Journal of Acute Disease

journal homepage: www.jadweb.org

doi:10.4103/2221-6189.219612

Acute abdomen presentation in dengue fever during recent outbreak

Bal Kishan Gupta✉, Hardeva Ram Nehara, Sahil Parmar, Shyam Lal Meena, Suresh Gajraj, Jigyasa Gupta

Department. of Medicine, S.P. Medical College, Bikaner, India

ARTICLE INFO

Article history:
Received 10 May 2017
Received in revised form 18 June 2017
Accepted 20 July 2017
Available online 1 September 2017

Keywords:
Acute abdomen
Acute hepatitis
Acute acalculus cholecystitis
Acute pancreatitis
Acute Ileo-Jejunal intussuception
Acute appendicitis

ABSTRACT

Objective: To evaluate the etiology, clinical profile and outcome of acute abdomen presentation in Dengue Fever (DF). **Methods**: This clinical prospective study was done on confirmed cases of DF admitted in the department of medicine during recent epidemic (September 2015 to November 2016). All patients were evaluated clinically and by laboratory and imaging investigations and followed-up during hospital stay till discharge. The cause of pain abdomen was ascertained by blood tests (amylase, lipase and liver function test etc), radiology (Flat plate abdomen-erect, Ultrasonography of abdomen, CECT abdomen) and/or endoscopy. **Results**: Out of the 501 patients diagnosed as DF, 165 (32.93%) presented with acute abdomen. Some patients presented in other departments like surgery, gastroenterology and emergency, were later diagnosed as DF on laboratory evaluation. Various causes of acute abdomen in our study were nonspecific severe pain abdomen (67 cases), acute hepatitis (46) one had acute fulminant hepatitis, acute acalculous cholecystitis (31), ascitis (12), acute hyperemic gastritis with malena (5), acute pancreatitis (2), and 1 case each of acute appendicitis and acute jejuno-ileal intussuception. All patients were managed conservatively. One patient of acute pancreatitis died of multi-organ failure. **Conclusion**: Our study concludes that clinical vigilance about such type of presentations is important as timely recognition can influence outcome and may prevent unwanted surgery.

1. Introduction

Dengue fever has emerged as the most important mosquito-borne viral disease globally. The virus is the member of flavivirus group which typically is a single stranded RNA virus. The infection is transmitted by mosquito bite. As per WHO report, the incidence of dengue fever has grown around the world dramatically in recent decades affecting about half of the world population[1].

Dengue virus infection may be asymptomatic or may present as Dengue fever (DF) and Severe Dengue fever which include Dengue hemorrhagic fever (DHF) and Dengue shock syndrome (DSS). The common symptoms in dengue infection are fever, malaise, headache, musculoskeletal pain, abdominal pain, nausea and vomiting[2]. Abdominal pain is one of the common symptoms of DF and severe pain abdomen is strongly associated with DHF[3]. About 500 000 people with severe dengue fever require hospitalization each year out of which about 2.5% die[1]. Severe pain abdomen may mimic many of the surgical emergencies like acute cholecystitis, appendicitis and pancreatitis[4-6]. However, in many cases the cause could not be found. Early recognition and proper management by an experienced team can save lives – decreasing mortality rates from >20% to less than 1%[1].

✉First and corresponding author: Dr. Bal Kishan Gupta, Prem Kutir, Opposite DRM Office, Hospital Road, Bikaner – 334003 Rajasthan, India.
Tel: +91 151 200218, +91 9829176143
Fax: +91 151 2226301
E-mail: bkgbkn@rediffmail.com

How to cite this article: Bal Kishan Gupta, Hardeva Ram Nehara, Sahil Parmar, Shyam Lal Meena, Suresh Gajraj, Jigyasa Gupta. Acute abdomen presentation in dengue fever during recent outbreak. J Acute Dis 2017; 6(5): 198-204.

2. Materials and methods

This prospective study was conducted in the Department of Medicine, S.P. Medical College, Bikaner, Rajasthan, India during the recent outbreak of dengue fever from September 2015 to November 2016. Diagnosis of dengue fever was made as per WHO criteria[7], rapid card test (NS1 Rapid card test device and IgM/IgG Rapid card test device, Welkang Ltd. London) and by ELISA (NIV DEN MAC ELISA kit, version 2.4 supplied by NIV, Pune, India). Patients were classified as dengue fever, dengue hemorrhagic fever or dengue shock syndrome according to WHO guidelines[7].

