Injury, Int. J. Care Injured 47 (2016) 691–694

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Incidental findings on whole-body trauma computed tomography: Experience at a major trauma centre

Matthew K.T. Seah [a,*], Colin G. Murphy [a], Scott McDonald [b], Andrew Carrothers [a]

[a] Orthopaedic Trauma Unit, Addenbrooke's Hospital, United Kingdom
[b] Addenbrooke's Hospital, United Kingdom

ARTICLE INFO

Article history:
Accepted 10 January 2016

Keywords:
Incidental findings
Trauma
Computed tomography

ABSTRACT

Introduction: The use of total-body computed tomography (CT) scanning in the evaluation of multiply injured patients is increasing, and their liberal use has stirred debate as to the added benefit relative to the risk of radiation exposure and inappropriate use of limited healthcare resources. Findings unrelated to the clinician's reasons for requesting the radiological examination are often uncovered due to the comprehensive nature of the evaluation at a trauma centre. However, some of these findings are outside the expertise of the trauma team who initially organised the scan and this may lead to uncertainty over who is best qualified to follow-up the incidental finding. We aim to evaluate the frequency of incidental findings on whole body trauma CT scans in a consecutive series of trauma admissions to our unit.
Materials and methods: We identified 104 consecutive major trauma patients who received a whole-body trauma CT (head, cervical spine, chest, abdomen and pelvis) from Jan 2013 to Dec 2013 in our unit (out of a total of 976 trauma admissions in the same year). Patient-specific information was extracted from computerised hospital databases containing admission and progress notes, radiological reports, operation notes and pathology reports.
Results: 57 patients (54.8%) had incidental findings identified on the radiologist report, with a total of 114 individual incidental findings. 6 (5.8%) patients had potentially severe findings that required further diagnostic work up; 65 (62.5%) patients had diagnostic workup dependant on their symptoms, and 43 (41.3%) patients had incidental findings of minor concern which required no follow up.
Discussion and conclusions: Our findings reflect the literature noting that incidental findings are increasingly common due to the central diagnostic role of CT imaging in trauma care, but also due to advances in imaging techniques and quality. In keeping with published literature, we note that increased age is associated with an increased incidence of "incidental findings" and this will continue to rise with the ageing population and the mandatory nature of trauma CTs.

Introduction

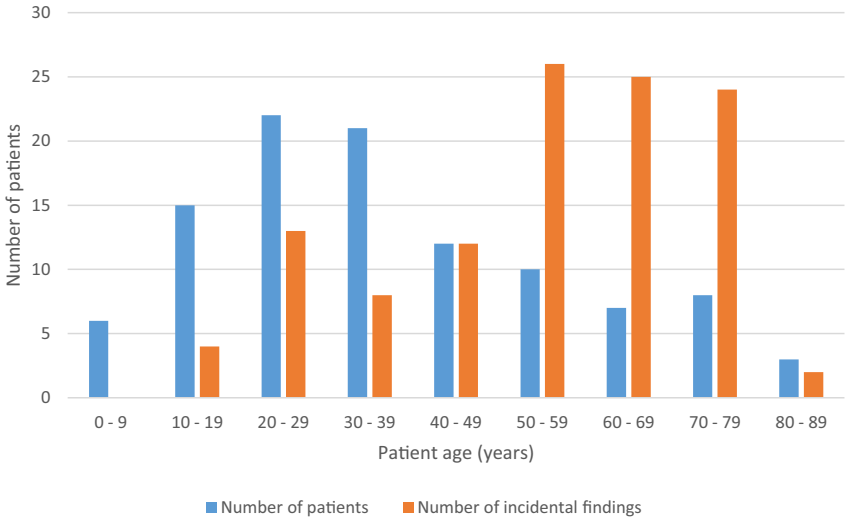
The use of total-body computed tomography (CT) scanning in the evaluation of multiply injured patients is increasing, and their liberal use has stirred debate as to the added benefit relative to the risk of radiation exposure and inappropriate use of limited healthcare resources [1]. Findings unrelated to the clinician's reasons for requesting the radiological examination are often uncovered due to the comprehensive nature of the evaluation at a trauma centre. However, some of these findings are outside the expertise of the trauma team who initially organised the scan and this may lead to uncertainty over who is best qualified to follow-up the incidental finding [2]. With multiple parties involved in the care of the severely injured patient, it is perhaps not surprising that incidental findings (even those deemed clinically significant) may not always be documented clearly on patients' charts, follow-up not organised or appropriate referrals not made [3].

