

## Feasibility of Extended Conservative Approach in Management of CSF Rhinorrhea

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### Abstract

*Context:* CSF rhinorrhea is a potentially devastating condition which if left untreated leads to significant morbidity and mortality so timely and appropriate intervention is needed.

*Aims and Objectives:* To determine feasibility of conservative approach and to find out whether this approach increases complications and recurrence.

*Settings and Design:* All patients attending OPD or admitted in the ward with CSF rhinorrhea were included in the study.

*Methods and Material:* Clinical history and physical examination followed by certain investigations were performed in all patients and clinical outcome of each patients were 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

CSF (Cerebrospinal fluid) rhinorrhea is leakage of CSF through the nasal cavity due to disruption of barriers between sinonasal cavity & the anterior and middle cranial fossa. It is one of the disease which still presents a major controversy in terms of its management and can lead to significant morbidity & mortality for the patient if there is delay in the diagnosis and timely and appropriate intervention is not taken. CSF leak most commonly occurs following trauma (80-90% of cases) [1] and 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 [4,5] 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. Such conditions include hydrocephalus, tumors, osteomyelitis of the skull and brain cysts. Congenital defects of the skull 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. Thus, timely diagnosis and repair is warranted to minimize this risk. Even though endoscopic repair [6,7] 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. 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

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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 Department of Neurosurgery, IPGME&R/BIN Kolkata from Feb 2016 to Nov 2017. All the patients attending OPD or admitted in the Department of Neurosurgery with the complaint of CSF rhinorrhea were included in the study. 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 detail clinical examination followed by CT brain with CT Cisternography. Follow up was done at 1 month, 3 month and 6 month. 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.

### Results and 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 meta-analysis 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 in diagnosis, 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 Transferrin as 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. Out of 30 patients which we selected 27 patients (90%) had history of head trauma, 2 patients (6.66%) presented following Transnasal Transsphenoidal approach for pituitary macroadenoma and in 1 patient (3.33%) presentation was spontaneous & cribriform plate was the most common site of defect which is at par with most other studies. Out of these

30 patients CSF leak subsided in 28 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 21 patients (70%) were found to be asymptomatic within 1 month & 7 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 2 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. 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 followup interval may have been required to fully ascertain the impact of conservative management.

**Statistical Analysis**

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.

$\chi^2$  test was used to test the association of different study variables with the study groups. Z-test

**Table 1:** Distribution of etiology of the patients

Etiology	Number	%
Head Injury	27	90.0%
Spontaneous	1	3.3%
TNTS Surgery	2	6.7%
Total	30	100.0%

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 TNTS surgery respectively.

**Table 2:** Location of defect of the patients

Location of defect	Number	%
Cribriform Plate	27	90.0%
Frontal Sinus	1	3.3%
Sella Floor	2	6.7%
Total	30	100.0%

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 Sella Floor respectively.

**Table 3:** Management of the patients

Management	Number	%
Conservative	28	93.4%
Endoscopic	1	3.3%
Trans Cranial Surgery	1	3.3%
Total	30	100.0%

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.

**Table 4:** Etiology and management of the patients

Etiology	Management			Total
	Conservative	Endoscopic	Trans Cranial Surgery	
<b>Head Injury</b>	26	0	1	27
Row %	96.3	0.0	3.7	100.0
Col %	92.9	0.0	100.0	90.0
<b>Spontaneous</b>	1	0	0	1
Row %	100.0	0.0	0.0	100.0
Col %	3.6	0.0	0.0	3.3
<b>TNTS Surgery</b>	1	1	0	2
Row %	50.0	50.0	0.0	100.0
Col %	3.6	100.0	0.0	6.7
<b>Total</b>	28	1	1	30
Row %	93.3	3.3	3.3	100.0
Col %	100.0	100.0	100.0	100.0

$\chi^2=14.54$ ;  $p=0.0057$  S-Significant

Corrected Chi-square ( $\chi^2$ ) 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

**Table 5:** Comparison of status of the patients at different follow-up

Status of the patients	At 1 month		At 3 month		At 6 month	
	Number	%	Number	%	Number	%
Symptoms Persistent	9	30.0%	2	6.7%	0	0.0%
Symptoms Subside	21	70.0%	28	93.3%	30	100.0%
Total	30	100.0%	30	100.0%	30	100.0%

$\chi^2=52.09$ ;  $p<0.00016$  S-Significant

Corrected Chi-square ( $\chi^2$ ) 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. only 1(3.3%) patient was complicated by meningitis. No patient died during treatment.

(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.

## 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.

### Key Messages

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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