

Computed Tomography (CT) of Blunt Abdominal Trauma: The Frequency of Incidental Findings, how it was Documented in Radiology Report and the Implication of These Findings to Acute Trauma Care

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SUMMARY

The wide use of computed tomography (CT) scanning for patients with blunt abdominal trauma can reveal incidental findings that vary in their importance. We evaluated these findings, how it was reported by radiologists and its implication on the trauma care. In 30 out of 154 patients, 32 incidental findings were discovered (19.5%). Out of these 32 findings, only 3 cases (9.4%) were considered significant and required immediate attention from the managing team. In all these 3 cases, the findings were described in the body of the report and highlighted in the conclusion section at the end of the radiology report. However, similar reporting style was used in only 58.4% of cases with moderate clinical concern and 23.5% of cases with little clinical concern. In 41.2% of cases with little concern, the incidental findings were not mentioned in the radiology report. In conclusion, incidental findings in CT scan performed for blunt abdominal trauma were common but many were clinically insignificant. There is little consistency in radiology reporting of these findings especially those with moderate and little clinical concern.

KEY WORDS:

Incidental findings, computed tomography, radiology report, blunt abdominal trauma, trauma

INTRODUCTION

An incidental finding may be defined as finding that is discovered unrelated to the clinical indication for the imaging examination performed¹. In trauma patients, the widespread use of computed tomography has led to more frequent discovery of these findings². It is known that most incidental findings are likely benign and often have little or no clinical significance. Only in small percentage of cases, incidental findings can give direct implication to trauma management³. The current approach to radiology reporting of these incidental findings varies from person to person, facility to facility and day to day for a given radiologist due to lack of guidelines^{4,5}.

OBJECTIVES

We evaluated the frequency and clinical importance of incidental findings found on abdominal CT of trauma

patients, how radiologists reported these findings and its effect to immediate trauma care.

MATERIALS AND METHODS

All patients who had abdominal CT scan for the evaluation of suspected blunt abdominal injury were retrospectively traced from January 2008 to December 2009. The CT scan images, formal or finalized radiology reports and clinical notes were reviewed. Demographic data including age, sex, mechanism of injury, type of incidental findings and the systems involved were documented. Incidental findings were divided into three categories according to its clinical importance; little, moderate and significant concern³. Those with little clinical concerns did not require further investigation or specific referral and follow up. Those with moderate clinical concern required referral and follow up before discharge. Those with significant clinical concerns include conditions that affect the treatment, require referral, follow-up and management before the discharge³. Radiology reports were reviewed in their entirety to identify incidental findings cited either in the body of the report or in the conclusion or impression section at the end of the report⁴. The imaging characteristics of the findings and any recommendation for further assessment were recorded. Degenerative joint diseases and focal bone sclerosis were excluded.

All CT scans were performed using Somatom Siemens Volume Zoom, a four-row multislice CT scanner from Siemens Medical Systems, Erlangen, Germany. The slice width of 10 mm, collimation of 2.5 mm, rotation time of 0.75s, table feed of 15 mm and a 3mm reconstruction interval were used. Pre and post-contrast scans were routinely performed and 2ml/kg intravenous contrast medium (Iohexol, 300mg/mL) were administered to all patients. Oral contrast was not routinely given. Post contrast scans were acquired during the portal venous phase approximately 80 seconds after the contrast injection.

RESULT

A total of 154 cases were reviewed. The mean age of the study subjects was 26.4 years (range 2-84). Motor vehicle accidents were the most common cause of the blunt abdominal trauma (82.8%).

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Table I: The incidental findings and how it was reported by radiologists

Formal report by radiologists	Incidental findings on CT scan for abdominal trauma			
	Little concern	Moderate concern	Significant concern	Total
Findings were not mentioned in the report	7 (41.2%)	1(8.3%)	0	8 (25.0%)
Findings were described in the report but not highlighted in the conclusion	6(35.3%)	4(33.3%)	0	10 (31.3%)
Findings were described in the report and highlighted in the conclusion	4(23.5%)	7(58.4%)	3 (100%)	14(43.7%)
Total	17(100%)	12(100%)	3(100%)	32(100%)

