

Multitraume

Billeddiagnostisk udredning

Strategi for modtagelse af patienten

1

Hvorfor skal vi som radiologer beskæftige os med begrebet "multitraume", - vi lærer i forvejen om alle de enkelte organsystemer, - er det ikke godt nok????

2

Gennemgang af billeddiagnostik i forbindelse med modtagelsen af svært kvæstede eller "potentielt svært kvæstede".



Den 17. august 1896 blev en 36 år gammel kvinde, Bridget Driscoll, dræbt ved påkørsel af en bil, som den første i historien.

Føreren, Arthur Edsell, blev fundet skyldig i "uagtsomt manddrab".

Dommeren sagde han håbede
"such a thing would never happen again".



10 Leading Causes of Death by Age Group, United States - 2010

Rank	Age Groups										Total
	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	
1	Congenital Anomalies 5,107	Unintentional Injury 1,394	Unintentional Injury 758	Unintentional Injury 885	Unintentional Injury 12,341	Unintentional Injury 14,573	Unintentional Injury 14,792	Malignant Neoplasms 50,211	Malignant Neoplasms 109,501	Heart Disease 477,338	Heart Disease 597,689
2	Short Gestation 4,148	Congenital Anomalies 507	Malignant Neoplasms 439	Malignant Neoplasms 477	Homicide 4,678	Suicide 5,735	Malignant Neoplasms 11,809	Heart Disease 36,729	Heart Disease 68,077	Malignant Neoplasms 396,670	Malignant Neoplasms 574,743
3	SIDS 2,063	Homicide 385	Congenital Anomalies 163	Suicide 267	Suicide 4,600	Homicide 4,258	Heart Disease 10,594	Unintentional Injury 19,667	Chronic Low Respiratory Disease 14,242	Chronic Low Respiratory Disease 118,031	Chronic Low Respiratory Disease 138,080
4	Maternal Pregnancy Comp. 1,561	Malignant Neoplasms 346	Homicide 111	Homicide 150	Malignant Neoplasms 1,604	Malignant Neoplasms 3,619	Suicide 6,571	Suicide 8,799	Unintentional Injury 14,023	Cerebrovascular 109,990	Cerebrovascular 129,476
5	Unintentional Injury 1,110	Heart Disease 159	Heart Disease 68	Congenital Anomalies 135	Heart Disease 1,028	Heart Disease 3,222	Homicide 2,473	Liver Disease 8,651	Diabetes Mellitus 11,677	Alzheimer's Disease 82,616	Unintentional Injury 120,859
6	Placenta Cord, Membranes 1,030	Influenza & Pneumonia 91	Chronic Low Respiratory Disease 60	Heart Disease 117	Congenital Anomalies 412	HIV 741	Liver Disease 2,423	Cerebrovascular 5,910	Cerebrovascular 10,693	Diabetes Mellitus 49,191	Alzheimer's Disease 83,494
7	Bacterial Sepsis 583	Septicemia 62	Cerebrovascular 47	Chronic Low Respiratory Disease 73	Cerebrovascular 190	Diabetes Mellitus 606	Cerebrovascular 1,904	Diabetes Mellitus 5,610	Liver Disease 9,764	Influenza & Pneumonia 42,846	Diabetes Mellitus 69,071
8	Respiratory Distress 514	Benign Neoplasms 59	Benign Neoplasms 37	Benign Neoplasms 45	Influenza & Pneumonia 181	Cerebrovascular 517	HIV 1,898	Chronic Low Respiratory Disease 4,452	Suicide 6,384	Nephritis 41,994	Nephritis 50,476
9	Circulatory System Disease 507	Perinatal Period 52	Influenza & Pneumonia 37	Cerebrovascular 43	Diabetes Mellitus 165	Liver Disease 487	Diabetes Mellitus 1,789	HIV 3,123	Nephritis 5,082	Unintentional Injury 41,300	Influenza & Pneumonia 50,097
10	Necrotizing Enterocolitis 472	Chronic Low Respiratory Disease 51	Septicemia 32	Septicemia 35	Complicated Pregnancy 163	Congenital Anomalies 397	Influenza & Pneumonia 773	Viral Hepatitis 2,376	Septicemia 4,604	Septicemia 26,310	Suicide 38,364

Data Source: National Vital Statistics System, National Center for Health Statistics, CDC.

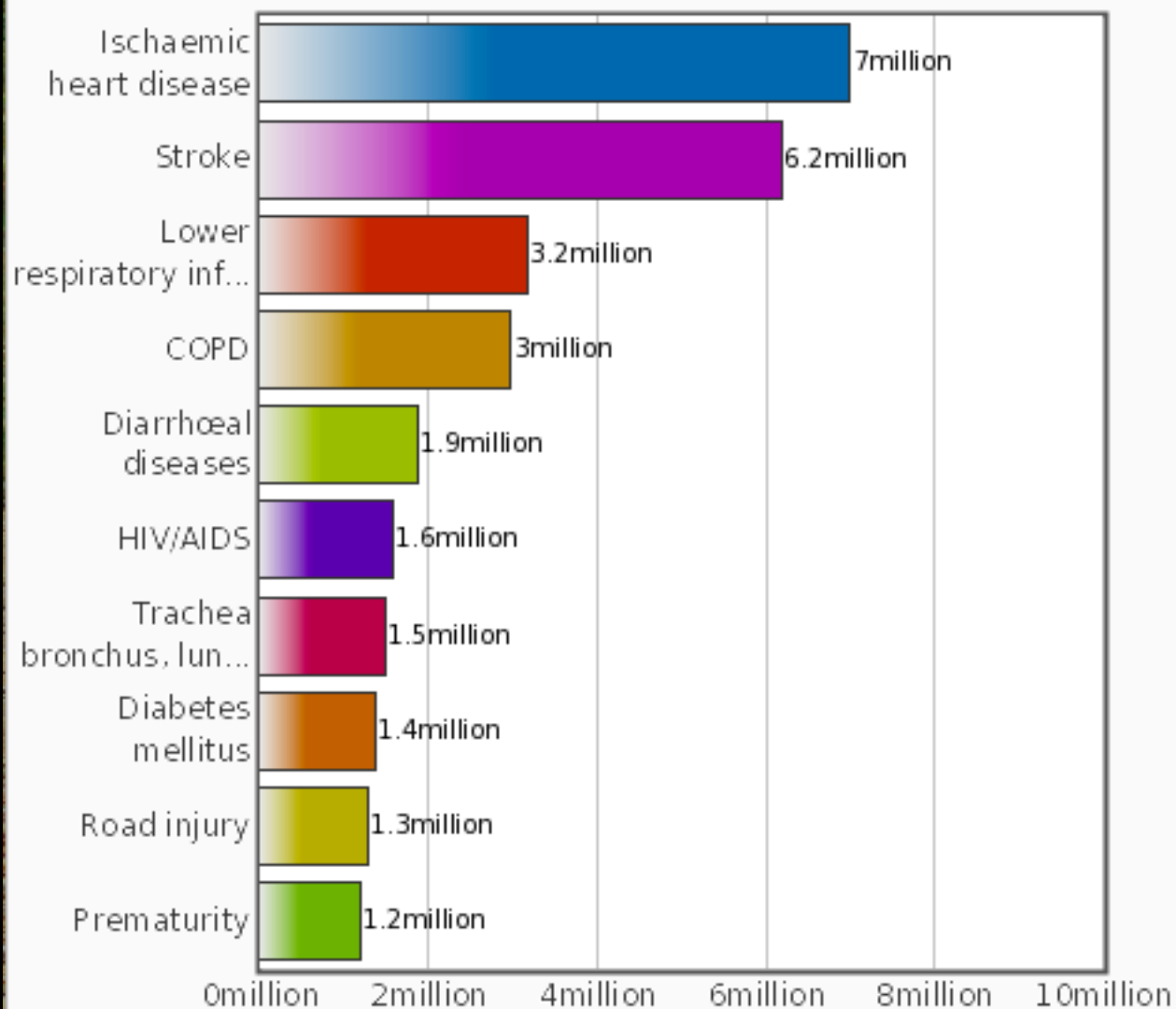
Produced by: Office of Statistics and Programming, National Center for Injury Prevention and Control, CDC using WISQARS™.



Center for Disease Control and Prevention
National Center for Injury Prevention and Control

The 10 leading causes of death in the world

2011



- **Trafikulykker**



- **Fald fra højde**

- **Vold**

- **Arbejdsulykker**

CT scanning af multitraume patienten

- *Er "State of the art" billeddiagnostisk udredningen af denne patientgruppe.*
- CT Cerebrum og ansigtsskelet.
- CT Columna cervicalis
- CT Thorax-abd-bækken

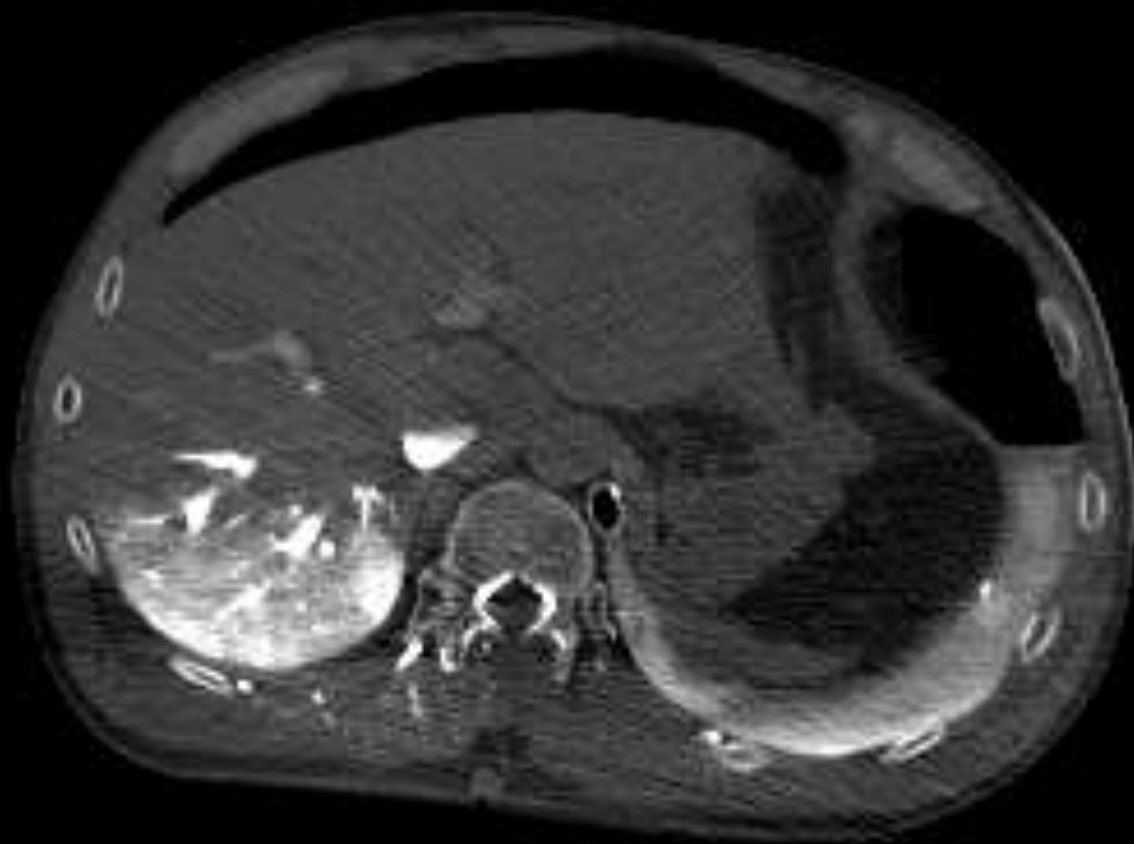
MEN:.....

