Mobilization of Patients with External Ventriculostomy Drains: Pros and Cons

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The effects of prolonged immobilization in the critical patient have been well described. Patients on mechanical ventilation and patients receiving extracorporeal membrane oxygenation therapy have been presented as evidence of the feasibility of implementation of early mobilization protocols. Prolonged immobilization of critically ill patients has been associated with intensive care unit-acquired weakness syndrome, increased mortality, at the cognitive level, impact on quality, and cost increase among other considerations. Early mobilization emphasizes strategies to stimulate motor, sensory, and proprioceptive levels in the context of critically ill patients. Early mobility intervention in critically ill patients begins in the first days of stay in the unit and requires a scheduled combination of passive and active activities. The presence of an external ventriculostomy device is not a contraindication for mobilization.[1,2] It helps as above with the progression and improvement in the outcome. The dislodgement and risk of fracture of external ventricular drainage (EVD) are major concerns. Here, we briefly go over the technical aspect of EVD placement and how to safely mobilize the patient.

Most of the EVDs are placed in the operating rooms, while some are in the intensive care. While placement is a closely controlled procedure, certain features help with the security of the device and hence early mobilization. After all, incisions are closed, and stitches with 3-0 nylon stitches are used. The ventriculostomy catheter itself should be tunneled at least 4 to 5cm from the entry site to decrease infection risk. The exiting ventriculostomy catheter is best secured with a *U stitch*. Then coil the catheter and place a figure of eight stitch around the connection of the ventriculostomy catheter to its most proximal port. Care should be taken to not suture this hub too close to the skin, as this could lead to skin necrosis. One technique to avoid skin necrosis is to secure this proximal hub with an air knot around with enough room to place a biopatch underneath the hub. Then one to four staples can be used to secure the coiled catheter segments. The staples will not harm the ventriculostomy tubing. At this point, a wet and dry sponge is used to clean your wound and a chloraprep can also be used. Two biopatches are used. One is underneath the exit site, and the second is underneath the proximal hub. Sterile dressings can be applied (►**Fig. 1 A–D**).

The proper selection of patients with a checklist-type tool has shown the benefits of the implementation for patients with EVD to receive early rehabilitation. Nurses-driven protocol has shown an effective methodology.[3,4] The activity positions that can be used are head of the bed elevation, upright in the bed, seat position inside the bed with legs down for the patient to move these against the gravity, sitting on the side of the bed for legs activity, full assistance to the bedside chair, standing with the full assist on the side of the bed, gentle ambulation inside the room, and finally ambulating around the intensive care unit. During all these activities, full assistance is required, and a protocol is in place for intensive care with neurological stability is noted. During any activity and ambulation, a close neurological and general examination is kept. The patient assessment is done after the activity and changes are documented. During the activity, the EVD is clamped especially during ambulation.

The limitation of ambulation and activity with EVD is related to the device, the patient's condition, and the limitation of resources. The biggest limitation is the device itself. There are multiple connections in EVD and any one of these can be loose or get disconnected. A disconnected EVD leads to infection risk and requires another procedure to replace the EVD. Patient condition, especially related to high output EVD and unstable neurological status, leads to delay or difficult situation to

