



A COMPREHENSIVE REVIEW OF CEREBRO-SPINAL FLUID RHINORRHEA AT GGH KAKINADA

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ABSTRACT

To avoid complications, CSF rhinorrhea needs to be treated appropriately. This study aimed to provide an overview of the patient data, as well as information on the causes, leak sites, contributing factors, and treatment outcomes of CSF rhinorrhea. Over a period of 1 year, a comprehensive study was carried out on patients who presented to Government General Hospital-Kakinada with an active CSF leak and did not respond to medical treatment. CT, CT_cisternography, and MR-Cisternography were used to collect data from clinical records. There were 15 cases, nine of which were traumatic leaks and six were spontaneous leaks. The cribriform plate was the most common location for leakage (8/15 cases), and all of those cases were successfully repaired using endoscopic surgery. The Keros Type II is most common based on depth of olfactory fossa. Imaging plays a crucial role. The standard treatment of CSF leak repair is endoscopic repair through endonasal route.

KEYWORDS : CSF –cerebrospinal Fluid; cerebrospinal fluid leak; skull base; cribriform plate; endoscopic surgical repair, Traumatic ,Intra cranial Tension(ICT)

INTRODUCTION:

CSF rhinorrhea is conventionally classified into traumatic and non-traumatic causes. The traumatic etiology again subdivided into iatrogenic and non-iatrogenic. Spontaneous CSF leaks are secondary due to tumours, hydrocephalus, meningitis and conditions associated with high Intra cranial tension(ICT). The risk factors for spontaneous CSF leak are female gender, obesity, elevated BMI and obstructive sleep apnea. Spontaneous CSF leaks are more common in middle aged females whereas traumatic are more common in young males. The early and accurate diagnosis of CSF leak can lead to better treatment outcomes.

MATERIAL AND METHODS:

A comprehensive study was conducted over a period of 1 year from December 2021-December 2022 including all the cases presented to GGH Kakinada with active CSF leak not responding to medical management. A total of 15 cases were taken into study including 9 males and 6 females, ages group of the patients varied from 18 to 48 with mean age of 31 years. In our study traumatic cases outnumbered spontaneous cases being 9 cases and 6 cases respectively. Cribriform plate (8 cases) is the most common site of CSF leak followed by fovea ethmoidalis (5 cases). Majority of the patients presented to GGH within 3 months of onset (9 cases) while 6 cases presented after 3 months and one case presented after 8 months. All patients underwent endoscopic CSF leak repair employing various types of grafts and flaps. 10 cases were

operated using flaps and 5 are operated using grafts. Out of 15 cases one case developed recurrence within one month post-operative period for which revision surgery was done and one case presented with post-operative meningitis.



Figure 1: patient with active CSF leak

Table 1: Patient characteristics and Demographic data

S.No	Group	Age	Sex	Etiology	Site Of Leak	Duration (Months)	Size (Mm)	Closure Method	Complications
1	Flap	18	F	Spontaneous	Fovea Ethmoidalis	2	3	Hadad Flap	Nil
2	Flap	22	F	Traumatic	Fovea Ethmoidalis	2	5	Middle Turbinate	Nil
3	Graft	24	M	Traumatic	Cribriform Plate	5	6	Fascia Lata + Septal Cartilage	Nil
4	Flap	27	M	Traumatic	Fovea Ethmoidalis	3	5	Middle Turbinate	Nil
5	Graft	27	M	Traumatic	Cribriform Plate	6	3	Fascia Lata + Septal Cartilage	Nil
6	Graft	29	M	Traumatic	Frontal	2	4	Fascia Lata + Septal Cartilage	Nil
7	Flap	29	M	Traumatic	Cribriform Plate	5	3	Hadad Flap + Septal Cartilage	Nil
8	Graft	29	M	Spontaneous	Fovea Ethmoidalis	8	5	Fascia Lata + Septal Cartilage	Nil
9	Flap	32	M	Spontaneous	Sphenoid	3	6	Hadad Flap	Nil
10	Flap	32	F	Spontaneous	Cribriform Plate	6	3	Middle Turbinate	Nil
11	Flap	35	F	Spontaneous	Fovea Ethmoidalis	1	2	Middle Turbinate	Nil
12	Flap	37	F	Spontaneous	Cribriform Plate	2	10	Middle Turbinate	Recurrence
13	Graft	39	M	Traumatic	Cribriform Plate	1	3	Fascia Lata + Septal Cartilage	Nil
14	Flap	42	F	Traumatic	Cribriform Plate	3	5	Middle Turbinate + Septal Cartilage	Meningitis
15	Graft	44	M	Traumatic	Cribriform Plate	5	6	Hadad Flap	Nil

DISCUSSION:

To avoid serious complications associated with CSF rhinorrhea it should be diagnosed and prompt management should be given at early presentation. Abnormal anatomical communications between the subarachnoid space and skull base provides communication between intracranial and sinonasal areas which leads to CSF leak. The causes of CSF leak of rhinorrhea are classified as traumatic and non traumatic(spontaneous). Farah Dayana Zahedi et al observed the following characteristics, the prevalence of traumatic CSF leaks were common in young adults males where as spontaneous CSF leaks are more common in middle aged females. Idiopathic intra cranial hypertension is one of the main factor responsible for primary spontaneous CSF leak. Out of total, 9 cases are traumatic origin and 6 cases are spontaneous leaks. In traumatic group 7 are males and 2 are female (figure 1) as males are more prone to risk of exposure to Road traffic accidents and physical trauma.