Den vigtigste udfordring er at vælge "de rigtige patienter" til denne undersøgelse:

Hvem skal scannes?

Hvem skal noget andet?

R



P

C1 238
W1 790

Det er det her vi skal undgå

R

P

CI 238
WI 790



strategi for modtagelse og planlægningen af udredningen af de multitraumatiserede patienter

Hvordan finder vi ud af hvem der
skal hvad??

I Februar 1976 faldt en amerikansk orthopædkirurg ned med sit lille privatfly i Nebraska.

Hans kone blev dræbt på stedet.

Han selv og hans tre børn blev bragt ind til et lille hospital, hvor de modtog en fuldstændig usystematisk og insufficient behandling.

Det inspirerede ham til at udvikle **ATLS** uddannelsen

Advanced

Trauma

Life

Support





Mere end 1 million læger i mere end 50 lande uddannet i
ATLS principperne:

**Diagnostik og behandling udføres
systematisk efter skadens potentielle
dødelighed.**

"ABCDE"-prioritering

A

AIRWAY

B

BREATHING

C

CIRCULATION

D

DISABILITY (neurology).

E

EXPOSURE/ENVIROMENTAL CONTROL.

"ABCDE"-prioritering

A

AIRWAY

B

BREATHING



Røntgen af thorax

C

CIRCULATION

D

DISABILITY (neurology).

E

EXPOSURE/ENVIROMENTAL CONTROL.

"ABCDE"-prioritering

A

AIRWAY

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Røntgen af thorax



Røntgen af bækken.
FAST UI

"ABCDE"-prioritering

A

AIRWAY

B

BREATHING

C

CIRCULATION

D

DISABILITY (neurology).

E

EXPOSURE/ENVIROMENTAL CONTROL.

Røntgen af thorax

Røntgen af bækken.
FAST UI

CT



Hvad er det første, man skal tænke på hos denne patient med et autoværn gennem abdomen?



A= Airway, - så B, - så C...



1: Røntgen af thorax

- Hjerte og mediastinum
- Lungefelter
- Pleurae
- Diaphragma
- Costae og øvrige knogler
- Dræn og Tube



Breddeøget mediastinum.....

- "Aorta-ruptur" = "traumatisk aortaaneurysme"

Mistænkes ved

- 1: udslettet aortaknop
- 2: costafrakturet med lavt nr.
- 3: scapulafraktur
- 4: apical venstresidig pleural sløring
- 5: deviation af trachea til højre



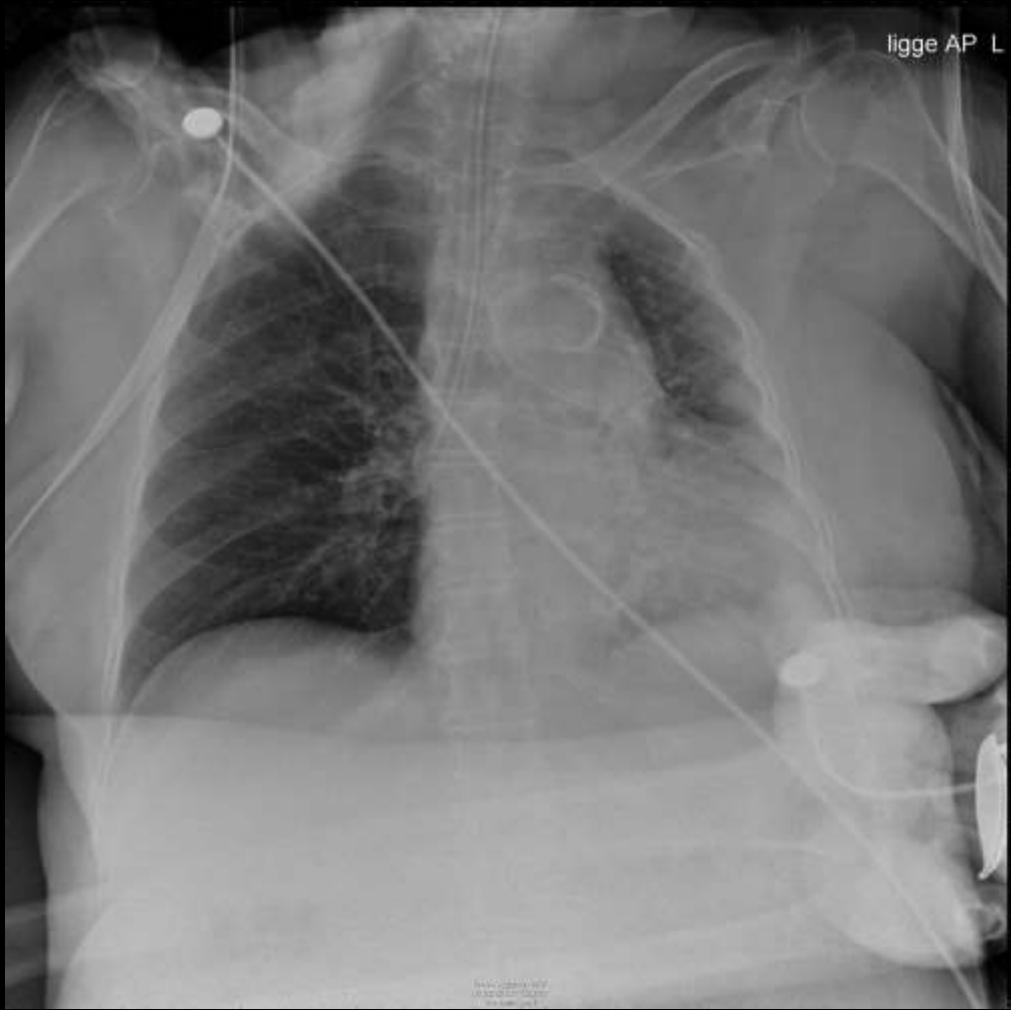
AP L



Johns Hopkins | 185
17.12.2015 (14:15:25)
Ward 100001

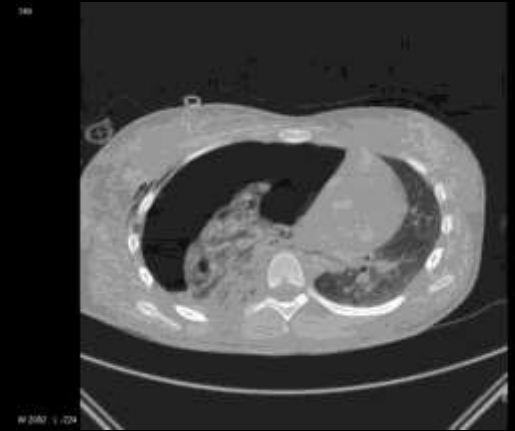
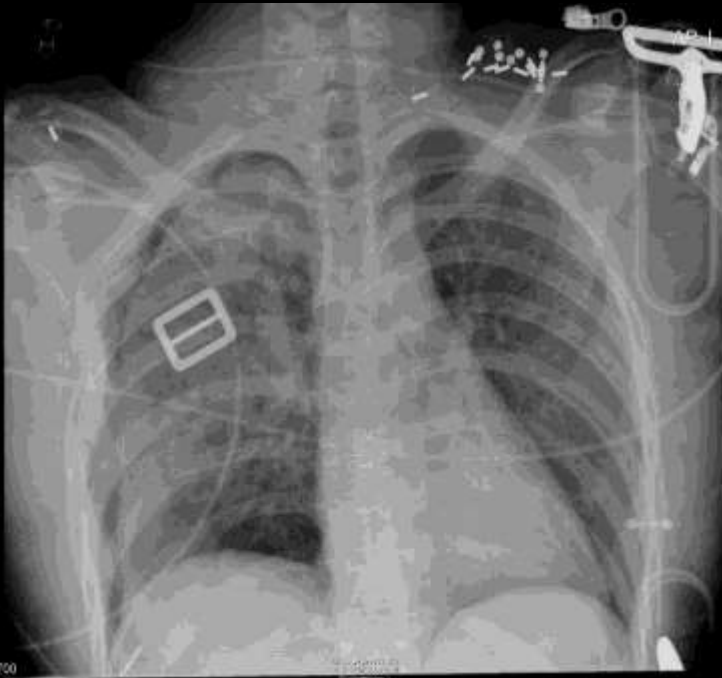






