

BANGLADESH JOURNAL OF NEUROSURGERY

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CONTENTS

Editorial	1
Original Articles	
Evaluation of stabilization failure for Thoracolumbar and Lumbosacral Spine instabilities treated by transepedicular screws and rods <i>Alam MS, Khan AM, Amin MR, Islam FA, Asfia KN, Hossain M, Sultana R</i>	3
Immediate Post-operative Outcome following Lumbo-Peritoneal Shunt Surgery in Idiopathic Intracranial Hypertension <i>Haroon K, Taher T, Mahmud K, Mondol SU, Paul S, Hossain SS</i>	8
Clinical Profile and Risk Factors of Aneurysmal Subarachnoid Haemorrhage in a Tertiary Level Hospital of Bangladesh <i>Hasan MN, Hoque A, Rahman KM, Amin MR, Khan AH, Barua KK</i>	12
Is Low Total Cholesterol Associated with Primary Intracerebral Hemorrhage in Bangladeshi Population? <i>Kibria MA, Hassanuzzaman M, Kayasthagir PK, Karim MR, Rahman A, Ahmed Z, Rahman MM, Azam A, Faruk MG</i>	17
Case Reports	
Idiopathic Fourth Ventricle Outlet Obstruction Successfully Treated by Endoscopic Third Ventriculostomy: a Case Report <i>Arman DM, Mukherjee SK, Ekramullah SM, Chowdhury D, Mia MAK, Asfia KN, Kadir L</i>	21
Endoscopic Trans-Sphenoidal Drainage of Pituitary Abscess: A Rare Case Report <i>Nath HD, Shah R, Bari S, Barua KK, Barua S, Amin MR, Bhattacharjee R</i>	25



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Dear Sir,

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.....5. for publication in your journal. This article **has not been published or submitted for publication elsewhere.**

We believe that this article may be of value to medical professionals engaged in Neurosurgery.

We therefore, hope that you would be kind enough to consider our manuscript for publication in your journal **as original / Review article / Case Report.**

Thanks and best regards

More than 17,000 people in the United States and 18,000 in India are diagnosed each year with a brain tumor. Unfortunately we do not have any accurate data for Bangladesh.

Some tumors are benign (noncancerous). Noncancerous tumors can usually be removed and are not likely to recur. Other tumors are malignant (cancerous). These tumors interfere with vital functions and are life threatening. Cancerous brain tumors usually grow rapidly, crowding and invading tissue.

Primary brain tumors (gliomas) start in the brain and affect the central nervous system (CNS). They can be noncancerous or cancerous. Secondary brain tumors, which are 10 times more common, are cancers that originated elsewhere in the body and have metastasized (spread) to the brain. Secondary tumors are about 3 times more common than primary tumors of the brain.

People with the following conditions or characteristics may be at risk for developing a brain tumor:

- Radiation exposure
- Exposure to pesticides, herbicides, fertilizer
- Certain occupations, such as lead, petroleum, plastic, rubber, and textile workers, as well as aircraft and vehicle operators
- Exposure to electromagnetic fields
- Certain viruses, especially Epstein-Barr virus
- Certain genetic disorders
- People who have had transplants and individuals with AIDS
- A small percentage of brain tumors may be hereditary (approximately 5% of gliomas)
- People over age 45

Studies have not shown an association between brain cancer and cell phone use.

Now it will be the right time to ask all the neurosurgeons of Bangladesh to take an initiation in opening and maintaining a combined central brain tumor registry.

Evaluation of Stabilization Failure for Thoracolumbar and Lumbosacral Spine Instabilities Treated by Transepipedicular Screws and Rods

Alam MS¹, Khan AM², Amin MR³, Islam FA⁴, Asfia KN⁵, Hossain M⁶, Sultana R⁷

Abstract

Background : The stabilization of the thoracolumbar spine was done due to trauma, tuberculosis, spondylolisthesis, osteoporotic fracture and secondaries in the vertebral body. Failure of stabilization in these groups of patients happened in several cases. This study observed those cases to find out the probable causes and future prevention.

Objective: The objective of the study was to observe the efficacy of pedicle screw stabilization with its failure rate to understand the probable cause of failure with further understanding to reduce failure rates in such cases.

Methodology: Retrospectively, 127 patients with various disorders leading to instability of the thoracolumbar spine were observed. The cases were treated via a posterior surgical approach with pedicle screw and rod fixation. The accuracy of screw placement was assessed on intraoperative, immediate postoperative, and follow-up radiographs.

Result: Among 127 cases 9 cases had stabilization failure and others improved in due courses with time. In 9 cases, 7 were male and 4 were female. Among them breakage of screw was in 5 cases, breakage of rod was in 2 cases and loosening of screw was in 2 cases.

Conclusion: Stabilization of thoracolumbar vertebra is an effective procedure in the management of thoracolumbar instabilities and failure can be prevented meticulously.

Keywords: Thoracolumbar stabilization, pedicle screw, stabilization failure.

Bang. J Neurosurgery 2015; 5(1): 3-7

Introduction :

The management of instability of the thoracolumbar spine remains controversial. A large number of publications describe various surgical techniques for the reduction and fixation of spinal fractures without a consensus on the optimal treatment. In general, surgical treatment of thoracolumbar fractures is deemed necessary if the biomechanical stability of

the spine is severely compromised or if a neurologic deficit is imminent or already present. Segmental fixation systems decrease the need for postoperative immobilization, bracing and facilitate early rehabilitation and ambulation.^{8,13,16,19}

Short-segment pedicle screw instrumentation is a well-described technique to reduce and stabilize thoracolumbar fractures. It has been increasingly used over the past decade, with numerous reports of good clinical results. It is a relatively easy procedure but can indirectly reduce a fractured vertebral body, and the means of augmenting the anterior column are limited.^{6,7,11}

And also because pedicle screw systems generally require fewer instrumented segments, they are advantageous in preserving motion segments, which is particularly important in the mobile lumbar spine and is shown to increase fusion rates. These advantages have made transpedicular fixation a mainstay of treatment for thoracolumbar fixation procedures. Despite these advantages, transpedicular fixation is associated with risks of screw breakage; screw/rod disconnection; pseudoarthrosis; and nerve root injury, dural laceration and pedicle fracture during screw insertion.^{5,14,15,18,21}

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Material and methods:

This is a retrospective analysis of the medical record of the Neurosurgery Department of Dhaka Medical College Hospital and some other private hospitals of Dhaka city for patients who underwent surgical treatment for thoracolumbar stabilization. Between January 2007 and December 2012 a total of 127 cases of stabilization were done, of which 9 (7%) cases failed.

Demography:

The inclusion criteria included all patients in whom short segmental instrumentation was done, one level above and below the injured vertebrae. The indications were traumatic fracture, osteoporotic fracture, primary bony lesion, secondaries of the spine, tuberculosis of the spine and spondylolisthesis.

Out of the 127 patients, there were 93 males and 34 females with a mean age of 37.6 years (range 16 - 60 years).

Operative technique:

The patients were treated with short-segmental instrumentation consisting of pedicle screws applied immediately above and below the fractured level. All patients were operated upon in prone position with a midline posterior incision. A marker was placed and a lateral x-ray was taken, AP view was not available in all the operative procedures either due to technical difficulties or unavailability of the C-arm machine. Spinal laminectomy opposite to the compromised neural canal was performed, when required for neural decompression or dural repair. No attempt was made to reduce the displaced or retro pulsed fragment of the broken vertebra. No neurophysiological monitoring was conducted during the placement of instrumentation. Different transpedicular screw systems were used in this series of patients. Both monoaxial and polyaxial pedicle screws had been used. The posterior or posterolateral bone grafting was used in most of our patients with a short segment transpedicular technique.

Radiological assessment :

Anteroposterior and lateral radiographs were performed in all patients. If one spinal fracture was detected, a total spine x-ray was taken because noncontiguous spine fractures occur in 10 - 30% of patients.¹⁶

Computed tomographic (CT) scan was done in selected patients as CT has enhanced the

understanding of mechanisms of neurologic injury and fracture morphology. The middle column and subtle posterior injuries can easily be diagnosed with CT. To allow accurate fracture classification and to help direct treatment, we recommended 3D CT examination.

Magnetic resonance imaging (MRI) was done to demonstrate spinal cord pathology and the presence of neural compression, other soft tissue injuries and the state of the intervertebral disc can be identified. Magnetic resonance imaging can predict neurologic recovery in some cases based on T2-weighted images. Magnetic resonance imaging was indicated in patients with progressive neurologic deterioration, incongruous neurologic, skeletal injury, and unexplained neurologic deficit. Also, MRI can be used to assess the status of the posterior ligamentous complex.

Follow up :

All patients were mobilized as soon as possible. Each patient wore an external orthosis (lumbosacral belt) for 6 - 8 weeks. Serial postoperative radiographs were obtained on follow-up; 6 months and one year. Of the 173 patients, 78 (45%) patients were available for follow-up until the end of the study and 90 patients were followed-up for 6 months postoperatively. Implant failure and radiological analysis done through plain x-rays. The postoperative plain radiological studies included the standard A/P and lateral views. Successful fusion was determined by evaluating the radiographs for the presence bridging bone between the fused segments. The radiographs were interpreted for manifestations of failure of fixation, the effect of implant failure, the point of implant failure, screw length and diameter, rod length and diameter and status of the bone graft. The most common complications were also observed in screw misplacement, breakage of screws, breakage of rods, loosening of screws and rods.

