PART 1| IMAGING IN CLINICAL PRACTICE

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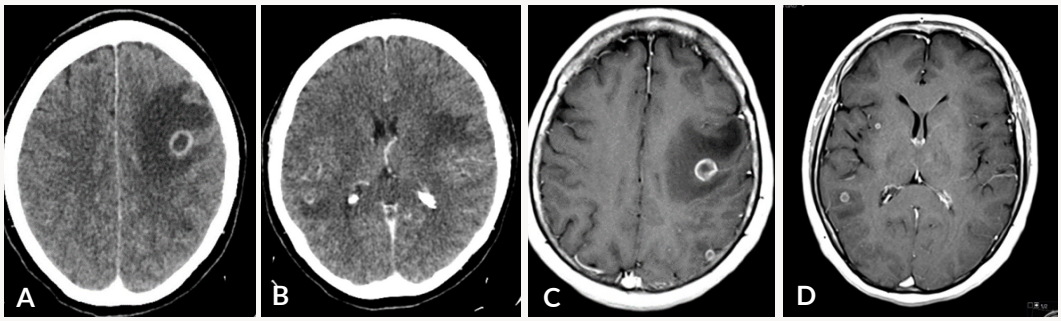
A 58-year-old female presented with headache for few days with acute onset of slurred speech and right upper limb weakness without significant constitutional symptoms. Past medical history was unremarkable apart from smoking tobacco cigarette (40 pack years). Her father had a lung cancer and her mother suffered from a breast cancer. On examination the patient was afebrile with normal vital signs. Neurological examination showed drooping of the right eye, reduced sensation on the right V2 and V3 branches of the trigeminal nerve, reduced sensation in the right upper limb down to the elbow. Other clinical notes were unremarkable. Routine laboratory investigations were within normal limits. CT scan and MRI of the brain are shown below.



Please answer the following questions:

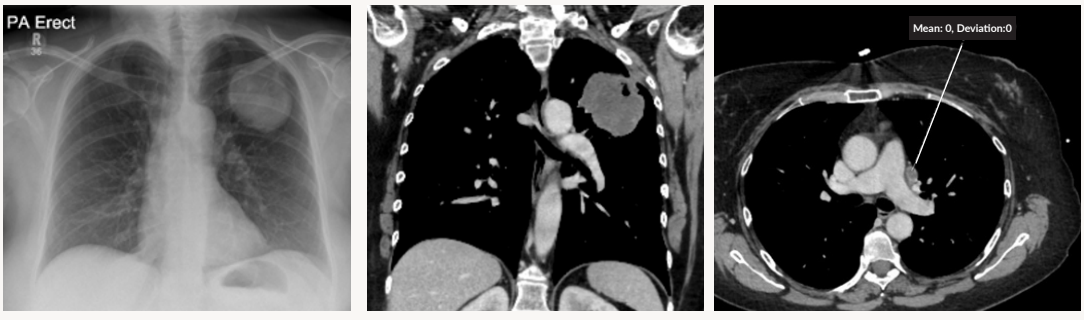
Q1) What are the radiological findings in the CT scan ? Q2) What is the next step to reach to the diagnosis and why ?
Q3) What are the radiological findings in chest X-rays and CT scan? Q4) How to confirm diagnosis ?

Answer Q1

CT scan of the brain shows bilateral multiple ring enhancing lesions with vasogenic oedema more obvious in left frontoparietal area. The conclusion of the scan was cerebral metastasis although cerebral primary malignancy or cerebral abscesses were in the differential. MRI was requested for further characterization of the lesions which demonstrated multiple rounded ring enhancing lesions at grey-white matter junction which show no diffusion restriction.

Answer Q2

CT chest abdomen and pelvis (CAP) because the most common sources of intracranial metastasis in order of decreasing frequency, are carcinoma of the lung and breast, malignant melanoma, and carcinoma of the kidney and gastrointestinal tract.[1]



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Answer Q3

A rounded slightly irregular left upper lobe cystic mass measuring 6.8cm , a small bubble like lucency noted peripherally with ipsilateral cystic mediastinal lymph nodes. Other structures of the chest and mediastinum unremarkable. Provisional radiological diagnosis and staging was T3N2M1c non-small cell lung cancer (Adenocarcinoma) according to the Eighth Edition Lung Cancer Stage Classification.

Answer Q4

By lung biopsy which revealed necrotized non-small cell lung cancer (Adenocarcinoma).

The final diagnosis: Primary lung adenocarcinoma with cystic/degenerative changes and metastasis to the mediastinal lymph nodes and brain.

Lung adenocarcinoma : Adenocarcinoma is the most common histologic type of lung cancer and accounts for over 40% of non-small cell lung cancers.[2]

Compared with other types of lung cancer, adenocarcinoma is truly localized tumour and may respond to treatment better than other lung cancers. It is generally found in smokers; however, it is still the most common type of lung cancer in nonsmokers. It is also the most common form of lung cancer in women and people younger than 45 years.

The typical CT appearance is a ground glass nodule. Part-solid lesions and lesions with bubble-like internal lucencies are also common.[2] Radiologically, ground glass component, bubble-like lucencies, air bronchograms and small size lesions are favorable prognostic indicators, while thick spiculations, thickened bronchovascular bundles, pleural retraction, concave cuts, and large size lesion are unfavorable.[2,3,4,5] Metastasis to lymph nodes, liver, bones, adrenal glands, and brain can occur.[5]

The teaching points from this case is that sometimes differentiation between abscess and degenerative malignant lesion is very difficult in different parts of the body but correlation with history, clinical examination, and laboratory and histopathology results would be helpful to reach the final diagnosis. Radiologically and for brain lesions , MRI findings of restricted diffusion, ring-like enhancement and the presence of a thin wall with intrinsic T1 signal are all features that suggest abscess rather than metastasis. Thickness, irregularity and nodularity are associated with malignant tumors.[6]

A helpful mnemonic is **MAGIC DR** is used for the differential of the ring enhancing cerebral lesions:

M: ***Metastasis***: Multiple rounded lesions at grey-white matter junction with the absence of diffusion restriction and a central necrotic component.

A: ***Abscess***: extensive oedema relative to lesion size with thin regular wall and restricted diffusion as well as intermediate to low T2 signal capsule.

G: ***Glioblastoma***: Thick irregular wall with extensive oedema.

I: ***Infarct*** (subacute phase), ***Inflammatory*** like neurocysticercosis (small <1-2 cm lesions with thin walls some of them are calcified and tuberculoma (central nidus of calcification surrounded by ringlike enhancement known as target sign as well as patient demography and TB history) , ***Immunocompromised*** (Lymphoma which is centrally located with thick irregular wall enhancement) .

C: ***Contusion*** (history of trauma and usually cortical)

D: ***Demyelinating*** disease (classically incomplete rim of enhancement)

R: ***Radiation necrosis*** (depend on the history of Radiotherapy). ***Resolving haematoma*** (Compare with previous scans to assess resolution).[7,8]

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