SPECIAL REPORT

Report on the international Primary Neurosurgical Life Support course in the eighth Asian Congress of Neurological Surgeons in Kuala Lumpur, Malaysia

Takehiro Nakamura, Yasuhiko Ajimi, Hiroshi Okudera, Mikito Yamada, Izumi Toyoda, Katsuhiro Itoh, Shuei Imizu, Masaaki Iwase, Yoshihiro Natori, Hiroki Ohkuma, Teruyasu Hirayama, Katsuji Shima, Keiji Kawamoto, Yoko Kato

The Committee of Primary Neurosurgical Life Support Course, The Japan Society of Neurosurgical Emergency

ABSTRACT

On November 22, 2010, a simulation-based hands-on education course for medical staff in the neurosurgical fields was held in 8th Asian Congress of Neurological Surgeons (ACNS) in Kuala Lumpur, Malaysia. The present education course called Primary Neurosurgical Life Support (PNLS) course had been started by the Japan Society of Neurosurgical Emergency since 2008. This report summarizes the international version of PNLS course in 8th ACNS.

Key words: Cerebral herniation, coma scale, clinical map, Primary Neurosurgical Life Support, simulation, stroke scale

Introduction

Management of the acute neurosurgical emergency patients represents one of the important clinical skill required for the neurosurgical staff. The goal of care for neurosurgical emergency diseases is to minimize brain damage and maximize patient recovery. Appropriate general managements should be needed before surgical treatment. Therefore, an education course should be necessary to learn the management. The Japan Society of Neurosurgical Emergency (JSNE) has developed and performed Primary Neurosurgical Life Support (PNLS) course as the educational course since 2008.[1,2] We performed the first trial PNLS and PNLS workshop in the 14th Annual Meeting of JSNE on January 16, 2009. After the trial, PNLS course was performed at Kansai Medical University on January 17, 2010, Tokai University on July 10, 2010, Kagawa University on October 16, 2010. We also performed PNLS workshop to train instructors at Kansai Medical University on August 16,

2009 and January 16, 2010, Nihon University on April 24, 2010. PNLS project was accepted as an official hands-on course and workshop in the 69th Annual Meeting of the JSNE on October 28 and 29, 2010. We performed not only Japanese version but also international version of PNLS course in the 9th International Conference of Cerebrovascular Surgery on November 12, 2009.[3] The PNLS project has been also accepted as an official program of the 8th Asian Congress of Neurological Surgeons (ACNS) in Kuala Lumpur, Malaysia, on November 22, 2010. The present PNLS course which was performed in 8th ACNS was an updated international version.

Design of the International PNLS Course

We designed subjective behavior objects as international version of PNLS course, such as 1) evaluation of consciousness level using coma scale, 2) evaluation of neurological conditions using stroke scale, 3) early detection and management of cerebral herniation, 4) learning of the representative neurosurgical cases [Table 1].

Module A: Coma scale

In this module, participants could learn to evaluate consciousness level using Glasgow Coma Scale (GCS)[4,5] and Emergency Coma Scale (ECS).[6-8] The GCS is internationally accepted when discussing patient's consciousness level with other professionals. However, the GCS has the disadvantages of complexity especially in category of best motor response.[8] We introduced "Ajimi" performance to understand the category of best motor response.[9] The ECS was designed by Ohta in 2003 and developed by the JNE and JSNE.[8] The ECS consists of three major categories

Address for correspondence:
Dr. Takehiro Nakamura, Department of Neurological Surgery and Neurobiology, Kagawa University Faculty of Medicine, 1750-1 Ikenobe, Miki, Kita, Kagawa 761-0193, Japan. E-mail: tanakamu@kms.ac.jp

Table 1: Four modules of the international PNLS course

Module A: Coma scale
    Goal: Evaluation of consciousness level using several coma scale (GCS and ECS)
    Style of learning: Simulated patient
Module B: Stroke scale
    Goal: Evaluation of neurological conditions using NIH stroke scale.
    Style of learning: Simulated patient
Module C: Cerebral herniation
    Goal: Early detection and management of cerebral herniation
    Style of learning: Simulated patient or high-fedelity simulator
Module D: Case simulation
    Goal: Learning of the representative neurosurgical cases
    Style of learning: Group work using clinical map

