Ultrasonography in Blunt Abdominal Trauma

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The purpose of this study is to assess the role of ultrasonography in the evaluation of patients with blunt abdominal trauma and to detect hepatic and splenic injury. From March 2018 to April 2019, forty-eight patients with blunt abdominal trauma were evaluated with ultrasonography (USG). Vulnerable age and causes of trauma were also evaluated. Among the patients, forty-three (90 %) were male & five (10%) were female. Ultrasonographic examination detected thirteen (27%) patients with intra-abdominal organ injury and twenty-six (54%) patients with intraperitoneal collection. Among the organ injuries; four (30%) patients were detected with hepatic injury and three (23%) patients with splenic injury. The most vulnerable age having trauma to abdomen were between eleven to twenty (27%) years (thirteen patients). Intraperitoneal collection is commonly found in hepatic injury patients and left sided pleural collection in splenic injury patients. Hepatic injury was usually associated with fall from height & splenic injury with road traffic accident. Ultrasonography can be used as primary tool for evaluating traumatic patients especially to detect hepatic and splenic injury in our country where accidental injury is very common and CT is still beyond the reach of general people.

Keywords: Ultrasonography, blunt abdominal trauma, hepatic and splenic injury

Ultrasonography (US) is the primary imaging modality of choice as it is non-invasive, easily accessible, and less costly tool which yields rapid results in screening (1). Furthermore it can also be performed in pregnant women and hemodynamically unstable patients. Although ultrasound has been used for the investigation of urgent diagnostic aids for almost 45 years, during the past two decades ultrasound has achieved a primary role in the investigation of emergency situations, notably in the related to trauma (2). An initial prospective investigation has demonstrated screening USG to have a specificity of 96% and an overall accuracy of 96% in the detection of intra-abdominal injury (3). Free peritoneal fluid shown on sonography has been reported in 67% of patients with liver injury (4) and 67% in splenic injury (5). Liver injury is frequently reported without combined hemoperitoneum. In a survey, 11% of liver injuries had no free fluid visible on CT (6). The pattern of fluid accumulation within various spaces correlate with site of organ injury (7). With the use of screening sonography, a 43% reduction of patient expenditure has been reported, resulting in 8-fold reduction in use of diagnostic peritoneal lavage and a 2-fold reduction in use of CT (8). In our institution we use sonography in patients having blunt trauma to abdomen in the detection of intraperitoneal collection and organ injuries specially hepatic and splenic injury. In the present study we share our experience and results of the use of ultrasound in detection of hepatic and splenic injury in blunt abdominal trauma.

PATIENTS AND METHODS

This study was performed between March 2018 to April 2019 in the patients having history of trauma to abdomen who were admitted in Mymensingh Medical College Hospital and were sent to Institute of Nuclear Medicine and Allied Sciences (INMAS), Mymensingh for ultrasonic evaluation. Sixty patients were included in the study. Patient having history of penetrating abdominal injury (12 patients) were excluded. The age and gender of the

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patients, cause of injury and types of organ injuries specially hepatic and splenic injury and relation of fluid collection with organ injury were recorded. The US examination was performed by an experienced sonologist. Toshiba Nemio 10 premium compact ultrasound machine equipped with multifrequency transducer ranging from 2-9 MHz was used in this study. Both curvilinear and linear probes were used to scan the patients. A complete abdominopelvic survey was carried out. Generalized intra-abdominal or pelvic collection and localized pockets of collection in peritoneal spaces like hepatorenal pouch, perisplenic area, paracolic gutter and pelvis were searched. Any type of hepatic and splenic injury was searched and correlated with intra-abdominal fluid collection in relation to organ injury. The causes of injury were also recorded from the history. The findings were recorded and evaluated in correlation with clinical features and patients were followed up clinically.

