

Not always CT: US in Abdominal Trauma

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What is Trauma?

“Injuries which are caused by external force or violence. They range from minor to major, obvious to not apparent and single injury to multiple.”

A.T.L.S.

Airway
Breathing
Circulation
Disability
Exposure

Extremities – Secondary survey

Adjuncts

CXR
Pelvic X-Ray
DPL
FAST scan
? CT scan

A.T.L.S.

“CT is a time consuming procedure that should be used only in patients with no haemodynamic abnormalities in whom there is no apparent indication for an emergency laparotomy”

Ultrasound

Bats
Insects
Dolphins
Whales

Ultrasound

1st described by Leonardo da Vinci 1490
1st patent for underwater listening device 1912 after Titanic sinking
Developed in WW1 and used extensively in WW2
Dr Who – Sonic Screwdriver

History

First used in 1970s in Europe

Non-invasive

Quick

Repeatable

Safe

UK & North America in 1990s

FAST

Focussed Assessment with Sonography for Trauma

Perihepatic

Perisplenic

Pelvis

Pericardium

FAST Scan

How good is it – Free Fluid

FAST

No	Sensitivity	Specificity	NPV
6324	75%	98%	94%

20% Liver injuries have no haemoperitoneum!

Requires 400mls to be identified

Up to 100% sensitivity reported for CT and now frequently used as the Gold Standard!

How good is it – solid organs?

FAST

Sensitivity	NPV
44-91	0.72-0.99

CT

Spleen 98% sensitive

(Marmery et al. Correlation of MDCT findings with splenic arteriography and surgery: prospective study in 392 patients. JACS 2008; 206:685-93)

CT vs USS

CT wins hands down

Better pick up

Ability to characterise injuries

Arteriography

Surgically friendly images

Reproducible

RCR Referral Guidelines

Major trauma

CT – This is the investigation of choice in major trauma as it improves the chance of survival!

FAST – This is not as sensitive as CT and should not delay CT when immediately available

Trauma Care

Ultrasound indicated?

Pre-hospital care

During resuscitation

Follow-up

Children – low index of suspicion cases

Pregnant patients – low index of suspicion cases

Vascular access

Paramedics

New handheld devices

Cost - \$4,000

Highly portable

Good quality image

Requires training

Experience

Understanding of limitations

Pre-Hospital Scan

Inform immediate care

Inform transfer – helicopter / ambulance

Pre-warn hospital

Serve as a base-line

Literature

Paramedics can be trained to obtain diagnostic quality images without delay

(Heegard et al. Acad Emerg Med. 2010 Jun;17(6):624-30 .Prehospital ultrasound by paramedics: results of field trial)

No proven benefit

(Jorgensen H et al. Eur J Emerg Med. 2010 Oct;17(5):249-53. Does prehospital ultrasound improve treatment of the trauma patient? A systematic review.)

Warnings

Don't waste time!

Be aware of limitations

Don't be blinded by the findings

Receiving hospital should treat all findings with care

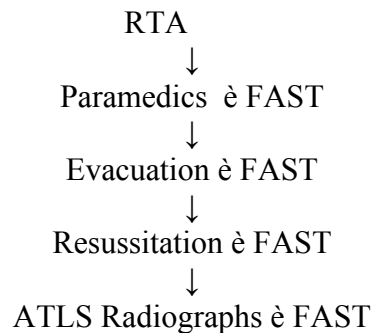
Resuscitation

Unless the patient goes STRAIGHT to CT

Good base-line & repeatable

Inform care

Inform CT protocols



A.T.L.S. (revised)

Airway

Breathing - FAST (Pneumothorax)

Circulation - FAST

Circulation + CT

CT is potentially indicated in all haemodynamically unstable patients where there is appropriate imaging provision

RCR Guidelines - Children

Major trauma cases – CT still investigation of choice

USS – primary investigation of choice where the clinical index of suspicion is low.

A negative ultrasound in a stable child merits observation only

Follow-up

Dose of a polytrauma CT is 15-40mSv

Justified in the immediate situation

Follow-up scans should be used more selectively

USS – no dose

Repeat as often as needed

Can be used to justify CT

Oddities

Sometimes the mechanism isn't so clear

Other indications

Abdomen

Nipples – knees

USS

Rib fractures

Testicular injuries

Summary

FAST

Pre-hospital care

Temporal assessment

Follow-up

Children

Where CT isn't readily available!

• References

- 1/ ATLS – Student Course Manual 8th Edition. American College Surgeons Committee on Trauma, Chicago.
- 2/ iREFER – Making the best use of clinical radiology, Version 7. Royal College of Radiologists.
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- 5/ Heegard et al. Acad Emerg Med. 2010 Jun;17(6):624-30 .Prehospital ultrasound by paramedics: results of field trial
- 6/ Jorgensen H et al. Eur J Emerg Med. 2010 Oct;17(5):249-53. Does prehospital ultrasound improve treatment of the trauma patient? A systematic review
- 7/ Imaging in Trauma and Critical Care 2nd Edition. Mirvis SE & Shanmuganathan K. Saunders, 2003. Philadelphia.