Results:

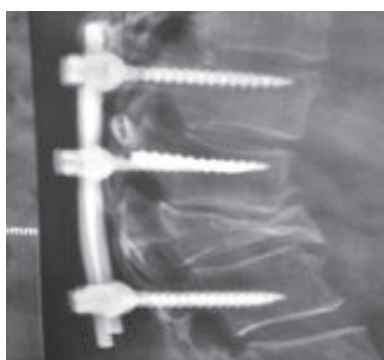
Nine patients with stabilization failure were identified in 127 consecutive patients in whom short-segment transpedicular instrumentation was placed. The probable causes of failure were the absence of bone graft, failure to bone fusion, poor surgical technique, use of less diameter screws, poor quality of implants, inadequate rest after surgery, trauma after surgery and short segment fixation.

Table-I
Patient profile of failed cases.

Case No.	Age	Sex(Yrs)	Indication	Type of failure
1	F	46	Spondylolisthesis	Breakage of screws
2	M	52	Fall from height	Breakage of screws
3	F	43	Spondylolisthesis	Loosening of screws
4	M	35	Fall from height	Loosening of screws
5	M	25	RTA	Breakage of screws
6	F	52	Osteoporotic fracture	Breakage of screws
7	M	43	RTA	Breakage of rods
8	M	32	Fall from height	Breakage of rods
9	F	23	TB Spine	Breakage of screws



Case No. : 1



Case No. : 2



Case No. : 3



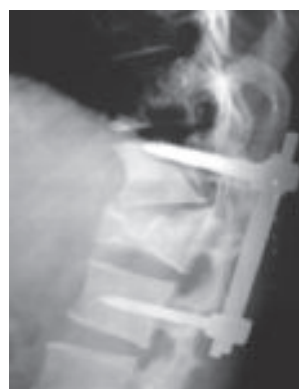
Case No. : 4



Case No. : 5



Case No. : 6



Case No. : 7



Case No. : 8



Case No. : 9

Figure : Radiography of failed cases.

All the patients with partial neurological deficits showed marked improvement postoperatively and ambulated independently without assistance.

Discussion:

The technique of posterior instrumentation for thoracolumbar fractures had been studied extensively. Various methods have been described for identifying the pedicle and placing the pedicle screws. Basic steps include: cleaning the soft tissues, exposing the cancellous bone of the pedicle by decortications at the intersection of the base of the facet and the middle of the transverse process, probing the pedicle, tapping the pedicle and placing the screw. In the lower thoracic levels, screw placement with a straightforward direction may be safe. The incidence of pedicle wall violation was significantly reduced when screws were placed using the open-lamina technique through a partial laminectomy.^{3,4,9,14,20}

Routine use of pedicle screw has not been free of complications.²⁶ The rate of screw misplacement has ranged from 10 - 25% and cortical violation up to 50% in some reports.³ The frequency of screw breakage ranged from 2.6 - 9%. Screw pull out and screw connector disengagements have been reported both in vitro testing and in vivo. The variable angle screws are most useful in multilevel constructs in which several screw/rod connections are necessary. In this regard, there is a greater "margin of safety" in both the mediolateral and sagittal dimensions. The need for rod contouring is lessened and each screw may be placed on an axis parallel to the superior endplate, reducing the chance of construct failures.^{3,5,12}

In a clinical trial with 20 patients suffering from traumatic thoracolumbar burst fractures, the balloon vertebroplasty procedure (additional to a pedicle screw construct) proved to be a feasible and safe technique.^{1,4,10}

In our series, 9 patients had implant failure. Among them the breakage of screws was in 5 cases, breakage of rods was in 2 cases and loosening of screws was in 2 cases.

Edwards et al, found excellent maintenance of alignment in terms of kyphosis, vertebral body height and translation in their review of 122 patients.⁹ The spinal canal area was improved by 32% (from 55% patency to 87%) if the rod sleeve construct was inserted within 2 days of injury. Between 3 and 14 days, they found a 23% improvement in canal

deviance (range, 53 - 76%). Little improvement was found with surgery after 14 days. In our study, we advised early surgical correction of spinal instability. Short-segment fixation using Cotrel-Du-bousset (CD) instrumentation has had poor outcomes, as reported by McLain et al. They reviewed 19 patients and found vertebral collapse, vertebral translation or hardware failure in 10 patients.²² The primary cause for failure was attributed to the fixation device. Good outcome studies used a hybrid system using pedicular screws, rods and laminar hooks.^{2,6,17,22}

Conclusion:

Short-segment pedicle screw fixation is a common and relatively simple method for treating thoracolumbar instabilities. The failure of implanted pedicle screws and rods are not unavoidable complications. Failure to provide adequate stabilization can necessitate additional surgical procedures to achieve spinal fusion. Therefore, great attention must be directed to maintain the coronal and sagittal balance of the fractured spine by the proper distraction of the implant, and early reconstruction of the comminuted anterior column. An understanding of fundamental biomechanical principles of the spine, fixation strategies and good surgical technique is essential to avoiding unnecessary subsequent failures.

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Immediate Post-operative Outcome following Lumbo-Peritoneal Shunt Surgery in Idiopathic Intracranial Hypertension

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Abstract:

Background: Idiopathic intracranial hypertension is a benign condition which is associated with headache and visual disturbance.

Introduction: Patients were diagnosed with IIH with Dandy's criteria and were treated with lumbo-peritoneal shunt system.

Materials and methods: This is an observational study. The study was done from September 2013 up to January 2015. Six patients were operated on. They were followed up to 15 days after surgery. They were evaluated with confrontation test, visual field analysis and fundal photograph, both preoperatively and post operatively.

Results: All patients had improvement of symptoms with decreased headache and in improvement in visual acuity.

Key Words: Headache, Idiopathic intracranial hypertension, Lumboperitoneal shunt, Optic nerve sheath fenestration, Papilledema, Venous sinus thrombosis, Ventriculoperitoneal shunt.

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Introduction:

Idiopathic intracranial hypertension (IIH), is a heterogeneous group of conditions characterized by increased intracranial pressure with no evidence of intracranial mass, hydrocephalus, infection (e.g. chronic fungal meningitis), or hypertensive encephalopathy. IIH is thus a diagnosis of exclusion. There is a juvenile and an adult form. It is also known as pseudotumor cerebri and benign intracranial hypertension.

Idiopathic intracranial hypertension (IIH), or pseudotumor cerebri, was originally described as *meningitis serosa* by Quincke in 1893. He reported several cases of increased intracranial pressure

(ICP) without a brain tumor.¹ It is a common problem in neurological practice is that of the patient with papilloedema who, on investigation, is found to have neither a brain tumour nor other space-occupying lesion, nor indeed any very well defined cause to explain it.²

Idiopathic intracranial hypertension (IIH) is a challenging disorder with a rapid increasing incidence due to a close relation to obesity. The onset of symptoms is often insidious and patients may see many different specialists before the IIH diagnosis is settled³.

IIH occurs most commonly among women. The prevalence is approximately 1 case/100,000 women but increases to 13 cases/100,000 women of ages 20 to 44 years who are 10% above ideal body weight and 19 cases/100,000 women of ages 20 to 44 years who are obese (>20% above ideal body weight). Depending on the exact criteria used, large proportions of patients in virtually all series were obese. Most studies demonstrated an age of onset between 11 and 58 years, with a mean of approximately 30 years. Men are affected less frequently. The incidence is 0.3 cases/100,000 men but increases to 1.5 cases/100,000 obese men

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(>20% above ideal body weight). Female-to-male ratios are approximately 4.3:1 to 8:1. (1) More than 93% of people with idiopathic intracranial hypertension (previously called pseudotumour cerebri and benign intracranial hypertension) are obese.⁴

The overall incidence of idiopathic intracranial hypertension is approximately two per 100,000, but is considerably higher among obese individuals and, given the global obesity epidemic, is likely to rise further.⁵ Digre and Corbett emphasized; these modified Dandy criteria must be met for a condition to be called IIH. (1) This criterion implies that the diagnosis may be established in asymptomatic patients with papilledema.⁶

The only major complication is visual loss. Early series reported that some 10% of affected eyes could end up blind. More recent studies have shown some degree of visual loss in up to 85% of cases if carefully sought.⁷

Among all patients (n = 353), the prevalence of those without papilledema was 5.7% (n = 20). Patients without papilledema reported photopsias (20%), and were found to have spontaneous venous pulsations (75%) and non-physiologic visual field constriction (20%) more often than did those with papilledema.⁸

Advantages of Lumbo-peritoneal shunting are that there is no direct involvement of visual pathways. It is readily obtained in neuro-surgical departments. The disadvantages include shunt obstruction, low-pressure headache, subdural haematoma, catheter migration/dislocation, radiculopathy/sciatica, back pain/arachnoiditis, shunt-related infection/meningitis, abdominal pain/infection/haemorrhage, tonsillar herniation, syringomyelia, and rarely death⁷.

