ORIGINAL RESEARCH

Evaluation of Role of Imaging Technique in Blunt Injury Abdomen: An Institutional Based Study

[1]Nikita Garg, [2]Amol Sasane

[1]Junior Resident, [2]Professor, Department of Radiology, Smt. Kashibai Navale Medical College and General Hospital, Pune, Maharashtra, India

Correspondence:
Nikita Garg
Junior Resident, Department of Radiology, Smt. KashibaiNavale Medical College and General Hospital, Pune, Maharashtra, India
Email: nikitagarg.2107@gmail.com

ABSTRACT

Background: The present study was conducted for evaluating the role of imaging techniques in blunt abdominal injury.

Materials &Methods: A total of 100 patients with presence of blunt abdominal trauma were enrolled. Complete demographic and clinical details of all the patients were obtained. All patients underwent both Ultrasound and CT and the time gap between the two were tried to be kept to a minimum. Emergent sonography for trauma was performed simultaneously with physical assessment, resuscitation, and stabilization within minutes of a patient's arrival. All the results were recorded and analysed using SPSS Software.

Results: Mean age of the patients was 36.5 years. The sensitivity, specificity and accuracy of ultrasound in detection of abdominal visceral organ injuries was 82.3 percent, 100 percent and 88.10 percent respectively. The sensitivity, specificity and accuracy of CT in detection of abdominal visceral organ injuries was 98.3 percent, 100 percent and 97.1 percent respectively.

Conclusion: Though ultrasound is the best initial imaging modality of choice, many injuries were missed, when used alone.While USG abdomen was used in conjunction with CT abdomen, better diagnostic results were obtained.

Key words: Blunt, Abdominal, Injury.

INTRODUCTION

India leads world in road deaths. Thirteen Indians die every hour due to an accident. 1,14,590 people died in road traffic accidents in India (2007), highest in the world. Fatalities due to road traffic injuries in India are projected to increase by 150% by the year 2020.[1] Abdominal trauma can be either blunt or penetrating type. Blunt trauma is more common in areas with heavy traffic while penetrating injuries, resulting from gunshot and stab wounds, or rarely from road side accidents, are common in military and violence prone areas.[2,3]

85% of abdominal traumas are of blunt character. Blunt abdominal trauma is defined as any traumatic lesion of blunt nature to intra-abdominal organse.g. spleen, liver, kidneys, pancreas, mesentry, and hollow viscuse.g. gastrointestinal tract, billiary system, urinary bladder, major vessels of retroperitonium. Blunt abdominal trauma (BAT) resulting from a traffic accident, fall, assault, or occupational accident is common in the emergency room.[3,4]

Traditionally physical examination (PE) has been the most important and sometimes the sole method of evaluating the abdomen.Accurate imaging facilitates selection for non-operative

management, where appropriate, and reduces non-therapeutic laparotomy rates. The main first line investigations are ultrasound, diagnostic peritoneal lavage, and computed tomography. These tests are complementary rather than interchangeable, and their usefulness depends on the clinical context.[5-7] Hence; the present study was conducted for evaluating the role of imaging techniques in blunt abdominal injury.

MATERIALS & METHODS

The present study was conducted for evaluating the role of imaging techniques in blunt abdominal injury. A total of 100 patients with presence of blunt abdominal trauma were enrolled. Complete demographic and clinical details of all the patients were obtained.All patients underwent both Ultrasound and CT and the time gap between the two were tried to be kept to a minimum. All patients chosen were hemodynamically stable and had no overt life threatening neurological, thoracic or penetrating abdominal injury. In the presence of shock & suspicion of massive solid organ injury, such patients were sent directly to the surgeon's table. Emergent sonography for trauma was performed simultaneously with physical assessment, resuscitation, and stabilization within minutes of a patient's arrival. All the results were recorded and analysed using SPSS Software.

