

FAST (Focused Assessment with Sonography in Trauma) Protocol in Polytrauma Patient. A Retrospective Study of 40 Patients Attended in Emergency Department of a Secondary Care Hospital in the UK

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ABSTRACT

Introduction: A study about the compliance of the FAST's (Focused Assessment with Sonography in Trauma) American College of Emergency Physicians: Emergency Ultrasound Guidelines 2008, was conducted in an emergency department hospital in the UK. Plenty of polytrauma patients have inner injuries that are not apparent on the initial physical exam. Important bleeding into the peritoneal pericardial or pleural spaces are possible without evident precocious warning signs. Emergency ultrasound in polytrauma patients can help to quickly identify free fluid in these spaces. The main objective of our study was to ascertain the degree of compliance of the FAST protocol in polytrauma patients attended in a secondary care hospital in the UK. The secondary objective was to identify possible causes of this compliance or noncompliance.

Material and Methods: A retrospective cross sectional study was performed on 40 consecutive patients in the emergency department of a secondary hospital, for a period of 3 months. All the records of the patients with polytrauma were studied according to specified protocol.

Results: Gender: 11 females, 29 males. Age group: 9 patients from 1-20 years old; 16 (40%) from 21-40; 8 (20%) from 41-60; 5 (12.5%) from 61-80; 1 (2.5%) from 81-100. FAST documented in 25% of patients. Abdominal CT was performed in 27%, with: 6 normal, 2 pneumothoraxes.

Conclusion: FAST is not commonly used in polytrauma patients in our study (25%). These results are not surprising, because unfortunately, bedside US is not commonly used in A&E departments.

Keywords: FAST protocol, polytrauma, emergency department

INTRODUCTION

Trauma is the first cause of death in young people (aged 1-44). When adjusted to all age groups, it is the third cause, after cancer and atherosclerotic disease. The term "polytrauma" describes a blunt trauma to several body areas or cavities, and potentially life threatening.¹

In the emergency department, we know that in polytrauma patients always have to be ruled out possible internal injuries that cannot be seen on first physical exam (even with no evident precocious warning symptoms / signs). Among these injuries, the most frequent and important ones are the bleeding into peritoneal, pleural or pericardial spaces. Bedside Ultrasonography (=BUS) performed by emergency doctors in these polytrauma patients, can quickly and safely identify free fluid in those spaces.

As it is well known, "FAST" is the acronym for Focused Assessment with Sonography in Trauma. It is the BUS performing by antonomasia in the emergency department, and

should be performed (as per ATLS, Advanced Trauma Life Support, protocol) immediately after patient's primary survey.² Over last years, FAST is gaining increasing importance, supported by a level I recommendation, adding a new aid to basic physical exam. The main concept that sustains FAST exam is the fact that bleeding is present in plenty of thoracic-abdominal life-threatening injuries. It is well known that Ultrasonography (=US) is not fully sensitive for identifying all bleeding, but it is also known that we can quickly identify intraperitoneal bleeding (if greater than 400 ml), pericardial effusion, haemothorax or pneumothorax in trauma patients. From thoracic injuries, it was created the term "E-FAST", or "Extended-FAST" technique, where we can evaluate the presence (or absence) or hemo- and pneumothorax better than with conventional radiographs (=XR).³⁻⁵

In Ma's prospective study⁶, FAST protocol was 90% sensitive and 99% specific for the detection of peritoneal bleeding in blunt trauma, and 91% sensitive and 100% specific in penetrating trauma.

In Plummer's retrospective study⁷, in patients with penetrating thoracic trauma, it was reported 100% sensitivity in detecting pericardial effusion and faster diagnosis and management when BUS was used.

In Melniker's randomized clinical trial⁸, patients in FAST group needed less time to go to theatre, fewer computed tomography (=CT) exams, shorter admission time, fewer complications and lower spending than in the group that FAST was not performed. Among other advantages of BUS, it can be performed while other

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resuscitative cares are being taken, providing simultaneously and immediately vital information, without wasting crucial time (as in XR and CT).

