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Review article

Natural history of incidental colloid cysts of the third ventricle: A systematic review

Anthea H. O'Neill [a], Cristian Gragnaniello [c], Leon T. Lai [a,b,*]

[a] Department of Neurosurgery, Monash Health, Melbourne, Australia[1]
[b] Department of Surgery, Monash University, Melbourne, Australia[2]
[c] Department of Neurosurgery, George Washington University, United States[3]

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ABSTRACT

Objective: Clinical significance and management of asymptomatic colloid cysts of the third ventricle is not well defined. The aim of this study was to investigate the risk of cyst progression necessitating surgical intervention during a surveillance period.
Methods: A systematic pooled analysis of the literature was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive search (conducted in December 2017) in MEDLINE and EMBASE databases, identified eligible studies. Data related to demographic (sex, age, size), clinical (surgical intervention, acute neurological deterioration, cyst related mortality) and radiological outcomes (cyst stability, progression, regression) were extrapolated and analysed.
Results: Of the 134 manuscripts identified, only 4 retrospective studies (176 patients) met the inclusion criteria. The level of evidence provided by these studies was low. During a median follow up of 61.2 months (IQR 41.6–70.1), 11 patients (8.6%, 95% CI 4.7–14.9) required surgical intervention due to either clinical or radiological progression. One patient experienced an acute neurological decline (0.8%, 95% CI −0.3–4.7), which eventuated in death a few years later. There were no reported cases of sudden death during this period. On radiological follow up, 86.7% (95% CI 78.5–92.2) of cysts remained stable, 11.2% (95% CI 6.2–19.2) progressed, and 2.0% (95% CI 0.1–7.6) regressed in size.
Conclusion: For incidental colloid cysts deemed appropriate for conservative management, there is a 5–15% risk of future progression necessitating operative intervention in the 5 years following diagnosis. The data presented supports the need for ongoing surveillance neuroimaging for asymptomatic colloid cysts.

1. Introduction

Surgical consideration for incidentally diagnosed colloid cysts of the third ventricle vary widely among institutions, with rates of operative intervention ranging between 0% and 57.1% [1–3]. This disparity in management may be explained in part by variation in clinician's judgement and experience, differences in institutional protocols, timing of evaluation and in general, a paucity of robust literature on the natural history of these lesions.

Symptomatic or large colloid cysts may present with headache, and can be associated with nausea and vomiting, blurred vision, gait ataxia, and altered cognition [4–6]. Because of their location, an enlarging cyst may cause obstructive hydrocephalus, resulting in acute rapid neurological deterioration and sudden death. For this reason, symptomatic or large colloid cysts are generally treated at the time of diagnosis.

Abbreviations: CSF, cerebrospinal fluid; FLAIR, fluid attenuation inversion recovery; MINORS, Methodological Index for Non-Randomized Studies; PICO, population, intervention, comparison, and outcome; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

* Corresponding author at: Department of Neurosurgery, Monash Health, Level 5, Block D, 246 Clayton Road, Clayton, Victoria 3168, Australia.
E-mail addresses: cristiang@email.gwu.edu (C. Gragnaniello), leon.lai@monash-health.org (L.T. Lai).
[1] Department of Neurosurgery, Monash Health, Level 5, Block D, 246 Clayton Road, Clayton, Victoria 3168, Australia.
[2] Department of Surgery, Faculty of Medicine, Nursing and Health Sciences, Monash University, Victoria 3800, Australia.
[3] Department of Neurosurgery, George Washington University, 2121 Eye Street, NW, Washington DC 20052, United States.

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Many colloid cysts, however, are asymptomatic and are diagnosed incidentally following cranial imaging for unrelated indications. The natural history of these cysts has not been well described, and many patients undergo repeated cranial imaging or clinical evaluations. Efforts to establish reliable prognostic factors for predicting future progression has been impeded by low incidence of these lesions, small number of reported cases in the literature and the inherent difficulty to conduct randomized controlled trials on the subject. The purpose of this study was to combine available quantitative literature data to determine the risk of cyst progression for asymptomatic colloid cysts deemed appropriate for conservative observation.

