Scintillations

They laughed at Columbus,
they laughed at Futon,
they laughed at Wright brothers.
and we made them laugh.

solov - PETCT

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Case 24. Diagnosing skeletal fractures

Contributed by : *Dr. Sandeep Patwardhan MS; Dr. Shrikant Solav MD DRM*

Fig. 24 A Initial radiograph of pelvis

Fig. 24 B Scintigraphic image of pelvis

Fig. 24 C Follow up radiograph of pelvis

Plain radiograph is the first investigation to be performed so as to document skeletal fracture. In almost all the cases of displaced fractures it unmistakably clinches the diagnosis. However in exceptional situations the fracture may not be obvious on initial skeletal radiograph. This happens especially in undisplaced fractures, stress fractures, shin splints or bone contusions. For an abnormality to become manifest radiologically in such situations, there must be loss of bone minerals to the tune of 30%.
Skeletal scintigraphy on the contrary picks up the diagnosis by virtue of altered osteoblastic activity in the traumatized region. Within 24 hours of the onset of injury, there is repair process that becomes manifest as a "hot spot" on the bone scan. About 80% of skeletal injuries are seen as hot spot within 4 hours of the initial insult, 90% show abnormality at 24 hours and 98% will be abnormal at 72hours.

This is the story of a 70years old lady who presented with pain in the hip. Her initial radiograph (Fig 24A) was unremarkable. Hence a bone scan was requested. The bone scan (Fig 24B) showed cold area in the head of right femur with mal-aligned proximal shaft in relation to the head. The findings were compatible with fracture neck femur with early phase of avascular necrosis of head of femur.
Follow up radiograph within hours of scintigram revealed displaced fracture neck femur (Fig 24C)

Case 25. FDG PET scan as an alternative to Gallium scan to document skeletal infection

Contributed by : *Dr. Neeraj Adkar MS, Dr. Shrikant Solav MD*

Fig. 25 A -MRI

Fig. 25 A -MRI T1W

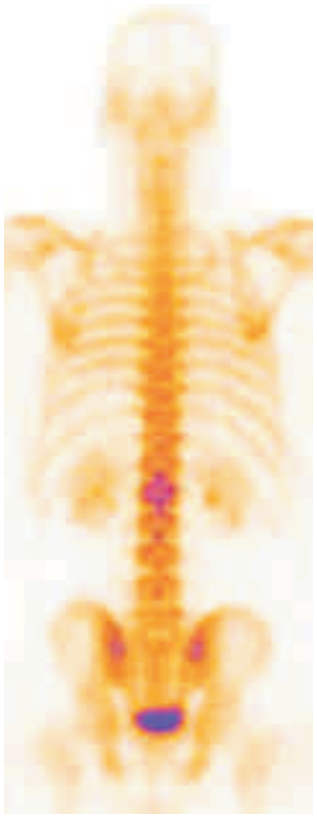


Fig. 25 B -Bone scan

Concept:

Gallium67 is an age old method to diagnose skeletal infection especially in violated bone. Violated bone implies situations such as fractured bone, implants in situ, peri-prosthetic infection. Bone scan is ordinarily performed in correlation with the Gallium scan so as to document or rule out infection.

The reason for this being inherent property of Gallium to localize in healthy as well as inflamed skeleton.

Bone scan (Technetium 99m-MDP) continues to show increased osteoblastic activity (hot spot) for as long as 1.5 to 2 years in an injured skeletal site. Hence a hot spot on a bone scan does not help in documentation of infection in a violated bone.

Adding Gallium scan for correlation helps in differentiating between normal healing sites (in which case Gallium will show less intense uptake as compared to the bone scan) and infected sites (in which case Gallium will show higher and/ or incongruent increased uptake as compared to the bone scan)

There are logistical issues with Gallium scan. It must be specifically imported for a given patient. Hence the time lost could range from 7 days to 10 days. Imaging protocol ranges from 7 hours to 72 hours post injection of tracer.

