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Entamoeba Histolytica Invasion and Metastasis of the Liver and Other Organs: A Case Report

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Abstract **Case Studies**

Introduction: Entamoeba histolytica is an invasive enteric protozoan. Infection typically begins with the ingestion of mature, quadrinucleated cysts found in fecally contaminated food or water. Entamoeba hystolytica invasion can result to the metastasis of the Liver and other organs. This condition is the result of the migration of the trophozoites hematologically through the portal vein to some distant organs. Adherence to the colonic mucus layer and colonization is through the Gal/GalNAc lectin, which targets galactose and N-acetyl-D- galactosamine residues found on D-linked sugar side chains of mucins. Mammals that do not possess N-acetyl-D-galactosamine or N-terminal galactose are resistant to trophozoite adherence, providing some degree of immunity against invasive disease.

Materials and Methods: Here is a case of a report of a 47-year old female, with the complaint of abdominal pain at the right upper quadrant with jaundice and a weight loss of about 12kg within a period of 1-month. For the purpose of the Abdomen/Pelvis Computer Tomographic (CT) scan, the contiguous 5mm axial helical image slices of the tissues of the lower chest, abdomen and pelvis were obtained from the level of the main pulmonary arteries to the level of the lesser femoral trochanters before and after bolus intravenous injection of 100mls of Ultravist 370. Multiplanar reconstructed images as well as source images viewed in various window settings were employed in analysis. This CT-Scan was carried out by Prof. S. O. Mgbor, and Dr. Onuh, A. C. of Hands Clinics, (Computer Tomography department).

Results: the 47 years old Patient was diagnosed of Amoebic Liver disease: a disease caused by the invasion of Entamoeba hystolytica, this attests that E. hystolytica is capable of causing liver metastases. This infection on the liver was a result of the trophozoites adhering to the colonic epithelium and spread hematologically from the liver to other distant organs.

Conclusion: This case report reveals the detrimental effect of Entamoeba hystolytica invasion on viscera organs particularly the liver, which resulted to organs metastases. Furthermore, Entamoeba histolytica invasion when not detected on time could be fatal as reviewed in the case study, as the said patient eventually died as a result of ruptured liver due to fatal nature of the invasion.

Keywords: Entamoeba histolytica, organs metastases, secondary invasion

1. INTRODUCTION

Entamoeba hystolytica is a protozoan parasite that is found at the enteric section of the human body. It has shown to be invasive. The pathogenesis of the infection is initiated by ingestion of a mature, quadrinucleated cysts found in which is found in food and water that has been contaminated by the causative cyst. Removal of the cysts and release of mature trophozoites takes place in the small intestine which eventually finds its way towards the large intestine [1]. As result of this infection, the symptoms can vary from an asymptomatic state to various symptoms like fulminating intestinal diseases or even life threatening diseases not involving the intestine. Histolysis as a word literally involves the lysis or destruction of organic tissues [1].

The parasite mostly affects humans and other primates resulting to a case of Amoebiasis. It is estimated to infect about a population of 35-50 million people globally and kill more than 55,000 people yearly [2].

The Case of Amoebiasis could be expressed in Intestinal or the parenteral form. The intestinal form is manifested in symptoms line increased diarrhea, abdominal pain, flatulence and increased fever while that of parenteral manifests when the parasite enters the body through blood from the intestines to other vital organs where it can inflict abscesses. Such organs include such as the liver, lungs, brain [1].

E. hystolytica has the potentials of being the cause or proliferation of liver metastases, which is a cancerous stage in which the cancer spread to the liver from other parts of the body. Liver metastases are different from cancer that originates in the liver, which is called hepatocellular carcinoma. This condition arises from movement of motile trophozoites having the ability to adhere and lyse the colonic epithelium (large intestine) and subsequently spread hematologically through the portal vein system to the liver [1]. This review examines a case study of metastasis of the Liver and other organs as a result of *Entamoeba hystolytica* invasion.

OVERVIEW OF ENTAMOEBA HYSTOLYTICA

Entamoeba histolytica is a human parasite that is unicellular and anaerobic Amoebic protozoan. Its mode of locomotion is with a jelly-like tongue-like protrusion of cytoplasm known as a pseudopodium (which is its organ for locomotion) [1].

Although other mammals can be become infected, they do not significantly contribute to its transmission. Poor sanitary practices increase the risk of contracting the disease [2].

The infection can be diagnosed in the laboratory through microscopic examination for the presence of trophozoites or cysts in fecal specimen, smears of aspirates or scrapings obtained by proctoscopy, and aspirates of abscesses or other tissue specimen [1].