The risk of shunt obstruction was three times higher amongst the LP shunts, where there was a 2.5-fold increase in risk of shunt revision (9). Eggenberger and coworkers⁷⁹ studied lumboperitoneal shunt retrospectively in 27 IIH patients. While initially successful, 56% required a shunt revision. Rosenberg and colleagues⁸⁰ reported on 37 IIH patients that underwent 73 lumboperitoneal shunts and nine ventricular shunts with modest success (38% of patients successfully treated after one shunting procedure). Shunt failure occurring in 55% and low-pressure headaches in 21% were the most common causes for reoperation. The vision of most patients improved or stabilized from the procedure, but three

who had initially improved later lost vision and six had a decrease in vision postoperatively. Serious complications occurred in 3.6%. Other series are similar^{81, 82} with the conclusion that there is initial success but at least half need reoperations. Also, when the procedure is done primarily for headache relief, long-term success is only about 50%.⁸³ In hospital mortality for new shunts is a surprising 0.5% with 0.9% for ventricular shunts and 0.2% for lumbar shunts.¹⁰

The revision rate for lumboperitoneal shunts ranges from 38% to 64%, with an overall revision rate of 52% (78 of 150 cases). The number of revisions per patient is 2.3% to 6.6% (mean 3.9%), but this value may be skewed because of the small number of reported patients. The reported interval between shunt placements to first revision is 9 to 27 months. Major causes of shunt failure include catheter obstruction, low ICP, catheter migration, and lumbar radiculopathy.¹¹

Postoperative visual acuity did not differ between ONSF (76.4 ETDRS equivalent letters) and shunt (76.4 letters), although there was a trend toward worse preoperative acuity in the ONSF cohort. Final MD was significantly better after shunt ("9.23 dB) compared to ONSF ("17.29 dB), U=52.0, p=0.036. Preoperative papilloedema was qualitatively worse in the ONSF group.¹²

Post-operatively, significantly fewer patients experienced declining vision and visual acuity improved at 6 (p<0.001) and 12 months (p<0.016). Headache continued in 68% at 6 months, 77% at 12 months and 79% at 2 years post-operatively. Additionally, post-operative low-pressure headache occurred in 28%. Shunt revision occurred in 51% of patients, with 30% requiring multiple revisions.¹³

Headache and vomiting was observed in 368 (90%) and 327 (80%) cases respectively. Two hundred and eighty six patients (70%) had fever. Fundoscopy revealed papilledema in 326 (80%) cases. Eighty (20%) cases had seizures and pupillary abnormality and hemiparesis was seen in 32 (8%) cases. The neurological status was evaluated on the basis of Glasgow Coma Scale. A total of 30 patients died following surgery; nine died within 6 months¹⁴. IIH patient management should include serial perimetry and optic disc grading or photography. Then, the proper therapy can be selected and visual loss prevented or reversed. Although there is no evidence

based data to guide therapy, there is an ongoing randomized double blind controlled treatment trial of IIH investigating diet and medical therapy.¹⁵

Materials and method:

This is an observational study which included IIH patients. A total of six (n=6) patients were diagnosed with IIH were treated with LP shunt in the Department of Neurosurgery of NINS from September 2013 up to January 2015. All patients were females. The average patients were between 18 to 45 years. After proper history taking, neurological examination and relative investigations were done.

Their MRI was Normal, Visual field was compromised and fundus showed signs of bilateral papilloedema.

All patients were treated with Lumbo-peritoneal shunt system manufactured by Surgiwear® Inc. all patients were regularly followed up and sutures were removed on day 8 to 10.

All the patients were followed up after surgery. They were clinically monitored for surgical as well as for their visual complications. The surgical symptoms looked for were wound infection, shunt infection, spinal headache. Other symptoms were visual acuity and dimness or deteriorating vision. Fundoscopy, visual field analysis and fundal photograph was done to assess visual symptoms on the 10th post-operative day.

Results:

Six patients were treated for IIH with Lumboperitoneal shunt system. All patients presented with Headache, Vomiting and visual disturbances. After surgery all patients had improved.

Table-I
Outcome of patients after surgery (n=6)

Symptoms/signs	No. of pt. improved	Percentage
Headache	6	100%
Vomiting	6	100%
Visual dimness	6	100%
Papilloedema	6	100%

According to the table 1, all patients had benefitted from surgery. Their headache, vomiting and visual problems had improved. Their papilloedema had improved following surgery which was observed with ophthalmoscope and confirmed by fundal photography.

Table-II
Post-operative Complications

Complications	No. of patients	Percentage
Spinal headache	4	66.66%
Wound infection	0	0
CSF leakage	0	0
Meningitis	0	0
Intestinal obstruction	0	0
Shunt revision	0	0

According to table 2, four patients (66.66%) out of 6 had suffered from spinal headache. No patients had suffered from wound infection, CSF leakage, Meningitis, intestinal obstruction, and shunt revision. They had unremarkable recovery.

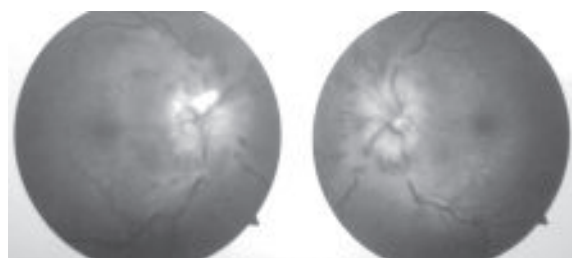


Fig.-1: Pre-operative fundal photograph

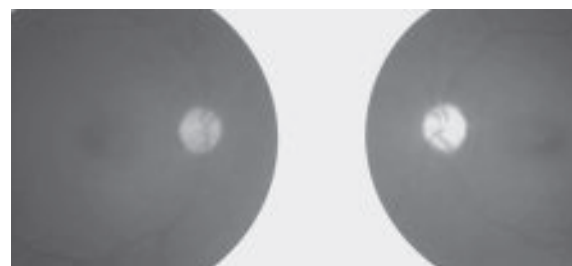


Fig.-2: Post-operative fundal photograph

Discussion:

Lumbo-peritoneal shunt is a standard procedure for Idiopathic intracranial hypertension. In our study six patients were treated with lumboperitoneal shunt system. They had excellent recovery from surgery and they had no short time complication. Four patients developed spinal headache which resolved after four days.

No patients developed any other complication. This is also true for studies by other investigators. Wound infection is common for any surgical procedure. In this study no infection was seen. Many patients develop intestinal obstruction following surgery.

Meningitis and CSF leak is also seen. But in this study none were noted whatsoever.

Conclusion:

Lumboperitoneal shunt surgery is a good treatment for Idiopathic intracranial hypertension. It is not an alternative to other modalities. The lumboperitoneal shunt surgery is a good option for relieving patients from headache and blindness. In our institution it is safe and relatively complication free. However longterm followup is needed for a better result.

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Clinical Profile and Risk Factors of Aneurysmal Subarachnoid Haemorrhage in a Tertiary Level Hospital of Bangladesh

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Abstract:

Objective: The present study was undertaken to evaluate the clinical features and risk factors of a patient who presented with aneurysmal subarachnoid haemorrhage.

Design & setting: The cross-sectional observational study was carried out in the Department of Neurology, Dhaka Medical College Hospital, Dhaka from January 2013 to January 2014.

Methods: Adult patients of spontaneous subarachnoid haemorrhage (SAH), diagnosed clinically and confirmed by CT scan of the head were included in the study. However, patients who are not capable financially of undergoing Digital Subtraction Angiography (DSA), traumatic subarachnoid haemorrhage, intracerebral haemorrhage and patients taking antiplatelet and anticoagulant drugs and with comorbidities were excluded. A total of 30 subjects meeting the above eligibility criteria were selected consecutively from the study population. After enrollment all patient underwent DSA.

Results: The present study demonstrated that 80% of the patients were 50 or younger than 50 years old (mean age 45.0 ± 9.4 years) with a male preponderance (60%). Sudden headache accompanied by vomiting was invariably complained by all the patients (100%) at onset of the disease. On admission two-thirds (66.7%) of the patients were unconscious. 4 out of 30 (16.65%) patients exhibited neurological deficit. Assessment of neurological impairment shows that 1 (3.3%) patient had impaired motor function and 1 (3.3%) had sensory loss. Three patients (10%) exhibited cranial nerve palsy. While meningism was present in every patients, hemiplegia and monoplegia were completely absent. Of the risk factors, 43.3% of the patients had smoking habit and nearly half (46.7%) had hypertension and a few patients had diabetes (10%) and family history of SAH (6.7%). Based on Glasgow Coma Scale, 7 (23.3%) patients out of 30 in the present study were in grade-v.

Conclusion: In ruptured aneurysmal subarachnoid haemorrhage, sudden headache accompanied by vomiting was invariably complained by all the patients at onset of the disease. On admission two-thirds of the patients were unconscious and a few patients exhibited neurological deficit. Among the risk factors, hypertension and smoking demonstrated majority.

Key words: Subarachnoid haemorrhage, cerebral aneurysm, clinical profile, Bangladesh.

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Introduction:

Subarachnoid hemorrhage (SAH) is the bleeding in the subarachnoid space - the area between the arachnoid mater and the pia mater surrounding the brain. This may occur spontaneously, usually from a

ruptured cerebral aneurysm or may result from head injury.¹ It is a form of stroke and comprises 1 to 7 % of all strokes² and affects about 6/100,000 of the population and women are affected more commonly than men, usually present before the age of 65.³ This is a medical emergency which can lead to death or severe disability even when recognized and treated at an early stage. Up to half of all cases are fatal and 10-15% dies before reaching to the hospital⁴ and those who survive often have neurological or cognitive impairment.⁵ Most of the survivors dies due to recurrence or re-bleeding - about 40% in first four weeks and 3% annually thereafter.³ Cerebral aneurysms are the most common cause of non traumatic subarachnoid hemorrhage occurring in 60 to 80% of cases.^{6,7} Other evidence says that cerebral aneurysm is responsible for 70 to 75% of spontaneous SAH, 5% of which is caused by AVM (arterio-venous malformation) and in 20% cases no causes are found.⁸ Ruptured "berry" aneurysm is the most common among the aneurysmal SAH and

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is responsible for 85% of cases.³ So, to determine anatomical site of cerebral aneurysm and securing them is essential to reduce mortality. In view of subsequent increased mortality and morbidity in patients of SAH, any investigation that is effective in planning further management to prevent re-bleeding, needs to be vigorously investigated. So, the purpose of the present study was to evaluate patients of SAH clinically and to determine the anatomical distribution and morphology of cerebral aneurysms in patients with subarachnoid hemorrhage (SAH) by DSA and to characterize the age and sex distribution of these patients.