The presence of incidental findings or 'incidentalomas' on CTs has been documented in several studies and may have a reported incidence of greater than 50% [3,4]. These incidental findings may be beneficial to patients in the case of earlier detection of other significant pathology (e.g. malignancy); conversely, they may result in increased anxiety and healthcare costs due to additional investigations for abnormalities that ultimately might not affect patients' health [5]. Fear of missing significant pathology resulting

* Corresponding author at: 9B Linton House, Puddicombe Way, Cambridge CB2 0AE, United Kingdom. Tel.: +44 7774520438.
E-mail address: matt.seah@doctors.org.uk (Matthew K.T. Seah).

http://dx.doi.org/10.1016/j.injury.2016.01.012
0020–1383/

Table 1
Number of patients and incidental findings by age group.



in serious complications or outcomes and the worry of medico-legal ramifications are legitimate concerns. We are therefore asked to consider, "What is the responsible use of information that nobody asked for?" [6]

The evaluation and surveillance of incidental findings have been cited as among the causes for the increased utilisation of cross-sectional imaging [4,7]. Indeed, incidental findings may be serious but when and how to evaluate them are unclear. The workup of incidental findings varies between clinician and region, and some concordance is desirable in light of the current need to limit excessive spending in the health service and to reduce risk to patients through unnecessary investigations. In this series, we aim to evaluate the frequency of incidental findings on whole body trauma CT scans in a consecutive series of trauma admissions to our unit, as well as the proportion of these which are potentially clinically significant.

Patients and methods

Patient selection

Addenbrooke's Hospital is the Major Trauma Centre for the East of England Trauma Network. The network serves the six counties of the region (Norfolk, Suffolk, Cambridgeshire, Bedfordshire, Hertfordshire and Essex), an area of approximately 19,000 square kilometres with a population of 5.95 million residents [8,9]. The population served is typical of stable urban populations. As a Major Trauma Centre, referrals comprise primary and secondary transfers of all major trauma patients where the Injury Severity Score is expected to be greater than 15. A trauma triage tool is also used to determine whether the patient can be transferred to the closest trauma unit or the Major Trauma Centre.

Using our trauma database, we identified 104 consecutive major trauma patients who received a whole-body trauma CT (head, cervical spine, chest, abdomen and pelvis) from Jan 2013 to Dec 2013 in our unit (out of a total of 976 trauma admissions in the same year). Patient-specific information was extracted from computerised hospital databases containing admission and progress notes, radiological reports, operation notes and pathology reports. All patients without a whole-body trauma CT scan were excluded from this study.

Image interpretation

The CT scans were initially reviewed by an appropriately trained on-call radiologist as well as the trauma service. Following this initial review, senior radiologists retrospectively reviewed all CT scans. The findings were compared against the presenting complaint, the mechanism of injury, and medical history when present to determine the presence of incidental findings (which we defined as previously unknown pathology, not attributable to the

Table 2
Incidental findings in 104 consecutive patients (by anatomical location).

Head/neck	Abdomen/pelvis
Arachnoid cyst (3)	Renal cyst (5)
Hydrocephalus (2)	Splenic cyst (5)
Small vessel disease (2)	Diverticulosis/diverticular disease (4)
Acute infarct	Bulky mesenteric nodes (2)
Carotid artery calcifications	Hernias (2)
Ethmoiditis	Ovarian cyst (2)
Foreign bodies	Atrophic pancreas
Previous brain trauma/infarct	Fatty liver
Pneumocephaly	Hepatic cyst
Mastoiditis	Pancreatic lesion (intraductal papillary mucinous neoplasm)
Thyroid nodule	Retroaortic left renal vein
Retroclival swelling	Small bowel dilation
White matter changes	
Chest	**Spine**
Emphysema (8)	Degenerative changes (10)
Chronic artherosclerotic disease (5)	Wedge compression fractures (3)
Pulmonary nodules (4)	Diffuse idiopathic skeletal hyperostosis
Mural thrombus of the large vessels (3)	Disc prolapse (2)
Coronary artery calcifications (2)	Fusion right lateral process C1 to occipital condyle (likely congenital)
Bulky mediastinal lymph nodes	Hypoplastic 1st rib
Cardiomegaly	Ossification posterior longitudinal ligament
Pleural plaques	Pars defect
Pleural scarring	Spondylosis
Pulmonary emboli	
Pulmonary fibrosis	
Ventricular hypertrophy	