All cases were evaluated as per Performa. A thorough clinical history and physical examination was done in all the cases. Laboratory investigations including complete blood count, liver function test, renal function test, blood sugar, peripheral blood smear examination, blood culture, ECG and Ultrasonography abdomen was done in all the cases. Specific tests like serum amylase, lipase, X-Ray chest, Flat plate abdomen, CECT abdomen, MRI brain, Upper GI endoscopy, Colonoscopy etc. were done in indicated cases. The inclusion criteria were all patients with clinical features and serologically positive dengue infection and who has given consent to participate in the study. The exclusion criteria were serologically negative patients, patients suffering from other associated bacterial, parasite, fungal or any other viral infection, patients suffering from other co-morbid diseases or on concomitant medication. Subjects not giving consent for participation in the study were also not included.

3. Results

A total of 501 patients with dengue fever admitted in department of medicine, S.P. Medical College, Bikaner during September 2015 to November 2016 were studied. Out of these, 165 cases presented with acute abdomen in different departments like Medicine, Casualty, Surgery, and Gastroenterology. 67 patients were having nonspecific severe pain abdomen. Rest of the patients were diagnosed as having Acute Hepatitis (46 cases) one had acute fulminant hepatitis, Acute acalculous cholecystitis (31 cases), Ascitis (12 cases), Acute hyperemic gastritis with malena (5 cases), Acute pancreatitis (2 cases), and 1 case each of Acute Appendicitis and Acute intussuception.

Clinical and laboratory profile of dengue fever presenting as acute abdomen is shown in Table 1 and Table 2 respectively. Course during hospital stay and outcome is shown in Table 3.

3.1. Acute non-specific pain abdomen

Most of the patients (67 cases;13.37%) with nonspecific severe pain abdomen presented on 3rd or 4th day of illness (fever). 23 patient presented in gastroenterology outdoor, 12 case in surgical casualty, 8 patient in medicine casualty and the rest in the medicine outdoor. Looking at the history of fever and thrombocytopenia they were investigated for dengue and diagnosed as suffering from dengue fever. All investigations including Ultrasonography were not suggestive of any specific cause of acute pain abdomen. All the patients were treated conservatively with plenty of fluids, bland and light diet, proton pump inhibitors and prokinetics. Most of the patients recovered from symptoms in 3-5 days.

3.2. Acute hepatitis

A total of 46 (9.18%) patients presented with right hypochondrium pain, dark urine and vomiting. Although clinical jaundice was present only in 9 cases but SGOT/SGPT were markedly raised. SGOT was more increased than SGPT but Serum alkaline phosphatase was normal or only slightly raised. Ultrasonography showed

Table 1

Clinical profile of dengue patients presenting with acute abdomen.

Acute abdomen etiology	No.	Age (Year) [Mean ±SD, (range)]	Sex (M:F)	Days of fever [Mean ±SD, (range)]	Days of relief of acute abdomen [(Mean ±SD) (range)] (days)
Nonspecific Pain abdomen	67	31.40±15.11 (16-79)	51:16	4.38±1.48 (1-6)	2.26±0.77 (2-4)
Acute hepatitis	46	30.66±11.80 (15-72)	29:17	4.20±1.34 (2-7)	3.77±1.09 (2-13)
Acute acalculus cholecystitis	31	34.19±15.89 (18-69)	17:14	4.30±1.45 (2-6)	3.90±1.28 (2-11)
Ascitis	12	36.12±10.91 (15-42)	7:5	3.90±2.12 (3-8)	4.21±1.23 (3-10)
Acute hyperemic gastritis	5	23.20±4.76 (19-30)	4:1	4.00±1.58 (2-7)	2.60±0.89 (2-4)
Acute pancreatitis	1 (I)	35	Male	6	7
	2(II)	23	Female	9	Died on 6th day of admission
Acute appendicites	1	28	Male	4	6
Acute intussuseption	1	20	Male	5	8

Table 2

Laboratory profile of dengue patients presented with acute abdomen*.

