Pleural effusion in dengue

Karachi perspective

Kiran Ejaz, *MBBS,* ***Munawar Khursheed,*** *MBBS, DABIM,* ***Ambreen Raza,*** *MBBS.*

ABSTRACT

الأهداف: دراسة أعراض ظهور الانصباب الجنبي (pleural effusion) بين مرضى حمى الضنك في باكستان، بالإضافة إلى تحديد المعوقات التي تحول دون الوصول إلى التشخيص الصحيح لمثل هؤلاء المرضى في البلدان النامية.

الطريقة: أُجريت هذه الدراسة المقطعية في مستشفى الآغا خان الجامعي، كراتشي، باكستان وذلك خلال الفترة من يناير 2005م إلى سبتمبر 2008م. شملت هذه الدراسة جميع المرضى المصابين بالضنك والذين نوموا في المستشفى وقد بلغ عددهم 663 مريضاً، حيث قمنا بدراسة بيانات المرضى الديموغرافية، وشكاويهم التنفسية، ونتائج التصوير الشعاعي، والنتائج النهائية. لقد قمنا بالتقصي عن الأعراض والاختبارات الشعاعية التي تؤكد الإصابة بالانصباب الجنبي، وبعد ذلك قمنا بإجراء اختبار مربع كاي للتوصل إلى القيمة الاحتمالية التي بلغت 0.05، ومدى الأمان الإحصائي الذي بلغ 95%.

النتائج: أشارت الدراسة إلى أن 354 مريضاً (53%) من أصل 663 لم يشكو من أي مشاكل تنفسية، كما لم تثبت الاختبارات إصابتهم بالانصباب الجنبي، ولذلك لم تُجرى لهم الاختبارات الشعاعية. لقد كان عدد المرضى المتبقي 309 مريضاً، وخضع 299 مريضاً (97%) للتصوير الشعاعي للصدر، و10 مرضى (3%) لتصوير البطن بالموجات فوق الصوتية. لقد تم تشخيص الانصباب الجنبي في 50 مريضاً (16%) (31 ذكراً، و19 أنثى، 15±32 عاماً)، وظهر الانصباب الجنبي الأيمن في 23 مريضاً (46%)، والانصباب الجنبي الأيسر في 9 مرضى (18%)، فيما ظهر الانصباب الجنبي في كلي الجزئين في 18 مريضاً (36%). لقد أظهرت نتائج تحليل الدم بأن 44 مريضاً (88%) ممن أثبتت الصور الشعاعية إصابتهم بالانصباب الجنبي كانوا يعانون من تفاوت تركيز الدم حيث وصلت النسبة الترجيحية إلى 0.7 فقط (95% CI: 0.263–2.066).

خاتمة: أظهرت هذه الدراسة بأن أعداداً قليلة من مرضى حمى الضنك كانوا يعانون من الانصباب الجنبي وذلك بالمقارنة مع الدراسات السابقة، ولقد كان التصوير الشعاعي للصدر هي الوسيلة التشخيصية المُفضلة لدى الأطباء.

Objectives: To study the presentation of pleural effusion among dengue patients in Pakistan and to explore limitations in the diagnosis of these patients by the physicians of a developing country.

Methods: We conducted a cross-sectional study on patients admitted to Aga Khan University Hospital, Karachi, Pakistan from January 2005 to September 2008. Records of 663 dengue patients were reviewed. Demographic data, respiratory complaints, radiographic studies, and final outcome were studied. Presentation and radiological modality confirming the diagnosis of pleural effusion were noted. Descriptive statistics followed by Chi-Square test were applied, testing against an alpha of 0.05 and 95% confidence interval (CI).

Results: Three hundred and fifty-four (53%) out of a total of 663 dengue syndrome patients did not complain of any respiratory symptoms at presentation, nor did their medical examination elicit any suspicion of PE. Hence, no radiological study was advised. Amongst the remaining 309 patients, 299 (97%) underwent chest x-ray and 10 (3%) had abdominal ultrasound. The pleural effusion was noted in 50 (16%) patients (31 male and 19 female patients, with a mean age of 32±15 years). A right-sided pleural effusion was found in 23/50 (46%) patients, left sided in 9/50 (18%), and 18/50 (36%) patients had pleural effusion on both sides. Out of the radiologically confirmed pleural effusion dengue patients, 44/50 (88%) showed altered hemo-concentration with an insignificant odds ratio of 0.7 (p=0.56, 95% CI: 0.263-2.066).

