

TRIAGE CT IN THE CIRCULATORY UNSTABLE PATIENT

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Triage CT

• Critical Issue

- Emergency Room equipped with MDCT
- or CT suite with ER equipment

Triage CT

- Non-contrast scan
- Thighs to head
- Total time from ambulance trolley to scan completion & patient ready for clinical work-up = 90 sec

New Scenario

- Airways secured
- Patient transferred directly to the scanning table from the prehospital care
 - » - same procedure as transfer to examination table
- Immediate scanning – no clinical measures
 - » Load and scan
 - » No patient preparation before scanning
 - » Still with clothes on, no change of patient position
 - » No new iv lines

Triage CT

- Non-contrast CT survey
 - » Immediately identify life threatening injuries
 - Airways
 - Breathing - chest status
- Main goal: **C** – identify source of bleeding
 - » Thorax, abdomen or in retroperitoneum
- Substitutes – chest, pelvic x-rays + FAST
 - » quicker & more accurate information

Clinical work-up

- Out of the gantry
 - » Full body access as scanned feet first
- Full clinical resuscitation & work-up on the CT table
 - » More iv lines if necessary – fluids etc
 - » E - Undress patient
- Or ... if the more convenient – back to the trauma room

Clinical work-up

- Knowledge of bleeding compartment from the primary scan
 - » ATLS - prioritize measures according to ABCDE
 - » Better possibility to parallel address all critical injuries
 - » Possible to plan definitive measures

Clinical work-up

- Circulatory stabilized or not
- Still bleeding – unstable
 - » Operating Room or Angio-embolization
- » (→ recon sub-mm images for spine evaluation – limited quality due to artifacts)

Clinical work-up

- Stabilized
 - » Standard Whole Body Trauma CT incl iv contrast
 - » Why?
 - Non-contrast exam does NOT exclude serious organ injuries
 - I.V. Contrast Information
 - Aorta/ angiographic evaluation
 - ongoing bleed/pseudoaneurysm
 - Some artifacts in primary scan may obscure information
 - Full spine evaluation + extremities

Triage CT - scan details

- Load and scan directly
- Feet first
 - » X-long table allows 190 cm helical scan
- Scan parameters
 - » 4 cm coverage per rotation
 - » 0.4 s rotation time
 - » Pitch 1.4 → 14 cm/s (140 cm → 10 sec)
 - » 200 mA → Effective mAs 100
 - » 5 mSv + (~ 14 mSv)



- 110 cm
- 7 sec scan
- 221 images @ 5 mm
- 14 sec recon time



Triage CT - survey - result

- Substitutes – chest + pelvic x-rays + ultrasound
- Geared to answer the same questions + head status
- Airways
 - » Injury? Airway threat?
 - » Correctly intubated?
- Breathing
 - » Pneumothorax, hemothorax, hemothorax, diaphragm
- Circulation – source of bleeding to stop
 - » Thorax, abdomen, retroperitoneum (pelvic tx)
- Disability – BRAIN STATUS
 - » Unique information of standard evaluation
 - » Intracranial hematoma to evacuate
 - » Immense value in the intubated/unconscious patient

Discussion

- CT suite & ER combined
- Only critically injured, i.e. circulatory unstable patients
 - » Don't tie up the scanner
 - » Don't waste radiation
 - Additional radiation (+ 1/3)
- Limited amount of patients
 - » Karolinska trauma center
 - 1 - 2 patients/week

Discussion

- Only critically injured & circulatory unstable patients
- Secure the total trauma work-up
 - » Equipment localization (ER/CT)
 - » Logistics
 - Two pathways – unstable / stable
 - » Too few / too many critical patients - problem

Discussion

- Only critically injured & circulatory unstable patients
- Secure the total trauma work-up
- Part of the future
 - » Challenges the traditional ATLS routine
 - » Needs to be implemented with the whole trauma team

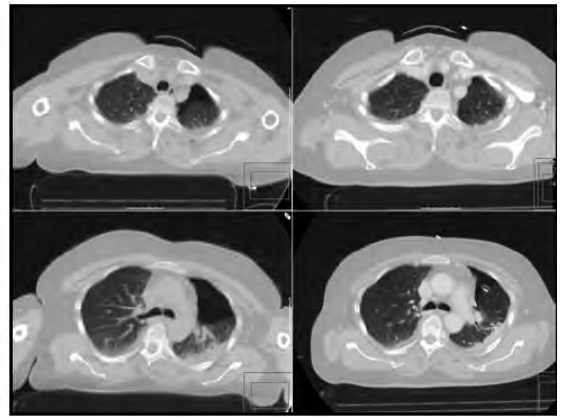
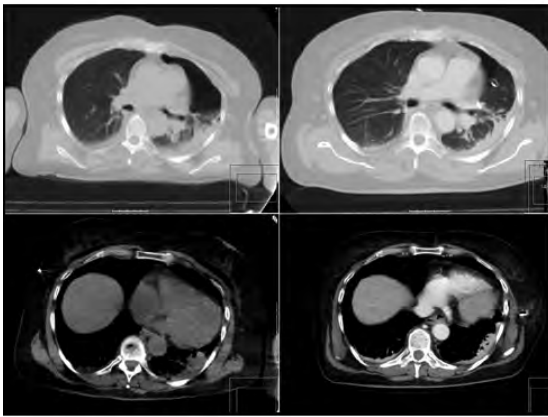
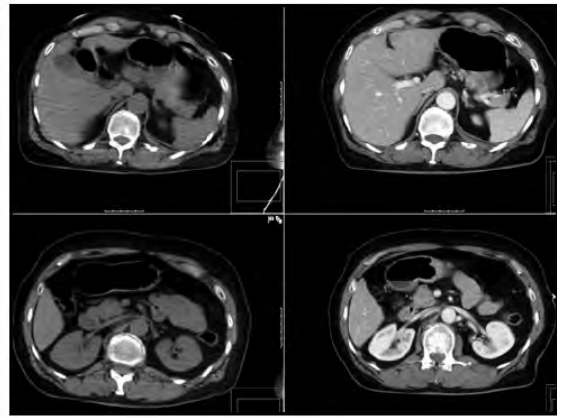
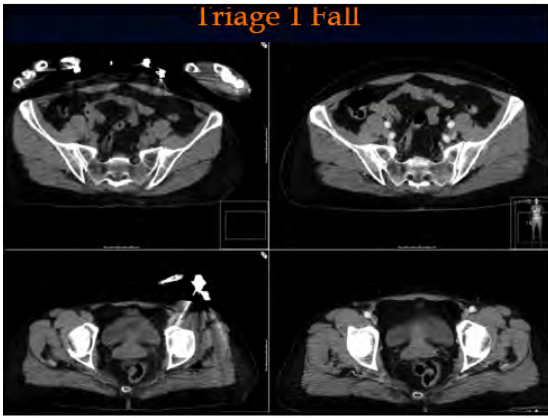
Pilot @ Karolinska