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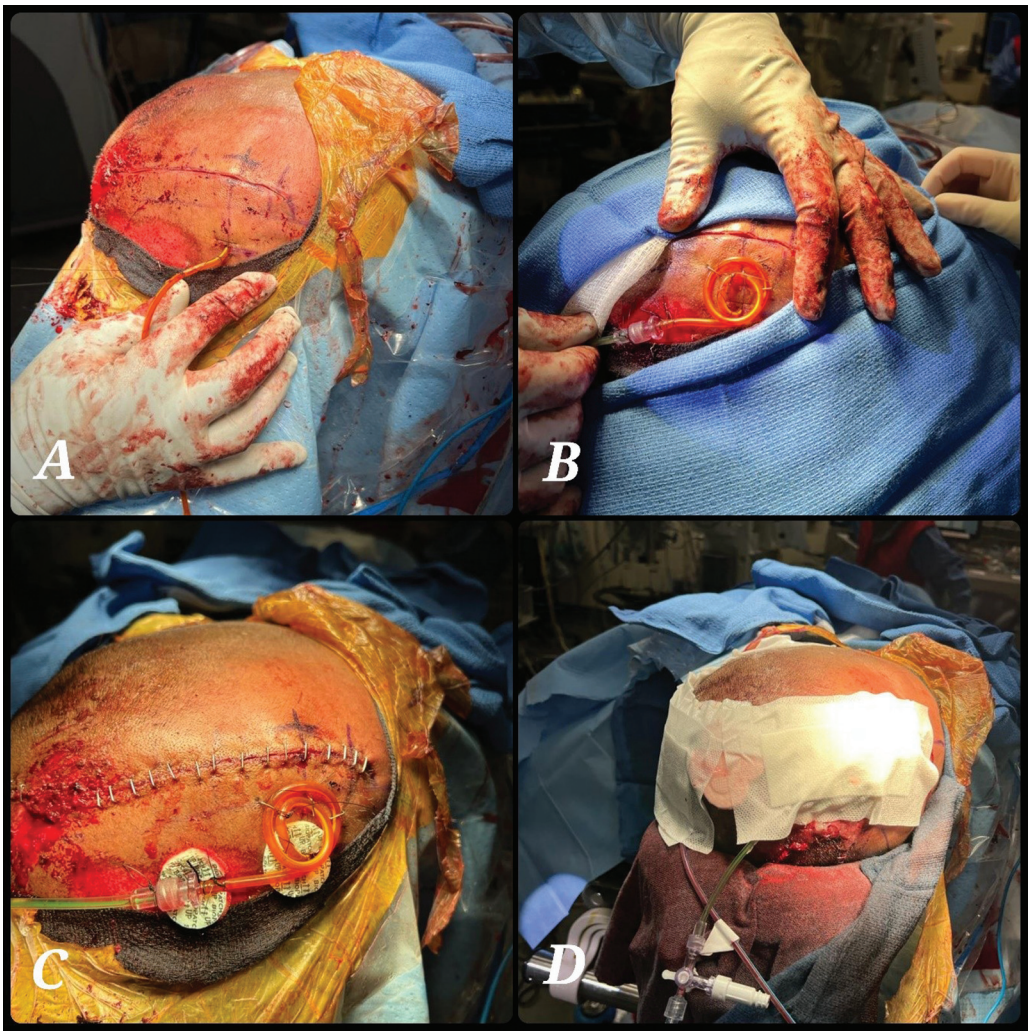

Fig. 1 Neurosurgical secure anchoring to help with activity planning in the intensive care. (**A**) Incision shown with a roman saddle wrapped around the external ventricular drainage (EVD); the knot for U stitch is under the exit site of the EVD. (**B**) Staples to secure the loop, U stitch secured at the end of EVD to pressure tube side, the silk tie is applied to secure EVD end over the proximal hub of pressure tubing. (**C**) Bipatches placed underneath the exit side of EVD and under the hub. (**D**) Dressing to cover the full system.

increasing the activity. EVD cannot be clamped during these changes and a close watch is required if any activity is done while keeping EVD opening. A system like *LiquoGuard* (MollerMedical GmbH), with continuous control of CSF drainage rather the gravity, can help in this matter. A protocol implementation requires resources and some intensive care units do not have all the key functional elements like a daily physical therapist, nursing staff, and respiratory therapist to proceed with ambulation and activity.

In conclusion, early and protocol-driven ambulation in intensive care with an EVD is a safe and effective therapy. A team effort is required including proper surgical placed EVD, early consultation with the physical therapy, nurse-driven oversite, and physician directed supervision. A daily review of activity in patients with EVD should be part of the bedside communication tool. There are limitations with early ambulation of stable intensive care patients with EVD. The risk of disconnection or dislodgement can set back the progress and the patient can go from stable to unstable status.

Informed Consent
Verbal and written consent was obtained.

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Conflict of Interest
None declared.

References

1 Kumar MA, Romero FG, Dharaneeswaran K. Early mobilization in neurocritical care patients. Curr Opin Crit Care 2020;26(02):147–154

2 Yataco RA, Arnold SM, Brown SM, et al. Early progressive mobilization of patients with external ventricular drains: safety and feasibility. Neurocrit Care 2019;30(02):414–420

3 Young B, Moyer M, Pino W, Kung D, Zager E, Kumar MA. Safety and feasibility of early mobilization in patients with subarachnoid hemorrhage and external ventricular drain. Neurocrit Care 2019; 31(01):88–96

4 Kumble S, Zink EK, Burch M, Deluzio S, Stevens RD, Bahouth MN. Physiological effects of early incremental mobilization of a patient with acute intracerebral and intraventricular hemorrhage requiring dual external ventricular drainage. Neurocrit Care 2017;27(01):115–119