Conclusion: Compared to other studies, fewer numbers of our patients suffered from pleural effusion. The diagnostic modality preferred by the physician was the chest x-ray.

Saudi Med J 2011; Vol. 32 (1): 46-49

From the Department of Emergency Medicine, Aga Khan University, Karachi, Pakistan.

Received 1st August 2010. Accepted 22nd November 2010.

Address correspondence and reprint request to: Dr. Kiran Ejaz, Research Associate, Department of Emergency Medicine, Aga Khan University, B-82 Block 10, Federal 'B' Area, PO Box 75950, Karachi, Pakistan. Tel. +92 (213) 6361312. E-mail: drkiranejaz@gmail.com

Resurgence of dengue syndrome (DS) is noted in most Asian countries.[1] A lot has been written in terms of presentation and management in this context. However, physicians miss signs of pleural effusion (PE) in differentiating the milder form from severe disease, and hence the prognosis profile is affected. Severity of disease with an increased percentage of plasma leakage has been noted. One of the WHO criteria for diagnosing dengue hemorrhagic fever (DHF) is evidence of increased plasma leakage along with other criteria.[2] Compared to younger adults, elderly individuals have significantly lower incidences of PE.[3] A clinical observation shows the PE in dengue is mostly mild and self-limiting, requiring only observation with no major intervention such as pleural tap. A well-trained clinical hand on initial visit can help such patients by avoiding unnecessary radiological exposure and cost. The types of radiological modalities used for its detection also play an important role. Most studies have shown abdominal, and thorax ultrasound to be better in detecting fluid levels.[4,5] Guidelines are lacking on what should be the radiological modality of choice in a developing country, where skilled radiologists and facilities are limited. Money spent on a radiological study can and usually is enough to treat the patient with these milder presentations. Symptoms of effusion and ascites are noted as early signs of the disease. Abdominal ultrasound (U/S) has been recommended as the first-line imaging modality with suspected dengue fever (DF) to detect early signs, even before obtaining serological confirmation.[6] The primary infection or the first infection with dengue is self-limiting and the diagnosis is usually made clinically. Studies leading to guidelines have been carried out elsewhere,[2] but not in the regional setting of South East Asia and Karachi, Pakistan. We decided to explore its presentation in our patients, with the limitations of our health care system. Therefore, we studied the presentation of PE among dengue patients in Pakistan, to explore limitations in the diagnosis of these patients by the physicians of a developing country.

Methods. After acquiring ethical approval from the institute's Ethical Review Committee, we conducted a cross-sectional study. A retrospective chart review of all patients was carried out from January 2005 to September 2008. Patients admitted to Aga Khan University Hospital, Karachi, Pakistan with a diagnosis of DS were included. A total of 663 patients were identified and included as per the hospital's medical records. Patients not admitted to the hospital, or either treated and discharged from the Emergency Department (ED), or seen at the outpatient clinic for the disease were excluded. Data was collected with a pretested questionnaire designed after literature search and validated by an expert on the subject. Demographic data, respiratory complaints, radiographic studies, and final outcome were studied. Presence or absence of PE in known dengue patients was noted with respect to clinical examination and radiological modality. Laboratory parameters were also correlated with presence of PE. Dengue severity levels such as DF, DHF and dengue shock syndrome (DSS) were taken as labeled by the attending physician. Altered hemo-concentration as defined by the WHO criteria is thrombocytopenia of <100,000/mm^3 and hematocrit of ≥20% of the baseline for the same age, gender, and population.[2]

Data was double entered and later analyzed using the Statistical Package for Social Sciences (SPSS Inc, Chicago, IL, USA) version 16. Initially, the complete data set of 663 was used for analysis. However, to remove under estimation in calculation, only 50 radiologically proven PE cases were used for further statistical analysis. Chi-square test with odds ratio was applied according to nominal variables to test the relation between PE and altered hemo-concentration in these DS patients. Statistical testing was carried out against an alpha of 0.05 and 95% confidence interval (CI).