The pathogenesis of the *E histolytica* infection occurs as a result of mature cysts ingested from fecally contaminated food or water especially in the developing world. After ingestion, the cysts on reaching the small intestine, it excysts and releases matured trophozoites which is the 'feeding stage' of the parasite [Figure 1]), which then penetrate the colonic mucosa (Large intestine). It is at this stage that they cause flask-shaped colonic ulcers and enter into to the portal venous system to infect the liver, brain, lungs, pericardium and other metastatic sites. The presence of the parasite in the liver gives rise an inflammatory reaction and cause necrosis of hepatocytes, producing an abscess. Interestingly, there is a relative paucity of inflammatory cells from biopsy specimens, which is believed to be due to lysis of cells by *E histolytica* [3].

Scientific Classification

Domain: Eukaryota
Phylum: Amoebozoa
Family: Entamoebidae
Genus: Entamoeba
Species*: E. histolytica*
Binomial name: *Entamoeba histolytica* [2].

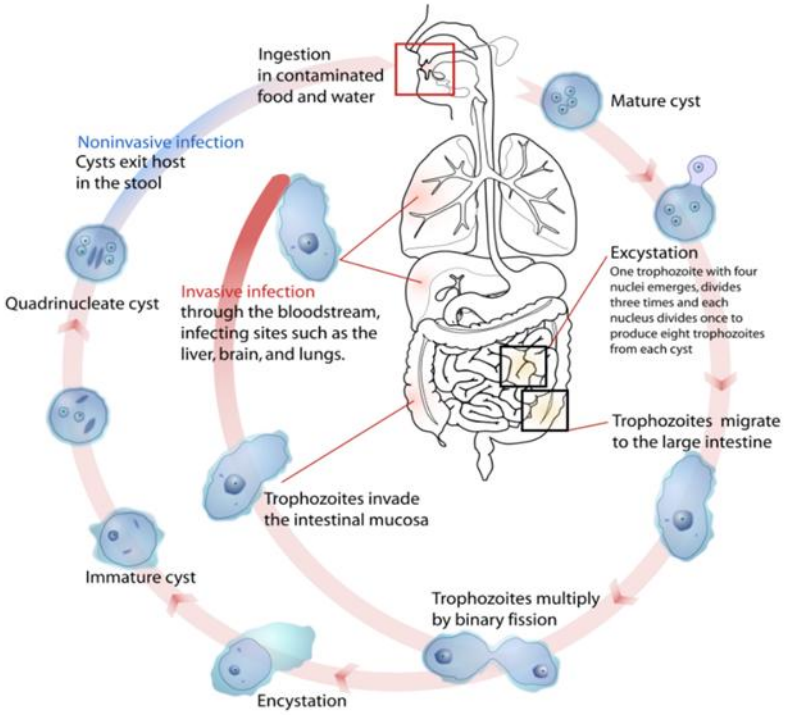

***Figure 1**: The Life-cycle of Entamoeba hystolytica*

Entamoeba Hystolytica Invasion

The infection is due to ingestion of the mature cyst from infected food substances. [4]. Unfavorable temperatures like heat and freezing temperatures can destroy the cysts and their survival outside a suitable host is time limited. On ingestion, the excyst (releasing the trophozoite stage) and cause infections in the digestive tracts [5].

Their three events that is ensued by *E. histolytica*–induced tissue damage includes; direct host cell death, inflammation, and parasite invasion. On Excystation, yhe trophozoites colonize the large bowel and remain on the mucus layer, feeding on food particles and other bacteria. Occasionally, and in response to unknown stimuli, trophozoites move through the mucus layer where they come in contact with the epithelial cell layer and start the pathological process [5]. *E. histolytica* posess a lectin (Gal/Gal NAC lectin) which binds to galactose and N-acetylgalactosamine sugars on the surface of the epithelial cells, the lectin normally is used to bind bacteria for ingestion. The parasite also posess some enzymes such as pore forming proteins, lipases, and cysteine proteases, which are normally used to digest bacteria in food vacuoles but which can cause lysis of the epithelial cells by inducing cellular necrosis and apoptosis when the trophozoite comes in contact with them and binds via the lectin. The enzymes released improve the penetration into the intestinal walls and blood vessels and in seldom cases, liver and other organs. The trophozoites will then ingest these dead cells. As a result of the damage, the human immune cells is attracted and these in turn can be destroyed by the trophozoite, which triggers the immune cell's lytic enzymes into the surrounding tissues hence initiating tissue destruction. This destruction manifests itself in the form of an 'ulcer' in the tissue, typically described as flask-shaped because of its appearance in transverse section [5].

