Basic Interpretation of CT Scan

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Basic Interpretation of CT Scans

Most of the CT pictures are non-specific

CT pictures are depending on the density of the structures.
Principles of CT Diagnosis

- Pre-contrast study
- Post-contrast study
- Change in adjacent structures
- Clinical Information
- Biological or anatomical characteristics
Pre-contrast study of CT

- Hypo-density
  Comparison with CSF and brain tissue
- Hyper-density
  Comparison with cranium bone
- Iso-density
  As brain parenchyma
- Hetero-density
Hypo-density in CT

Higher than CSF but lower than brain tissue

tumor, abscess, resolving hematoma, evolution infarct,

protein, blood, debris
Hypo-density in CT
Higher than CSF but lower than brain tissue
Hypo-density in CT

Iso-density to CSF

chronic hematoma, chronic infarct, porencephaly, congenital cyst, encephalomalacia change

Water-like content
Hypo-density in CT
Iso-density to CSF
Hypo-density in CT

Lower than CSF

- fat or cholesterol
  - congenital tumor: dermoid, epidermoid, lipoma,
- air
  - head injury, pneumocephaly
- myxoid
Hypo-density in CT
Lower than CSF
Hyper-density in CT

Comparison with bone

- Iso- or higher than bone ossification, calcification, metallic, iatrogenic, blood pooling
- Less than bone but higher than brain tissue hemorrhage, compacted cellularity
Hyper-density in CT
Iso- or higher than bone
Hyper-density in CT
Less than bone but higher than brain tissue
Post-contrast CT

Enhancement patterns

- gyral, ribbon, cortical
- solid
- rim or ring
- mural nodular
- linear and dot
- heterogenous
- no enhancement
Enhancement Patterns
Change in Adjacent Structures in CT

- Edema
- Bone
- Ventricles, sulci and cistern
Edema Pattern in CT

- Vasogenic edema
tumors, infection, late infarct
along the white matters, finger-like

- Interstitial edema
periventricular white matter, ependymitis granularis

- Cytotoxic edema
ischemia or infarct, gray matter
Vasogenic Edema
Vasogenic edema
Cytotoxic Edema
CAUSES of RAISED INTRACRANIAL PRESSURE

- Hydrocephalus
- Brain edema
- S.T.L
  - Tumor,
  - Hematoma,
  - Cyts,
  - Infarct....
RAISED INTRACRANIAL PRESSURE

- ICP
- DAYS
- WEEKS
- HOURS
- DEATH

- Focal mass effect
- CSF space change
- hydrocephalus
- Herniation
- Coning
TRANSTENTORIAL HERNIAS

1. PARAHIPPOCAMPAL GYRUS (PHG) HERNIATION

2. CENTRAL/DIENCEPHALIC HERNIATION

MAY OCCUR INDEPENDENTLY OR IN COMBINATION
PARAHIPPOCAMPAL GYRUS (PHG) HERNIATION
COMPLICATIONS of PHG HERNIATION
COMPLICATIONS of PHG
HERNIATION

PCA ossculsion

3rd nerve palsy
CENTRAL HERNIATION

MAMILLARY BODY
PONS
CENTRAL HERNIATION

NORMAL

AP diameter > trans diameter

AP diameter =/< trans diameter

HERNIA
SECONDARY BRAIN STEM HAEMORRHAGES

Duret hemorrhage
CEREBELLAR TONSILAR HERNIATION

OR

CONING
Bone Change in CT

- Foramen
  - internal auditory canal, foramen ovale, orbital fissures
- Cranium bone
  - hyperostosis
CSF Spaces Change in CT

- Widening or obliterated
- Sensitive to mass effect
- Proportional or in-proportional
CT of Cerebral Ischemia (lentiform nucleus sign)

- Ischemia: gray matter increased water -- density -- density closed to white matter -- loss of the differentiation between the lentiform nucleus and internal capsule
CT of Cerebral Ischemia (Insular ribbon sign)

Ischemia -- cytotoxic edema -- cellular swelling -- mass effect -- straightening the normal waving insular ribbon
CT of Cerebral Ischemia
(Hyper-dense vascular sign)

• Ischemia -- blood stasis in great vessel such as M1 -- blood clot -- high density
Biological and Anatomical Characteristics

• Hemangioblastoma
  hemoglobin, hematocrit, erythropoietin
• Craniopharyngioma
  anterior 3rd ventricle to nasopharynx
Clinical Information in CT

- Acute, progressive or stationary
- Timing
  important in ischemic disease
- previous history of irradiation or operation