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Assessment and Management of Severe Dengue Illness in Pediatric Population Using Inferior Vena Cava Measurement (IVC): Prospective Study at Khaja Bandenawaz Teaching and General Hospital (KBNU FOMS)

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ABSTRACT
Dengue is arboviral infection. It is multisystem involvement in nature. Dengue is primarily disease of all ages it is complex in nature and its management involves the stage of disease and depends on the severity of illness. This Study mainly aims to define a case severity based on WHO Classification, assessment and intervention based on point of care ultrasound measurement of IVC. Source of data All the paediatric dengue patients admitted in PICU ward Khaja Banda Nawaz Teaching and General Hospital, Gulbarga. Prospective observational study. August 2022-January 2023 50. Out of 50 patients, most of them i.e., 20 presented with dengue shock syndrome patient, followed by 30 patients with DHF. 20 patients presented with fever, weak pulse, tachycardia, wide pulse pressure and raised PCV (hematocrit) 30 patients presented with fever tachycardia, raised hematocrit. All patients point of care ultrasound was done and managed as accordingly among 27 patients had IVC-less than 7 mm with more than 50% collapsibility and 23 patients had IVC-more than 8. This study mainly highlights the need for regular use of point of ultrasound care in critical care settings for managing fluid responsiveness. In particularly cases like severe dengue and in Pediatric Population as third space loss in critical care illness worsens the condition of the child.

INTRODUCTION

Dengue infection accounts for majority of admission in peadiatric ICU in recent years. Recognising the severe dengue in early stage and quick intervention and appropriate management is key[1,2]. WHO Classification has revised accordingly for better management of cases as dengue illness with warning signs, without warning signs and severe dengue[3]. The critical phase of dengue fever the leakage of intravascular fluid into interstitial space and 3rd space can cause hemoconcentration and severe complications such as dengue shock syndrome (DSS), and it can lead to multiple organ failure followed by death[4]. Assessment and management of severe dengue with proper fluid dose is recommended in dengue treatment and algorithm of srilankan critical care group. POCUS (bedside)[5,6] is helps to understand fluid responsiveness and assessement of inferior venacaval diameter and IVC collapsibility (IVC and IVC-CI), which are valuable in assessing intravascular fluid volume[7]. This indices are important guides for pediatric patients in critically ill for fluid management[8].

MATERIALS AND METHODS

Source of Data: All the paediatric dengue patients admitted in PICU ward Khaja Banda Nawaz Teaching and General Hospital, Gulbarga.

Study Design: prospective observational study.

Study Period: August 2022-January 2023.

Sample Size: 50.

Inclusion Criteria:

- Patients from 0-14 years of age group
- Clinical features suggestive of dengue fever and confirmed by rapid dengue kit, or ELISA or PCR and ultrasound proved dengue

Exclusion Criteria:

- Patient presenting with fever, dengue rapid test and dengue serology negative
- Dengue with severe ascites. (Tense)

RESULTS

Total 50 cases were analysed who are admitted in PICU. There were 33 were males (66%), 17 were females (34%). Patients were divided into four age groups for proper care 1). 0-2 years accounts to 08, 2). 3-5 years accounts 15 cases 3). 6-10 years 18 cases 4). 11-14 years accounts 9 cases. Table 1. Most common mode of presentation was fever, headache, myalgia, vomiting and pain in abdomen, thready pulse, wide pulse pressure, hyotension, tachycardia, cold clammy peripheries. Table 2 Important indicators at the time of admission included leukopenia, thrombocytopenia, hyponatremia raised liver enzymes, positive tourniquet test. Table 3 POCUS point of care ultrasound screening before giving intravenous fluid. Measurement of IVC (INSPIRATION) Values 0-3 mm, 3-7, 8-1 cm. IVC collapsibilty index IVC-CI.

DISCUSSIONS

Assessment of inferior venacaval (IVC and IVC-CI) guide in fluid management also contribute to hemodynamic monitoring[9] POCUS is adjunct to diagnosis and facilitates management[9,10]. We conducted a prospective study over a period of 6 months and more in all sick and severe dengue admitted in PICU. Male childrens and age of 6-10 contribute majority of the cases, data very well correlated with study done by hussei and colleagues. In present study, 20 cases were dengue shock or

Table 1: Age wise distribution

	Gender		
Age group	Male n (%)	Female n (%)	Total n (%)
0-2 year	03	05	08
3-5 year	10	05	15
6-10 year	13	04	17
10-14 year	07	03	10
	33	17	50

Table 2: Data of Overall presentation of patients

Mode of presentation	Value n (%)
Fever	62 (77)
Headache	41 (51)
Myalgia	39 (48)
Vomiting	61 (76)
Pain in abdomen	56 (70)
Weak thready pulse	51 (63)
Epistaxis	2 (2.5)
Rash	45 (56)
Wide pulse pressure	40 (12)
Hepatomegaly	25 (31)
Mild ascites	25 (21)
Pleural effusion	11 (13)
Petechiae	27 (33)
Gum bleeding	5 (6)

Table 3: Overall presentation of important indicators for assessing the severity of dengue