But, what do clinical guidelines say?

- American College of Emergency Physicians: Emergency Ultrasound Guidelines 2008³:
detection of abnormal fluid or air collection in the torso. This application is for both blunt and penetrating trauma in all ages.
- The Royal College of Radiologists. Standards of practice and guidance for trauma radiology in severely injured patients. 2010⁹: Where FAST or plain films have been used in a severely injured patient, their use and value in that case should be evaluated in a multidisciplinary debriefing.
- NICE guidelines Feb 2016, not available when our study was started.¹⁰

Haemorrhage imaging in hospital settings: Imaging for haemorrhage in patients with suspected haemorrhage should be performed urgently, and the images should be interpreted immediately by a healthcare professional with training and skills in this area.

Nonetheless, there are still plenty of queries regarding the usefulness of FAST technique in polytrauma patients.¹¹⁻¹⁴ Because of the abdominal air, it is not always possible to have good views, there is a high ratio of false negative scans (not seen if hemorrhage is less than 400 ml), so negative FAST cannot exclude injury or bleeding to the abdomen and repeated observations and FAST should be performed. If they become positive, this information would be crucial. It can be told that in UK secondary hospitals where CT is available at all times, the use of FAST technique is not so important. But it is not less true, than in a very unstable patient with positive FAST, probably should go immediately to theatre because neither patient nor surgeon can't afford 15 minutes to go to radiology department. In the UK, when starting this study, there were no concrete guidelines for the use of BUS in the polytrauma patient¹⁵, so we followed the compliance of BUS by the American College of Emergency Physicians: Emergency Ultrasound Guidelines 2008.³ This study was performed with the objective to ascertain the degree of compliance of the FAST protocol, according to the American College of Emergency Physicians: Emergency Ultrasound Guidelines 2008, in polytrauma patients attended in a secondary care hospital in the UK and to identify possible causes of this compliance or noncompliance.

MATERIAL AND METHODS

A retrospective cross-sectional study should be performed on 40 consecutive patients who attended Resus, in the Emergency Department at Southend University Hospital for a period of four months.

The inclusion criteria were: 1) admitted to Resus, and 2) diagnosis of "Polytrauma". There were no exclusion criteria if inclusion criteria were present.

The Audit Department estimated that a 4-month period time, with more than 30 patients, will give a reasonable idea of the FAST performance in these patients.

This study was approved by the Audit Committee at our hospital. From July 2014 to October 2014, 40 consecutive clinical histories with the clinical diagnosis of "Polytrauma", were reviewed. We checked the following data in paper clinical

Table-1: Working Protocol

Patient study number: _____

Sex: M _____ F _____

Age: _____

Date: Monday to Thursday : _____
Friday or bank holiday eve : _____
Sat-Sun-bank holiday : _____

Arrival hour (24h) : _____

Doctor writing / attending:

A&E : _____
Ortho : _____
Surg : _____
Medics : _____
Non identified : _____
Consultant : _____
Specialist reg : _____
SHO : _____
FY 1-2 : _____
Non identified : _____

Bedside fast documented as performed:

Yes _____
No _____
If yes:

1) Right pararenal Yes _____ No _____
Positive _____ Negative _____ Not conclusive _____

2) Subcostal Yes _____ No _____
Positive _____ Negative _____ Not conclusive _____

3) Left pararenal Yes _____ No _____
Positive _____ Negative _____ Not conclusive _____

4) Paravesical Yes _____ No _____
Positive _____ Negative _____ Not conclusive _____

Other diagnostic made through e-fast:

1) Pneumothorax : _____
2) Pleural effusion : _____
3) Pericardic effusion : _____
4) Other : _____

Abdominal CT performed: Yes _____ No _____
Positive _____ Negative _____

If yes:

1) Ruptured spleen : _____
2) Ruptured liver : _____
3) Pneumothorax : _____
4) Pleural effusion : _____
5) Pericardic effusion : _____
6) Other diagnosis : _____

XR Performed: Yes _____ No _____
If yes:

1) CXR : _____
2) Abdomen : _____
3) C-spine : _____
4) D-spine : _____
5) L-spine : _____
6) Upper extremities : _____
7) Hip. Lower extremities : _____
If significant fractures, detail: _____

Patient admitted to hospital?

