Endoscopic Surgery in Nonhydrocephalous Third Ventricular Colloid Cysts: A Feasibility Study

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BACKGROUND: **The aim of this study was to investigate the feasibility and effectiveness of endoscopic neurosurgery for patients with third ventricular colloid cysts but without ventriculomegaly.**

METHODS: **Seventy-one patients with third ventricular colloid cysts were identified and recruited to this study. Eighteen of these patients did not have concomitant hydrocephalus and underwent primary endoscopic surgery for cyst resection. The surgical technique, the success rate, and patients' outcome were assessed and compared with another 53 patients with hydrocephalus who underwent similar procedures. Our study was performed in a retrospective basis, although in middle of our work we decided to study and follow nonhydrocephalus cases prospectively.**

RESULTS: **The ventricular compartments were successfully cannulated and gross total resection and near total resection of the colloid cysts was achieved in all patients. There were no persistent operative complications related to the endoscopic procedure. The success rate for endoscopic surgery in patients without hydrocephalus was similar to its value in patients with hydrocephalus.**

CONCLUSIONS: **Endoscopic resection of third ventricular colloid cyst in patients without hydrocephalus seems to be feasible, effective, and not contraindicated.**

INTRODUCTION

Colloid cysts are benign developmental lesions that commonly occur at the anterior roof of the third cerebral ventricle close to the foramen of Monro. They account for 0.5%–2% of all intracranial and 15%–20% of all intraventricular tumors (2, 13). Despite their rare occurrence, colloid cysts are important clinical problems as they interfere with the cerebrospinal fluid (CSF) outflow, can cause prominent hydrocephalus, acute deterioration, and, rarely, sudden death (5). Therefore, early detection and treatment are highly recommended (4).

The optimal management of colloid cysts has always been a debatable issue during the past decades. Treatment options include CSF diversion procedures, stereotactic aspiration, microsurgical resection, and endoscopic removal of colloid cysts (7–9). The transcallosal or transcortical craniotomy has been the traditional approach for microsurgical resection of colloid cysts for many years. Because of its capability of accomplishing a complete resection, the microsurgical approach has been considered as the gold standard technique for treatment of colloid cysts. However, it is associated with significant morbidity and prolonged postoperative hospital stay (7, 10), although some studies favored microsurgery over other techniques (13, 14, 17). On the other hand, endoscopic resection of colloid cysts has been associated with lower risk of complications, less operative morbidity and postoperative shunt dependency, reduced operative time, shorter hospital stay, and lower infection rate, but with a slightly higher recurrence rate (7, 11, 12, 20).

Most cysts that are 1 cm or larger or those associated with symptoms or signs are recommended for treatment.

Total extirpation of colloid cysts using endoscopic neurosurgery has frequently been reported since the advent of modern endoscopic equipment (3, 6). Endoscopic neurosurgery has been considered as the first-line approach for removal of colloid cysts in the presence of ventriculomegaly (1, 18). But, it usually is avoided in patients without hydrocephalus owing to presumed difficulties with ventricular cannulation and intraventricular navigation, and the perceived risk of greater morbidity. However, some reports exist on the viability of the endoscopic approach for removal of colloid cysts and other brain tumors, as well as biopsy of periventricular and intraventricular brain tumors (15, 19). Here we present and review our experience in endoscopic treatment of patients with third ventricular colloid cysts and discuss the

Key words
- Caudate
- Colloid cyst
- Endoscopic
- Fornix
- Hydrocephalus

Abbreviations and Acronyms
CSF: Cerebrospinal fluid
MRI: Magnetic resonance imaging

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treatment outcomes and complications, particularly in patients with normal-size ventricles.

