The Modules for ISLS/PNLS Combined Course as International Version: Report of Workshop in 9th International Conference of Cerebrovascular Surgery

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Introduction

The goal of care for neurosurgical emergency diseases, including stroke, is to minimize brain damage and maximize patient recovery. Appropriate general managements should be needed before surgical treatment. It is, therefore, necessary to perform training to learn these management. There are two simulation based training system for neurosurgical diseases in Japan. One is interdisciplinary stroke training system, which is called as ISLS (Immediate Stroke Life Support) course1,2. The other is training system for neurosurgical emergency, which is termed as PNLS (Primary Neurosurgical Life Support) course3,4. ISLS course has been developed and performed by Japan Congress of Neurological Emergencies (JNE) and Japanese Association for Acute Medicine (JAAM) since 2005, and PNLS course has been developed and performed by Japan Society of Neurosurgical Emergency (JSNE) since 2008. We performed first international version of ISLS/PNLS combined course with the 9th International Conference of Cerebrovascular Surgery on November 12, 2009, organized by the Department of Neurosurgery, Fujita Health University. More than 30 international participants attended this workshop.

Keywords: ISLS (Immediate Stroke Life Support), PNLS (Primary Neurosurgical Life Support), simulation, coma scale, stroke scale, cerebral herniation, clinical map

Design of ISLS/PSLS combined course as international version

We designed subjective behavior objects as international version of ISLS/PSLS combined course, such as 1) evaluation of consciousness level using coma scale, 2) evaluation of neurological conditions using stroke scale, 3)
learning early systemic management for cerebral herniation, 4) learning of the treatment algorithm of ISLS/PNLS. (Table 1).

**Module A: Coma scale**

In this module, participants could learn to evaluate consciousness level using Glasgow Coma Scale (GCS)\(^5\)\(^,\)\(^6\) and Emergency Coma Scale (ECS)\(^7\)\(^,\)\(^8\). The GCS is internationally accepted when discussing patient’s consciousness level with other professionals. However, the GCS has the disadvantages of complexity especially 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 JNES\(^8\). The ECS consists of three major categories 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 motor 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\(^7\).

**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.

| 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

Module C: Systemic management

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 staff 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. We design algorithm of ISLS/PNLS for neurosurgical emergency patients (Figure 2). It is emphasized that stabilization of respiratory and circulatory function has priority over evaluation of cerebral herniation. Key points in management include the assessment of oxygenation, blood pressure, consciousness level, and the papillary examination before CT (computed tomography) scan. Treatment strategies are directed toward maintaining adequate oxygenation and perfusion, and then treating cerebral herniation. All the workshop participants confirmed these points.

Table 3. NIH stroke scale

|   |   |
|---|---|
| 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: loss of consciousness

Figure 1. The scenery of workshop (First ISLS/PNLS International Version Trial Task Force) in 9th International Conference of Cerebrovascular Surgery (November 12, 2009). Participants leaned the NIH stroke scale with simulated patient.
Module D: Group work using clinical map

We designed and performed a group work, which was a system/structure oriented case debriefing to summarize ISLS/PNLS course. The group work was performed using a clinical map as a desk work of simulation for initial management for a stroke or neurosurgical emergency patients.

1) Structure of a clinical map

We produced a clinical map of an initial treatment for a patient of severe hemorrhagic stroke with cerebral herniation. The clinical map has a structure like a clinical path and provides a procedure and contents of an initial treatment of stroke in chronological order according to the algorithm of ISLS/PNLS. Its horizontal axis means the algorithm and vertical axis means physical findings, examinations, imaging, treatment and other clinical items.

2) How to use a stroke clinical map for group work

Initially participants were given a frame and elements which were divided from a clinical map as a desk work of simulation for initial management for a stroke or neurosurgical emergency patients. The workshop was held as the project of the first ISLS/PNLS international version task force. The participants’ comments indicated that a sufficiently high standard of knowledge was obtained in this workshop. This workshop could contribute to the spread of ISLS and PNLS.
The scenery of a group work using a clinical map in module D. Participants enjoyed the group work.

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