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Cerebrospinal fluid rhinorrhoea: an overview of endoscopic multilayer repair

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ABSTRACT

Background: A cerebrospinal fluid (CSF) rhinorrhoea occurs when there is communication between the subarachnoid space and the nasal cavity. CSF rhinorrhoea commonly occurs following head trauma (fronto-basal skull fractures), as a result of intracranial surgery or spontaneously. The aim of our article was to emphasize the importance of endonasal endoscopic surgery using multilayer autograft technique.
Methods: A total of 08 cases of CSF rhinorrhoea were treated. A retrospective study was undertaken to analyze the characteristics of 08 patients. After detailed otorhinolaryngoscopic examination, diagnostic nasal endoscopy and radiological evaluation by CT and MRI, all underwent endonasal endoscopic surgery. This article reviews the causes, diagnosis and treatment of CSF leakage of cases done with a 0 degree 4 mm sinoscope using fascia lata septal cartilage and fat as a graft material.
Results: The defects as large as 1.5 cm could be safely treated with this technique. The overall success rate of endoscopic repair for CSF rhinorrhoea has been 100%.
Conclusions: Endonasal approach is less morbid compared with external approach. Endoscopic surgery gives better visualization.

Keywords: CSF rhinorrhoea, Endoscopic repair, Cisternography, Multilayer technique

INTRODUCTION

Cerebrospinal fluid (CSF) leak is an escape of the fluid that surrounds the brain and spinal cord, from the cavities within the brain or central canal in the spinal cord. CSF rhinorrhoea occurs when there is a communication between the subarachnoid space and the nasal cavity. It is potentially very serious because of the risk of an ascending infection which can produce fulminant meningitis.[1] Surgical treatment of patients of CSF rhinorrhoea requires utmost skilled personnel and the success depends on a number of factors which include aetiology, intracranial pressure, concomitant injuries, patient age, general condition of patient and the possibility of an Interdisciplinary procedure. The other critical factor is impaired tissue repair, which may be due to lack of proper closure, inadequate support of weak healing tissues, and poor healing of tissue owing to infection, metabolic disorders and other chronic disease. Endoscopic repair of these defects is widely practiced, and has led to 90% success rate after first repair.[2] First endoscopic CSF rhinorrhoea repaired in 1981 by Wigand (~90% or better success rate).[3] Although traumatic leakage of CSF is more common, the first published case of CSF rhinorrhoea was a non-traumatic high pressure type due to hydrocephalus reported by Miller et al followed by reports by King et al.[4,5] The objective of the study was to emphasize the importance of endonasal endoscopic approach by using multilayer autograft

technique i.e.: septal cartilage, fascia lata, fat and tissue glue.

METHODS

A total of 08 cases of CSF leak of rhinologic origin were treated (June 2014 to April 2016). A retrospective study was undertaken to analyze the characteristics of 08 patients with CSF rhinorrhoea. Cases were selected from the patients coming to ENT OPD of our institute. After detailed otorhinolaryngoscopic examination (Figure 1), diagnostic nasal endoscopy (Figure 2) and radiological evaluation by CT (Figure 3) and MRI (sos cisternography), all underwent endonasal endoscopic surgery using multilayer autograft technique.

Figure 1: CSF leak from right nostril.

Figure 2: DNE showing CSF from sphenoid.

Technique

All the patients gave written informed consent; they underwent endonasal endoscopic surgery using multilayer autograft technique under general anaesthesia. Fat and cartilage were kept in underlay fashion while fascia lata was kept in overlay fashion and whole assembly supported by Gelfoam. We didn't use tissue glue in all cases cause of high cost and patient affordability. Antibiotics along with antihistaminic, stool softeners like syrup cremaffin, cough suppressants with 30 degree head elevation were administered to the patients. Merocel nasal pack with gel foam was kept for 48 hrs. Strict bed rest was given to patient for 2 weeks.

Figure 3: CT cisternography showing CSF leak.

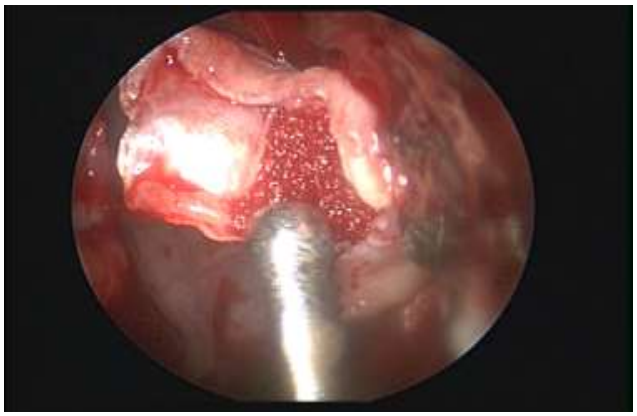

Figure 4: Fascia lata application.

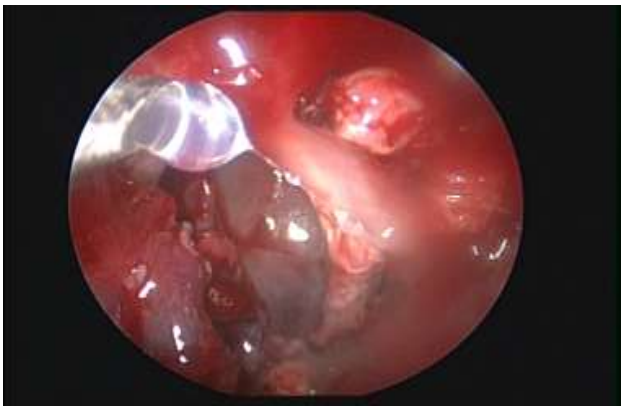

Figure 5: Tissue glue application.