RESULTS

Mean age of the patients was 36.5 years. Out of 100 patients, 76 patients were males while the remaining were females. Road traffic accident was the main etiologic factor found to be present in 80 percent of the patients. Abdominal visceral organs were involved in 76 percent of the patients with blunt abdominal trauma. Out of 100 patients, ultrasound depicted involvement of liver, spleen and kidneys in 35 percent, 43 percent and 23 percent of the patients respectively. Out of 100 patients, CT depicted involvement of liver, spleen and kidneys in 38 percent, 46 percent and 25 percent of the patients respectively. The sensitivity, specificity and accuracy of ultrasound in detection of abdominal visceral organ injuries was 82.3 percent, 100 percent and 88.10 percent respectively. The sensitivity, specificity and accuracy of CT in detection of abdominal visceral organ injuries was 98.3 percent, 100 percent and 97.1 percent respectively.

Table 1: Abdominal visceral organ involvement

Abdominal visceral organ injury	Number of patients	Percentage
Present	76	76
Absent	24	24
Total	100	100

Table 2: Abdominal visceral organ injuries on ultrasound

Abdominal visceral organ on ultrasound	Number of patients	Percentage
Liver	35	35
Spleen	43	43
Renal	23	23
Others	18	18
No evident abdominal visceral injury on ultrasound	24	24

Table 3: Abdominal visceral organ injuries on CT

Abdominal visceral organ involvement on CT	Number of patients	Percentage
Liver	38	38
Spleen	46	46
Renal	25	25

Others	18	18
No evident abdominal visceral injury on CT	16	16

DISCUSSION

Trauma is still the most frequent cause of death in the first four decades of life, and it remains a major public health problem in every country, regardless of the level of socioeconomic development. The abdomen is the third most common injured region, with surgery required in about 25% of civilian cases. Abdominal trauma is traditionally classified as either blunt or penetrating. Penetrating abdominal trauma can usually be diagnosed easily and reliably, whereas blunt abdominal trauma is often missed because clinical signs are less obvious. Blunt abdominal injuries predominate in rural areas, while penetrating ones are more frequent in urban settings. Penetrating abdominal trauma is often subdivided into stab wounds and gunshot wounds, which require different methods of treatment.[7- 9] Hence; the present study was conducted for evaluating the role of imaging techniques in blunt abdominal injury.

In the present study, mean age of the patients was 36.5 years. Out of 100 patients, 76 patients were males while the remaining were females. Road traffic accident was the main etiologic factor found to be present in 80 percent of the patients. Abdominal visceral organs were involved in 76 percent of the patients with blunt abdominal trauma. Out of 100 patients, ultrasound depicted involvement of liver, spleen and kidneys in 35 percent, 43 percent and 23 percent of the patients respectively. Out of 100 patients, CT depicted involvement of liver, spleen and kidneys in 38 percent, 46 percent and 25 percent of the patients respectively. In a similar previous study, Madhu P et al evaluated the role of USG & MDCT in identifying IAI in patients with BAT and to provide information that could accurately determine choice of management. Most common affected organs were liver and spleen, accounting for 33% and 26% respectively. Third common affected organ was Hollow viscus (23%). Hemoperitoneum was observed in 28 patients. Sensitivity of USG in detecting hemoperitoneum was 89.28%. Sensitivity of MDCT in detecting hemoperitoneum was 100%. Sensitivity of USG in detecting solid organ injuries was 78.57%. Sensitivity of MDCT in detecting solid organ injuries was 92.3%. MDCT is the superior diagnostic modality in the diagnosis of blunt abdominal trauma. USG can be a valuable initial investigation.[9] Kharbanda A et al 2020 evaluated the correlation of ultrasonography (USG) and computed tomography (CT) in detecting the visceral injuries with the assessment of their diagnostic indices. X-ray was done in cases of suspected bowel injuries. Hemoperitoneum associated with visceral injuries were the major findings detected by both USG (70.7%) and CT (81.7%). Sensitivities of USG for the detection of spleen, liver, kidney, and pancreatic injuries were 95%, 94%, 66.6%, and 40%, respectively, while the sensitivity of CT for the detection of liver, spleen, kidney, and pancreas was 100%. CT is highly sensitive, specific, and accurate in detecting the presence or absence of injury in BAT and defining its extent. However, USG still remains the initial investigation of choice.[10]

