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MIRACLE OF IMAGING: THE TRUTH IS OUT THERE!

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Garden of Knowledge and Virtue

Introduction

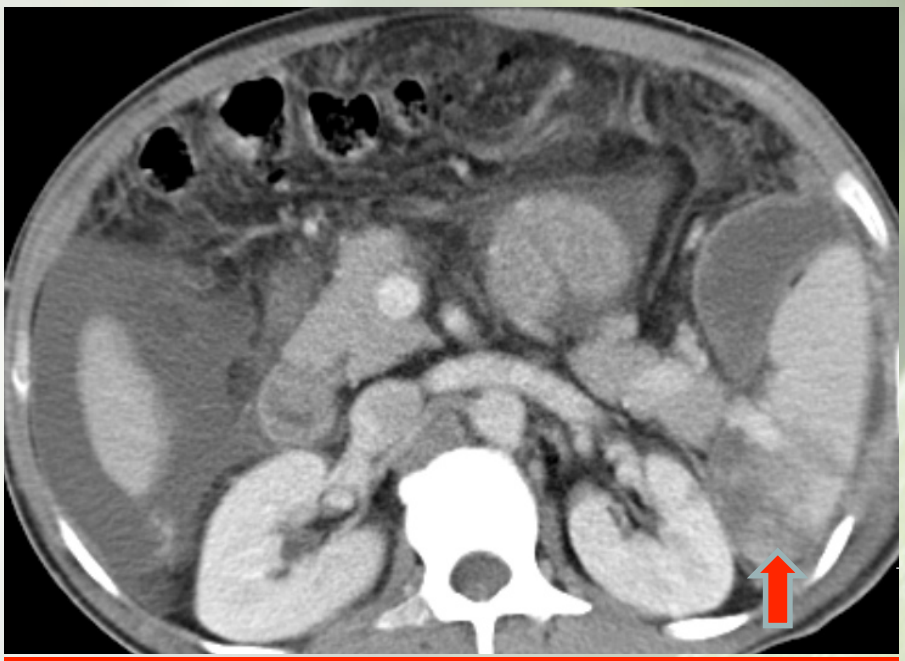
- Radiologists face daily challenges of analyzing and interpreting high volumes of images and expected to complete their report in a timely manner.
- Most of the time, appropriate diagnosis or differential diagnosis can be derived from cases with good clinical correlation.
- However, when the history or clinical presentation is unclear, radiologists shouldn't be misled and they play an important role to guide the clinicians towards an accurate diagnosis.
- Thus, it is important for the radiologist to be always meticulous in image assessment and interpretation for high quality diagnostic and patient care.

Methodology

- We retrospectively reviewed cases where discrepancies existed between the indication for the imaging with findings detected during these investigations.
- Brief clinical information, indication for radiological investigations and pictorial illustration are shown.
- The subsequent management or outcome of these cases are briefly described.

CASE 1

- 44-year-old male prisoner
- Hep B, Hep C, IVDU and alcoholic
- Abdominal pain for 4 days, no other associated symptom. Denies trauma or fall
- Clinically: abdomen was distended with generalized tenderness
- Blood investigations: liver enzymes deranged and low haemoglobin
- US abdomen: liver cirrhosis with massive ascites
- Diagnostic peritoneal tap revealed hemorrhagic peritoneal fluids.
- CT scan was requested to rule out ruptured hepatocellular carcinoma

