BChiMed V – Fundamental of Diagnosis

Investigations in Surgical Patients

DEPARTMENT OF SURGERY

THE UNIVERSITY OF HONG KONG

General Principles

Aid / confirm diagnosis

Plan for treatment options

Assess progress of disease & response to treatment

Only be done if

- degree of suspicion high
- consequence of missing diagnosis serious

Laboratory

- disease process represented by change in blood & other body fluid components

Radiology

- imaging of various organs

Endoscopy

- instrument to visualize & examine inside of luminal structure

Cytology/Histopathology

- examination of body tissue to see change at macroscopic or microscopic level

Laboratory - Blood

Complete blood count / picture

Haemoglobin

- anaemia

White cell count

- leucocytosis: infection or response to stress / malignancy or bone marrow disease
- leucopenia: poor immune status, bone marrow disease

Platelet count

- thrombocytosis: response to stress, bone marrow disease
- thrombocytopenia: spleen disorder, bone marrow disease, sepsis, bleeding tendency

Laboratory - Blood

Clotting profile

- APTT / INR
- reflection of coagulation ability
- deranged as result of sepsis, liver disease, anticoagulation drugs, herbal medicine
- unsafe for operation if deranged

Laboratory - Blood

Renal function test (RFT)

- Na, K – electrolyte balance, hydration
- Urea / creatinine: direct index of kidney function

Liver function test (LFT)

- Ductal enzyme: Bilirubin (Bili) , alkaline phosphates (ALP),
- Liver enzyme: ALT, AST
- Albumin: reflection of synthetic function of liver and nutrition status

Drugs can affect liver and renal function

Laboratory - Blood

Blood glucose

- fasting glucose for diagnosis of diabetes mellitus (DM)
- monitor of DM by Hemstix test

Laboratory - Blood

Tumor marker

- Alpha feto-protein: hepatocellular carcinoma, cirrhosis, testicular tumor
- Prostate specific antigen: prostatic cancer
- Carcinoembryonic antigen: cancer of stomach, large and small intestine, smoking
- Ca 19.9: cancer of pancreas
- Ca 125: cancer of uterus

Laboratory - Blood

Infection marker

- hepatitis, HIV, syphilis

Blood culture

- sepsis: replication of bacteria in blood
- important in identifying cause of sepsis and administration of correct antibiotic

Laboratory – other body fluids

Urine, sputum, abdominal fluid, pleural fluid, cerebrospinal fluid (CSF)

Examination for

- Infection: white cells, culture for pathogens
- Red cells: bleeding, caused by tumor, inflammation, trauma by stone (kidney)
- presence of malignant cell

Radiology – Plain X Ray

Less expensive and easily available

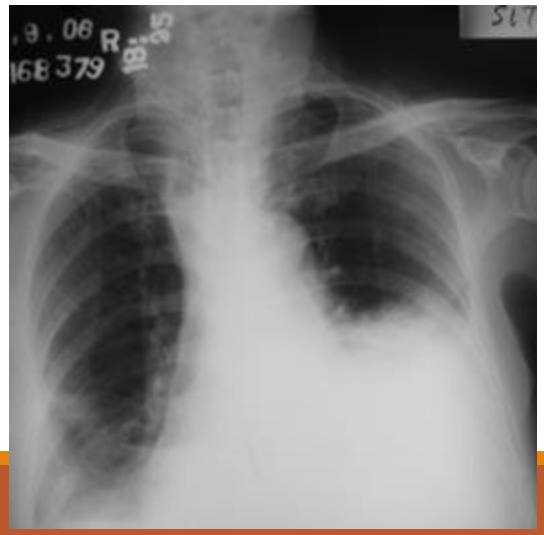
Good to show radioopaque substance (bone, stone, foreign body), air-tissue interface (pneumonia, lung mass, bowel pathology)

