Ramathibodi External Ventricular Drainage Collecting Device

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The authors report the use of Ramathibodi External ventricular drainage (EVD) collecting device. It is made of previously-used medical items. The device costs 100 baht, compared to over 3,000 baht for those commercially available in Thailand. Over two hundred RAMA EVD collecting devices have been used with neurosurgical patients since 2002. Accurate cerebrospinal fluid (CSF) output measurement can be made with this device. Intracranial pressure monitoring is also possible. Because it is inexpensive and can be easily assembled, the authors recommend the RAMA EVD collecting device uses to other hospitals in Thailand.

***Keywords**: External ventricular drainage, EVD, Cerebrospinal fluid, CSF*

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External ventricular drainage (EVD) is a commonly performed procedure for neurosurgeons when treating patients with hydrocephalus. A ventricular catheter is connected to a collecting container. Commercialized EVD collecting devices, despite their user-friendly designs, are expensive for routine use in Thailand. Hence, a transfusion bag has commonly been used for cerebrospinal fluid (CSF) collection. With a transfusion bag collection, CSF output is measured by weighing the bag. The authors report the use of a Ramathibodi EVD collecting device (RAMA EVD) that is easy to assemble and costs only 100 baht. It is made of re-sterilized intravenous Soluset and connecting components. For the past few years, over two hundred RAMA EVD collecting devices have been used. Accurate CSF output can be measured by reading the volume scale on the side of the Soluset. The authors recommend the use of this locally made device for CSF collection.

Material and Method

The device is composed of many medical parts. The authors used a Soluset for a collecting chamber. This soluset was previously used for intravenous (I.V.) fluid administration. After sterilization, a previously used Soluset is connected to various components i.e. three-way connectors, silastic tubes, I.V. extension tubes and urinary leg bag. Step-by-step and detailed descriptions of its assembly can be found in Chiannilkulchai N et al [1]. One important step in making the device is that the microdrip needle of the Soluset must be removed to allow CSF flow. This part is frequently clogged by CSF debris if not taken out. A picture of a complete RAMA EVD collecting device is shown in Fig. 1. Ethylene Oxide gas is used for sterilization of the entire device.

The RAMA EVD collecting device allows simple set up at an appropriate level of CSF drainage above external auditory meatus[2-4]. The top of the Soluset chamber is placed at the desired level (Fig. 2). Hourly CSF output can be measured by reading the volume scale on the side of the Soluset. CSF is emptied into a urinary leg bag connected to the bottom of the Soluset (Fig. 2). In addition, an IV extension tube can be connected to another three-way for ICP monitoring. When needed, a patient can be transported with the device by turning off the three-way to prevent CSF over-drainage.

Accurate CSF output can be measured by reading the volume scale marked at the side of the Solu-

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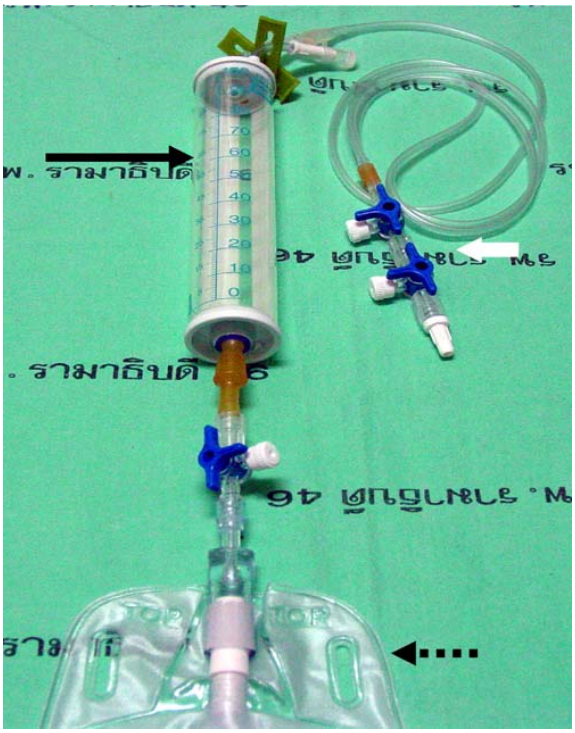

