Presentation of Pleural Effusion in Dengue Fever in Port Sudan Teaching Hospital

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ABSTRACT

Dengue fever is a flue like viral infection, caused by flavivirus, it has three different presentation, these are classic dengue fever, dengue hemorrhagic fever and dengue shock syndrome. Pleural effusion is not uncommon in dengue fever, it occurs due to fluid over load, increased vascular permeability, and plasma leakage. In Port Sudan, eastern Sudan the dengue fever occurred in significant numbers since 2002 [1], and from 2005 cases are registered as epidemic(who), in this area dengue fever has two beaks one in January and the second in May to June, and this is related to environmental causes. To know the causes of pleural effusion in dengue fever a descriptive study done in 42 patients of dengue fever whose developed pleural effusion. The study showed serous pleural effusion in (92.9%) of patients, and hemorrhagic in (7.1%), while pleural fluid analysis showed exudative effusion in (52.4%) of patients, and transudative in (47.6%). causes of pleural effusion was pneumonia (28.6%), CCF (28.6%), hypoalbuminemia (19%), and pulmonary embolism (9.5%), while in (14.3%) of patients the cause remains unknown.

Keywords: Dengue fever, Pleural effusion, Presentation, Port Sudan

1. INTRODUCTION

Dengue fever is a flue like viral infection, caused by flavivirus, and it is the commonest arthropod viral infection. It transmitted by Aedes aegypti mosquito, which is a day time mosquito [2]. World health organization [3] consider dengue fever as the most rapid spreading mosquito born disease. The virus has four different genetic serotypes, those are DEN1, DEN2, DEN3, and DEN4, the latest is more serious and usually presented with hemorrhagic dengue fever [3], but DEN2 is more fatal [4]. If a person got infection with one serotype he will develop a lifelong immunity against this specific serotype, but if he infected with other serotype usually he shows more severe presentation and worst outcome, because of ineffective antibodies [3]. Dengue fever has three different presentation, these are classic dengue fever, dengue hemorrhagic fever, this is a classic dengue fever plus feature of bleeding disorder, the third is dengue shock syndrome which is classic dengue fever with features of circulatory collapse.

Dengue fever is diagnosed clinically, depending on symptomatology specially in endemic areas, and confirmed serologically using rapid immunological tests, and ELISA to detect the antigens, IGM, and IGg [2], and seldom need polymerase chain reaction study (PCR). The symptoms of dengue fever are high grade fever of 40 centigrade, Severe
headache, Retro- orbital pain, Joint and muscle pain, Nausea, Vomiting, Skin rash, and bleeding. The clinical diagnosis is based on presence of high-grade fever and two other symptoms.

Pleural effusion which is accumulation of fluid in the pleural space, is not uncommon in dengue fever, it occurs due to fluid over load, increased vascular permeability, and plasma leakage. Usually pleural effusion in dengue fever resolve spontaneously, and pleurocentesis is considered only in severe respiratory compromise condition, to relief severe dyspnea.

Dengue fever was firstly recognized in 1950 in Philippine and Thailand, during outbreak, WHO estimate about 50 to 100 million case of dengue fever per year worldwide [3].

In Port Sudan, eastern Sudan, the first case was diagnosed by Dr, Osman Eldawi in 1984 and he think that the source of this fever coming from Yemen, but there is no document evidence for this hypothesis (conference). The cases occurred in significant numbers since 2002 [1], and in 2005 WHO consider Port Sudan as endemic area [3], in this area dengue fever has two beaks one in January and the second in May to June, when the weather is suitable to viability of mosquito.

**Objective**

This study done to know the presentation, causes and features of pleural effusion in patients with dengue fever in Port Sudan, in eastern Sudan, where dengue fever is an endemic, and to help in constructing local policy for diagnosis and treatment.

**2. METHOD**

This is a hospital base descriptive study, done in multicenter in port Sudan, those are Port Sudan teaching hospital, Almwani hospital and Sudan line hospital, from January to December 2014, in 42 patients, who were hospitalized with dengue fever, diagnosis of dengue fever was done according to guideline and confirmed serologically, but no virus was isolated because of deficiency in diagnostic facilities, so the viral serotype is not known. In those patients who were developed features of pleural effusion, proper medical history was taken, including age, sex, history of chronic diseases, and proper clinical examination done, this followed by laboratory investigations, such as complete blood count, liver profile, pleural fluid analysis and D. dimer polymerase.

Radiological studies, CXR done for all patients as diagnostic tool and for follow up, and CT chest done for selected patients, and ECG also done for all patients. And data analyzed. Patients with history of heart disease, renal and liver disease, and malnourished were excluded.