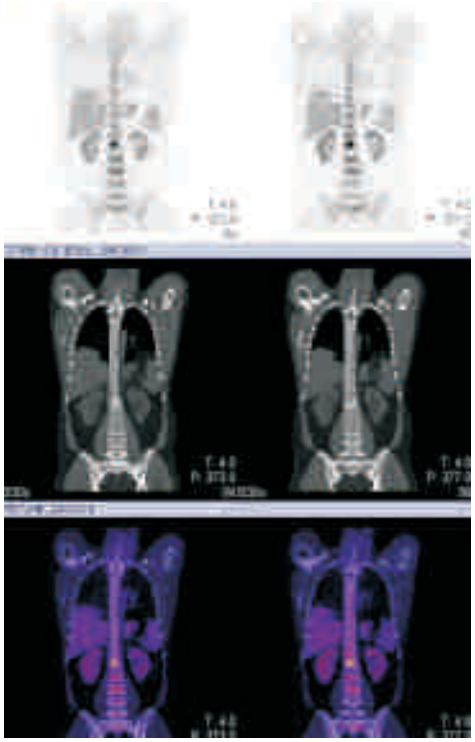


Fig. C -FDG PET CT scan

To overcome this difficulty, another compound is now readily available to document infection by the name of F18-FDG (fluorodeoxyglucose). This is a PET (positron emission tomography compound) that has a half life of 110 minutes. As the name indicates, it is a glucose analogue and must be administered on fasting stomach so as to prevent interference from physiologic hyperglycemia that occurs in postprandial state. This compound localizes to glut receptors and indicates hypermetabolism at these sites.

It is not specific for either neoplasm or infection. However, in a given clinical situation it can be a useful tool to help document infection.

As the test is performed almost six days a week, time saved is crucial. The images are compared to the bone scan and interpreted in a manner similar to the Gallium scan. The advantage of this test is additional structural details provided by CT scan which is an inherent part of imaging.

About this case:

A 36 years old gentleman presented with gradual onset backache over 2 months. There was no history of fever or weight loss. There were no other constitutional symptoms. An MRI examination revealed abnormal signal in D12 vertebra (Fig 25 A), hence a bone scan was requested which revealed solitary lesion at the same site (Fig 25 B).

Further in view of clinical as well as radiological suspicion of tuberculosis, there was a choice between CT guided biopsy and FDG PET scan.

FDG PET scan revealed a focus of abnormal metabolic activity corresponding to an osteolytic lesion in this vertebra (Fig 25 C).

In view of the above findings, the gentleman was put on antitubercular treatment and so far is doing well. We propose to perform a follow up study at six months to look for treatment response.

