

doi: 10.13241/j.cnki.pmb.2020.09.035

CPAP 联合肺表面活性物治疗新生儿呼吸窘迫综合征的临床疗效 及对患者血气指标的影响 *

杨松媚¹ 易金远² 冯燕妮³ 梁玉美^{3Δ}

(1 右江民族医学院 广西 百色 533000;

2 右江民族医学院附属医院心胸外科 广西 百色 533000; 3 右江民族医学院附属医院新生儿科 广西 百色 533000)

摘要 目的:探讨 CPAP(Continuous Positive Airway Pressure)联合肺表面活性物质治疗新生儿呼吸窘迫综合征(NRDS)临床疗效及对血气指标的影响。**方法:**选择 2014 年 8 月至 2018 年 8 月本院收治的新生儿呼吸窘迫综合征患者 200 例,将其随机分为 2 组,每组 100 例。A 组给予 CPAP(持续正压通气)联合肺表面活性物质治疗,B 组给予 CPAP(持续正压通气)治疗,分析和比较两组的临床疗效及治疗前后血气指标的变化。**结果:**治疗后,两组新生儿患者 PaO₂ 均较治疗前均显著升高,PaCO₂ 较治疗前明显降低,且 A 组 PaO₂ 显著高于 B 组($P<0.05$),PaCO₂ 显著低于 B 组($P<0.05$);A 组住院时间显著短于 B 组($P<0.05$),临床总有效率显著高于 B 组($P<0.05$);两组新生儿患者的胸部 X 线评分均较治疗前显著降低($P<0.05$),A 组 12 h 和 24 h 胸部 X 线评分均显著性低于 B 组($P<0.05$);A 组 PEEP/cmH₂O 水平显著低于 B 组($P<0.05$),FiO₂ 水平显著高于 B 组($P<0.05$);两组生儿患者的 OI 指数均较治疗前显著升高,且 A 组明显高于 B 组($P<0.05$)。**结论:**CPAP 联合肺表面活性物质治疗 NRDS 的临床效果显著优于单用 CPAP(持续正压通气)治疗,且可显著改善患儿血气指标。

关键词:肺表面活性物质;CPAP;新生儿呼吸窘迫综合征

中图分类号:R722.19 **文献标识码:**A **文章编号:**1673-6273(2020)09-1761-04

Clinical Efficacy of CPAP Combined with Pulmonary Surface Active Substances in the Treatment of NRDS and Its Effect on the Blood Gas Indexes*

YANG Song-mei¹, YI Jin-yuan², FENG Yan-ni³, LIANG Yu-mei^{3Δ}

(1 Youjiang Medical University for nationalities, Baise, Guangxi, 533000, China; 2 Cardiothoracic surgery department, Affiliated Hospital of Youjiang Medical University for nationalities, Baise, Guangxi, 533000, China; 3 Neonatal pediatrics department, Affiliated Hospital of Youjiang Medical University for nationalities, Baise, Guangxi, 533000, China)

ABSTRACT Objective: The study was designed to investigate the effect of dual-level CPAP combined with pulmonary surfactant on oxidative stress and blood gas index of neonatal respiratory distress syndrome. **Methods:** In our hospital from August 2014 to August 2018, 200 cases of neonatal respiratory distress syndrome patients were treated, randomly divided into two groups. The group A were treated with double-level CPAP (double-level positive pressure ventilation) combined with pulmonary surfactant. The group B were treated with pulmonary surfactant. To analyze and compare the results of oxidative stress between the two groups and its effect on blood gas index. **Results:** After treatment, PaO₂ levels was significantly increased in both groups compared with that before treatment, and PaCO₂ levels was significantly decreased in both groups. Meanwhile, it was found that the increased level of PaO₂ in group A was significantly better than that in group B, and the decreased level of PaCO₂ in group A was significantly better than that in group B. The length of hospital stay in group A was significantly shorter than that in group B, and the clinical effect in group A was significantly better than that in group B. After treatment, the chest X-ray scores of neonates in both groups A and B were significantly reduced, among which the chest X-ray scores at 12 h and 24 h in group A were significantly lower than those in group B. After treatment, the decreased level of PEEP/cmH₂O in group A was significantly higher than that in group B; after treatment, the decreased level of FiO₂ in group A was significantly lower than that in group B ($P<0.05$); after treatment, the OI index of the two groups was significantly increased, and the significance of group A was significantly higher than that of group B ($P<0.05$). **Conclusion:** The clinical effect of dual level CPAP combined with pulmonary surfactant on neonatal respiratory distress syndrome was significant, and the blood gas indexes had significant changes.