Subarachnoid hemorrhage can be diagnosed clinically and can be confirmed by CT scan of head or by lumbar puncture (LP) in CT scan negative cases. The classic symptoms of subarachnoid hemorrhage are thunderclap headache, described as 'like being kicked in the head or the worst ever'.⁹ The headache from aneurysmal rupture develops in seconds to few minutes.¹⁰ Vomiting occurs in 70% of patients with aneurysmal rupture and 1 in every 14 cases exhibit seizure.² Confusion, decreased level of consciousness or coma may be present. Neck stiffness usually presents 6 hours after initial onset of SAH.¹¹ Intraocular hemorrhage may occur in response to raised intracranial pressure. Subhyaloid hemorrhage or vitreous hemorrhage, which may be visible on fundoscopy, occurs in 3-13% patients with severe SAH.¹² Physical examination can provide information about the cause of SAH. Monocular blindness may result from anterior communicating artery aneurysm if it is exceptionally large.¹³ Complete or partial third nerve palsy is a well-recognized sign after rupture of an aneurysm of the internal carotid artery at the origin of posterior communicating artery. Approximately 85% of all spontaneous haemorrhage into the subarachnoid space arises from rupture of morphologically saccular type aneurysms at the base of the brain.^{14,15} If SAH is suspected, CT scan of head is the first line investigation because of the characteristically hyperdense appearance of extravasated blood in the basal cisterns. The pattern of haemorrhage often suggests the location of any underlying aneurysm, although with variable degrees of certainty.¹⁶ Lumbar puncture is done to exclude SAH in patients with a convincing history and negative brain imaging. Imaging modalities for detecting aneurysms are CT angiography, MR

angiography and DSA. The first work using digital subtraction techniques was performed in the laboratory of Meyers. The actual subtraction techniques are accomplished by associated computer technology, resulting in greater contrast between transient blood flow within the vasculature and permanent structures (bones). Later developments in robotic C-arms allowed larger image intensifiers to be manipulated in multiple planes creating multiple views with image resolution greater than conventional angiography. The multiple views obtained have also been manipulated into three-dimensional (3D) images and movies allowing further analysis of cerebral aneurysms regarding their location, size and morphology. The introduction of nonionic contrast agents further increased image quality and reduced patient's risk of complication. With these advancements DSA is still considered as the gold standard.¹⁷ Many studies showed that the sensitivity and specificity of digital subtraction angiography (DSA) is more than CTA and MRA in detecting, localizing and sizing cerebral aneurysms.^{18, 19} The proper detection and localization of the cerebral aneurysm can be done more accurately by digital subtraction angiography (DSA). Moreover, DSA is the only technique for endovascular coiling to secure aneurysm.

Materials & Methods:

This study was a cross-sectional observational study. The study was carried out in the Department of neurology, Dhaka Medical College Hospital, Dhaka from January 2013 to January 2014. Adult (18-75 years) patients of subarachnoid haemorrhage (SAH), diagnosed clinically and were confirmed by CT scan of the head, of both sex, patients who are financially capable of doing DSA and patients who gave consent were included in the study. Traumatic subarachnoid haemorrhage, intracerebral haemorrhage, patients taking antiplatelet and anticoagulant drugs and patient with co-morbid conditions were excluded from the study. Data were collected in pre-designed structured questionnaire by the researcher himself. The subjects were thoroughly inform about the procedure of DSA and informed written consent was taken. Having obtained an informed consent from the attendant of all the study patients, the study was carried out on patients admitted in the Neurology Department of Dhaka Medical College Hospital (DMCH), Dhaka. Medical history and personal history like smoking

habit were noted. Detailed history was taken and thorough physical examination, especially neurological examination were carried out by the investigator himself to assess the Glasgow Coma Scale score and any neurological impairment. The overall score on the Glasgow Coma Scale is the sum of points for eye opening (4 points), best motor response (6 points), and best verbal response (5 points). It is a very reliable method for evaluating the level of consciousness) and the presence of focal neurologic signs. The higher the score, the worse is the prognosis.

Before reaching a final diagnosis, consultation was done with a Neurologist. History of unconscious patients was taken from their attendants. A sign of meningeal irritation was considered if there was neck rigidity with or without kernig's sign. The following information was collected from each patient: age, sex, hypertension, diabetes mellitus, hypercholesterolemia, current or previous smoking, previous incidence of SAH, family history of subarachnoid haemorrhage and family history of kidney disease. Emphasis was laid to determine the presence of aneurysm in patients with SAH using clinical findings and the findings of DSA. The patients of subarachnoid haemorrhage were diagnosed on the basis of clinical features and findings of CT scan of head.

Clinical features and examination findings were noted. Detailed drug history was taken. Investigations like CBC, serum lipid profile, blood sugar, serum creatinine, ECG, Chest X-ray were also done. Then Biplaner DSA was performed after 4 weeks via a femoral arterial approach by interventional neurologists. Each patient was evaluated immediately and 6 hours after DSA for any post-procedural complications and was advised to attend the Neurology Out-patient for subsequent follow-up. Data was analysed using statistical package for social software (SPSS).

Results:

Among 30 patients in the study, 18(60%) were male while 12(40%) were female. The mean (\pm SD) age of the patient was 45.00 ± 9.4 years with the youngest and oldest patient were 18 and 59 years respectively. Presenting features demonstrate that headache and vomiting was invariably complained by the patients at onset. Two-thirds (66.7%) of the patients were unconscious at presentation (Table I).

Table-I
Distribution of patients by presenting features (n = 100)

Presenting features	Frequency	Percentage
Headache	30	100.0
Vomiting	30	100.0
Unconsciousness	20	66.7

Risk factors distributions are shown in table II. Approximately 44% of the patients had smoking habit and nearly half (46.7%) had hypertension. A few patients had diabetes (10%) and family history SAH (6.7%).

Table-II
Distribution of patients by risk factors (n = 30)

Presence risk factors	Frequency	Percentage
Smoking	13	43.3
Hypertension	14	46.7
Diabetes	3	10.0
Family history of SAH	2	6.7

Assessment of neurological impairment shows that 1(3.3%) patient had impaired motor function and 1(3.3%) had sensory loss. Three patients (10%) exhibited cranial nerve palsy. While meningeal irritation (manifested as neck rigidity) was present in every patients, hemiplegia and monoplegia were completely absent (table III).

Table-III
Distribution of patients by neurological impairment (n = 30)

Neurological impairment	Frequency	Percentage
Abnormal motor function	1	3.3
Impaired sensory function	1	3.3
Cranial nerve palsy(3 rd nerve)	3	10.0

Over one-third (36.7%) of the patients exhibited aneurysm in the anterior communication artery, 26.7% in the middle cerebral artery, 23.3% in the posterior communicating artery. Internal carotid artery and top of the basilar artery were seldom involved (table IV).

Table-IV
Distribution of patients by anatomical location of aneurysm (n= 30)

Anatomical location	Frequency	Percentage
Anterior communicating artery	11	36.7
Middle cerebral artery	8	26.7
Posterior communicating artery	7	23.3
Internal carotid artery	1	3.3
Top of the basilar artery	1	3.3

Discussions:

The present study demonstrated that 80% of the patients were 50 or younger than 50 years old with a male preponderance (60%). Although the incidence increase with age, half the patients in any series are found younger than 55 years at the time of subarachnoid haemorrhage.¹⁵ However, a female preponderance of the disease has been seen in several studies.³ The medical records of all residents of Olmsted county Minnesota with a view to find the population-based incidence and prevalence rates of intracranial saccular aneurysm showed a total 348 intracranial aneurysms were detected among 270 persons during the 31-year period. There were 105 male subjects (39%) and 165 female subjects (61%). The mean age at diagnosis was 59.1 years.¹⁶ The age-sex adjusted incidence rate for intracranial aneurysms excluding asymptomatic autopsy cases was 9 per 100000 person-years.¹⁶

In the present study sudden headache was invariably complained by the patients at onset. Consistent with this finding, sudden headache is the most characteristic symptom of subarachnoid haemorrhage in three out of four patients. Conversely, in patients who present with sudden headache alone in general practice, subarachnoid haemorrhage is the cause in one in ten patients.¹⁷

Vomiting is not a distinctive feature either because almost half the patients with nonhaemorrhagic thunderclap headache also report vomiting at onset.¹⁸ However in the present study all the patients experienced vomiting at onset. Seizures at onset of the haemorrhage occur in one of every 14 patients with subarachnoid haemorrhage.¹⁸⁻²⁰ although none of the patients in the present series have had seizure, which may be due to chance error resulting from small sample-size.

On admission two-thirds (66.7%) of the patients were unconscious which quite consistent with the findings that two-thirds of all patients have depressed consciousness, of whom half remain in coma.²¹ Neck stiffness is a common symptom, caused by the inflammatory response to blood in the subarachnoid space. It takes some 3–12 h to appear and might not develop at all in deeply unconscious patients, or in patients with minor subarachnoid haemorrhage.²² Therefore, absence of neck stiffness cannot exclude the diagnosis of subarachnoid haemorrhage in a patient with sudden headache.