Selection criteria

Cases were selected from patients coming to ENT OPD with CSF leak of rhinologic origin and defect less than 1.5 cm.

Exclusion criteria

Cases with CSF rhinorrhoea with defect size more than 1.5 cm.

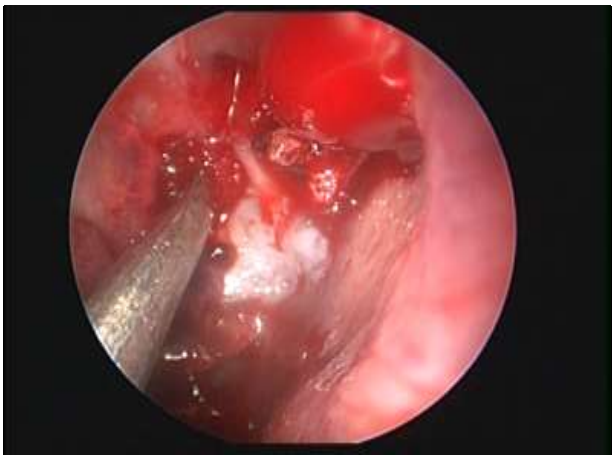

Figure 6: Gelfoam support.

RESULTS

Between June 2014 and April 2016, 12 patients visited to the ENT OPD of our institute. Out of which 08 underwent endoscopic repair of CSF rhinorrhoea at our institution. One patient was referred to Neurosurgeon for open repair as the defect was more than 1.5 cm and 3 patients managed conservatively. Age of the patients ranged from 09-40 years with overall male predominance but present study shows equal gender distribution. The durations of symptoms ranged from 1 day to 1 month.

Table 1: Gender and etiological distribution of patients.

CSF rhinorrhoea	Traumatic	Non traumatic	Total
Male	03	01	04 (50%)
Female	00	04	04 (50%)
Total	03 (37.5%)	05 (62.5%)	08 (100%)

Table 2: Diagnostic nasal endoscopic findings.

Site	No. of patients
CSF leak (+) with site of location as cribriform plate area	04
CSF leak (+) but site not identifiable	02
Menningocele from ant ethemoid	01
Adhesions	01
Total	08

Post traumatic leak was present in 03 patients and spontaneous leak in 05 patients. 04 patients had defect in cribriform plate, 02 had in anterior ethmoid and one each in posterior ethmoid and sphenoid respectively. Size of the defect ranged from 0.5 cm to 1.5 cm. Repair was successful in 100% patients; Mean follow-up was 6 months with a range of 4 months to 12 months.

Table 3: CT cisternography findings.

Site of defect	No. of patients
Cribriform plate	04
Anterior ethemoid	02
posterior ethemoid	01
sphenoid	01
Total	08

Table 4: Size of defect.

Size of defect (in mm)	No. of patients
0-5	01
6-10	04
11-15	03
Total	08

DISCUSSION

Most neurosurgeons prefer the intracranial approach for management of CSF Rhinorrhoea that leads to exposure of the skull base and the necessity of brain retraction which is associated with a significant risk of anosmia, intra-postoperative intracerebral hemorrhage and brain edema. Multiple approaches to the management of CSF rhinorrhoea can be successful. Endoscopic repair provides best exposure of the sphenoid, parasellar, and posterior ethmoidal regions and offer excellent visualization of fistulas in the posterior wall of the frontal sinus, the cribriform plate, and the fovea ethmoidalis. Transnasal endoscopic surgery minimizes intranasal trauma and preserves the bony framework supporting the frontal recess and other critical areas. In our study repair was successful in 100% patients with mean follow-up of 6 months ranging from 4 months to 12 months. Our results are comparable to those reported in literature.

Graft materials like cartilage, mucoperichondrium, septal mucosa, turbinate, fascia, abdominal fat, conchal cartilage, free tissue or pedicel tissue and composite grafts can be used to repair CSF leak.[9] Single layer autograft technique along with fibrin glue was tried for small (<05 mm) defect by Holger G et al. with success rate of 91.6%.[10] Schmerber S. et al used abdominal fat, fibrin glue and silastic sheet with success rate of ~95.5%.[11] Banhawy OA et al used fascia lata, septal cartilage and fat as a graft material with success rate of 100% (n=15).[12]

In our study we used multilayer graft i.e. fascia lata, septal cartilage, fat and fibrin glue for closure of CSF rhinorrhoea with success rate of 100%. Which is in accordance with Banhawy OA et al.

The defects as large as 1.5 cm could be safely treated with this technique. Patients with spontaneous CSF

rhinorrhoea, elevated BMI, lateral sphenoid leaks, and extensive skull base defects are at increased risk for recurrence. Alternative management options may need to be considered in these cases.

CONCLUSION

The success rate of repair was 100 %. We conclude that it is reasonable in majority of cases to proceed with endoscopic approach rather than going for external approach. Endonasal approach is less morbid compared with external approach. Endoscopic surgery gives better visualization. As revision surgery can be done with ease. Healing can be observed in follow up with endoscopic evaluation. Patient undergoing primary endoscopic repair have less likely chance of developing anosmia or other neurodeficit as compared to patients undergoing open surgery.

We emphasize the importance of multilayer auto graft material as CSF rhinorrhoea is notorious for graft displacement.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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