ENDOSCOPIC ENDONASAL TRANSPHENOIDAL APPROACH FOR REPAIR OF CEREBEROSPINAL FLUID RHINORRHEA

Farooq Azam, Adnan Ahmad, Musawer Khan, Mohammad Ishaq, Mansoor ahmed, Arif Hussain, Mumtaz ali

ABSTRACT

Objective: To know the surgical outcome of endoscopic endonasal transphenoidal approach for repair of cereberospinal fluid rhinorrhea.

Material and methods: This prospective study was carried in neurosurgery department Lady Reading, hospital, Peshawar from 1st January 2016 to 30th January 2018. Approval was taken from the ethical committee of MTI, lady reading hospital, Peshawar. After fulfilling inclusion and exclusion criteria the endoscopic endonasal transphenoidal procedure was done. The patient demographics, cause of leakage, duration of leakage, type of leak, symptoms, relevant investigations, site and size of leak, outcome and complications were documented in a pre-designed proforma. The data was entered and analyzed through SPSS Version 22.

Results: Total number of patients was 16. Nine (56.25%) patients were males and 7 (43.75%) females. Mean age was 41.06±14.06 years. Cribriform plate (43.75%) was the commonest site of leak. Size of defect ranged from 0.5cm to 2.5cm. Mean size of defect was 1.56cm. One (6.25%) patient had recurrent leak after initial surgery, two (12.5%) patients had meningitis, one (6.25%) patient had pneumocephalus, one (6.25%) patient had nasal bleed and one (6.25%) patient had. Hospital stay ranged from 5 to 8 days. Overall success rate of our procedure on first surgery was 93.75%. Whereas keeping complications in mind, success rate was 68.75%. After addressing the complications and rectifying the recurrent case, the overall success was 100% on last follow up.

Conclusion: Endoscopic endonasal transphenoidal approach is a safe and effective procedure for repair of cereberospinal fluid rhinorrhea.

Key words: endoscopic endonasal transphenoidal, repair, cerebrospinal fluid rhinorrhea.

INTRODUCTION

Cereberospinal fluid (CSF) rhinorrhea is clear watery discharge from nose which is increased by performing valsulva maneuver and is associated with low pressure headache. The headache is more during standing due to orthostatic CSF hypotension. Target population is the people who have sustained trauma to the head in the recent past, any cranial or paranasal surgery and middle aged obese females. [1,2]

CSF rhinorrhea occurs secondary to loss of integrity of structures that resides between the subarachoid space and nasal cavity, that is the duramater, bones in the skull base and periosteal layer alongside of aerodigestive tract mucosa. Aetilogically CSF rhinorrhea can be classified into two groups, traumatic and non-traumatic or spontaneous. Traumatic CSF rhinorrhea can be further subclassified into iatrogenic and non-iatrogenic. Non traumatic or spontaneous is sub classified as congenital and idiopathic. Another classification is on the basis of underlying pressure as: low pressure CSF rhinorrhea or high pressure CSF rhinorrhea. [2,3,4]

Department of Neurosurgery unit LRH

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Address for correspondence:
Dr. Adnan Ahmad
Department of Neurosurgery unit LRH
Email: adnankmc2011@yahoo.com
Contact: 03359795060

Management of CSF rhinorrhea is by two modes, either open craniotomy technique or endoscopic technique. Open surgery is difficult and results in large wounds with comparatively low success rate (about 73%). [3] Endoscopic endonasal approach was first done in 1981 by Wingad and is now widely used as the treatment of choice for CSF rhinorrhea throughout the world.[5] There has been a lot advances in surgical technique of endoscopic repair of CSF rhinorrhea with time. Although the details of surgical technique are different in various reports, yet the efficacy and safety of this approach in all those reports is confirmed. [4,5,6,7]

The basic reasons behind this surgery is prevention of ascending intracranial infections and restoration of normal circulation of CSF, that helps in maintaining normal bathing of the brain in CSF and also avoid CSF hypotension. [8,9,10] Our study objective was to know the surgical outcome of endoscopic endonasal transphenoidal approach for repair of cereberospinal fluid rhinorrhea.