Very few patients in the present study exhibited neurological deficit (1 abnormal motor function, 1 sensory loss and 3 cranial nerve palsy) Focal neurological deficits occur when an aneurysm compresses a cranial nerve or bleeds into the brain parenchyma, or from focal ischaemia due to acute vasoconstriction immediately after aneurysmal rupture. Complete or partial third-nerve palsy is a well recognized sign after rupture of aneurysms, mostly of the internal carotid artery at the origin of the posterior communicating artery.

Of the risk factors, hypertension and smoking demonstrated their significant presence (around 45%) among the patients studied. Other studies also showed cigarette smoking hyper-tension and heavy alcohol as major modifiable risk factors.²³⁻²⁵

In the present study we used DSA in all patients to achieve a diagnosis. The sensitivity for detecting ruptured aneurysms, with conventional angiography as the gold standard, is currently about 95%.^{27,28} A great advantage of CT angiography over MR angiography and catheter angiography is the speed with which it can be undertaken, preferably immediately after the CT scan of the brain by which the diagnosis of aneurysmal haemorrhage is made, and while the patient is still in the scanner.

Conclusion:

From the findings of the study it can be concluded that patients with aneurysmal SAH are usually middle-aged (younger than 50 years) and predominantly female. Headache and vomiting are universal complaints at onset. Smoking and hypertension are common modifiable risk factors. Though this study is a very small one but still it reflects a small light. A comprehensive and large scale study involving greater number of patients in multiple centres is

required to make a final comment regarding this issue.

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Is Low Total Cholesterol Associated with Primary Intracerebral Hemorrhage in Bangladeshi Population?

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Abstract

Objective: This study was carried out to see the association of the low total cholesterol level with primary Intracerebral Hemorrhage (ICH) in Bangladeshi population.

Materials and Methods: This was a case-control study carried out in the department of Neurology, Chittagong Medical College and Hospital from January 2013 to December 2013. Total of 132 patients were enrolled where 67 patients of hemorrhagic stroke were in the experimental group and 65 age and sex matched persons were in the control group. Low total cholesterol was designated as level less than 200mg/dl. Data were analyzed and compared by SPSS version 19.

Results: The proportion of ICH patients with low total cholesterol was significantly higher than the controls (74.6% vs. 32.3%). Mean total cholesterol was also significantly low in ICH patients compared with controls (180 mg/dL vs. 217 mg/dL; P-value = 0.001). Low-density lipoprotein cholesterol (LDL-c) and triglycerides were also significantly low in ICH patients compared with controls. Mean LDL-C in the ICH patient group was 106 mg/dL, whereas it was 128.5 mg/dL in the control group (P-value = 0.001). There was no significant difference in the high-density lipoprotein (HDL) levels in both groups. Although lower mean cholesterol was seen in both young and older individuals in the ICH group than in controls, the difference was significant only in the older group (age >60 years). In multivariate analysis, odds ratio of low cholesterol in the hemorrhage cases was 6.03 (95% CI = 2.1–16.059) which was adjusted other risk factors of hemorrhagic stroke.

Conclusion: The inference of this study is that, there is an increased risk of primary ICH associated with low total cholesterol, especially in older individuals.

Keywords: Intracerebral hemorrhage, Low total cholesterol, risk factors

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Introduction:

Intracerebral Hemorrhage (ICH) is a common occurring in the older population. Cholesterol levels play important role in pathology of ICH. Different studies have demonstrated positive association of higher serum cholesterol levels with ischemic stroke and cardiovascular disease. But the association

between the serum cholesterol level and the risk of intracerebral hemorrhage is inverse.¹

Cholesterol is essential for all animal life, which is synthesized in each cell from simpler molecules in a complex 37-step process. Cholesterol is essential for many normal bodily functions. Enzymes use cholesterol to produce vitamin D, steroid hormones (estrogen, progesterone and testosterone), stress hormones and bile acid for digestion. Cholesterol forms a membrane that surrounds all cells and is also a critical part of regenerating damaged endothelial cells. Cholesterol is actually a “healing agent” and is needed to produce new cells whenever healing is required. For example, cholesterol levels drastically increase after surgery, infections and even heart attack as part of healing process². Cholesterol is recycled and excreted through liver in a non-esterified form (via bile) into the digestive tract. Typically about 50% of the excreted cholesterol is reabsorbed by the small bowel back into the bloodstream.³

Low serum total cholesterol is designated as fasting total cholesterol < 200 mg/dl⁴. In Asian societies, where plasma cholesterol levels are low, hemorrhagic stroke

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may form up to 30% of all strokes.⁵ Although other factors probably also contribute to this high frequency of intracerebral hemorrhage (ICH), low cholesterol levels have been proposed as one explanation for the high incidence of ICH in these countries.

The explanation for a higher incidence of intracerebral hemorrhage in those with low cholesterol levels is unclear. Cholesterol and triglyceride play important role in cell membrane. There is increased erythrocyte fragility and decreased platelet aggregability *in vitro* and *in vivo* with reduced levels of cholesterol. It has been proposed that lower cholesterol results in a weakened endothelium that hemorrhages^{6,7}. Potentially weakened endothelium may be more susceptible to micro aneurisms, the chief pathological finding of cerebral hemorrhage⁸.

It remains unclear whether low cholesterol directly promotes ICH by these or other mechanisms. It is perhaps equally likely that the relationship might be based on a common underlying factor rather than a direct causal link. Alternatively, the finding may reflect an effect of dietary differences, such as protein deficiency or substitution of saturated with polyunsaturated fatty acids⁹. Studies also showed the only cause of death attributable to serum cholesterol concentration was hemorrhagic stroke.¹⁰

We carried out this study to see if there is any association of low total cholesterol level with increased incidence of ICH.

Materials & Methods:

This is a case control study which was performed in the Department of Neurology, Chittagong Medical College & Hospital, Chittagong, from January 2013 to December 2013 for a duration of 01 (one) year. A total number of 132 subjects were enrolled in this study, where 65 patients of hemorrhagic stroke were taken as cases and 65 age and sex matched subjects were taken as control. Sampling technique was purposive sampling. Inclusion criteria were radiologically (C.T scan of Head) documented hemorrhagic stroke within 5-7 days of stroke occurrence. Patients were aged between 18 to 80 years. Patients with history of head trauma, CNS tumor, patients on anticoagulants, antiplatelet, drug abuse and patients with arterio venous malformation were excluded from the study.

Detailed history regarding age, sex, socioeconomic status, known medical diseases and risk factors of

stroke were taken from each subject. Through general examination, nervous system and other systemic examination were done. Physical examination and examination for focal neurological sign were carried out with special attention.

5 (Five) ml of blood was collected from each selected subjects for analysis of lipid profile at fasting state and analysis was done under Department of Biochemistry with Dimension series autoanalyzer, Siemens, USA by automated method.

The data were analyzed with the help of Statistical Package for Social Science (SPSS - 19). Descriptive statistics were presented in frequencies, percentages and 95% confidence intervals. Quantitative variable was analyzed by mean, standard deviation and t-test. Qualitative variable was analyzed & presented with frequency and chi-square test. Regression analysis was done where necessary. "p" value of <0.05 was considered statistically significant.

Results:

A total number of 67 cases of hemorrhagic stroke and age and sex matched 65 subjects were taken as control, were enrolled in the study. (Table I) 53.7% were male and 46.3% were female in case group and it was 56.9% and 43.1% respectively in control group. Maximum patients were below 60 years in both study & control groups. (Table II) Regarding age of case and control it was matched ($P > 0.05$)

Among the risk factors that is diabetes mellitus, Hypertension, cigarette smoking, obesity and low cholesterol were analyzed. (Table-III) It was found that hypertension ($P < 0.05$) and low cholesterol ($P < 0.05$) were highly significant. Cigarette Smoking was also found to be significant.

In analysis of biochemical variables, serum total cholesterol, LDL and triglyceride (TG) were found significantly low in case group then in control group ($P < 0.001$). (Table-IV) HDL was found not to be significant in any group.

In With regression analysis it found that hypertension, age >60 years and low serum cholesterol were of very high significant value. (Table-V) DM, cigarette smoking and obesity were found to be insignificant in development of ICH.

Discussion:

The prevalence of hemorrhagic stroke in populations with low serum cholesterol has been reported in

different population-based studies. One likely explanation for this observation is an inverse relationship between hemorrhagic stroke and serum cholesterol². In Asian societies, where plasma cholesterol levels are low, hemorrhagic stroke may form up to 30% of all strokes⁵. Low total cholesterol plays an important role along with other risk factors in developing high frequency of intra cerebral hemorrhage (ICH). So, this present case control study is designed to find the relationship between primary ICH and low cholesterol in our context.

Among the 67 patients suffering from hemorrhagic stroke, lowest age was 25 years and highest age was 90 years. Majority of the patients were above 50 years (61.1%). We found that the mean age of the stroke patients were 56.30 ± 13.88 . Previously, one study¹¹ showed mean age to be 59.61 ± 13.20 years which matches with our findings. Age more than 60 years were found increasingly associated with hemorrhagic stroke (OR 2.45; 95% CI=0.79-7.30; $p=0.018$).

In the present study, among the total 132 subjects, 55.3% were male and 44.7% were female and ratio between male and female was 1.2:1. Presently in our socioeconomic condition, males get more attention than females and are taken to and treated in the hospitals more. So the present finding regarding gender distribution is consistent with our social architecture and it is likely that this does not represent the real percentage of incidence of ICH among women of our country.

