Case Number 5
Liver Abscesses

Thomas Gatt
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Case Summary:

Demographic details:

Mr. CG, male.
Referred from: GP.

A 69 year-old smoker presented to casualty with a one month history of worsening right upper quadrant pain and lethargy. The patient also complained of constipation and decreased appetite. Initial examination revealed noticeable hepatomegaly while initial blood tests showed a very high white blood cell count coupled with deranged liver function tests. The patient underwent a CT abdomen pelvis, which showed 2 large pyogenic liver abscesses of unknown origin. The patient was started on antibiotics and underwent US guided drainage of the abscesses. The pus was sent to microbiology lab for microscopy, culture and sensitivity. The patient was monitored until the abscesses began to resolve and was investigated further to try and establish the cause of these abscesses. The patient was discharged 21 days post-admission.

Presenting complaint:

Lethargy: 4 weeks
Worsening RUQ abdominal pain: 4 weeks
Decreased appetite
Worsening constipation

History of presenting complaint:

Mr. CG, a 69-year-old male, was referred to A&E, complaining with a one month history of lethargy and worsening abdominal right upper quadrant pain with no radiation. The patient also gave a history of worsening constipation and decreased appetite. He was seen by his GP, who prescribed omeprazole and antibiotics to no effect. The patient had no nausea, no vomiting and no lower urinary tract symptoms, however admitted to occasional night sweats, chills and rigors. No fever was documented.

Past medical and surgical history:

Past medical history:

Previously healthy. Nil of note.

Past surgical history:

Previously healthy. Nil of note.

Drug history:

Drug	Dosage	Frequency	Type	Reason
Omeprazole	20mg	BD	Proton Pump Inhibitor	Relief of RUQ pain
Forceval	1 tablet	Daily	Antacid	Reduces stomach acid

Family history:

Nil to note.

Social history:

Mr. CG is married and lives with his wife. He admits to smoking 2 packets a day since he was young and drinks alcohol socially.

Systemic inquiry:

- General Health: Looks well in general, patient appeared dehydrated
- Cardiovascular System: Lower limb oedema noted
- Respiratory System: Crepitations heard at base of left lung
- Gastrointestinal Tract: Constipated, distended abdomen, tender epigastrium and RUQ pain. 3cm finger breath hepatomegaly was noticed. DRE normal.
- Genitourinary System: Nil of note
- Central Nervous System: Nil of note
- Musculoskeletal System: Nil of note
- Endocrine System: Nil of note

Current Therapy:

Drug	Dosage	Frequency	Type	Reason
Hartmann's solution	1L	8-hourly	Rehydration IV solution	To ensure good hydration
Omeprazole	30mg	BD	Proton pump inhibitor	Inhibits acid production in stomach
Ranitidine	50mg	TDS	Histamine receptor antagonist	Inhibits acid production in stomach
Paracetamol	1g	6 hourly	Analgesic	Pain relief

Discussion of results of general and specific examination:

On general examination, the patient appeared alert, oriented and well. The patient did not appear to be jaundiced, pale or cyanosed. His pulse was measured at 90 beats per min, with an SpO2 of 99% on air and a blood pressure of 135/82. The patient was afebrile, with a body temperature of 37.2°C.

Examinations of the cardiovascular and respiratory systems were unremarkable. A normal respiratory rate of 18/min was observed, together with equal air entry on both sites. Minimal lower limb oedema and crepitations at the base of the left lung were the only features of note.

An abdominal examination revealed a tender and distended abdomen, specifically with right upper

quadrant pain. A 3cm fingerbreadth hepatomegaly was found. The patient had no nausea, diarrhoea or vomiting. A digital rectal exam was found to be normal, as was examination of the hernial orifices.

In view of the examination findings, the patient was initially sent for x-rays of the chest and abdomen.

Differential diagnosis:

- Peptic ulcer disease
- Acute cholecystitis
- Pancreatitis
- Appendicitis
- Musculoskeletal pain
- Intestinal obstruction
- Liver abscess

Diagnostic procedures:

Laboratory Exams:

Test: Blood tests 11/12/14 and 12/12/14
Justification for test: Obtain baseline values and make a diagnosis according to the clinical findings.
Result:
Complete blood count:
White blood cell count: 21.3 x 10^9/l [4-11x10^9/l]
Neutrophils: 19.44 x10^9/l [2-7.5x10^9/l]
Urea and electrolytes: Normal
Creatinine: Normal
Amylase: Normal
Urinalysis: Negative
Liver function tests:
Alkaline Phosphatase: 235U/l [40-129U/l]
Alanine aminotransferase: 43U/l [5-41U/l]
Gamma Glutamyl Transferase: 160U/l [8-61 U/l]

Test: Microbiology Culture & Sensitivity (13/11/14)
Justification for test: Pus was sent to the lab to identify the organisms causing the pathology.
Result: Abundant polymorphs, gram positive cocci in clusters and in chains as well as gram negative rods were found. Eventually a more detailed report identifying cultures of *Klebsiella pneumoniae (K. pneumoniae)* and *Morganella morganii (M. morganii)* was later issued.

