Biomedical Research 2017; 28 (11): 4928-4930 *ISSN 0970-938X*
www.biomedres.info

Application of bronchoscopy treatment and nursing on severe craniocerebral trauma patients with hospital acquired pneumonia.

Simiao Peng[1], Wei'e He[2*]

[1]Respiratory Medicine Department, the Second Xiangya Hospital of Central South University, 139, Renmin Zhong Road, Changsha City, Hunan Province, PR China

[2]Neurosurgery Department, the Second Xiangya Hospital of Central South University, 139, Renmin Zhong Road, Changsha City, Hunan Province, PR China

Abstract

Objective: To discuss the application effect of bronchoscope treatment on HAP patients with severe craniocerebral injury.
Method: 120 HAP patients with severe craniocerebral injury hospitalized in the department of neurology and ICU (Intensive Care Unit) of our hospital from March 2013 to March 2016 are selected and randomly divided into the control group and observation group. Each group contains 60 cases. Conventional treatment is conducted for the control group, while bronchoscope airway lavage in addition to conventional treatment is adopted for the observation group. The respiration, heart rate and blood gas change of both groups before and after treatment are compared.
Result: By comparing the heart rate, respiration, partial pressure of carbon dioxide, oxygen partial pressure, and oxygen saturation changes of both groups after treatment , the result shows that the effect of the observation group is significantly superior to that of the control group ($p<0.05$).
Conclusion: Bronchoscope airway lavage is adopted for HAP patients with severe craniocerebral trauma, and targeted nursing intervention is provided, the result shows that hypoxia of patients can be improved significantly and infection can be controlled effectively and timely.

Keywords: Bronchoscope examination, Craniocerebral injury, Nursing, HAP.

Accepted on March 27, 2017

Introduction

HAP refers to the pneumonia patients gets 48 h later in the hospital. It does not exist or show signs of infection when patients are hospitalized [1,2]. Bacteria, fungus or virus are main pathogens. Patients with craniocerebral trauma may be at the coma state for a long time, accompanied by disordered vital signs. It has characteristics of quick morbidity, rapid progression, multiple complication, and high mortality [3,4]. HAP is one of the common complications for patients with craniocerebral trauma. It not only prolongs the hospitalization time of patients but also increases the treatment cost, and may even lead to the death of patients [5]. The research attempts to provide nursing intervention during the bronchoscope treatment for HAP patients with severe craniocerebral injury and satisfactory effect is obtained and reported below.

Materials and Methods

Materials

120 cases of HAP patients with severe craniocerebral injury hospitalized in the department of neurology and ICU (Intensive Care Unit) of our hospital from March 2013 to March 2016 are selected and randomly divided into the control group and observation group. Each group contains 60 cases. Relevant patients are all in line with the HAP diagnosis standard. Conventional treatment is conducted for the control group, while bronchoscope airway lavage in addition to conventional treatment is adopted for the observation group. The respiration, heart rate and blood gas change of both groups before and after treatment are compared. There are 36 males and 24 females in the control group aging from 18 to 65. Their average age is 41.5. When being hospitalized, their GCS value is 4-11 and 7.3 on average. Their course of disease is 0.4-1.5 years and 0.8 on average. For the observation group, there are 29 males and 31 females aging from 24 to 62. Their average age is 46.2. When being hospitalized, their GCS value is 3-10 and 6.8 on average. The course of disease is 0.3-1.6 years and 1 on average. Thus, both groups show no significant difference in gender, age, disease type, GCS value and course of disease ($p>0.05$), so comparison of both groups is meaningful.

Method

Conventional nursing is received by the control group, while bronchoscope airway lavage is applied on the basis of conventional nursing for the observation group [6]. (1) Electrocardiogram monitoring and high-concentration oxygen inhalation is available in the whole operation process. When SPO_2<85% and HR>100 times/min, operation should be suspended temporarily. When hypoxia is improved and vital signs become stable again, operation can be further conducted; (2) 2-3 h fasting after operation is needed to avoid aspiration; (3) After carrying out the bronchoscope treatment, the oxygen inhalation concentration can be reduced in accordance with patients' HR and SPO_2 gradually, making sure SPO_2 remains above 95%. The pulmonary respiration sound of patients can be listened to compared if there is any improvement after treatment. Vital signs of patients should be observed closely to see if there's any abnormality. In case of abnormal heart rate or dyspnea, relevant work should be done timely [7]; (4) Complications such as hemoptysis, airway spasm and post-operation fever should be prevented and observed rigorously; (5) Assist doctors to carry out bronchial lavage treatment, be gentle and flexible in operation. During the lavage, the total amount of normal saline should be 100ml at best. If specimens are to be taken, do it before lavage. Sterilized operation should be implemented strictly with timely check of phlegm specimens. After lavage, relevant antibiotics should be injected when necessary [8].