Etiology	Total leucocyte count	Platelets count ($\times10^3$ Per mm^3)	HCT	RDW	SGOT	SGPT	SAP	Serum bilirubin	Serum amylase	Serum lipase
Nonspecific pain abdomen	4504.54±2849.25	56.74±36.35	43.16±6.90	14.31±1.13	90.65±17.10	64.04±12.90	187.10±29.50	0.97±0.50	31.89±8.70	27.13±7.60
Acute hepatitis	4142.20±1987.42	42.11±9.98	43.14±5.51	13.60±0.92	300.83±172.89	238.87±122.25	239.30±21.67	2.89±0.66	49.60±9.20	42.30±6.70
Acute cholecystitis	4400.00±1689.90	54.23±19.45	45.54±6.80	12.80±0.85	98.30±16.90	72.20±13.50	175.00±31.60	0.70±0.30	40.30±3.80	32.00±5.70
Ascitis	4439.20±2134.78	64.00±9.19	44.12±6.91	13.60±0.79	87.20±59.30	62.40±41.10	167.20±27.70	0.90±0.30	32.10±5.90	31.00±4.90
Acute gastritis	3760.00±1235.85	39.00±33.77	41.20±5.89	13.70±0.81	72.70±22.30	60.40±17.90	192.80±19.80	1.31±0.50	48.10±5.90	40.50±3.70
Acute pancreatitis (I)	6200	32.00	44.00	15.50	82.00	67.00	201.00	1.02	145.20	110.20
Acute pancreatitis (II)	4400	54.00	45.00	16.00	62.00	42.00	189.00	1.13	478.00	359.00
Acute appendicitis	8300	62.00	43.40	14.90	71.00	50.00	176.40	0.90	38.00	35.00
Acute intussuseption	6600	90.00	44.00	16.20	86.00	74.00	190.20	0.70	42.00	38.00

HCT=Hematocrit, RDW=Red Cell Distribution Width, SAP=Serum Alkaline Phosphatase, *All values are in Mean±SD.

Table 3

Course during hospital stay and outcome.

Etiology	Days of hospital stay [Mean±SD (range)]	Management			Outcome
		IV fluids	IV antibiotics	Platelets transfusion	
Non specific pain abdomen	3.78±1.33 (2-6)	IV fluids	IV antibiotics	Nil	All improved
Acute hepatitis	5.22±1.99 (2-13)	IV fluids	IV antibiotics	Nil	All improved
Acute cholecystitis	5.10±1.94 (3-11)	IV fluids	IV antibiotics	Nil	All improved
Ascitis	4.50±1.65 (3-10)	IV fluids	IV antibiotics	Nil	All improved
Acute gastritis (Melana)	6.16±1.87 (3-8)	IV fluids	IV antibiotics	RDP	All improved
Acute pancreatitis	7 days & 6 days	IV fluids	IV antibiotics	Nil	One improved & 1 died on 6th day due to multi-organ failure
Acute intussuseption	8	IV fluids	IV antibiotics	Nil	Improved
Acute appendicites	6	IV fluids	IV antibiotics	Nil	Improved

hepatomegaly, gall bladder was normal. They were diagnosed as suffering from acute hepatitis with dengue fever. Patients were managed conservatively with iv fluids, antiemetics, proton pump inhibitors, light diet and plenty of liquids and recovered within 4-7 days.

One 32 year old female presented with Acute fulminant hepatitis. She was admitted with high grade fever for 5 days, nausea and vomiting for 4 days and yellow urine for 2 days. At admission her TLC was 6 500/cmm P72 L22 M2 E4, Hb=10.9 mg%, total platelet count 56 000/cmm, SGOT=1989 IU/L, SGPT=1660 IU/L, serum bilirubin 5.6 mg%. HbsAg, HCV, HAV and HEV were negative. Peripheral blood smear and rapid card test for malaria was negative. Dengue IgM was positive. Her bilirubin levels rose to 14.6 on 5th day of admission and PT INR was 1.68. She was diagnosed as suffering from dengue fulminant hepatitis. CECT abdomen showed diffuse hypodensity in liver parenchyma with rounding of its margin, circumferential regular thickening of distal ileal loop in pelvis, mild to moderate ascitis and mild to moderate right pleural effusion (Figure 1). She was treated conservatively by intravenous dextrose, high carbohydrate bland diet, anti-emetic, pantoprazole, ursodeoxycholic acid, intravenous L-Ornithin L-Aspartate, lactulose and supportive care. She recovered in 13 days.