PNLS: Primary Neurosurgical Life Support, GCS: Glasgow Coma Scale, ECS: Emergency Coma Scale, NIH: National Institute of Health

Table 2: The Emergency Coma Scale (Ohta)

Category 1: The patients open their eyes, speak and/or behave spontaneously (awake) and
    1 can say correct date, place and person
    2 cannot say correct date, place and person
Category 2: The patients can open their eyes, speak and/or behave (aroused) by
    10 speech
    20 painful stimuli
Category 3: The patients can neither open their eyes, nor speak by painful stimuli (not aroused) but respond with
    100L localization
    100W withdraw forearm with opened armpits
    200F flex forearm with closed armpits
    200E extend forearm with closed armpits
    300 none

L: Localization, W: Withdrawal, F: Flexion, E: Extension

Table 3: National Institute of Health stroke scale[10,11]

1a LOC	0 = Alert, 1 = Not alert but arouse, 2 = Not alert, 3 = unresponsive
1b LOC questions	0 = Answers both, 1 = Answers one, 2 = Answers neither question
1c LOC commands	0 = Perform both, 1 = Perform one, 2 = Perform neither task
2 Best gaze	0 = Normal, 1 = Partial gaze palsy, 2 = Forced deviation
3 Visual fields	0 = No visual loss, 1 = Partial, 2 = Complete, 3 = Bilateral hemianopsia
4 Facial weakness	0 = Normal, 1 = Minor, 2 = Partial, 3 = Complete paralysis
5a Motor left arm	0 = No drift, 1 = Drift before 10 seconds, 2 = Fall before 10 seconds, 3 = No effort against gravity, 4 = No movement
5b Motor right arm	0 = No drift, 1 = Drift before 10 seconds, 2 = Fall before 10 seconds, 3 = No effort against gravity, 4 = No movement
6a Motor left leg	0 = No drift, 1 = Drift before 5 seconds, 2 = Fall before 5 seconds, 3 = No effort against gravity, 4 = No movement
6b Motor right leg	0 = No drift, 1 = Drift before 5 seconds, 2 = Fall before 5 seconds, 3 = No effort against gravity, 4 = No movement
7 Ataxia	0 = Absent, 1 = Present in one limb, 2 = Present in two limb
8 Sensory	0 = Normal, 1 = Mild-to-moderate loss, 2 = Severe to total loss
9 Best language	0 = Normal, 1 = Mild-to-moderate aphasia, 2 = Severe aphasia, 3 = Mute, global aphasia
10 Dysarthria	0 = Normal, 1 = Mild-to-moderate dysarthria, 2 = Severe dysarthria
11 Extinction	0 = Normal, 1 = Mild, 2 = Severe

LOC: Level of consciousness

depending on the severity of consciousness disturbance [Table 2]. Category 1 and 2 have two subcategories, and category 3 has five subcategories based on the category of best mortar response of GCS. Many participants have commented about the usefulness of it. The ECS could be understood for beginners in evaluating consciousness level and useful for staff education.[6,7]

Module B: Stroke scale

The National Institute of Health (NIH) stroke scale is a standardized method used by physicians and other health care professionals to measure the level of impairment caused by a stroke.[10,11] The NIH stroke scale could measure several aspects of neurological function, including 1) consciousness, 2) gaze, 3) vision, 4) facial palsy, 5) arm movement, 6) leg movement, 7) ataxia, 8) sensation, 9) language, 10) dysarthria and 11) extinction [Table 3]. A maximal score of 42 represents the most severe stroke. Participants learned how to evaluate neurological conditions using NIH stroke scale with simulated patients [Figure 1]. Interestingly, although some participants were not familiar with NIH stroke scale until workshop, they have commented about the usefulness of it. The NIH stroke scale could be understandable for medical staff in evaluating neurological conditions and also useful for staff education in the same as coma scale.

