

ORIGINAL RESEARCH

Comparison between CT brain and USG guided OSD: Raised Intracranial pressure

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ABSTRACT

The optic sheath (OS) is a continuation of the dura, and a significant increase in ICP is transmitted through the subarachnoid space to the OS as well as the optic nerve head. The eventual distension of the optic nerve head as a result of the transmitted pressure results in however, is not a sensitive marker of raised ICP and can take several days to develop. Every case was examined in detail on the lines of the proforma designed for cases of suspected raised ICP, taking in to consideration history, symptoms, clinical signs, laboratory tests, USG optic sheath and CT Scan. The patient were thoroughly examined clinically and Radiologically and investigated for other risk factors and followed. In present study of 100 cases, 47 cases were having GCS ≤ 8 out of those 42 were having raised ICP on USG, and 12 cases having GCS ≥ 13 being lowest number of cases, out of 12 cases 9 cases were having raised ICP. the present study out of 100 cases 86 were having USG guided OSD > 5 mm and out of 100 cases 90 patients were having features of raised ICP in CT brain.

Keywords: CT brain, USG guided OSD, Raised Intracranial pressure

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INTRODUCTION

Optic sheath ultrasonography provides a very promising bedside tool for the detection of raised ICP. Since the optic nerve is a part of the central nervous system, it is surrounded by cerebrospinal fluid (CSF). Thus, if CSF circulation is not blocked, an increase in ICP will be transmitted through the subarachnoid space surrounding the optic nerve, within the nerve sheath, especially the retro bulbar segment¹. Studies conducted by various authors have tried to determine the OSD threshold in millimeters above or equal to 20mmHg of ICP. This threshold varies from 4.8 mm to 5.9 mm according to studies²⁻⁴. When ICP is normal the optic sheath diameter remains the same as baseline. When it raises the CSF flows towards into perineural subarachnoid space and increases the pressure around the optic nerve⁵. This results in expansion of the dural sheath and an increase in the diameter of the optic sheath^{5,6}.

The optic sheath (OS) is a continuation of the dura, and a significant increase in ICP is transmitted

through the subarachnoid space to the OS as well as the optic nerve head. The eventual distension of the optic nerve head as a result of the transmitted pressure results in however, is not a sensitive marker of raised ICP and can take several days to develop⁷. The optic nerve is surrounded by a dural sheath that can inflate in cases of raised pressure in the cerebrospinal fluid. An enlarged OSD, measured using ocular sonography, has been found in patients with raised intracranial pressure⁷.

Generally accepted normal OSD is considered less than 5mm at location 3mm posterior to the optic disc with greatest diameter strongly associated with increased ICP⁸.

METHODOLOGY

Every case was examined in detail on the lines of the proforma designed for cases of suspected raised ICP, taking in to consideration history, symptoms, clinical signs, laboratory tests, USG optic sheath and CT Scan.

The patient were thoroughly examined clinically and Radiologically and investigated for other risk factors and followed.

- Study design was hospital based prospective study.
- A total of 100 cases with suspected raised ICP were taken for the study.
- Sample method: Sample size for the study was calculated considering the 80% of the average past 3 year hospital statistics.

INCLUSION CRITERIA

All patients above the age of 18 years coming to ED With

- Head injury
- Cerebro vascular accident
- Meningitis

EXCLUSION CRITERIA

- Patients with Ocular trauma
- Patient with Optic neuritis
- Patients with Optic Nerve tumour
- Glaucoma

All investigations and interventions were done under direct supervision and guidance of our guide.

RESULTS

Table 1: Distribution of study participants according to age

Age in years	Frequency studied	Raised ICP
19-30	24	20
31-50	49	43
51-70	22	19
71-90	5	4
Total	100	86

In the present study of 100 cases, 49 (49%) cases were between age 31-50 years accounting for highest number. Among those, 43 cases were having raised

ICP and least number of cases between age 71-90 years, accounting for 5. Amongst 5 cases, 4 cases were having raised ICP.

Table 2: Distribution of study participants according to gender

Gender	Study group	Positive result
Female	25	21
Male	75	65
Total	100	86

In present study of 100 cases 75 cases were males, among them 65 cases were having raised ICP, and 25

cases were female among them 21 cases were having raised ICP.

Table 3: Distribution of study participants according to GCS scale

GCS scale	Frequency	Raised ICP
≤8	47	42
9-12	41	35
≥13	12	9
Total	100	86

In present study of 100 cases, 47 cases were having GCS ≤8 out of those 42 were having raised ICP on USG, and 12 cases having GCS ≥13 being lowest

number of cases, out of 12 cases 9 cases were having raised ICP.

Table 4: Comparison between CT brain and USG guided OSD

Instigation	No of cases	Raised ICP
USG-OSD	100	86
CT BRAIN	100	90

In the present study out of 100 cases 86 were having USG guided OSD >5mm and out of 100 cases 90 patients were having features of raised ICP in CT brain.

correlated with poor outcome, is an elevated intracranial pressure⁹.

Raised ICP result in decreased cerebral perfusion pressure (CPP). CPP, the pressure of blood flowing to the brain, is normally fairly constant due to autoregulation, but for abnormal mean arterial pressure (MAP) or abnormal ICP the cerebral perfusion pressure is calculated by subtracting the intracranial pressure from the mean arterial pressure: $CPP = MAP - ICP^{10}$.

DISCUSSION

Intracranial pressure more than 15mmhg said to be raised ICP. And it is one of the most damaging aspects of brain trauma and other conditions, directly

One of the main dangers of increased ICP is that it can cause ischemia by decreasing CPP. Once the ICP approaches the level of the mean systemic pressure, cerebral perfusion falls. The body's response to a fall in CPP is to raise systemic blood pressure and dilate cerebral blood vessels. This results in increased cerebral blood volume, which increases ICP, lowering CPP further and causing a vicious cycle. This results in widespread reduction in cerebral flow and perfusion, eventually leading to ischemia and brain infarction. Increased blood pressure can also make intracranial hemorrhages bleed faster, also increasing ICP.¹¹

CT brain an impact on several aspects of the diagnosis of intracerebral haemorrhage and intracranial space occupying lesion. This non-invasive test not only allows a precise localization of the haemorrhage and its effects (midline shift, surrounding oedema, herniation of brain and ventricular extension) but also provides rapid diagnosis of small or clinically atypical haemorrhages that in the past either were misdiagnosed as infarcts or required extensive invasive diagnostic efforts. The use of contrast infusion in CT in Intracerebral haemorrhage offers the possibility of diagnosing an underlying cause in non-hypertensive or atypically located haematomas.¹²

CONCLUSION

In the present study out of 100 cases 86 were having USG guided OSD>5mm and out of 100 cases 90 patients were having features of raised ICP in CT brain.

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