Disadvantage: radiation, cost

Foreign body in throat

Large bowel obstruction

Pneumonia



Free gas under diaphragm

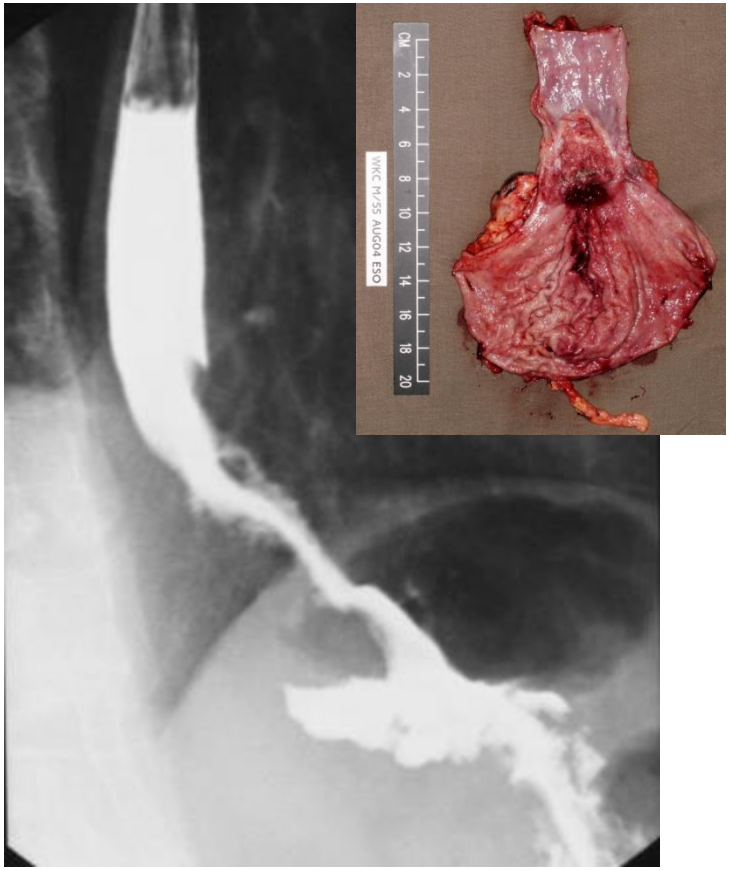
Radiology – Contrast X-ray

Mucosal lesion in luminal organ e.g. esophagus, stomach, large and small bowel

Disadvantage: radiation, aspiration of contrast, cost

Barium enema (Ca caecum)

Barium swallow (Ca esophagus)



Angiogram

X-ray after injection of contrast (IV / IA)

Side effect: vessel injury from puncture, bleeding, contrast toxicity (allergy, renal impairment), radiation

Lower limb Angiogram

Aortic aneurysm

Radiology – ultrasound

Imaging of solid organ: liver, kidney

Imaging of blood vessels: aorta, arteries & veins

Collection of fluid: abscess in abdomen, groin

No side effect except for cost

Accuracy of result depends on operator

Liver tumor

Carotid stenosis

Radiology - CT scan

Absorption of radiation by different tissue detected and image reconstructed by computer

