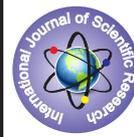


RECURRENT MENINGITIS – A CURE POSSIBLE?



ENT

KEYWORDS: Recurrent Meningitis, Skull base defect, endoscopic repair

Dr Suma R

Additional Professor, Dept of ENT, Govt. Medical College, Calicut

Dr Bashir N K

Additional Professor, Dept of ENT, Govt Medical College, Calicut

Dr Silpa

Senior Resident, Govt Medical College, Calicut

ABSTRACT

Recurrent meningitis continues to be a diagnostic challenge. It is studied in literature that 9% of acute bacterial meningitis is associated with recurrence. Aim of the study was

1. To assess the outcome of endoscopic repair of radiologically confirmed skull base defects.
 2. To analyse the association between recurrent meningitis & radiologically confirmed skull base defects in those without CSF rhinorrhoea.
- Ours is a combination of prospective & retrospective study on 60 patients who presented in the ENT department of a tertiary care hospital during the time period of August 2008 to June 2014, who presented with radiologically confirmed skull base defects, majority with recurrent meningitis with or without CSF rhinorrhoea. All cases were surgically repaired, the repair being done by a single surgeon. Of the 60 patients, aetiology was spontaneous in 32(53.3%) & traumatic in 28(46.7%). History of CSF rhinorrhoea was present in 45(75%) & history of recurrent meningitis in 41(68.3%). Most common site of leak was cribriform plate (33.3%). Post operative CSF rhinorrhoea & recurrent meningitis recurrences were present in 3 cases each respectively.
- Of the 60 cases who underwent surgical repair there were only 3 recurrences. Success rate was 95%, clinically significant. Among the 41 patients who presented with recurrent meningitis among the 60 cases studied, 14 patients never gave a h/o CSF rhinorrhoea ie, 34.1%, the association being clinically & statistically significant (p value 0.03%)

INTRODUCTION

Skull base was considered an inaccessible area being located ventral to brain & posterior to facial skeleton surrounded by vital structures. With the advent of high resolution imaging modalities, advanced neuroanaesthetic techniques & endoscopes with their excellent illumination & better panoramic view, an otolaryngologist can more confidently approach this area at present.

Recurrent meningitis continues to be a diagnostic challenge. It is studied in literature that 9% of acute bacterial meningitis is associated with recurrence (1). In adults the most common cause is traumatic skull base defects (2). Other important cause being immune deficiency (3) which comprises of Hypogammaglobulinemia, Selective IgM deficiency etc. Chemical meningitis, granulomatous diseases, mollaret meningitis etc comes later in the list.

The first published report of CSF rhinorrhoea comes from Dandy in 1926 who performed a frontal craniotomy to repair a defect. Various reports by Dohlman (1948), Hirsch (1952) and Hallberg (1964) all demonstrate repair of various skull base defects through various external approaches. In 1981, Wigand reported on the use of endoscope to assist the repair of a skull base defect. In the last 30 years, endoscopic repair of skull base defects has become the preferred method of addressing CSF rhinorrhoea and is successful in over 95% of cases.

CSF leaks can be traumatic or spontaneous. Traumatic includes accidental and surgical. Post surgery defects were excluded from the study.

Preoperative studies should establish the diagnosis and localize the defect. The presence of clear watery fluid dripping from nasal cavity and presence of halo sign on tissue paper should arouse suspicion of CSF rhinorrhoea. Beta-2 transferrin is a protein present only in CSF, perilymph and aqueous humour. Testing nasal secretions for beta-2 transferrin represents a more specific and sensitive test. It provides an accurate, non invasive method to establish the diagnosis of an active CSF leak but does not provide information on the site of leak.

HRCT Skull base & PNS 1mm axial & coronal cuts extending from the anterior table of frontal sinus to clivus is useful in detecting the defect. MRI & CT Cisternography can also be used to localize the defect.

In our study we are assessing the outcome of endoscopic repair of radiologically confirmed skull base defects and also analyzing whether there is any association between radiologically confirmed skull base defects and recurrent meningitis in those without CSF rhinorrhoea.

