

CSF Rhinorrhoea- 100% Success Rate -What do we do

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Abstract

Objective: The objective of this study is to assess the outcomes of Endoscopic Repair of CSF Rhinorrhoea .

Materials and Methods: The study was conducted at Yashoda Hospital, Hyderabad between 2011 to 2016, which is a Tertiary Referral Centre in South India.

Study Design: This is a Retrospective study.

Results: Among the 23 patients included in this study, 9 were male and 14 were female patients. The most common cause for CSF leak was found to be spontaneous and the second most common cause was trauma. Significant Female Preponderance was seen for CSF Leak. The most common site of Spontaneous CSF Leak was found to be the cribriform plate. There was no surgery failure, morbidity or mortality during the course of this study.

Conclusion: Endoscopic endo nasal approach is the safe and effective way to repair CSF Leaks of various aetiologies. Tensor fascia lata is an excellent graft yielding good post op results.

I. Introduction

Cerebrospinal Fluid Rhinorrhoea, also known as CSF Rhinorrhoea, is leakage of CSF from nostrils due to disruption of osseous, dural and arachnoid barriers between the nasal cavity and brain¹ CSF Fistula is characterised watery (CSF) discharge from nose, which is usually unilateral but can also be bilateral. Untreated CSF rhinorrhoea can lead to severe complications like meningitis and brain abscess which are seen in 10-40% of the patients. ² Endoscopic CSF fistula repair is a widely accepted mode of treatment. In this study we have tried to describe our experience and results.

II. Materials and Methods

All patients that presented CSF leak and operated upon by our department were included in the study. All patients were evaluated through plain and contrast CT brain in order to exclude space occupying lesions in patients having spontaneous leak and to delineate fractures in patients with traumatic CSF leak. All patients also underwent CT cisternogram in order to identify the leak and localize defect size. All patients with traumatic CSF leak were initially managed conservatively by the neurosurgery department. On failure of conservative treatment, they were then referred to us. We did not maintain record of patients with traumatic CSF leak who were successfully managed conservatively in the neurosurgery department.

All patients were operated upon by us through an endoscopic endo-nasal approach by a single surgeon . Initially, the nose was decongested using adrenaline or oxy metazoline-soaked pledgets. Rigid Hopkins rod-lens telescopes of 0° and 30° with a 4 mm diameter were used (Karl Storz Tuttlingen, Germany). Post decongestion, ethmoid defects were approached through ethmoidectomy, cribriform plate defects were approached through partial, middle turbinectomy and sphenoid defects were reached by identification of sphenoid ostium through a para septal approach. The bony defect was finally localized with the assistance of Valsalva manoeuvre. Once localized, it was fully exposed by the removal of 5-8 mm mucosa surrounding it. In 21 out of 23 patients, the defect was closed with layers of fat, fascia lata and gel-foam. In 2 patients, towards the final part of the study, the defect was closed with a tensor fascia lata and Haddad flap. Fibrin glue was finally applied over the grafts. Conclusively, both nostrils were packed with merocel packs. During the postoperative period, measures were taken to prevent elevation of intracranial pressure and patients were advised not to blow their nose. A CSF subarachnoid drain was placed in patients with traumatic defects and when the size of defect was more than 4 mm . Appropriate care of the drain was done .The nasal pack was removed after 5 days . Post-operatively, the patients were reviewed after 1 week, 15 days, 1 month, 3 months and 6 months. They were clinically examined for any CSF leak.

III. Results

A total of 23 patients were included in our study with 9 male and 14 female patients.

Cause of CSF Leak: Spontaneous CSF Leak was seen in 14 patients. We did not find intracranial cause in 13 patients and 1 patient was found to have pituitary adenoma. Traumatic CSF Leak was seen in 6

patients. Iatrogenic CSF Leak was seen in 3 patients. One among them had CSF Leak post-surgery for Olfactory Neuroblastoma. Another patient had CSF Leak post-surgery for pituitary adenoma and the third patient had CSF Leak post functional endoscopic sinus surgery. We discovered during the course of our study that the most common cause of CSF Leak was spontaneous and the second most common cause to be trauma.