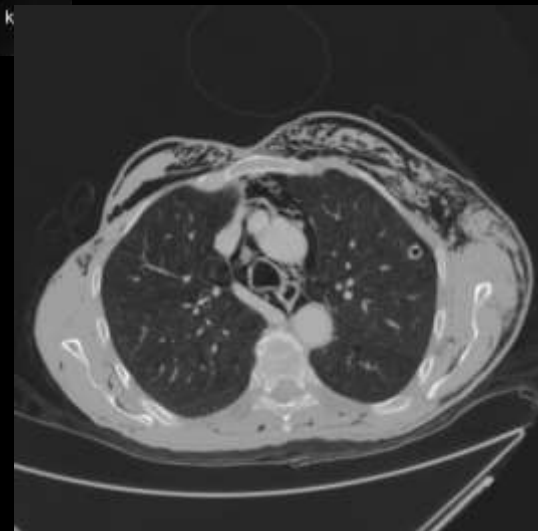
ligge AP L

Pneumothorax / trykpneumothorax







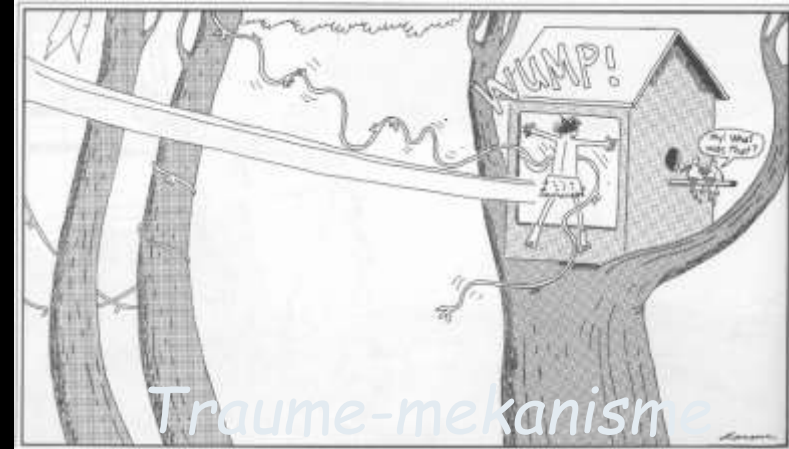


Røntgen af bækken

Bækkenfraktur kan medføre kraftig blødning

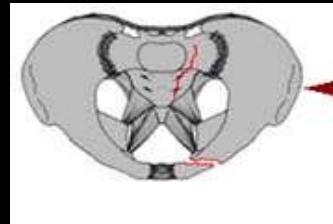
"C-problem"

Røntgen af bækken



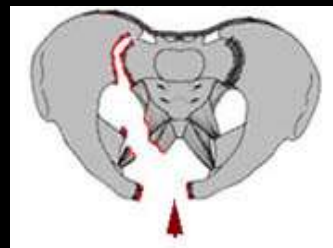
A

Lateral kompression



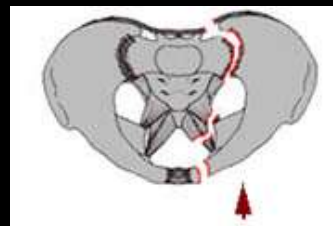
B

Anterior kompression

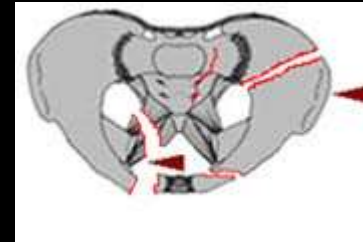
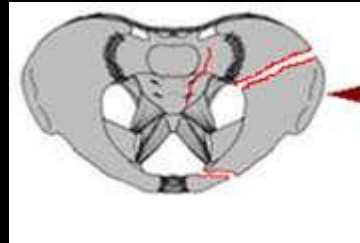
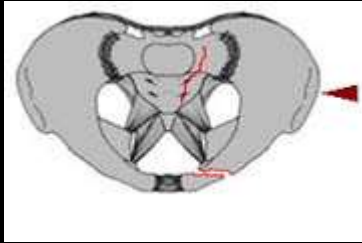


C

Vertical shear



lateral kompression

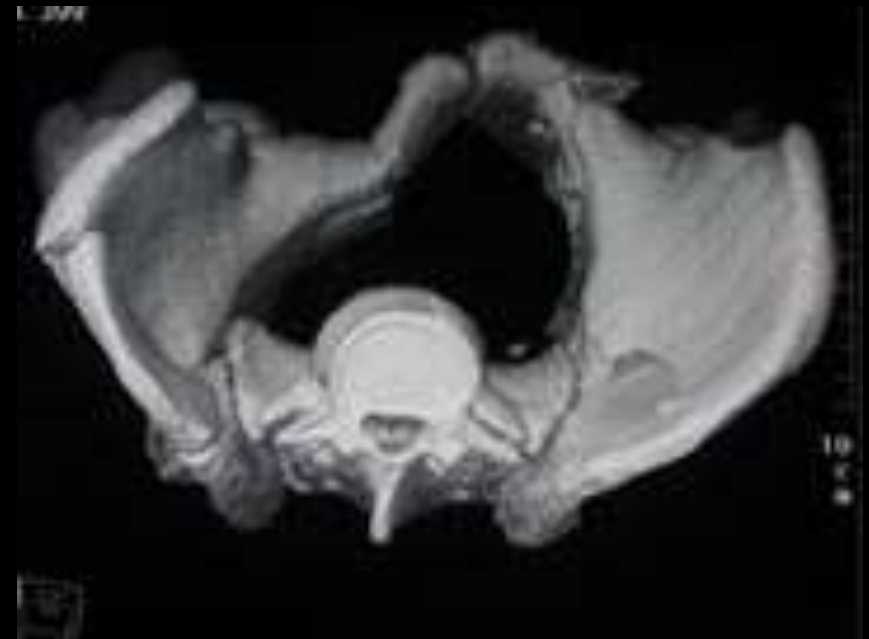


Hyppigste frakturmekanisme.

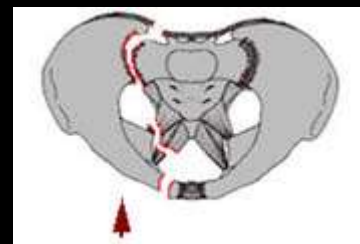
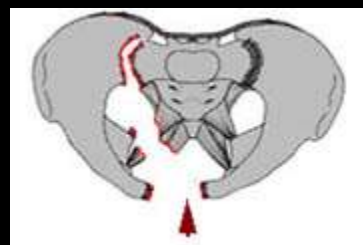
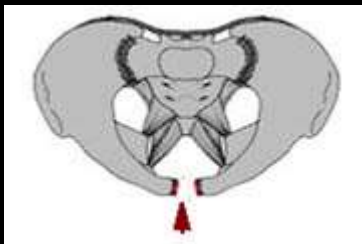
Giver risiko for skader på nedre urinveje.

Ligamentene omkring os sacrum er intakte så frakturen er stabil

Lateral kompression



Anterior kompression "Åben bog-fraktur"

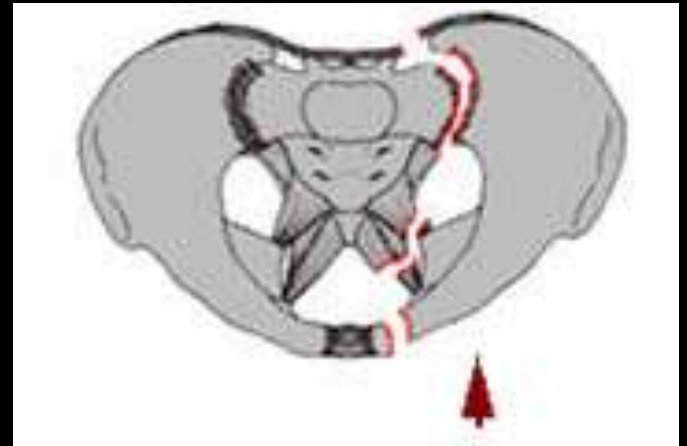


- Diastase ved symfysen og sacroiliacaled på den ene eller begge sider. Er de bageste ligamenter er gået er bækkenet ustabil. **Risiko for blødning.**



vertical shear

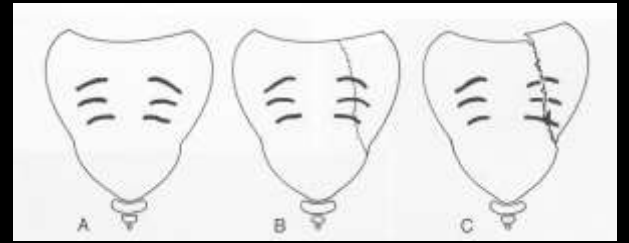
kraften transmitteres længdegående op via samme sides femur.



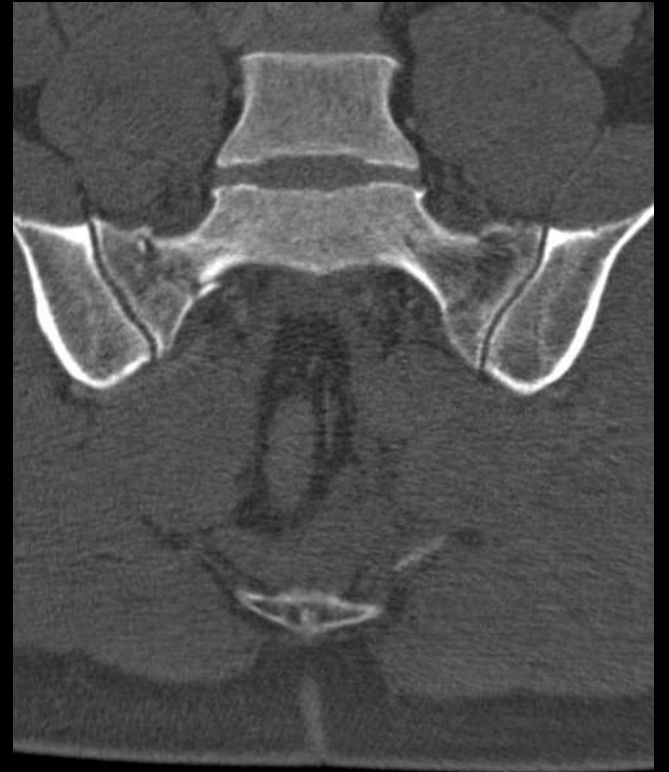
Denne fraktur er **både vertikalt og rotations ustabil**.

AP L











• FAST SCANNING

*Focused
Assessment with
Sonography for
Trauma*



- Anamnese
- Rtg thorax
- Rtg. Bækken
- Fast UL
- Hvad nu ??

VIDERE FORLØB



CT-SCANNING ?

ANGIOGRAFI ?

OPERATION ?

OVERFLYTTES ?

CT-scanning

(ingen tryk-ustabile patienter i CT-scanneren!!)