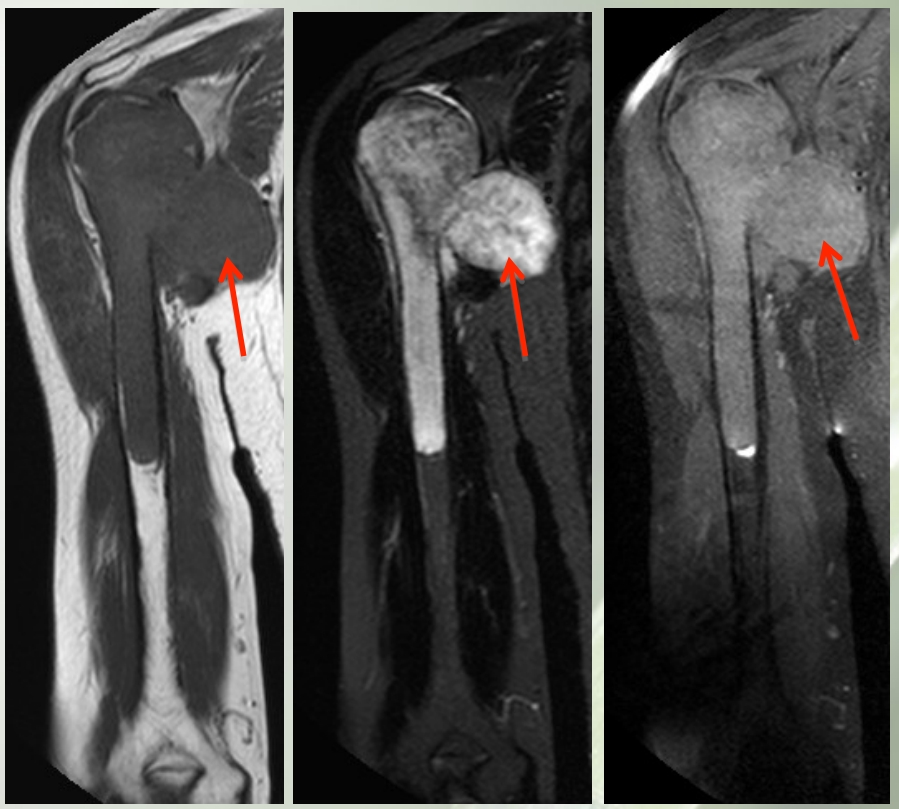


CECT of abdomen showed splenic lacerations (red arrow). Liver has nodular surfaces (images not shown) with no lesion within its parenchyma. There was massive peritoneal fluids (HU=25).

- Intra-operative findings confirmed the splenic lacerations and liver cirrhosis with 2.5 L haemoperitoneum consisted of old blood.
- ***Patient confessed of being kicked by an inmate only after CT scan findings.***

CASE 2

- 34-year old man, previously healthy and active in sport
- Right shoulder pain after a football match
- He was clinically diagnosed to have rotator cuff injury and treated conservatively for one year but no improvement
- MRI was requested for suspected supraspinatus tear in view for surgical intervention



MRI right upper limb. Coronal T1WI, T2WI & post Gadolinium, demonstrate a large lesion arising from the proximal humerus (arrow).

- Biopsy revealed this lesion as a Chondrosarcoma. Limb-sparing surgery was performed.
- He had multiple lung metastasis 2 years after the operation.

CASE 3

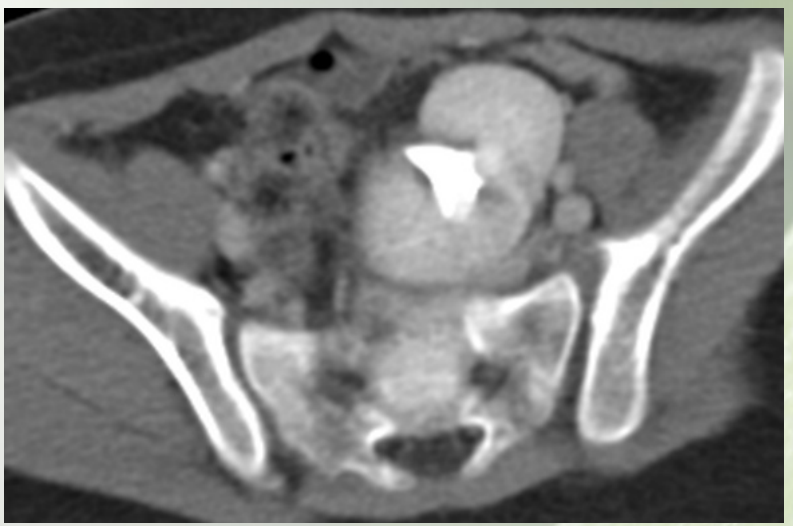
- 70-year-old man
- Multiple medical problems
- Had left BKA few years ago
- Sudden onset of right lower limb pain
- Clinically popliteal, dorsalis pedis and posterior tibialis arteries pulses were not palpable
- CTA was requested with clinical impression of acute limb ischaemia for urgent embolectomy

CTA of lower limb. Sagittal reformatted image shows a fusiform dilatation of the right popliteal artery (red arrow) measuring about 4x4x9 cm. This dilated vessel was not opacified by contrast suggestive of thrombosed aneurysm. The arteries distal to this were also not opacified by contrast.

He was referred to the Vascular Unit in Hospital Kuala Lumpur for further management. Below knee amputation was performed.

Case 4

- 4-year-old girl brought in by her mother, suspecting of sexually being abused as she complained of pain at genitalia region since last 3 weeks
- It was associated with per vaginal staining, recurrent dysuria with increased in frequencies
- Clinically she was well and hymen was intact
- US in O&G clinic detected suspicious lesion in the uterus
- CT scan was requested for assessment of this mass



Axial CECT showed the left kidney ectopically located in the pelvic cavity. No other mass was found and the uterus was normal.

A final diagnosis of a left pelvic kidney with urinary tract infection was made.