Correlation with Age: The entire group constituted of patients in the age group ranging from 8 to 55 years. Patients with spontaneous CSF Leak were between 25 to 52 years of age with a mean age of 38.28 years. Patients with Traumatic CSF Leak were between 8 to 50 years of age with a mean age of 29.5 years.

Correlation with Sex: Among the entire group constituting of 9 male and 14 female patients, Spontaneous CSF Leak was seen in 3 Male and 11 female patients. (Significant Female Preponderance is seen). Traumatic CSF Leak was seen in 2 Male and 3 Female patients.

Clinical Presentation: All of the patients presented watery discharge from the nose while none of them had a history of Meningitis.

Duration of CSF Leak before surgery: The spontaneous group had CSF Leak for a duration of 0.4 to 84 months with a mean duration of 9.8 months. The Traumatic group had CSF Leak for a duration of 5 to 30 days with a mean of 11 days.

Site of CSF Leak: The most common site of Spontaneous CSF Leak was found to be the cribriform plate. Three leaks were from the sphenoid sinus, out of which one was from the lateral recess.

		Frequency
	Cribriform plate	10
	Sphenoid sinus	3
	Ethmoid sinus	1
	Total	14

Traumatic CSF Leak:

		Frequency
Valid	Cribriform plate	1
	Sphenoid sinus	3
	Ethmoids sinus	1
	Frontal sinus	1
	Total	6

Size of the Defect: For the entire group, size of the defect was in the range of 0.2 to 2 cm with a mean size of 0.9 cm. The Spontaneous CSF Leak Group had a defect size ranging from 0.2 to 2 cm with a mean size of 0.89 cm. The Traumatic CSF Leak group has a defect size ranging from 0.2 to 2 cm with a mean size of 0.96 cm.

Failure of Surgery/Success Rate/Complications: We did not encounter surgery failure or recurrence. No morbidity or mortality due to the surgical procedure was encountered in our series.

IV. Discussion

In this study, we have tried to evaluate the efficacy of endoscopic trans nasal repair for CSF Rhinorrhoea. Twenty-three patients were operated through an endonasal endoscopic approach.

Age

In our study, the mean age of patients with Spontaneous CSF Leak was 38.28 years and the mean age of patients with Traumatic CSF Leak was 29.5 years. Similarly other authors have found a statistically significant difference between the mean age of patients with a spontaneous leak (50.4 years) and those with a traumatic aetiology (42.8 years).³ Patients with spontaneous leak had higher age compared to patients with traumatic leak.

Sex Ratio

Vladimir Kljajic et al., found that 2/3rd of the patients with CSF leak in their study were male. In the traumatic group male patients were more than female patients, while most of the patients with spontaneous CSF leaks were females.⁴ But, in our study, spontaneous CSF leaks occurred predominantly in female patients (11/14). But, Traumatic CSF Leaks were equally distributed between male and female patients (3 each). Similar to our findings, female preponderance in spontaneous CSF group was found by some.⁵

Aetiology

In our study, we discovered spontaneous CSF leak was found to be the most common cause of CSF Leak and trauma to be the second most common cause. There are conflicting reports in the literature regarding

the relative incidences of traumatic and spontaneous CSF leaks. While Rajesh Reddy et al and Vladimir Kljajic et al found a higher incidence of posttraumatic CSF Leaks spontaneous leaks, others have found a higher incidence of spontaneous leaks.^{2,4,6} This difference in observations probably reflects a difference in hospital settings. Hospitals with an active neurosurgical department have a higher incidence of traumatic CSF leaks and hospitals with a predominant otorhinolaryngological referrals found a higher incidence of spontaneous CSF leak.

