

Poster presentation

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## Vertical extension device for automatic adjustment of EVD-drip chambers or ICP-transducers

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### Background

The external ventricular drainage (EVD) is a standard tool for ICP-monitoring and treatment of pathologic ICPs in neurosurgical ICUs. In a typical ICU-patient the position of the head is being changed at least 100 times per day. In order to achieve appropriate ICP-measurements and to avoid unwanted complications such as aneurysm bleeding or upward herniation due to rapid over drainage accurate positioning of the ICP-transducer and of the height of the drip-chamber is necessary. Therefore a mechanical device is required to constantly readapt the position of the drip chamber and the ICP-transducer to changes of the position of the head.

### Materials and methods

A mechanical device was created to maintain the relative position of the outflow level and the ICP-transducer to the patient's head despite changes to the vertical position of the head using a vertical extension system. A chord is fixed to the patient's bed lateral to the head of the patient and is guided vertically up to enter a hollow stand that is inverse L-shaped and mounted to the patient's bed. Inside the stand the chord is guided further sliding on two rolls. In the vertical part of the stand the chord is fixed to a counterweight of 600 to 1000 g allowing mobility of the chord and still keeping the chord stretched despite changes to the vertical position of the patient's head. ICP-transducer or drip chamber can be easily attached to the free vertical part of the chord.

### Results

Due to the vertical extension device constant readjustment could reduce positioning errors to  $\pm 2-3$  cm minimizing hydrostatic measurement errors and preventing unwanted over drainage. Thus, occurrence of complications such as aneurysm bleeding, subdural hematoma/hygroma or even upward herniation could be significantly reduced.

### Conclusion

We present an easily by oneself to manufacture, low-cost device to reliably avoid over drainage and erroneous ICP-readings.