- Cerebrum.
- Ansigtsskelet
- Columna cervicalis
- Thorax-abdomen-bækken

Årsager til ustabilt blodtryk hos traumepatienter

- 1: Blødning

Årsager til ustabilt blodtryk hos traumepatienter

- 1: Blødning
- 2: Blødning

Årsager til ustabilt blodtryk hos traumepatienter

- 1: Blødning
- 2: Blødning
- 3: Blødning

Bevæggeartefakt



A

PHILIPS



20 cm

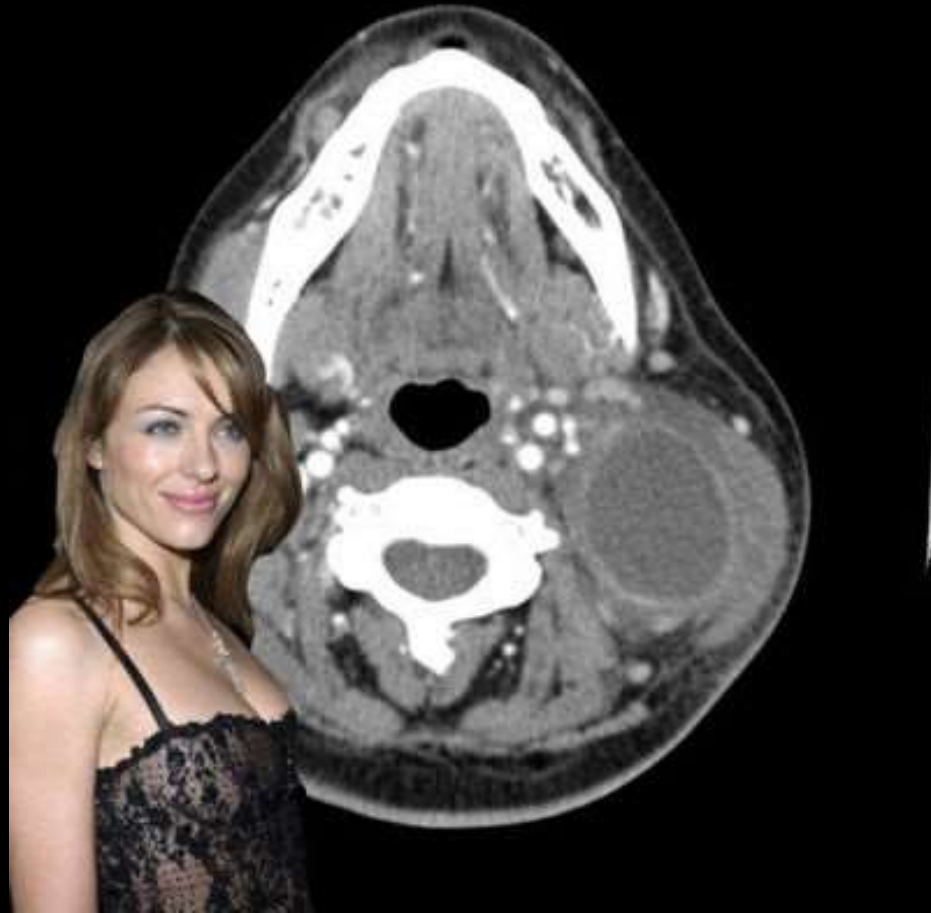
C1 652
W1 2174

Check-liste til gennemgang af CT-SCAN (Vigtigt at være systematisk!!!)

I.a	Patologi	Region/organ	Fund	NB!	Note
•	•	Intrakraniel blødning	<ul style="list-style-type: none"> • Epiduralt • Subduralt • Subarachnoidalt • Parenkym • Cerebralt ødem • Ventrikelpåvirkning 	• Midtlinie forskydning	
•	•	Kraniet	<u>Fraktur:</u> <ul style="list-style-type: none"> • Calvariet • Temporalregionen • Orbita • Øvrige ansigt 		
•	•	Columna cervicalis Niveau:	<ul style="list-style-type: none"> • Fraktur • Luksation 	• Ustabil	
•	•	Columna thoracalis Niveau:	<ul style="list-style-type: none"> • Fraktur • Luksation 	• Ustabil	
•	•	Columna lumbalis Niveau:	<ul style="list-style-type: none"> • Fraktur • Luksation 	• Ustabil	
•	•	Thorax	<ul style="list-style-type: none"> • Mediastinalblødning • Hæmopericardium • Lungekontusion • Pneumothorax • Hæmothorax • Diafragmaruptur 	<u>Aorta:</u> <ul style="list-style-type: none"> • Dissektion • Aneurisme • Ruptur • Extravasation 	
•	•	T-tube Pleuradræn CVK Ventrikelsonde	_____ cm fra carina		

"Satisfaction of search" in radiology

- Beskriver det fænomen, hvor opdagelsen af eet radiologisk "fund" påvirker diagnostikken af andre "fund" i samme undersøgelse



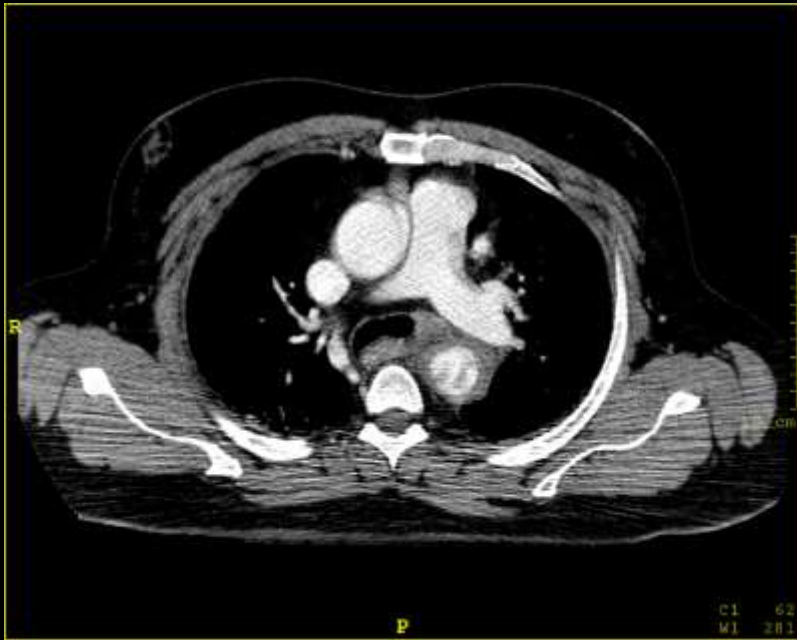
“The interpreter found [Elizabeth Hurley](#) without difficulty but then terminated his search before finding the [branchial cleft cyst](#). “

- Original Article
- **Missed fractures resulting from satisfaction of search effect**
- [Kevin S. Berbaum](#), [Georges Y. El-Khoury](#), [Edmund A. Franken](#), [David M. Kuehn](#), [David M. Meis](#), [Donald D. Dorfman](#), [Niall G. Warnock](#), [Brad H. Thompson](#), [Simon C. S. Kao](#) and [Mary H. Kathol](#)

Aorta

- Ca. 15 % af alle trafik-dødsfald skyldes læsion af thoracale aorta.
- Læsionen sidder oftest lige efter arcus, hvor aorta er fast fixeret, - arcus er relativt mobil.
- Læsionen kan give en udrift i aortas væg, og danne et svagt sted, hvilket medfører en pseudoaneurysmedannelse.
- *"semi-elektiv" operation.....(husk det ved pt. der skal overflyttes til behandling, - udred for evt. andre skader).*

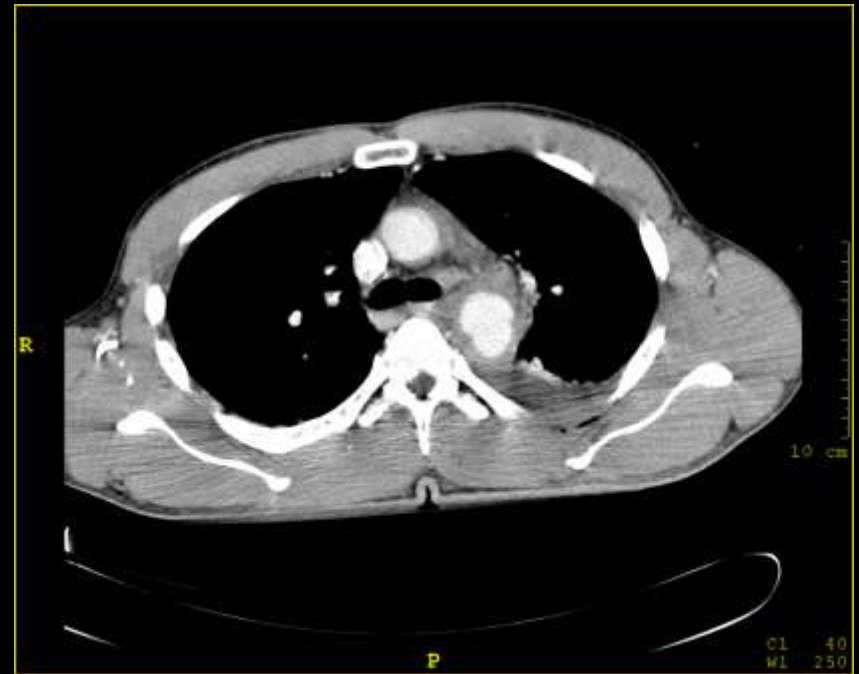
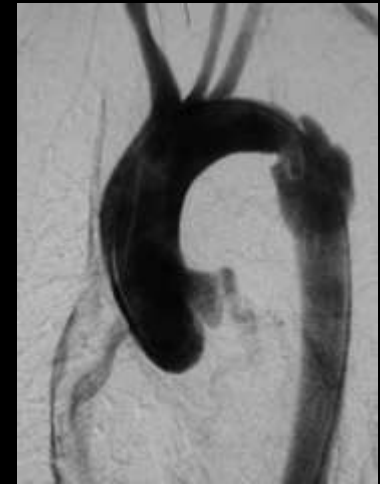
aortalæsion



normal



Aorta-læsion



Aorta-læsion



PHILIPS



PHILIPS



PHILIPS

normal

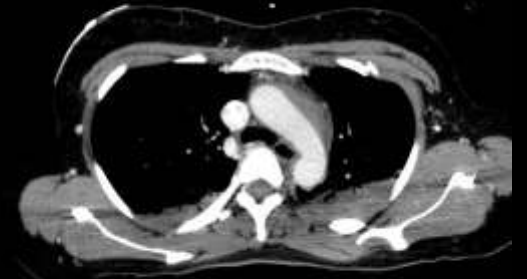
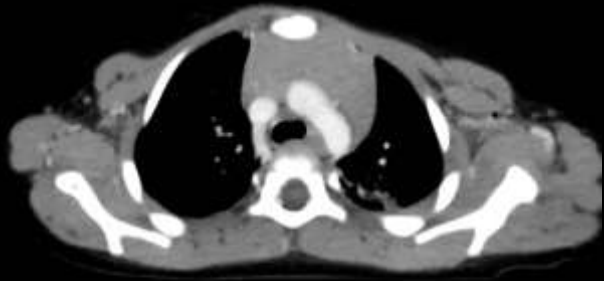