Clinical Presentation And Duration Of CSF Leak Before Surgery:

All of our patients presented with watery discharge from the nose. The mean duration of CSF Leak in the Spontaneous group ranged from 0.4 to 82 months (mean: 9.8 months) and in the Traumatic group, it ranged from 5 to 30 months (mean 11 days). Our findings were concordant to literature and the duration of CSF Leak in the spontaneous group was longer than the duration of CSF Leak in the Traumatic group. The study conducted by Virk et al. stated that the mean duration of CSF Rhinorrhoea in all patients was 11.8 months with a range of 1 to 36 months (median 8 months). In the spontaneous leak group, the mean duration (14.5 months) was significantly longer than in the traumatic cases (6.4 months) ($p < 0.05$).³

Site Of Defect:

Vladimir Kljajic et al. found the cerebrospinal fluid fistulas are commonly located in the ethmoid (35%) and sphenoid sinus (32%).⁴ Virk et al. found cribriform plate to be the most common site of CSF leak. It has been postulated that anatomy of the plate allowing for transmission of olfactory nerve fibres easily permits a CSF Leak.³ Our study located the most common site of spontaneous CSF leak to be the cribriform plate.

Success Rate:

Our study included 23 patients with 9 male and 14 female patients. Overall success rate was 100%. No surgical failure or complications were seen. In our study, the minimum follow-up was three months and none of the patients with spontaneous CSF Rhinorrhoea had elevated intracranial pressure which may be the reason behind the high success rates we achieved, even in patients with spontaneous CSF Rhinorrhoea. Nyquist and associates studied a similar size sample (28 patients) and reported an overall endo-nasal closure rate of 93.8% (30 of 32 procedures).⁷ Virk et al. had an overall success rate of 93% after first and 100% after the second operation.³ Presuuti et al reported a success rate of 88.5% (46/52) after the first attempt, and 98.1% (51/52 patients) after second attempt.⁸

Castelnuovo et al., reviewed the literature for 286 endoscopic CSF leak repairs and found 28 cases of failure at the first attempt.⁹ Most important step during the procedure which ensures successful repair is accurate identification of the site of defect and baring of at least 5mm of bone surrounding the defect before placement of graft. Other factors which may lead to failure are elevated body mass index, location of leak in lateral sphenoid, and a massive skull base defect.¹⁰ In all cases of failure causes of elevated intra cranial pressure should be ruled out.

Variations In Technique :

Closure with various materials like fascia lata, fat, cartilage, bone, fibrin glue, nasoseptal flap from nasal mucosa have been reported in the literature. In their meta-analysis, Hegazy et al., found no statistically significant difference among different grafting techniques and materials.¹¹ Similar conclusions were drawn by other authors also.⁹ In the series by Virk et al., repair of the skull base defect was performed with fat, fascia lata, oxidized cellulose, and fibrin sealant.² A piece of nasal septal cartilage was used to cover sphenoid ostia after packing the sinus with fat and fibrin glue. The efficacy of fibrin glue in preventing CSF leaks remains controversial. Mohindra et al., evaluated CSF leaks in 27 paediatric patients and found no statistically significant difference in outcome of endoscopic repairs with or without fibrin glue.¹² For our study, we made use of fat, fascia lata and fibrin glue in 21 patients. In two patients, tensor fascia lata and Haddad Flap and fibrin glue was used. A thin layer of fibrin glue was used over the graft in all the cases. We had good results with this technique.

There is no clear consensus on the use of lumbar drains although high success rates have been shown without their use. On the basis of a meta-analysis of 14 studies comprising 289 CSF Fistulae reports, Hegazy et al, advocated the use of lumbar drain for 3-5 days with idiopathic leaks, posttraumatic leaks, leaks associated with large defect (15 mm), recurrent leaks and leaks associated with a meningocele.¹¹

In the study performed by Vladimir Kljajic et al., they believed that the use of lumbar drains for 5 days had positive effects on the success of CSF repair.⁴ On the other hand, some authors do not use lumbar drains after CSF repair at all. In his study, Oles et al did not use lumbar drain and postoperative management was based on diuretics for 5 days and have reported good success rate.¹³ We have used lumbar drain in our patients with traumatic leaks and defect size of > 4mm with good success rate .

V. Conclusion

CSF Leaks of various aetiologies can safely and effectively be repaired by endoscopic endo nasal approach. This technique of repair with fascia lata and fat or Haddad Flap has a high success rate with minimal morbidity and mortality.

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