2. Methods

2.1. Eligibility criteria and information sources

The study search method adhered to a population, intervention, comparison, and outcome (PICO) protocol. Two electronic databases, including the Ovid Medline and EMBASE databases, were searched to identify articles relevant to the natural history of asymptomatic colloid cysts. This was further supplemented with manual screening of the bibliographies of all relevant retrieved publications. The authors did not include systematic reviews, guidelines or meta-analyses conducted by other authors, other than reviewing their bibliographies for potentially relevant citations. In studies where both symptomatic and incidental colloid cysts were reported, care was taken to extrapolate only data that were relevant to the incidental colloid cysts. When it was suspected that papers were based on the same study population (i.e., same study or same study centre), the paper with the most complete patient data or, if papers were equally complete, the paper with the longest follow-up data was included. Studies for which data extraction was not possible were excluded. Study authors were not contacted to obtain incomplete or unpublished data.

2.2. Study selection and quality assessment

A Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) search style was adhered to [7]. The following inclusions and exclusions were applied: patients with incidental or asymptomatic colloid cyst of the third ventricle; human patients; published in English and between 1 December 1980 and 1 December 2017; patients followed up clinically or radiologically for at least 6 months; contained quantitatively presented data; and contained >5 patients or patient samples.

A predesigned form was used to extract data from the included studies with emphasis on sample size, demographics, colloid cyst size, symptoms, presence of hydrocephalus, surgical intervention, time to follow-up, clinical outcomes, radiological outcomes, and mortality. Data extraction was performed by one reviewer (A. O'N) and was cross-checked by another (L.T.L). The methodological quality of all included studies was assessed by two reviewers (A. O'N and L.T.L) independently, using the Methodological Index for Non-Randomized Studies (MINORS) [8]. Inconsistencies between reviewers were discussed and resolved by consensus.

2.3. Definition of outcome measures

To quantitatively analyse the data, key outcome measures were recorded as: surgical intervention required (microsurgery, endoscopy or stereotactic aspiration) during the follow-up interval as a result of clinical or radiological progression; acute neurological deterioration when there was a significant and rapid decrease in conscious state over a period of one week or less (this was required to be clearly defined within the body of the manuscript and directly attributable to colloid cyst); cyst-related mortality when a death had occurred as a direct result of a cyst complication; and hydrocephalus, when studies reported the presence of ventriculomegaly on radiological imaging at the time of diagnosis or when the placement of an external ventricular drain was required.

Cyst size was recorded as stable when no change in size was reported at the conclusion of the follow up period, where this was identified on radiological imaging. Cyst progression was recorded when an increase in size was reported on radiological imaging, and regression when the cyst was documented to have decreased in size on radiological imaging, at any time during the follow up period.

2.4. Statistical analysis

For all included studies, the mean data on a study level (aggregate data) were presented using descriptive statistics. From each cohort, we estimated the cumulative incidence (event rate) and 95% confidence interval for each outcome using the modified Wald method. Data were analyzed using Statistical Package for the Social Sciences (SPSS) software version 21 (Statistical software for social sciences, SPSS Inc. Chicago, IL).

3. Results

The initial search yielded a total of 132 articles written in English. Additional records identified through references provided two further studies. The process of the literature search is depicted in Fig. 1. After exclusion of duplicates and irrelevant articles, 21 studies remained. Through abstract and then full text review, and exclusion of articles, a total of 4 studies remained with available quantitative data extracted for analysis. All included studies were retrospective case series and were published between 1996 and 2016.

The 4 manuscripts reported data for 182 patients with incidental colloid cysts that were subjected to non-interventional management with clinical and radiological surveillance (Table 1). Six patients were reported to have been treated immediately on diagnosis due to previously overlooked symptoms or cyst size. These cases were excluded from the analysis. In total, 176 patients were included in this review, of whom 70 were females (42.2%). The median age was 54.2 years (range 7.0–88.0 years). The median size of the colloid cysts was 7.5 mm (range 3.0–18.0 mm). Headache was the most common reason (25.4% of cases) for radiological imaging that led to the diagnosis. Ventriculomegaly was noted in 33.3% cases at diagnosis.

3.1. Clinical outcomes

All four studies reported on the clinical patient outcomes, with quantitative data available for 128 patients of the 176 patient cohort (Table 2).

Of the 128 patients that were followed up for a median period of 61.2 months (IQR 41.6–70.1), 11 (8.6%; 95% CI 4.7–14.9) had required surgical intervention, with microsurgery, endoscopic resection, or stereotactic aspiration. Five patients developed symptoms of raised intracranial pressure and underwent neurosurgical intervention. Five patients were treated following the discovery of increasing size of the colloid cyst on radiological follow up imaging. The indication for surgery in the final patient was not recorded.

During the follow up period, one patient (0.8%; 95% CI -0.3–4.6) experienced a sudden neurological deterioration due to acute

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