* 基金项目:广西百色市科学计划与技术开发项目(百科技 20171109)

作者简介:杨松媚(1982-),女,硕士研究生,主治医师,主要从事新生儿危重症救治方面的研究,

电话:15907865656, E-mail:ysm81874@163.com

Δ 通讯作者:梁玉美(1968-),女,硕士,主任医师,主要从事新生儿危重症救治方面的研究

(收稿日期:2019-09-23 接受日期:2019-10-18)

Key words: Pulmonary surfactant; CPAP; NRDS**Chinese Library Classification(CLC):** R722.19 **Document code:** A**Article ID:** 1673-6273(2020)09-1761-04

前言

新生儿呼吸窘迫综合征 (NRDS) 是指新生儿在出生后 24 小时内或出生后不久即出现的呼吸障碍; 在生命的最初 48 小时内, 病情会加重^[1]。呼吸窘迫通常是由胎儿到新生儿生命过渡期间的呼吸功能异常引起的, 表现为呼吸急促、鼻扇、吸气时三凹征、呼气性呻吟和发绀^[2]。部分患儿呼吸窘迫可能会并发肺炎, 导致病情进一步加重, 甚至死亡。目前 NRDS 治疗主要进行呼吸支持, 而早期 CPAP 联合肺表面活性物质被公认为治疗 RDS 最佳治疗方案, 甚至可取代机械通气^[3]。从而本研究主要探讨了双水平 CPAP 联合肺表面活性物质对新生儿呼吸窘迫综合征临床疗效及血气指标影响, 旨在为 CPAP 联合肺表面活性物质的推广应用提供更多的理论依据

1 资料与方法

1.1 临床资料

选择 2014 年 8 月至 2018 年 8 月在本院治疗的新生儿呼吸窘迫综合征患者 200 例, 均符合实用新生儿学第四版规定的新生儿呼吸窘迫综合征诊断标准^[4]。排除标准: 出生后心率过低的患者(<100 次/min), 有显著性的呼吸困难和需要插管的自主呼吸功能不足的患者; 合并重大疾病的, 例如: 心脏病, 膈疝和颅内出血以及气胸等。将 200 例患儿依据随机数表法分为 2 组, A 组 100 人(男 51 人, 女 49 人), 平均胎龄 32.71 ± 2.92 周, B 组 100 人(男 50 人, 女 50 人), 平均胎龄 32.72 ± 2.93 周, 两组一般临床资料比较均无统计学差异($P > 0.05$)。家长均自愿参与本研究, 已签署知情同意书, 且该研究通过了本院伦理委员会批准。

1.2 治疗方法

两组新生儿患者均根据病情及血气分析等结果联合使用 CPAP 呼吸治疗仪(SIPAP, 美国康尔福盛公司), 设置程序, 随后根据新生儿患者恢复情况逐渐撤机。同时 A 组新生儿患者均

使用肺表面活性物质(商品名为固尔药, 意大利凯西制药有限公司, 国药准字 H20080428) 进行治疗, 使用剂量为每次 100-200 mg/kg, 每次给新生儿用药时必须清理其呼吸道分泌物, 用药前需预热至 37℃, 用无菌注射器吸取药液, 分别从不同体位经气管插管注入, 每个体位用药后均用球囊加压通气 1~2 min, 频率 40~60 次/min, 除非有明显的气道阻塞, 否则用药后 6 h 不予以拍背吸痰。

