EXTENDING THE INDICATIONS FOR
CHOROID PLEXUS RESECTION

POSTER ID: 41554
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DISCLOSURES

The presenting author and all supporting authors have no financial or nonfinancial disclosures. The presenting author agrees with the Terms and Conditions.
INTRODUCTION

The goal of choroid plexectomy is reduction of CSF output to limit excessive fluid diversion and to prevent overloading the body’s distal CSF absorption. Major indications for choroid plexectomy include: choroid plexus hypertrophy and papilloma, hydrocephalus, pseudotumor cerebri, hydranencephaly, and low socioeconomic status (financial limits to repeated shunt revisions or developing countries with limited access to shunts). In patients with brain tumors or other complicating comorbid conditions, chronic/repeated shunt infections/malfunctions requiring surgical revision can interrupt or delay chemotherapy or other life-saving interventions and prolong the treatment course. Yet, shunting is still the primary management in these cases, and repeated shunt revisions are often pursued for extended periods of time. We propose that in patients with chronic or repeated shunt infections/malfunctions, brain tumors, or other medical conditions that necessitate urgent treatment or that increase risk of shunt infection/malfunction, choroid plexectomy should be considered one of the primary candidates for definitive treatment early on in surgical care.
ILLUSTRATIVE CASE #1

• 2-year-old male with obstructive hydrocephalus secondary to hypothalamic pilocytic astrocytoma with polymyxoid features

• Tumor resection surgery and chemotherapy was indicated based on biopsy

• Third ventriculostomy was contraindicated due to tumor location, so a left VP shunt was placed prior to partial tumor resection

• Patient suffered from several distal malfunctions and received several shunt revisions (right subdural-peritoneal shunt, conversion of original left VP shunt to a subdural-pleural shunt, and EVD) that delayed chemotherapy for several months

T2 Axial Brain MRI on first admission after placement of right VP shunt.

T2 Axial Brain MRI showing tumor growth and worsening midline shift secondary to lowered ventricular pressure from peripheral edema and overshunting, despite high opening pressure and anti-siphon device.
ILLUSTRATIVE CASE #1

• In light of the numerous shunt revisions, open microscopic navigation-assisted complete bilateral choroid coagulation and resection was successfully performed with no complications.

• Patient has remained stable with chronic left subdural CSF collection and is receiving chemotherapy for residual pilocytic astrocytoma.

• In this case, choroid plexectomy served as a definitive treatment for the patient’s hydrocephalus, whereas further shunt revisions would have further delayed his chemotherapy.

Rapid T2 Axial Brain MRI s/p VP shunt and partial tumor resection.

T2 Axial Brain MRI 4 months after choroid plexectomy. Patient has maintained stable ventricular and tumor size and is currently undergoing chemotherapy for residual pilocytic astrocytoma.
ILLUSTRATIVE CASE #2

• 3-year-old male with PMH of pneumococcal meningitis with abscess, infantile spasms, bilateral inguinal hernias, left undescended testis, tracheostomy and Nissen fundoplication with G-tube placement for poor feeding and frequent aspiration, who presented with hydrocephalus, encephalomalacia, and cerebritis

• Right frontal VP shunt was placed but subsequently underwent multiple infections and malfunctions that required several revisions

T2 Axial Brain MRI before VP shunt placement showing ventriculomegaly of the lateral ventricles.

Rapid T2 Axial Brain MRI s/p VP shunt placement demonstrating decompressed lateral ventricles.
ILLUSTRATIVE CASE #2

• Choroid plexus coagulation and partial resection was performed, and the patient has been neurologically stable for the past 6 months

• This patient had extensive medical conditions and abdominal surgeries with surrounding tissue injury/scarring and subcutaneous hematoma prior to initial shunt placement and throughout subsequent revisions, predisposing him to shunt malfunctions

• Choroid plexectomy in this case was indicated because the patient was at high risk for, and actually did experience, shunt malfunctions

Rapid T2 Axial Brain MRI 4 months after choroid plexectomy showing stabilization of the size of the lateral ventricles.
ILLUSTRATIVE CASE #3

• 3-year-old female with a PMH of lissencephaly, GERD, and VACTERL association (anal atresia, VSD, and radial abnormalities) who presented with congenital hydrocephalus and macrocephaly

• She underwent a series of operations, including VP shunt placements and revisions, ETVs, and EVDs due to wound dehiscence secondary to thin scalp, CSF leakage, and shunt infections/malfunctions

• Patient’s treatment course was complicated by increased subdural fluid collection and Chiari secondary to overshunting

CT Comparison Study done on initial admission demonstrating abnormal skull morphology and ventriculomegaly.

Head MRI done on initial admission demonstrating abnormal skull morphology and ventriculomegaly.
ILLUSTRATIVE CASE #3

• Patient finally underwent bilateral choroid plexus coagulation and Chiari decompression, with reservoir placement and 2 consecutive reservoir taps; reservoir was left in place and capped in case of future CSF leaks or elevated ICP

• Patient is currently stable with no progression of her hydrocephalus for the past 7 months

• This patient, who had abnormal skull morphology (impeding the success of ETVs) and high risk for shunt infections/malfunctions (thin scalp, multiple GI surgeries), was an ideal candidate for choroid plexectomy early on in her treatment course

• Early choroid plexectomy would have prevented the need for extensive neurosurgical procedures and repeated hospitalizations

Head MRI after VP shunt placement and several revisions, with intervening ETVs and EVDs.

Head MRI s/p ETV, choroid plexus coagulation, and Chiari decompression demonstrating stable moderately dilated lateral ventricles.
SUMMARY
The incidences of shunt infections/malfunctions occurring within the first year of placement are currently reported in the literature to be at 10% and 15%, respectively. Moreover, although the lifetime rate of shunt revision varies markedly between studies, many have reported a rate of as high as 50%. In patients with concomitant brain tumors or other medical conditions that predispose them to shunt infections/malformations, the high rate of shunt complications often leads to repeated revisions that delay other necessary interventions or lengthen and complicate their treatment course. Nevertheless, prolonged repeated shunt revisions continue to be the mainstay management in these patients. As our patients demonstrated, choroid plexectomy served as a definitive treatment for their hydrocephalus, whereas further shunt revisions would only have delayed chemotherapy (case #1) or prolonged treatment (cases #2 and #3). Thus, in patients with hydrocephalus who have a propensity for shunt infections/malfunctions, the threshold indication for choroid plexus resection should be lowered to hasten resolution of their hydrocephalus and progression to other nonsurgical management.