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Review Article

Surgical versus non-surgical treatment for pituitary apoplexy: A systematic review and meta-analysis

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ABSTRACT

Background: Pituitary apoplexy is a rare disease caused by a sudden hemorrhage into or infarction of the pituitary gland. Its optimal management remains controversial. The aim of this study was to compare the outcomes of surgical and non-surgical treatments for pituitary apoplexy.
Methods: A systematic literature search was performed of MedLine, EmBase, the Cochrane Library, and the Web of Science for articles published between January 1992 and September 2014. Studies of the outcomes in consecutive patients that compared surgical intervention with non-surgical treatment for pituitary apoplexy were included.
Results: Six studies met the inclusion criteria. As compared to the non-surgically treated patients, surgically treated patients had a significantly higher rate of recovery of ocular palsy and visual field (both $P < 0.05$). However, there was no significant difference in the recovery of visual acuity and pituitary function ($P > 0.05$) between the two groups.
Conclusions: The findings of our study suggest that surgical intervention should be advocated for pituitary apoplexy patients with visual field defects and ocular palsy.

Contents

1. Introduction

Pituitary apoplexy is a potentially life-threatening syndrome that classically presents with a sudden onset of headache, vomiting, visual difficulties, altered consciousness, and hormonal dysfunction [1,2]. Its early treatment is critical to avoid complications and prevent persistent ophthalmic deficits. However, whether surgical or non-surgical (hereafter referred to as conservative) treatment should be performed first remains controversial. Some studies [1,3,4] indicated that neurosurgical decompression should be preferred, while others [5–7] advocated conservative management initially, especially if the ophthalmic deficits are mild or non-progressive. This disagreement in the management of pituitary apoplexy emphasizes the need for additional studies to compare the two treatments.

Abbreviations: CI, confidence interval; OR, odds ratio.

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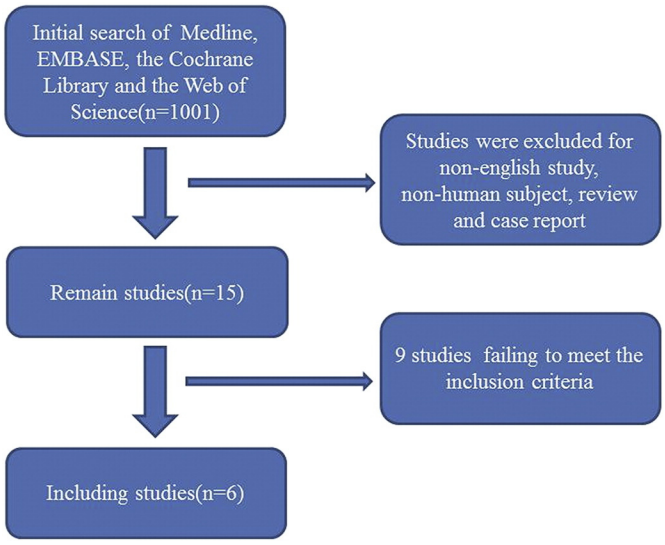

Fig. 1. Flowchart for identifying eligible studies.

The effect on patients receiving surgery versus non-surgical treatments has been extensively studied [5–10]. This study compared the outcomes of the two treatments for pituitary apoplexy—surgery and conservative methods—through a meta-analysis of the current relevant literature.

2. Materials and methods

2.1. Data sources, search strategy, and selection criteria

This review was conducted and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Statement, 2009 [11] We performed a systematic search in MedLine, EmBase, the Cochrane Library, and the Web of Science for relevant literature published between January 1992 and September 2014. The following terms were used in the search: pituitary apoplexy, pituitary apoplexy and treatment, pituitary apoplexy and surgical, pituitary apoplexy and conservative, and surgical and conservative. The titles and abstracts of all primary retrieved articles were browsed, and all observational studies were extracted. To identify additional candidate studies, the reference lists of the included studies and reviews were also reviewed.