Pathophysiology Of Liver Metastases

The liver has dual vascular supply which emanates from the artrial and portal venous systems. Hence the hematogenous spread of the disease to the liver from the intra and extra-abdominal sources. On clinical presentation, the patient may be asymptomatic or present varying symptoms. Such symptoms include weight loss, fatigue, hematochezia, jaundice, encephalopathy, and pain [6].

DISCUSSION

Metastasis of the Liver and other Organs: Case Report

Cancer metastasis is mostly common in the liver accounting for nearly 25% of all cases. [1] Metastatic hepatic tumors are more prominent than primary hepatocellular or biliary tumors, although the majority of metastatic tumors are adenocarcinomas. Squamous cell carcinoma, neuroendocrine carcinoma, and other far less common subtypes such as lymphoma, sarcoma, and melanoma also exist [4].

A 47 year Old Patient was diagnosed of Amoebic Liver disease: a disease caused by the invasion of *Entamoeba hystolytica*, this attests that *E. hystolytica* is capable of causing liver metastases. This infection on the liver was a result of the trophozoites adhering to the colonic epithelium and spread hematologically from the liver to other distant organs.

The CT-scan result revealed that the parenchyma of the patient's liver was riddled with numerous solid nodules and masses of different sizes. These lesions were hypodense with weak peripheral enhancing, some of which caused capsular bulge. This condition strongly suggested metastasis.

Also, multiple enlarged lymph nodes were evident in the retroperitoneal space in the region of her liver hilum, which were metastatic.

The CT-Scan report revealed that her lung bases harboured some soft tissue nodules, one on the right and two on the left, which were metastatic. Also, there was a lytic lesion involving the posterior inferior medial aspect of the right iliac bone bordering the sacroiliac joint, with associated soft tissue component, which might be metastatic.

This CT-Scan was carried out by Prof. S. O. Mgbor, and Dr. Onuh, A. C. of Hands Clinics, (Computer Tomography department). Patient's ID no: HC/CT/0732/21

The invasion of *Entamoeba hystolytica* can bring about metastasis of the Liver and other organs and clearly reviewed in this case study. *E. hystolytica* could invade and penetrate the host cells because it has Gal/Gal NAC lectin which binds to galactose and N-acetylgalactosamine sugars that is found on the peripherals of the epithelial cells of the host cells. It also possesses some enzymes which includes pore forming proteins that allows for the degradation of the protective mucous barrier and subsequently penetrate the colonic epithelium, hence increasing the risk of metastasis to distant sites (organs).

Figure 2: *Abdominal CT scan, with arrow highlighting liver lesion.*

CONCLUSION

This case report reveals the detrimental effect of *Entamoeba hystolytica* invasion on some viscera organs. Furthermore, Liver Amoebic disease when not detected on time could be fatal as reviewed in the case study, the patient eventually died as a result of ruptured liver due to fatal nature of the invasion.

Statement of Ethics

This study did not require informed consent nor review/approval by the appropriate ethics committee.

Disclosure Statement

The authors report no conflicts of interest.