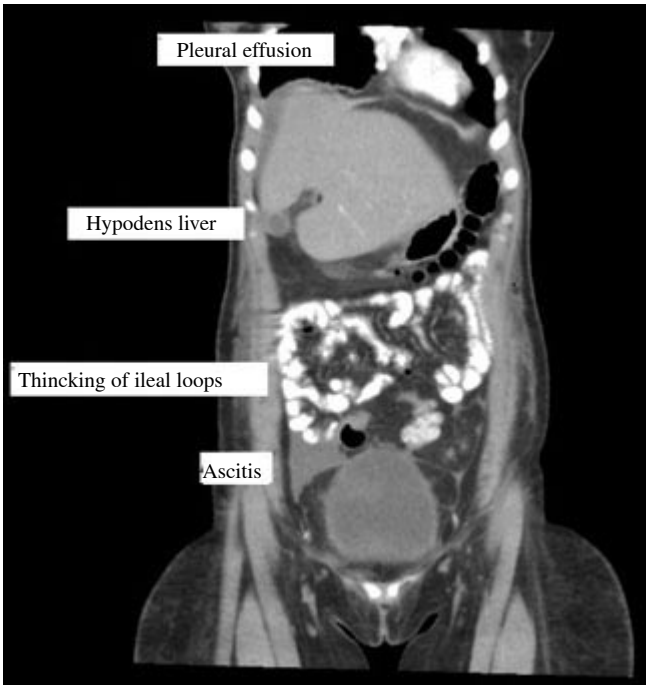

Figure 1. CECT abdomen showing diffuse hypodensity in liver parenchyma with rounding of its margin, circumferential regular thickening of distal ileal loop in pelvis, mild to moderate ascitis and mild to moderate right pleural effusion.

3.3. Acute acalulous cholecystitis

31 (6.18%) cases presented with severe pain abdomen in right hypochondrium and epigastric region with tenderness in right hypochondrium. All were having nausea, vomiting and upper abdominal discomfort. On ultrasonography, all cases were having Gall Bladder oedema and positive sonographic Murphy's sign. 17 cases were also having peri gallbladder collection. All cases were managed conservatively and recovered in 5-7 days. One patient was having frank acute acalculous cholecystitis (Figure 2) presented in the surgical emergency but because of history of fever and thrombocytopenia physician opinion was taken and patient was diagnosed to be suffering from acute acalculous cholecystitis with dengue fever. This patient was managed conservatively and recovered in 11 days.

3.4. Ascitis

12(2.39%) patients presented with acute generalized non-specific pain abdomen along with distended abdomen on 10 to 14 days of illness. Ultrasonography revealed ascitis and of them 7 cases were also having right pleural effusion and low blood pressure. All of these cases were having high haematocrit. These patients were managed with intra-venous fluids and recovered within 5 to 10 days.

3.5. Acute hyperemic gastritis with malena

5(1%) cases presented with fever and pain in epigastrium region with history of retching, nausea, vomiting and black stools although no one had hemetemesis. Ultrasonography showed mild gallbladder edema and mild hepatomegaly. Upper gastrointestinal endocopy showed fundal hyperemia with petechae (Figure 3). These patients were managed conservatively with proton pump inhibitors and prokinetics and recovered in 5-8 days.

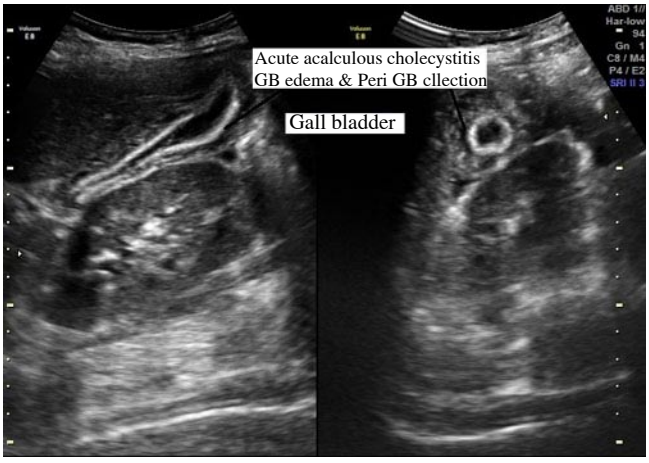

Figure 2. Ultrasonography abdomen showing acute acalculous cholecystitis (Gallbladder edema and peri-gallbladder collection).

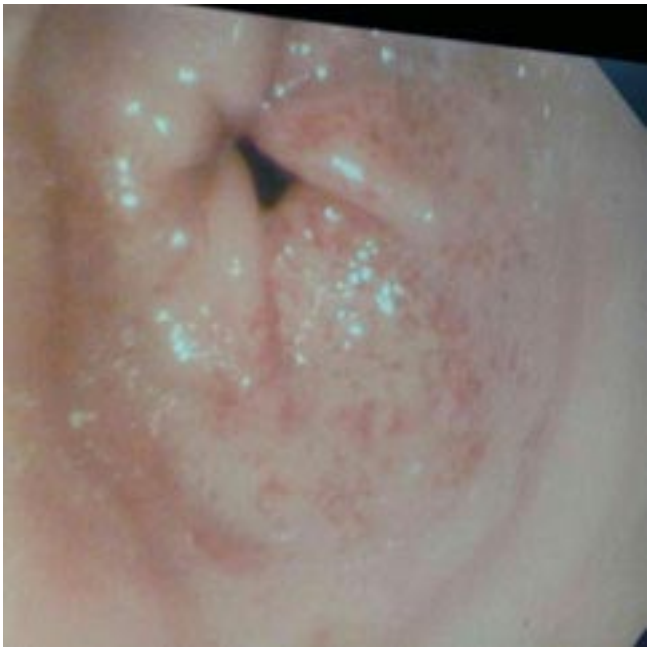

Figure 3. Upper gastrointestinal endocopy showing fundal hyperemia with petechae.

