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RESEARCH ARTICLE

POST-TRAUMATIC RECURRENT CSF RHINORRHOEA

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Abstract

Traumatic cerebrospinal fluid (CSF) leak is seen in 2% of all the head injuries and 12-13% of cases with skull base fractures. Management of traumatic CSF leak is challenging because of multiple sites of leak, distorted anatomy and due to its high chances of recurrence. Prompt identification and meticulous management of these leaks is required to prevent complications. Here, we report one such interesting case of post-traumatic recurrent CSF rhinorrhea which was diagnosed after having recurrent meningitis secondary to CSF rhinorrhea. The patient was evaluated with CT-PNS and MRI cisternogram to identify the defects and surgical repair of the defects was done using multilayer technique. Immediate postoperative period was uneventful and he had no recurrence during 12 month follow-up period.

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Introduction:-

CSF rhinorrhea occurs due to the abnormal communication between the subarachnoid space and the nasal cavity^[1]. High velocity trauma like road traffic accidents can cause large and multiple skull base defects which leads to CSF rhinorrhea. Majority of CSF leaks resolve spontaneously with conservative management. Surgical repair is indicated when there is a persistent leak. In rare cases, CSF rhinorrhea can recur after an endoscopic repair, and these patients usually present with recurrent meningitis with the CSF leak being detected during the work up for recurrent meningitis^[2].

Case Report:

A 30-year-old man diagnosed with recurrent meningitis which was suspected to be secondary to CSF rhinorrhea was referred to us by neuro-physician. On thorough ENT evaluation, patient gave the history of watery nasal discharge from the left nostril 4 years ago which was intermittent in nature, after road traffic accident. He was diagnosed as traumatic CSF rhinorrhea and after 10 days, he underwent endoscopic repair elsewhere. 2 months post-surgery, he developed fever, headache, vomiting, neck rigidity and was diagnosed as pyogenic meningitis and was treated. 4 years later now, he again developed similar complaints of meningitis along with watery nasal discharge. The discharge was non-blood stained, cannot be sniffed back and aggravated on bending forward.

On clinical examination, active leak was noted from the left nasal cavity on bending forward. CT-PNS was advised, which revealed multiple defects (Fig 1). A Large defect noted extending from the right frontal sinus to posterior ethmoidal sinus, and a small bony defect 4.5 mm noted involving the roof of the right sphenoid at the sphenoid-ethmoidal junction. MR cisternogram reveals defect seen from posterior table of the frontal sinus to the posterior ethmoid sinus and at roof of sphenoid sinus seen as an inferior extent of fluid signal (Fig 2).

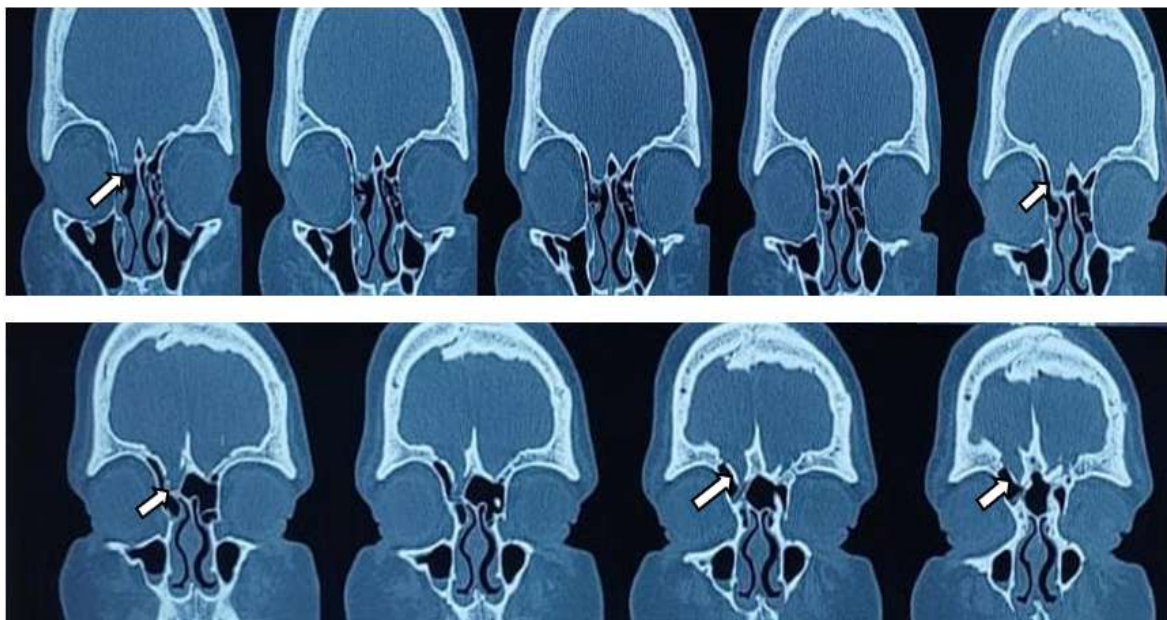


Fig1:- CT-PNS, showing the large defect in right frontal sinus extending into the posterior ethmoids.

