Original Research Article

A Prospective Clinical Analysis of Subarachnoid Haemorrhage of Unknown Etiology in a Secondary Referral Hospital

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Abstract

Introduction: Spontaneous subarachnoid haemorrhage (SAH) accounts for 15 per lakh population. In 1985, SAH was identified as the pattern of haemorrhage anterior to the midbrain without intraparenchymal or intra ventricular extension without any bleeding on digital subtraction angiography (DSA) and a benign clinical condition. SAH is usually caused by the rupture of an intracranial aneurysm. But only 13 % was found to be negative for any intracranial aneurysms. Such patients with angiography negative SAH have lower risk of rebleeding and their blood distribution is termed as perimesencephalic or Prepontine.**Aims and Objectives:** The aim of the present study was to investigate the clinical course and outcome in patients with SAH.**Materials and Methods:** Quantitative research approach was used to assess the Clinical Analysis of Subarachnoid Haemorrhage of Unknown Origin (SAHUE) at Telangana hospitals, Khammam. Purposive sampling technique was used to select samples. During the study period, 55 samples were selected based on the inclusion and exclusion criteria.**Results:** Totally, we identified 55 cases of spontaneous subarachnoid haemorrhage during the study period. All the cases of subarachnoid haemorrhage were identified by CT and clinical evaluation of the patients. The mean age of the 55 patients was 27.5±1.3 (25 men and 30 women). 47 patients had Glasgow Coma Scale (GCS) between 13-14 both after admission and on discharge. Original CT films that were used to measure the volume of subarachnoid, intraventricular, and intraparenchymalhaemorrhage were available for all the 55 patients included in this study. The patient results have been tabulated and the factors studied have been analysed. Results of radiological assessment of haematoma showed that majority of them had local haematoma, and other members had hypertension as reason of haematoma.**Conclusion:** Each patient with subarachnoid haemorrhage should be monitored as an individual case and to prevent death it is important to identify patients to reduce the aneurysms and modify the risk factors associated with it.

Keywords: Spontaneous subarachnoid haemorrhage, Glasgow Coma Scale, CT, Subarachnoid Haemorrhage of Unknown Origin

Introduction

Spontaneous subarachnoid haemorrhage (SAH) accounts for 15 per lakh population. In 1985, SAH was identified as the pattern of haemorrhage anterior to the midbrain without intraparenchymal or intra ventricular extension without any bleeding on digital subtraction angiography (DSA) and a benign clinical condition[1]. SAH is usually caused by the rupture of an intracranial aneurysm. But only 13 % was found to be negative for any intracranial aneurysms. Such patients with angiography negative SAH have lower risk of rebleeding and their blood distribution is termed as primesencephalic or Prepontine[2].Perimesencephalic haemorrhage is a subset of subarachnoid haemorrhage. It has been identified in recent years that patients with an aneurysmal subarachnoid haemorrhage have a reduced life expectancy[3].Spontaneous subarachnoid haemorrhage occurs by sudden onset headache which is usually described as the worst ever headache explained by the patient. The patient presents with neck pain along with headache and usually it may be associated with vomiting also. The patient also has loss of consciousness based on the severity of haemorrhage[4].Based on the associated intra-parenchymal haemorrhage there may even be neurological deficits associated with blurring of vision. Bleeding cannot be demonstrated in the spontaneous SAH patients [5]. Patients with peri-mesencephalic SAH are believed to attain a good outcome and they are found to have a lower risk of rebleeding. There are few reports on the patients with perimesencephalic haemorrhage and few reports with limited number of patients. Therefore, the aim of the present study was to investigate the clinical course and outcome in patients with SAH[7]

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Aims and Objectives

The aim of the present study was to investigate the clinical course and outcome in patients with SAH.

Materials and Methods

Quantitative research approach was used to assess the Clinical Analysis of Subarachnoid Haemorrhage of Unknown Origin (SAHUE) at Telangana hospitals, Khammam. Purposive sampling technique was used to select samples. During the study period, 55 samples were selected based on the inclusion and exclusion criteria.

