ORIGINAL ARTICLE

NASAL ENDOSCOPIC REPAIR OF CEREBROSPINAL FLUID RHINORRHEA: CASE SERIES OF TEN PATIENTS

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ABSTRACT

Background: CSF rhinorrhea is a rare entity but it needs proper evaluation and management. Previously it was managed through intracranial approach carrying increased morbidity and mortality. Since the introduction of nasal endoscopic surgery in 1981, it is being managed through transnasal endoscopic technique which has high success rate and less morbidity. The purpose of this study was to review the clinical presentation, etiology, diagnosis and outcome of nasal endoscopic repair in CSF rhinorrhea. **Methods:** It was a retrospective multicentre review of the records of the patients from January 2005 to December 2010. Data was collected on a detailed proforma. Patients with incomplete or missing data were excluded. **Results:** Total number of patients undergoing nasal endoscopic repair for CSF rhinorrhea was 10; 7(70%) females and 3(30%) males. Mean age at the time of repair was 39.5$\pm$4.3 years. CT scan was performed in all patients, CT cisternography in 3 and MRI in 4 patients to rule out any encephalocele. Majority of leaks were found at the cribriform area. In 6(60%), muochondrial graft were used while in 4(40%) patients septal cartilage as well as mucoperichondrial graft were used. In 7(70%) patients nose was packed with gelfoam and in 3(30%) vaseline nasal packs were used. Lumber drain was placed only in 2 patients. No complication was encountered in follow-up period. **Conclusion:** Nasal endoscopic technique is an effective method in closing CSF leak.

KEY WORDS: CSF rhinorrhea, Nasal endoscopic technique, Rhinorrhea.

INTRODUCTION

Dandy was the first person who successfully closed the cranio-nasal cerebrospinal fluid (CSF) leak using frontal craniotomy approach in 1926. Dohlman in 1948 described the first extracranial approach. He used naso-orbital incision to repair the anterior skull base defects and CSF leak. Transnasal approaches were used by Hirsch in 1952 and by Hallberg in 1964. Subsequently, improvement and sophistication of endoscopic instruments led to endoscopic sinus surgery and Wigand in 1981 repaired the CSF leak by endonasal endoscope successfully. Over the last three decades, minimally invasive endoscopic approach became the standard treatment for repair of CSF rhinorrhea, carrying over 90% success rate with lower rate of morbidity and mortality as compared to the traditional intracranial techniques.[1,2]

CSF leaks are broadly divided into two types; traumatic and spontaneous. Traumatic leaks are usually managed conservatively but spontaneous leaks are real challenge in terms of diagnosis and management. Spontaneous leaks are thought to be due to sustained or intermittent rise of intracranial pressure (ICP) which exerts increased pulsatile hydrostatic forces at the naturally weekend sites of skull base such as cribriform plate or lateral recess of sphenoid sinus. The 2nd common risk for spontaneous rhinorrhea is obesity as it increases the intrathoracic and intra-abdominal pressure.[3] Spontaneous CSF leak has the highest recurrence rate (25-87%) as compared to less than 10% for other etiologies.[4,5]

The purpose of this study was to review the clinical presentation, etiology, diagnosis and outcome of nasal endoscopic repair in CSF rhinorrhea.

MATERIAL AND METHODS

It was a multicentre retrospective review of cases from January 2005 to December 2010. Data was collected from three private medical centers in Karachi, Pakistan. All the patients treated endoscopically for CSF rhinorrhea were included in the study while the patients having incomplete or missing record were excluded from the study.

The data was collected on a proforma, consisting of age, gender, co-morbidities, site of CSF leak, etiology of leak, diagnostic tests to localize

the leak, technique used to repair the leak, length of hospital stay and follow up.

The diagnosis of CSF rhinorrhea was based on clinical history and detailed nasal endoscopic examination and the confirmation techniques applied were computed tomography (CT), Magnetic resonance imaging (MRI), CT cisternography and pre-operative use of intrathecal fluorescein. As Beta 2 transferrin facility is not available in the country, only CSF examination for electrolytes was performed.

All the patients underwent nasal endoscopic repair by using 0 and 30 degree endoscopes. Nasal packs of 4% xylocaine and xynosine were placed for 10 minutes after induction. Then 2% xylocaine with adrenaline (1: 100,000) was injected into inferior and middle turbinates on the side leak. Anterior and posterior ethmoidectomy done to expose the site of leak. Once fluorescence was seen coming out from the leak site, mucosal margins were freshened and the leak site closed by septal grafts, gelfoam and adhesive material. At the end, nasal packing was done and kept for 2-4 days. In some patients lumber drain was also placed.

The follow up of all the patients was also reviewed. Some patients were contacted via phone calls to know the status. Patients with incomplete or missing data were excluded from the study. Data was analyzed on SPSS version 17 for different variables such as age, gender, success rate and complications.

RESULTS

Total number of patients undergoing nasal endoscopic repair for CSF rhinorrhea was 10; 7 (70%) females and 3 (30%) males. Mean age at the time of CSF repair was 39.5 ± 4.3 years. In all the patients, the presenting complaint was intermittent watery rhinorrhea for 4-7 month. None of the patients had any attack of meningitis. No etiological factors were found on detailed history and clinical examination and all the patients were labeled as spontaneous CSF leak.