CASE 5

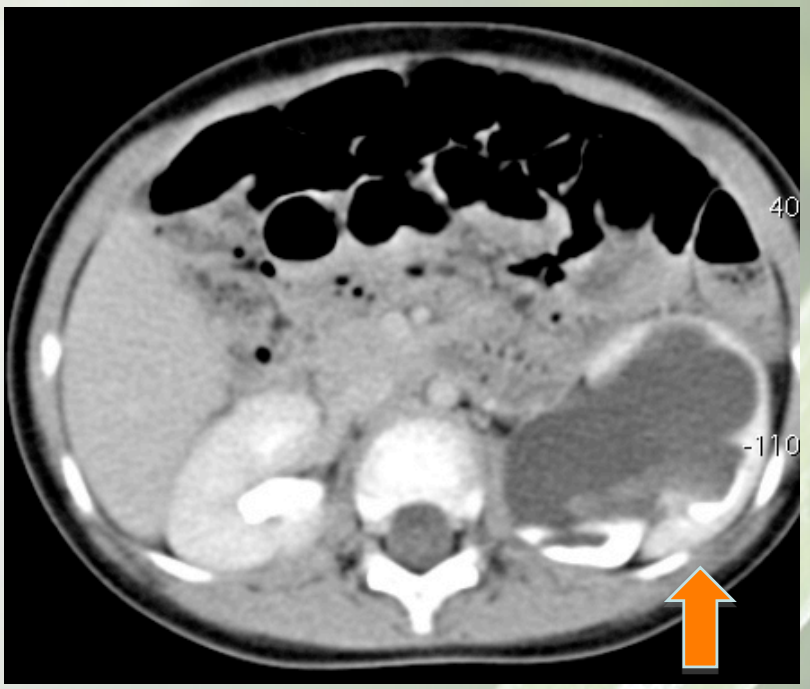
- 47-year-old man, involved in MVA
- Noted to have hematuria
- Clinically he was stable, abdomen was soft
- He also had fracture pubic ramus and fracture midshaft of left femur
- Urgent CT abdomen to rule out genitourinary tract injury

CT showed left kidney and part of bowel loops located high at the level of thoracic cavity but no features of injury to these structures. Left lung parenchyma was normal.
The high position of the bowel loop on the left side may suggest congenital anomaly rather than from injury. The managing team was informed and clinical correlation was suggested.

Diagnostic laparotomy was performed for a suspicion of traumatic diaphragmatic hernia. Intraoperative findings : intact left hemidiaphragm, normal hiatus opening with no hernia, presence of contused sigmoid colon and an ectopic left kidney.

CASE 6

- 3-year-old girl, who was previously well
- Presented with hematuria after fall from staircase
- Clinically she was stable. Otherwise no significant findings.
- UFEME showed gross hematuria
- Urgent CT scan requested to rule out genitourinary injury



Axial CECT revealed gross left hydronephrosis. No contusion or perinephric changes to suggest injury.

Anderson Hynes dismembered pyeloroplasty was performed. Intraoperative findings were rotated left kidney with dilated and thick-walled renal pelvis. PUJ and proximal ureter were narrowed. Distal ureter was normal. DTPA post pyeloroplasty showed good function of both kidneys (differential function of left kidney =52% and right kidney=48%).

Case 7

- 66-year-old man
- Presented with upper lid discharge and proptosis of left eye for 4 weeks duration
- It was associated with progressive blurring of vision for the past 2 years
- Clinically vision was 5/60, left eyeball was proptosed and injected
- Urgent CT orbit was requested with clinical impression of non-axial proptosis of left eye due to extraconal mass

CECT shows soft tissue mass arising from the left ethmoid sinus infiltrating the orbital cavity and frontal sinus. Erosion of adjacent bones are demonstrated. No intracranial extension.

Intraoperative findings : polypoidal tumour in the left ethmoidal sinus extending into the extraconal region and frontal sinus. HPE: sinonasal papilloma with inverted pattern of growth.

Discussion (1)

- Cases with discrepancies between the indication and imaging findings as illustrated here were not uncommon in our practice as radiologist

- Studies have identified five features of potential diagnostic difficulty[1]
  - ✓ **Atypical presentation**
  - ✓ **Non-specific presentation**
  - ✓ **Very low prevalence (rare condition)**
  - ✓ **Co-morbidity**
  - ✓ **Perceptual features that could be missed**

- Other factors include failure of communication, reticence of the part of patients to seek expedite treatment and patients presenting with multiple problems in short general practice consultations[2].

Discussion (2)

- Cancers were the most frequently identified condition with reported diagnostic error or delay. They are missed because[3,4,5]

  - ✓ **they are rare, such as tongue cancer and childhood cancers or**
  - ✓ **present atypically (testicular or breast cancer presenting without a lump) or**
  - ✓ **with features that are common to other less serious condition (upper GI cancer presenting with dyspeptic symptoms)**

- For clinicians it is important to note that failure to gather sufficient and appropriate information was responsible for most errors[6].

- An existing diagnostic label should not hamper radiologist's critical assessment of any lesion and their ability to restructure the diagnostic problem and look for alternative explanations.

Conclusion

- These cases illustrate that diagnostic error or diagnostic delay are multi-factorial.
- It is a good reminder to the radiologists and clinicians to be more meticulous with the image interpretation and patient's assessment respectively.
- Most of the time, accurate diagnosis can be made with good history taking, thorough physical examination and appropriate investigations including imaging with proper analysis.
- Good teamwork between different disciplines managing the patients and holistic approach in all cases is warranted to minimize this potential problem.

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THANK YOU