

COMPUTED TOMOGRAPHIC EVALUATION OF PATIENTS WITH BLUNT ABDOMINAL TRAUMA

Radiodiagnosis

Dr. Vedansh Gutain	Resident, Dept. of Radio-diagnosis, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra, India - 442001.
Dr. D.U Kakade*	Professor, Dept. of Radio-diagnosis, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra, India - 442001 *Corresponding Author
Dr. Suresh Phatak	Professor and Head of department, Dept. of Radio-diagnosis, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra, India - 442001

ABSTRACT

Objective: To study with the aid of Multi Detector CT, different traumatic pathologies of abdomen in blunt trauma & determining the sensitivity, specificity & Accuracy of CT scan as compared with laparotomy findings.

Materials and Method: The proposed study was done in the Department of Radiodiagnosis at AVBRH, Sawangi, Wardha. Patients with history of Road Traffic Accidents, Fall, or assault or other causes where clinically blunt trauma of abdomen is suspected and referred for CT abdomen (if hemodynamically stable).

Result: 50 patients were included in the study, Most common age group involved is 21-30 yrs, 16 patients (32%). Male predominance was seen with 44 patients (88%) & 6 females (12%). RTA was the most common mode of injury with 41 patients (82%). Liver was the most common injured organ followed by spleen, kidney, bowel & pancreas being least common. Most common associated finding was hemoperitoneum with next being multiple fractures followed by pneumothorax, pleural effusion & subcutaneous emphysema, pneumoperitoneum was the least common. CT scan had highest sensitivity for liver (90.91%) followed by spleen (84.09%), kidney (77.27%), bowel (72.73%) & least for pancreas (50%). The specificity was highest for liver & pancreas (83.33%) followed by spleen, kidney & bowel each at 66.67%. Diagnostic accuracy was highest for liver (90%) followed by spleen (82%), kidney (76%), bowel (72%) & least for pancreas (54%).

Conclusion: MDCT is the gold standard modality for evaluation of blunt abdominal trauma in hemodynamically stable patients as it plays an important role in detection of injuries to various organs along with grading of these injuries on which the management of the patient is dependent. MDCT scan has proved to be highly sensitive in detection of active hemorrhage which is a life threatening condition.

KEYWORDS

Blunt abdominal trauma (BAT), CT scan.

INTRODUCTION

Isolated blunt abdominal trauma (BAT) represents about 5% of annual trauma mortality from blunt trauma. As part of multiple-site injury (polytrauma), BAT contributes another 15% of trauma mortality.⁽¹⁾ CT imaging is the diagnostic tool of choice for the evaluation of abdominal injury due to blunt trauma in haemodynamically stable patients.⁽²⁾

In addition, an abdominal CT scan can assist in the evaluation of coexisting abdominal injuries such as thoracic injuries and unsuspected pelvic and spinal fractures.⁽³⁾

The role of the radiologist is to look for the following aspects that are to be expected in abdominal blunt trauma: hemoperitoneum, contrast blush consistent with active bleeding, lacerations, contusions, parenchymal hematomas, subcapsular hematomas, devascularisation of organs or part of organs, free intraperitoneal or retroperitoneal air, and diaphragmatic rupture.⁽⁴⁾

In approximate order of frequency, the most commonly injured abdominal organs and structures are the spleen, liver, kidneys, small bowel and/or mesentery, bladder, colon and/or rectum, diaphragm, pancreas, and major vessels and multiple organs are often affected simultaneously.⁽⁵⁾

MATERIALS AND METHODS

- The proposed study was done in the Department of Radiodiagnosis at AVBRH, Sawangi, Wardha. Patients with history of Road Traffic Accidents, Fall, or assault or other causes where clinically blunt trauma of abdomen is suspected and referred for CT abdomen (if hemodynamically stable).
- Our trauma protocol includes plain CT study followed by IV contrast administration with three phase acquisition of images. Reconstructed Images will be analyzed with volume viewer software.

- Technique: All these patients were scanned on SEIMENS SOMATOM 16 slice CT scanner. Patients were scanned in supine position. Axial images were taken in the scan range from base of the lungs, continuing distally pelvis. Slice thickness of 3 to 5 mm for plain, arterial, venous & delayed phases was used. Delayed scan performed in all cases of renal trauma.

- Bone windows for possible bony involvement and lung window for possible parenchymal or pleural involvement were obtained in all relevant cases

Contrast Material

- 100-120 cc of Omnipaque 350 of the contrast was injected intravenously by the peripheral intravenous route at injection rate 2-3 cc per second. Continuous monitoring of the vital parameters was done during contrast injection.

OBSERVATIONS AND RESULTS

Most common age group involved was 21-30 yrs with 32% & total 16 patients followed by 31-40 yrs with 18% & total 9 patients, 11-20 yrs & 61-70 yrs each had 7 patients (14%). Less than 10 yrs & more than 70 yrs were the least common age group involved with 2 patients each accounting for 4% cases.

Male predominance was seen with 44 patients out of 50 with 88% cases. Females accounted for 6 patients i.e. 12% cases.

Out of 50 patients 41 patients presented after RTA as most common mode of injury comprising of 82% cases followed by fall, assault & sports injury being least common cause with 8%, 6% & 4% cases respectively.

Liver was the most common injured organ seen in 41 patients out of 50 patients i.e. 82% cases followed by spleen in 39 patients i.e. 78% cases, kidney in 36 patients with 72% cases, bowel in 34 patients i.e. in 68% cases pancreas in 23 patients with 46% cases being least common injured organ.