Module C: Cerebral herniation

This module introduced initial management for impaired respiratory and circulatory function in patients by slides. Participants could learn to stabilize airway obstruction, breathing disturbance and extensive hypertension and to evaluate cerebral herniation. Emergency medical staffs should assess the patient with suspected stroke within 10 minutes of arrival in the hospital. General care includes assessment and support of airway, breathing, and circulation. The American Heart Association Guidelines indicate that emergency medical staff should administer oxygen to hypoxemic patients, confirm intravenous access and obtain blood samples.[12] We design algorithm of PNLS for neurosurgical emergency patients [Figure 2]. It is emphasized that stabilization of respiratory and circulatory function has priority over evaluation of cerebral herniation.
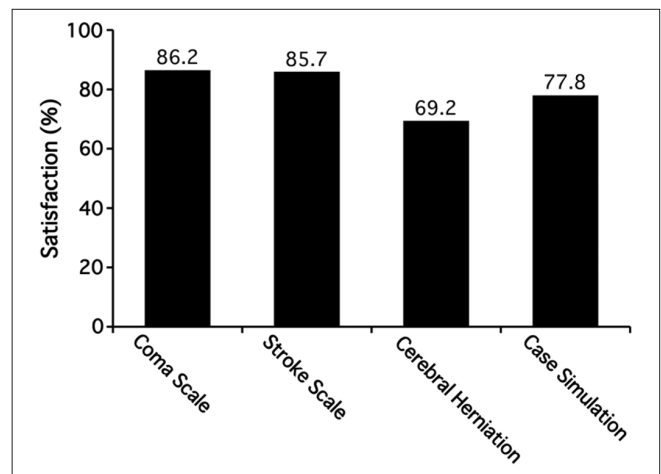
Figure 1: The scenery of international Primary Neurosurgical Life Support course in 9th Asian Congress of Neurological Surgeon in Kuala Lumpur on November 22, 2010
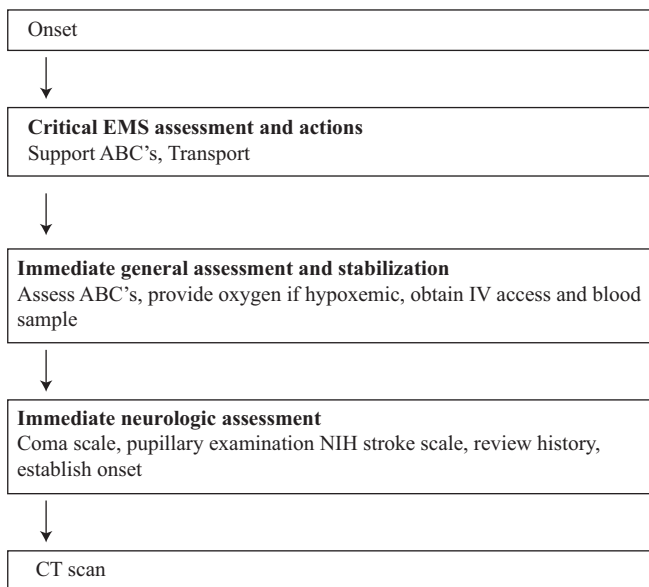
Figure 2: PNLS algorithm for neurosurgical emergency patients. Reference in the American Heart Association guidelines.[12] EMS: Emergency medical services, ABC: Airway, breathing, and circulation, IV: Intravenous, CT: Computed tomography

Figure 3: Results of the questionnaires

Key points in management include the assessment of oxygenation, blood pressure, consciousness level, and the papillary examination before computed tomography

(CT) scan. Treatment strategies are directed toward maintaining adequate oxygenation and perfusion, and then treating cerebral herniation. All the workshop participants confirmed these points.

Module D: Case simulation
We designed and performed a group work, which was a system/structure oriented case debriefing to summarize PNLS course. The group work was performed using a clinical

Table 4: Time schedule of the international PNLS course in the 8th ACNS

15:30-15:50	Keynote lecture
15:55-16:30	Module A: Coma scale
16:35-17:10	Module B: Stroke scale
17:15-17:50	Module C: Cerebral herniation
17:55-18:30	Module D: Case simulation

PNLS: Primary Neurosurgical Life Support, ACNS: Asian Congress of Neurological Surgeon

map[13-15] as a desk work of simulation for initial management for neurosurgical emergency patients. Initially participants were given a frame and elements which were divided from a clinical map. Participants need to fill an empty frame by putting pieces of elements to complete the clinical map. A facilitator observed their performance and helped their work.