- Trauma Center in Karolinska Solna
- Start November 2007
- Outline
 - » Identifying logistic problems
 - » Secure routines
 - » Define criteria for patient selection
- Goal
 - » Detect bleeding source & treat critical injuries faster

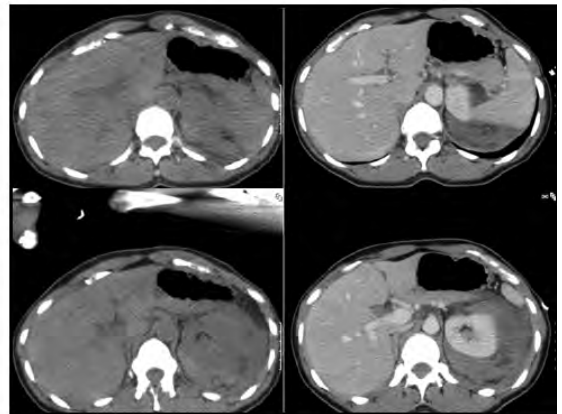
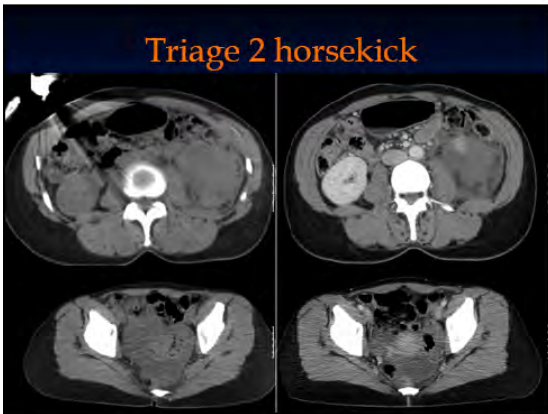
Pilot @ Karolinska

- Inclusion criterias
 - » Single patient arrival
 - » Blunt trauma
 - » Secured airway
 - » Systolic BP < 90 mm Hg and/or HR >120
 - » At the discretion of the trauma leader
- Back to the trauma room

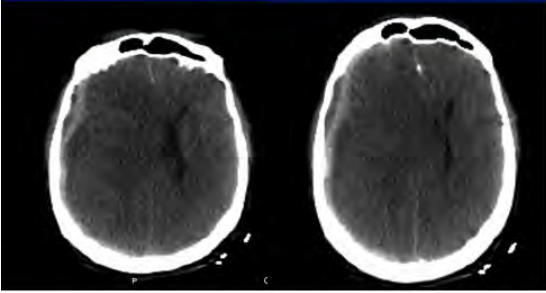
Triage 1 Fall



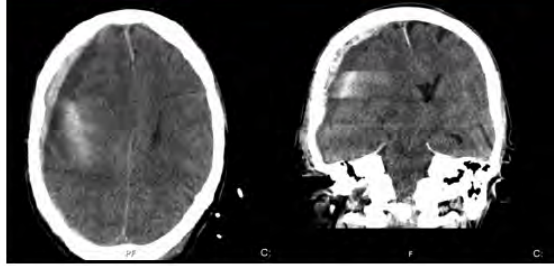
Triage 2 horsekick



Triage 2,5 GCS 4



Hyperacute sdh



Solna pilot timing

- Standard:
 - » ambulance trolley
 - trauma trolley
 - = 2 min
- Triage CT:
 - » ambulance trolley
 - triage CT
 - trauma trolley
 - = 4.5 min



Summary

- 64 channel MDCT
 - » offers new possibilities
- Work in progress
 - » Emergency room CT resource
 - » **Triage CT** - Non-contrast scan as primary survey



Summary

- 64 channel MDCT
 - » offers new possibilities
- Work in progress
 - » Emergency room CT resource
 - » Non-contrast fast scan as 1st survey
 - » 90 seconds from trolley to diagnosed bleeding source
- ER + CT suite joint resource organization
- ONLY circulatory unstable patients
 - » Injured by blunt trauma
- Clinical resus & work-up on CT-table
 - » Still unstable → OR / angio-embolization
 - » Stabilized → Rescan with i.v. contrast

