

Management of Adverse Event in Neurosurgery – Issues Concerning HAP

Goro Nagashima^{1,2*}, Tetsuya Ikeda¹, Takao Kohno¹, Taku Tanaka², Akihito Kato² and Hiroyuki Morishima¹

¹Department of Neurosurgery, St. Marianna University Kawasaki Municipal Hospital, Japan

²Division of Emergency and Disaster Center, St. Marianna University Kawasaki Municipal Hospital, Japan

Abstract

The high disease rate and high mortality rate, suggest the necessity of the appropriate education to treat Hospital Acquired Pneumonia (HAP) even in neurosurgical field. For rapidly progressed aging society, in Japan, appropriate measures to prevent in-hospital complications including HAP, will be focused much more in the future.

Keywords: Neurosurgery; Complication; HAP; Education; Aging

Introduction

Prognosis of patients usually result from primary disease, however, neurosurgical complications also affect the prognosis of patients. However, systematic investigation has not yet been performed for neurosurgical complications so far. In this study, we analyzed neurosurgical patients who died of Hospital Acquired Pneumonia (HAP) in our hospital for 8 years from its opening. Pneumonia is third major cause of death in Japan, and its importance increases along with the rapidly progressed aging society. Appropriate treatments have already been introduced in HAP guideline and so on, however, they have not been applied to neurosurgical patients enough [1].

Materials and Methods

One hundred forty nine death cases were analyzed within 2880 in-hospital patients who were treated from February 2006 to December 2013 at a 376-beds medium sized regional key hospital including 10 intensive care unit beds with emergency and disaster center. About 4000 ambulance cars are accepted a year. Judgement of inappropriate treatments was undertaken as below:

Inappropriate initial treatment

- leave the febrile patients without any examinations nor treatments for several days
- aimless continuation of antimicrobials without culture specimens
- airway was not secured in appropriate method

Inappropriate antimicrobial use

- deviation from HAP guideline
- selection of ineffective antimicrobials against recovered organisms
- neglect the possibility of anaerobic species or eumycetes

<inappropriate dose selection>

- deviation from PK/PD theory

Bacterial culture was performed using rapid-growth diagnostic plates as soon as possible the specimens were obtained.

Results

One hundred forty nine death cases were experienced during this periods, which comprised from 47 cerebral infarctions, 43 cerebral hemorrhages, 31 subarachnoid hemorrhages, 13 head injuries, 9 brain tumors, and 6 other diseases. More than 80% were comprised from stroke cases. Ninety eight cases (65.8%) died from primary disease, and the others from complication. Within 51 death cases from complications, 19 cases died from hospital acquired pneumonia, which were analyzed in this study.

In hospital death 149/2880 (5.2%)	Average age 73.5 ± 14.6 years
Original disease	
Cerebral infarction	47
Cerebral hemorrhage	43
SAH	31
Head injury	13
Brain tumor	9
Others	6

Table 1: Original disease of death cases.

Recovered organisms from sputum or blood culture		
<i>S aureus</i>	11	MRSA
<i>P aeruginosa</i>	8	8 (IPM resistant 2, MDRP 1)
<i>Candida sp</i>	7	7 (<i>C albicans</i> 6, <i>C glabrata</i> 1)
<i>K pneumoniae</i>	5	
<i>E coli</i>	3	(Quinolone resistant 1)
Others	8	

Table 2: Recovered organisms from cases died of pneumonia

Nineteen cases died from HAP comprised from 7 cerebral infarctions, 6 cerebral hemorrhages, 2 subarachnoid hemorrhages, 2 head injuries, and 2 brain tumors. Average age was 82.4 ± 10.7 years old in pneumonia cases, which is significantly higher than that of all 149 death case; 73.5 ± 14.6 years old (Table 1). Recovered organisms were *Staphylococcus aureus* in 11 cases (9 cases were Methicillin-resistant), followed by *Pseudomonas aeruginosa* in 8 cases (1 imipenem resistant, 1 imipenem and levofloxacin resistant, and 1 multidrug resistant), *Candida spp* in 7 cases (6 *Candida albicans*, 1 *Candida glabrata*), *Klebsiella pneumoniae* in 5 cases, and *Escherichia coli* in 3 cases (1 quinolone resistant) (Table 2).