**3. RESULT**

From those 42 patients 28 patients (66.7%) was female, while 14 patients (33.3%) was male, 18 patients (42.86%) were pregnant. At presentation 36 patients (85.7%) was presented with classic dengue fever, 4 (9.5%) with dengue hemorrhagic fever, and 2 patients (4.8%) dengue shock syndrome, this showed that classic dengue fever was the commonest and that pleural effusion developed in patient with dengue fever regardless the severity of the disease. Respiratory symptoms that they developed were cough in 42 patients (100%), this cough change from dry to productive, which is may be clear, purulent, or bloody stain, and this may reflect the cause of pleural effusion. 34 patients (80.2%) showed shortness of breath, this is varied from that occurred on exertion or even at rest, and this may be related to amount of pleural effusion, presence of pleuritis or even anxiety. Chest pain appears in 18 patients (42.9%) this was dull, tight or stabbing in nature, again this may reflect the cause of pleural effusion, and it may be due to pleural effusion itself, pleuritis, or as a presenting feature of underline cause. And hemoptysis was seen in 4 patients (9.5%) which was mild, and it may be due to platelets dysfunction, or secondary to underline cause. Platelets was decreased to various degrees in 38 (90.5%) of patients, while it was normal in 4 patients (9.5%). Liver enzyme was normal in 22 (52.4%) of patients and increased in 20 patients (47.6%), serum albumin was decreased in 31 (73.8%) of patients and was normal in 11 patients (26.2%). Pleural effusion was serous in 39 (92.9%) of patients, and hemorrhagic in 3 (7.1%), while pleural fluid analysis showed exudative effusion in 22 (52.4%) of patients, and transudative in 20 patients (47.6%). Radiological studies showed unilateral pleural effusion in 28 (66.7%) of patients, and bilateral pleural effusion in 14 (33.7%), and it showed cardiomegaly in 12 (28.6%), consolidation in 8 (19%), collapse in 6 (14.3%) and 2 (4.8%) showed hilar shadow. ECG showed sinus tachycardia in 38 (90.5%) of patients, 16 (38.3%) T- wave inversion in 16 (38.3%), Rt axis in 3 (7.1%) and 2 (4.8%) of patients showed S1Q3T3.

From work up the causes of pleural effusion was pneumonia in 12 (28.6%) of patients.
cardiac failure in 12 (28.6%) of patients, hypoalbuminemia in 8 (19%) of patients, pulmonary embolism in 4 (9.5%) of patients, while in 6 (14.3%) of patients the cause remain unknown.

Figure 1: The presentation of dengue fever

Figure 2: Distribution of symptoms

Figure 3: CXR showed bilateral pleural effusion in patient with dengue fever

4. DISCUSSION

Pleural fluid complicated dengue fever in several condition apart from that which may occur due to fluid overload, increased vascular permeability, or plasma leakage, which is considered as primary, and other are secondary, which is need management beside management of dengue fever, while that occur as a consequent of immunological or pathological effect of dengue fever usually resolved spontaneously, and does not need intervention unless it became massive and causing severe breathlessness that result in discomfort.

No other study done in Sudan regarding this topic, but comparing to other studies in Pakistan [6], and Yemen [7] the prevalence of pleural effusion in patient with dengue appear lower, and this may indicate that pleural fluid is under diagnosis here due to lag of diagnostic facilities as they used ultrasound, and diagnose very mild effusion, which is not used here.

Female in this study are two third, and this because the spend most of their time in a home where the mosquito breeding. Cough almost appear in all patient because it is a cardinal sign of all under line causes of pleural effusion [8], while SOB about double chest pain, and this indicate that effusion usually mild to moderate, and that shortness of breath is not always due to pleural effusion itself.

Liver enzyme are affected in about half of the patients and this due to direct effect of the virus, but still unknown why other patients not affected, so it may be due to hypersensitivity. After work up pneumonia and congestive cardiac failure are common cause of pleural effusion in patient with dengue fever in Port Sudan, pneumonia can be developed due to dengue virus directly or due to the effect of virus on immunity as it decreases the immunity through its effect on the macrophages [3]. Pulmonary embolism occur in small
percentage, and many factors are predisposing to PE, dengue virus affect the endothelium of the vascular wall, decreasing the activity in both natural protein C and protein S, so patient being at risk to develop pulmonary embolism, in addition to these fever causing dehydration plus the increase in hematocrit both increase the blood viscosity and increasing the risk of pulmonary embolism.

5. **CONCLUSION**

Pleural effusion may complicate dengue fever either as a consequence of fluid overload or as features of other pulmonary or non-pulmonary complication. It occurs despite normal platelets count, but more with thrombocytopenia. In our study congestive heart failure and pneumonia are the commonest cause of pleural effusion, pulmonary embolism appears as a cause of pleural effusion in this study, while this is very rare anywhere. Actually, although DVT was reported rather than pulmonary embolism as complication of dengue fever, but still pulmonary embolism can occur due to effect of virus on protein S and protein C, and in other study in Port Sudan about pulmonary complication in pregnancy with dengue fever pulmonary embolism was reported. Comparing to other studies in Pakistan and Yemen pleural effusion in our area may be under diagnosed, and this return to deficiency of diagnostic tools, as we used just CXR and in some patients CT chest, while they used CXR, CT, and chest ultrasound to diagnose pleural effusion. And also comparing to those studies DHF represent the majority of patient who developed pleural effusion, while in our study those with simple DF was more. The bilateral effusion is a little more in our study comparing to global one. Pleural effusion as other pulmonary complication affects both morbidity and mortality of dengue fever, so it need special consideration, and again pulmonary embolism although occur in small percentage, it represents a real problem in management because of hemorrhage that may be feature of dengue fever and making use of anticoagulant hazardous, and so it need special consideration, and national guideline should be published.

6. **RECOMMENDATION**

Large multidisciplinary studies are needed regarding dengue fever to published local applicable and affordable diagnostic policy, and management protocol, and a comprehensive popular and governmental effort should be done to control the vector and eradicate dengue fever.

**ABBREVIATION**

- CXR: Chest x-ray
- DF: Dengue fever
- DHF: Dengue hemorrhagic fever
- DSS: Dengue shock syndrome
- ECG: Electrocardiogram
- MOH: Ministry of health
- PCR: Polymerase chain reaction
- SOB: Shortness of breath
- WHO: World health organization

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