1.3 观察指标

1) 分析两组新生儿患者治疗 3 天后采用 ABL80 雷度血气分析仪进行血气指标的分析, 测量其 PaO_2 (血氧分压) 和 PaCO_2 (二氧化碳分压) 等, 2) 对两组新生儿患者进行治疗前和治疗后 12 h 和 24 h 拍胸部 X 线片。由单盲的放射科医师按 NRDS 的 X 线片分期标准进行半定量评分^[5], 每期为 1 分, 对所得分数进行统计学处理。3) 对两组新生儿患者治疗效果和住院时间进行评价^[6], 显效: 呼吸急促, 三凹征以及发绀等重要的症状体征有了明显的痊愈, 指标检查均有明显的改善, 例如呼吸急促, 三凹征以及发绀等症状消失; 有效: 主要的症状体征有了好转, 指标检查有所改善; 无效: 呼吸急促, 三凹征以及发绀等症状均未消失。3) 分析治疗前后机械通气参数对比和 OI 指数对比等变化。

1.4 统计学分析

采用 SPSS 19.0 统计学软件进行数据分析, 计数资料以(n) 或(%)形式表示, 组间比较采用 χ^2 检验; 计量资料以($\text{mean} \pm \text{SEM}$)表示, 组间比较采用 t 检验, 以 $P < 0.05$ 为差异具有统计学意义。

2 结果

2.1 两组患者治疗前后血气指标的变化比较

治疗前, 两组 PaO_2 和 PaCO_2 比较差异无统计学意义($P > 0.05$)。治疗后, 两组新生儿患者 PaO_2 较治疗前均显著升高, 而 PaCO_2 较治疗前均显著降低, A 组 PaO_2 显著高于 B 组, PaCO_2 明显低于 B 组($P < 0.05$)。

表 1 两组患者治疗前后血气指标的变化($\bar{x} \pm s$)Table 1 Changes of blood gas indexes before and after treatment in the two groups ($\bar{x} \pm s$)

Groups	n	PaO_2 /mm Hg		PaCO_2 /mm Hg	
		Prior treatment	Post treatment	Prior treatment	Post treatment
Group A	100	57.21 $\pm$ 10.13	88.05 $\pm$ 11.10*	81.66 $\pm$ 9.27	54.55 $\pm$ 7.68*
Group B	100	58.34 $\pm$ 10.22	69.58 $\pm$ 10.45*	82.35 $\pm$ 9.42	74.07 $\pm$ 8.17*
t		1.00	14.53	1.24	26.63
P		>0.05	<0.05	>0.05	<0.05

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

2.2 两组患者临床效果的比较

A、B 两组患者的胎龄比较无显著性差异 ($P > 0.05$), A 组住院时间显著短于 B 组, 显效率、有效率均显著高于 B 组($P < 0.05$)。

2.3 两组治疗前后胸部 X 线评分的比较

治疗后, 两组新生儿患者的胸部 X 线评分均较治疗前显著降低, A 组 12 h 和 24 h 胸部 X 线评分均显著低于 B 组($P < 0.05$)。

表 2 两组患者临床效果的比较($\bar{x}\pm s$)Table 2 Comparison of the clinical effects between the two groups ($\bar{x}\pm s$)

Groups	n	Gestational age (weeks)	Excellent	Effectivity	Inefficiency	Total efficiency	LOS/d
Group A	100	32.71 $\pm$ 2.92	59(59.00%)	34(34.00%)	7(7.00%)	93(93.00%)	19.64 $\pm$ 1.02
Group B	100	32.72 $\pm$ 2.93	35(35.00%)	48(48.00%)	17(17.00%)	83(83.00%)	22.15 $\pm$ 1.23
t/χ^2		0.78				4.735	22.64
P		>0.05				<0.05	<0.05