1) Orthopaedics : _____
2) Surgery : _____
3) Medics : _____
4) Other (specify) : _____

Patient referred to other hospital?

1) Orthopaedics : _____
2) Neurosurgery : _____
3) Other : _____

Patient discharged home? Yes _____ No _____

Patient died in A&E? Yes _____ No _____

histories, according to the protocol in Table 1.

In our protocol, we recorded in first place the epidemiologic data: age and sex. We also recorded the date, if it was a working day, Friday / bank holiday evening, or Saturday / Sunday / bank holiday. On week-ends and bank holidays there was only one consultant (in working days there were three consultants). And to ascertain if Fridays of bank holiday evening were more prevalent days.

The attendance hour was also recorded, because (as explained before), in morning shifts there were three consultants, only one in evenings, and none in night shifts.

Next data were about the degree and specialty of the doctor attending the polytrauma patient. We tried to ascertain if there was any relationship between these data with the performance of FAST protocol. We also recorded if FAST was specifically detailed with the 4 views (which implies a higher recording quality) or just recorded as “positive” or “negative”, and if any further diagnosis was made through FAST.

We also recorded if CT or any other XR was performed, and see if there was any relationship with the FAST protocol.

Finally, we also recorded if patient was discharged home, admitted (and to what service), or if died in the emergency department.

STATISTICAL ANALYSIS

All the measurements were done using the statistic software Stata V.11 (StataCorp, College Station, Texas, USA) and interpreted using descriptive statistics.

RESULTS

The results of epidemiologic data were: gender: 11 females (27.5%), 29 males (72.5%). Age group: 9 patients (22.5%) from 1-20 years old; 16 (40%) from 21-40; 8 (20%) from 41-60; 5 (12.5%) from 61-80; 1 (2.5%) from 81-100. In 1 patient (2.5%) the age was unknown.

About the day attended: 22 patients of 39 (55%) were attended from Monday to Thursday (not bank holidays), 1 (2.5%) was attended on Friday or bank holiday evening and 16 (40%) were attended on Saturday, Sunday or bank holiday. Finally, in 1 patient (2.5%) it was not recorded the exact attendance date (only the month and year).

The time of arrival was: 9 patients (22%) from 00.00 to 07.59; 17 patients (43%) from 08.00 to 15.59, and 14 patients (35%), from 16.00 to 23.59.

The doctor writing the polytrauma notes was: in 33 (82.5%) clinical histories, an emergency doctor; in 3 (7.5%), a surgeon, and in 4 (10%) could not be identified.

Regarding the grade of attending doctor, 13 (32.5%) were consultants, 14 (35%) were clinical specialists, 8 (20%), Senior House Officer (SHO) and in 5 (12.5) clinical histories the grade was not identified.

Bedside FAST was documented as performed in 10 histories (25%) and not documented in 30 (75%). Only in 1 clinical history (2.5% of the total) was specifically detailed the 4 views of FAST protocol. Also in only 1 history, another additional diagnostic was made through BUS: pneumothorax was recorded.

Abdominal CT was performed in 10 patients (25%), with 2 pneumothoraxes and 1 hemothorax diagnosed, the rest were normal. Interesting findings in the chapter “other imaging

performed”, were: 29 (72.5%) patients had further XR performed, 9 (22.5%) patients did not have any other XR, and in 2 cases it was not recorded. Among other XR studies: 15 Chest XR, 5 Cervical Spine XR, 5 Hip / Lower Extremities XR, 2 Dorsal Spine XR, 1 Lumbar Spine XR, 1 Upper Extremities XR and finally 1 Chest CT.

