



Isolated Free Fluid on Abdominal Computed Tomography in Blunt Trauma: Watch and Wait or Operate?

Laura N Gonser-Hafertepen, DO, James W Davis, MD, FACS, John F Bilello, MD, FACS, Shana L Ballow, DO, Lawrence P Sue, MD, FACS, Kathleen M Cagle, FNP-C, Chandrasekar Venugopal, MD, DABR, Stephen C Hafertepen, MD, Krista L Kaups, MD, FACS

BACKGROUND: Isolated free fluid (FF) on abdominal CT in stable blunt trauma patients can indicate the presence of hollow viscus injury. No criteria exist to differentiate treatment by operative exploration vs observation. The goals of this study were to determine the incidence of isolated FF and to identify factors that discriminate between patients who should undergo operative exploration vs observation.

STUDY DESIGN: A review of blunt trauma patients at a Level I trauma center from July 2009 to March 2012 was performed. Patients with a CT showing isolated FF after blunt trauma were included. Data collected included demographics, injury severity, physical examination, CT, and operative findings.

RESULTS: Two thousand eight hundred and ninety-nine patients had CT scans, 156 (5.4%) of whom had isolated FF. The therapeutic operative group included 13 patients; 9 had immediate operation and 4 failed nonoperative management. The nonoperative/nontherapeutic operation group consisted of 142 patients with successful nonoperative management and 1 patient with a nontherapeutic operation. Abdominal tenderness was documented in 69% of the therapeutic operative group and 23% of the nonoperative/nontherapeutic group (odds ratio = 7.5; $p < 0.001$). The presence of a moderate to large amount of FF was increased in the therapeutic operative group (85% vs 8%; odds ratio = 66; $p < 0.001$).

CONCLUSIONS: Isolated FF was noted in 5.4% of stable blunt trauma patients. Blunt trauma patients with moderate to large amounts of FF without solid organ injury on CT and abdominal tenderness should undergo immediate operative exploration. Patients with neither of these findings can be safely observed. (J Am Coll Surg 2014;219:599–605. © 2014 by the American College of Surgeons)

Isolated free fluid (FF) identified on abdominal/pelvic CT in the stable adult blunt trauma patient presents a management dilemma. Free fluid without solid organ injury (SOI) might be an important clue to the presence of hollow viscus or mesenteric injury, which has a

CME questions for this article available at
<http://jacscme.facs.org>

Disclosure Information: Authors have nothing to disclose. Timothy J Eberlein, Editor-in-Chief, has nothing to disclose.

Presented at the Western Trauma Association 43rd Annual Meeting, Snowmass, CO, March 2013.

Received March 4, 2014; Revised April 8, 2014; Accepted April 15, 2014. From the University of California San Francisco, Fresno, Community Regional Medical Center, Fresno, CA.

Correspondence address: Laura N Gonser-Hafertepen, DO, Department of Surgery, University of California San Francisco, Fresno, Community Regional Medical Center, 2823 Fresno St, 1st Fl, Fresno, CA 93721. email: lgonser@fresno.ucsf.edu

considerable risk of morbidity and mortality if diagnosis is delayed.¹⁻⁴ In 1998, Cunningham and colleagues recommended mandatory laparotomy for the CT finding of FF without SOI or signs of bowel injury.⁵ Some studies concurred,⁶⁻⁸ but others proposed that these patients should instead be carefully observed with serial abdominal examinations and laboratory studies, with the understanding that a minority of patients would fail nonoperative management.⁹⁻¹²

During the last decade, multi-detector CT (MDCT) has been routinely available at most trauma centers. Because earlier studies were performed using single-detector CT (10-mm images), use of MDCT would theoretically allow identification of more injuries with higher-quality, thinner images (2.5 to 5 mm). However, MDCT has not proven to be more sensitive or specific for the diagnosis of hollow viscus or mesenteric injury,

Abbreviations and Acronyms

FAST	= Focused Assessment with Sonography for Trauma
FF	= free fluid
MDCT	= multi-detector CT
OR	= odds ratio
SOI	= solid organ injury

and isolated FF remains an important indicator of the possibility of underlying pathology.¹³ Initial retrospective reviews from radiology literature done in male patients have shown a higher rate of isolated FF with MDCT and report that most of the patients underwent successful nonoperative management.^{11,12}

Consensus has still not been reached on the finding of isolated FF, as demonstrated by a survey of the members of the American Association for the Surgery of Trauma, which showed considerable variation with regard to diagnostic approach and treatment for patients with this finding.¹⁴ No previous studies have identified characteristics to differentiate between stable blunt trauma patients with isolated FF who should undergo operative exploration vs those that can be managed safely with careful observation.