We found DM was mildly associated with ICH but statistically insignificant (OR 1.62, $p>0.05$). DM was defined as patients with history with DM or taking anti diabetic medications and by Capillary Blood Glucose (CBG) analysis. In one study role of diabetes mellitus in the pathogenesis of intracerebral hemorrhage (ICH) is controversial¹². We also found obesity was mildly associated with ICH but statistically insignificant (OR 1.80, $p>0.05$). Obesity was calculated from Body Mass Index (BMI). The present study found cigarette smoking to be statistically insignificant (OR= 1.64; $p>0.05$). In previous studies, some found positive association between cigarette smoking and primary ICH¹³. Whereas, some studies did not find any association between smoking and ICH.¹⁴

74.6% of the patients were hypertensive in our study and hypertension was found to be the commonest

major risk factor in hemorrhagic stroke (OR=18.08; CI 6.50-50.2; $p=0.0001$). This study defined Hypertension was defined as patients having history of hypertension with or without taking antihypertensives. Hypertension as the number one risk factor was also found in other studies.^{15,16,17} In those studies hypertension was found in 59.09%, 68.30% and 60% of patients respectively, which are relatively less than our finding. But in another study of 188 patients with primary ICH, hypertension was observed in 72% of the patients, which corresponds with our study.¹⁸

Serum total cholesterol was found significantly low in the case group than in the control group ($P<0.001$). Mean total cholesterol was 180.36 mg/dl in case group and 217.68 mg/dl in control group. Although mean total cholesterol was significantly low in both young and elderly individuals, the difference was statistically significant in individuals above 60 years of age (OR=2.45; CI 0.79-7.3; $p=0.018$). In the largest population-based study MRFIT,¹⁹ the mean cholesterol level in the hemorrhage and non-hemorrhage groups was 211 ± 14 and 214 ± 40 , respectively, with a pronounced increase in hemorrhage only among those with cholesterol <160 mg/dl.

Corroborating previous findings examining ICH and cholesterol, we observed an inverse association between LDL-c and ICH. Mean LDL-c was 106.63 mg/dl in case group and 128.57 in control group ($p<0.05$).

In a study done previously,²⁰ they found low LDL-c not only increases ICH risk but also increases 90 days mortality after ICH. Mean TG level was also found low in case group in our study. Mean TG was 115.23 in case group and 187.43 in control group ($p<0.05$). So, TG level were also found inversely associated with ICH. An Indian study²¹ found the proportion of ICH patients with low cholesterol was significantly higher than controls (68% vs. 43%). Mean total cholesterol was also significantly low in ICH patients compared with controls (177 mg/dl vs. 200 mg/dl, $p=.0006$). LDL-c and TG were also significantly low in ICH patients compared with controls. Although lower mean cholesterol was seen in both young and older individuals in ICH groups than in controls, the difference was significant only in older group (Age.45 years). The odds ratio of low cholesterol in hemorrhage cases was 2.75 (95% CI

1.44-5.49). Our study is similar to this study. A Turkish study²² also found mean cholesterol level of patients to be significantly lower than the controls ($p < 0.05$). In ICH group, frequency of patients who had the very low cholesterol levels was significantly higher than the control group ($p < 0.05$). Results of both the studies are similar to our study.

From this study, our inference is that, older age, hypertension, low total cholesterol, low LDL-c and low TG increase the risk of ICH. So in our context, low level of cholesterol and hypertension are two important modifiable risk factors for the development of hemorrhagic stroke.

Conclusion:

Along with other risk factors like hypertension and old age, low total cholesterol also plays an important role for development of primary intracerebral hemorrhage. Present study found significant association with low total cholesterol with primary intracerebral hemorrhage especially in older population. This finding of relationship between serum lipids and primary intracerebral hemorrhage has implication for both prevention of intracerebral hemorrhage as well as the potential risk of lipid lowering therapies.

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Idiopathic Fourth Ventricle Outlet Obstruction Successfully Treated by Endoscopic Third Ventriculostomy: a Case Report

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Abstract

Introduction: Fourth ventricle outlet obstruction (FVOO) is a rare cause of obstructive hydrocephalus. We describe a case of idiopathic FVOO that was successfully treated with endoscopic third ventriculostomy (ETV).

Case report: A 22-year old female without any remarkable medical history presented with a headache and vomiting and blurring of vision. Magnetic resonance imaging (MRI) showed tetra-ventricular hydrocephalus associated with the dilatation of the fourth ventricle outlets, without any obstructive lesions. However, MRI suggested mechanical obstruction of the cerebrospinal fluid (CSF) at the fourth ventricle outlets. Thus, the patient was diagnosed as FVOO and ETV was performed; the hydrocephalus was subsequently resolved.

Conclusion: ETV should be considered for FVOO treatment, particularly in idiopathic cases without CSF malabsorption.

Keywords: Hydrocephalus, Fourth ventricle outlet obstruction (FVOO), Endoscopic third ventriculostomy (ETV).

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Background:

Fourth ventricle outlet obstruction (FVOO) is an uncommon clinical condition that causes obstructive hydrocephalus. In FVOO, cerebrospinal fluid (CSF) is blocked at the fourth ventricle outlets by a

membranous structure in the absence of any additional obstructive organic pathologies¹. Various terms for referring to FVOO have been used in previous reports, such as fourth ventricle/ventricular outlet obstruction^{2,3,4,5}, fourth ventricular outflow obstruction⁶, membranous obstruction of the fourth ventricle outlet⁷, obstruction of Magendie's and Luschka's foramina⁸, obstruction of fourth ventricular exit⁹ and primary obstruction of the fourth ventricle outlets¹⁰. Far distal obstructive hydrocephalus is a term that includes Dandy Walker or Arnold Chiari malformation, membranous obstruction or fourth ventricle and intercisternal external obstruction of the CSF¹¹. The etiology and pathogenesis of FVOO are unclear, although some cases present with a history of meningitis or intraventricular hemorrhage. In the present report, we describe the case of idiopathic FVOO without any remarkable medical history that was successfully treated by endoscopic third ventriculostomy (ETV).

Case report :

A 22-year-old female presented with a headache, vomiting and blurring of vision. She had no previous significant medical history. The patient had no neurological deficit except papilloedema on admission.

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Magnetic resonance imaging (MRI) showed enlargement of all ventricular systems associated with the dilatation of the foramina of Magendie and Luschka, with no obstructive organic lesions (such as brain tumors) on contrast enhanced MRI (Fig. 1 and 2). We had initially considered this case might be a communicating hydrocephalus because the fourth ventricle was dilated on MRI. However, the highly expanded fourth ventricle and its outlets were inconsistent with communicating hydrocephalus.

These findings suggested a mechanical obstruction at the outlets of the fourth ventricle. We therefore diagnosed the patient with FVOO and chose to

perform an ETV using a neuro-endoscope (Storz, Germany). A standard third ventriculostomy in the floor of third ventricle was performed on 27.03.2016. On endoscopic observation of the lateral ventricle and pre-pontine cistern, no abnormalities suggestive of previous meningitis or intraventricular hemorrhage were found.

The patient's postoperative course was uneventful with no signs of neurological deficit. Her vision was dramatically improved immediately after operation. MR images obtained 4 and a half month post-surgery revealed significant resolution of the hydrocephalus (Fig. 4a,b). The patient has remained in good

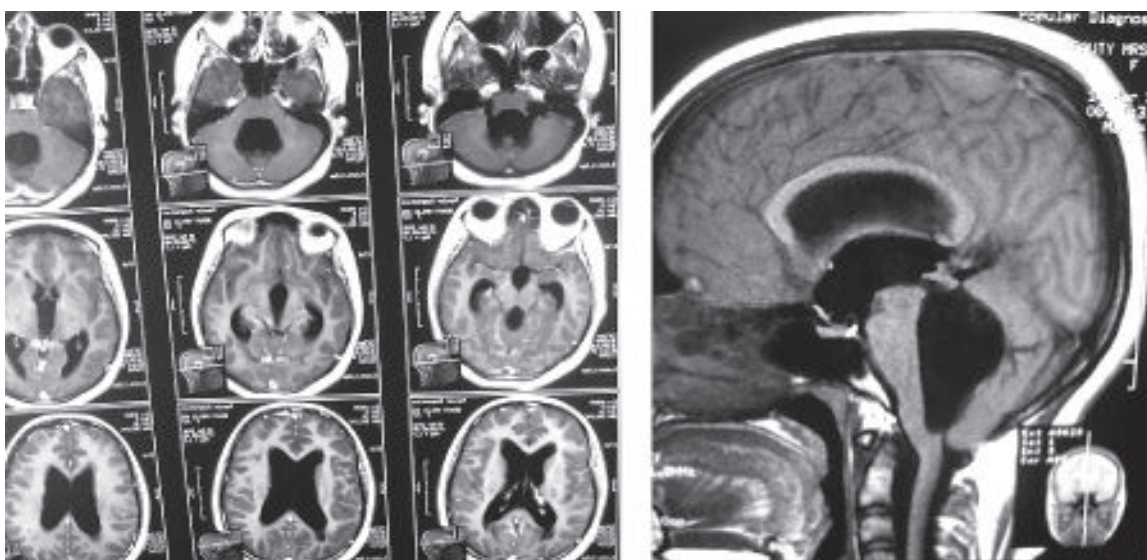


Fig.-1: MRI of brain contrast-enhanced T1-weighted axial and sagittal image on admission showed dilatation of both lateral, third and fourth ventricles, no obstructive lesion.