International PNLS course in the 8th ACNS

PNLS project has been accepted as an official program of the 8th ACNS in Kuala Lumpur, Malaysia. We performed the present international PNLS course at the Kuala Lumpur Convention Center at 15:30 until 18:30 on November 22, 2010 [Table 4]. The number of preregistered participants (neurosurgeons) was 8 and on-site registered participants (comedical staffs) was more than 50. They were taught by 14 staffs of the international PNLS course. We performed a questionnaire to the participants of the neurosurgeons ($n=8$). They were asked about their satisfaction of each module via the questionnaire immediately after the present course. Responses from 6/8 participants of the neurosurgeons were obtained. The satisfaction rating of each module was shown on the Visual Analogue Scale (0- 100%). The mean scores for "Coma Scale" was 86.2%, "Stroke Scale" was 85.7%, "Cerebral Herniation" was 69.7%, and "Case Simulation" was 77.8% [Figure 3].

Conclusions

We performed the new version of international PNLS course in 8th ACNS as hands-on education course. The participants' comments indicated that a sufficiently high standard of knowledge was obtained in the present course. The international PNLS course could play an important role for Asian neurosurgical education.

Acknowledgments

References

1. Nakamura T, Okudera H, Iwase M, Kato Y, Kano H, Kameyama M, *et al*. Report of trial course of PNLS (Primary Neurosurgical Life Support). Neurosurg Emerg 2009;14:12-7.
2. Iwase M, Shima K, Okudera H, Kato Y, Ajimi Y, Imizu S, *et al*. Report of instructor workshop for Primary Neurosurgical Life Support. Neurosurg Emerg 2009;14:110-6.
3. Nakamura T, Ajimi Y, Okudera H, Yamada M, Imizu S, Hirayama T, *et al*. The module for ISLS/PNLS combined course as international version: Report of workshop in 9th International Conference of Cerebrovascular Surgery. Asian J Neurosurg 2010;5:95-100
4. Teasdale G, Jenett B. Assessment of coma and impaired consciousness. Lancet 1974;13:81-2.
5. Teasdale G, Jennett B. Assessment and prognosis of coma after head injury. Acta Neurochir (Wien) 1976;34:45-55.
6. Takahashi C, Okudera H, Sakamoto T, Aruga T, Ohta T. The emergency coma scale for patients in the ED: concept, validity and simplicity. Am J Emerg Med 2009;27:240-3.
7. Takahashi C, Okudera H, Origasa H, Takeuchi E, Nakamura K, Fukuda O, *et al*. A simple and useful coma scale for patients with neurologic emergencies: the emergency coma scale. Am J Emerg Med 2011;29:196-202.
8. Okudera H, Ohta T, Aruga T, Ueda M, Uetsuhara K, Ootaka H, *et al*. Development of an Emergency Coma Scale by the ECS task force: 2003 report. J Jpn Congr Neurol Emerg 2004;17:66-8.
9. Ajimi Y. Visual mnemonic performance 333ce of best motor response. Prehosp Care 2008;21:1-3.
10. Lyden P, Brott T, Tilley B, Welch KM, Mascha EJ, Levine S, *et al*. Improved reliability of the NIH stroke scale using video training. NINDS TPA Stroke Study Group. Stroke 1994;25:2220-6.
11. Spilker J, Kongable G, Barch C, Braimah J, Brattina P, Daley S, *et al*. Using the NIH stroke scale to assess stroke patients. The NINDS rt-PA Stroke Study Group. J Neurosci Nurs 1997;29:384-92.
12. 2005 American heart association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Part 9: Adult Stroke. Circulation 2005;112: IV111-20.
13. Ajimi Y, Oshiro K, Ito S, Takahashi S, Gounai S, Ishii S. Simulation of an initial management for trauma in ER using a clinical map in an electronic chart. KANTO J Jpn Assoc Acute Med 2009; 30:152-4.
14. Ajimi Y. Simulation training for cerebrovascular disease. J Integr Med 2009;19:122-6.
15. Ajimi Y, Okudera H, Nakamura T, Sakamoto T. Introduction of a group work training using clinical maps for an initial treatment of stroke. J Jpn Congr Neurol Emerg 2010;22:1-5.