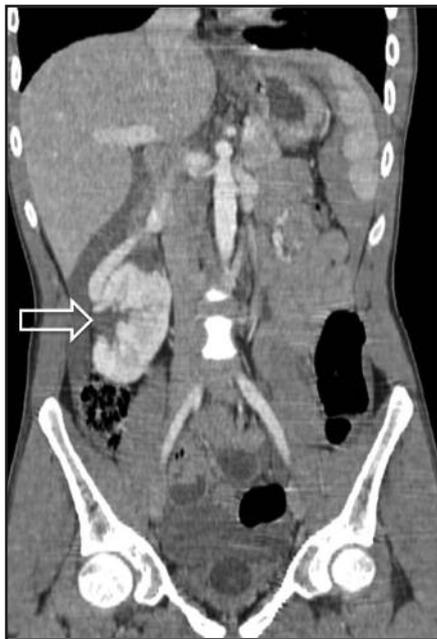


Fig. 1 : Incidental finding classified as little concern. There was an abnormal orientation of the right kidney (arrow) with no evidence of injury. This condition required no specific follow up.



Fig. 2a: Incidental finding classified as significant concern that needs further work out. A 3-year-old girl, who was previously well, presented with abdominal pain and haematuria after a fall from staircase. CT scan showed gross left hydronephrosis due to PUJ obstruction (arrow). This patient had pyeloplasty with good outcome.

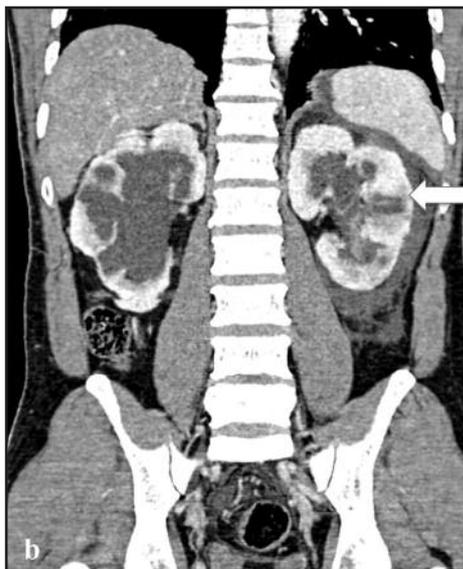


Fig. 2b: Incidental finding classified as significant concern that needs further work out. A 43-year-old prisoner who had been assaulted complained of abdominal pain with haematuria. CT scan showed left renal injury (arrow). This patient also had bilateral gross hydronephrosis caused by eosinophilic cystitis.

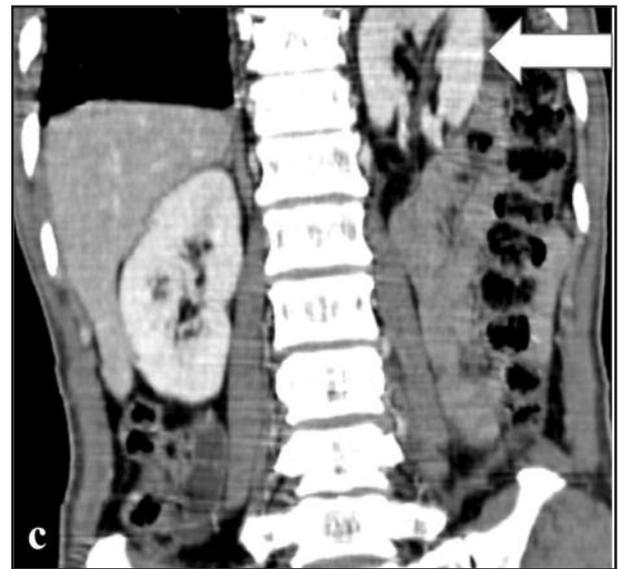


Fig. 2c: Incidental finding classified as significant concern that cause confusion in diagnosis. A 47-year-old man admitted with fractures of the pelvis and femur after a motor vehicle accident. He had haematuria and abdominal pain. CT scan showed contusion of urinary bladder with transthoracic left kidney mistaken for traumatic diaphragmatic hernia. Normal diaphragm was confirmed via laparoscopic examination⁵.

A total of 32 incidental findings were discovered in 30 patients (19.5%). Out of the 32 incidental findings, majority (53.1%) were of little clinical concern (n=17). Cases with moderate concern were seen in 12 patients (37.5%) and those with 'significant concern' in three cases (9.4%). The mean age of patients with incidental findings was 39.4 years. The most common system involved was the genitourinary tract (80%) and the most common finding was simple renal cortical cyst (43.8%).

The findings that were considered of little clinical concern include simple renal cortical cyst (n=14), inguinal hernia (n=2) and abnormal kidney orientation (n=1) (Figure 1). In 41.2% of patients, these findings were not described at all in the reports. In 35.5% of cases, the description of incidental findings was found in the body of the report but not in the conclusion at the end. Only in 23.5 % of cases, these findings were described in the report and highlighted in the conclusion (Table I).