Note: Compared with before treatment, * P <0.05.表 3 两组治疗前后胸部 X 线评分的比较($\bar{x}\pm s$)Table 3 Comparison of the chest X-ray scores before and after treatment between the two groups ($\bar{x}\pm s$)

Groups	n	Chest X-ray score (score)		
		Prior treatment	12 h after treatment	24 h after treatment
Group A	100	3.37 $\pm$ 0.52	1.32 $\pm$ 0.21*	1.02 $\pm$ 0.31*
Group B	100	3.31 $\pm$ 0.51	1.68 $\pm$ 0.17*	1.28 $\pm$ 0.37*
t		1.17	18.85	7.62
P		>0.05	<0.05	<0.05

Note: Compared with before treatment, * P <0.05.表 4 两组治疗前后的机械通气指数和 OI 指数比较($\bar{x}\pm s$)Table 4 Comparison of the mechanical ventilation index and OI index before and after treatment between the two groups ($\bar{x}\pm s$)

Groups	n	PEEP/cmH ₂ O		FiO ₂ /%		OI index	
		Prior-treatment	Post treatment	Prior treatment	Post treatment	Prior treatment	Post treatment
Group A	100	5.01 $\pm$ 1.01	3.40 $\pm$ 0.67*	62.41 $\pm$ 9.22	30.32 $\pm$ 13.57*	103.12 $\pm$ 11.12	176.22 $\pm$ 12.21*
Group B	100	4.98 $\pm$ 0.98	4.72 $\pm$ 0.88	63.12 $\pm$ 9.11	46.14 $\pm$ 9.62*	102.13 $\pm$ 10.12	136.12 $\pm$ 12.11*
t		0.30	16.88	0.77	17.48	0.88	8.31
P		>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

Note: Compared with before treatment, * P <0.05.

2.4 两组治疗前后机械通气指数和 OI 指数的比较

两组新生儿患者治疗前 PEEP/cmH₂O、FiO₂/%和 OI 指数比较差异均无统计学意义 (P >0.05), A 组治疗后的 PEEP/cmH₂O 较治疗前显著降低, 但 A 组显著高于 B 组; 同时, 两组治疗后 FiO₂ 显著低于治疗前, 且 A 组治疗后的 FiO₂ 显著性低于 B 组 (P <0.05), 治疗两组的 OI 指数显著性升高, 且 A 组显著性高于 B 组 (P <0.05)。

3 讨论

呼吸窘迫综合征(RDS)是美国婴儿死亡的第八大原因, 仅 2013 年每 10 万活产婴儿就有 13.4 例^[6-8]。新生儿呼吸窘迫综合征是由生理和结构上的肺发育不成熟引起的肺表面活性物质水平不足而导致肺泡壁表面张力增高, 肺泡逐渐萎陷, 进行性肺不张, 使肺顺应性下降和气体交换障碍^[9-12]。新生儿呼吸窘迫综合征可发生低通气、低氧血症和呼吸性酸中毒, 也是早产儿发病和新生儿进入重症监护病房(NICU)的最常见的原因^[13-15]。本研究选择的新生儿呼吸窘迫综合征患者胎龄均在 32 周左

右, 提示早产的新生儿容易患呼吸窘迫综合征, 与前人研究的新生儿呼吸窘迫综合征的发生率随着胎龄的降低而增加的结果相一致, 胎龄小于 28 周的新生儿中有 60%会发生新生儿呼吸窘迫综合征, 胎龄 28-34 周的新生儿发生率为 30%, 而胎龄大于 34 周的新生儿发病率不到 5%^[16-19]。