3.6. Acute pancreatitis

2(0.4%) patients of dengue fever had acute pancreatitis. One 35 year old non-alcoholic male admitted in the surgical ward with complain of severe generalized acute abdominal pain, restlessness, sense of fullness of abdomen, nausea and vomiting. Clinical examination revealed tenderness and rigidity. Ultrasonography showed thick gall bladder wall, edematous pancreas and mild ascitis. CECT Scan of abdomen revealed mild bilateral pleural effusion, mild ascitis, bulky and edematous pancreas with stranding in peripancreatic and mesenteric fat suggestive of acute pancreatitis (Figure 4). Minimal pericholecystic fluid was also seen, there was no stone or bile sludge in gall bladder or billiary tract. Lab investigation showed thrombocytopenia (32 000/cmm) raised serum amylase (145.2 IU) and lipase (110 IU). He also gave history of acute febrile illness of three days of high grade fever six days before onset of pain abdomen for which he took only tablet paracetamol. He was investigated for dengue infection which was positive. He was transferred to medical ward and managed conservatively with Nil by mouth (NBM), Continuous Ryle's tube suction (CRTS), IV fluids, IV antibiotics. He was discharged on seventh day of hospitalization after recovery. Another patient, a 23 year old female was admitted with high grade fever for 2 days, severe pain abdomen, vomiting and distension of abdomen. She also gave history of fever 9 days back for three days before present febrile episode. On clinical examination she was having rash all over, tourniquet test was positive, rigidity was present over abdomen. Laboratory evaluation showed total leucocyte count 4 400 (P-59%, L-34%, M-7%), thrombocytopenia (54 000/cmm), raised serum amylase, lipase and LDH. Ultrasonography showed acute acalculous cholecystitis with gall bladder edema, bulky and

edematous pancreas. She was started conservative management but her condition deteriorated her total leucocyte count raised to 13 500, platelet count dropped to 20 000/cmm, she developed jaundice, acute renal failure and DIC on third day and she died on sixth day of hospitalization.

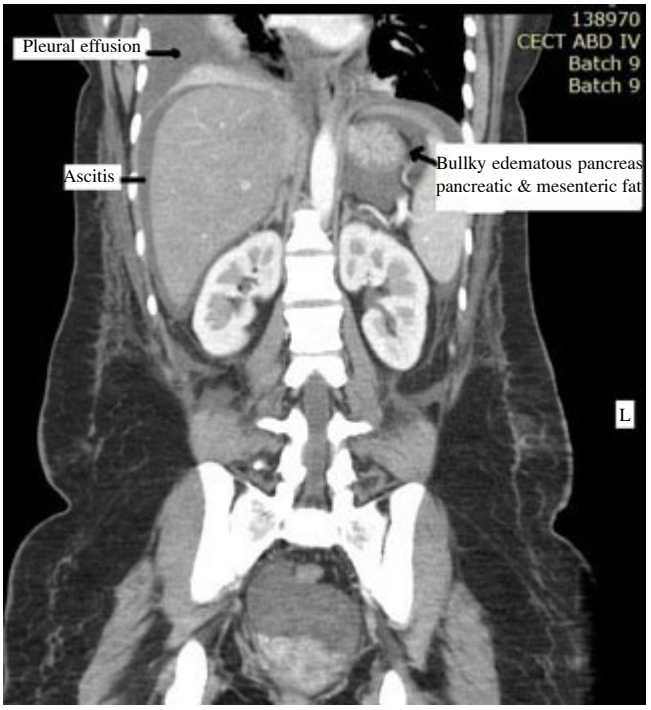

Figure 4. CECT abdomen showing mild bilateral pleural effusion, mild ascitis, bulky and edematous pancreas with stranding in peripancreatic and mesenteric fat suggestive of acute pancreatitis.

3.7. Acute appendicitis

One 28 year old male patient was admitted in surgical ward with complain of pain abdomen in right iliac fossa, vomiting and history of fever for 2 days 4 days back. Complete blood count revealed thrombocytopenia (62 000/cmm). Ultrasonography suggestive of acute inflamed appendix. The patient was investigated and found to be having acute appendicitis with dengue fever. The patient was managed conservatively with intravenous antibiotics and fluids and recovered on 6th day of hospitalization.