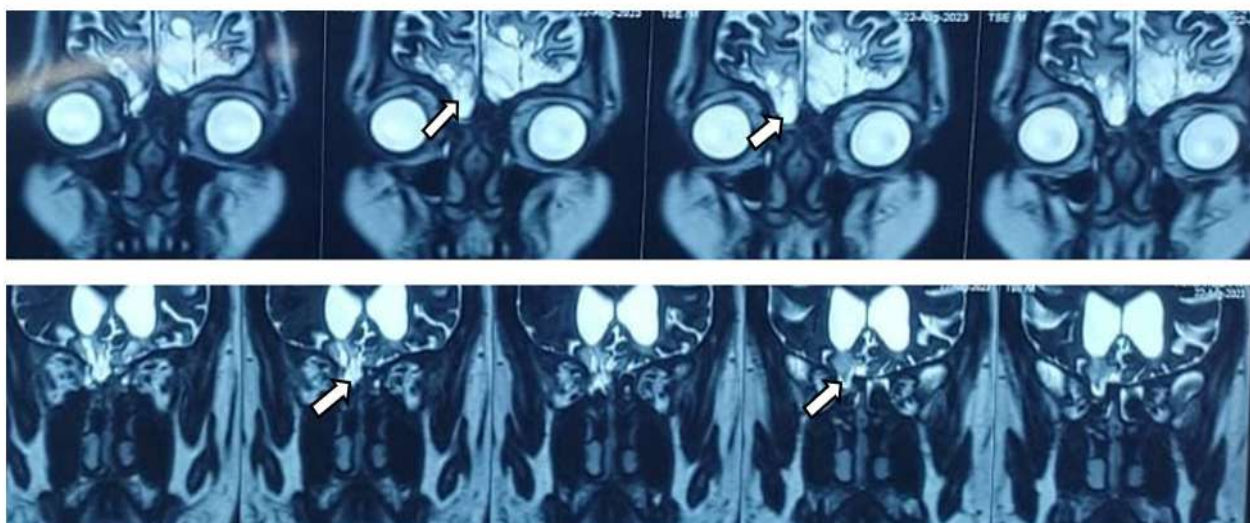


Fig. 2:- MRI-PNS, showing the defect seen from posterior table of the frontal sinus to the posterior ethmoid sinus and at roof of sphenoid sinus seen as a inferior extent of fluid signal.

The patient was planned for revision endoscopic CSF leak repair surgery. Frontal sinus ostium was widened after drilling the frontal sinus. Two defects with active leak were noted: one large defect in the right cribriform area, extending from posterior table of the right frontal sinus to the posterior ethmoidal region, and another small defect just posterior to it near the sphenoid sinus (Fig 3A, B). Stripping of frontal sinus mucosa all around the defects was done followed by obliteration of the defects in a multilayered fashion; a vastus lateralis muscle graft was harvested and was pushed to snugly fit as in a bath plug technique. Fascia lata was placed over it and reinforced with fibrin glue followed by a posterior septal flap in an overlaid fashion. This was supported by Surgicel and gel foam, followed by a nasal pack (Fig 4A, B). The immediate postoperative period was uneventful.

On postoperative day one lumbar drainage was done. No signs of recurrence was noted during the 12 month follow up period.

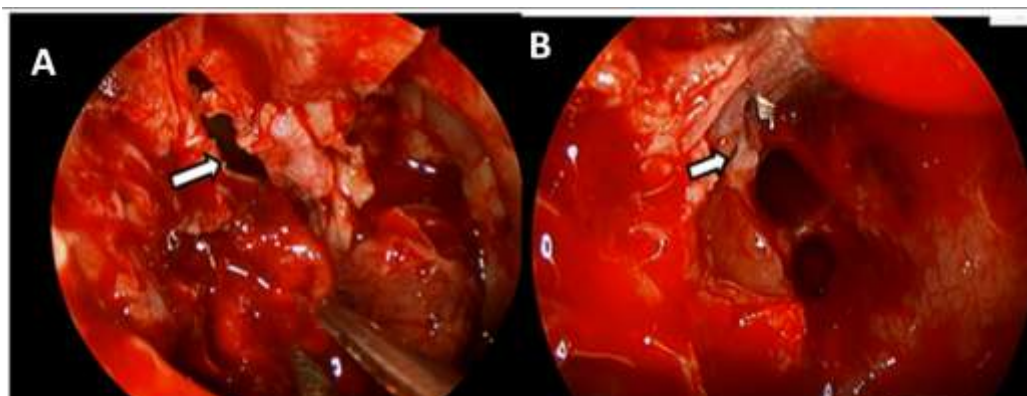


Fig. 3:- A) Intra-operative image showing a large defect noted extending from posterior table of the frontal sinus to the posterior ethmoidal sinus, B) a small defect near the sphenoethmoidal junction in the sphenoid sinus.