Computed Tomography (CT scan)

most common associated finding was hemoperitoneum in 35 patients i.e. 70 cases with next being multiple fractures seen in 27 patients i.e. 54% cases followed by pneumothorax in 8 patients i.e. 16% cases, pleural effusion & subcutaneous emphysema is seen in 7 patients each with 14% cases, pneumoperitoneum was the least common finding seen in 4 patients accounting for 8% cases.

CT scan had highest sensitivity for liver (90.91%) followed by spleen (84.09%), kidney (77.27%), bowel (72.73%) & least for pancreas (50%). The specificity was highest for liver & pancreas (83.33%) followed by spleen, kidney & bowel each at 66.67%. Diagnostic accuracy was highest for liver (90%) followed by spleen (82%), kidney (76%), bowel (72%) & least for pancreas (54%).

DISCUSSION

A total of 50 patients who fulfilled the inclusion criteria were included in the study for a period of 1 year. Most common age group involved was 21-30 yrs with 32% cases & total 16 patients followed by 31-40 yrs with 18% cases & total 9 patients, 11-20 yrs & 61-70 yrs each had 7 patients i.e. 14% cases. Patients with age less than 10 yrs & more than 70 yrs were the least common age group involved with 2 patients each accounting for 4% cases. Javad Salimi et al (2009) also conducted their study & found out the peak age was 20-40 years (43%) and followed by patients aged more than 40 years (24%), patients aged 10-19 years accounted for 21% of the admissions.

Male predominance was seen with 44 patients out of 50 with 88% cases. Females accounted for 6 patients i.e. 12% cases.

This in comparison with the study conducted by MM KUMAR et al (2005), Of the 210 patients evaluated by us in the study, 166 patients were males and 44 patients were females giving a male to female ratio of about 4:1, as males have a more outdoor nature of work and more travel.

RTA as most common mode of injury comprising of 82% cases followed by fall, assault & sports injury being least common cause with 8%, 6% & 4% cases respectively.

This in comparison with the study conducted by Javad Salimi et al (2009) showed Accident (63%) and fall (22%) were the most frequent mechanism of trauma in these patients.

Liver was the most common injured organ seen in 41 patients out of 50 patients i.e. 82% cases followed by spleen in 39 patients i.e. 78% cases, kidney in 36 patients with 72% cases, bowel in 34 patients i.e. in 68% cases & pancreas in 23 patients with 46% cases being least common injured organ.

In the study conducted by Adel Mohamed El Wakeel et al (2015), The liver was the most common injured organ representing 40%, spleen 30%, kidneys 16%, peritoneum 8%, while the pancreas was the least common one representing only 2% of all our cases.

most common associated finding was hemoperitoneum in 35 patients i.e. 70% cases with next being multiple fractures seen in 27 patients i.e. 54% cases followed by pneumothorax in 8 patients i.e. 16% cases, pleural effusion & subcutaneous emphysema is seen in 7 patients each with 14% cases, pneumoperitoneum was the least common finding seen in 4 patients accounting for 8% cases. In another study conducted by MM KUMAR et al (2005) shows hemoperitoneum associated with visceral organ injury in 35 patients accounting up to 62.50% of cases. CT scan had highest sensitivity for liver (90.91%) followed by spleen (84.09%), kidney (77.27%), bowel (72.73%) & least for pancreas (50%). The specificity was highest for liver & pancreas (83.33%) followed by spleen, kidney & bowel each at 66.67%. Diagnostic accuracy was highest for liver (90%) followed by spleen (82%), kidney (76%), bowel (72%) & least for pancreas (54%).

Similar study conducted by Javad Salimi et al (2009) shows CT scan had the highest sensitivity for detecting the injuries to liver (100%), spleen (86.6%), kidney (80%) and stomach (80%). On the contrary, the specificity of the CT-scan images for detecting retroperitoneal hematoma (100%) and injuries to kidney (93.5%) and mesentery (87.5%) was higher than other organs. The accuracy of CT images to detect the injuries to spleen, liver, kidney and retroperitoneal hematoma were reported to be 96.1%, 94.4%, 91.6% and 91.6% respectively.

CONCLUSION

From our study we conclude that MDCT scan is the gold standard modality for evaluation of blunt abdominal trauma in hemodynamically stable patients as it plays an important role in detection of injuries to various organs in the abdomen along with grading of these injuries on which the management of the patient is dependent. CT is also important in the follow up of the cases which were managed conservatively. MDCT scan has proved to be highly sensitive in detection of active hemorrhage which is a life threatening condition.

IMAGE GALLERY

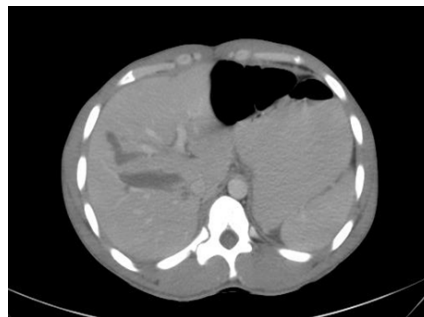


IMAGE-1: Axial CECT of the abdomen shows hypo dense area seen in the liver suggestive of liver laceration.



IMAGE-2: Axial CECT of the abdomen shows multiple hypodense areas in the spleen with a deep linear hypodense line along with a large sub capsular hematoma suggestive of grade-III splenic injury.



IMAGE-4: Axial CECT image of the abdomen shows complete transection of the pancreas between head & neck suggestive of grade-IV injury.

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