Editorial

Posthemorrhagic ventricular dilation

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In the current issue of Journal of Neurosurgery: Pediatrics, Limbrick and colleagues\(^1\) report a 10-year institutional review of the surgical management of progressive posthemorrhagic ventricular dilation (PPHVD) in preterm infants. A handful of surgeons were responsible for the cases reviewed, and surgical preferences varied between ventricular access devices (VADs) and ventriculosubgaleal (VSG) shunts, which the authors describe as temporizing neurosurgical procedures (TNPs). The outcomes tabulated included failure and infection of the temporizing device, eventual conversion to permanent ventriculoperitoneal (VP) shunts, early VP shunt failure and infection, transfusion requirements, and death. The differences between the two TNPs were neither clinically suggestive nor statistically significant.

This contribution serves to dampen the point-counterpoint in the recent literature, reviewed well by the authors, on the relative merits of VADs and VSG shunts. What is disappointing about this literature is its surgeon-centrism: the major outcomes are surgical complications. A cynic might accuse us neurosurgeons of seeking solely to minimize the time that we spend in the neonatal intensive care unit. A more sympathetic view is that we have been studying how to stay out of trouble. In any event, we have not learned much about how actually to do good for our smallest and most fragile patients. There is no evidence that either VADs or VSG shunts in the preterm period improve on the natural history of untreated PPHVD with respect to developmental outcome or lifelong disability.

While the current paper has been in press, Whitelaw and coworkers\(^2\) from Bristol have reported the results of a randomized controlled trial of drainage, irrigation, and fibrinolytic therapy for PPHVD in the preterm period. The control arm of the trial featured conventional management with lumbar punctures and VADs. What is so notable about this work is its patient-centric outcomes: mortality and disability rates at 2 years past term. With respect to all outcome parameters, the superiority of the experimental intervention was significant, both statistically and clinically. The bar has been raised. Future clinical research in the management of PPHVD in preterm infants must focus on functional outcomes.

References


Response

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We appreciate Dr. Piatt’s thoughtful comments, and we could not agree more with his assertion that long-term functional outcomes should be the ultimate focus of current and future research in PPHVD. Indeed, data regarding the neurodevelopmental outcomes of the patient cohort described in our article in this issue of Journal of Neurosurgery: Pediatrics are currently under investigation and will be reported soon.

In recent years, several major research efforts have been initiated to evaluate the effect of varying surgical strategies on long-term functional outcomes. Our group at St. Louis Children’s Hospital is currently enrolling patients in the Early v Late Ventricular Intervention Study (ELVIS), an international, multicenter, prospective randomized controlled trial investigating the timing of neurosurgical intervention in PPHVD. Meanwhile, the Hydrocephalus Clinical Research Network is actively comparing methods of neurosurgical treatment for PPHVD in a pilot randomized clinical trial (J. Wellons, personal communication, 2010). Both of these trials have as either primary or secondary end points the neurodevelopmental status at 2 years’ corrected age, in addition to mortality rate, shunt rate, and other parameters.

These sorts of large-scale, multicenter, prospective studies require years to conduct, and present significant challenges, even once underway. To illustrate this complexity, consider the DRIFT (DRainage, Irrigation, and
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Fibrinolytic Therapy) trial\(^2\) to which Dr. Piatt referred. The initial results of the DRIFT algorithm showed no difference in mortality or shunt rates compared with “standard therapy” for PPHVD.\(^1\) In fact, an increase in secondary hemorrhage was observed with DRIFT, presumably due to the recombinant tissue plasminogen activator (rTPA), and enrollment in the trial was suspended. It was not until the 2-year neurodevelopmental data were available that the benefit of DRIFT—a reduction in long-term death and disability—was recognized. The DRIFT investigators now use a modification of their original protocol, without the routine use of rTPA (A. Whitelaw, personal communication, 2010), and we anxiously await additional data from this group.

Although long-term neurocognitive and psychomotor outcomes will always be the ultimate measures of efficacy in studies of PPHVD treatment, we and others are working to develop quantifiable, objective metrics to assist clinicians in the ongoing management of PPHVD. These biomarkers will be used to inform clinical decisions in real time (as treatment is executed), but they also will serve as surrogate end points to predict long-term outcomes in advance of 2-year neurodevelopment scores. To this end, we have embraced novel technologies like high-throughput genomics, proteomics, and advanced imaging to study the complex pathophysiological mechanisms at play and to develop relevant metrics to optimize the treatment of this condition.

Indeed, these are “our smallest and most fragile patients,” and we must consider all aspects of their neonatal, neurological, and neurosurgical care, most importantly long-term neurodevelopmental outcome. Additional solid, Level I data from studies like DRIFT will be coming in the next few years, and ultimately a PPHVD task force will be required to generate treatment guidelines. But for our patients suffering from PPHVD right now—and the clinicians treating them—there is value in mining the data that we already have at our fingertips in order to refine our existing treatment methodologies, to improve our performance as surgeons, and to deliver the best quality care possible for these infants. (DOI: 10.3171/2010.4.PEDS10176)

References