The patient’s destination after attendance was: 28 patients (69%) were admitted to our own hospital, 8 (20%) were discharged home, 3 (7%) were referred to other hospital, and 1 patient (3%) died in the emergency department.

Among patients admitted to our hospital: 13 patients went to Surgery beds, 6 to Orthopedics, 2 to Pediatrics, 1 to Medics, 1 to Mental Health, 1 to Other Department bed and in 4 it was not documented. Among patients admitted to other hospital: 1 went to Neurosurgery bed, 1 to Surgery bed and 1 to Plastic Surgery bed.

Of the 10 FAST performed, 6 were from 8 to 15.59 hours, 2 of them from 16 to 23.59 h and other 2 from 00 to 7.59 h. There was no statistical significance between number of FAST performed and the day of the week, FAST with the number of abdominal CT, nor abdominal CT and the hour of attendance.

DISCUSSION

FAST protocol was documented as performed in polytrauma patients in only 10 out of 40 patients (25%). This number seems a bit low, probably we should expect about at least 50% to 75% of FAST performed.

We raise the question about if all the papers we can see from the Literature talking about “polytrauma patients” are speaking about the same patients.¹ The diagnostic criteria are not homogeneous and we have realised that plenty of times this diagnosis is made more upon the Paramedics’ diagnosis when arriving to Resus.

We did not find any relationship between: if number of FAST performed and grade of doctor writing FAST report, between FAST and the day of the week, FAST with the number of abdominal CT, nor abdominal CT and the hour of attendance.

But one datum was statistically significant and can be relevant, of the 10 FAST performed, 6 were done from 8 to 15.59 h, 2 of them from 16 to 23.59 h and other 2 from 00 to 7.59 h. We believe this finding can be easily explained because the increasing number of consultants and clinical specialists able to perform FAST at that time in our department.

No further commentaries for the chapter other XR performed.

In none case BUS was crucial to detect an internal haemorrhage in a haemodynamically very unstable patient.

In our 10 out of 40 patients (25%) in which FAST was performed, no bleeding was detected, but in one patient a pneumothorax was diagnosed. Pneumothorax is more easily diagnosed with BUS than with conventional XR, as reported before³⁻⁵

Most of the studies available in the Literature are actually to ascertain the usefulness of FAST technique in the polytrauma patient.^{2,5,6,8,11-14} But our study was more orientated to evaluate the degree of compliance of FAST technique in real clinical practice in our Emergency Department (Resus) when attending real polytrauma patients.

Our personal impression about these results is that:

1. Even assuming that FAST is not too reliable and all the controversy we have seen in Introduction^{2,6,7}, and there are

no cut points for good / improvable practice in this field, 25% of FAST in polytrauma and only 2.5% of detailed 4 views of FAST, might be far from ideal.

- Maybe the number of cases can be considered too low, but a four-month period seems long enough at least not to be a biased period of time (as one month could be). We believe that a one-year time instead a 4-month one, very probably would not radically change these results.

Further prospective studies with more patients included should be conducted for a better understanding of FAST technique in the polytrauma patient. Nonetheless, even these results cannot be exported to other hospitals (areas), because unfortunately not all of them had at that time a BUS device available, and what is more relevant, not all of them have trained emergency doctors to perform confidently BUS / FAST protocol.

We cannot find any convincing reasons for this low use of BUS in our emergency department. But we should try to find solutions to fix this great problem: consultants in emergency departments should be aware of this current status and begin training. Training for ourselves and training for every emergency doctor who really wants to help their patients in a quick and confident way, mastering the basics of BUS and also their limitations.

CONCLUSION

FAST protocol was not commonly used in polytrauma patients in our hospital by the second half of 2014. We think this is not strange finding, because unfortunately, BUS is not commonly performed in A&E departments, not only for FAST, but actually nor for other pathologies, and two years later that situation is not much better. We can see that the number of doctors in every emergency department in the UK mastering BUS is seldom more than 20%.

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