Observation indexes

The oxygen partial pressure, partial pressure of carbon dioxide, oxygen saturation, respiration, and heart rate changes of both groups before and after treatment are compared.

Efficacy determination Cure: cough, expectoration, choking sensation in chest, breath shortness, normothermia, disappeared rale in lungs, complete inflammation absorption according to X-ray or mere cord-like shadows left; Getting better: cough, expectoration, check hurt alleviation, normothermia, disappeared rale in lungs, incomplete inflammation absorption according to X-ray, or incomplete disappearance of hollow; Not effective: keep coughing, expectoration, still with rale in lungs, non-absorption of inflammation according to X-ray or increased shadow.

Statistical method

SPSS 17.0 software is adopted for statistical analysis. Measuring materials are expressed by $\bar{x} \pm s$ along with t-test. χ^2 and rank sum test are adopted for counting materials. If $p<0.05$, it means the difference is with statistical significance.

Results

1. Blood gas analysis and HR and R change comparison of both groups (Table 1).

2. Efficacy comparison of both groups (Table 2).

Discussions

With the enhancement of medical technical level, the number of patients using artificial airway and mechanical ventilation is increasing in large general hospitals, leading to the increase of HAP incidence and mortality [9,10]. The incidence rate of HAP in America is 5-10/1000, and that in China is about 1.30%-3.45% [11,12]. About 15% of hospitalization death is related to lung infection, and HAP accounts for 60% of infection death cases, making it the most common hospital-acquired infection type [13,14]. Researches have verified that HAP attack is mainly caused by the direct respiratory mucosa exposure caused by tracheotomy. Without nasopharynx protection, numerous pathogenic microorganisms may enter to lungs directly, thus increasing the hospital-acquired infection rate [15]. Patients with severe craniocerebral trauma may show nausea and vomiting, and coma caused by increased intracranial pressure. Because of swallowing reflex weakening or disappearance, vomit aspiration may occur. In addition, due to the repeated use of dehydrating agent, intracranial pressure may be reduced, making sputum thick and uneasy to be coughed up. Sputum may be left in lungs or bronchus, resulting in respiratory tract obstruction, influencing pulmonary ventilation, and leading to germ breeding. With advantages incomparable by bedside sputum suction, bronchoscope lavage can not only help to understand the bronchus lesion degree, suck secreta in bronchus, directly improve hypoxia, but also realize direct lavage for lesion lung lobes by using sensitive antibiotics, thus maintaining the efficient drug concentration in lungs. Meanwhile, deep sputum obtained by bronchoscope lavage can be cultivated to enhance the accuracy and sensitivity, thus providing basis for the selection of antibiotics and controlling infection timely.

The research result shows that PaO_2 and SPO_2 can increase after treatment by both groups, while $PaCO_2$, HR and R values are decreased. The improvement degree of the observation group is more significant compared to the control group ($p<0.05$). The effective rate of the observation group is clearly higher than that of the control group ($p<0.05$), indicating that conventional treatment and nursing is effective on clinical symptoms of patients. Better effects can be achieved by bronchoscope lavage, because it can realize targeted sputum suction and can directly improve pulmonary ventilation of patients. Meanwhile, inflammatory secreta at the lesion site can be collected, thus laying a foundation for the further targeted antibiotic treatment.

To sum up, positive treatment can be realized in the treatment for HPA patients by bronchoscope, while targeted nursing is the basis for improving the smooth proceeding of the bronchoscope and achieving effective treatment.