Those considered to be of moderate concern include renal calculus without hydronephrosis (n=3), liver hemangioma (n=2), ovarian cyst (n=2), breast lesion (n=2), cholelithiasis (n=1), aortic aneurysm (n=1) and adrenal lesion (n=1). Majority of these findings were described in the body of report and highlighted in the conclusion section (58.4%). However, there was one case in which the breast lesion was not mentioned at all in the report (Table I).

Three cases were considered as incidental findings with significant clinical concern. The first case was a gross left hydronephrosis due to PUJ obstruction in a 3-year-old girl. CT scan showed no evidence of abdominal injury (Figure 2a) and this patient subsequently had pyeloplasty performed with good outcome on follow up. The second case was gross bilateral hydronephrosis detected in a 43-year-old prisoner who sustained a left renal injury (Figure 2b). The obstruction at the ureteral orifices was caused by generalized thickening of the urinary bladder wall and subsequent HPE showed eosinophilic cystitis. The third case was a transthoracic left kidney mistaken for traumatic diaphragmatic hernia (Figure 2c). All these three incidental findings were described in the radiologist's report and the findings were highlighted in the conclusion section (Table I). None of these 3 patients had significant injury related to the trauma, thus the incidental findings did not affect the immediate patient care. No recommendation for further radiological assessment was made in any of these incidental findings.

DISCUSSION

Incidental findings were common in CT scans obtained for suspected blunt abdominal injuries. We found 19.5% of the 154 scans had incidental findings. This is slightly lower than previous reported series^{2,3}. Thompson et al reported an incidence of 33.4% in CT done in emergency department, however their study include all trauma and non-trauma cases². Another possible reason for higher incidence of incidental findings in other studies is the mean age of their study population was higher. This resulted in more age-related diseases detected^{2,3}.

As in previous reports, majority of the incidental findings were of little concern in term of clinical importance and did not affect the immediate management of trauma patients².

In our study, only three cases had significant clinical concern which needed immediate attention from the managing trauma team. All cases were successfully managed as described and they all have good outcome on follow-up.

There is no significant inconsistency in the reporting of incidental findings especially those with moderate and little clinical concern. In our local practice, none of the final radiology report gave recommendation for subsequent imaging for these incidental findings as they are not necessary for further management. Currently, there is no national consensus that can be used as guidelines for managing incidental findings. Attempt to standardize the reporting and improve the consistency of report will not be easy because the findings are too variable. However if it is made available, it will improve the quality of radiology report and contribute to appropriate care management^{4,5}.

LIMITATION:

- 1) We did not evaluate if all these incidental findings have been notified or informed to the patients.
- 2) We did not assess the cost effectiveness if all the incidental findings were being followed up or managed.

CONCLUSION:

In our experience, only small numbers of incidental findings encountered in CT abdomen of trauma patients were clinically significant. Making a standardized radiology report can be difficult as there can be numerous types of incidental findings encountered. Nevertheless this is important to ensure that radiologist will remember to include all incidental findings no matter how small or insignificant clinical concern those findings are and to provide recommendation if further imaging is necessary to enhance the quality of the report and for the appropriate patient care.

Disclaimer: The case illustrated in Figure 2c had been published as case report in *Med J Malaysia* 2011; 66:60-61.

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REFERENCES

1. Berland LL, Silverman SG, Gore RM, Mayo-Smith WW, Megibow AJ, Yee 1, et al. Managing incidental findings on the abdominal CT: white paper of the ACR incidental findings committee. *J Am Coll Radiol* 2010; 7: 754-73.
2. Thompson RJ, Wojcik SM, Grant WD, Ko PY. Incidental findings on CT scan in the emergency department. *Emergency Medicine International* 2011; article ID 624847; doi: 10.1155/2011/624847.
3. Messersmith WA, Brown DFM, Barry MJ. The prevalence of incidental findings on ED abdominal scans. *Am Journal of Emergency Medicine* 2001; 19(6). Doi: 10.1053/ajem.2001.27137.
4. Johnson PT, Horton KM, Megibow AJ, Jeffrey RB, Fishman EK. Common incidental findings on MDCT: survey on radiologist recommendation for patient management. *J Am Coll Radiol* 2011; 8: 762-7.
5. Sperry JL, Massaro MS, Collage RD, Nicholas DH, Forsythe RM, Watson GA, et al. Incidental radiographic findings following injury: dedicated attention results in improved capture, documentation, and management. *Surgery* 2010; 148: 618-24.