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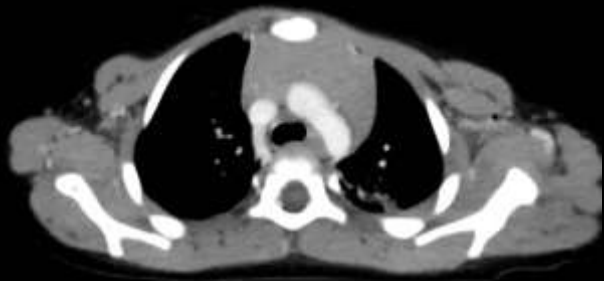


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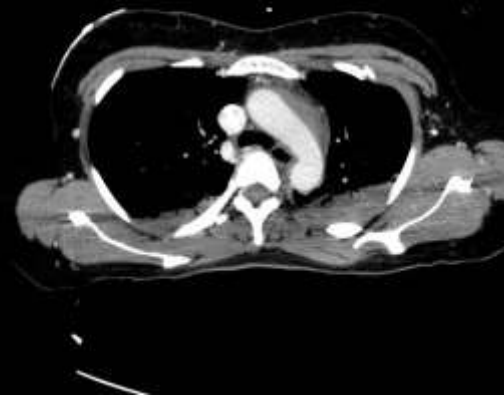




thymus



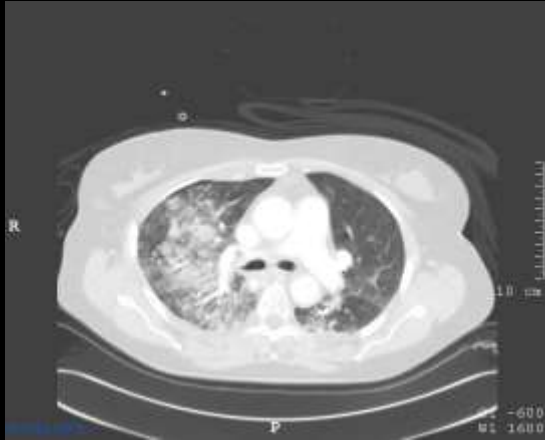
Mediastinalt hæmatom



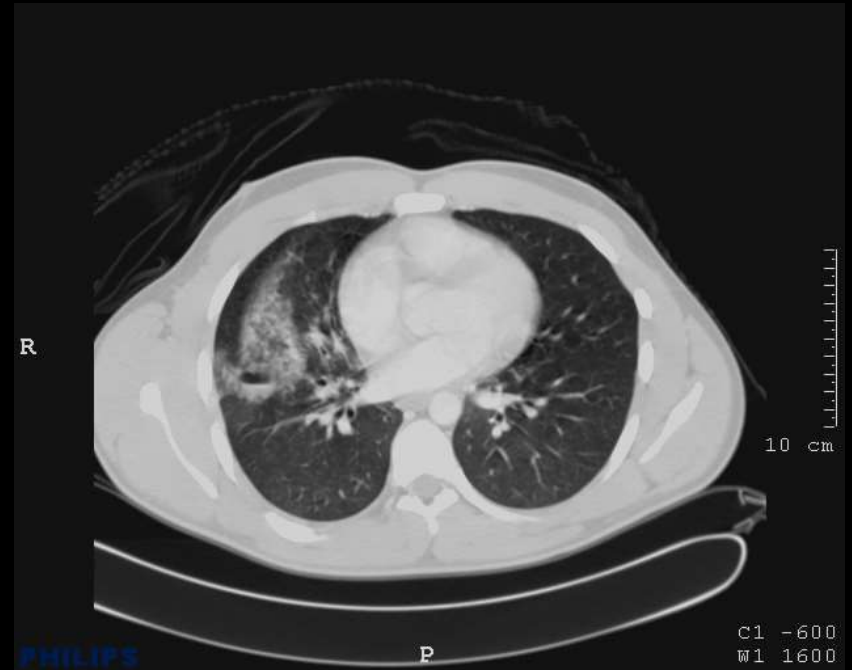
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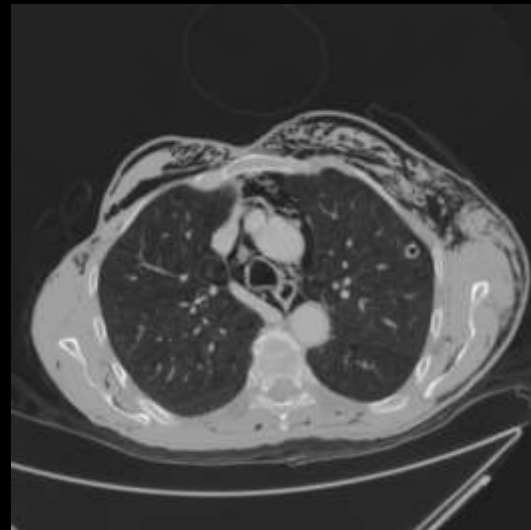
Lungekontusion

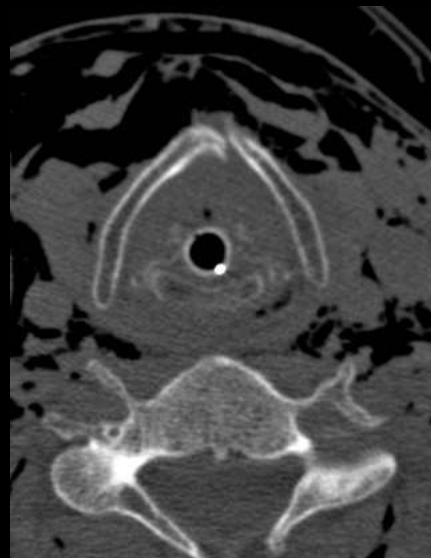
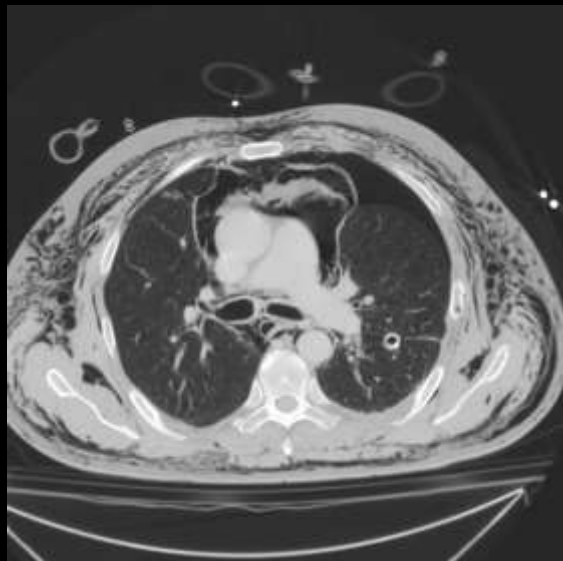
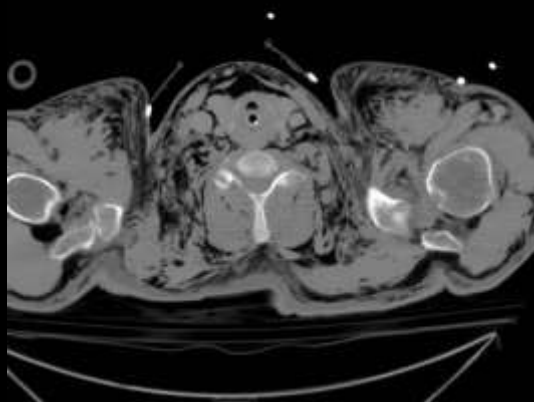


Lunge-laceration



Trachea eller bronchie læsion



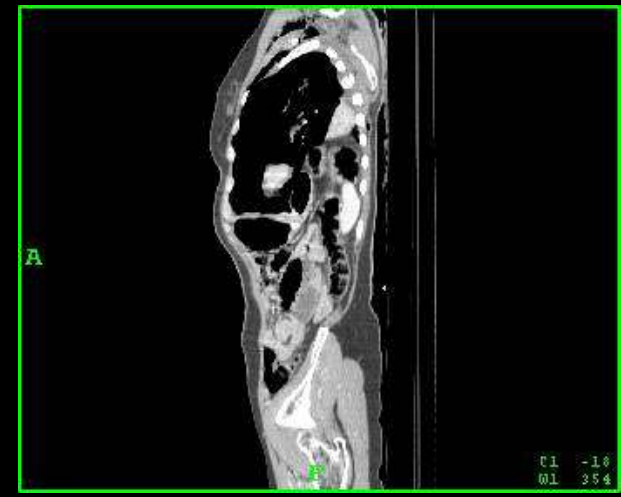
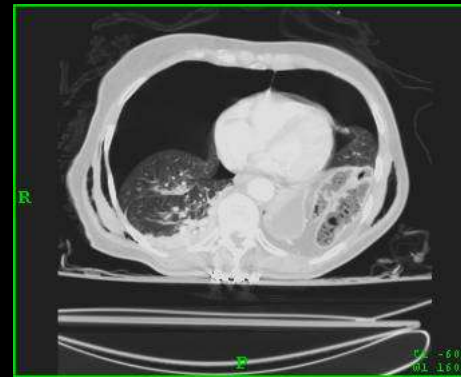


Diaphragma-ruptur

Overses ofte!

Efter stumpe abdominal-traumer

95% er venstresidige.



Leverlæsion m. extravasation



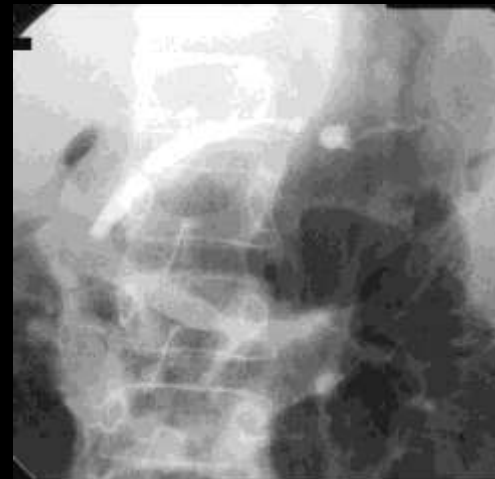
Milttraume med ekstravasation



Pancreas-læsion.