Within these 19 cases, appropriate treatments were performed only in 5 cases, and intended withdrawal of treatment in 1 case. In 13 cases, the treatments were considered to be inappropriate. There were delayed empirical treatment in 6 cases, incorrect antimicrobial selection in 9 cases, and inappropriate dosages in 6 cases (Table 3).

Hereby we present representative cases.

***Corresponding author:** Goro Nagashima, Department of Neurosurgery, St. Marianna University Kawasaki Municipal Hospital, Japan, Tel: 81-44-933-8111; Fax: 81-44-930-5181; E-mail: goro-n@marianna-u.ac.jp

Received November 05, 2015; **Accepted** December 01, 2015; **Published** December 08, 2015

Citation: Nagashima G, Ikeda T, Kohno T, Tanaka T, Kato A, et al. (2015) Management of Adverse Event in Neurosurgery – Issues Concerning HAP. J Clin Case Rep 5: 653. doi:10.4172/2165-7920.1000653

Copyright: © 2015 Nagashima G, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Case Presentation

Case 1

The patient was 85 year old man who was admitted to our hospital for left thalamic hemorrhage (Figure 1). Respiratory distress appeared in subacute period, and tracheal intubation was performed. Imipenem

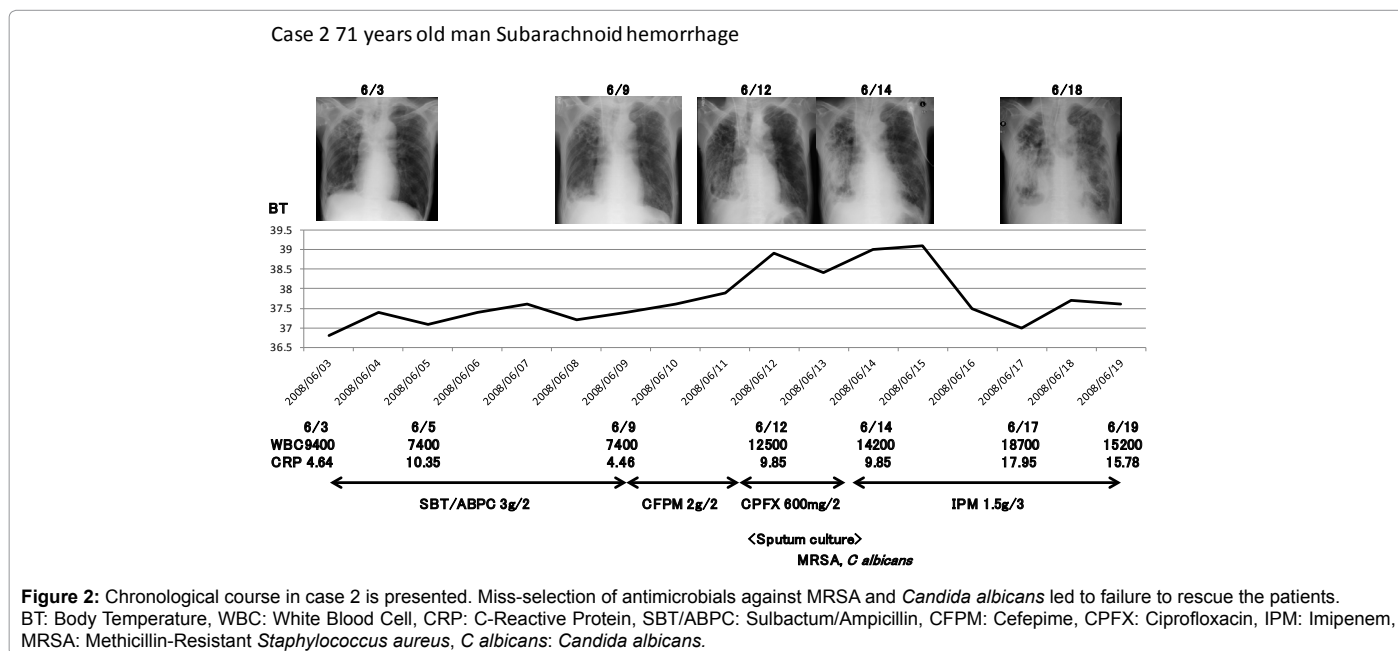
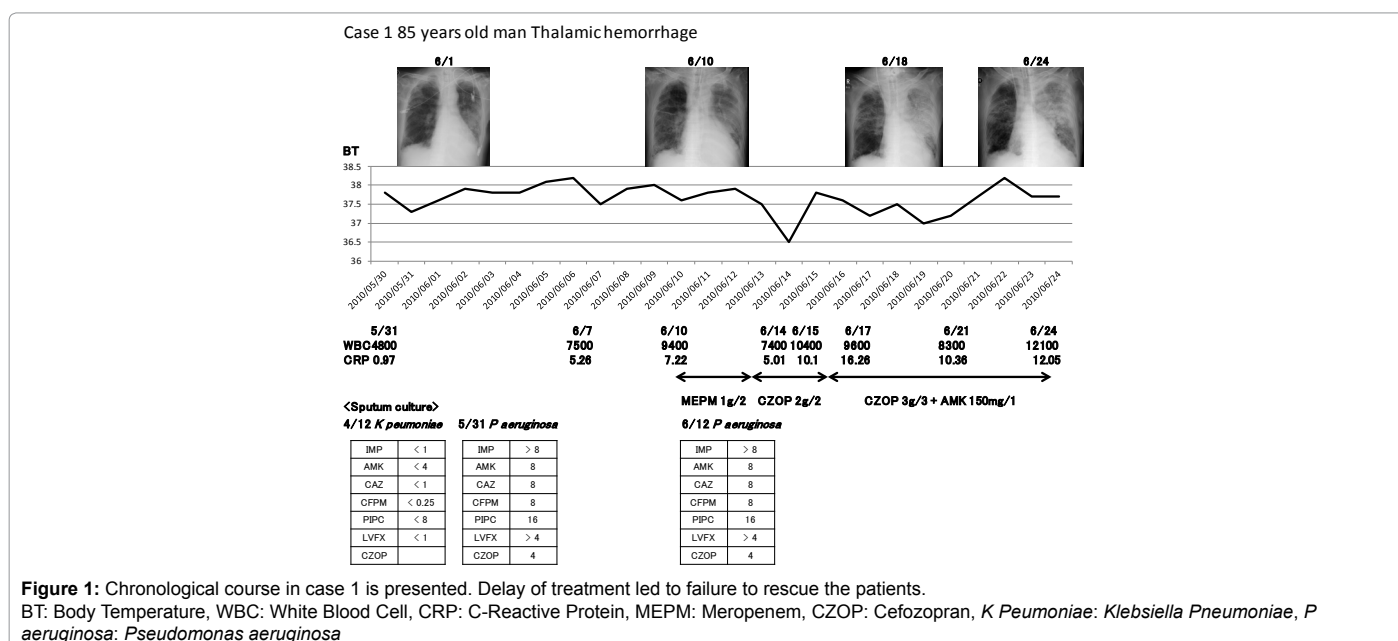
Withdrawal for families wish	1
Appropriate treatment	5
Inappropriate treatment	13
delay of initial treatment	6
antimicrobial selection	9
dosage	6

Table 3: Appropriateness of treatment for cases died of pneumonia

and levofloxacin resistant *Pseudomonas aeruginosa* was recovered from sputum culture, and chest roentogram demonstrated consolidation in left inferior lung area. Even with slight fever, antimicrobial was not administered for more than 1 week, and respiratory distress worsened. Meropenem was selected as initial antimicrobials, which was changed to ceftazidime thereafter, however, the patient died from pneumonia 2 weeks after the beginning of the antimicrobial administration.