Laboratory Parameters	No. (%)
Leucopenia	39 (48)
thrombocytopenia	47 (58)
Increased Hematocrit	25 (31)
Hyponatremia	21 (26)
Raised SGPT	22 (27)
Raised SGOT	18(22)
Hemodynamics	
Weak, rapid pulse	20
Cold peripheries	20
Mean pulse pressure	60
Positive tourniquet test	35
IVC Diameter	
1cm-1.2cm	12
8mm-1cm	14
3 mm -7mm	14
1-3	10
IVC collapsibility index	
IVC Collapsible >50%	23
Diagnosis	Total n (%)
Dengue hemorrhagic fever	30
Dengue shock syndrome	20

severe dengue and 30 cases were DHF or dengue with warning signs all were managed as in patient. Many studies done on dengue were admitted based of warning signs and serial measurement of hematocrit particularly our study coorelates with similar findings done by leo *et al*.[11] noticed threefold increase in admissions after warning sign policy by WHO hospital were overburdened. Increase use of tools like POCUS adjunct to clinical parameters justified fewer admissions in PICU when IVC is more than 1.2 cm with decrease collapsibity index.

In current study, hospitalised patients with warning signs and severe dengue were subjected to POCUS bedside ultrasound all the cases with diameter of 1.2 cm with warning signs and serial hematocrit to understand need for admission in PICU. In study done at south Indian hospital by Raman *et al*.[12] where in 46 childrens studied were grouped as dengue shock (40) and dengue with warning signs (06) were evaluated the relationship among IVC-CI with hematocrit and fluid responsiveness and fluid requirement. Study under taken by Thanachartwet *et al*.[13] all dengue shock as IVC of less than 1.2 cm and less than 50% collapsibility. Point of care ultrasound plays a vital role in management and prevention of complications in childrens such as fluid overload pulmonary edeme and worsening shock and mortality[14]. Dengue is expending across all horizons, with vaccine under stage of trail and implementation. Management clearly is with intravenous fluids, role of blood products, antibiotics, plasma expanders is very minimal. Intravenous fluid which replenishes the intravascular space and helps to manage critical phase but vascular leakage and fluid titration rely more on serial haematocrit measurements. Subjecting the patients for repeated blood investigation is challenging. So our study has added bedside ultrasound as adjunct with blood investigation in management of severe dengue.

CONCLUSION

This study mainly highlights the need for regular use of point of ultrasound care in critical care settings for managing fluid responsiveness. In particularly cases like severe dengue and in Pediatric Population as third space loss in critical care illness worsens the condition of the child. Serial assessment of IVC following fluid therapy helps to manage critical stage of dengue and titration of the fluids in all the patients admitted in critical ward there by helps to overcome complications of severe dengue.

REFERENCES

1. WHO., 2009. Dengue guidelines. WHO., 1: 10-12.
2. Biswas, A. and G. Pangtey, 2015. Indian national guidelines for clinical management of dengue fever. J. Ind. med. assoc., Vol. 113.
3. WHO., 1997. Dengue hemorrhagic fever: Diagnosis, treatment, prevention and control.
4. Adisorn, S. and E. Wongsa, 2015. Asian journal of topical medicine public health Fluid and hemodynamic management in severe dengue, https://www.tm.mahidol.ac.th/seameo/2015-46-1-suppl/c4-06p123-127.pdf
5. Antunes, A.C., G.L. Oliveira, L.I. Nunes, L.A.G. Filho, R.S. Prado, H.R. Henriques and A.J.C. Vieira, 2013. Evaluation of the diagnostic value of the tourniquet test in predicting severe dengue cases in a population from belo horizonte, state of minas gerais, Brazil. Rev. Socied. Bras. Med. Trop., 46: 542-546.
6. Michels, M., U. Sumardi, Q. de Mast, H. Jusuf and M. Puspita *et al*., 2013. The predictive diagnostic value of serial daily bedside ultrasonography for severe dengue in Indonesian adults. Plos. Neglec. Trop. Dis., Vol. 7 .10.1371/journal.pntd.0002277
7. Jambeih, R., J.I. Keddissi and H.A. Youness, 2017. Ivc measurements in critically ill patients with acute renal failure. Crit. Care. Res. Pract., 2017: 1-6.
8. Dipti, A., Z. Soucy, A. Surana and S. Chandra, 2012. Role of inferior vena cava diameter in assessment of volume status: A meta-analysis. Am. J. Emerg. Med., 30: 1414-14190.
9. Yildizdas, D., 2020. Ultrasonographic IVC AND IVC CI for detecting the volume status of critically ill pedatric. J. Ultrason., 2020: 18-22.
10. Dodhy, A.A., 2021. IVC Collapsibilty index and CVP for fluid assessment in critical ill patients.
11. Basu, S., 2022. POCUS assessment of IVC in mechanically ventilated Childrens.
12. Raman, R. and M. Lakshmi, 2016. Correlation of inferior vena cava ultrasound with packed cell volume and clinical condition in children with dengue fever. J. Emerg. Med. Trau. Acu. Care., Vol. 2016 .10.5339/jemtac.2016.6
13. Thanachartwet, V., A. Wattanathum, D. Sahassananda, P. Wacharasint and S. Chamnanchanunt *et al*., 2016. Dynamic measurement of hemodynamic parameters and cardiac preload in adults with dengue: A prospective observational study. Plos. One., 11: 1-17.
14. Yolanda, N. and H. Alfan, 2018. Initial clinical and laboratory profiles to predict pediatric dengue infection severity. Paediatr. Indone., 57: 303-309.