Case 26. Serentipitous diagnosis of achalasia cardia

Contributed by : *Dr. Sanjay Agarwal MD Dr. Shrikant Solav MD*

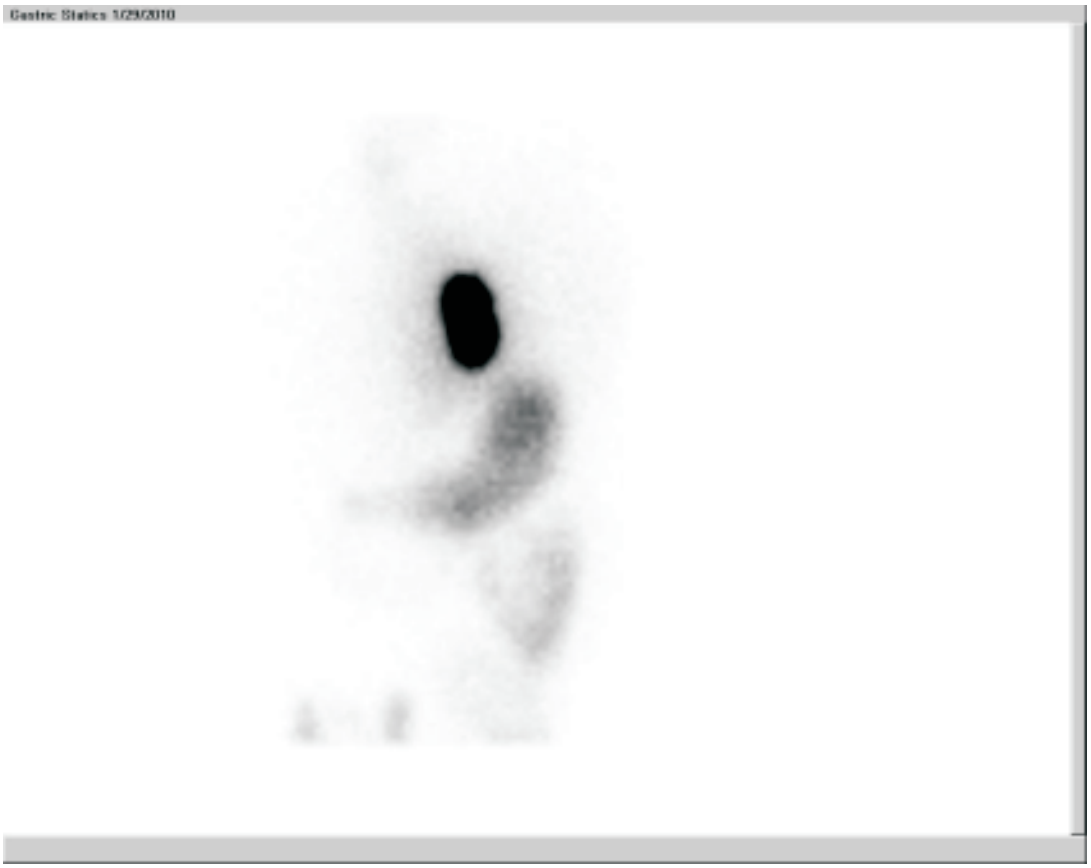


Fig. 26 A

Achalasia cardia is a motility disorder involving the distal esophagus resulting in elevated lower esophageal sphincter pressure, increased intraesophageal pressure, incomplete relaxation of lower esophageal sphinter in response to deglutition and loss of esophageal peristalsis.

It usually presents between 3rd and 5th decades of life with the most common symptom of dysphagia.

We present a case of middle aged lady who complained of intermittent vomiting post meal and excessive postprandial sense of fullness in abdomen. It was suspected to be related to delayed gastric emptying. Hence a gastric emptying time study was requested. The solid bolus of radioactive meal was held up in the lower end of esophagus thereby suggesting achalasia. Barium meal examination confirmed the diagnosis.

