Neurosurgical Forum

LETTERS TO THE EDITOR

Abdominal pseudocysts and ventriculoperitoneal shunts

TO THE EDITOR: I read with great interest the article by Erwood et al.¹ published in the *Journal of Neurosurgery: Pediatrics* in which they address the abdominal pseudocysts and failure of peritoneal absorption in patients with ventriculoperitoneal shunts (Erwood A, Rindler RS, Motiwala M, et al. Management of sterile abdominal pseudocysts related to ventriculoperitoneal shunts. *J Neurosurg Pediatr*. 2020;25[1]:57–61). They propose as an algorithm ventriculoatrial shunts, ventriculopleural shunts, and/or reintroduction into the abdomen with a laparoscopic procedure.

We have previously reported on the usefulness of ventriculogallbladder shunts in the described setting.² Our patients ranged from 4 months to 17 years of age, and there were only 2 early shunt malfunctions and a late-onset 5-year malfunction. The follow-up for ventriculogallbladder shunts ranged from 1 to 8 years. We instituted this protocol after review of the animal experiments with ventriculogallbladder shunts³ and clinical experiences reported by others. We have had very good collaboration from our pediatric general surgery colleagues once the indications were explained to them, and procedures were performed as co-surgeons.

We recommend that where pediatric surgery is available, ventriculogallbladder shunts should be considered as a good alternative over others.

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Disclosures

The author reports no conflict of interest.

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Response

We are grateful for the insightful commentary from Dr. James regarding our article.

It is certainly true that ventriculogallbladder shunts are a viable alternative for patients in whom a ventriculoperitoneal shunt is not an ideal option. Like Dr. James, we have also had successful institutional experience with gallbladder shunts, placing them in 7 patients over the last 25 years. All 7 children had a history of intraventricular hemorrhage of prematurity and developed posthemorrhagic hydrocephalus. All of them underwent ventriculogallbladder shunting due to failed ventriculoatrial shunts with poor alternative venous access (e.g., internal jugular vein, subclavian vein, femoral vein, etc.), abdominal peritoneal scarring, and/or a history of abdominal pseudocysts.

The longest lifetime of a single gallbladder shunt was 17 years, and revision to a ventriculopleural shunt was ultimately required because abdominal adhesions precluded replacement into the gallbladder after it had retracted. The shortest lifetime of a gallbladder shunt was 7 days, because it became infected with gram-negative rods. The remainder lasted for a median of 2.4 years, ranging from 3 months (still in place) to 9 years. Most failures were ultimately distal, with findings of elevated gallbladder pressures or catheter retraction from the gallbladder. Only one child had his catheter replaced in the gallbladder after retraction, but this was a long, painstaking undertaking for our pediatric surgeons due to significant peritoneal scarring.

None of the children with sterile abdominal pseudocysts in our published series underwent gallbladder shunting as a result of their pseudocyst. However, 2 patients with gallbladder shunts had interesting clinical courses. One patient, who was included in our study, had a history of a failed gallbladder shunt from a distal disconnection that was converted to a ventriculoperitoneal shunt lasting 2 years prior to pseudocyst development. The gallbladder shunt had been originally placed for history of multiple failed ventriculoatrial shunts and peritoneal scarring, but no previous history of abdominal pseudocysts. A second patient developed an abdominal pseudocyst from ven-

tricoloperitoneal shunting and underwent immediate revision to a gallbladder shunt with simultaneous pseudocyst aspiration that was ultimately negative for infection. This patient was not included in our study because he had undergone shunt revisions within the last year.

From our small series, it is clear that a ventriculogallbladder shunt placed with the assistance of our pediatric surgeons can be a long-term solution for many patients in whom “traditional” sites are no longer available. However, dense peritoneal adhesions that are often present in patients who develop pseudocysts may or may not involve the right upper quadrant. If present, this situation would make gallbladder dissection difficult. This again highlights the importance of laparoscopic assistance in dealing with this group of patients.