目前, 双水平正压通气模式广泛应用于各种肺内肺外疾病导致的急慢性呼吸衰竭, 如慢阻肺、支气管扩张、肺囊性纤维化、间质性肺病、心衰、神经肌肉疾病、肥胖低通气等, 以及各种类型的睡眠呼吸疾病, 尤其是伴有中枢性睡眠呼吸暂停或复杂性睡眠呼吸障碍的患者。在本研究中, 采用 CPAP 通气的患者较未使用 CPAP 通气的患者, 住院时间显著缩短(19.64 $\pm$ 1.02) d, 显著性短于未使用 CPAP 通气的患者, 该结果可能与 CPAP 通气的患者能显著提高通气量, 呼气时的压力相当于呼气末正压(PEEP), 能够对抗内源性呼气末正压(PEEPi), 降低气道阻力, 防止气道内陷等有关^[20-23]。同时, 两组新生儿患者治疗后 PaO₂ 较治疗前均显著提高, 而 PaCO₂ 较治疗前均显著降低, 使用 CPAP 通气的患者较未使用 CPAP 通气的患者 PaO₂ 升高水平显著

性优于 B 组, 使用 CPAP 通气患者较未使用 CPAP 通气患者 PaCO₂ 降低水平显著性优于 B 组 ($P < 0.05$), 说明 CPAP 联合肺表面活性物质能更好的改善治疗后血气指标的变化。既往研究显示 CPAP 联合肺表面活性物质能有效改善呼吸窘迫综合征相一致^[24-26], 这可能不仅与 CPAP 能够对抗内源性呼气末正压, 降低气道阻力, 防止气道内陷等有关同时可能与肺表面活性剂通过降低表面张力来提高肺部顺应性的功能等有关^[27], 根据相关文献报道 CPAP 联合表面活性剂疗法已在早产儿中得到广泛研究, 并已被证明可显著降低空气泄漏和新生儿及婴儿死亡率^[28]。

胸部 X 线片能有效评价肺泡的充气情况及肺部功能改善等, 而氧化应激指标能有效评价活性氧的生产和细胞的抗氧化防御之间的不平衡, 提示肺部等疾病功能恢复情况等。本研究发现使用 CPAP 不仅能显著性提高新生儿呼吸窘迫综合征患者的临床效果, 同时能显著性降低胸部 X 线分数, 改善氧化应激指标。该结果可能与 CPAP 能有效消除呼吸肌疲劳, 提高肺通气量和纠正低血氧等和肺表面活性物质能显著性提高肺的扩张等有关, 同时前人研究报道发现 CPAP 模式能有效提高患者使用呼吸机的依从性, 同时有效改善呼吸窘迫综合征的症状, 与本研究结果相一致^[29]。

本研究结果显示使用肺表面活性物质联合 CPAP 能有效降低患者 EEP/cmH₂O 与 FiO₂% 的通气指数, 有效提高患者的 OI 指数, 表明肺表面活性物质联合 CPAP 不仅能有效提高患者的通气指数同时能有效提高患者的 OI 指数, 该结果可能与肺表面活性物质联合 CPAP 能有效促进血氧结合能力, 改善患者的呼吸换气等功能从而加快患者的恢复有关^[30]。

综上所述, CPAP 联合肺表面活性物质治疗 NRDS 的临床效果显著优于单用 CPAP(持续正压通气)治疗, 且可显著改善患儿血气指标。

参考文献(References)

