Use of a Stop-flow Programmable Shunt Valve to Maximize CNS Chemotherapy Delivery in a Pediatric Patient with CNS Leukemia
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Introduction
The requirement for frequent intraventricular drug delivery in the setting of shunt dependence is challenging and can be a complicating factor for the treatment of CNS infection, neoplastic disease, and hemorrhage. This is especially relevant in the pediatric population where hematogenous malignancy requiring intrathecal drug delivery and shunt-dependent hydrocephalus are relatively more prevalent. Intrathecal chemotherapy agents can be prematurely diverted in these shunt-dependent patients. We report the use of a stop-flow programmable shunt valve to maximize delivery of intrathecal chemotherapy.

Methods
Literature review and case presentation. A 3-year-old male with acute lymphoblastic lymphoma (ALL) with CNS spread and disseminated intravascular coagulation (DIC) presented with spontaneous intracerebral and intraventricular hemorrhages. The patient then developed post-hemorrhagic hydrocephalus and eventually progressed to shunt dependence but still required frequent intrathecal chemotherapy administration. A ventriculoperitoneal shunt, equipped with a valve that allows for near cessation of CSF flow (Certas®, Codman, Raynham, MA), and a contralateral Ommaya reservoir were inserted to maximize intraventricular dissemination of chemotherapy.

Results
To the best of our knowledge, this is the first reported case of the use of a high-resistance programmable valve being used to virtually cease CSF flow through the distal shunt catheter temporarily in order to maximize intraventricular drug dissemination in a pediatric patient with CNS leukemia.

Conclusions
A high-flow programmable valve with a very high resistance setting option can be used in conjunction with an Ommaya reservoir to allow CSF diversion in shunt-dependent patients. Simultaneously it can be used to temporarily halt premature evacuation of the drug-containing CSF from the CNS in those who require intrathecal chemotherapy.