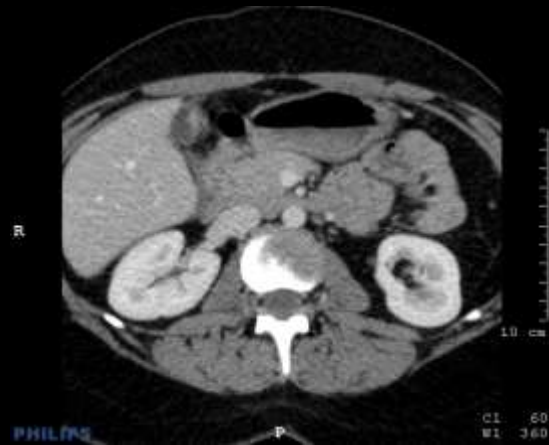
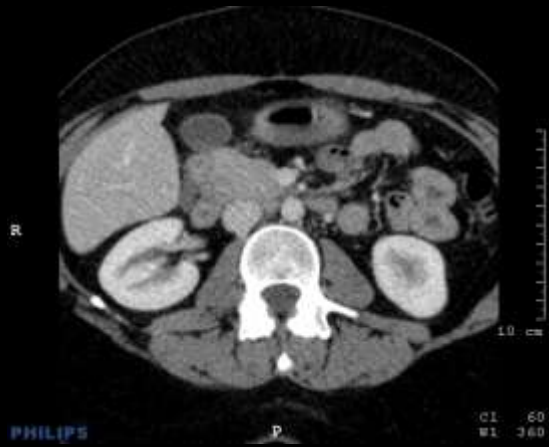
E
R
C
P



primært

Efter 3 mdr

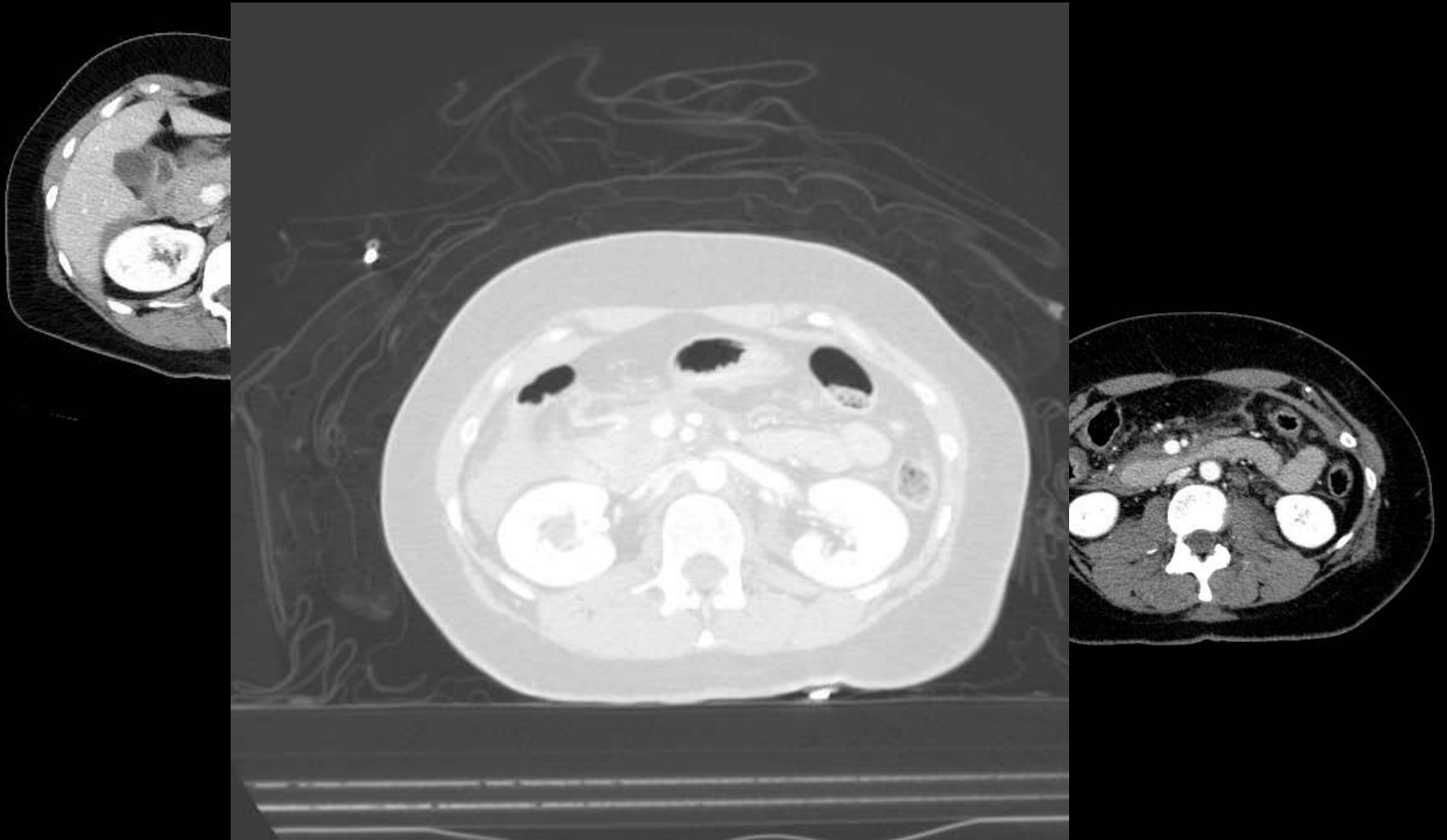
Duodenum



Duodenum



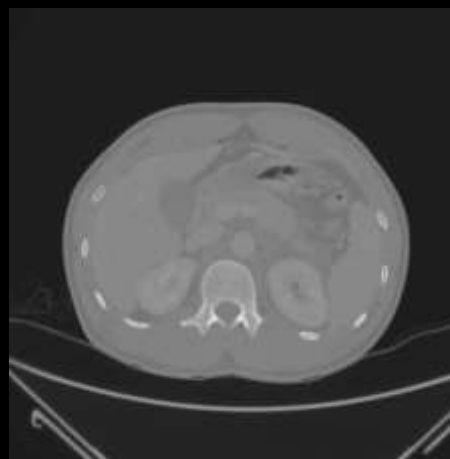
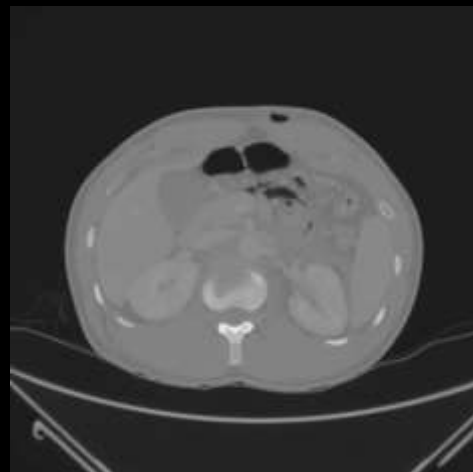
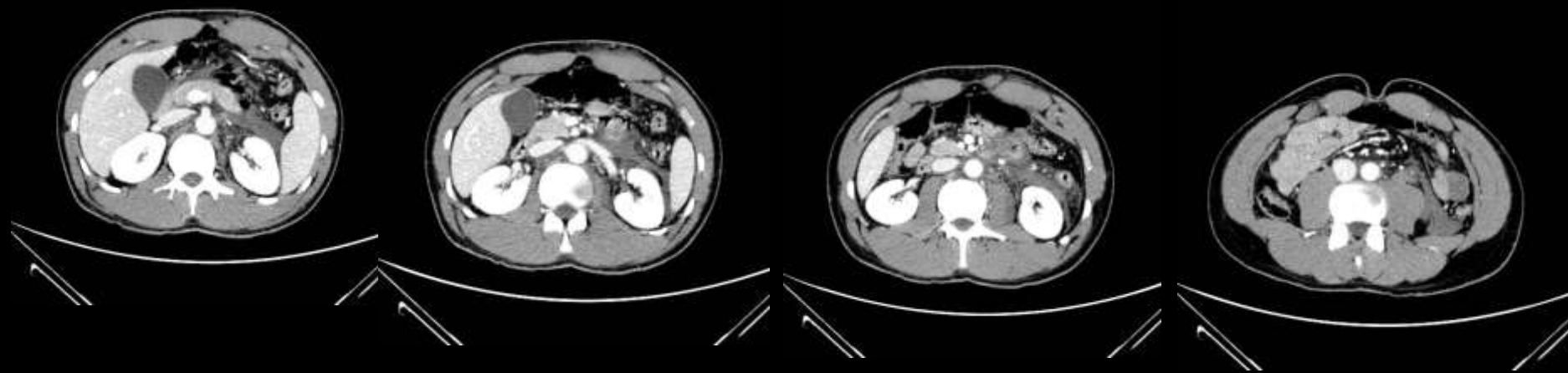
Duodenum



Duodenum, - læsion??



Duodenum, - cykelstyr i maven



Nyrelæsion med arteriel blødning



Uroplani

- **1min** efter iv-kontrast

- **10 min** efter i.v.-kontrast



Tegn på tarmlæsion

- 1:pneumoperitoneum
- 2:fri væske som ikke kan forklares af andre læsioner
- 3:direkte synlig læsion.
- 4:fortykket eller luftholdig tarmvæg.
- 5:"trekantede hæmatomer"

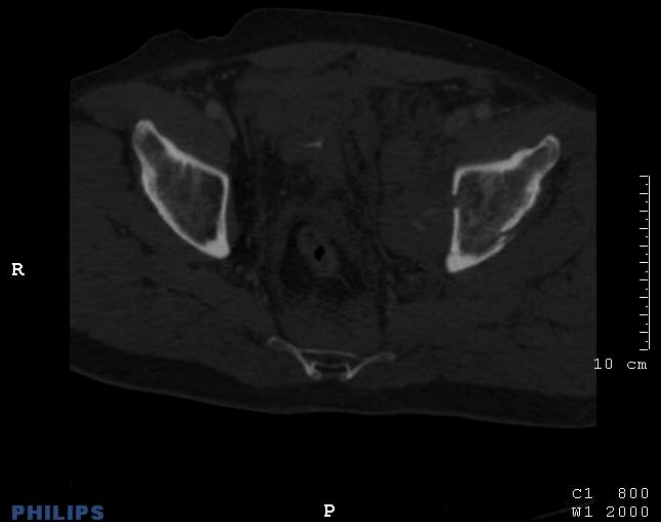
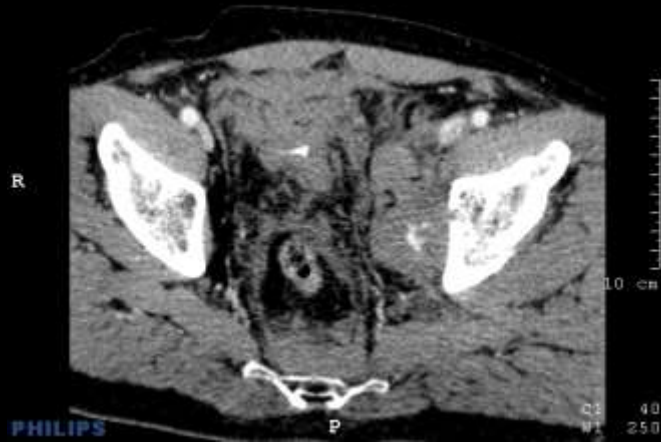
**Ved tvivl:
gentag scanning**