MATERIALS AND METHODS

We have used a combination of retrospective & prospective methods in this study which spans from August 2008 to June 2014. The study group included 60 patients who presented in our department with radiologically confirmed skull base defects, majority had recurrent meningitis with or without CSF rhinorrhoea. Those skull base defects conservatively managed immediate post surgery defects like post FESS and post pituitary surgery defects and those whom we lost to follow up were excluded from the study. All underwent surgical repair, the repair being done by the same surgeon.

We followed regular diagnostic criteria which comprised of a detailed history including aetiology, history of recurrent meningitis, history of CSF rhinorrhoea etc. High Resolution Computed Tomography Skull Base and Para nasal Sinuses 1mm cuts extending from anterior table of frontal sinus to clivus was done in all patients to delineate the defect. MRI was taken in those whom an encephalocele was suspected. CT Cisternogram was done in whom HRCT failed to identify the defect. All patients were vaccinated prior to the surgery. Children were vaccinated against pneumococci and hemophilus influenza and adults against pneumococci.

All patients underwent surgical repair of the defect either via endoscopic or endoscopic associated external approach. In endoscopic repair the entire anterior skull base is exposed and defect delineated by clearing the mucosa around the defect. Fat and fascia lata taken from the lateral aspect of thigh is used to close the defect along with a fibrin sealant. Fat kept by bath plug technique act as a good sealant. Hadad nasoseptal flap was used in cases where the defect was large. All were followed up for a period ranging from 4 months to 6 years for any evidence of CSF rhinorrhoea or any features suggestive of meningitis. Most cases underwent endoscopy to assess graft uptake by the end of 2 months after surgery.

RESULTS

Of the total 60 patients, there were 37 males (61.7%) and 23 females (38.3%). The aetiology was spontaneous in 32(53.3%) and traumatic in 28(46.7%) cases. History of CSF rhinorrhoea was present in 45

cases (75%). History of recurrent meningitis was present in 41 (68.3%) cases. The site of defect was cribriform plate in 20 cases (33.3%), fovea in 14 cases (23.3%), sphenoid sinus in 11 cases (18.3%), frontal sinus in 3 cases (5%), combined defect involving cribriform plate and fovea in 7 cases (11.7%), fovea and frontal sinus in 4 cases (6.7%) and cribriform plate and frontal sinus in 1 case (1.7%) (Table 2). The size of defect was single defect less than 1.5 cm in 25 cases (41.7%), multiple defects none more than 1.5 cm in 21 cases (35%), single defect more than 1.5 cm in 7 cases (11.7%) and multiple defects at least one more than 1.5 cm in 7 cases (11.7%) (Table 3). Endoscopic repair was done in 58 cases (96.7%) and endoscopic assisted external approach in 2 cases (3.3%). Fascia lata was used as graft in 42 cases (70%) and hadad flap in 18 cases (30%). Post operative CSF rhinorrhoea occurred in 3 cases and meningitis in 3 cases..

Success rate of surgical repair was 95%, clinically significant comparable with studies done elsewhere (table 1). Among the 41 patients who presented with recurrent meningitis among the 60 cases studied, 14 patients never gave a h/o CSF rhinorrhoea ie, 34.1%, the association being clinically & statistically significant (p value (0.03%).

DISCUSSION

With the advent of advanced neuroanaesthetic techniques, high resolution imaging modalities and endoscopes with their excellent illumination and panoramic view an otolaryngologist can more confidently approach this area at present.

Of the 60 patients, the aetiology was spontaneous in 32 (53.3%) & traumatic in 28 (46.7%) (4). It was the monograph by St Clair Thomson (1899) that first clearly described and attempted to define spontaneous CSF rhinorrhoea as a clinical entity. This condition can be subdivided into primary spontaneous rhinorrhoea when there is no precipitating cause and secondary when a cause usually tumour was discovered (5). In our study primary spontaneous CSF rhinorrhoea is taken as spontaneous. Secondary CSF rhinorrhoea like those associated with tumour were excluded from the study.