Results. According to our data 354 (53%) out of a total of 663 DS patients did not complain of any respiratory symptoms at presentation, nor did their medical examination elicit any suspicion of PE. Hence, no radiological study was advised. Amongst the remaining 309 patients, 299 (97%) underwent chest x-ray (CXR), and 10 (3%) had abdominal ultrasound. The PE was noted in 50 (16%) patients, and was absent in 259 (84%). The rest of the analysis was carried out with only those who had radiologically proven PE. Out of these 50 patients, 31 (62%) were male and 19 (38%) female. Their mean age was 32±15 years. The severity of DS (n=45) was evident as DF in 43 (96%), DHF in one (2%), and DSS in one (2%) patient. Dengue IgM was positive in 32/45 (71%), negative in 8/45 (18%), and laboratory reports were not traceable in 5/45 (11%) patients. Comparison of the severity of effusion to side of PE is shown in **Figure 1**. Out of the radiologically confirmed PE dengue patients, 44/50 (88%) showed altered hemo-concentration (p=0.56, 95% CI: 0.263-2.066) with an odds ratio of 0.736. Most of the patients were treated and sent home. **Table 1** demonstrates the comparison of severity of dengue to PE. Fever was the chief complaint of these patients, with a mean duration of 6±2 days. No hemorrhagic manifestation of any form was seen in 47 (94%) out of 50 radiological proven PE patients. Complaints of dyspnea were present in only 2 (4%) patients. Among the patients showing signs or reported respiratory problems, the radiologically study

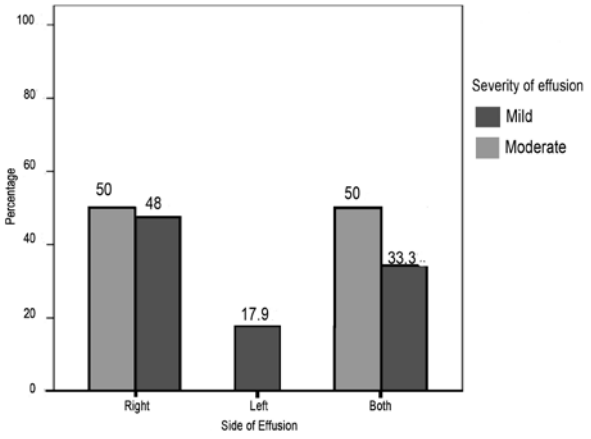

Figure 1 - Comparison of severity of effusion to side of pleural effusion.

Table 1 - Comparison of severity of dengue to pleural effusion.

Variable	Dengue severity frequency (%)		
	DF	DHF	DSS
Presence of effusion (n=45)	43 (96)	1 (2)	1 (2)
Severity of effusion			
Mild (n=36)	35 (97)	1 (3)	-
Moderate (n=1)	1 (100)	-	-
Side of effusion			
Right (n=23)	22 (96)	1 (4)	-
Left (n=7)	7 (100)	-	-
Both (n=13)	12 (92)	-	1 (8)

DF - dengue fever, DHF - dengue hemorrhagic fever, DSS - dengue shock syndrome

Table 2 - Clinical features observed in the sample population.

Parameters (unit)	Mean ± SD
Temperature (°C)	38±9
Systolic blood pressure (mm Hg)	113±19
Diastolic blood pressure (mm Hg)	73±14
Pulse pressure (beats/min)	39±16
Hematocrit (gm/dl)	42±9
Platelets ($x10^9$/L)	37±31
Prothrombin time (sec) (n=243)	13±3
Activated partial thromboplastin time (sec) (n=241)	44±15

Sec - seconds

was carried out within approximately 6±2 days of fever. A detailed clinical presentation of these patients is shown in **Table 2**.

Discussion. The efficacy of U/S over CXR is well documented; a preference for the later over the other is a debatable issue especially in developing countries.[4,6] In this retrospective study, CXR was performed on most patients with dengue infection. A larger fraction of patients showed no signs of effusion. Small PE is detected on CXR as the blunting of costophrenic angle. It could be inferred that the dengue infection in most of our patients presented with DF rather than DHF, as evident by the global data also.[7] Physicians dealing with dengue patients place little significance on imaging modalities and do not consider them as an important investigation, especially when it comes to classifying the disease as DF or DHF.

Theoretically speaking if every patient with suspected dengue infection undergoes imaging such as CXR or chest U/S, the results could be different and more patients with PE could be identified. The timing of performing a radiological examination is also important. When performed much earlier in the disease course, a CXR may fail to show any effusion patterns. This is the time when the patient has a high fever, and the plasma leakage has not yet begun to produce an effusion.