METHODOLOGY

This prospective study was carried in neurosurgery department lady reading, hospital, Peshawar from 1st January 2016 to 30th January 2018. We included all those patients who were having CSF rhinorrhea either traumatic or non-traumatic. Patients of either gender with age more than 18 years were included. We ex-

cluded those patients who responded to conservative treatment, patients who were operated trans-cranially and patients with spontaneous CSF rhinorrhea having raised CSF pressure on manometry. Approval was taken from the ethical committee of MTI, lady reading hospital, Peshawar. Detailed history and clinical examination taken. Fig. 1 showing CSf rhinorrhea in an elderly female. 3D CT skull/paranasal sinus (2mm cuts) and MRI brain was performed to detect the site of leakage. (Fig.2-4)Patients having non traumatic CSF rhinorrhea underwent both neurological and ENT examination to look for any underlying cause. Laboratory analysis of nasal secretions was not performed and no intrathecal fluorescence injection was used. Antibiotics (cephalosporin) were given to the patients who were having pre op meningitis.

Surgical steps

After pre op preparation, each patient was shifted to operating room. After giving general anesthesia, patient was positioned was positioned supine with head tilted to right by 10 degree and operating table at 20 degree elevation. Nasal packing was done with decongestants for about 10 mins. Surgery was performed using standard endoscopic endonasal sinus surgery equipment with no neuro navigation system. Middle turbinectomy was done and mucosa was removed from the suspected area of leakage. Provocative measure (like valsulva maneuver) was used in patients in whom active leak was not seen. Margins of bony defect were identified. In some patients fats were used to close the defect and glue and surgical placed. Fats were taken from the abdominal wall. In some patients hadad flap (pedicled nasoseptal flap (NSF) based on posterior nasal septal artery) was used. After hadad flap surgicel and fibrin glue was spread over.(Fig. 6-10) Polyfax (polymyxin B sulphate and bacitracin zinc) ointment soaked pack was instilled in the end and 12 Fr Foleys catheter placed in nostril with balloon inflated with 3cc water. Lumbar puncture was done on o.t table after completing the surgery. Lumbar drain was placed in two patients.

Post-Operative period

After surgery patients were shifted to ICU for 12-24 hours for monitoring. They were advised bed rest and urinary catheter was left in situ for 5-7 days. Antibiotics, Stool softeners and anti tussives were advised to all patients. Polyfax ointment pack and catheter from nasal cavity was removed after 72 hours of surgery. Lumbar drain was first clamped 4 days post-operatively, and patients were assessed for any symptoms like headache or CSF rhinorrhea. If patient was alright, then the drain was removed. . Post op CT brain was done was done in all patients. All patients were followed for a period of 3-6 months. The patient demographics, cause of leakage, duration of leakage, type of leak, symptoms, relevant investigations, site and size of leak, outcome and complications were documented in a pre-designed proforma. The data was entered and analyzed through SPSS Version 22.

RESULTS

Total number of patients was 16. Nine (56.25%) patients were males and 7 (43.75%) females. Age range was from 18-60 years with mean age of 41.06±14.06 years. Frequency and percentages of CSF rhinorrhea is shown in Table 1. Four (80%) out of 5 patients having spontaneous rhinorrhea were females. Six (37.5%) patients were having symptoms for less than six months while 10 (62.5%) patients were having symptoms for more than 6 months. Nine (56.25%) patients were having right sided nostril leak, 5 (31.25%) were having leak from left nostril while 2 (12.5%) were having leak from both nostrils. 3 (18.75%) of our patients presented with history of meningitis. 3D CT scan with 2mm cuts was done in all patients while MRI brain was done in 5 (31.25%) patients only.

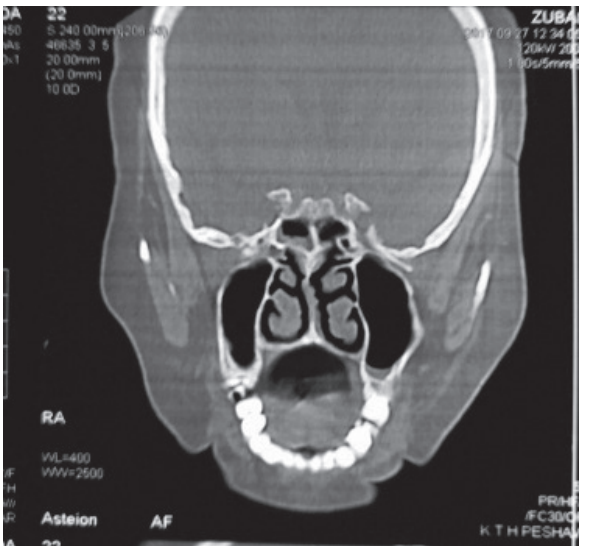
Frequency and percentages for site of leak is shown in Table 2. Size of defect ranged from 0.5cm to 2.5cm. Mean size of defect was 1.56±0.56 cm. Majority (60%) of spontaneous leak were also from cribriform plate. One (6.25%) patient had recurrent leak after initial surgery which was addressed and rectified during redo-surgery. Complications are shown in Table 3. None of patients died in our series. Hospital stay ranged from 5 to 8 days. Overall success rate of our procedure on first surgery was 93.75%. Whereas keeping complications in mind, success rate was 68.75%. After addressing the complications and rectifying the recurrent case, the overall success was 100% on last follow up.