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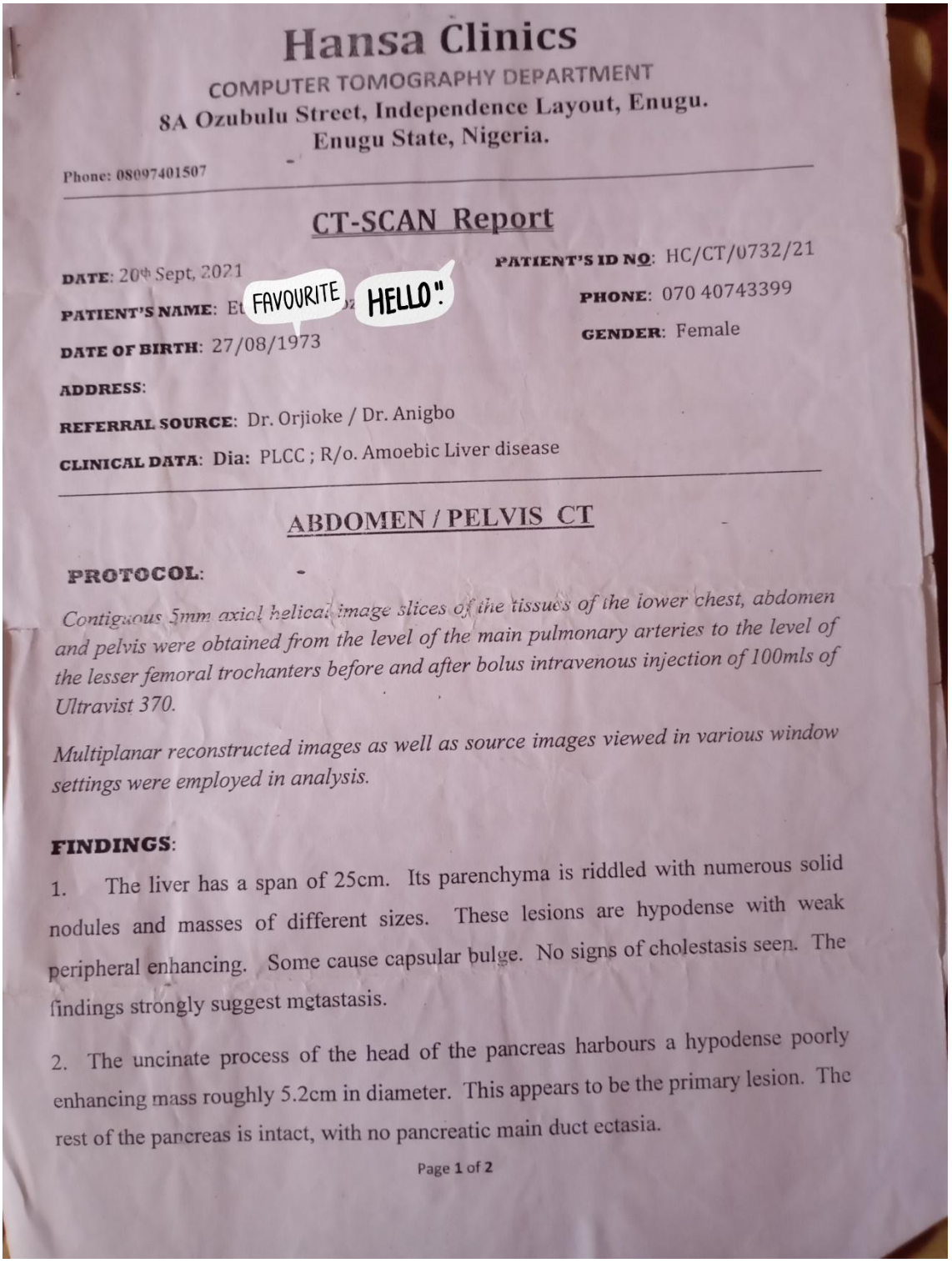
APPENDIX



Hansa Clinics

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Enugu State, Nigeria.

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CT-SCAN Report

DATE: 20th Sept, 2021
PATIENT'S NAME: Et[illegible] FAVOURITE HELLO"
DATE OF BIRTH: 27/08/1973
ADDRESS:
REFERRAL SOURCE: Dr. Orjioke / Dr. Anigbo
CLINICAL DATA: **Dia:** PLCC ; R/o. Amoebic Liver disease

PATIENT'S ID NO: HC/CT/0732/21
PHONE: 070 40743399
GENDER: Female

ABDOMEN / PELVIS CT

PROTOCOL:

Contiguous 5mm axial helical image slices of the tissues of the lower chest, abdomen and pelvis were obtained from the level of the main pulmonary arteries to the level of the lesser femoral trochanters before and after bolus intravenous injection of 100mls of Ultravist 370.

Multiplanar reconstructed images as well as source images viewed in various window settings were employed in analysis.

FINDINGS:

1. The liver has a span of 25cm. Its parenchyma is riddled with numerous solid nodules and masses of different sizes. These lesions are hypodense with weak peripheral enhancing. Some cause capsular bulge. No signs of cholestasis seen. The findings strongly suggest metastasis.

2. The uncinate process of the head of the pancreas harbours a hypodense poorly enhancing mass roughly 5.2cm in diameter. This appears to be the primary lesion. The rest of the pancreas is intact, with no pancreatic main duct ectasia.