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The fallacy of sunk cost: decision-making after intrauterine myelomeningocele repair

TO THE EDITOR: We read with interest the article by Dewan and Wellons¹ (Dewan MC, Wellons JC III. Fetal surgery for spina bifida. JNSPG 75th Anniversary Invited Review Article. *J Neurosurg Pediatr.* 2019;24[2]:105–114). The authors provide an excellent review of intrauterine myelomeningocele (MMC) repair and expertly identified the shifting attitudes of hydrocephalus treatment following the Management of Myelomeningocele Study (MOMS) trial.² In the trial, the shunt placement rates were 40% in the prenatal surgery group and 82% in the postnatal surgery group. During the trial, a blinded adjudication group judged the need for shunt to be 68% and 98%, respectively. Dewan and Wellons¹ provide several reasons for a “cultural pivot in attitudes regarding shunt placement.” We encourage careful consideration in the assessment and treatment of hydrocephalus or ventriculomegaly in these patients with intrauterine MMC repair, as they are very susceptible to the “sunk cost bias.”

The sunk cost bias is the tendency to pursue a predisposed course of action because of previously invested resources.³ Intrauterine MMC surgery requires a great amount of effort and resources invested before the child's first breath. Investments in intrauterine surgery encompass capital, logistical, and human elements. The mother is at increased risk of pregnancy complications or uterine dehiscence (one-third of women), and the child is at risk

of premature birth and the associated morbidity, including respiratory distress syndrome of prematurity.^{2,4} Additionally, only 50 centers worldwide (21 in North America) offer this procedure, requiring careful coordination of telehealth, maternal travel and relocation, and parental trust in a novel procedure.⁵ Ultimately, the effort provided prior to birth to avoid CSF diversion is immense.

In the case of infants after prenatal or postnatal MMC repair, the decision against a CSF shunt may be influenced by sunk cost bias. The 1-year data of the MOMS trial demonstrated that almost 30% of children who met the initial shunt insertion criteria did not actually receive a CSF shunt in the prenatal repair group, compared with approximately 15% in the postnatal group. Tulipan et al.⁶ then revised the original criterion and noted that when also applying overt clinical signs of hydrocephalus, such as split sutures, bulging fontanelle, or sunsetting eyes, this discrepancy disappears. In the absence of overt clinical signs of hydrocephalus, the remaining findings fall on a spectrum and may be subject to personal biases such as the sunk cost bias.

Of course, the increasing popularity of endoscopic third ventriculostomy (ETV) and choroid plexus cauterization (CPC) may also in part explain the discrepancy. It would be interesting if future longitudinal data of the MOMS trial include data on *any* treatment for CSF diversion, including ETV, to clarify its role in discrepant shunt placement rates as well as if the same bias against placing ventriculoperitoneal shunts is also held against ETV/CPC.

All humans suffer losses disproportionately more than they enjoy triumphs, and the acknowledgment of a sunk cost is experienced as a loss. As the popularity of intrauterine MMC grows, more infants will require careful assessment of hydrocephalus. It is therefore increasingly important to understand common biases and seek unbiased opinions when diagnosing and treating this new, growing cohort of infants.

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Response

We appreciate the commentary by Dr. Yan and colleagues regarding our review of fetal surgery for spina bifida that was written in celebration of the *Journal of Neurosurgery's* 75th anniversary. The notion of sunk costs is something we, as physicians and surgeons, encounter frequently as clinical decisions are made in relation to the many preceding events, circumstances, and data points. Indeed, our group has previously acknowledged these decision modifiers in the literature and on the podium. But

we thank these authors for formally labeling this form of bias and for eloquently describing its conscious and subconscious influence. Few scenarios illustrate the sunk cost phenomenon better than hydrocephalus following intra-uterine MMC repair. To avoid their potentially deleterious influence, we must first recognize their existence. Disallowing sunk costs to manipulate our treatment recommendations will ensure that our patients—and their families—are offered the optimal treatment based on the objective data at hand.

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