In our study initially entire anterior skull base is exposed and defects delineated. Fat and fascia lata taken from the lateral aspect of thigh along with a fibrin glue is used to seal the defect. Fat kept by bath plug technique act as a very good sealant. A free graft helps wound healing by acting as a scaffold. Free grafts are adherent to bone after 1 week and are replaced by fibrous connective tissue after 3 weeks (6). Septal mucosa flaps like hadad nasoseptal flap can be used to cover the grafted area for additional support. In our study hadad nasoseptal flap was used in those cases where the defect was large.

The basic principle of endoscopic repair is positive identification of the leak site, meticulous preparation of graft bed and accurate placement of graft material. In our study of 60 patients who underwent surgical repair of skull base defect by mainly endoscopic (58) and endoscopic assisted external approach (2), the success rate was 95%. This compares favourably with studies done in other parts of the world (Table 1). We had 3 post operative recurrences. Among the 3 cases who developed recurrence, 1 patient with selective Ig M deficiency with family history of selective Ig M deficiency expired, 1 patient underwent repair later successfully, 1 underwent repair later from another centre.

Among the 41 patients who presented with recurrent meningitis among the 60 cases studied, 14 patients never gave a h/o CSF rhinorrhoea ie, 34.1%, the association being clinically & statistically significant (p value (0.03%).

Table 1 Success rate of CSF rhinorrhoea repair

Authors	No of cases	Success rate
Papay et al 1999	4	100%
Lanza et al 1996	36	94%
Burns et al 1996	42	83%

Table 2 Site of defect

Site	No of cases	Percentage
Cribriform plate	20	33.3
Fovea Ethmoidalis	14	23.3
Sphenoid Sinus	11	18.3
Frontal Sinus	3	5
Cribriform plate & Fovea Ethmoidalis	7	11.7
Fovea Ethmoidalis & Frontal Sinus	4	6.7
Cribriform Plate & Frontal Sinus	1	1.7

Table 3 Size and number of defect

Size & No	No of cases	Percentage
Single defect <1.5cm	25	41.7
Single defect >1.5cm	7	11.7
Multiple defects none more than 1.5cm	21	35
Multiple defects at least one more than 1.5cm	7	11.7

CONCLUSION

Recurrent bacterial meningitis should prompt a search for an underlying anatomical cause. Skull base defects can be there even in the absence of CSF rhinorrhoea. Normal axial or HRCT doesn't rule out skull base defects. The high success rate associated with endoscopic repair of skull base defect should make it the preferred approach.

All cases of recurrent meningitis should be evaluated for skull base defects along with other routine investigations for meningitis and there should be awareness among the medical specialties regarding this cause for recurrent meningitis.

REFERENCES

- Durand et al, Acute bacterial meningitis in adults – A Review of 493 episodes; N Engle J Med 1993;328 21-28(1)
- Epidemiology, Etiology, Pathogenesis and Diagnosis of Recurrent Bacterial Meningitis; Marc Tebruegge and Nigel Curtis ; Clin Microbiol Rev:2009 January; 22(1):183(2)
- Pediatric Selective IgM Immunodeficiency; Goldstein et al ; Clinical and Developmental Immunology Volume 2008, Article ID 624850, 10 pages(3)
- Closure of csf leaks prevent ascending bacterial meningitis ; Bernal- Sprechelsen M , Alobid I, Mullol J, Trobat F, Tomas Barberan M
- Non traumatic CSF rhinorrhoea : Aijub K Onimaya, Guovanni Di Chiro, Martland Baldwin, J.B Penny Backer.
- Endoscopic repair of cerebrospinal fluid rhinorrhoea- Manual experience; Rohit Singh, Produl Hazarika, D.R. Nayak, R. Balakrishnan, Manali Hazarika, Anshul Singh; Indian Journal of Otolaryngology and Head and Neck Surgery (Jan- March 2009)
- Cerebrospinal fluid rhinorrhoea: endoscopic repair based on a combined diagnostic approach; Neena H Bhalodiya, Shawn T Joseph; Indian Journal of Otolaryngology and Head and Neck Surgery (April-June 2009)