



EXTENDED CONSERVATIVE APPROACH IN THE MANAGEMENT OF CSF RHINORRHEA

Neurosurgery

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ABSTRACT

Introduction: CSF rhinorrhea is a potentially devastating condition which if left untreated leads to significant morbidity and mortality so timely and appropriate intervention is needed. Conservative methods of management is still an important aspect of management of all patients after the onset of CSF rhinorrhea. **Aims and Objectives:** To determine feasibility of conservative approach and to find out whether this approach increases complications and recurrence. **Methodology:** Clinical history and physical examination followed by certain investigations were performed in all patients and clinical outcome of each patient was noted in terms of improvement of symptoms. **Results:** Extended conservative approach was found to be safe and effective in management of CSF rhinorrhea **Conclusion:** Extended conservative approach can be safely applied to treat CSF rhinorrhea

KEYWORDS

CSF Rhinorrhea; Controversies; Management; Surgery; Conservative.

INTRODUCTION:

Cerebrospinal fluid rhinorrhea is the leakage of CSF through the nasal cavity owing to disruption of barriers between the anterior and middle cranial cavity and the sinonasal cavity. There is still a major controversy in its management as it can lead to significant mortality and morbidity in cases of delay in the diagnosis and inappropriate intervention. Trauma continues to be the major etiological factor (80-90% of cases) [1] with the majority of cases presenting within the first three months [2,3]. Other etiologies include: postoperative defect (10%), spontaneous leak (3-4%), tumor, and inflammation. Nontraumatic cerebrospinal fluid fistulae tend to occur less frequently, and most of them are related to diseases that cause increased intracranial pressure or local skull destruction [4,5]. Such conditions include hydrocephalus, tumors, osteomyelitis of the skull and brain cysts. Congenital skull defects can also serve as the source of fistulae, usually occurring in the anterior cranial fossa resulting in a communication with the CNS that can lead to various complications such as meningitis that can impart significant morbidity & mortality to the patient. Untreated CSF leaks can represent a potentially life threatening situation leading to meningitis, brain infection, stroke and death. Hence, timely diagnosis and repair is warranted to minimize this risk. Even though endoscopic repair of CSF rhinorrhea is now an established entity in literatures, there is no clear cut guidelines regarding the role of conservative management to treat CSF rhinorrhea [6,7]. In addition, no authors have consistently analyzed the success of nonsurgical treatment modalities, such as bed rest, Acetazolamide, laxatives, and still little is known about the most appropriate method of diagnosis and treatment of CSF rhinorrhea, the need for antibiotics, and the surgical indications and timing of intervention. There is no reported study suggesting the outcome following extended conservative approach. This study tries to find out outcome of CSF rhinorrhea following extended conservative approach.

MATERIALS AND METHODS:

The study was conducted in the Institute of Neurosurgery, Madras Medical College from January 2021 to January 2023. All the patients attending OPD or admitted in the Department of Neurosurgery with the complaint of CSF rhinorrhea were included in the study. Patients admitted with trauma and developed subsequent CSF rhinorrhea were also included. Detailed history regarding present, personal and past history were obtained. History regarding mode of injury (if any), onset of symptom, duration, surgical procedure (if performed) were obtained. Each patient underwent detailed clinical examination followed by CT brain with CT Cisternography. Follow up was done at 1 month, 3 months and 6 months. Conservative management were continued for 3 months & surgical intervention were contemplated only if symptoms persisted for 3 months. Conservative management consisted of bed rest with head end elevation, avoidance of straining factors such as nose blowing, sneezing, coughing, use of laxatives to avoid straining and use of diuretics such as acetazolamide to reduce the intracranial pressure. Clinical outcome of each patient were noted in terms of

improvement of symptom. Statistical Analysis was performed with help of Epi Info (TM) 3.5.3. EPI INFO is a trademark of the Centers for Disease Control and Prevention (CDC). Using this software, basic cross-tabulation, inferences and associations were performed. Means along with the standard deviations were calculated under descriptive analysis. χ^2 test was used to test the association of different study variables with the study groups. Z-test (Standard Normal Deviate) was used to test the significant difference between two proportions. t-test was used to compare the means. $p < 0.05$ was considered statistically significant.

RESULTS:

Out of the 90 patients which we selected, 81 patients (90%) had history of head trauma, 6 patients (6.66%) presented following Transnasal Transphenoidal approach for pituitary macroadenoma and in 3 patients (3.33%) presentation was spontaneous & cribriform plate was the most common site of defect which is at par with most other studies.

Etiology	Number	Percentage
Head injury	81	90%
Spontaneous	3	3.30%
Transnasal surgery	6	6.70%
Total	90	100%

90.0% of the patients had head injury which was significantly higher ($Z=11.78$; $p<0.0001$). Only 3.3% and 6.7% had spontaneous and TNS surgery respectively.

Location of the defect	Number	Percentage
Cribriform plate	81	90%
Frontal sinus	3	3.30%
Sellar floor	6	6.70%

Most of the location of trauma was Cribriform Plate (90.0%) which was significantly higher ($Z=11.78$; $p<0.0001$). Only 3.3% and 6.7% had location at Frontal Sinus and sellar Floor respectively. 93.3% of the patients were treated conservatively ($Z=12.74$; $p<0.0001$). Only 3.3% were managed with Endoscopy and another 3.3% were managed with Trans Cranial Surgery.