RESULT

Forty-eight patients with history of blunt trauma were included in this cross sectional study. Among them forty-three (90%) were male and five (10%) were female. Age ranging between 1-50 years, 13(27%) mostly affected were between 11-20 years of age (Table 1). US detected twenty six

Table 1: Age distribution of hepatic and splenic injury patients

Age range (years)	Hepatic injury (No.)	Splenic injury (No.)	Other organ injury (No.)	No organ injury	Total number of patients
1-10	1	0	1	6	8
11-20	2	0	3	8	13
21-30	1	0	2	9	12
31-40	0	2	0	7	9
41-50	0	1	0	5	6
Total	4	3	6	35	48

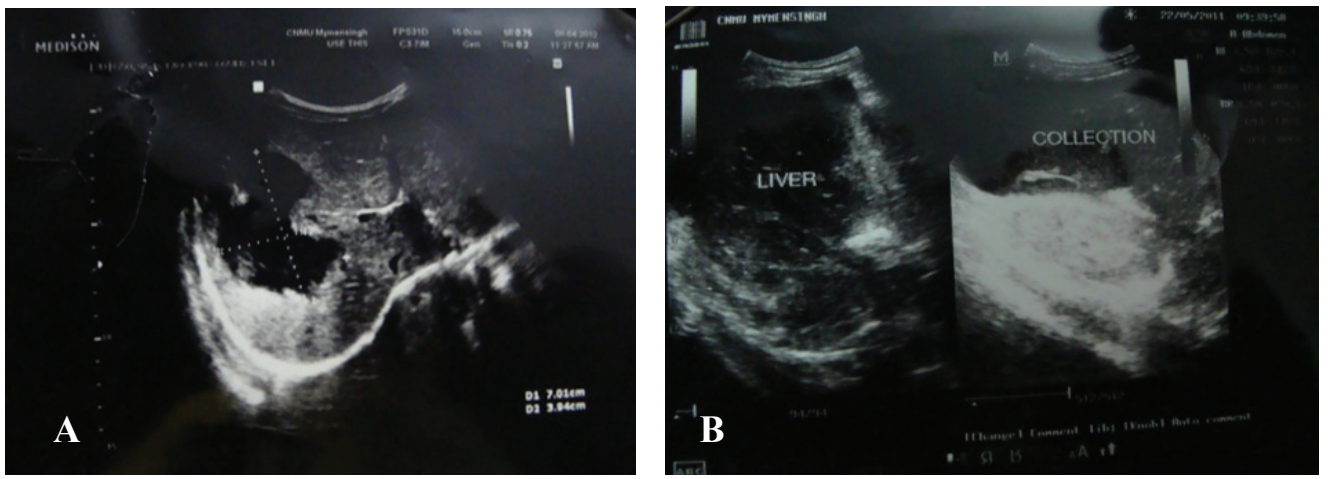

Figure 1: A. Sonographic Image in a 8 years old boy admitted to the hospital after a motor vehicle accideent. Transvers image obtained immdiately after admission shows a hematoma in right lobe of liver.

B. Somographic image in a 15 years old boy admitted to the hospital with abdominal pain after trauma. Transverse ultrasound image shows laceration in right lobe of liver with moderate to marked intraperitoneal collection.

(54%) patients with intraperitoneal collection. Among the solid organs, four (30%) patients had hepatic injury (Figure- 1 & 2) and three (23%) had splenic injury (Figure- 3 & 4). Seventeen (35.4 %) patients had no intra-peritoneal collection or organ injury. Sites of hepatic and splenic injuries were correlated with causes of injury (Table 2). On follow up US, it was found that intra-peritoneal collection and injured organs improved from initial observation.

