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ORIGINAL ARTICLE

Role of brain image in neurological complications of eclampsia

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Abstract

Background: *Eclampsia is frequently associated with unexplained coma and takes prolong time in clinical recovery. Neuroimaging of head may be helpful to detect abnormal neurological findings and proper care in Eclampsia.*

Objective: *The objective of the study was to investigate cerebral complications of Eclampsia. For this we corelate neuroimaging study in a series of eclampsia population presented with neurological symptoms.*

Methods: *This one year prospective observational study of Eclampsia was conducted in the Obs and Gyne department of Khulna medical college hospital . Available clinical data were extracted from obstetric records. Computed Tomography (CT) findings of head were studied with respect to neurological signs and symptoms.*

Results: *A total of 92 women with Eclampsia, age group between 16-37 years were studied. 48 (52.7%) of mothers had severe hypertension and proteinuria in 67 (72%) cases. CT scan were abnormal in 21 (70%) cases. Hypertensive encephalopathy were mostly associated with PRES (posterior reversible encephalopathy syndrome) in CT among 20 (66.66%) patients. Prolonged coma, HDU care were more in those with positive CT scan, but not statistically significant. Pearson coefficient was significant in correlation of Intrauterine foetal death and maternal severe hypertension.*

Conclusion: *Cerebral odema and PRES are frequent neuroimaging pathology with Eclampsia,but proper detection is a challenge in resource poor settings. Altered level of consciousness should be a warning for possible brain lesions. Early CT scan of Brain can provide useful information and prompt supportive care preventing death from brain damage.*

Key Words: *Eclampsia, Coma, Brain Computed tomography.*

Introduction

Preclampsia and Eclampsia, the Hypertensive disorders of pregnancy (HDP) are common medical problem and second most common cause of maternal morbidity and death globally.[1] Pathophysiology attributes to abnormal placental vascular remodeling and function, resulting systemic response to reduced perfusion.[2] New onset of raised blood pressure upto140/90 mmHg at least two occasion, or more after 20 weeks gestation are clue to early clinical diagnosis.[3] So effective screening for HDP are frequent blood monitoring in antenatal clinic. By definition Eclampsia is new onset of tonic clonic convulsion or and coma in a pregnant and recent parturient in clinical setting of Pre-eclampsia. Clinically any type of HDP has a potential risk for Eclampsia.[4] The international Society for the study of hypertension in pregnancy (ISSHP) has classified many clinical subtypes, increased risk of developing HDP could also be predicted by HDP - gestosis score.[5] Early diagnosis and treatment of preeclampsia and prophylaxis by inj. Mag sulph may prevent convulsion.[6]

Eclamptic convulsion can occur antepartum, intrapartum and even on post partum period, its pathogenesis is elusive. Mothers has not have any preexisting brain lesions.[7] It is thought to be results of hypertensive encephalopathy with failure of cerebrovascular autoregulation. Control of hypertension, anticonvulsant therapy and expedite delivery of foetus may stops disease progression. Maternal out come may be unpredictable which can lead to dangerous complications including apnoea, thrombosis, coma, stroke, heart failure, premature

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birth and maternal and foetal death. New evidences are known affecting prognosis in Eclampsia ,neuronal dysfunction are one of them, but progress in treatment are slow. Cerebral haemorrhage, micro infarcts, diffuse odema accounts for 28-50% of maternal deaths in autopsy series. With advances in radio-neuro imaging, our knowledge could be improved by use of CT and MRI for different types of cerebral insult in Eclampsia. Most of the patients frequently have evidence of cerebral odema in posterior lobe known PRES (Posterior reversible encephalopathy syndrome). PRES is a non specific syndrome observed with hypertensive encephalopathy in obstetric settings of Preeclampsia- Eclampsia.[8,9] Eclampsia cases complicated by intracranial pathology, it is critical to diagnose it early, and to provide multidisciplinary care. It is acknowledged that in many parts of the world it is not possible to adopt all recommendation and no unique guideline for management of neurological complications and there is also paucity of research.[10]

Objectives of this study were to investigate neuroimaging abnormalities in Eclampsia, to aware the care providers that altered level of consciousness should be a warning for possible brain lesions. The study will gather current data regarding association of neurological manifestation of eclampsia and brain lesions and hints to proper care. Research results will contribute in future in treatment modalities, in policy making, as well as funding for Eclampsia.

Material and Methods

We conducted a prospective observational study of Eclampsia from April 2022 to March 2023 in department of Obs and Gynae, Khulna medical college Hospital Khulna, Bangladesh. Available data of demography and obstetric records were extracted in a predesigned data collection sheet. Study protocol was approved by local Ethical review board. Patients were treated in Eclampsia wards and High Dependency Care unit (HDU) by a team headed by consultants. National Eclampsia guideline protocol were followed for general supportive care, control of convulsion by intravenous Inj Magsulph regime, labetalol to treat hypertension, urine for heat coagulation test including obstetric management.

