



RADIOLOGY IN MEDICAL EMERGENCIES

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What is emergency?

Emergency is a situation which poses an immediate risk to health.

Algorithms

- ▣ *A finite sequence* to solve a problem
- ▣ ...to be able to do „everything“ within the „golden-one-our“.
- ▣ ...because with the mortality with massive abdominal bleeding increases by 0.35% in every second

Levels of treatment in emergencies

▣ *Acute/reanimation*

3 hrs

▣ Primer

1-2. day

▣ Secunder

3-6. day

▣ Tercier

from 7. day

The phases of acute level

▣ „Alfa” → the first minute
ABC

▣ „Bravo” → the first 5 minutes
circulation

▣ „Charlie” → the first 30 minutes
diagnostise life-threatening
diseases, begin adequate therapy

CXR

Imaging modalities

OK, BUT WHICH?

The emergency room

One-stop-shopping

Which modality?

- ▣ Conventional x-rays
- ▣ Ultrasound
- ▣ CT – Whole body CT
- ▣ MRI

Emergency imaging



Emergencies in trauma

▣ Conscious patient

1. can be questioned
2. able to get anamnesis

Modality depends on what we want to examine

▣ Unconscious patient

1. Most important questions:
 - Is there a spinal cord injury?
 - Is there an intracranial hemorrhage?
 - Is there internal abdominal or chest bleeding?

Choose that modality which has the strongest diagnostic value in the shortest time

Spinal injuries

- ▣ Conventional x-rays are made most often
- ▣ BUT: spinal cord injuries exist without abnormalities on x-rays (SCIWORA)
- ▣ CT, MRI


Spinal injuries – mechanisms

- ▣ Flexion
- ▣ Extension
- ▣ Rotational
- ▣ Compressional
- ▣ „Shear“

Spinal injuries – questions

- ▣ Stable or instabile?
- ▣ Is there a spinal cord injury or not?

Principles to choose a modality in spinal injuries

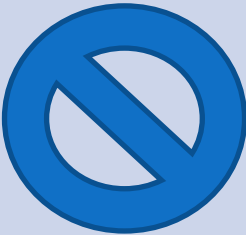
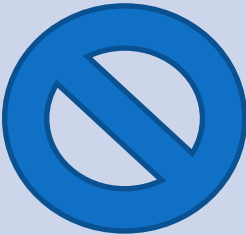
X-ray	US	CT	MRI
<ul style="list-style-type: none"> •Bones - fractures •Pathological soft tissue densities •At least in two direction! •SCIWORA! 		<ul style="list-style-type: none"> •To see more accurately the pathologies •3D reconstructions •Other structures 	<ul style="list-style-type: none"> •To rule out spinal cord injuries •SCIWORA!

Head injuries

Head injuries

- ▣ Is there an intracranial bleeding?
- ▣ Is there a fracture?
 - Intracranial complications
 - Dislocations -
 - Orbital herniations - reconstructions


Principles to choose a modality in head injuries

X-ray	US	CT	MRI
<ul style="list-style-type: none">•Bones•Abnormal soft tissue or air densities•At least two in directions!		<ul style="list-style-type: none">•Rule out intracranial bleeding (without CM)•+CM angio•Bones, fractures	

Injuries of the chest


- ▣ Injuries of the chest wall
rib fractures
- ▣ Rupture of the diaphragm
- ▣ Ruptures of the esophagus
- ▣ PTX, hemothorax
- ▣ Tamponade
- ▣ Rupture of the aorta

Principles to choose a modality in chest injuries

X-ray	US	CT	MRI
<ul style="list-style-type: none"> •Cardiopulmonal status •PTX •Pleural fluid •Status of the mediastinum •Rupture of the diaphragm •Contusion •„Radiodens“ Foreign bodies •Bones 	<ul style="list-style-type: none"> •Pleural fluid •Pericardial fluid 	<ul style="list-style-type: none"> •Without CM: plural, pericardial fluid, contusion, fractures, radiopaque FBs, localization of these •+CM angio 	

Abdominal and pelvic injuries

Principles to choose a modality in abdominal and pelvic injuries

X-ray	US	CT	MRI
<ul style="list-style-type: none"> •Free air •Abnormal soft tissue densities •Radiopaque FBs •Bones •+CM 	<ul style="list-style-type: none"> •Free fluid •Rupture of parenchymal organs •Injuries of vessels •(Free air) 	<ul style="list-style-type: none"> •Without CM: free air, fluid, ruptures(?), bones, sugárfogó radiopaque FBs and location of these •+CM: angio, ruptures, injuries of ureters, and bladder •Bones 	

Injuries of the musculoskeletal system

Fractures







- ▣ Where is the fracture?
- ▣ What type of fracture is this?
- ▣ Location of the fragments.
- ▣ Is a joint affected?
- ▣ Complette or incomplette?

Principles to choose a modality in the musculoskeletal system


X-ray	US	CT	MRI
<ul style="list-style-type: none">•Bones – fractures•2 directions!•Abnormal soft tissue densities	<ul style="list-style-type: none">•Soft tissues•Joints•Vessels	<ul style="list-style-type: none">•Bony structures - accurately•+CM angio	<ul style="list-style-type: none">•Soft tissues•Ligament injuries

NON TRAUMATIC EMERGENCIES

Headache

- ▣ Stroke 
- ▣ Sinusthrombosis (sinus cavernosus!) 
- ▣ Trigeminus neuralgia
- ▣ Ophthalmological causes
- ▣ Sinusitis 
- ▣ Complicated otitis 
- ▣ Infections 
- ▣ Hydrocephalus 

Principles to choose a modality in DD of headache

X-ray	US	CT	MRI
<ul style="list-style-type: none"> •Bones •Abnormal soft tissue densities •Air •Niveau-s •2 DIRECTIONS! 		<ul style="list-style-type: none"> •Without CM: to rule out bleeding and herniations •+CM angio •Bony structures 	<ul style="list-style-type: none"> •Stroke •Infections •Tumors

Chest pain

▣ Frequent causes

Acute myocardial infarct



Oesophagitis

Pneumonia

Pneumothorax



Pulmonary embolism



Chest pain

▣ Rare causes

Dissection of aorta



Cholecystitis

Herpes zoster

Rupture of esophagus (Boerhaave sy.)




Pancreatitis



Compressional fractures of vertebrae

Principles to choose a modality in DD of chest pain

X-ray	US	CT	MRI
<ul style="list-style-type: none">•Cardiopulmonal status•PTX•Fluid•Pneumomediastinum•+CM	<ul style="list-style-type: none">•Pleural, pericardial fluid	<ul style="list-style-type: none">•All that of x-ray, but much more accurately•+CM angio•Bony structures	

Abdominal pain

Principles to choose a modality in DD of abdominal pain

X-ray	US	CT
<ul style="list-style-type: none"> •Free air •Abnormal distension •Niveau •Abnormal soft tissue densities •Abnormal calcifications •Sziluet-tünet •Radiopaque FBs •+CM 	<ul style="list-style-type: none"> •Solid - fluid •Free fluid •Niveau •(free air) •ColorDoppler 	<p><u>Without CM</u></p> <ul style="list-style-type: none"> •All before, except infos from vessels • Sensitivity↑ •Loaclisation! •Signs of inflammations <p><u>+CM</u></p> <ul style="list-style-type: none"> •AAA leakage, rupture •Vasc. informations

The most important things, once again

Algorithms

Team work

Whole-body CT

One-STOP-shopping



Modality