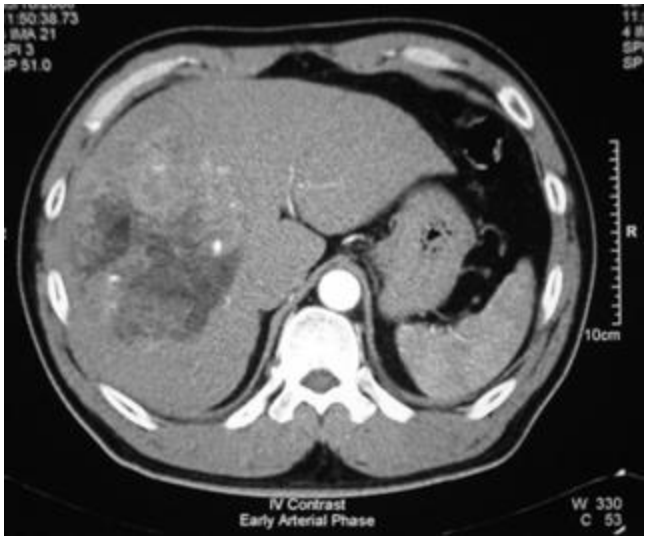
Fast, good quality imaging provided

Demonstrate morphology change of organs

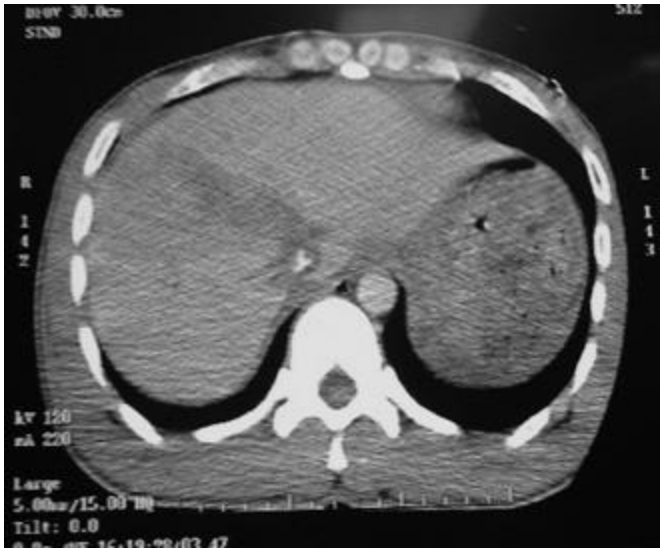
Tumor, infection (abscess), arterial / venous disease (aneurysm, occlusion)

Disadvantages: expensive, toxicity from contrast injection (renal impairment, allergy), high dose radiation (pregnancy contraindicated)

Hepatocellular Ca



Trauma - Liver laceration



Ca colon

Intraabdominal abscess

Radiology - MRI

Proton (hydrogen ions) excited/aligned by magnetic field and then relax & returned to original position by radio-frequency pulse

Radio signal released during proton realignment and reconstructed by computer

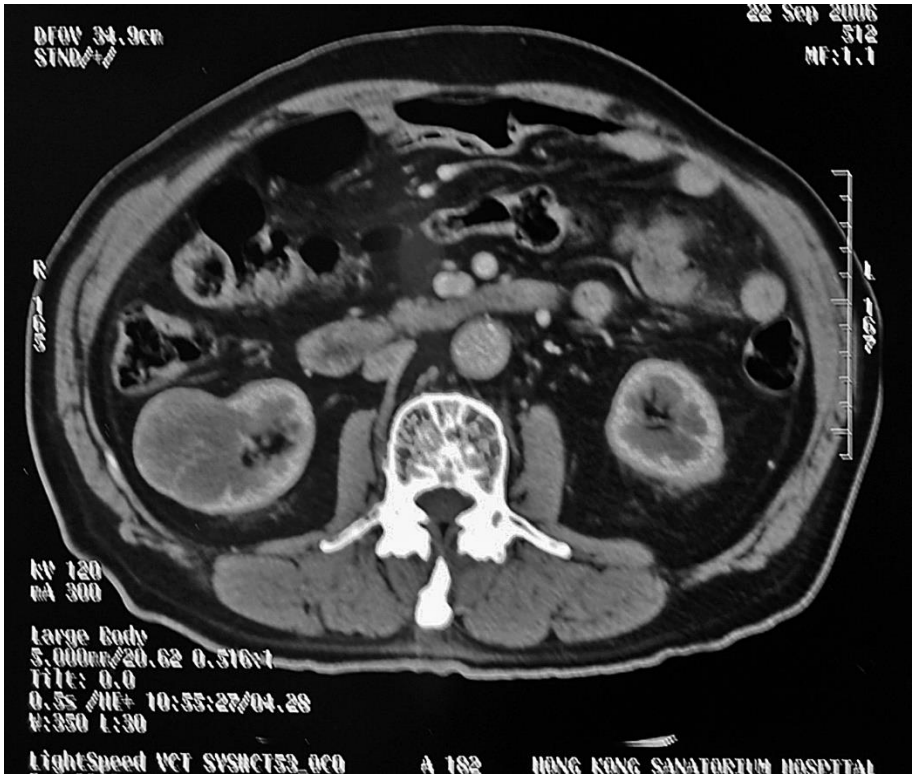
Quality depend on hydrogen content (fat, water)