- [1] Mishra G P, Mulani J D. First National Anti-Tuberculosis Drug Resistance Survey (NDRS) from India-An Eye Opener [J]. *J. Infectiology*, 2018, 1(2): 26-29
- [2] Sweet D G, Carnielli V, Greisen G, et al. European consensus guidelines on the management of neonatal respiratory distress syndrome in preterm infants-2013 update[J]. *Neonatology*, 2013, 103(4): 353-368
- [3] Spektor R, Tipples N D, Mimoso C A, et al. methyl-ATAC-seq measures DNA methylation at accessible chromatin [J]. *Genome research*, 2019, 29(6): 969-977
- [4] Verma S, Yarrington R, Trautman J, et al. Impact of Chromatin on Genome Accessibility and Cleavage by CRISPR-Cas9 in vivo[J]. *The FASEB Journal*, 2018, 32(1_supplement): 649.11-649.11
- [5] Gao xiangyu, Yang bo, Hei mingyan, et al. Randomized controlled study of three types of non-invasive positive pressure ventilation in the initial treatment of respiratory distress syndrome in premature infants[J]. *Chinese journal of pediatrics*, 2014, 52(1): 34-40
- [6] Sweet D G, Carnielli V, Greisen G, et al. European consensus guidelines on the management of neonatal respiratory distress syndrome in preterm infants-2013 update[J]. *Neonatology*, 2013, 103(4): 353-368
- [7] Ridella S A, Kang J J, Kitazaki S. The potential for adaptive safety through in-vehicle biomedical and biometric monitoring[J]. Accessed: Jul, 2015
- [8] Lund K, McEvoy C T, Davies M, et al. Host Inflammatory Response to Nasal CPAP in a Rhesus Macaque Model of Respiratory Immaturity [M]//D48. LUNG DEVELOPMENT AND BPD. American Thoracic Society, 2018: A6980-A6980
- [9] Ramachandran S, Ahmad K, Henikoff S. Capitalizing on disaster: Establishing chromatin specificity behind the replication fork[J]. *Bioessays*, 2017, 39(4): 1600150
- [10] Grappone L, Messina F. Hyaline membrane disease or respiratory distress syndrome? A new approach for an old disease[J]. *JPNIM*, 2014, 3(2): e030263
- [11] McEvoy R D, Antic N A, Heeley E, et al. CPAP for prevention of cardiovascular events in obstructive sleep apnea [J]. *New England Journal of Medicine*, 2016, 375(10): 919-931
- [12] El H E D G M, Hany S, Mahmoud M K, et al. Lung ultrasonography in evaluation of neonatal respiratory distress syndrome [J]. *The Egyptian Journal of Radiology and Nuclear Medicine*, 2015, 46(2): 469-474
- [13] Liu J, Cao H Y, Wang H W, et al. The role of lung ultrasound in diagnosis of respiratory distress syndrome in newborn infants [J]. *Iranian journal of pediatrics*, 2014, 24(2): 147
- [14] Warren J B, Anderson J D M. Core concepts: respiratory distress syndrome[J]. *NeoReviews*, 2009, 10(7): e351-e361
- [15] Rowland S, Aiyappan V, Hennessy C, et al. Comparing the efficacy, mask leak, patient adherence, and patient preference of three different CPAP interfaces to treat moderate-severe obstructive sleep apnea[J]. *Journal of Clinical Sleep Medicine*, 2018, 14(01): 101-108
- [16] Kawaza K, Machen H E, Brown J, et al. Research Article (PLOS ONE) Efficacy of a low-cost bubble CPAP system in treatment of respiratory distress in a neonatal ward in Malawi[J]. *Malawi Medical Journal*, 2016, 28(3): 131-138
- [17] von Neergaard K. Neue Auffassungen über einen Grundbegriff der Atemmechanik: die Retraktionskraft der Lunge, abhagig von der Oberflächenspannung in den Alveolen[J]. *Z Gesamte Exp Med*, 1929, 66: 373-394
- [18] Owens N, Papadopoulou T, Festuccia N, et al. CTCF confers local nucleosome resiliency after DNA replication and during mitosis[J]. *bioRxiv*, 2019: 563619
- [19] Dargaville P A, Gerber A, Johansson S, et al. Incidence and outcome of CPAP failure in preterm infants[J]. *Pediatrics*, 2016, 138(1): e20153985
- [20] Howard M E, Piper A J, Stevens B, et al. A randomised controlled trial of CPAP versus non-invasive ventilation for initial treatment of obesity hypoventilation syndrome[J]. *Thorax*, 2017, 72(5): 437-444
- [21] Ifikhar I H, Bittencourt L, Youngstedt S D, et al. Comparative efficacy of CPAP, MADs, exercise-training, and dietary weight loss for sleep apnea: a network meta-analysis[J]. *Sleep medicine*, 2017, 30: 7-14
- [22] Jain A, DiBlasi R M, Devgan V, et al. Simple point of care continuous positive airway pressure delivery device (Jain-CPAP)[J]. *BMJ Innovations*, 2019: bmjinnov-2018-000339