In our study, we identified a total of 55 patients admitted to the Neurosurgery department of Telangana hospitals, Khammam who presented with subarachnoid haemorrhage between 2019 and 2020. Subarachnoid haemorrhage was confirmed radiologically via urgent computed tomography (CT) scan without contrast. Traditionally, a negative CT scan is followed with lumbar puncture. However, non-contrast CT followed by CT angiography (CTA) of the brain can rule out SAH with greater than 99% sensitivity. The patients were subjected to four-vessel 3D digital subtraction angiography (DSA) within 24 hours of admission and repeat DSA done at an interval of 2 weeks. IV 3D DSA was obtained with rotational angiographies which was performed on a C-Arm (InfinixCeleve VS; Toshiba, Tokyo, Japan). This covers a total angular range of 200°, with a first rotation of 40°/s to acquire the mask images, a second rotation to return to the starting position, and a third rotation of 40°/s to acquire the opacified images. The type of detector in this system was an image intensifier (RTP12303J-G9E; Toshiba). An 18-gauge angiocatheter was inserted into the right antecubital vein and linked with a connective tube for power injection. First, 15 mL of nonionic contrast medium (Omnipaque 350; Daiichi Seiyaku, Tokyo, Japan) was injected with a pump at a rate of 9 ml/s. The delay time from the start of contrast injection to the time when the common carotid arteries were filled with contrast was measured with DSA. Then 50 mL of the contrast medium was injected at a rate of 9 ml/s. The acquisition of source images was started immediately after the injection of contrast. The acquisition matrix was 512 × 512. This protocol resulted in a rotational series of 200 subtracted images. Rotational angiography data were automatically transferred to a personal computer (XIDF- 100A; Toshiba), which reconstructed 3D volume data. The matrix of transferred data were transformed from 512 × 512 to 256 × 256 by voxel addition. The 3D volume data were transferred to a commercially available multimodality 3D work station(ZIO M900TXA; ZIO Software, Tokyo, Japan), processed, and presented. Available visualization of algorithms included maximum intensity projection (MIP) and volume rendering. A computed tomography scan was performed within 72 hours after the onset of headache showing a perimesencephalic pattern of haemorrhage. The initial CT scan of the patient's brain revealed blood either in peri-mesencephalic cisterns which was called as localized blood and people who had blood in both peri-mesencephalic cisterns and in the lateral cisterns were classified as diffuse collection of blood radiologically. The absence of a saccular aneurysm on computed tomographic angiography or conventional angiography was noted. The patients who had initial angiogram negative finding for aneurysm were taken into study.

The Glasgow Coma Scale (GCS)

It is a neurological scale which aims to give a reliable and objective way of recording the state of a person's consciousness for initial as well as subsequent assessment. A person is assessed against the criteria of the scale, and the resulting points give a person's score between 3 (indicating deep unconsciousness) and either 14 (original scale) or 15 (more widely used, modified or revised scale). GCS was used to assess a person's level of consciousness after a head injury, and the scale is widely used by emergency medical services, nurses, and physicians as being applicable to all acute medical and trauma patients. In these hospitals, it is also used in monitoring patients in intensive care units. The score is expressed in the form "GCS 9 = E2 V4 M3 at 07:35". Generally, brain injury is classified as: Severe; GCS < 8–9; Moderate; GCS 8 or 9–12 (controversial); Minor; GCS ≥ 13.

Statistical Analysis

The collected data were grouped and analyzed based on percentage, mean and standard deviation.

Results

Totally, we identified 55 cases of spontaneous subarachnoid haemorrhage during the study period. All the cases of subarachnoid haemorrhage were identified by CT and clinical evaluation of the patients. The mean age of the 55 patients was 27.5±1.3 (25 men and 30 women) (Table 1). 47 patients had Glasgow Coma Scale (GCS) between 13-14 both after admission and on discharge. Original CT films that were used to measure the volume of subarachnoid, intraventricular, and intraparenchymalhaemorrhage were available for all the 55 patients included in this study. The patient results have been tabulated below and the factors studied have been analysed. Results of radiological assessment of haematoma showed that majority of them had local haematoma, and other members had hypertension as reason of haematoma.