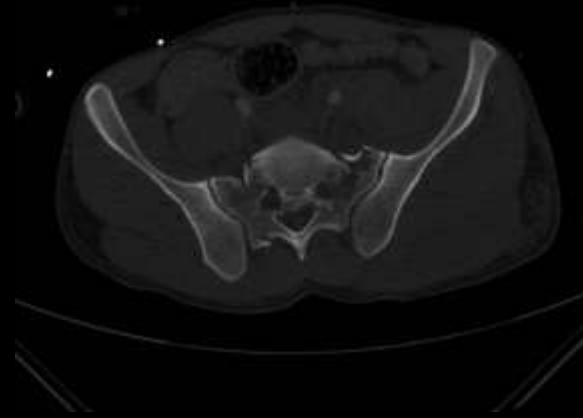


Tarmlæsion



Bækkenfraktur med ekstravasation



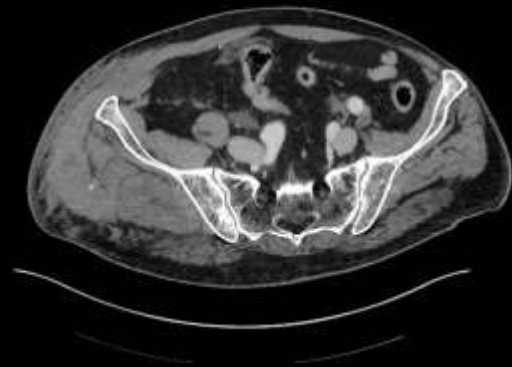






Ekstravasation fra bløddelslæsion

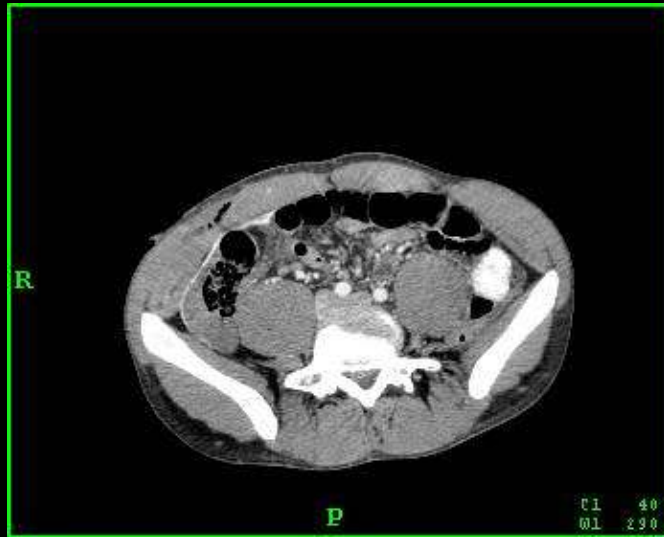




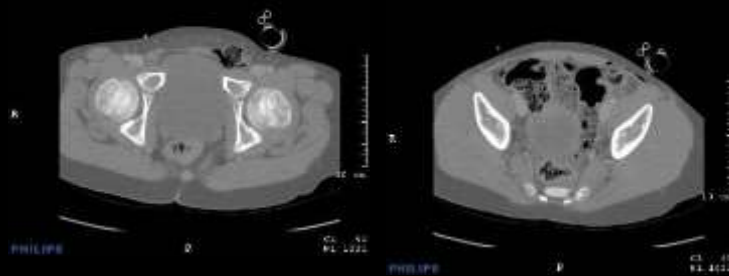
Penetrerende traumer (stik, skud o.lign)

- Generelt vanskeligt at forudsige læsionens omfang (stikdybde, kugle-retning..).
- Vær specielt opmærksom på evt. tarmskader.
- Specielt opmærksom på colon ved traume i flanke og ryg.

Knivstik



R



PHILIPS

D

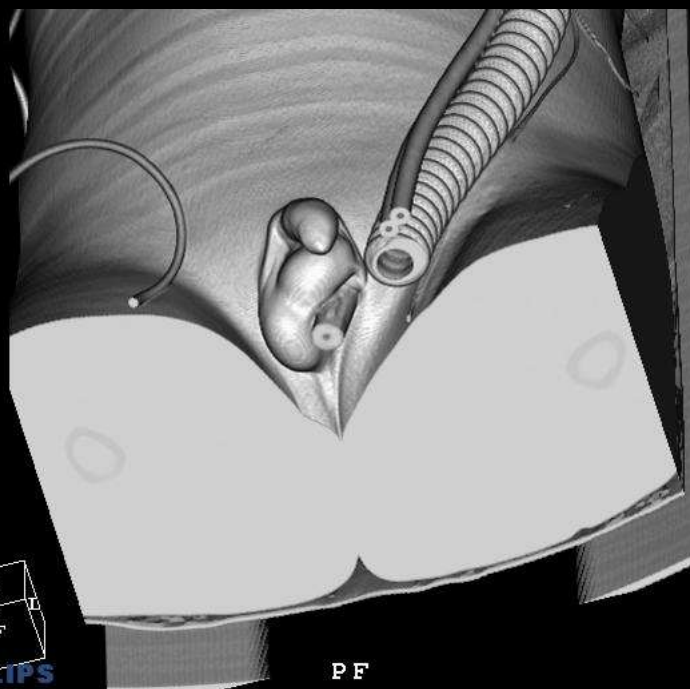
C1 40
W1 1031

PHILIPS

P

C1 40
W1 1031

R



PF

R



10 cm

PHILIPS

F

C1 40
W1 1031

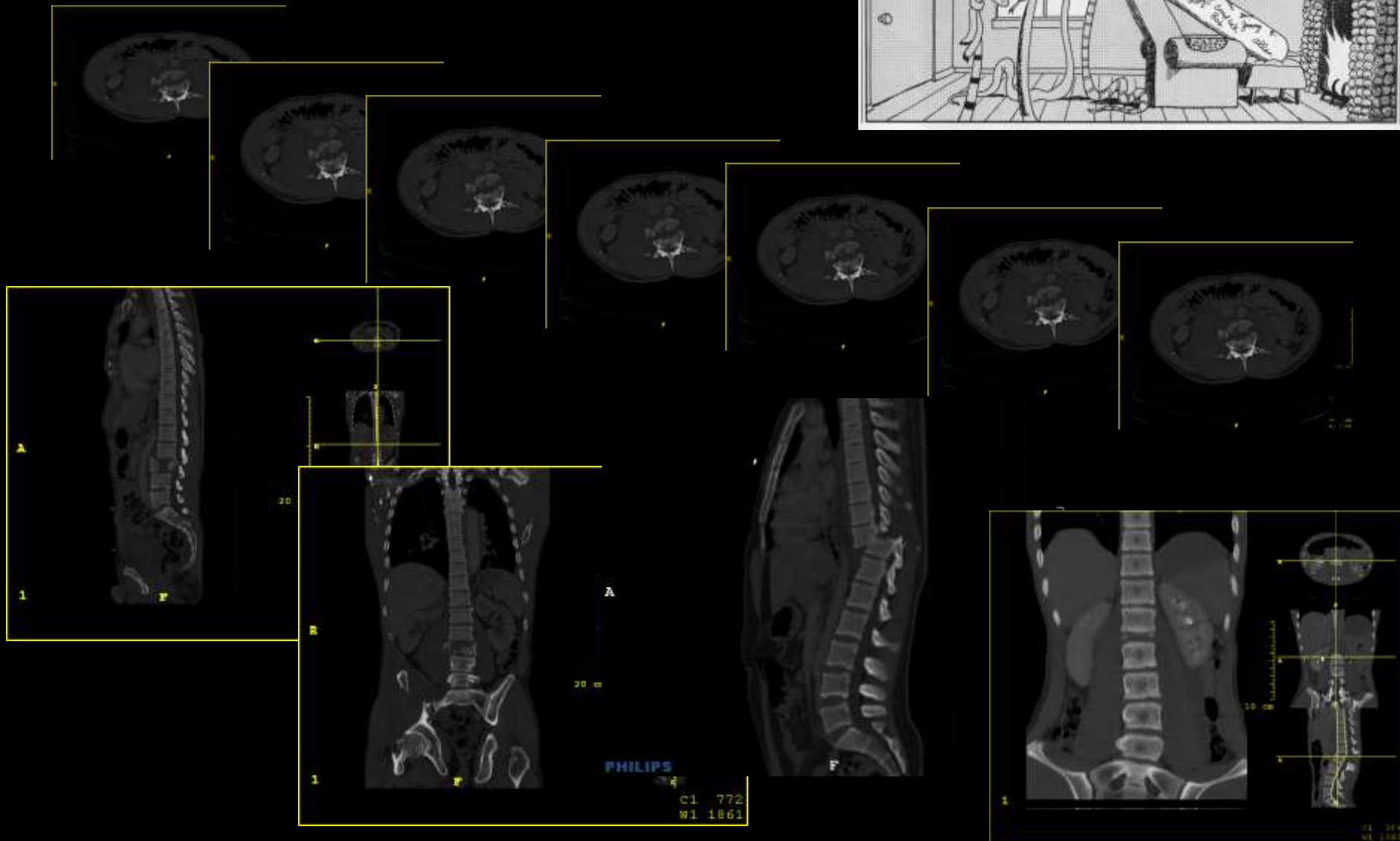
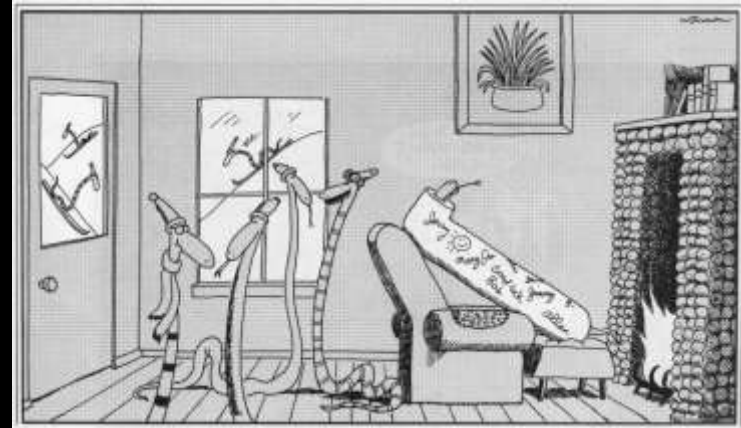


Gravide.

