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Gravitational valves. Personal 27 year experience in 420 patients

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Background

The first gravitational valve, the Cordis-Hakim-Lumbar (CHL) was patented in 1975. In 1980 the author assisted two implantations in LP-shunts, but similar to all contemporary neurosurgeons he does not recognise the technical breakthrough. In spite of a brilliant concept the CHL flopped, probably due to the exclusive design for the rare lumbar shunts (transversal connectors) and a round valve body with a strong tendency to rotate in the lumbar fat and resulting dysfunctions. Fred Jackson, the initiator of the first large series in the USA died by an aircrash in 1980; his encouraging results were never published. In 1989 the CHL was tested with excellent results by Richard and us. As the first we proposed the combination with adjustable valves on 91 and implanted a modified CHL with a Medos-P in 83. We conceived longitudinal valve bodies, which stimulated the development of Cordis GCA and Miethke Shunt Assistant (94). Independently the Chhabra Z-Flow, the Sophysa AS and the Affeld-valve, a precursor of the Miethke Dual-Switch, were developed.

Materials and methods

Retrospective study on 420 patients treated with Cordis Hakim-Lumbar or -GCA, Miethke ShuntAssistant, -DualSwitch, -Paedi/GAV and ProGAV. Follow-up since 1984.

Results

The overdrainage was reduced: Only 5/420 patients required surgery due to subdurals (1.2%); 6 other mild hygromas disappeared conservatively. Of 11 chronic hematomas, five were caused by significant head traumata, two by incorrect (diagonal) valve placement, one by inadequate pressure selection and one by pneumatocephalus. We counted only two valve related "real failures" with consecutive cSDHs. Of 110 NPH-patients two only (1.8%) presented hygromas. The quote of infections, catheter problems and valve dysfunctions met standard experiences.

Conclusion

Gravitational valves have largely solved the problems of overdrainage. However, residual problems such as the adaptation on the growth of children or high abdominal counter pressure in adipous patients with resulting underdrainage require further improvements, especially adjustable g-valves. The current state-of-the-art is the crossover of adjustable and gravitational valves.