The site of effusion was recorded in only 43 radiographs we noted, however, 23/43 (53%) of our patients had pure right sided PE, consistent with the global data;[4,7] bilateral PE was found in 13/43 (30%) of patients. Right sided effusion has also been observed by Wang et al.[8] However, an interesting point that differs in our patients was the presence of isolated left sided effusion in 7/43 (16%) cases. However, the difference of right sided 23/50 (46%) effusion versus left sided 9/50 (18%) is not that significant. This may be attributed to genetic or anatomical differences, which might have caused our patients to present differently. It could also be argued that perhaps CXR is not as efficient in detecting PE.

Ultrasound appears to be a significant investigation in patients with suspected dengue infection. Sonography has the capacity to detect minor PE.[5] It can thus set the course of patient management from a much earlier point, critically before circulatory failure ensues. It has a value in both accelerating the diagnosis and directing confirmatory tests. Dengue can be diagnosed earlier using ultrasound compared to other modes of diagnosis.[4]

This brings to our attention the question of a better modality to detect PE. In our study, a small percentage of patients underwent abdominal U/S. It is striking that all showed right-sided PE. This could be because it can detect even milder effusion patterns, which are perhaps missed on CXR. Previously, researchers in 2007 specified the limited number of CXR studies, and we also observed the same difficulty while comparing our work.[8] The results become even more relevant in our clinical settings, where we have limited resources to reach the diagnosis of the disease. However, the management in all cases is supportive and intervention is needed in seldom cases. No intervention was carried out in any of our patients.

Limitations to this study include the use of a secondary data set. The abdominal U/S was performed in only 8 patients, and none underwent chest ultrasound as there was no clinical indication for it. Ordering an ultrasound compared to a CXR does not alter the management, and would also increase patients' cost. Dengue classification could be subjective as the attending physician may not have used precise WHO classification.

In conclusion, compared to other studies, fewer numbers of our patients suffered from PE. Most of the dengue patients had no respiratory complaints. The PE was present mostly on the right side, however, it also showed some atypical presentation, namely, isolated left sided PE. The diagnostic modality preferred by our physicians was CXR.

References

1. Ahsan T. Dengue fever: a regular epidemic? ***J Pak Med Assoc*** 2008; 58: 1-2.
2. WHO. Dengue Hemorrhagic Fever: Diagnosis, Treatment, and Control. Geneva: World Health Organization; 1997.
3. Lee IK, Liu JW, Yang KD. Clinical and laboratory characteristics and risk factors for fatality in elderly patients with dengue hemorrhagic fever. ***Am J Trop Med Hyg*** 2008; 79: 149-153.
4. Venkata Sai PM, Dev B, Krishnan R. Role of ultrasound in dengue fever. ***Br J Radiol*** 2005; 78: 416-418.
5. Quiroz-Moreno R, Mendez GF, Ovando-Rivera KM. [Clinical utility of ultrasound in the identification of dengue hemorrhagic fever]. ***Rev Med Inst Mex Seguro Soc*** 2006; 44: 243-248. Spanish
6. Wu KL, Changchien CS, Kuo CH, Chiu KW, Lu SN, Kuo CM, et al. Early abdominal sonographic findings in patients with dengue fever. ***J Clin Ultrasound*** 2004; 32: 386-388.
7. Wang CC, Wu CC, Liu JW, Lin AS, Liu SF, Chung YH, et al. Chest radiographic presentation in patients with dengue hemorrhagic fever. ***Am J Trop Med Hyg*** 2007; 77: 291-296.
8. Chaturvedi UC, Nagar R, Shrivastava R. Dengue and dengue haemorrhagic fever: implications of host genetics. ***FEMS Immunol Med Microbiol*** 2006; 47: 155-66.

Related topics

Khadadah ME, Muqim AT, Al-Mutairi AD, Nahar IK, Sharma PN, Behbehani NH, et al. Closed percutaneous pleural biopsy. A lost art in the new era. ***Saudi Med J*** 2009; 30: 793-797.

Al-Talib A, Gilbert L, Arseneau J. Endometrioid adenocarcinoma 13 years after total abdominal hysterectomy and bilateral salpingo-oophorectomy. ***Saudi Med J*** 2008; 29: 1044-1047.

Topal NB, Gurel S, Ercan I, Savci G. The role of ultrasonography and computed tomography in determining the etiology of ascites. ***Saudi Med J*** 2007; 28: 1822-1826.

Yassin MA. Loculated pleural effusion. ***Saudi Med J*** 2007; 28: 1302-1303.