Table 2: Relation of sites of collection with hepatic and splenic injury

Age range	Types of injury in involved organ	Sites of collection	Number of patients	Cause of injury	Total
1-10	Hematoma formation with another area of laceration in right lobe of liver	No intraperitoneal collection	1	Fall from tree	1
11-20	laceration in right lobe of liver	Moderate to marked dense intraperitoneal collection	1	Road traffic accident	2
	Hematoma in right lobe of liver	Moderate intraperitoneal collection	1	Fall from a building	
21-30	An area of laceration in right lobe of liver	Significant hemorrhagic collection in abdomen	1	Attacked by cow	1
31-40	Splenic rupture with hematoma in formation in lower part	Significant collection in left pleural cavity. Mild collection in lower abdomen & pelvis.	1	Road traffic accident	2
	Splenic rupture with dense hematoma in upper pole	Significant amount of collection in left pleural cavity. Mild intraperitoneal collection	1	Road traffic accident	
41-50	Hematoma in mid region of spleen	Mild to moderate intraperitoneal collection	1	Fall from tree	1

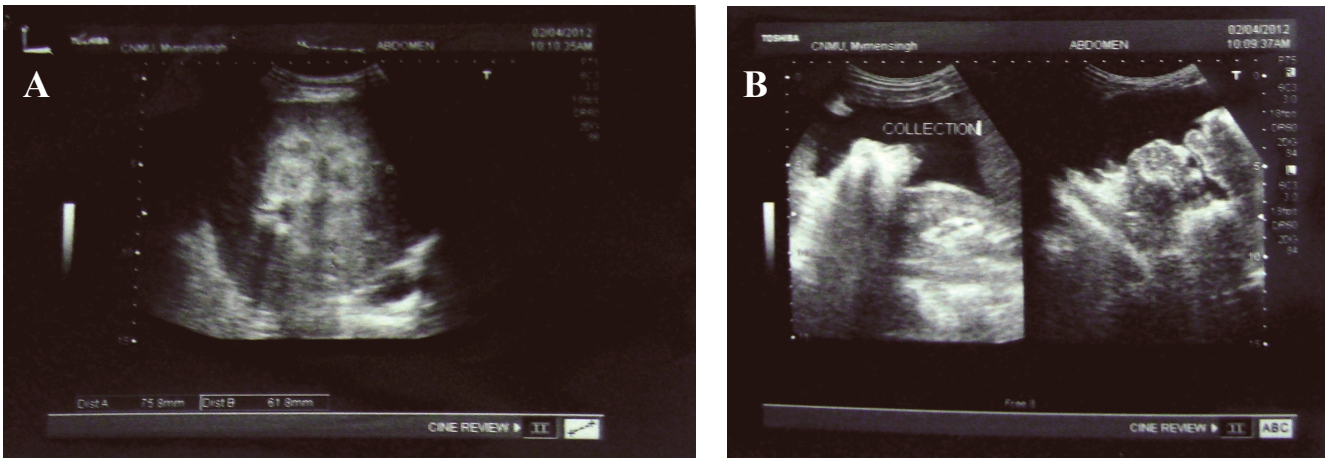

Figure 2: (A) Image of 25 years man admitted to hospital after a motor vehicle accident transverse images of ultra-sonogram shows an area of laceration in right lobe of liver and (B) hemorrhagic collection in peritoneal cavity.

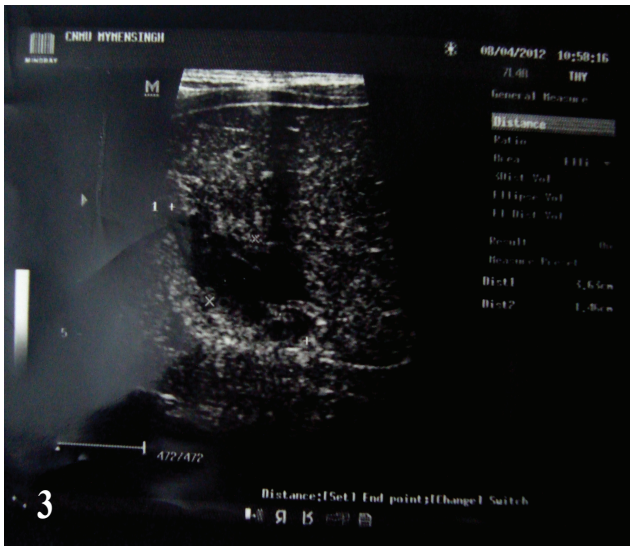

Figure 3: Ultrasound image of a 40 years male demonstrating lung splenic rupture with hematoma formation.