Radiological and Instrumental investigations:

Test: Chest Xray (11/11/14)
Justification for test: Basic Investigation and to identify possible pathology.
Result: No abnormality detected.

Test: Abdominal Xray (11/11/14)
Justification for test: Basic Investigation and to identify possible pathology.
Result: Faecal loading and gas.

Test: CT Abdomen and Pelvis (11/11/14)
Justification for test: To identify cause of leucocytosis.
Result: Two non-communicating abscesses located in the liver which containing fluid and gases.

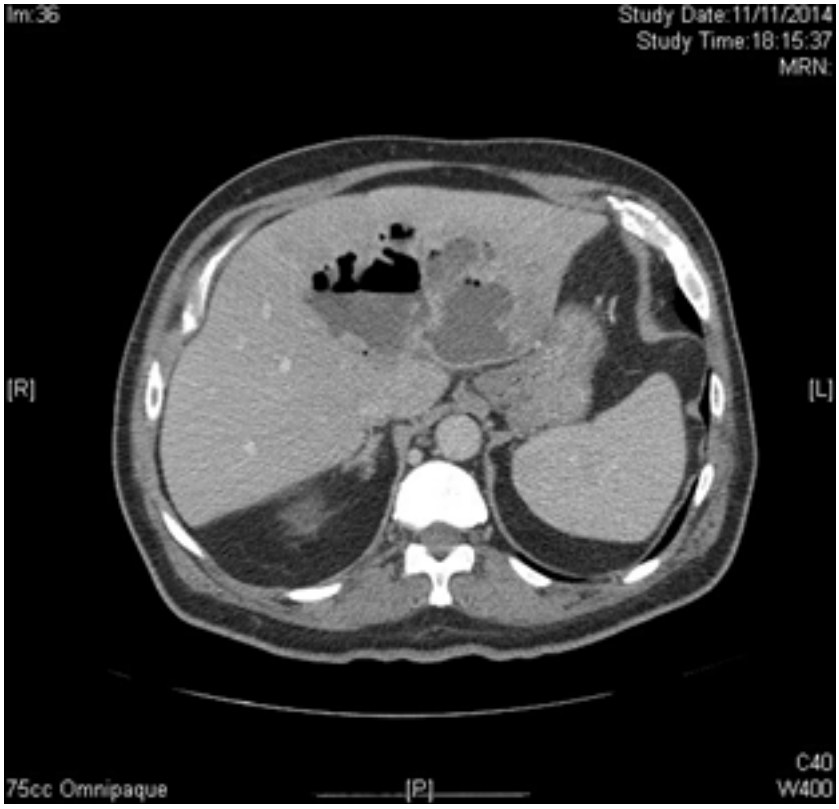

Figure 1: The CT Abdomen Pelvis showing the 2 non-communicating abscesses. Note the irregular shaped margins and the fluid-gas levels present.

Test: Colonoscopy (21/11/14)
Justification for test: To identify any potential sources of infection which could have led to abscesses.
Result: Normal, except for a polyp found at 30cm which was removed.
Conclusion: No potential sources of infection detected.

Test: MRI of Pancreas (still pending at time of writing)
Justification for test: Non-urgent investigation to exclude any biliary strictures.
Results: n/a

Therapy:

Drugs:

Drug Name	Dosage	Frequency	Type	Reason
Enoxaparin	40mg	Daily	Anticoagulant	Thromboprophylaxis in immobile patient (high risk due to smoking)
Tazocin	4.5mg	TDS	Antibiotic	Broad spectrum antibiotic

Metronidazole	500mg	TDS	Antibiotic	Broad spectrum for anaerobic bacteria

Management:

The patient was admitted, his parameters monitored and bloods and urine samples were taken. Initial chest and abdominal x-rays revealed nothing significant. A CT scan was carried out, revealing two liver abscesses. The patient was kept nil by mouth, given 1 litre IV Hartmann's solution 8 hourly and started on a 4.5mg dose of the antibiotic Tazocin, three times daily. The patient's WBC and LFTs were abnormally high as indicated in the section on Laboratory Investigations above.

On day 2 post admission, an ultrasound-guided drainage of the liver abscesses was ordered. The patient was started on a 500mg dose of metronidazole IV, three times daily.