The literature search and study selection were independently conducted by two authors. Any inconsistencies between these two authors were settled by a group discussion, until a consensus was reached. The inclusion criteria were as follows: 1) a direct comparison between surgical and non-surgical treatments for pituitary apoplexy, and 2) retrospective studies that included consecutive pituitary apoplexy patients. The exclusion criteria were as follows: 1) single-armed or non-human studies, or 2) non-investigative studies (technical reports, case reports, letters, or comments).

2.2. Data collection and quality assessment

The following descriptive data were extracted from each study included in the meta-analysis: year of publication; number of cases treated; years of follow-up; and the dichotomous data from the two treatments, such as visual acuity improvement, visual field recovery, ocular palsy recovery, and endocrine outcome. We also extracted the nb design factors in each study. A quality assessment of the retrospective comparative study was performed based on the Newcastle–Ottawa Scale, and each study was graded as 'I' if the score was >6 or 'II' if the score was ≤5 [12].

2.3. Statistical analyses

We examined the effect of surgical versus non-surgical treatments in patients with pituitary apoplexy on the basis of the events and total patients in each study. The odds ratio (OR) was used as the summary statistic; (an OR >1 favored conservative management for pituitary apoplexy, whereas an OR <1 favored surgery). Heterogeneity between studies was investigated using the chi-square test and I^2 statistic [13,14]. A fixed-effects model was used when $P > 0.10$ or $I^2 < 50\%$, or else a random-effects model was applied [15]. We also performed a sensitivity analysis by removing each individual study from the meta-analysis [16]. Furthermore, the Egger [17] and Begg tests [18] were used to statistically evaluate any publication bias. All reported P values are two-sided, and $P < 0.05$ was considered to be statistically significant for all included studies. Statistical analyses were performed using Review Manager 4.2 and STATA 11.0.

3. Results

From the publications search, 1001 articles were retrieved. Six articles [5–10] that met the inclusion criteria were selected to retrospectively compare the surgical and conservative treatments for pituitary apoplexy (Fig. 1). The data on the included studies are listed in Table 1, which shows that five studies were grade I and one study was grade II according to the Newcastle–Ottawa Scale [12].

Information on the cases with one of the two treatments is presented in Tables 2 and 3. Meta-analysis techniques were used to estimate the outcomes in the surgical intervention and conservative management groups. Five studies reported data on the visual field and ocular palsy (Table 2). Since there was no evidence of significant heterogeneity ($P = 0.9$, $I^2 = 0\%$), a fixed-effects model was used (Fig. 2A). As shown in Fig. 2A, a significant difference was found between the surgical and conservative groups in the recovery of the visual field (OR = 0.32, 95% confidence interval [CI] 0.1–0.97, $P = 0.04$). Neither the Begg's test ($P = 1.000$) nor the Egger's test ($P = 0.854$) identified any publication bias.

Using a fixed-effects model ($P = 0.9$, $I^2 = 0\%$), statistical significance was found between the surgical and conservative groups (OR = 0.17, 95% CI 0.03–0.79, $P = 0.02$) (Fig. 2B). Neither the Begg's test ($P = 0.806$) nor the Egger's test ($P = 0.342$) identified any publication bias.

The five studies showed no significant difference between the surgical and conservative groups in the deficiency of pituitary function after

Table 1
Data on the included studies.

Study	Year	Number of cases treated		Follow-up (median years)	Surgery status	Quality of study (grade)
		S	C			
J. Abucham	1995	5	7	3.5	≥2 weeks	II
J. Ayuk	2004	15	18	3.7	1–120 days	I
B. Vaidya	2004	27	18	4.9	1–121 days	I
A. Gruber	2006	10	20	4.4	1–24 days	I
T. Brue	2011	19	16	1.8	1–365 days	I
S. Jawansa	2014	32	23	7	1 day–3 years	I

S, Surgery; C, Conservative management.