METHODS

Patient Selection

From September 2004 to September 2012, 96 patients with third ventricular colloid cysts were treated at Loghman Hakim Hospital, Shahid Beheshti Medical University, Teheran, Iran. Our center is known as the referral center for brain microsurgery and neuroendoscopic procedure skull base and ventricular. Of these patients, 25 underwent open craniotomy and 71 patients were treated with endoscopic surgery. Craniotomy was selected as the surgical approach in 25 patients because of a previous shunting procedure, presumed very hard, not amenable to suctioning (based on low intensity on T_2-weighted magnetic resonance imaging [MRI]), failure of removal on previous surgery (referred from another center), or patient preference due to getting informed that, at that moment, the gold standard was microsurgical resection. By passing time and becoming more experienced, we have changed our priority from microsurgery for colloid cyst to endoscopic resection, which led us to propose this article. From the latter population, 18 (~25%; 8 men and 10 women; aged 18–56 years; mean age, 35.3 years) did not have radiographic indication of ventriculomegaly at presentation, and the other 53 (~75%; 24 men and 29 women; aged 30–62 years; mean age, 43.1 years) presented with hydrocephalus. Radiographic imaging were performed for a variety of reasons, including headaches, nausea, and incidental findings such as a minor closed head injury with progressive memory disturbance, altered cognition, and visual symptoms. To ascertain the accuracy of the preliminary judgment regarding the normal size of the ventricular system in patients with no apparent hydrocephalus, a two-dimensional measurement of the frontal Evan's ratio was performed on preoperative MRI scans by an independent radiologist. A value of less than 0.30 was considered the normal-size ventricle. Our study was performed in a retrospective basis, although in middle of our work we decided to study and follow nonhydrocephalus cases prospectively. The Research Deputy of Shahid Beheshti University of Medical Sciences granted approval for the review of medical records and conducting this study.

Endoscopic Surgery

All procedures were performed using general anesthesia in patients laid in supine position with the head elevated to approximately 30° above the horizontal plane to minimize CSF egress through the endoscope. All patients received intravenous antibiotic prophylaxis before skin incision. An access point offering the most direct intraventricular path to the tumor site was selected on the nondominant side of the head, 5–6 cm anterior to the coronal suture at hairline, and 3–4 cm lateral to the midline. A 4-cm linear skin incision was made parallel to the midline at the selected entry site and a 1-cm diameter burr hole was then created on the frontal bone to permit access to the ventricular space. The dura was incised, a ventricular catheter was introduced into the anterior horn of the lateral ventricle, and upon CSF return, controlled gradual insufflations of the ventricular system were performed with lactated Ringer's solution (Figure 1). During this step, which takes at least 5 minutes, we elevate the serum chamber above the Monroe foramen plane in a horizontal position up to 45 cm. This acheives 45 cm H_2O inside the ventricle during this induction period and afterward the anesthesiologist carefully checks the blood pressure and cardiac rhythm. Any changes are promptly reported and addressed by discontinuing the insufflation procedure. Subsequently, the access catheter was substituted with either a 0-degree, or rarely, a 30-degree rigid lens endoscope (Karl Storz, Tuttlingen, Germany) with an outside diameter of 6 mm and a 2-mm working channel.

After assurance about the being in the expanded ventricle, the ventricular catheter is gently removed and the endoscope sheath and lens is introduced instead. When inside of the lateral ventricle, the endoscope was oriented backward to observe the foramen of Monro, and guided toward the third ventricle through a trajectory perpendicular to the roof of the third ventricle, lateral

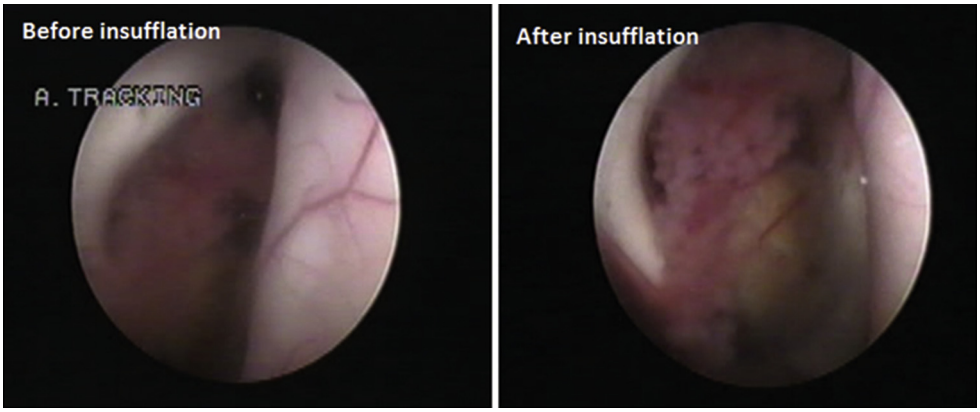

Figure 1. Endoscopic views of the ventricular space before *(left)* and after *(right)* insufflation.