On day 3, the patient was seen to be well and appeared to be responding to the antibiotic therapy. His abdomen was soft and non-tender on examination. Two 12F drains were inserted into the two liver abscesses under ultrasound guidance. The drains were attached to bags and allowed to drain freely, collecting around 230mL of pus. No immediate complications occurred. The pus was sent to the microbiology lab for microscopy, culture and sensitivity (MCS) testing. A direct gram stain report from the microbiology lab showed the pus to contain a mixture of gram positive cocci in clusters and chains, as well as gram negative rods.

On day 5, it was noted that the patient's WBC count had decreased from 16.8 to 14.8. The liver function tests were however still deranged with a high ALP of 191 (normal range; 40-124) and a high GGT of 141 (normal range; 8-61). The two drains in the upper abdomen collected a further 50ml each since last recorded two days previously.

On day 8, the WBC had decreased further to 14.1, however the albumin was found to have risen to 24. A detailed report of MCS from the lab showed the presence of Klebsiella pneumoniae and Morganella morganii. A colonoscopy was scheduled to exclude any colonic sources of infection which may have given rise to the liver abscesses. The case was also discussed with a consultant gastroenterologist who suggested an MR of the pancreas to exclude any biliary strictures.

The patient took bowel preparation over the next 3 days until a colonoscopy could be performed. No abnormalities were detected except for a polyp which was removed. In the meantime, the abscesses appeared to be draining well and the patient was stable. His albumin levels were increasing once again. On further questioning, the patient admitted to having had a chest infection a couple of weeks prior to admission. A follow up US was carried out to observe the resolving abscesses.

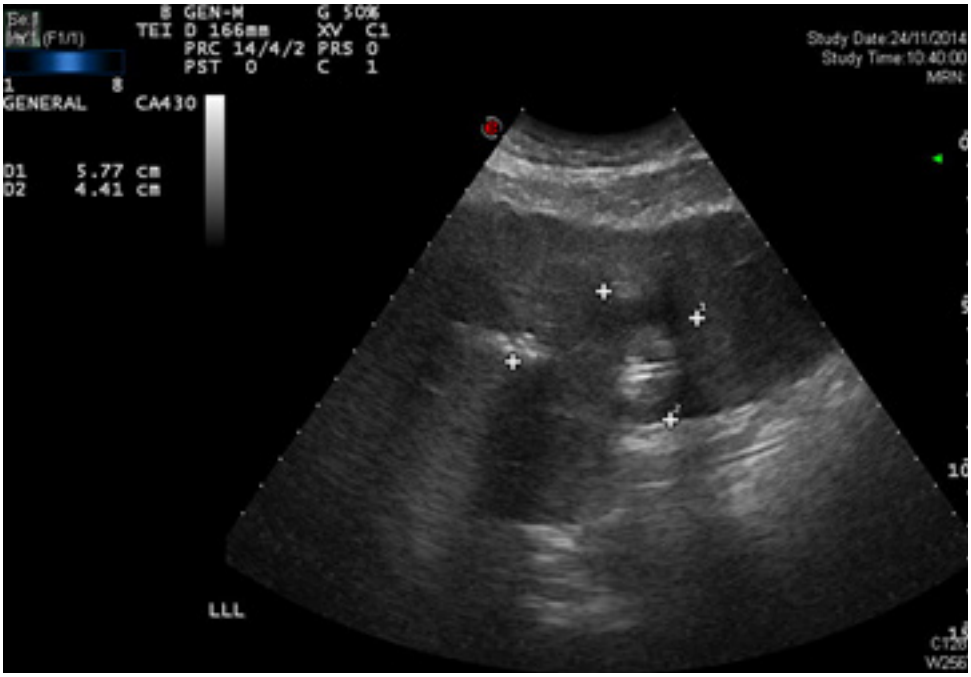

Figure 2: A follow up US scan showing the abscesses draining well and beginning to resolve.

The patient was kept in hospital until his liver function tests improved, his albumin levels increased, his CRP went down and his WCC returned to normal. Prior to discharge, the patient was discussed with microbiologists who advised levofloxacin (Tavanic) for the next 5 days and then to stop treatment. The patient was discharged 21 days post admission, with the drains intact, and scheduled to return 10 days later for drain removal and review.

Diagnosis:

There are 3 major types of liver abscesses which can be classified according to the underlying aetiology;

- Pyogenic liver abscesses, which are commonest in the Western world and are typically polymicrobial.
- Amoebic abscesses, which are more common in the developing world, the major causative organism being *Entamoeba histolytica*.
- Fungal abscesses, which generally account for fewer than 10% of cases and are typically due to *Candida* species[1-2].