Figure 4: Sagittal oblique ultrasound image shows a splenic hematoma in upper mid region.

DISCUSSION

Clinically it is difficult for ourselves to asses a patient with blunt abdominal trauma properly so, we always need the help of imaging modalities. Computed tomography (CT) of the abdomen has been established as a sensitive mean of identifying intraperitoneal blood, detecting retroperitoneal hematomas and characterizing the magnitude of solid organ injuries even without hemoperitoneum. It is also more sensitive than other modalities for diaphragmatic hollow viscus and retroperitoneal injuries (9-11). But it needs radiation exposure, administration of intravenous contrast material, cannot be performed in unstable patient and it is costly, many people of our country are unable to afford it. It is not widely available in our country till now. US is a patient friendly, quick, cheaper, noninvasive bed side modality designed to answer one single question: whether free fluid is present in peritoneal, pericardial or pleural cavity. It can also detect solid organ injury. Furthermore, it can be useful in an unstable patient or in pregnant women and it does not have radiation hazards (12-13). The sensitivity of sonography for hemoperitoneum is usually considered high, comparable with computed tomography (CT) (4). It was also shown that sensitivity of sonography greater than 90% in identifying organ injuries (14). In this study, we tried to evaluate trauma patients with the help of ultrasonography to find out hepatic and splenic injury & intraperitoneal collection very carefully. We searched every patient for hepatic and splenic injury. For example, figure 1 and 2 shows hepatic injury with or without intraperitoneal collection and figure 3 and 4 shows splenic injury with pleural and peritoneal collection. We have detected twenty six patients out of forty eight patients with intraperitoneal collection which is significant (54%). We found four (30%) patients with hepatic injury and three (23%) patients with splenic injury. During the study some other information's were also been discovered, mostly affected people in our country were between eleven to twenty year of age and common causes of hepatic injury was fall from height and splenic injury was road traffic accident.

CONCLUSION

Ultrasonography is suggested as a primary screening modality for early detection of hepatic and splenic

injury in Bangladesh where road traffic accident is one of the most common causes of mortality and morbidity and CT is not available in rural areas.

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Diagnostic Dilemma of Lateral Cystic Neck Mass in Children- A Case Report

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Neck masses are frequent presentation in pediatric medicine which may cause diagnostic dilemma sometimes. Common neck masses are thyroglossal cyst, dermoid cyst, bronchogenic cyst, brachial cleft cyst and lymphangioma. Initial diagonostic work-up for neck masses includes clinical history physical examination neck USG and radiological imaging such as CT or MRI. Fine needle aspiration cystology may be crucial for excluding malignancy but histopathology confirms the types of lesion. This reported case is about dilemma in diagnosis of cystic neck mass in children. A 12-year-old boy presented to our institution with left sided neck swelling which was soft, nontender on palpation and no superficial skin pathology was seen. USG comments were limitated only on cystic nature and origin.

CT scan feature were not pathognomic as well. FNA showed that the cystic mass was benign in nature and most favorable diagnosis was lymphangioma.

Although for overcoming diagnostic dilemma in cystic neck mass many investigation procedures are used USG can be initial choice followed by MRI if necessary. However histopathology is the only method for definative diagnosis.