During study period 92 out of total 1033 Eclampsia (8.9%) were included by purposive sampling. Inclusion criteria were those with persistent Hypertension and headache, consciousness deterioration, visual impairment, coma, neurological deficit, recurrent convulsions, delay in treatment response or other signs and symptoms of neurological complications. Neurological evaluation and monitoring were done by GLASGOW Coma Scale (GCS). Severe Preeclampsia, established coagulopathy, gestation less than 28 weeks, postpartum more than 6 weeks, previous history of epilepsy, unwilling to verbal consent, and death cases were excluded from study. Among study population thirty post partum women had opportunity for CT scan of brain in office hours. Helical non contrast CT of brain were done, images were reviewed in 5mm-10mm slices reconstructed in axial planes. The CT interpretation was made by the Neuroradiologist in the imaging unit. Clinical out come were followed up till discharge. Follow up CT scan of Head were not done. Statistical analysis was done by IBM version 24. Categorical variable are expressed as number and percentage. Demographic variables as frequency, mean and range. Significance was set in p value <.05

Results

Age range of study population 16-37 years, mean SD 24.34 ± 5.35, primigravida 35 (38.0%), 57 (61.9%) were multipara. Ante partum Eclampsia 54 (58.7%) was more common than Intrapartum 08 (8.7%) and Post partum Eclampsia 30 (32.6%). Infrequent ANC visit within last 4 weeks in 27 (29.3%). Most were Preterm gestations 67 (72.8%), seizure prophylaxis used in 07 (7.6%). Mode of delivery were via vaginal route 40(43.7%) and caesarean section 52(56.5%). Place of delivery were at home in 20(21.7%), still birth were 10(10.8%) (Table I).

Table I

Clinical characteristic of Eclampsia

Clinical History	n	%
Age Range		
16-37 years	92	100
Parity		
Nullipara	35	38.0
Multi Para	57	61.9
Eclampsia		
Antepartum	54	58.6
Intrapartum	08	8.6
Post partum	30	32.6
Antenatal care		
Last 4 wks	27	29/3
Gestation		
Term	25	27.1
Preterm	67	72.8
Obstetric outcome		
Vaginal delivery	40	43.4
LUCS	52	56.5
Still birth	10	10.8

In sociodemographic data 62 (67.4%) had monthly income of <15 000 taka, urban 32 (34.7%), rural 60 (60.2%), Maternal status of education were primary 13 (14.1%), SSC 68 (73.9%), HSC 10 (10.8%), Graduate 01(1.0%), most of them were home maker 87 (94.5%) and service holder 05 (5.8%) by profession (Table II)

Table II

Distribution of Sociodemography of participants

Variables	n	%
Residence		
Urban	32	34.7
Rural	60	66.2
Education		
primary	13	14.1
SSC	68	73.9
HSC	10	10.8
Graduate	01	1.0
Profession		
House wife	87	94.5
Monthly income (Taka)		
15000	62	67.3
>15 000	30	32.6

Mother had severe hypertension-BP ≥160/110 mm Hg in 63 (68.5%), proteinuria 67 (72%), 30 (32.6%) had admission in HDU, recurrent convulsion 12 (13.0%), anesthetic complication 12 (13.0%), prolonged time to recover 12 (13.0%). Neurological complication were persistent headache 27 (29.3%), blurred vision

Table III

Distribution of Neurological complications and Brain imaging findings

Variables	n	%
Hypertensive encephalpathy		
BP ≤150/100	29	31.5
BP ≥ 160/110	63	68.5
Headache	27	29.3
Confusion	32	34.7
Multiple fits	12	13.0
Persistent Coma	16	17.3
Blurring of vision	05	5.4
Brain CT Scan	30	32.6
Normal	09	29.9
PRES(mild)	20	66.6
RCVS	01	3.3
Post. Lobe	20	66.6
HDU care	30	32.6
≥ 5 days	12	13.4

05(5.3%), altered consciousness 32 (34.7%) and coma 16 (17.3%). Imaging study by CT scan of Brain were available in 30 (32.6%), among them common lesions were PRES with vasogenic cerebral odema in 20 (66.6%), PRVS (Posterior reversible vasoconstrictive syndrome) 01 (3.3%), no detectable finding in 09 (29.9%). Most commonly affected area of brain were Parieto occipital lobes (Table III).

Pearson coefficient was significant in correlation of Intrauterine foetal death, with severe hypertension. Prolonged coma, anesthetic complication, HDU care were more in those with positive CT scan, but not statistically significant.