- hippocampus of rats with vascular dementia [J]. J Int Med Res, 2012, 40(3): 1036-1045
- [8] Sha SJ, Miller ZA, Min S, et al. An 8-week, open-label, dose-finding study of nimodipine for the treatment of progranulin insufficiency from GRN gene mutations[J]. Alzheimers Dement, 2017, 3(4): 507-512
- [9] Benisty S, Hernandez K, Viswanathan A, et al. Diagnostic criteria of vascular dementia in CADASIL[J]. Stroke, 2008, 39(3): 838-844
- [10] 凌凤英, 卓新, 陈阳玉, 等. 家庭护理干预对居家老年痴呆患者日常生活能力的影响[J]. 现代临床护理, 2013, (5): 45-47
- [11] Cockrell JR, Folstein MF. Mini-Mental State Examination (MMSE) [J]. Aust J Physiother, 2005, 51(3): 689-692
- [12] De Reuck, Jacques, Auger F, Durieux N, et al. Frequency and topography of small cerebrovascular lesions in vascular and in mixed dementia: a post-mortem 7-tesla magnetic resonance imaging study with neuropathological correlates[J]. Folia Neuropathol, 2017, 55(1): 31-37
- [13] Mao S, Bezerra LS, Cdc C, et al. Neuropsychiatric symptoms in vascular dementia: Epidemiologic and clinical aspects [J]. Dement Neuropsychol, 2018, 12(1): 40-44
- [14] Li M, Meng Y, Wang M, et al. Cerebral gray matter volume reduction in subcortical vascular mild cognitive impairment patients and subcortical vascular dementia patients, and its relation with cognitive deficits[J]. Brain Behav, 2017, 7(8): e00745
- [15] Duncombe J, Kitamura, Akihiro, Hase, Yoshiki, et al. Chronic cerebral hypoperfusion: a key mechanism leading to vascular cognitive impairment and dementia. Closing the translational gap between rodent models and human vascular cognitive impairment and dementia[J]. Clin Sci (Lond), 2017, 131(19): 2451-2468
- [16] Zou J, Chen Z, Liang C, et al. Trefoil Factor 3, Cholinesterase and Homocysteine: Potential Predictors for Parkinson's Disease Dementia and Vascular Parkinsonism Dementia in Advanced Stage [J]. Aging Dis, 2018, 9(1): 51-65
- [17] Appleton JP, Scutt P, Sprigg N, et al. Hypercholesterolaemia and vascular dementia[J]. Clin Sci, 2017, 131(14): 1561-1578
- [18] Zhu JD, Wang JJ, Zhang XH, et al. Panax ginseng extract attenuates neuronal injury and cognitive deficits in rats with vascular dementia induced by chronic cerebral hypoperfusion [J]. Neural Regen Res, 2018, 13(4): 664-672
- [19] Farooq MU, Min J, Goshgarian C, et al. Pharmacotherapy for Vascular Cognitive Impairment[J]. Cns Drugs, 2017, 31(9): 759-776
- [20] Fujiyoshi A, Jr JD, Fitzpatrick AL, et al. Coronary Artery Calcium and Risk of Dementia in MESA (Multi-Ethnic Study of Atherosclerosis)[J]. Circ Cardiovasc Imaging, 2017, 10(5): e005349
- [21] 韩晶, 成娜, 徐海, 等. 康复训练联合阿托伐他汀对 SIVD 患者认知功能及日常行为能力的影响 [J]. 现代生物医学进展, 2017, 17(17): 3282-3284
- [22] 王建民, 周冬亮, 卓宏伟, 等. 丁苯酞对血管性痴呆患者血清中细胞因子、可溶性凋亡因子、抗氧化分子的影响[J]. 海南医学院学报, 2017, 23(3): 422-424
- [23] Zhang J, Cheng X, Yang H, et al. Effects of kaempferol on learning and memory in rats with chronic cerebral ischemia and possible mechanisms[J]. Chin Pharmacol Bull, 2017, 33(1): 39-44
- [24] 贺丹, 谭军, 张杰文. 盐酸美金刚对血管性痴呆患者认知功能、脑血流动力学及氧化应激水平的影响 [J]. 中国药房, 2018, 29(4): 534-537
- [25] 李倩, 王智超. 参附注射液对大鼠心肌组织缺血 / 再灌注损伤及血红素加氧酶 -1 表达的影响[J]. 湖北中医药大学学报, 2018, 20(3): 17-20
- [26] 宋扬, 徐天舒. 电针补肾益精法对围绝经期血管性痴呆大鼠脑组织 SOD、MDA 含量的影响[J]. 江苏中医药, 2018, 50(8): 76-78
- [27] 张丽欣, 孙丽芳, 刘毅, 等. 尼莫地平不同时间给药对血管性痴呆小鼠氧自由基代谢的影响[J]. 贵阳医学院学报, 2017, 42(3): 305-307
- [28] 蒋颖. 丁苯酞胶囊联合阿托伐他汀钙片治疗血管性痴呆患者的临床效果[J]. 中国医药导报, 2018, 15(14): 48-52
- [29] 黎军宏, 翟阳, 刘禹舟, 等. 益气活血法治疗轻中度血管性痴呆临床研究 Meta 分析[J]. 长春中医药大学学报, 2017, 33(5): 753-756