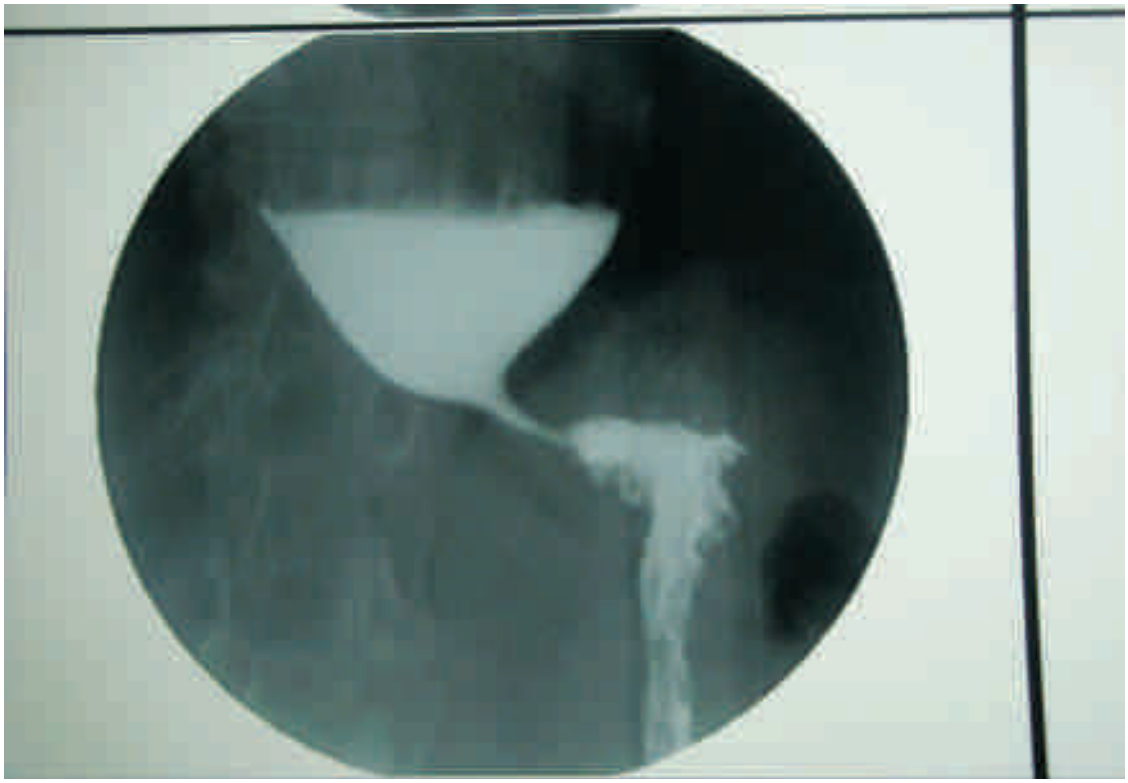


Fig. 26 B

About this case:

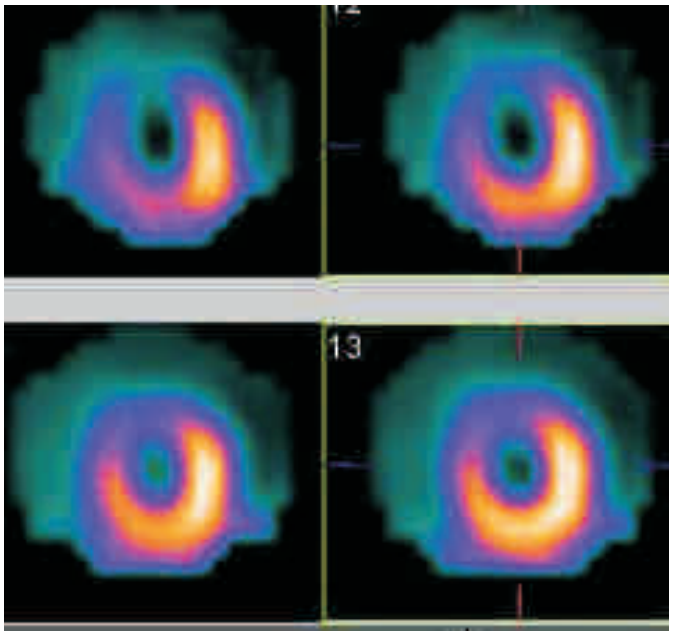
A 45 years old lady complained of intermittent vomiting and excessive sense of fullness post meal. She was normotensive and euglycemic with unremarkable physical examination.

An endoscopy revealed candida esophagitis. She was not immunocompromised. Ultrasonography of abdomen was normal. In view of persistent symptoms, she was referred for radionuclide gastric emptying study. A solid bolus of radioactive meal (comprising of 1 millicurie Technetium-99m-phytate mixed with mashed potatoes) was administered orally. There was significant hold up of the bolus at the lower esophagus as seen in the figure 26 A. A small liquid radioactive meal was administered to delineate the stomach. This finding prompted the suggestion of achalasia (especially as an organic cause of obstruction was ruled out in the preceding endoscopy)

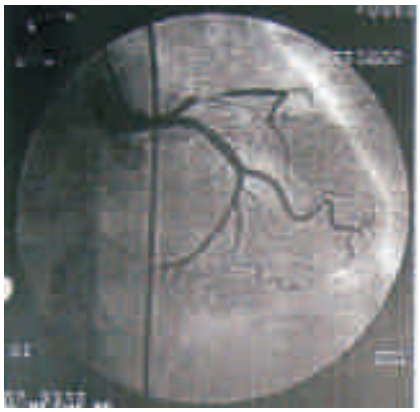
Figure 26 B: Barium meal examination revealed dilated distal esophagus with air-barium level, rat tail appearance of lower esophageal sphincter which are typical of achalasia.

Esophageal transit time studies using radionuclide method have been done in the past to demonstrate functional improvement post pneumatic dilatation of achalasia. However there have been no reports of diagnosis of achalasia using radionuclide study.

Spot Case



Myocardial perfusion image



Angiogram showing lesion in LAD

POST PTCA angiogram

This 66 years old lady complained of effort related chest discomfort. Stress myocardial perfusion study revealed anteroseptal ischemia. An angiogram confirmed stenosis of left anterior descending coronary artery. Angioplasty was successfully performed that relieved her complains.