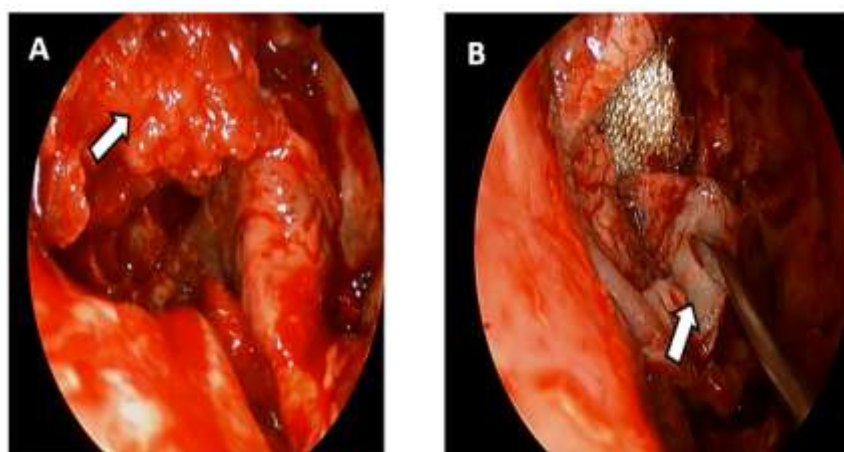


Fig. 4:- Showing the closure of the defect in multilayer fashion supported with (A) muscle layer, fascia lata, posterior septal flap and supported with (B) surgicel and gelfoam.

Discussion:-

Post traumatic CSF leak comprises about 80-90% of all CSF leaks^[7], they occur due to high velocity trauma like road traffic accidents which can cause large and multiple skull base defects. 12-13% of skull base fractures land up in CSF rhinorrhoea and carries about 10% risk of developing meningitis^[3]. These skull base fractures rupture the dura and can cause CSF leak which provides a route for microorganisms through this defect, so these patients are at high risk of developing acute bacterial meningitis^[5]. For its precise management, it is essential to know exact anatomy of the skull base^[5].

A thorough assessment of CSF leaks is crucial in cases of traumatic cause, as the origin of the leak is not necessarily limited to a single site but can be from multiple sites. The most common cause of traumatic CSF leak is due to the fracture at the junction of cribriform and fovea ethmoidalis^[5]. The presence of CSF leak is readily suspected if patient complains of a persistent, clear unilateral discharge from the nose after a head injury. It is important to recognize that, there are some instances where patients may exhibit recurrent episodes of post-traumatic meningitis even in the absence of an active leak.

HRCT-PNS is the best radiographic method to identify the extent of the defect but it is unable to identify or locate the sites of the leak. It helps in showing the bony details of the fractures. Cisternograms (CT, MRI) are the gold standard investigations to identify and confirm anatomical sites for CSF rhinorrhoea, and its accuracy in diagnosing active CSF rhinorrhoea is about 90%.

Majority of the traumatic CSF leaks (80-95%) do get resolved spontaneously within the first 24 to 48 hours^[3]. Conversely, when dealing with large and multiple defects, surgical repair is recommended in which there is a

high chance of getting meningitis due to ascending infection^[7]. Endonasal endoscopic approach is preferred, due to its advantages like minimal morbidity, olfactory preservation and shorter duration of hospital stay. The nasoseptal flap, which relies on the posterior septal branch of the sphenopalatine artery, is well suited for reconstruction of the large skull base defects.

The management of large fractures involving the frontal sinus and extending up to the posterior ethmoid includes meticulous stripping of the sinus mucosa, and packing the sinus cavity with muscle to prevent mucocoele and recurrence of CSF leak^[3]. Fibrin glue is the mostly used sealant, which is an amalgamation of the Fibrinogen, Thrombin, and the Ca cofactor. This provides a non-permanent closure and fabricates an additional barrier to CSF leakage at the time of healing of wound and fibrosis.

Lumbar drain is still a controversial choice. And over drainage may create a resultant pneumocephalus. Since graft displacement can be expected with increased intracranial pressure, in some cases lumbar puncture may be required postoperatively^[4]. Successful outcome of the procedure depends on the surgeon and the patient's post-operative care. During regular follow-ups, our patient had no recurrence and is doing well.

Conclusion:-

Post-traumatic cerebrospinal fluid leakage through the skull base is a critical condition that results in fulminating and recurrent pyogenic meningitis and serious complications if not managed properly.

Declarations

Funding:

No source of funding was required for the study.

Conflict of interest:

There is no conflict of interest.

Compliance with Ethical standards:

The Ethics Committee at our institute has confirmed that no ethical approval is required.

Financial interest:

Authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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