

Microsurgical, Endoscopic, and Trans-Portal Resection of Colloid Cysts: A Comparative Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION**Support** - No support.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202670126**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 30 July 2026 and was last updated on 31 July 2026.**INTRODUCTION**

Review question / Objective To systematically evaluate and compare the efficacy and complication profiles of open microsurgical, endoscopic, and trans-portal techniques in the surgical treatment of third ventricular colloid cysts.

Rationale Although microsurgical and endoscopic techniques have been widely used for the treatment of third ventricular colloid cysts, the optimal surgical approach remains debated because of differences in extent of resection, recurrence, operative morbidity, and postoperative outcomes. More recently, minimally invasive trans-portal approaches have emerged as a promising alternative, but comparative evidence remains limited. An updated systematic review and meta-analysis including all three surgical strategies is needed to provide a comprehensive comparison of their efficacy and safety and to support evidence-based surgical decision-making.

Condition being studied Third ventricular colloid cysts are rare benign intracranial lesions located at the foramen of Monro that may cause obstructive hydrocephalus, increased intracranial pressure, acute neurological deterioration, and, in severe cases, sudden death. Surgical resection represents the standard treatment for symptomatic lesions and can be performed through microsurgical, endoscopic, or trans-portal minimally invasive approaches. However, the optimal surgical strategy remains controversial because each technique presents distinct advantages and limitations regarding extent of resection, recurrence, operative morbidity, and postoperative outcomes. This systematic review and meta-analysis aims to evaluate and compare the efficacy and safety of these three surgical approaches.

METHODS

Search strategy A systematic literature search had been conducted in PubMed, Embase, and the Cochrane Library to identify studies published between January 2000 and 2025 evaluating the

surgical management of third ventricular colloid cysts. The search strategy had combined controlled vocabulary and free-text terms related to “colloid cyst” and surgical approaches, including “microsurgery,” “open craniotomy,” “endoscopic,” “trans-portal,” and “trans-sulcal.” The reference lists of all included studies had also been manually screened to identify additional eligible publications. Only full-text studies published in English had been considered.

Participant or population The review included adult patients who underwent surgical treatment for third ventricular colloid cysts. Eligible studies had enrolled patients treated with open microsurgical, endoscopic, or trans-portal approaches. Studies including fewer than five patients, pediatric populations, non-surgical cases, studies with insufficient outcome or follow-up data, duplicate publications, non-English articles, and studies not specifically focused on third ventricular colloid cysts had been excluded.

Intervention Open microsurgical resection, endoscopic resection, and trans-portal resection for third ventricular colloid cysts.

Comparator Comparisons were performed between the three surgical techniques (microsurgical vs endoscopic, microsurgical vs trans-portal, and endoscopic vs trans-portal) for efficacy and safety outcomes.

Study designs to be included Retrospective and prospective observational studies reporting clinical outcomes of surgical treatment for third ventricular colloid cysts had been included. Eligible studies had evaluated open microsurgical, endoscopic, or trans-portal surgical approaches and had provided sufficient data on at least one predefined outcome of interest. Case reports, review articles, technical notes without clinical outcome data, conference abstracts, duplicate publications, and studies including fewer than five patients had been excluded.

Eligibility criteria Studies published between January 2000 and 2025 evaluating the surgical management of third ventricular colloid cysts in adult patients had been considered eligible. Included studies had reported outcomes following open microsurgical, endoscopic, or trans-portal resection and had provided sufficient clinical and follow-up data for analysis. Studies published before 2000, non-English articles, non-surgical studies, case series including fewer than five patients, pediatric-only studies, duplicate publications, studies with insufficient outcome or

follow-up data, articles that could not be retrieved, and studies not specifically focused on third ventricular colloid cysts had been excluded.

Information sources Electronic searches had been conducted in PubMed, Embase, and the Cochrane Library. In addition, the reference lists of all eligible studies had been manually screened to identify further relevant publications not retrieved through the electronic database search. Only full-text articles published in English were considered for inclusion.

Main outcome(s) The primary outcome was the pooled gross total resection (GTR) rate following open microsurgical, endoscopic, and trans-portal resection of third ventricular colloid cysts. Secondary outcomes included operative time, length of hospital stay, recurrence, mortality, postoperative complications (including seizures, memory deficits, motor deficits, postoperative hemorrhage, and infection), shunt dependency, and follow-up duration.

Quality assessment / Risk of bias analysis A formal study-level risk of bias assessment had not been performed. Therefore, methodological differences among the included studies were not systematically quantified. The findings were interpreted considering the retrospective design of most included studies, potential selection and reporting biases, heterogeneity in patient selection, surgical indications, outcome definitions, and follow-up duration, as well as the limited number of studies available for the trans-portal approach.

Strategy of data synthesis Meta-analyses had been performed using RStudio (Posit Software, Boston, MA, USA). Pooled estimates for gross total resection, operative time, hospital stay, follow-up duration, recurrence, mortality, and postoperative complications were calculated using DerSimonian–Laird random-effects models with 95% confidence intervals. Statistical heterogeneity had been assessed using Cochran’s Q test and quantified with the I^2 statistic. Differences among surgical approaches were evaluated using chi-square tests for subgroup differences within the meta-analysis. For categorical outcomes that could not be pooled through meta-analysis, χ^2 or Fisher’s exact tests had been applied, as appropriate. Statistical significance had been defined as a two-sided p value < 0.05.

Subgroup analysis Subgroup analyses had been performed according to the surgical approach, including open microsurgical, endoscopic, and trans-portal resection. Comparisons among the

three groups were conducted for gross total resection, operative time, hospital stay, follow-up duration, recurrence, mortality, and postoperative complications whenever sufficient data were available. Differences between subgroups were assessed using chi-square tests within the random-effects meta-analysis.

Sensitivity analysis No formal sensitivity analyses had been performed. Given the limited number of studies available for several outcomes, particularly for the trans-portal approach, all eligible studies meeting the predefined inclusion criteria had been included in the quantitative synthesis.

Country(ies) involved United States, Italy, Colombia, and Mexico.

Keywords Third ventricle; Microsurgery; Endoscopic surgery; Trans-portal surgery; Tubular retractor; Gross total resection; Systematic review; Meta-analysis.

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