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***In vitro* hydrodynamic properties of the Miethke proGAV hydrocephalus shunt**

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Abstract

Background: Adjustable shunts are very popular in the management of hydrocephalus and are believed to help in minimizing the number of surgical revisions. The drawback with almost all constructions is that they may be accidentally readjusted in relatively weak magnetic fields (around 30–40 mTesla)

Materials and methods: The ProGav Miethke shunt is composed of an adjustable ballon-spring valve unit and an integrated over-drainage compensating gravitational device (known as the shunt assistant). A mechanical 'brake' is intended to prevent changes to the valve's performance level in a strong magnetic field. We evaluated the performance and hydrodynamic properties of a sample of three valves in the UK Shunt Evaluation Laboratory.

Results: All the shunts showed good mechanical durability over the three-month period of testing, and good stability of hydrodynamic performance over a one-month period

The pressure-flow performance curves, operating, opening and closing pressures fell within the limits specified by the manufacturer, and changed according to the programmed performance levels. The operating pressure increased when the shunt assistant was in the vertical position, as specified. The valve has a low hydrodynamic resistance (0.53 mm mmHg ml⁻¹ min⁻¹). External programming proved to be easy and reliable. Strong magnetic fields from a 3 Tesla MR scanner were not able to change the programming of the valve.

Conclusion: The ProGAV shunt is an adjustable, low resistance valve that is able to limit posture-related over-drainage. Unlike other adjustable valves, the ProGAV cannot be accidentally re-adjusted by external magnetic field such as a 3T MR scanner.