3.8. Acute Jejuno-ileal Intussception

A 20 year old male patient of Dengue fever admitted in the medical ward developed pain abdomen on 5th day of the illness. He also complained of distension of abdomen, projectile vomiting and obstipation. His laboratory report showed total leucocyte count-6 600 (P-77, L-20, M-3), thrombocytopenia (90 000/cmm). His Ultrasonography and flate plate skiagram and CECT of abdomen was suggestive of acute jejuno-ileal intussception, CECT abdomen also revealed thickening of jejunal loop, circumscribe thickening of colon from ascending colon to rectum, mild hepatosplenomegaly and moderate ascitis. He was managed conservatively and recovered after 8 days (Figure 5).

Figure 5. Flat plate abdomen showing acute jejuno-ileal intussception.

4. Discussion

Pain abdomen is not an uncommon symptom in dengue patients[2]. The abdominal pain can either specific or non-specific[8] and some may present like surgical emergencies[4,9], however, in many cases of severe abdominal pain, no cause can be found[10]. Although in our study we found pain abdomen in most of the cases (70.05%) but our focus was to evaluate patients who presented with acute abdomen or whose main complaint and concern was severe pain abdomen.

We found 32.9% cases presented with acute abdomen similar to observation made by Shabbir et al in 2012 who reported acute abdomen presentation in 32% of the cases[10]. Acute abdominal pain presentation was found only in 4.15% of the cases in a study done by Weerakoon in Sri Lanka in 2009[11]. Thus we are observing changing clinical pattern of dengue fever similar to other illness like malaria. High percentage of acute abdomen presentation in our study may also be because our hospital is tertiary care referral hospital therefore serious patients come to our institution or it may also be due to change in virulence of dengue virus.

We found non-specific acute abdominal pain (no cause was fond) in 13.37% of the cases in comparison to only 2.7% of the cases observed by Shabbir *et al*[10]. Although the exact pathogenesis of abdominal pain in DF remains unclear, but there seems to be an important role of lymphoid follicular hyperplasia and plasma leakage

through damaged capillary endothelium[10-12].

Most common specific cause of acute abdominal pain in our study was acute hepatitis (46 cases, 9.18%). These hepatitis cases presented with pain in the right hypochondrium, tender hepatomegaly and raised aminotransferase levels. Similar to our finding, hepatitis was the most common atypical presentation of dengue in a study done by Nimmagadda *et al* in 2014[12]. Liver injury due to dengue infection is not uncommon and has been described since 1970. Mild hepatic involvement manifested solely as increase in aminotransferase levels had been observed in Thailand and Malaysia during 1973 to 1982 but after this period several cases of fulminant hepatitis with high mortality have been reported[13]. Up to 30% of patients experience painful hepatomegaly and It is most commonly associated with DHF but its magnitude has no relationship with the severity of the disease[14]. Although liver involvement in DF has been described from all over including Asia, the Pacific islands, and to a lesser degree from the America but the pathogenic mechanisms are yet to be fully elucidated. It may be related to combined interactions of the virus, the host and the duration of disease. The virus may have a replication phase in hepatocytes, causing hepatic injury, stimulating apoptosis, microvesicular steatosis and the development of Councilman-Rocha Lima bodies, similarly to yellow fever and other viral hemorrhagic infections. The histopathological observation of liver specimens is restricted to fatal cases only because of the risk of bleeding[15].

Acute right hypochondrial abdominal pain because of gall bladder wall edema was seen in 31 (6%) patients and one patient had frank acute acalculus cholecystitis. Acalculous cholecystitis is rare in dengue fever[5]. Criteria for the diagnosis of acalculous cholecystitis are both clinical and sonographic findings[16,17]. The clinical manifestations are: fever, right upper quadrant tenderness and a positive Murphy's sign. Sonographic findings are gallbladder wall thickening > 3 mm; presence of striated gallbladder suggesting gallbladder wall edema; sonographic Murphy's sign (localized gallbladder wall tenderness); pericholecystic fluid and no stones in the gallbladder. The main pathophysiological changes in DF could be due to increased vascular permeability causing plasma leakage and serous effusion with high protein content which causes thickening of gall bladder wall[18]. The course of the disease is usually self-limiting, the gall bladder wall thickness usually returns to normal and cholecystectomy is usually not advised in dengue patients rather it may lead to serious cosequences[19].

