32(13):1649-1656.
- 17 Lee DH, Cho IS, Lee SH, et al. Correlation between initial serum levels of lactate after return of spontaneous circulation and survival and neurological outcomes in patients who undergo therapeutic hypothermia after cardiac arrest [J]. *Resuscitation*, 2015, 88(13):143-149.

(2017-02-21 收稿 2018-08-30 修回)

(上接第 142 页)

- 2 Nieman GF, Gatto LA, Bates JH, Habashi NM. Mechanical ventilation as a therapeutic tool to reduce ARDS incidence[J]. *Chest*, 2015, 148(6):1396-404.
- 3 Fuller BM, Mohr NM, Miller CN, et al. Mechanical ventilation and ARDS in the ED: a multicenter, observational, prospective, cross-sectional study[J]. *Chest*, 2015, 148(2):365-374.
- 4 Lall R, Hamilton P, Young D, et al. A randomised controlled trial and cost-effectiveness analysis of high-frequency oscillatory ventilation against conventional artificial ventilation for adults with acute respiratory distress syndrome. The OSCAR (OSCillation in ARDS) study[J]. *Health Technol Assess*, 2015, 19(23):1-177.
- 5 徐志华, 李峰, 曹亮, 等. 肺内或肺外源性急性呼吸窘迫综合征血管外肺水指数和肺毛细血管渗透性指数的比较[J]. *内科急危重症杂志*, 2015, 21(1):20-23.
- 6 Slutsky AS. History of mechanical ventilation. From vesalius to ventilator-induced lung injury[J]. *Am J Respir Crit Care Med*, 2015, 191(10):1106-1115.
- 7 Helmi M, Gommers D. Less invasive mechanical ventilation strategies in ARDS: the future[J]. *Acta Med Indones*, 2013, 45(4):329-336.
- 8 陆薇. 急性重症胰腺炎合并急性呼吸窘迫综合征的综合治疗[J]. *中国医学创新*, 2013, (32):99-100.
- 9 Pannu SR, Hubmayr RD. Safe mechanical ventilation in patients without acute respiratory distress syndrome (ARDS) [J]. *Minerva Anesthesiol*, 2015, 81(9):1031-1040.
- 10 Del Sorbo L, Goffi A, Goligher E, et al. Setting mechanical ventilation in ARDS patients during VV-ECMO: where are we [J]? *Minerva Anesthesiol*, 2015, 81(12):1369-1376.
- 11 陈玉兰, 陈烽. 机械通气联合血液滤过对 SAP 合并 ARDS 疗效分析[J]. *深圳中西医结合杂志*, 2016, 26(10):85-87.
- 12 Vieillard-Baron A, Matthay M, Teboul JL, et al. Experts' opinion on management of hemodynamics in ARDS patients: focus on the effects of mechanical ventilation[J]. *Intensive Care Med*, 2016, 42(5):739-749.
- 13 Gattinoni L, Quintel M. Is mechanical ventilation a cure for ARDS [J]? *Intensive Care Med*, 2016, 42(5):916-917.
- 14 Qi Y. Clinical study on VATS combined mechanical ventilation treatment of ARDS secondary to severe chest trauma[J]. *Exp Ther Med*, 2016, 12(2):1034-1038.
- 15 刘大朋. 28 例重症胰腺炎合并急性呼吸窘迫症患者的临床观察分析[J]. *现代诊断与治疗*, 2014, (10):2321-2322.

(2017-03-07 收稿 2017-10-16 修回)