Programmable shunts versus nonprogrammable shunts

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In this provocative single-institution retrospective review, Hatlen et al.1 report the long-term results of valve survival in a large group of children with programmable valves (PVs) and nonprogrammable valves (NPVs). In this 8-year analysis (with a minimum 2-year follow-up), the authors report on 616 valves, 313 of which were programmable and 303 of which were nonprogrammable. Twelve surgeons contributed patients to the study, but more than 70% of the surgeries were performed by 4 surgeons. Indications for placing PVs varied per surgeon. The authors excluded 43 children with shunts placed for brain tumors and 117 children for whom follow-up data were inadequate.

From this cohort, the authors noted that the children receiving NPVs tended to be younger, but the 2 cohorts were otherwise not statistically different. Interestingly, although PVs have been reported to reduce the incidence of proximal shunt malfunction by either preventing slit ventricles or limiting overdrainage, these authors found no difference in the rate of proximal shunt revisions between their 2 groups. Additionally, they found that the NPVs had a 5-year survival rate of 45.8% compared with 19.8% for PVs (p = 0.0005).

In the past, it has been suggested that the additional costs incurred by using programmable shunt valves would be offset by the reduction in the number of operative interventions required as a result. This is the first large institutional study to question that supposition. The authors reference the report by Richards et al. (Richards H, Seeley H, Pickard J: Are adjustable valves effective in all ages of patient? Paper presented at the 54th International Conference, Society for Research into Hydrocephalus and Spina Bifida, Vancouver, British Columbia, Canada, July 9, 2010) that corroborates their findings. In long-term follow-up, more complex valve systems may fail at a higher rate than simpler valve systems. However, the authors could have provided more detail about their own reported failures. First, it would be of interest for the authors to tell us how these PVs were found to fail. Were the failures due to obstruction within the valve or to a mechanical failure of the rotor? The Codman PVs with Siphonguard have long been known to have a weak silicone connection between the PV and the Siphonguard component, which sometimes fatigues over time, leading to separation of the 2 components and failure. I have experienced 5 valve failures in this particular valve due to design. Second, the valve failure rate in each group as viewed in Table 3 drops off precipitously between Years 4 and 5 for the PV. Do the authors have any suggestions as to why?

In summary, the paper is well written and the authors have controlled for as many variables as they can in a large retrospective review. Their findings are certainly noteworthy. Their conclusion calling for a larger multiinstitutional prospective study appears justified as at least 80% of children requiring shunts will do just fine with an NPV. This current review calls into question whether PVs are really cost effective for the majority of patients. (http://thejns.org/doi/abs/10.3171/2011.11.PEDS11431)

Disclosure
The author reports no conflict of interest.

Reference

Response

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We appreciate Dr. Boop’s thoughtful comments. Unfortunately, this retrospective review did not allow us to comment on the causes for valve system failure. We have 2 suggestions as to why the PVs failed after 4 years. First, the obstruction may be due to the accumulation of materials impairing these more complicated valves compared with the NPVs, as we noted in the Discussion section. Second, accelerated wear in the more complicated mechanism (that is, more parts, more failure) may be a cause for valve failure. We agree that our data are only suggestive and warrant a carefully designed prospective study.

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