Gastric fundus hyperaemia and petechie was seen in 5 (1%) patients on upper gastrointestinal (UGI) endoscopy who presented with persistent epigastric pain and malena. This may be because of high grade fever, use of non-steroidal anti inflammatory drugs and thrombocytopenia. Gastric fundus hyperaemia, peptic ulcer, upper gastrointestinal hemorrhage has been reported in DF on upper GI endoscopy[20].

Two patients presented with pancreatitis in our study. Acute pancreatitis is a rare complication of DF[21]. The exact pathogenesis of pancreatic involvement in dengue is not known. But it can be due to result of direct invasion by the virus itself causing inflammation and destruction of pancreatic acinar cells, pancreatic damage due to dengue shock syndrome or acute viral infection causing an autoimmune response to pancreatic islet cells and development of edema of the ampulla of Vater with obstruction to the outflow of pancreatic fluid[21].

One patient presented with acute appendicitis with clinical features of pain in right iliac fossa, fever, tenderness in right iliac fossa. USG in this patient showed inflamed appendix suggestive of acute appendicitis. This patient was admitted in surgical ward, later diagnosed with dengue fever because of thrombocytopenia. He improved over next four days with symptomatic management of dengue fever, not requiring any surgical intervention. Appendix has also been shown to be involved in dengue fever. The features closely mimic acute bacterial appendicitis[6]. There has been a case report wherein appendicectomy was done following which the patient developed severe thrombocytopenia leading to GI haemorrhage[22]. There has been reports of acute appendicitis not mimicking appendicitis[23] and appendicular mass complicating appendicitis in dengue fever[24]. However, the histology of the specimen revealed predominantly lymphocytic infiltration thus ruling out a bacterial aetiology[25].

One patient of dengue fever developed Jejunoileal Intussception during hospital stay, diagnosed by ultrasonography, flat plat abdomen skiagram and computed tomography scan. Patient's condition improved spontaneously on conservative management. Although case has been reported of intestinal perforation, gastric perforation[26] and multiple small and large perforations in the mid jejunum at mesenteric side along with necrosis of the part of the mesenteric side near that segment[27]. To our knowledge, no case reports are available in literature to show association of intussception with dengue fever. So this was unique finding in our study, knowledge of which will be helpful in pick up such case at the earliest in dengue patients.

Although abdominal pain is a commonly reported symptom of dengue fever but it may also be primary presentation. Patient may present with acute abdominal pain in Medical OPD, Surgery OPD, Gastroenterology OPD and Emergency department. Failure to identify this group of patients early may lead to high risk of mortality. Presentation of acute abdominal pain may also closely mimic classical surgical diseases. Awareness, thorough interpretation of clinical findings, laboratory and radiological reports are essential to prevent unnecessary surgical procedures in sick and moribund patients.

Authors contribution

Designed the study: BKG. Drafted the manuscript: BKG and HRN. Approved the final version to be published: BKG. Carried out clinical assessment, data collection and review of literature: BKG, HRN, SLM, SP, SG and JG. Evaluated and analyzed laboratory data and their interpretation: BKG, HRN, SLM and SP. All authors read and approved the final manuscript. Guarantors of the paper: BKG.

Conflict of interest statement

Ethical Approval: A prior approval has been taken from the Institutional Ethics Committee to carry out this work, and an informed consent was obtained from the subjects enrolled in this study.

Reference

[1]Dengue and Severe Dengue. *WHO report on dengue. Fact sheet, updated April 2017*. Geneva:WHO. [Online] Avaliable at: http://www.who.int/mediacentre/factsheets/fs117/en/[Accessed on 10th July 2017].

[2]Murray NEA, Quam MB, Wilder-Smith A. Epidemiology of dengue: past, present and future prospects. *Clin Epidemiol* 2013; **5**: 299-309.

[3]Casali CG, Pereira MR, Santos LM, Passos MN, Fortes Bde P, Ortiz Valencia LI, et al. The epidemic of dengue and hemorrhagic dengue fever in the city of Rio de Janeiro, 2001/2002. *Rev Soc Bras Med Trop* 2004; **37**(4): 296-299.

[4]Shashirekha CA, Sreeramulu PN, Ravikiran HR, Katti P. Surgical presentations with abdominal pain in dengue fever. *Int Surg J* 2016; **3**:754-756.

[5]Kuna A, Wroczy ska A, Gajewski M, Felczak-Korzybska I, Nahorski WL. A case of acalculous cholecystitis in the course of dengue fever in a traveller returned from Brazil. *Int Marit Health* 2016; **67**(1): 38–41.