Fig. 1 A complete RAMA EVD collecting device. I.V. Soluset (Dark arrow) is connected to I.V. tubes, three-way stopcocks (White arrow) and urinary leg bag (dotted arrow). A ventricular catheter can be connected to the three-way stopcock (White arrow). CSF output can be measured with accuracy by reading the scale at the side of the Soluset. CSF from the Soluset can be emptied into the urinary leg bag (dotted arrow) attached below

Fig. 2 An ICU patient with RAMA EVD collecting device. Large arrow indicates the height at which the top of RAMA EVD collecting device is placed above the external auditory meatus. CSF can be emptied into a urinary leg bag via a three-way (Dotted arrow)

set. CSF can be drained into a urinary leg bag, connected to the bottom of the Soluset, if it is full (Fig. 2). It is recommended that the RAMA EVD collecting device be kept as a closed system due to increased risk of infection if opened. Upon patient's transportation, it is recommended that the three-way turned off so that no CSF may return into the ventricular catheter, if placed at a significant height.

Results

Since 2002, two hundred CSF collecting devices have been used. In small pediatric patients, closed CSF output monitoring for volume replacement can be achieved. EVD-related ventriculitis occurred in 18 patients, approximately 9% (18/200). Most of the infection was noted after seven days of EVD placement.

Discussion

For several years in Thailand, a transfusion bag has been used as CSF-collecting chamber. Although it is simple to connect with an EVD, CSF output volume has to be indirectly measured by weight. Inaccurate monitoring of volume loss may not be crucial in adult patients. However, this is significant in pediatric patients. The authors' RAMA EVD collecting device provides more accurate CSF volume reading over the

transfusion bag. This group of patients is highly sensitive to small changes in volume loss or volume gain. Replacement of CSF output milliliter per milliliter every four hours can be easily done.

The authors' ventriculostomy-related infection is comparable to those of a large series. Common risk factors of ventriculitis after EVD placement are length of tunneling, duration of EVD, younger age, and prior infection[5-8]. The authors' ventriculostomy-related infection is 9%. It faired well to other series that vary from 5-19%[5-8]. No report mentioned increased infection rate when different CSF collecting devices were used.

RAMA EVD collecting device is simple to assemble. All of its components can be recycled and re-sterilized. Local hospitals in Thailand can make it by utilizing their previously-used items. The device costs one hundred baht to make compared to over 3,000 baht of those brand-name collecting devices. At present, RAMA EVD collecting device is used in neurosurgical patients instead of the transfusion bag for CSF collection.

In summary, the authors suggest to hospitals in Thailand the use of the RAMA EVD collecting device because it is easy to assemble and is very economical.

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อุปกรณ์เก็บและวัดปริมาตรน้ำไขสันหลังที่ดัดแปลงมาจากวัสดุใช้แล้วในโรงพยาบาลรามาธิบดี

เอก หังสสูต, ณัฏฐชา เจียรนิลกุลชัย

ผู้เขียนรายงานการใช้อุปกรณ์เก็บและวัดปริมาตรน้ำไขสันหลังที่ดัดแปลงมาจากวัสดุใช้แล้วในโรงพยาบาลรามาธิบดี อุปกรณ์นี้มีราคาถูกและสามารถประกอบขึ้นเองได้โดยไม่มีความซับซ้อน การวัดปริมาตรน้ำไขสันหลังด้วยอุปกรณ์นี้ทำได้ด้วยความเที่ยงตรงและแม่นยำอีกทั้งสามารถต่อเข้ากับเครื่องวัดความดันในกะโหลกศีรษะได้ด้วย มีผู้ป่วยจำนวนกว่าสองร้อยรายที่ได้ใช้อุปกรณ์นี้ในโรงพยาบาลรามาธิบดีตั้งแต่ปี พ.ศ. 2545 จนถึงปัจจุบัน