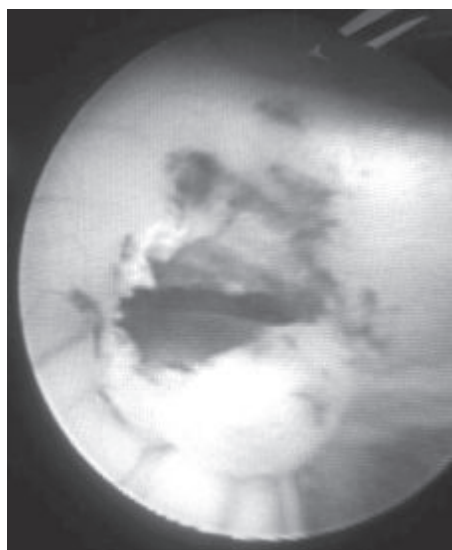


Fig.-2: Intraoperative view of ETV after fenestration of 3rd ventricular floor.

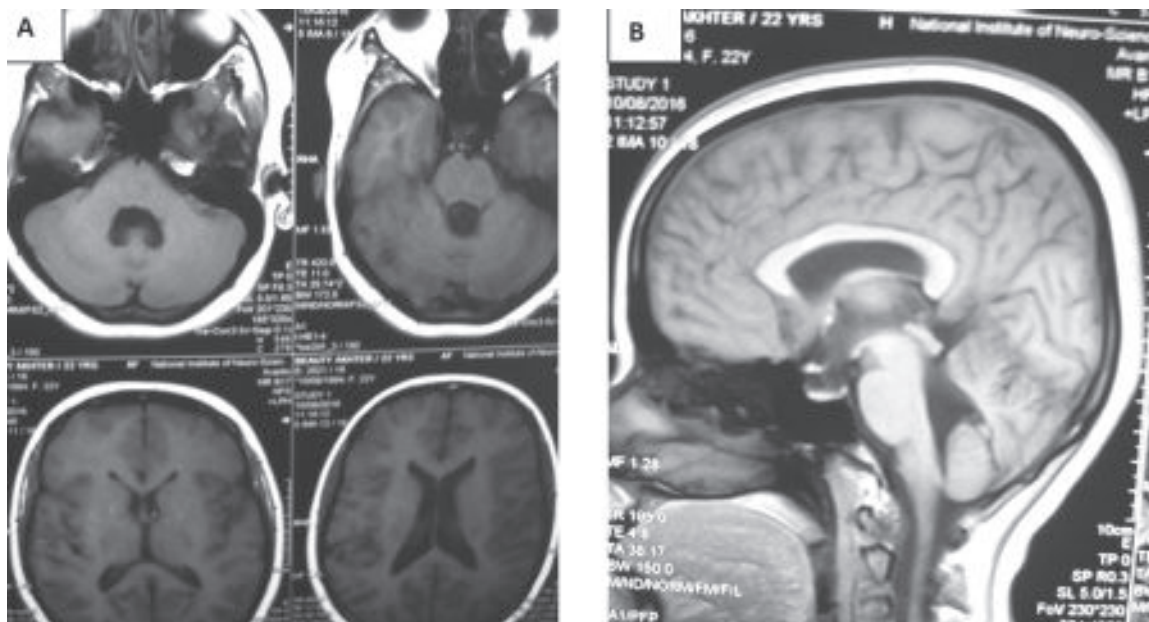


Fig.-3 A,B: Magnetic resonance imaging (MRI) of brain, performed 4 and a half months after ETV showed significant shrinkage of each ventricle, improvement of the hydrocephalus.

condition without recurrence of hydrocephalus followed up to 11 months in the postoperative period.

Discussion:

FVOO is a rare cause of obstructive hydrocephalus. Although many studies on FVOO have been published, the pathogenic mechanism of this condition remains unclear. FVOO tends to occur in children and may be congenital^{12,13,14}, but adult cases are also in fact common. There have been no reports that gender affects the prevalence of this condition. The present case had no obvious medical histories. These facts suggest that the present case represents a case of 'idiopathic' FVOO.

Diagnostic modalities for FVOO:

It is difficult to confirm the presence of a membranous obstruction via conventional MRI. High-resolution three-dimensional constructive interference with steady state sequence on 3T MRI may be able to detect obstructive membranes¹⁵, although this may not be possible in all cases¹⁰. The most sensitive diagnostic method is CT ventriculography, with the injection of contrast medium through a ventricular catheter^{13,3}. Serial CT images after injection will show collected contrast medium in the outlets of the fourth ventricle and subsequent blockage of its diffusion to the pre-pontine cistern. One concern about this method is radiation exposure of the brain, particularly in younger children. It is recommended the use of MRI instead of CT as the diagnostic modality for FVOO in order to avoid exposure to radiation¹⁶. As

alternative examination to access the dynamics of CSF, efficacy of phase-contrast MRI^{8,6}, cine-MRI^{7,8,17,12,5,9,4} or radioisotope cisternogram^{8,4} is also reported. Another diagnostic option is direct endoscopic inspection of the fourth ventricle in case where the aqueduct is sufficiently expanded to safely insert a neuro-endoscope through it². Although this technique needs to be done under general anesthesia and carries a risk of damaging the midbrain around the aqueduct, it has recently been reported to be relatively safe^{18,19,2,20}. When FVOO is highly suspected solely with MRI, this technique could allow simultaneous diagnosis and treatment, thereby reducing the chance of radiation exposure, duration of hospitalization, and risk of drainage infection.

Treatment options of FVOO:

Although a ventriculo-peritoneal (V-P) shunt is the most conventional treatment for FVOO⁹, it is not in fact preferable in children, who represent the majority of patients. In the past, direct fenestration of the membranous occlusion through craniotomy was attempted for treating FVOO^{9,2}; however, recent studies have suggested that ETV is a less invasive and effective treatment strategy^{1,17,9,21,2,10,4}. Therefore, correct preoperative diagnosis is very important because ETV can eliminate the need for surgical implantation of a V-P shunt. In the imaging study with the 3D-CISS sequence on 3T MRI, they found 26 endoscopically treatable noncommunicating cases among 134 cases who had been previously diagnosed as communicating hydrocephalus by

conventional MR images¹⁵. It is reported the entire success rate of ETV for FVOO is 65 % (13 successes in 20 cases)². Although they did not evaluate the success rates of primary and secondary FVOOs separately, they speculated that failure was attributable to CSF malabsorption as a result of prior meningitis or intraventricular hemorrhage. Other case reports or case series^{7,17,5,9,2,4} of ETV performed exclusively for primary FVOO demonstrated obviously better outcome (75–100 %). According to these previous reports, ETV would be more effective in patients of primary FVOO. It is reported that most failures of ETV for treating FVOO occur within 6 weeks of surgery and that subsequent endoscopic re-exploration revealed patency at the fenestration site². Endoscopic exploration not only confirmed a highly stenosed fenestration site, but re-expansion of the fenestration also relieved the hydrocephalus. Endoscopic foraminoplasty by direct fenestration of membranous obstruction at the fourth ventricle outlets is another previously reported treatment option^{18, 9, 19}.

Conclusion:

In the present report, we describe a case of idiopathic FVOO with no remarkable medical history that resulted in the development of hydrocephalus. ETV should be considered as a treatment option for FVOO, particularly in idiopathic cases without CSF absorption disorders. Moreover, in such cases, endoscopic re-exploration of the fenestration would be effective, even when hydrocephalus recurs.

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Endoscopic Trans-Sphenoidal Drainage of Pituitary Abscess: A Rare Case Report

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Abstract

Background: Pituitary abscess is less common but life threatening which is usually misdiagnosed as pituitary tumor pre-operatively, in spite of radiological advancement. Definite diagnosis is possible only postoperatively.

Material and Methods: We report a case of 40 years old woman, admitted in our department with symptoms of headache, visual impairment and pituitary dysfunction. MRI brain revealed sellar and supra-sellar mass consistent with pituitary tumor. She eventually underwent endoscopic trans-sphenoidal removal. Per operatively pus was evident. A month later, she was well and fully recovered pituitary function.

Results: The histopathological examination confirmed presence wall of abscess cavity, however, Culture showed no growth.

Conclusion: This case report gives emphasis on the importance of considering pituitary abscess as a differential diagnosis in patients with sella/supra-sellar mass. Early diagnosis and Surgical management of a pituitary abscess significantly decreases morbidity and mortality, and it also helps to establish the definite diagnosis.

Key words: Pituitary abscess, Pituitary adenoma, Endoscopy, Trans-sphenoidal.

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Introduction:

Pituitary abscess is a rare, first case reported by Simmonds in 1914, accounts for less than 1% in sellar region lesion^{1,2}. The most common symptom is nonspecific pattern of headache (70–92%), followed by anterior pituitary dysfunction, central DI, visual impairment, fever, meningeal irritation and nonspecific symptoms like vertigo^{3,4,5}.

It may occur either de novo or as a result of hematogenous spread or spread from a contiguous

focus of infection such as meningitis and sphenoiditis³. The most commonly isolated pathogens are Staphylococcus spp. and Streptococcus spp., followed by Neisseria spp., Micrococcus, Citrobacter spp., Escherichia coli, Brucella, Salmonella, Corynebacterium and Mycobacterium⁵. However, in immunosuppressed patients, Aspergillus, Candida and Histoplasma are the most frequent pathogens⁶. Pre-operative diagnosis is difficult because of rarity of disease, nonspecific symptoms and ring enhancing other pituitary lesions⁷.

Endoscopic Trans-sphenoidal excision (TSS) of the lesion with decompression of the sella is the most effective and safe approach for patients presenting with mass effect, followed by antibiotics for 4–6 weeks, seems most acceptable treatment modalities in most of the literatures^{8,9,10}.