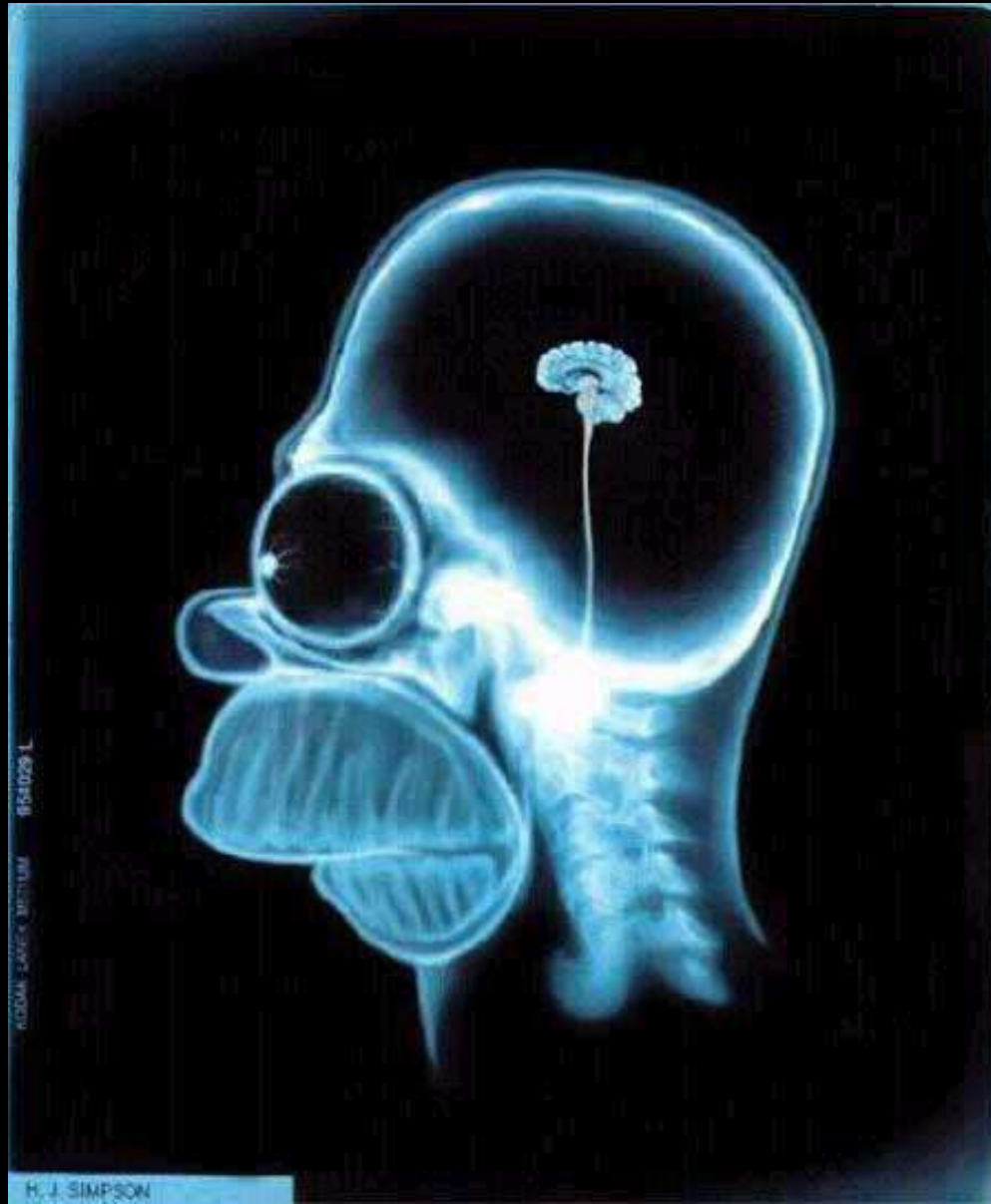
Generelt er den billeddiagnostiske udredning af en gravid multitraumatiseret kvinde ikke forskellig fra normalen, - indikationerne er de samme. (moderen "vigtigere" end barnet).



Columna-fraktur



?



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- www.nordictraumarad.com

- www.atls.dk

NORDICFORUM www.nordictraumarad.com
TRAUMA & EMERGENCY RADIOLOGY

"Take home"

- Tænk alfabetisk A-B-C-D-E.
- Kend traumemekanismen/klinikken.
- Vær systematisk i CT-gennemgangen.
- Kommunikation!!!!!!!!!!!!!!!!!!!!!!!!!!!!!! .

Case A-1



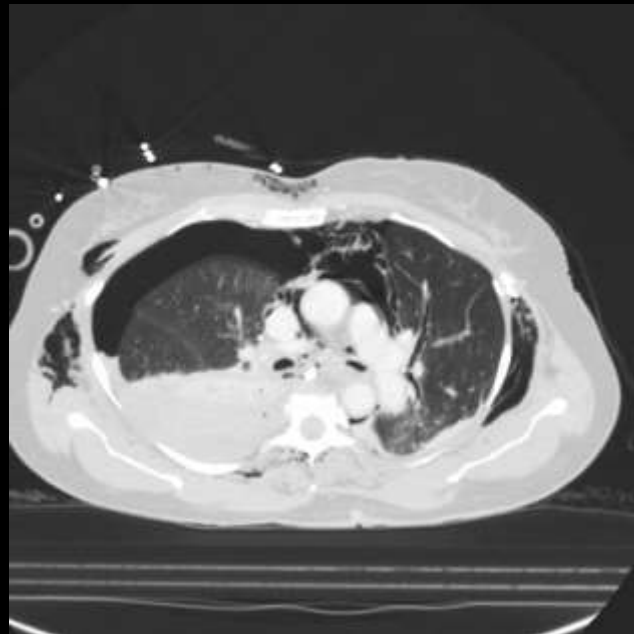
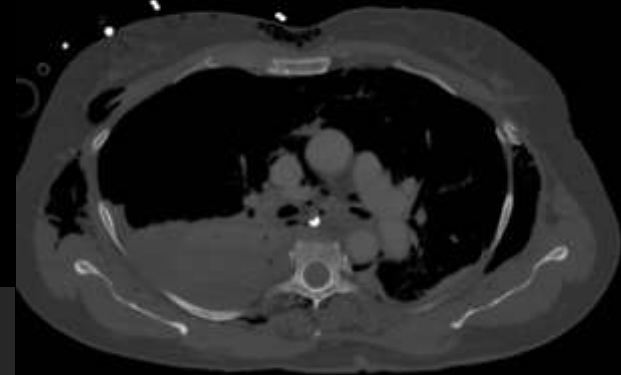
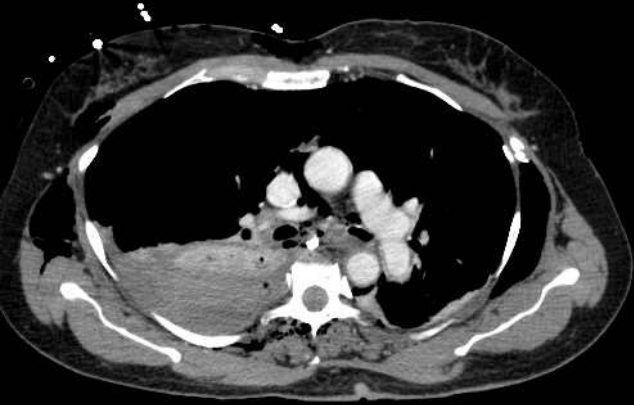
Case A-2



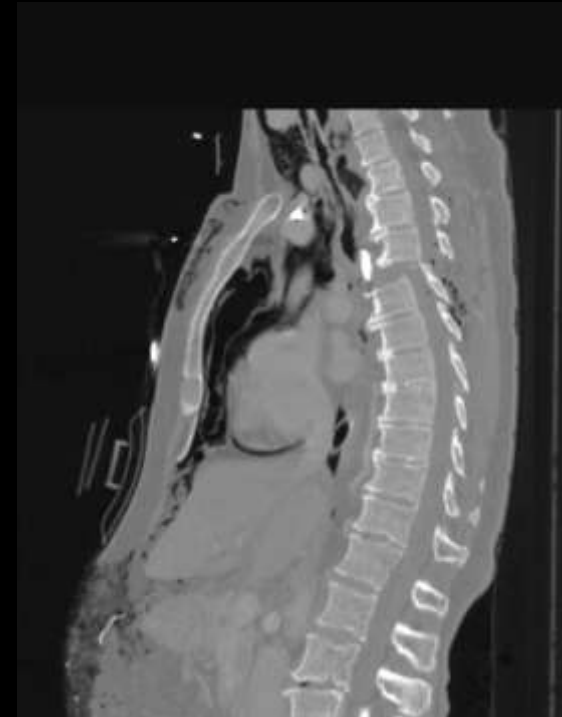
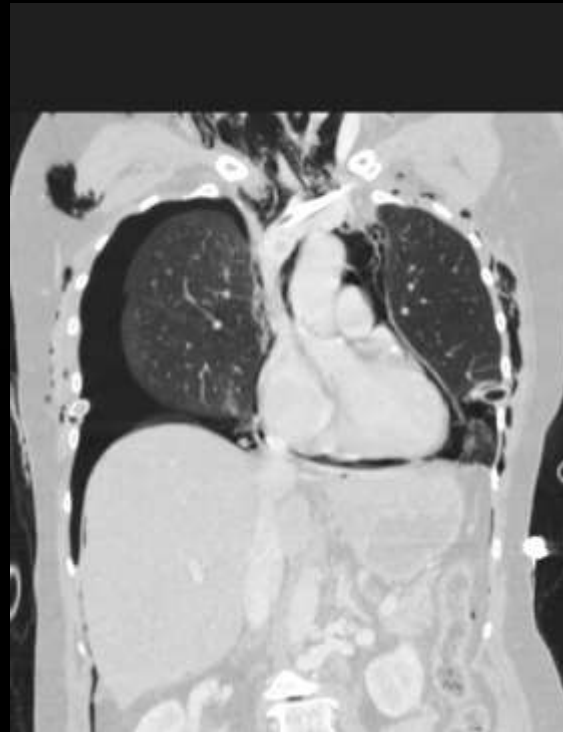
Case A-3



Case A-4



Case A-5



Case A-6





Case A-7

Case B-1



Case B-2