In the present study, the sensitivity, specificity and accuracy of ultrasound in detection of abdominal visceral organ injuries was 82.3 percent, 100 percent and 88.10 percent respectively. The sensitivity, specificity and accuracy of CT in detection of abdominal visceral organ injuries was 98.3 percent, 100 percent and 97.1 percent respectively. Manikandan P et al evaluated the usefulness of ultrasonography and computed tomography in detection of intraabdominal injury in patients with blunt abdominal trauma and to provide information that could determine choice of management and correlate the combined role of ultrasound and computed tomography findings with surgical, early diagnosis and management of solid visceral injuries from blunt abdominal trauma with high sensitivity and specificity resulting in reduction of mortality and morbidity.[11]

CONCLUSION

Though ultrasound is the best initial imaging modality of choice, many injuries were missed, when used alone.While USG abdomen was used in conjunction with CT abdomen, better diagnostic results were obtained.

REFERENCES

1. Marx J, Moore EE and Jordan RC: Limitation of CT scan in evaluating acute abdominal trauma: a prospective comparison with diagnosticperitoneal lavage. J trauma 11985;25;933-937.
2. Okuş A, Sevinç B, Ay S, Arslan K, Karahan Ö, Eryılmaz MA. Conservative management of abdominal injuries. Turkish Journal of Surgery/Ulusalcerrahidergisi. 2013;29(4):153-157. doi:10.5152/UCD.2013.2300.
3. Mohamed AA1, Mahran KM, Zaazou MM. Blunt abdominal trauma requiring laparotomy in poly-traumatized patients. Saudi Med J. 2010 Jan;31(1):43-8.
4. Ali J. Abdominal trauma with special reference to hepatic trauma.Can J surg1978;21:512.
5. Gupta S1, Talwar S, Sharma RK, Gupta P, Goyal A, Prasad P. Blunt trauma abdomen: a study of 63 cases. Indian J Med Sci. 1996 Aug;50(8):272-6.
6. Kendall JL, Kestler AM, Whitaker KT, Adkisson MM, Haukoos JS. Blunt abdominal trauma patients are at very low risk for intra-abdominal injury after emergency department observation.West J Emerg Med2011 Nov;12(4):496-504. doi: 10.5811/westjem.2010.11.2016.
7. Marathu, Kranthi &Budigireddy, Jayalakshmi. Role of Ultrasonography and CT in the Evaluation of Blunt Abdominal Trauma- A Prospective Study. International Journal of Anatomy, Radiology and Surgery. 2019 Oct, Vol-8(4): RO27-RO31. 10.7860/IJARS/2019/42581:2518.
8. G, R. K., NS, H., Madurwar, A. U., & D, S. Evaluation of Patients with Blunt Abdominal Injuries by Ultrasonography and Multidetector Computed Tomography. Asian Journal of Medical Radiological Research 2019; 7(1), 05-08.
9. P. Madhu, D. Santhosh. Evaluation of patients with blunt abdominal injury by ultrasonography (USG) and multi detector computed tomography (MDCT). International Journal of Contemporary Medicine Surgery and Radiology. 2019;4(4):D177-D180.
10. Kharbanda A, Mital M, Saran S, Verma SR. Multimodality imaging approach to blunt abdominal trauma in a tertiary care center in North India. West African Journal of Radiology. 2020 Jan 1;27(1):40.
11. Manikandan P, Prabakaran M. Ultrasound and Computed Tomography Correlation in Blunt Abdominalinjury. Annals of the Romanian Society for Cell Biology. 2021 Mar 27:3381-93.