Keywords: Lateral neck mass. CT scan, USG, FNA

Neck masses, either congenital, developmental, neoplastic and/or infective, are common presentation in pediatric medicine which causes diagnostic dilemma (1). Cystic neck masses are broadly divided into medial and lateral lesions according to their anatomical location. Most common medial lesion are thyroglossal cyst, dermoid cyst and bronchogenic cysts. In lateral cystic neck mass, the most common differential diagnosis is brachial cleft cyst followed by lymphangioma (2,3). Though 90% of the lateral neck cystic swellings are proven to be benign in the young adults, probability of cystic metastatic lymph nodes cannot not be ignored (4). Hence a systemic and careful survey of lesion including physical examination of neck, ultrasound (US) of swelling, Computed tomography (CT) or magnetic resonance imaging (MRI) in some instance and finally fine needle aspiration cytology (FNA) are crucial in diagnostic workup. In this case we faced shadow of doubt in making diagnosis of cystic lesion whether it is thyroidal (cystic nodule or cystic metastases) or extrathyroidal in origin (branchial cleft cyst, lymphangiomas.)

CASE REPORT

A 12-year-old boy was referred to Institute of Nuclear Medicine & Allied Sciences (INMAS), Khulna with left sided neck swelling. The patient did not have any history of trauma or upper respiratory tract infection. On physical examination a swelling was found along the left sternocleidomastoid muscle. It was soft and non-tender but lower end of it could not be reached out on palpation (Figure 1). Cervical lymph nodes were not enlarged and overlying skin was normal without color change or any sign of discharging sinus. He has no constitutional symptoms or local compressive symptoms. Thyroid function was also normal. He

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underwent high resolution ultrasound of neck and computed tomography (CT) scan to the confirm site, size and extent. On ultrasound, there was a thick walled cystic structure measuring about 46 X 30 mm with multiple thick internal septations noted along the left sternohyoid muscle. Thyroid gland was normal in size and no nodule was found within it. For further evaluation, CT scan of neck was done and it showed a well defined cystic density mass (measuring about 42 mm X 51 mm X 92 mm) in the left side neck extending up to the superior mediastinum. The mass was separated from left lobe of thyroid but pushed the thyroid gland medially. No calcification or enhancing solid component is seen. After IV contrast no contrast enhancement was found (Figure 2). Our radiological diagnosis was left sided cystic mass. After IV contrast no contrast enhancement is seen. Finally, patient underwent fine needle aspiration cytology of the mass and about 5cc brownish fluid material was aspirated (Figure 3). Smear showed many lymphocytes and few histiocytes in a proteinaceous background. No malignant cell was seen and cytomorphological features were consistent with benign cystic lesion which was most likely in favor of lymphangioma (Figure 4).

Figure 1: Extended neck showing non tender, visible swelling in the midline.