The goals of this study were to determine the frequency of isolated FF in stable blunt trauma patients since the integration of MDCT and identification of characteristics to discriminate between patients who should undergo immediate operative exploration vs those that might be carefully observed.

METHODS

A retrospective review was conducted of blunt trauma patients, aged 16 years and older, presenting to Community Regional Medical Center in Fresno, California from July 1, 2009 through March 31, 2012. Community Regional Medical Center is an American College of Surgeons—verified Level I trauma center with approximately 3,500 trauma patients evaluated annually. All patients in the Trauma Registry who had abdominal/pelvic CT scan after sustaining blunt trauma were reviewed. The standardized CT protocol at our institution uses a 64-slice helical MDCT (General Electric Company), using approximately 100 mL Omnipaque intravenous contrast, with 2.5-mm slices through the thorax and abdomen through the level of T-12 and 5-mm slices through the remainder of the abdomen and pelvis.

Computed tomography scans were initially reviewed by the trauma surgery attending and senior surgical resident/fellow, as well as the emergency department physicians. Computed tomography scans were then read by an

Table 1. Free Fluid Grading System

Amount of free fluid	Definition
Trace	Fluid in 1 slice* of 1 region [†]
Small	Fluid in 1 to 3 slices of 1 region
Moderate	Fluid in 1 to 3 slices of >2 regions, or fluid in >4 slices of 1 region
Large	Fluid in multiple regions of multiple slices

*1 slice = 5 mm.

[†]Regions are defined as pelvis, right pericolic gutter, left pericolic gutter, perisplenic, perinephric (retroperitoneal), within bowel loops, and other.

on-site group of experienced trauma radiologists. Final interpretations by the radiologists were reconciled with those of the trauma service, usually within 12 hours of admission. Any discrepancies were discussed and patient care was modified as appropriate. The decision for immediate operation vs careful observation was at the discretion of the attending trauma surgeon at the time of admission.

The patient cohort in this study was defined by reviewing the radiologist's final read via electronic medical record. Patients with FF and no sign of SOI or hollow viscus injury (defined as bowel wall thickening, contrast extravasation, or extraluminal air) were included in the study. Each CT scan identified to have isolated FF without SOI was reviewed by the Chief of Trauma (JWD) and a senior radiologist (CV) using a standardized grading system.

No universally accepted grading system has been defined for describing the amount of FF seen on CT. For this investigation, the amount of FF was classified as follows: Trace FF is fluid in 1 slice of 1 region; small FF is in 1 to 3 slices in 1 region; moderate FF is fluid in >4 slices in 1 region or 1 to 3 slices in 2 regions; and large FF is fluid seen in multiple slices in multiple regions. Abdominal regions were separated into pelvis, right pericolic gutter, left pericolic gutter, perisplenic, perinephric (retroperitoneal), within bowel loops, and other (Table 1). Hounsfield units were only sporadically mentioned in the radiology reports and were not reviewed because they have not been routinely mentioned in earlier publications on this topic.

Patients were excluded from the study if they were deemed hemodynamically unstable (ie, emergency department systolic blood pressure <90 mmHg, prehospital hypotension, and/or positive Focused Assessment with Sonography for Trauma [FAST] in patients with base deficit less than -6¹⁵). Those patients in whom the CT was performed outside of the standard protocol or at an outside institution were also excluded. Patients with clinical indications for immediate laparotomy (eg, peritonitis, traumatic abdominal wall hernia, etc) and those with CT evidence of SOI (ie, liver, spleen, or kidney) or hollow

Download English Version:

<https://daneshyari.com/en/article/4291476>

Download Persian Version:

<https://daneshyari.com/article/4291476>

[Daneshyari.com](https://daneshyari.com)