Only in 4 (40%) patients CSF examination for electrolytes was done as Beta 2 transferrine facility was not available. CT scan was done in all patients and it showed bony defects as possible site for CSF leak in 8 (80%) patients. CT cisternography was done in 3 patients and it demonstrated the leak site in 2 patients. While MRI was done in 4 patients to rule out any encephalocele.

All the patients were admitted one day before surgery. Intrathecal fluorescein was injected in all the patients one hour before the time of surgery. Typically, 0.1 ml of 10% fluorescein diluted in 10 ml of patient CSF was injected slowly over 10 to 15 minutes. This was helpful in localizing the defect in 8 (80%) patients, while in 2 (20%) patients, the definitive leak site was not identified per-operatively.

Anterior and posterior ethemoidectomy was done at the start of procedure to get exposure of the leak site. The majority of the leaks were found at the cribriform area. In 6 (60%), only septal muochondrial graft were used while in 4 (40%) patients septal cartilage as well as septal mucoperichondrial graft was used. Pedicle grafts were used in none of the patients. In all the 10 patients fibrin glue was used as an adhesive material. In 7 (70%) patients nose was packed with gelfoam and in 3 (30%) patients vaseline nasal packs were used. Lumber drain was placed only in 2 patients.

Post-operatively, patients were given broad spectrum antibiotics, stool softener and antiemetic. Average hospital stay was 2.5 days. In 2 patients, CSF rhinorrhea was observed after few days of surgery while in 1 patient after six months. These 3 patients underwent 2nd surgery and CSF leak was closed successfully. So the overall success rate of nasal endoscopic repair was 100%. With follow-up period of 15 months, no complication was observed.

DISCUSSION

Cerebrospinal fluid leak is a rare entity and if not managed properly, it may have very serious consequences. Dandy was the first one who repaired the CSF leak by doing frontal craniotomy.[6] Since then, transcranial approaches have been adopted routinely to repair the CSF leaks even after minor maxillofacial and head trauma.[7] This remained continue till 1980. The first purely endoscopic repair of CSF rhinorrhea was done in 1981 and now over the last three decades, it has become the standard treatment for CSF rhinorrhea.[8] Hegazy et al.[9] reviewed the published data of CSF leaks, repaired endoscopically, and concluded that success rate are 90% on first attempt and 97% overall. These results are compatible to our study. Therefore, transcranial approaches are now reserved only for extensive dural tears, multiple fractures and associated brain injuries.

Proper diagnosis is very crucial in the CSF rhinorrhea. Occult or intermittent rhinorrhea is found in 20-30% cases,[10] therefore, detailed history and endoscopic examination of nose are crucial in making the diagnosis of CSF rhinorrhea. In our patients, the presenting complaint was watery rhinorrhea intermittently for a period of 4-7 month. None of patients had any attack of meningitis. No etiological factors were found on detailed history and clinical examination. Therefore, all the patients

were labeled as spontaneous CSF leak. Beta 2 transferrin is a good utility to confirm the presence of CSF in nasal secretions[11] but as this facility is not available in the country, nasal secretions were analyzed only in 4 patients for the glucose content to show the presence of CSF.

In our study, CT scan with thin cuts was the major diagnostic tool to reveal the bony defects of possible leak sites. In the past, CT cisternography was considered the investigation of choice for intermittent or small leaks but it lost favor due to expense, neurotoxicity and need of anticonvulsant premedication.[12,13] Intrathecal administration of fluorescein has been a useful modality in localizing the leak site since its introduction by Kirchner.[14] In this study, intrathecal fluorescein administration was helpful in locating the site of leak in 80% patients which is comparable to the international studies.[15]

Nasal endoscopic surgery is still in its initial stages in our country. To our knowledge, there is only one published study about CSF rhinorrhea[16] and no study on nasal endoscopic surgery. So there is paucity of data regarding outcomes of this technique in our set up. In our study, the major population was of adult age and female patients. The most common site involved in this series was cribriform plate while in literature the common sites reported for spontaneous rhinorrhea are cribriform plate and sphenoid sinus.[17]

Large number of grafting material can be used to close the defect such as abdominal fat, nasal septum mucosa, bone, fascia lata and muscle grafts.[18] The grafts can be attached with fibrin glue, Vaseline gauze or haemostatic sponges. However, the success of procedure critically depends on the adequate removal of mucosa around the defect. In our series, graft consisted of nasal mucosa (60%) and septal cartilage (40%) which was fixed with fibrin glueIn all the patients' nasal packing remained post-operatively for 2.3 days on average. Some authors[19] still recommend the use of lumber drain postoperatively, but recent studies suggest that it should not be done routinely. Lumber drain was used only in 20% patients in our study.

We observed no complication of this technique in this series over the average follow up of 15 months which are comparable with international literature[20] mentioning only substantial morbidities.

Contraindications to the endoscopic repair of CSF rhinorrhea include fracture of posterior wall of frontal sinus, presence of intracranial lesion and CSF rhinorrhea from temporal bone defects.[21] This new perspective of endonasal endoscopic repair of CSF rhinorrhea has given the excellent success rate, low morbidity and possibility of performing more than one procedure using the same approach and technique; now this model of treatment has been evolved into the standard of care for surgical repair of CSF fistula.

CONCLUSION

Nasal endoscopic repair for CSF rhinorrhea carries over 90% success rates with no complication. This study, with low numbers of patients, might be a foundation stone to bring this technique to its maturity and to gain the utmost results in our part of the world.

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