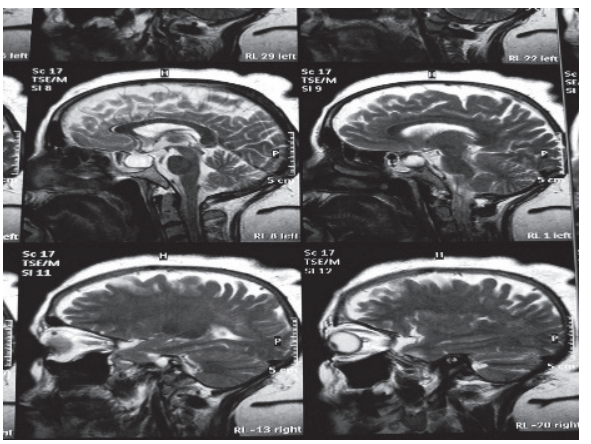
DISCUSSION

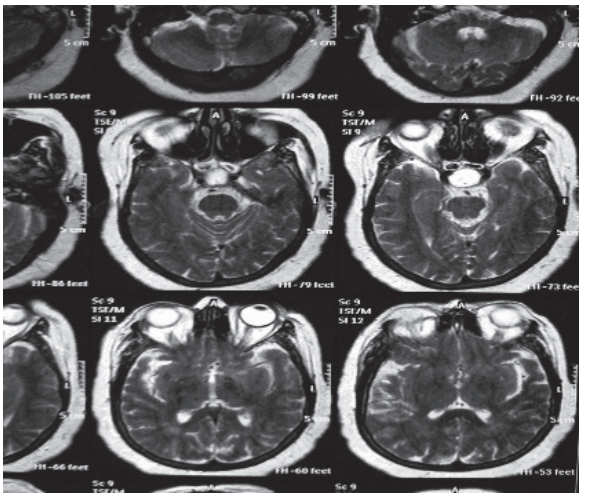
Cereberospinal fluid rhinorrhea is a serious condition that is the potential cause of ascending infection leading to meningitis. Trauma is the commonest cause of CSF rhinorrhea. Symptoms of rhinorrhea occur immediately after traumatic causes however delay may occur in some cases. We found traumatic rhinorrhea in younger age group and spontaneous rhinorrhea in relatively older age group. This finding is similar with other studies in which mean age of patients with traumatic rhinorrhea was less as compared to the ones having spontaneous rhinorrhea. [7,9,10]

We found more (68.75%) patients with traumatic leaks as compared to spontaneous leaks (31.25%). These results are similar to other studies.[9,11] In one series the author found higher percentage of spontaneous rhinorrhea versus traumatic, 67% and 33% respectively. Kapitanov and his colleagues found equal number of patients in both groups.[12] Virk et al found two third of cases with spontaneous rhinorrhea. [2] Traumatic leaks occur in male patients commonly and we found the same in our study. This is due to the reason that male patients are more prone to trauma as compared to

Fig 1. CSF rhinorrhea in an elderly female. (Picture produced with consent of the patient)