Case 2

The patient was 71 year old man who was admitted to our hospital for subarachnoid hemorrhage and aneurysmal clipping was performed on the day of admission (Figure 2). Along with the improvement of consciousness, consolidation was appeared in right inferior lung area on chest roentogram, and sulbactam/ampicillin was started.



Consolidation increased with slight fever 6 post-operative days, antimicrobials were changed to cefepime 1 g twice a day. Even with these treatment, pneumonia worsened, and high fever continued. The antimicrobials were changed to ciprofloxacin, and sputum culture revealed Methicillin-resistant *Staphylococcus aureus* and *Candida albicans*. The antimicrobials were changed to imipenem, and the patient died from pneumonia 2 weeks after the operation.

Discussion

In hospital complications after neurosurgical interventions may worsen the prognosis of patients, however, systematic investigation has not yet been performed. In this study, we analyzed neurosurgical patients who died from HAP for 8 years after the opening of our hospital. Pneumonia is third major cause of death in Japan, and guidelines have already been introduced for adult HAP patients [1]. Even in neurosurgical fields, there are several reports about post-operative pneumonia. Savardekar A analyzed 130 cases of subarachnoid hemorrhage, 27.2% of the cases experienced post-operative pneumonia, and 9.7% of cases died from pneumonia [2]. Göçmez C reported that level of consciousness, duration of hospitalization, administration of broad spectrum antimicrobials, artificial ventilation, tube feeding, and repeated surgery are the risk factors of post-operative pneumonia [3]. Among severe head injured patients, complication rate of bacterial pneumonia reportedly become 87%, and mortality rate 50%. Wang KWI analyzed 290 head injured patients, and concluded that age, tube feeding, and hemiparesis are the risk factor of pneumonia [4]. Every these articles emphasize the importance of peri-operative management.

In Japan, we have 4 times beds compared to the average beds in OECD, and average duration of hospitalization is 34.7 days, where 9.6 days of OECD average in 2006. This situation may contribute the prevalence of multi-drug resistant bacteria in Japan, even with appropriate infection control practices. The high disease rate and high

mortality rate, suggest the necessity of the appropriate education to treat HAP even in neurosurgical field. More rapid and appropriate use of antimicrobials are the fundamental treatment of HAP. In all 13 cases (68.4%) of which treatments were considered as inappropriate, all patients were treated without these fundamental principals [5].

Conclusion

For rapidly progressing aging society, in Japan, appropriate measures to prevent in-hospital complications including HAP, will be focused much more in the future.

For the development of neurosurgery, transmission of sophisticated surgical techniques to young neurosurgeons are important. However, systematic consideration and appropriate education for treating post-operative complications are also necessary even in neurosurgical fields. Further data accumulation and establishment of evidence will be needed even for neurosurgical pneumonia.

References

1. The committee for the JRS guidelines in management of respiratory infections (2002) The JRS Guidelines for the management of hospital-acquired pneumonia in adults. The Japanese Respiratory Society Tokyo, Japan.
2. Savardekar A, Gyurmey T, Agarwal R, Podder S, Mohindra S, et al. (2013) Incidence, risk factors, and outcome of postoperative pneumonia after microsurgical clipping of ruptured intracranial aneurysms. *Surg Neurol Int* 4: 24.
3. Göçmez C, Çelik F, Tekin R, Kamaşak K, Turan Y, et al. (2014) Evaluation of risk factors affecting hospital-acquired infections in the neurosurgery intensive care unit. *Int J Neurosci* 124: 503-508.
4. Wang KW, Chen HJ, Lu K, Liliang PC, Huang CK, et al. (2013) Pneumonia in patients with severe head injury: incidence, risk factors, and outcomes. *J Neurosurg* 118: 358-363.
5. American Thoracic Society Documents (2005) Guidelines for the Management of Adults with Hospital-acquired, Ventilator-associated, and Healthcare-associated Pneumonia. *Am J Respir Crit Care Med* 171: 388-416.