Discussion

The study place serve the mother from coastal area, having higher risk of hypertension due to high salinity of drinking water.[11] There are no studies on neuro imaging data of Eclampsia patients in Khulna division. Our target of MMR in SDG goal needs to reduce death from Eclampsia and PPH.[12]

Age group of population were bimodal, with peak in adolescent and in elderly. Now a days more and more proportion of women giving birth that has increased risk of preeclampsia- Eclampsia. Inadequate access to quality care in pregnancy and child birth observed in this study, were similar to other study.[13,14]

First convulsions outside the health facility were common. Antecedent severe hypertension cases were without seizure prophylaxisis by Inj Mags04, a finding also observed in a study of Dhaka medical college hospital.[15-17] Multipara were slightly higher than primigravida. There is mixed consensus about preferable route of delivery in different study. In this study 56.5% of delivery in Eclampsia were by emergency caesarean section. Though safety of spinal anesthesia in Eclampsia were documented, delivery plan should be individualized.[18] In foetal out come still birth rate was high (10.8%), Eclampsia itself had twice the risk of adverse foetal outcome. Foetal mortality 9.4 to 22.5% were documented in different study of Bangladesh and Africa.[19,20] Like other study, indicators of social deprivation such as low educational level, rural population, low income were common risk factors for severe Preeclampsia and were also common in our observation.

Neurological complications in Eclampsia remains high (8.9%). In a study in India incidence of neurological complications were 20.63%, that has included death cases.[21] Neurological symptoms were variable, as do brain imaging features. Most of them had features of hypertensive encephalopathy. Clinical

observation were headache with altered sensorium and confusion, multiple fits, blurring of vision and persistent coma. Acute severe hypertension and headache were most common 63(68.5%), it may vary in between 20-54% in different study. The risk increased about 9.2% than of those with normal blood pressure, but a threshhold trigger for Eclampsia not yet verified. In few cases proteinuria may be absent and with mild hypertension may suffer from hypertensive encephalopathy. Recent data reveal increase in number of post partum convulsion, 48 hrs after delivery.[22-23]

Differential diagnoses are particularly important in management of atypical Eclampsia occurring late post partum. Diagnostic evaluation by imaging parameters recommended in every Eclamptic mother in many study. To overcome dilemma in context of hypertension and cerebral lesion.[24]

Neurological injury in pregnancy and postpartum are results of acute hypertension or uncontrolled hypertension. Clinical syndrome of Eclampsia is associated with anatomical changes in brain. Cerebral odema might develop before and after Eclamptic convulsion. Most common imaging methods in pregnancy related neurologic manifestation are CT scan and MRI of cranium. Imaging study describe effects of hypertension and vasculopathy on brain Spectrum of disorder include infarction, haemorrhage, vasoconstriction, and both vasogenic and cytotoxic odema in neuro imaging.[25,26]

CT scan of brain provide useful information, to establish the diagnosis. Hypodense area in white matter and grey matter suggestive of cerebral odema. Although any area of brain may be involved, it is characteristically located in posterior parieto-occipital lobe, this radiologic entity is clinically known as PRES. This disorder was first described in 1996 by Hinchey et al. Incidence of PRES vary in between 10-90% in different study.[27,28] In this study PRES were in 66.6% in postpartum cases. In study by Harandou M et all showed cerebral odema in 73.8% in 24 Hrs of convulsion.[29] With availability of imaging technology our understanding of this disease has been improved but its clinical practice and implication are still limited. Most of the lesions are reversible, while effects are mild with control of hypertension. Cerebral odema may persist one to two weeks even after clinical improvement. There was good correlation with symptoms and rise of blood pressure. Hypertension and brain imaging abnormalities were not statistically significant.

Manifestation like sudden onset of thunderclap headache with vasoconstrictive effect known as RCVS (Reversible cerebral vasoconstriction syndrome (RCVS) were rare. Ischemia with brain odema documented only in 01 case. Maternal morbidity that needed admission in HDU were 30(32.6%), in a study 4 out of 11 admission in ICU had Eclampia, with prolonged hospital staying. In literature review regarding anesthetic and critical care management for eclampsia with stroke is very sparse. In a study of ICU cases both ischaemic stroke haemorrhagic stroke were documented.[30]

Treatment is challenging, Inj Mannitol may have role who had persistent coma and cerebral odema,details of which was out of scope of present study.[31] Our study has some limitation, like, we used CT scan for evaluation, but MRI is considered as gold standard and more sensitive. Small group study, resource constraint, neuroimaging in post partum cases, exclusion of death cases, and data from single institute, no provision for repeat CT scan, might affect our study results. Eclampsia is associated with long-term risk for hypertension, stroke, and heart disease and residual neuroimaging abnormalities. Documentation of impact of Eclampsia on brain and treatment of risk factors will prevent future neurological event.[32]

Conclusions

Eclampsia with Brain lesions could significantly affect level of consciousness. Cerebral odema and PRES are frequent neuroimaging pathology with Eclampsia but proper detection is a challenge in resource poor settings. We suggest that cranial imaging should be performed early, to provide prompt advanced supportive care and prevent death from brain damage.

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