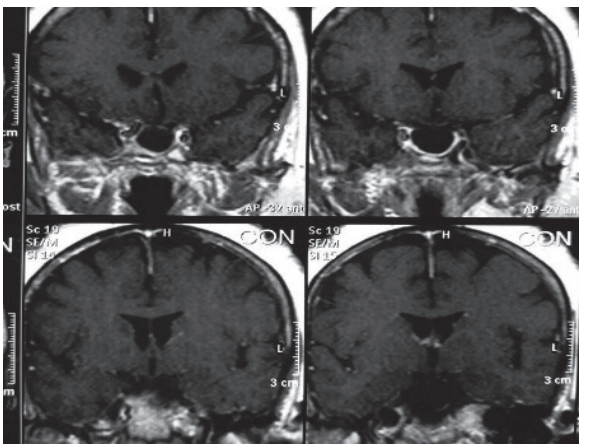
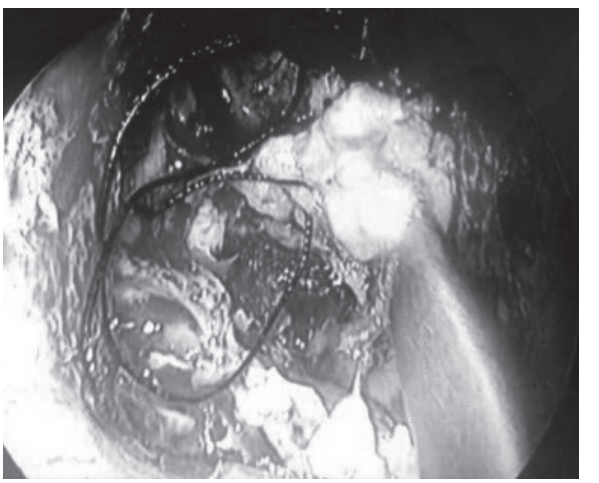
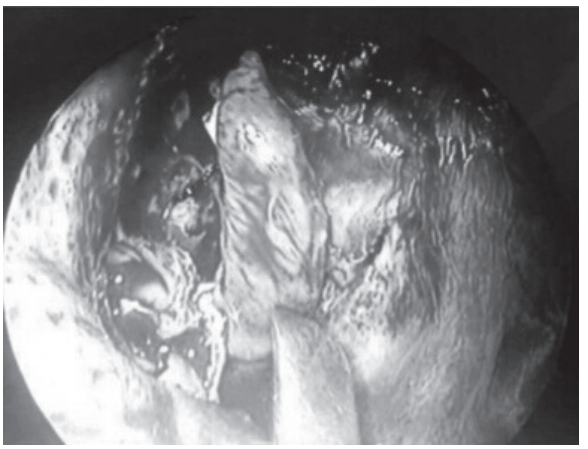
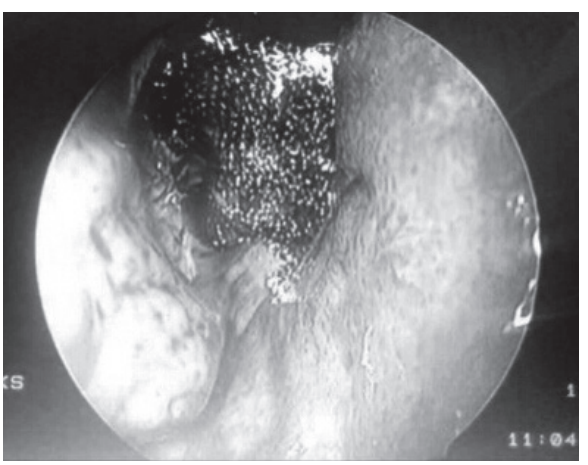


Fig. 2-5: Showing CT scan bone and MRI brain T2WI and MRI brain with contrast showing defect in bone, CSF signal intensities with internal encephalocele







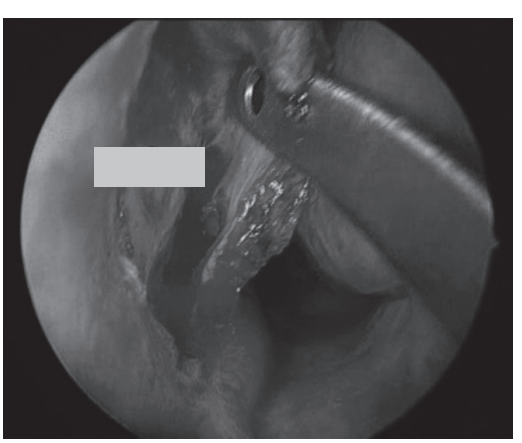


Fig 6-9: Showing different surgical repairing techniques for closing the defect through endoscopic endonasal approach viz. fat ball technique, triple F technique, gel foam/surgical plus glue technique and Hadad flap technique respectively

females. [13] Spontaneous rhinorrhea occurs in females commonly and we also found the same. Literature has shown that spontaneous rhinorrhea occurs in obese females more frequently.[10,13] we found meningitis in 3 patients out of which two patients were in traumatic group. According to literature, risk of meningitis is similar in both cases.[8,9,13]