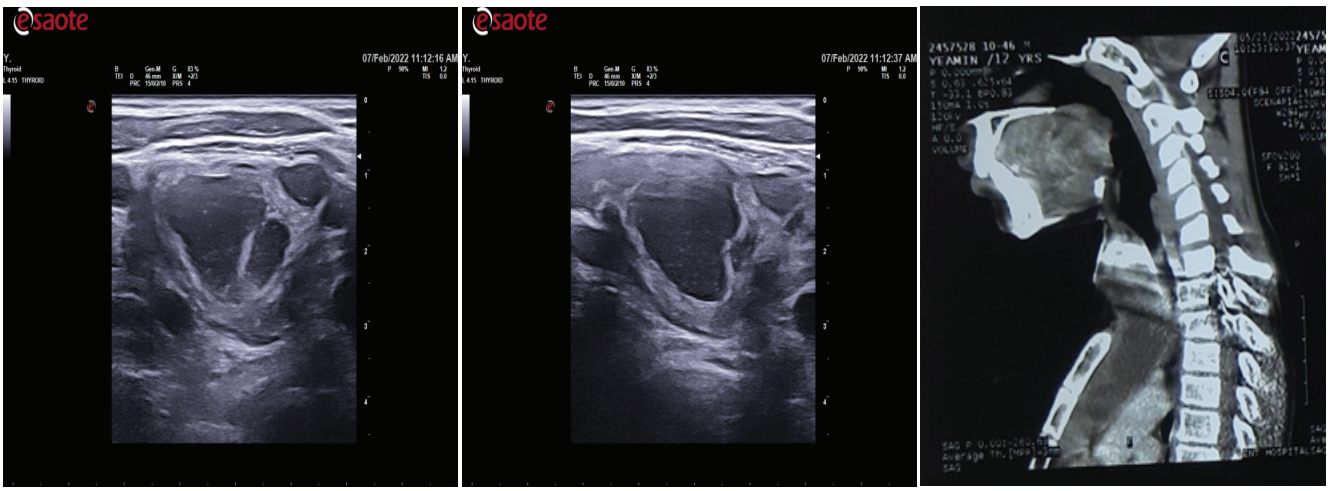

Figure 2: US and CT image showing cystic and dense mass extending into mediastinum.

Figure 3: Aspirated contents from the neck mass.

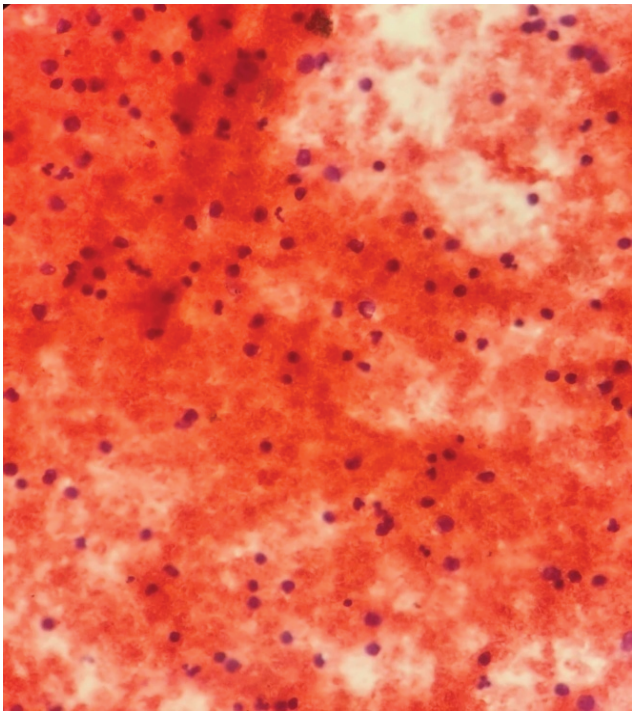

Figure 4: Smear shows marked distribution of lymphocytes in proteinaceous background.

DISCUSSION

Neck cysts can be subclassified by age at presentation, anatomical location and radiological presentation. Congenital neck cysts, which include thyroglossal duct cysts, branchial cleft cysts, lymphangioma, dermoid cysts, thymic and bronchogenic cysts can vary from common in prevalence to very rare. However in children, majority are benign in nature. Common congenital lateral lesions are branchial cleft cysts, lymphangioma and thymic cysts (5). Sometimes it is challenging for the primary care physician to differntiate between branchial cleft cysts, lymphangioma and cystic thyroid disease in children with lateral neck pathology (1). As a diagnostic work-up following physical examination, US is generaly performed for confirming cystic nature as well as defining size and extent of mass. US can be considered sufficient if diagnosis is clear and well matched with clinical presentations. Other radiological imaging such are CT scan and MRI can add useful clinical information for management (5).

Branchial cleft cysts is considered the most frequent cervical cyst and constitute of about 20% of all cervical masses in children. These congenital malformations are related to embryological developmental alterations of branchial apparatus. Clinically these cysts are presented as non-tender fluctuant masses in lateral neck along the anterior border of sternocleidomastoid muscle which may become infected and lead to abscess formation. Hence differential diagnosis may be challenging between the branchial cyst and that of cervical lympnadenopathy. US is the initial investigation of choice and US features include well defined thin walled mass displacing adjacent soft tissues. CT and MRI can predict typical locations such as antero-medial to sternocleidomastoid muscle, posterior to the submandibular gland and lateral to carotid sheath. Beaking between internal and external carotid arteries is considered pathognomic. Complete surgical excision of cyst with sinuses or fistulous tract is final choice of treament (6,7,11).