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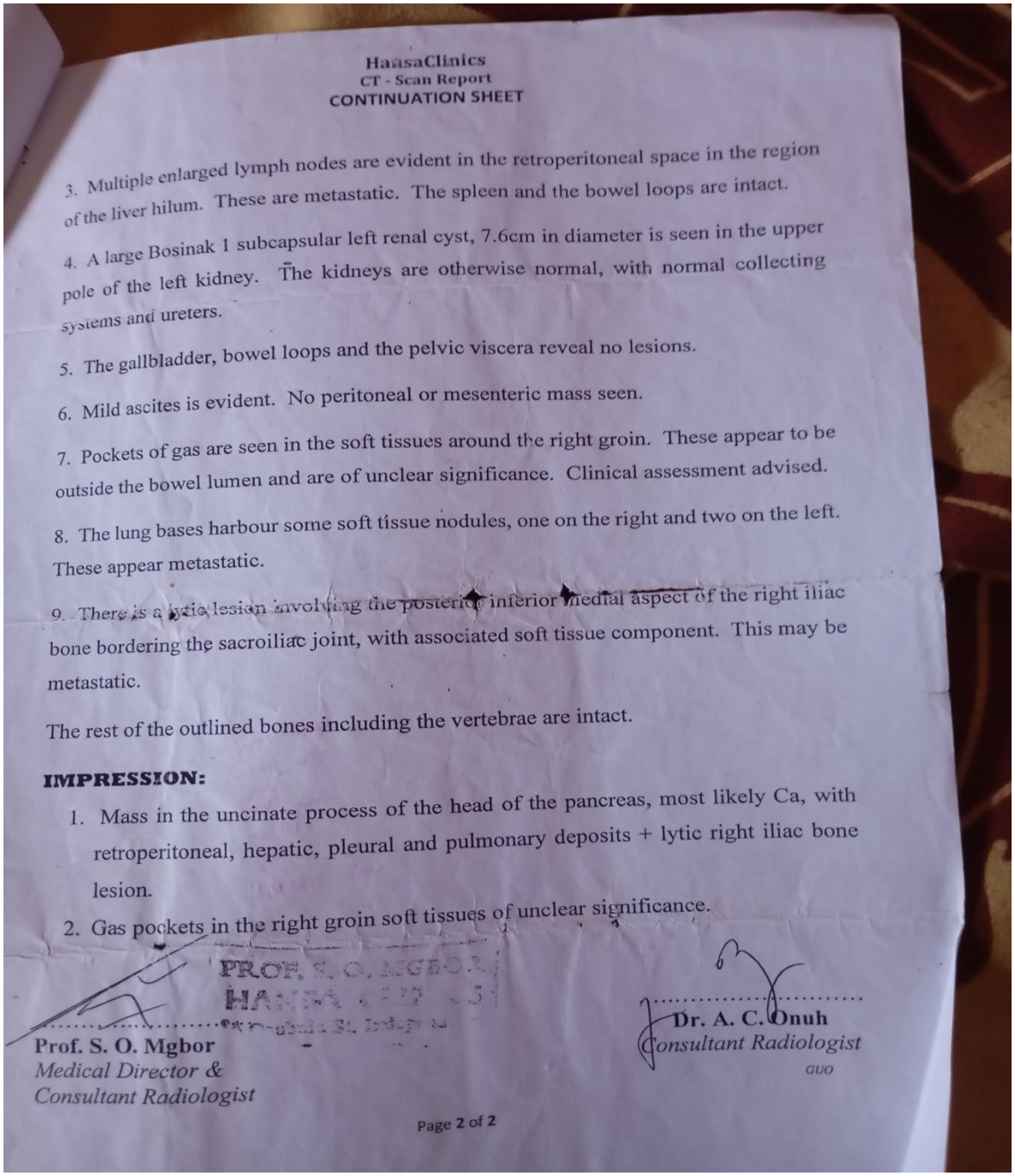

HaasaClinics
CT - Scan Report
CONTINUATION SHEET

3. Multiple enlarged lymph nodes are evident in the retroperitoneal space in the region of the liver hilum. These are metastatic. The spleen and the bowel loops are intact.

4. A large Bosinak 1 subcapsular left renal cyst, 7.6cm in diameter is seen in the upper pole of the left kidney. The kidneys are otherwise normal, with normal collecting systems and ureters.

5. The gallbladder, bowel loops and the pelvic viscera reveal no lesions.

6. Mild ascites is evident. No peritoneal or mesenteric mass seen.

7. Pockets of gas are seen in the soft tissues around the right groin. These appear to be outside the bowel lumen and are of unclear significance. Clinical assessment advised.

8. The lung bases harbour some soft tissue nodules, one on the right and two on the left. These appear metastatic.

9. There is a lytic lesion involving the posterior inferior medial aspect of the right iliac bone bordering the sacroiliac joint, with associated soft tissue component. This may be metastatic.

The rest of the outlined bones including the vertebrae are intact.

IMPRESSION:

1. Mass in the uncinate process of the head of the pancreas, most likely Ca, with retroperitoneal, hepatic, pleural and pulmonary deposits + lytic right iliac bone lesion.
2. Gas pockets in the right groin soft tissues of unclear significance.

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