The diagnosis and detection of site of leak is important for surgical treatment. We did routine pre-operative workup except for that of laboratory analysis of nasal secretions for β2transferrin. Expected site of leak is detected by clinical correlation but exact location is found nasal endoscopy along with high resolution CT head and paranasal sinuses, MRI brain. According to literature search, sensitivity of this CT is 87-100%.[14] We did CT in all cases but we were able to find out defects in 12 out of 16 (75%) of cases. One study found 77.3% defects with high resolution CT. CT and radionucleid cisternography detects location of defect accurately but its sensitive is comparatively low (33-48%), as it doesn't provide real time images so inactive CSF lesions may be missed. [13,14] In addition MR brain (both T1WI and T2WI) is required when herniation or any underlying lesion is suspected. Additional MRI (with T2- weighted sequences) is indicated when parenchymal or meningeal herniation is suspected. [9,13,14] We did MR brain in 5 patients in conjunction with other investigations.

We found cribriform plate defects as common site of leak. Our finding is the same as that of previous studies which also found cribriform plate as commonest site. It is presumed that anatomy of plate is such that it allows transmission of olfactory fibers so it permits CSF leak more easily.[13,15] In other studies lateral recess of sphenoid and roof of ethmoid defects are more frequently seen.[11,13] Cribriform plate and lateral recess of sphenoid is the thinnest portion of skull base so high intra-cranial pressure of CSF leads to erosion of these parts.[8,9,12] our findings are consistent with the results of previous studies.[13,15]

In our study the defect size ranged from 1 to 2.5 cm that was easily addressed using endoscopic approach. A defect with larger diameter that is more than 2cm should be repaired using trans-cranial approaches. But we did hadad flap in defects more than 2cm in size.[12,14,15] A report of 43 patients having hadad flap reconstruction showed 95% improvement. [4,8,9] Literature shows hadad flap closure for smaller defects upto 4cm to 5cm in size. [5,7,9] However this flap is more useful for larger anterior or central skull base defects. Hadad flap provides a base of healthy mucosa that remucosalize over nonvascular graft (fat, fascia lata) by epithelial cells migration. It helps in prevention of flap shrinkage that would subsequently lead to recurrent CSF leak. [7,9,11] It is also reported that if small CSF fistula persist after first surgery than fat graft of free mucosa repair should be advocated. We first placed fat graft and then did hadad flap. Kassam with his colleagues used inlay graft of Duragen inside dura and then a layer of acellular dermis above the dura and followed by fat graft and naso-septal flap.[13,16] Currently, Kassam and associates do not advise the use of intervening layer of fat and thus directly lay naso-septal flap on the wound.

A study on 52 patients by Presutti found 88.5%

success on their first attempt. They used septal mucoper-chindrial grafts for resonstrution of the defect. He didn't use flouresecene dye per operatively and also didn't use lumbar drain. Ye in his study on 193 patients, used intrathecal fluorescene dye for localization of leak and he used lumbar drain in 73% of cases. He reprted a success rate of 85-90% on first attempt and overall success of 98%. Ye in another study of 69 patients, in which he used endoscopic multilayer repair reported a success rate of 89% . He didn't use intrathecal fluorescene in this study. [17]

We found 93.7% success rate on first attempt with 6.25% recurrence on first attempt whereas 100% success on second attempt. Our finding is consistent with the previous studies results. Important risk factors for failure of the procedure is difficulty in finding the site of leak, large size of defect and on multiple sites and associated conditions like constipation and coughing. [18] So we advised strict bed rest and anti- tussives with anti-constipation drugs.

In our study one (6.25%) patient had recurrent leak after initial surgery which was addressed and rectified during redo-surgery. Two (12.5%) patients had meningitis which were treated with antibiotics, one (6.25%) patient had pneumocephalus and one (6.25%) patient had nasal bleed, both patients were treated conservatively. One (6.25%) patient had hydrocephalus in which ventriculo-peritoneal shunt was placed in.

CONCLUSION

Endoscopic endonasal transphenoidal approach is a safe and effective procedure for repair of cereberospinal fluid rhinorrhea.

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