Giant Choroid Plexus Papilloma Resection Utilizing a Transcollation System

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Introduction

Large vascular brain tumors pose an exceptional challenge in young children. Choroid plexus papilloma is an example of a rare, often large and especially vascular neuroepithelial tumor that most commonly arises in children under five years old. Although patients may be cured by total resection, the characteristic vascularity of choroid plexus papillomas and carcinomas and their propensity to occur in children with relatively small intravascular blood volume produces very unique challenges related to intraoperative hemostasis.

Figure 1. Aquamantys transcollation system, Medtronic Advanced Energy, Portsmouth, NH, USA

The transcollation system offers another modality complementary to traditional and bipolar cautery, with the goal of improved intraoperative hemostasis (Fig. 1). It supplies a proprietary radiofrequency pulse coupled with saline irrigation to induce a high temperature environment, coagulating blood vessels below the frame of the surgical field where they are embedded in tissue. The saline flowing through the device tip cools the tissue, maintaining temperatures at 100° C, inhibiting vaporization, and inducing shrinkage of collagen in blood vessel walls.

Methods

A 3-year-old girl presented following a fall from her grandmother's lap. On thorough history, parents also noted progressive tremor over the last year, initially starting in the upper extremities and progressing to the lower extremities. A CT head with and without contrast revealed a lesion measuring 7.0 x 5.2 x 6.2 cm occupying the majority of the atrium and body of the right lateral ventricle with mass effect on the septum pellucidum and thalamus producing 11 mm of midline shift (Fig. 2).

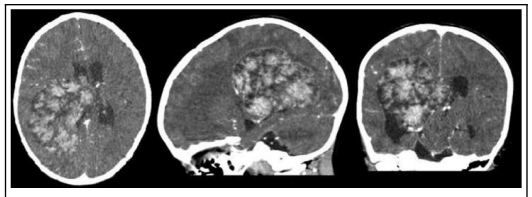

Figure 2. CT Head with IV contrast

MRI with and without contrast showed that the mass was predominantly T1 isointense signal and demonstrated marked lobular enhancement on post-contrast sequences (Fig. 3,4). Ill-defined enhancement was also seen concerning for leptomeningeal and ependymal tumor dissemination (Fig. 5).

A right parietal craniotomy was performed for resection of tumor. The transcollation device was used in lieu of standard bipolar cautery during the central debulking stage of resection. Given the large size of the lesion, the greater surface area covered by the transcollation system and the lack of tissue adhesion allowed for more rapid resection of tumor mass with excellent visualization.

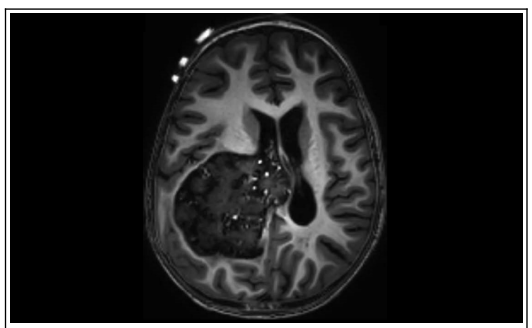

Figure 3. T1-weighted MRI brain

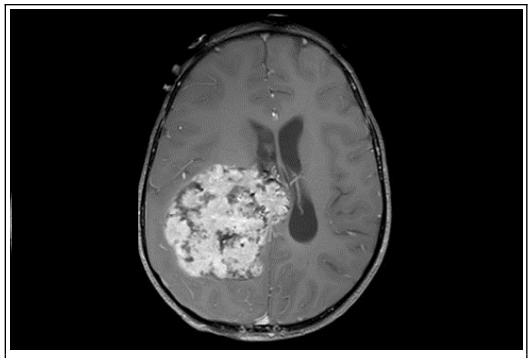

Figure 4. MRI brain, T1 post-contrast

Results

A transcollation system was used to maintain hemostasis during resection. Gross total resection was achieved with approximately 300 mL of blood loss, and the pre- and post-operative hemoglobin was 12.0 g/dL and 10.0 g/dL, respectively. Pathology analysis was consistent with WHO grade II atypical choroid plexus papilloma. Post-operatively, the patient was noted to be free of tremor or balance issues and was neurologically intact. Three month follow-up MRI confirmed resection of the tumor with return of normal brain architecture (Fig. 6).

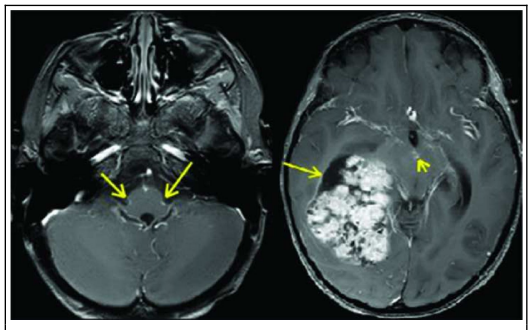

Figure 5. T1 post-contrast showing possible leptomeningeal enhancement.

Conclusions

Transcollation devices appear to be an effective and safe addition to the armamentarium of neurosurgical hemostatic options in intracranial tumor resection in which there is a high risk of intraoperative hemorrhage. To the author's knowledge, this case represents the first reported use of a transcollation device during resection of a large intracranial tumor in a child. The effects of thermoelectrical spread with use of this technology in brain tissue is not yet well understood, and we urge caution employing this near eloquent tissue, normal cerebral vasculature, and cranial nerves.

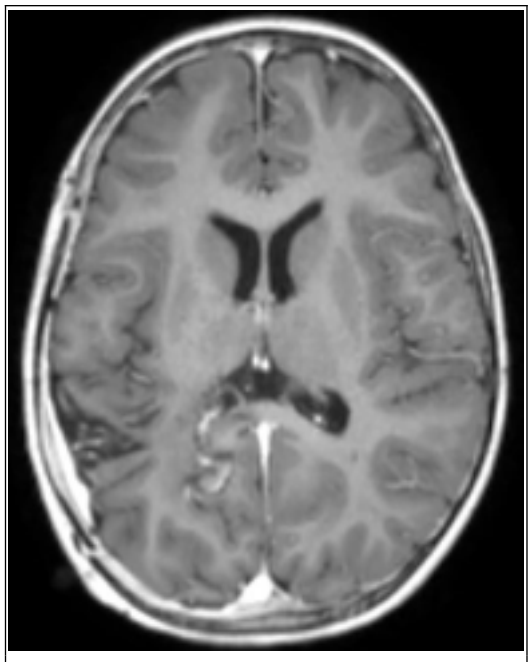

Figure 6. Three month post-operative MRI

Learning Objective

Readers should be able to discuss the efficacy and safety of a transcollation system in achieving hemostasis and minimizing blood loss in procedures with high risk of intraoperative hemorrhage.