Table 1: Characteristics of Patients Studied and the Factors Analysed

Characteristics Studied	Number of Patients	Percentage
1.Sex		
Male	25	45%
Female	30	55%
2.Glasgow Coma Scale (GCS) on Admission		
13-14	47	85%
3-4	8	15%
3.Hypertension		
Yes	47	85%
No	8	15%
4.Radiology of Haematoma		
Diffuse	8	15%
Local	47	85%
5.Associated severe risk factors		
Diabetes	12	22%
Hypertension	13	23%
Anticoagulants	3	5%
None	27	50%
6.Glasgow Coma Scale (GCS) on Discharge		
14	47	85%
8	8	15%
7.Repeat DSA		
Positive	7	14.30%
Negative	48	85.70%

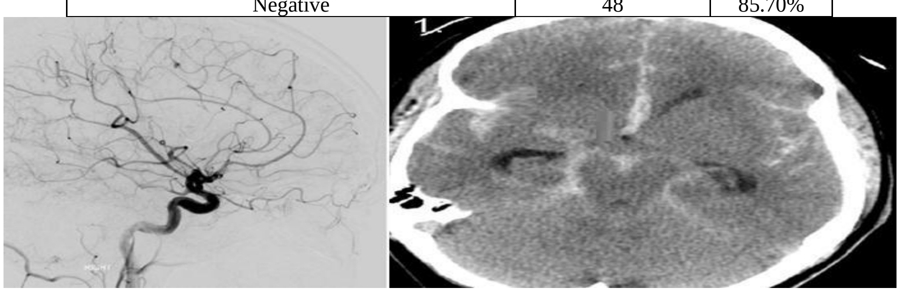

Fig 1:DSA Showing a Normal Study

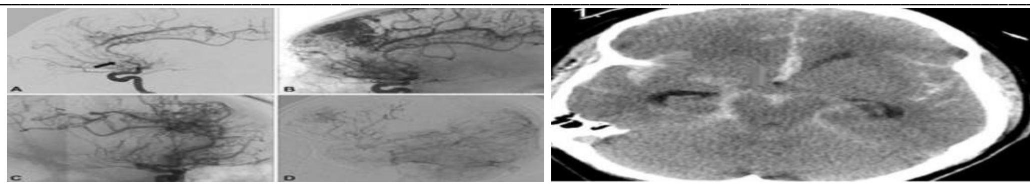

Fig 2:DSA Normal with CT Scan Showing Diffuse SAH

The image shows the preliminary illustration of a patient with subarachnoid haemorrhage and a normal DSA (Fig 2 & 3). Non-contrast head CT; Examples of SAH.Perimesencephalic SAH: axial image from a non-contrast head CT demonstrates acute SAH in the prepontine and interpeduncular cistern, consistent with a perimesencephalic pattern of SAH (A). Sulcal SAH: axial image from a non-contrast head CT demonstrates acute SAH in the left precentral sulcus and in the sulci overlying the left middle frontal gyrus, consistent with a sulcal pattern of SAH (B). Diffuse SAH: axial image from a non-contrast head CT demonstrates acute SAH in the bilateral Sylvian fissures, overlying the sulci of the bilateral temporal lobes, consistent with a diffuse pattern of SAH. Note also intraventricular haemorrhage within the third ventricle (C). Isolated IVH: axial image from a non-contrast head CT demonstrates acute intraventricular haemorrhage casting the right lateral ventricle (D).