Case Report:

A 40 years old woman presented in Neurosurgery OPD with occasional mild headache for 4 months, which was generally relieved by taking paracetamol and had blurring of vision, generalized weakness and amenorrhea for 3 months. She had no significant past history. She was nonsmoker and no history of alcohol consumption. Her menarche was at age of 14. She was married and had healthy children. On her examination, she was obese (BMI-32.3), vital signs – within normal limit. All systemic examinations were

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normal including neurological examination except cranial nerve II i.e. Bitemporal hemianopia. The patient had mild hirsutism over the face and the abdomen. There was no galactorrhea, and secondary sexual characteristics were unremarkable.

Laboratory investigation including CBC, biochemical profile and inflammatory markers, including ESR and CRP levels including urine specific gravity and chest x-ray were all within the normal range. Hormonal evaluation revealed mildly elevated serum prolactin levels of 31.16 ng/mL (1.39–24.2ng/ml), decreased serum thyroid-stimulating hormone (TSH) 0.05 μ IU/mL, (normal: 0.47–5.01) with decrease free thyroxine (fT4) 5.35 pmol/L (normal: 9.14–23.81), fT3-1.32(2.62–5.7pmol/L and low morning serum cortisol of 2.6 nmol/L (normal:101.2–535.7nmol/L) with normal adrenocorticotrophic hormone (ACTH) 13.9pg/ml (normal: up to 46pg/mL).

Visual evaluation with Humphrey's perimeter revealed bitemporal hemianopsia.

Her MRI of brain showed T1WI-slightly hypo-intense lesion, T2WI-hyper-intense and gadolinium contrast administration showed mild ring enhancement of lesion in seen in sellar/supra-sellar which was compressing the internal carotid arteries and optic chiasma, measuring about 24mmX22 mm (Fig.1). The patient was diagnosed possibly as Pituitary macroadenoma. In the pre-operative period, her hormonal deficiency i.e. thyroid hormone and cortisol were corrected with thyroxine and hydro cortisone respectively.

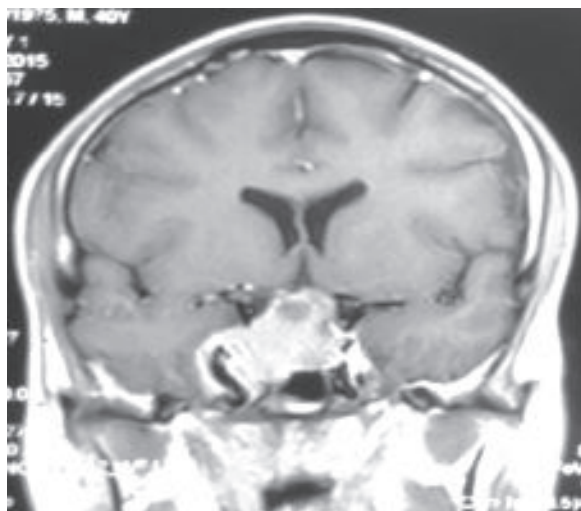


Fig.-1: MRI of Brain Contrast/ Coronal: mild ring enhancement of lesion seen in sellar/supra-sellar compressing the internal carotid arteries and optic chiasma.

Operation and post-operative period:

She underwent through endoscopic trans-sphenoidal removal of tumor. Per-operatively significant amount of yellowish colored pus was found with fibrotic tissue (Fig.2) and capsule, which was drained and sent for histopathological examination and culture. Postoperatively, she was managed with empirical intravenous antibiotics Ceftriazone and Amikacin which were continued for 6 week and followed by 4 weeks' oral antibiotic. No growth was found in culture and histopathology report was consistent with presence of wall of lesion. And hormone replacement was continued. She developed transient diabetic mellitus in early post-operative which was managed with inj. Pitressin. Her immediate CT scan showed no evidence of existence of pre-operative lesion (Fig.3).

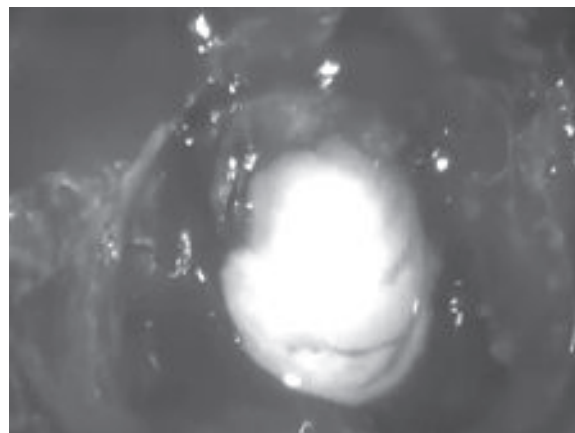


Fig.-2: Endoscopic Intra-operative picture shows yellowish white colored pus.

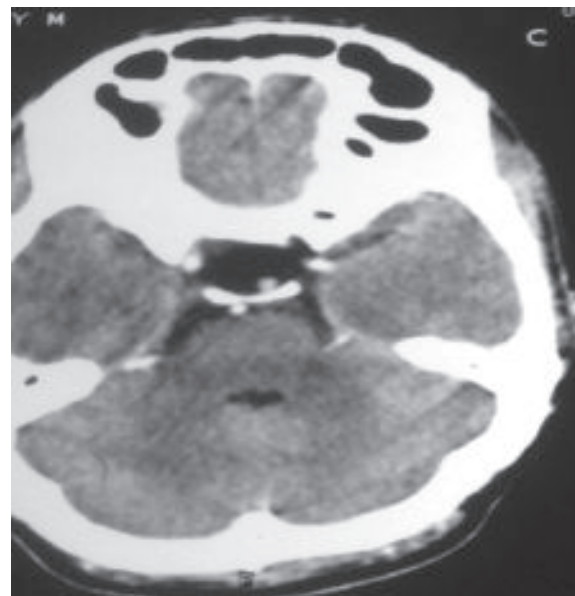


Fig.-3: Post-operative CT Scan of Brain Axial Contrast: normal sellar and supra-sellar region.

Outcome and follow up:

One month after surgery, while on cortisol and thyroxine(replacement therapy), her morning cortisol and TSH, T3,T4 were within normal range. So, hormonal replacement therapy was discontinued. Visual field examination was normal and there was no bitemporal hemianopsia, and had fully recovered and regular menstrual cycles resumed after 2 months.



Fig.-4: Postoperative photograph of patients

Discussion:

In this case report, we presented 40 years women with no fever and no sign of infection where diagnosis was made as pituitary abscess intraoperatively, however, preoperative diagnosis was Pituitary adenoma. Pituitary abscess accounts for less than 1 % of all pituitary disease. Primary pituitary abscess occurs due to hematogenous seeding or by direct extension of adjacent infection, either in the CSF or in the sphenoid sinus, and more rarely as a complication of thrombosis of the cavernous sinus¹¹. Secondary pituitary abscesses occur in a pre-existing lesion, such as an adenoma, a craniopharyngioma or a Rathke cleft cyst. Other risk factors are underlying immunocompromised condition, previous pituitary surgery or irradiation of the pituitary gland ¹.

In this case, it was seen *de novo* like Jain et al where 5 cases out of 6 had no history of fever and sign of infection. No growth was found in culture despite no preoperative administration of antibiotics. Most common organism are Staphylococcus spp. and Streptococcus spp., followed by Neisseria spp., Micrococcus, Citrobacter spp., Escherichia coli, Brucella, Salmonella, Corynebacterium and Mycobacterium. However, in immunosuppressed patients, Aspergillus, Candida and Histoplasma are the most frequent pathogens ^{5,6}.

This case presented nonspecific pattern of headache, anterior pituitary dysfunction, visual disorders which accounts for 70–92%, 54–85%, 27–50% respectively and other symptoms may occur like central diabetic insipidus, fever with meningeal irritation and systemic illness with vertigo ^{3,4,5}. Commonly CT scan enlargement of the sellaturcica and a welldefined low-attenuation rounded lesion demonstrating ring-enhancement⁴ and MRI iso or hypo-intense lesion on T1WI, iso or hyper-intense On T2WI and ring enhancement on gadolinium administration^{4,12} but in this case mild ring enhancement which signifies lack of matured capsule. The differential diagnosis of sellar cystic lesions include adenoma, carcinoma, abscess, arachnoid cyst, colloid cyst, Rathke cleft cyst, craniopharyngioma and metastasis¹³.

Trans-sphenoidal excision (TSS) of the lesion with decompression of the sella is the most effective and safe approach for patients presenting with mass effect^{8,9,10}. Endoscopic trans-sphenoidal is most favored over craniotomy because of more invasive and has a greater complication rate including bleeding, CSF infection, and thus longer hospitalization ¹⁴. Empirical treatment with antibiotics is indicated while awaiting microbiology and histological confirmation. Hence, it is important to do a Gram-staining and culture of the pus and to treat with appropriate antibiotics in the postoperative period to reduce the risk of recurrence. Hormone replacement therapy is administered based on hormone deficits of the pituitary gland ^{14,15}. We have treated our patient with empirical antibiotics.

Early diagnosis and treatment decreases mortality from 45 % to 10%^{3,16}. Recovery of vision and endocrine function were seen within a month in this case, but it may be shorter or longer period depend upon duration of symptoms.

Conclusion:

Pituitary abscess is a rare disease. Pre-operative diagnosis is difficult because of rarity of disease, nonspecific symptoms and ring enhancing another pituitary lesion. Endoscopic trans-sphenoidal approach is choice of treatment, followed by appropriate antibiotics for 4- 6 weeks, seems most acceptable treatment modalities in most of the literatures. So, early diagnosis and treatment decreases morbidities and mortalities significantly. These patients need to be followed up closely because of the risk of recurrence.

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