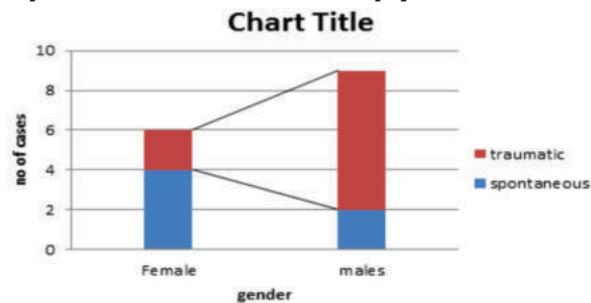


Figure 2: ethology vs gender

Imaging plays a crucial role in detailed assessment of skull base anatomy including anterior ethmoidal roof, cribriform plate and identification of leak site. HRCT of brain and PNS is the initial investigation of choice to identify the site of leak. While MRI has a role in spontaneous CSF leak cases. Diagnostic nasal endoscopy is to be done preoperatively to find the site of active leak.

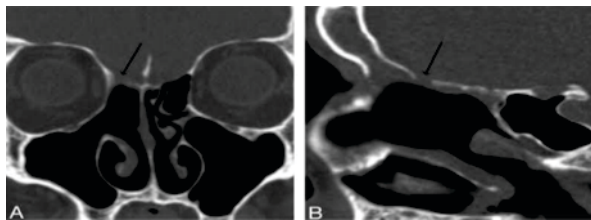


Figure 3: CT A) coronal & B) Sagittal section showing defect at cribriform plate

A proper pre operative evaluation of anterior skull base according to Kero's classification of olfactory fossa is very much essential in endoscopic skull base surgeries, the higher the depth of olfactory fossa the higher is the risk associated with it. Hence type 3 Kero's is more vulnerable for trauma. The ethmoid roof and cribriform plate being the thinnest structures at the skull base are more prone to injury. Increase in intracranial pressure due to tumors has tendency to inflict damage at the thinnest structures.



Figure 4: Intra-operative image showing active CSF leak meningoencephalocele

A combination of radiological and biochemical investigations is needed to optimise the diagnosis of CSF rhinorrhea. Majority of the traumatic cases are treated conservatively and have good prognosis. The conservative management includes head elevation, avoidance of straining, coughing and vomiting, proper antibiotic coverage, diuretics and treating underlying pathology in spontaneous cases (reduce ICP). Surgical intervention is needed in cases with persistent leak and in patients with complications. Sometimes the surgical outcomes can be challenging and require multidisciplinary involvement of otolaryngologist, neurosurgeon and maxillofacial surgeons.

In our study, endoscopic repair of the defect site was done employing various graft and flap materials with a success rate of (93.3%) 14/15. The usage of grafts (fascia lata) or flaps (hadad/middle turbinate flap) varies according to surgeons' preferences and surgical experience. In our institute, a multi-layered technique was preferred using autologous fat, septal cartilage and tissue sealant (surgical). Only one case developed recurrence postoperatively and revision surgery was done and one patient developed postoperative meningitis managed with antibiotics.

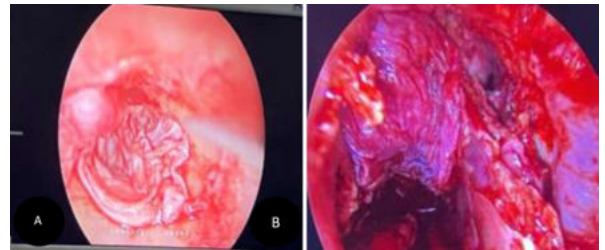


Figure 5: A) CSF leak repair using graft (fascia lata) B) CSF leak repair using Falp (middle turbinate flap)

The success outcome of endoscopic CSF leak repair depends on surgeons' experience, time of presentation, nature of leak (high or low pressure) and associated comorbid factors.

CONCLUSION:

Traumatic cases predominated the spontaneous cases in our study as majority of the cases are males and young age group. Cribriform plate was the most common site of leak. HRCT BRAIN & PNS, CT/MR Cisternography are the imaging modalities. Imaging plays an important role in accurate localisation in CSF leak, the assessment of anterior skull base anatomy, depth of olfactory fossa according to Kero's classification. Both conservative and surgical management were practiced and had successful outcomes. Endoscopic CSF leak repair is the mainstay of treatment for CSF rhinorrhea using multi-layered technique.

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