Management	Number	Percentage
Conservative	84	93.40%
Endoscopic	3	3.30%
Transcranial surgery	3	3.30%

Etiology	onservative	Endoscopic	Transcranial surgery	Total
Head injury	78	0	3	81
Row%	96.3	0	3.7	100
Column%	92.9	0	100	90
Spontaneous	3	0	0	3
Row%	100	0	0	100
Column%	3.6	0	0	3.3

Transnasal surgery	3	3	0	6
Row%	50	50	0	100
Column%	3.6	100	0	6.7
Total	84	3	3	90
Row%	93.3	3.3	3.3	100
Column%	100	100	100	100

Status of the patient	1 month		3month		6 months	
	Number	%	Number	%	Number	%
Persistent symptoms	247	30	6	6.7	0	0
Symptoms subsided	63	70	84	93.3	90	100
Total	30	100	30	100	0	100

Corrected Chi-square) test showed that there was significant association between etiology and management of the patients ($p=0.0057$). Most of the patients were managed conservatively which was significantly higher corrected Chi-square test showed that there was significant association between status of the patients and follow-up at different months of the patients ($p<0.0001$). For 30.0% of the patients symptoms were persistent at 1 month which significantly decreased over time. CSF leak subsided in 84 patients (93.33%) on conservative management only which comprised of bed rest, antibiotic coverage and avoidance of straining, coughing etc. However, the surprising finding here is that 63 patients (70%) were found to be asymptomatic within 1 month & 21 patients (23.33%) became asymptomatic in next two months on conservative management only. This finding is again in contrast to the available literatures which does not recommend trial of conservative management for more than 2-3 weeks. Operative interventions were required in 6 patients (6.66%) only of which one was due to head injury & other following Transnasal Transsphenoidal surgery. One patient was complicated with meningitis which resolved with conservative management itself. All patients were asymptomatic at follow up after 6 months.

DISCUSSION:

In 1981 Wigand was first to use nasal endoscope in the management of CSF leak [8]. With the invent of Functional Endoscopic Sinus Surgery (FESS), it is now easy to diagnose and treat the defect by minimally invasive transnasal approach, without any increased morbidity and mortality and with high success rate ranging from 83 to 100% [6,7]. Nevertheless, reports that spontaneous cessation of a CSF leak was possible led some to think that surgical intervention was unnecessary and unproven [9]. Calvert and Cairns [10] in a discussion of war injuries to the frontal and ethmoidal sinuses, described a number of cases in which CSF rhinorrhea healed spontaneously [11] Brodie et al published a metaanalysis in 1997 reviewing 6 studies and 324 patients with CSF leaks. Two hundred thirty-seven patients were treated with antibiotics while 87 were not treated with antibiotics. Meningitis was reported to have occurred in 2.5% of patients in the antibiotic group (6/237) and 10% of patients in the no-antibiotic group (9/87) [12]. Villalobos et al published a metaanalysis in 1998 that reviewed 12 studies and 1241 patients with CSF leaks. Seven hundred nineteen patients were treated with antibiotics while 522 patients were not treated with antibiotics. They found that patients were 1.34 times more likely to develop meningitis without the use of antibiotics when a basilar skull fracture had resulted in a CSF leak. With all causes of CSF leak, patients were only 1.10 times more likely to develop meningitis without the use of antibiotics. For this reason, they recommended not using antibiotics when CSF leaks are present [13]. However still certain controversies exists such as CT cisternography indidiagnosis, routine use of antibiotics & best modality of treatment for CSF rhinorrhea. Among the several causes of CSF leak, the most common cause is trauma which is reflected in our study too. In contrary to the available literatures which suggests B2 Transferrinas gold standard test to diagnose CSF rhinorrhea, we relied mainly upon patients clinical history & physical examination followed by CT brain & CT cisternography if required to document the site of leak. The reason behind it is that even though B2 Transferrin is a specific test to diagnose CSF rhinorrhea, the test is not readily available at all centres. As far as management of CSF rhinorrhea is concerned, we extended conservative management upto 3 months in all cases presenting with CSF rhinorrhea irrespective of its etiologies which again is in contrast to recent literatures which recommends a trial of conservative management for not more than 2-3 weeks. The reason behind this extended conservative approach is that most of the patients were reluctant to go for surgical intervention for a reason which was neither so obvious nor causing them severe discomfort, even though we explained to them the morbidities associated with CSF rhinorrhea. So what we did is that we kept patients on conservative management

under antibiotic coverage & other supportive measures for a period extending upto 3 months.

Choice of antibiotic in our case was Azithromycin as it is targeted against some common organisms causing meningitis such as *Streptococcus pneumoniae* and is declared as one of the safest and effective antibiotics by world health organisation and second, it has a long t-half of about 68 hrs. It was given as usual single dose for 3 days & repeated after every 3 weeks for a period of 3 months in certain cases which did not resolve within the timeline of 3 months. The logic to follow the extended conservative approach was to stop or reduce CSF leak at least temporarily in an attempt to buy time for granulation tissues and epithelialisation to occur & this may be the reason behind the success of this approach. The aim of our study was mainly to determine feasibility of conservative management & to assess whether conservative management increases complications and recurrence. The study suggested that conservative management can be extended for a longer period & antibiotics have definitely a role in reducing complications like meningitis which is in contrast to the finding by Villalobos who recommended not to use antibiotics in CSF leak [13]. The main limitation of this study was smaller number of cases. Larger and comparative series are required to determine if there are significant differences with this and other modes of management of the condition. A longer follow-up interval may have been required to fully ascertain the impact of conservative management.

CONCLUSION:

In a developing country like India where the resources are limited and most of the people are difficult to motivate for surgical intervention for reasons which are not so obvious, CSF rhinorrhea can be diagnosed based upon clinical history & imaging alone and conservative management can be extended successfully for a longer period without adding further morbidity or mortality. Even though controversy still exists regarding the most appropriate mode of management of CSF rhinorrhea, this study suggests that extended conservative approach under antibiotic coverage can be safely applied to treat this condition.

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