Especially good for central nervous system

Advantage: no radiation, minimal side effect from contrast

Disadvantage: slow scanning, more expensive, not for claustrophobia

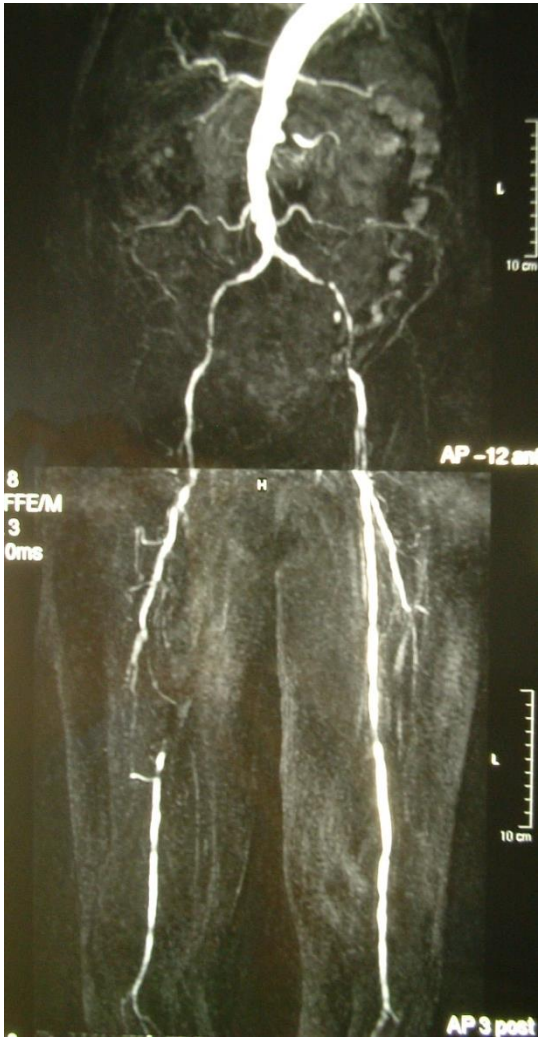
MRI - Renal cell carcinoma



Transverse section

Coronal section

MR angiogram



Endoscopy

Flexible optical instrument inserted through body orifices to examine mucosa internal organs

Gastrointestinal tract - upper endoscopy, colonoscopy, ERCP

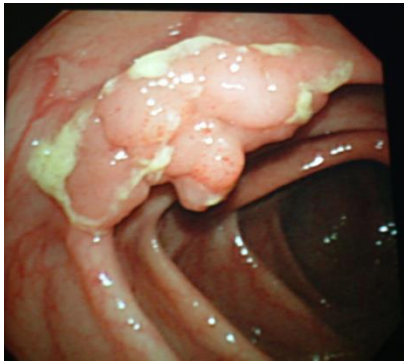
Respiratory tract - bronchoscopy

Allows - for biopsy

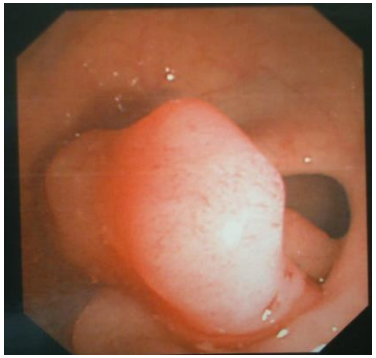
- for therapeutic procedure

e.g. removal of polyp, homeostasis, stenting of obstructing lesion

Colonoscopy



Ca colon



Colonic polyp

Bring Home Messages

Cost and side effects should be always considered

Investigations are not substitutes of good clinical knowledge, history taking and physical examination