In this patient, the cause of the liver abscess is seemingly cryptogenic. In normal cases, liver abscesses typically occur due to an infection in the abdominal cavity (e.g. following appendicitis or diverticulitis). Other potential causes include biliary tract infection (e.g. ascending cholangitis), septicaemia and liver trauma[3].

A prominent feature in this case is the lack of severity of symptoms the patient presented with, especially when considering the size of the abscesses formed. In 95% of cases, the patient typically presents with a high grade fever[4] which was absent in this case. Other typical symptoms of jaundice, nausea and vomiting were also absent.

K. pneumoniae, one of the pathogens found inside the abscesses of this patient, is known to be commonly associated with liver abscesses. In fact, over the past two decades *K. pneumoniae* has surpassed Escherichia coli as the prominent bacteria found in such pyogenic liver abcesses[3]. While its predominance is found to be increasing worldwide, an extraordinary significant number of cases have been documented in Taiwan[4]. Recent studies by Chen, S.C. et al which sought to compare *E.coli* and *K. pneumoniae* liver abscesses

concluded that in the case of *K. pneumoniae*, the cause is typically cryptogenic[4], as appears to be the case in this patient. However *K. pneumoniae* abscesses are also typically associated with diabetes mellitus[4] which was not the case in this particular patient.

K. pneumoniae is associated with pneumonia and other chest infections such as bronchitis or bronchopneumonia. If the patient's claim of a chest infection prior to admission is correct, this may explain the presence of the organism in his body which would have reached the liver by haematogenous spread.

The presence of *M. morganii* in the pus specimen cultured is also noteworthy. While typically a commensal gram negative bacteria found in the intestine, cases have also been documented of this pathogen in cases of pneumonia, as well as bacteraemia. Mucosal defects of the colon may provide a route for invasion of bacteria into the portal system, and subsequent spread to the liver via the blood. In a colonoscopy, performed on the patient on day 11 post-admission, no evident signs of pathology were found and it was concluded that the presence of the M. morganii in the abscess was unlikely to have originated from the colon.

In a study carried out by Jeong et al on 230 patients with pyogenic liver abscesses, they showed evidence that cryptogenic liver abscesses may actually herald colonic cancers, especially in patients with *K. pneumoniae* abscesses and diabetes mellitus. In cases were colonoscopy was indicated as a means of investigation, typical findings included carcinoma, polyps and diverticula in over 80% of cryptogenic cases[6].

Prognosis is generally positive if treated by drainage and with the correct antibiotics. In a 6-year study of 248 pyogenic liver abscesses, the mortality rate of *K. pneumoniae* was found to be only 4.1% when compared to the non-*K. pneumoniae* group which had a rate of 20.8%. No significant differences in relapse were recorded (6.4%)[7].

What makes this case peculiar is the uncharacteristic way in which the patient presented to hospital. It is difficult to deduce the exact cause of the abscesses, since it is hard to distinguish between a bacteraemia caused by a preceding infection or a primary cryptogenic abscess; both of which have been recorded in the past.

Final Treatment and Follow ups:

Following the US guided drainage of the liver abscess, the patient began to make an immediate recovery. He was discharged 21 days post-admission, with the drains intact and started on levofloxacin, 500mg daily for 6 days. After 10 days, he returned for drain removal. On review, his condition seems to have resolved completely.

Fact Box 5:

Sri Vidya Sundara

Title: Liver Abscesses

The three main forms of abscesses, as classified by aetiology are[1]:
1. Pyogenic abscess – often polymicrobial and the global incidence can be variable between 3-25 per 10,000 paediatric admissions.
2. Amoebic liver abscess - attributable to 10% of cases and is due to Entamoeba histoloytica accounts for 10%.
3. Fungal abscess – accounts for less than 10% of cases and is frequently due to Candida.

Pyogenic liver abscess (PLA) has been reported since the time of Hippocrates and account for almost 80% of all cases. Peak incidence is towards sixth and seventh decades of life and typically associated with underlying disease.[2]

Signs and Symptoms[3]*:*

- Fever
- Right upper quadrant pain
- Chills
- Nausea
- Vomiting
- Weight loss
- Jaundice

Causes of PLA[4]*:*

- Diseases of biliary tract
- Infectious gastrointestinal disorders spreading via the portal vein
- Haemotogeneous spread via the hepatic artery
- Direct extension from an intra-abdominal infection
- Trauma

Investigations[1]*:*

- Ultrasonography
- Computer tomography
- Liver function tests

Treatment and prognosis[2,5]*:*

- Small abscesses:

-Systemic antimicrobial therapy
-Broad spectrum antibiotics (administered parentally)

- Large uniloculated abscess

-Percutaneous drainage plus antibiotics

- Large multiloculated abscess

-Surgical therapy

In the last 25 years, mortality rates have decreased from 9-80% to 5-30%[6].

References:

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