[6]Mcfarlane MEC, Plummer JM, Leake PA, Powell L, Chand LV, Chung S, et al. Dengue fever mimicking acute appendicitis: A case report. *Int J Surg Case Rep* 2013; **4**(11): 1032–1034.

[7]WHO. Dengue: Guidelines for diagnosis, treatment, prevention and control, WHO: Geneva,\Switzerland, 2009[Online]. Avaliable at: http://whqlibdoc.who.int/publications/2009/9789241547871 eng.pdf.

[8]Khanna S, Vij JC, Kumar A, Singal D, Tandon R. Etiology of Abdominal Pain in Dengue Fever. *Dengue Bulletin* 2005; **29**: 85-89.

[9]Jayasundara B, Perera L, de Silva A. Dengue fever may mislead the surgeons when it presents as an acute abdomen. *Asian Pac J Trop Med* 2017; **10**(1): 15–19.

[10]Shabbier B, Qadir H, Shafi F, Mahboob F. Acute abdominal pain in dengue fever. *PJMHS* 2012; **6**: 155-158.

[11]Weerakoon KGAD, Chandrasekaram S, Jayabahu Jpsnk, Gunasena S, Kularatne SAM. Acute abdominal pain in dengue hemorrhagic fever: A study in Sri Lanka, 2009. *Dengue Bull* 2009; **33**: 70-74.

[12]Nimmagadda SS, Mahabala C, Boloor A, Raghuram PM, Nayak AU. Atypical manifestations of dengue fever (DF) – Where do we stand today? *J Clin Diagn Res* 2014; **8**(1): 71–73.

[13]Sedhain A, Adhikari S, Regmi S, Chaudhari SK, Shah M, Shrestha B. Fulminant hepatic failure due to dengue. *Kathmandu Univ Med J* 2011; **34**(2):73-75.

[14]Mourão MPG, Lacerda MVG, Bastos MS, Cláudio B, Albuquerque BC, Alecrim WD. Dengue hemorrhagic fever and acute hepatitis: A case report. *Braz J Infect Dis* 2004; **8**(6): 461-464.

[15]Huerre MR, Lan NT, Marianneau P, Hue NB, Khun H, Hung NT, et al. Liver histopathology and biological correlates in five cases of fatal dengue fever in Vietnamese children. *Virchows Arch* 2001; **438**(2): 107-115.

[16]Nasim A. Dengue fever presenting as acute acalculous cholecystitis. *J Coll Physicians Surg Pak* 2009; **19**(8): 531-533.

[17]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.

[18]Koh FH, Misli H, Chong VH. Acute acalculous cholecystitis secondary to dengue fever. *Brunei Int Med J* 2011; **7** (1): 45-49.

[19]Sreeramulu PN, Shashirekha CA, Pawan Katti. Incidence and management of acalculus cholecystitis in dengue fever-A retrospective study. *IJBAR* 2014; **05**(09): 422-424.

[20]Chiu YC, Wu KL, Kuo CH, Hu TH, Chou YP, Chuah SK, et al. Endoscopic findings and management of dengue patients with upper gastrointestinal bleeding. *Am J Trop Med Hyg* 2005; **73**(2): 441-444.

[21]Durbesula AT, Usham G, Meriga RK, Venkatakrishnan T, Karnati R. A rare combination in dengue fever: Acute pancreatitis with normal enzyme levels. *Int J Med Health Sci* 2016; **5**(1): 57-60.

[22]Kumar L, Singh M, Saxena A, Kolhe Y, Karande SK, Singh N, et al. Unusual presentation of dengue fever leading to unnecessary appendectomy. *Case Rep Infect Dis* 2015; **2015**. 465238. http://dx.doi.org/10.1155/2015/465238

[23]Kumarasena L, Piranavan P, Bandara S, Pubudu WPG, Jayasundara B, de Silva A. A case of dengue fever with acute appendicitis: Not dengue fever mimicking appendicitis. *The Sri Lanka J Surg* 2014; **32**(3): 33-35.

[24]Nee LY, Keong BCM. Appendicular mass complicating acute appendicitis in a patient with dengue fever. *Med J Malaysia* 2016; **71**(2): 83-84.

[25]Vagholkar K, Mirani J, Jain U. Abdominal manifestations of dengue. *JMSCR* 2014; **2**(12):3159-3162.

[26]Mandhane N, Ansari S, Shaikh T, Deolekar S, Mahadik A, Karandikar S. Dengue presenting as gastric perforation:first case reported till date. *Int J Res Med Sci* 2015; **3**(8): 2139-2140.

[27]Jain AC, Viswanath S. Multiple jejunal perforations in dengue. *Int J Adv Med* 2014; **1**: 153-154.