Table 1. *Analysis of blood gas, HR and R changes in both groups.*

Group	N	Group	PaO_2 (kPa)	$PaCO_2$ (kPa)	SPO_2 (%)	HR (Times/min)	R (Times/min)
Control	60	Pre-treatment	5.31 ± 0.25	4.15 ± 0.87	46.52 ± 3.14	132.57 ± 11.96	41.38 ± 3.69
		Post-treatment	6.81 ± 0.78	3.42 ± 1.15	76.90 ± 4.23	81.33 ± 12.84	32.15 ± 6.53
Observation	60	Pre-treatment	5.18 ± 0.37	4.18 ± 1.02	45.72 ± 1.39	134.53 ± 12.24	41.63 ± 8.74
		Post-treatment	9.36 ± 0.83	3.18 ± 0.33	91.54 ± 2.75	74.25 ± 7.28	26.46 ± 5.81

Note: The italic results were significant different with control group.

Table 2. *Efficacy comparison in both of the groups.*

Group	N	Healing	Improvement	Invalid	Effective rate (%)
Control	60	17	23	20	66.7
Observation	60	33	20	7	88.3

References

1. Listed N. Hospital-acquired pneumonia in adults: diagnosis, assessment of severity, initial antimicrobial therapy, and preventive strategies. A consensus statement, American Thoracic Society, November 1995. Am J Resp Crit Care Med 1996; 153: 1711-1725.
2. Siemieniuk RAC, Meade MO, Alonsocoello P. Corticosteroid therapy for patients hospitalized with community-acquired pneumonia: a systematic review and meta-analysis. Ann Int Med 2016; 164: 636.
3. Leroy O, Soubrier S. Hospital-acquired pneumonia: risk factors, clinical features, management, and antibiotic resistance. Curr Opin Pulm Med 2004; 10: 171-175.
4. Wojkowskamach J, Bulanda M, Rozanska A. Hospital-acquired pneumonia in the intensive care units of Polish hospitals. Infect Control 2006; 27: 784-786.
5. Craig TM, Lingaas JL, Reisner RC. Prevention of hospital-acquired pneumonia: an integrative review. Dig Common Cedraville 2015.
6. Fukada T, Tsuchiya Y, Iwakiri H, Ozaki M. Is the Ambua scope 3 slim single-use fiberscope equally efficient compared with a conventional bronchoscope for management of the difficult airway? J Clin Anesth 2016; 30: 68-73.
7. Wang SQ, Zhai JF, Jia JG. Effect of bronchoscope sputum suction combined with bronchoalveolar lavage on treatment of patients with severe pulmonary infections. Chin J Nosocomiol 2015.
8. Xiong CY, Zhou MX, Deng YP. Clinical effect observation of drug treatment under bronchoscope for patients with severe pneumonia. Chin Pract Med 2015.
9. Mansour MGE, Bendary S. Hospital-acquired pneumonia in critically ill children: Incidence, risk factors, outcome and diagnosis with insight on the novel diagnostic technique of multiplex polymerase chain reaction. Egypt J Med Human Gene 2012; 13: 99-105.
10. Johnson CS, Frei CR, Metersky ML, Anzueto AR, Mortensen EM. Non-invasive mechanical ventilation and mortality in elderly immunocompromised patients hospitalized with pneumonia: a retrospective cohort study. BMC Pulm Med 2014; 14: 7.
11. Lesher BA, Liu Z, Chen Y. Linezolid for the treatment of hospital-acquired pneumonia in a Chinese tertiary hospital. Clinicoeconom Outcomes Res Ceor 2014; 7: 521.
12. Ewan VC, Sails AD, Walls AWG. Dental and microbiological risk factors for hospital-acquired pneumonia in non-ventilated older patients. Plos One 2014; 10.
13. Rozanska A, Walaszek M, Wolak Z. Prolonged hospitalization of patients with hospital acquired pneumoniae in the intensive care unit-morbidity, mortality and costs of Przeglad Epidemiol 2016; 70: 449-461.
14. Seligman R, Ramoslima L F, Oliveira VDA. Risk factors for infection with multidrug-resistant bacteria in non-ventilated patients with hospital-acquired pneumonia. J Bras Pneumol 2013; 39: 339-348.
15. Nelson RE, Xie Y, Duvall SL. Multiple sclerosis and risk of infection-related hospitalization and death in US veterans. Int J Ms Care 2015; 17: 221.

*Correspondence to

Wei'e He

Neurosurgery Department

The Second Xiangya Hospital of Central South University

PR China

Email: heweie_xiangya@outlook.com