Discussion

A perimesencephalic haemorrhagic pattern is actually due to the rupture of a posterior circulation aneurysm. Thus, the viewing of the intracranial vessels becomes mandatory. The use of CTA as a primary imaging and triage technique in patients presenting with SAH results in decreased time to diagnosis and reduced medical costs. At our tertiary care center, all patients presenting with SAH undergo a CTA of the head, and this technique identified an aneurysm as the cause of SAH. For much of this period, the bulk of patients who underwent subsequent craniotomy for ruptured aneurysms did not undergo preoperative DSA examination[8].In our study, population with perimesencephalic haemorrhage, there was no mortality encountered among these patients in comparison to the general population and the patients were recovered with full independence to day to day activities. Reports suggested that negative sub-arachnoid haemorrhage angiogram exhibited very mild prognosis than with aneurysmal sub-arachnoid haemorrhage. Many patients experience morbidity and mortality due to haemorrhage. For such cases repeat DSA is performed to identify the source of bleeding but the sources still remain undetected[9].In our study, we included patients with only negative aneurysm. We studied perimesencephalic haemorrhage disease due to causes other than intracranial aneurysm. The thicker the blood there were more deficits found and recovery was delayed. Theoretically when no aneurysm was found they say it is of venous origin which is still doubtful because no evidence is present till date. But DSA done after 4 weeks interval revealed positive aneurysm in 14 percent of patients. Thus, our study collaborates the characteristics of aneurysm which does not occur as one-time life effect but occurs in all the patients who had survived an aneurysmal subarachnoid haemorrhage episode. The patients in this study underwent a DSA within 24 hours of admission and they had one more DSA done at an interval of 2 weeks. The patients who had initial angiogram negative finding for aneurysm were taken into study.We could not have some reliable data on the non-specific symptoms of the patients such as headache, dizziness, fatigue etc., and hence we could not study these in detail. Only computed tomography and DSA was performed in our study to rule out the negative aneurysm. Some previous studies state that this may pose a risk of missing out an aneurysm. But in contrary few previous reports suggested that computed tomographic angiography alone is the best diagnostic strategy to rule out any aneurysm. Our study also confirmed the same with hardly any negative prediction of computed tomographic angiography for an aneurysm in the patients with a peri-mesencephalic haemorrhage. Five per cent of patients in our study were under anticoagulant therapy but the adequate risk of anticoagulant therapy on patients with peri-mesencephalic haemorrhage is not available[10]The prognosis of patient varies based on the thickness of hematoma and people with hydrocephalus had poor prognosis. Hydrocephalus developed in 7 of our patients for which intervention in the form of External Ventricular Drain (EVD) was done in 4 patients and 2 patients underwent permanent ventriculoperitoneal (V.P) shunt. Blood in localized basal cisterns had a good prognosis than patients with diffuse blood in all the cisterns. Each patient with subarachnoid haemorrhage should be monitored and treated since the mortality of patients with subarachnoid haemorrhage may not be reduced due to any therapy.

Conclusion

Perimesencephalic haemorrhagic pattern is due to posterior circulation aneurysm rupture, which becomes mandatory to visualise. Study suggested that negative sub-arachnoid haemorrhage angiogram exhibited very mild prognosis than with aneurysmal sub-arachnoid haemorrhage. Here, We studied perimesencephalic haemorrhage disease due to causes other than intracranial aneurysm., which showed that all the patients had presence of blood either in perimesencephalic cisterns and in the lateral cisterns. This study concludes that each patient with subarachnoid haemorrhage should be monitored as an individual case and to prevent death it is important to identify patients to reduce the aneurysms and modify the risk factors associated with it.

Conflict of Interest: Nil Source of support:Nil

References

1. Broderick JP, Brott TG, Duldner JE et al. Initial and recurrent bleeding are the major causes of death following subarachnoid haemorrhage. Stroke. 1994;25(7):1342-7.
2. McMahon J, Dorsch N.Subarachnoid haemorrhage of unknown aetiology: what next? Crit Rev Neurosurg. 1999;9(3):147-55.
3. Ildan F, Tuna M, Erman T et al. Prognosis and prognostic factors in nonaneurysmalperimesencephalichaemorrhage: a follow-up study in 29 patients. Surg Neurol. 2002;57(3):160-5.
4. vanGijn J, van Dongen KJ, Vermeulen M et al. Perim esencephalic haemorrhage: a nonaneurysmal and benign form of subarachnoid haemorrhage. Neurology. 1985;35(4): 493-7.
5. Canhao P,Ferro JM et al.Perimesencephalic and nonperi-mesencephalic subarachnoid haemorrhages with negative angiograms.ActaNeurochir (Wien).1995;132(1-3):14-9.
6. Garcia-Rodriguez LA, Gaist D, Morton J et al. Antithrombotic drugs and risk of haemorrhagic stroke in the general population. Neurology. 2013;81(6):566-74.
7. van derWorp HB, Fonville S, Ramos LMP et al. Recurrent perimesencephalic subarachnoid haemorrhage during antit-hrombotic therapy. Neurocrit Care. 2009;10(2):209-12.
8. Konczalla J, Platz J et al. Non-aneurysmal non-traumatic subarachnoid haemorrhage: patient characteristics, clinical outcome and prognostic factors based on a single-center experience in 125 patients. BMC Neurology. 2014;14: 140.
9. Hawkins TD, Sims C, Hanka R. Subarachnoid haemorrhage of unknown cause: a long term follow-up. J NeurolNeurosurg Psychiatry. 1989;52(2):230-5.
10. Almandoz JED, Jagadeesan BD, Refai D et al. Diagnostic yield of repeat catheter angiography in patients with catheter and computed tomographyangiography negative subarachnoid haemorrhage. Neurosurgery. 2012;70(5):1135-42.