

The enigma of underdrainage in shunting with hydrostatic valves and possible solutions

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Summary

Objective. Hydrostatic devices have considerable advantages compared to “conventional” differential-pressure-valves concerning overdrainage, but are thought to imply a tendency to underdrain or to clog. The aim of this study was to evaluate the ability of the hydrostatic gravitational Dual-Switch-Valve (DSV) to minimize overdrainage-related complications without increasing the danger of underdrainage.

Results. In a series of 202 adult patients with different etiologies treated with a ventriculo-peritoneal shunt including the hydrostatic Dual-Switch-valve (DSV), 21 cases were suspected of suffering from underdrainage. Using a new algorithm we were able to differentiate obstruction in 6 patients from functional underdrainage in 15 cases, thus we saw an indication to reimplant a DSV with a lower opening pressure in the latter.

Conclusion. The reasons for functional underdrainage were multifold in our series, especially the intraperitoneal pressure is still a “black box”. Despite the ability of the DSV to avoid clogging and to minimize overdrainage by its high-pressure-chamber, it remains difficult to determine the optimal opening pressure of the low-pressure-chamber of the DSV for ideal clinical improvement. Therefore a new hydrostatic gravitational “programmable” valve (proGAV), entitled on avoiding the disadvantages of other adjustable devices, has been developed and implanted in 16 patients with promising results.

Keywords: Hydrocephalus; ventriculo-peritoneal shunt; underdrainage; hydrostatic valve; programmable shunt.