Evaluation of a Novel Method of Shunting for Patients With Normal Pressure Hydrocephalus

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An overlying problem with shunting cerebrospinal fluid (CSF) is that there is no way to directly measure the volume being drained through a shunt once it has been implanted. Therefore, it becomes very difficult to determine if the shunt is working properly. If the patient's symptoms remain unchanged, the shunt may not be draining fluid, the pressure setting on the shunt may need to be changed, or the patient may simply be unresponsive to shunt treatment. The objective is to develop a prototype shunt device which is capable of measuring, recording, and controlling the amount of CSF that passes through it on a daily basis. By using a positive displacement pump and controlling the stroke frequency, a volume of fluid similar to CSF (water) is controlled, measured, and recorded. If the volume of CSF being drained could be measured and controlled, this would make troubleshooting much easier. By using a bicorporeal device, power supply, and pumping device, it is hypothesized that shunting can be achieved with success.

Design and Development of an Improved Tissue Retractor for Use in Minimally Invasive Surgical Procedures

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Laparoscopic surgery is a widespread and rapidly growing surgical technique. One of the challenges facing surgeons performing laparoscopic procedures is the retraction of anatomical structures that restrict vision and access to the surgical site. Current solutions to this problem involve opening additional incisions, which causes increased risk and discomfort to the patient. This study proposes a design for a laparoscopic retractor that can be inserted and operated without the need for additional incisions. The anatomical principles relevant to the design are introduced. The inventive problem is investigated and the design requirements for the device are listed and explained. The processes of initial concept generation and selection are described, as well as the various stages of design refinement and prototyping performed on the chosen concept. User feedback regarding the alpha prototype of the device is presented. Finally, recommendations are made for future development of the device.