(上接第 1764 页)

- [23] Thunström E, Glantz H, Yucel-Lindberg T, et al. CPAP does not reduce inflammatory biomarkers in patients with coronary artery disease and nonsleepy obstructive sleep apnea: a randomized controlled trial[J]. Sleep, 2017, 40(11): zsx157
- [24] Bratton D J, Gaisl T, Wons A M, et al. CPAP vs mandibular advancement devices and blood pressure in patients with obstructive sleep apnea: a systematic review and meta-analysis [J]. Jama, 2015, 314(21): 2280-2293
- [25] Pascual M, de Batlle J, Barbé F, et al. Erectile dysfunction in obstructive sleep apnea patients: A randomized trial on the effects of Continuous Positive Airway Pressure (CPAP)[J]. PloS one, 2018, 13(8): e0201930
- [26] Melehan K L, Hoyos C M, Hamilton G S, et al. Randomized trial of CPAP and vardenafil on erectile and arterial function in men with obstructive sleep apnea and erectile dysfunction [J]. The Journal of Clinical Endocrinology & Metabolism, 2018, 103(4): 1601-1611
- [27] Wei jianning, Feng xiulan, Li yuqiong, et al. Compliance investigation and nursing intervention of patients with COPD using BiPAP ventilator [J]. Chinese journal of practical nursing, 2015, 21(6): 61-63
- [28] Wang B, Hu Y. Promoter-Targeted Small Activating RNAs Alter Nucleosome Positioning [M]//RNA Activation. Springer, Singapore, 2017: 53-61
- [29] Wan qunfang, Peng Xi, Zhu jing, et al. Effect of CPAP model on early compliance of COPD patients using BiPAP ventilator [J]. Nursing research, 2012, 26(29): 2744-2745
- [30] Xie huaizhen, Dong chuanli, Zhang lan, et al. Efficacy observation of combined pulmonary surface active substances with nasal continuous positive airway pressure ventilation in the treatment of neonatal respiratory distress syndrome[J]. Journal of bengbu medical college, 2016, 41(6): 750-752