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## The Acute Abdomen - Commonly Missed And Mis-diagnosed Conditions: Review

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# The Acute Abdomen - Commonly Missed And Mis-diagnosed Conditions: Review

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## Abstract

The varying presentations of acute surgical conditions make diagnoses often challenging. The commonly missed or misdiagnosed surgical conditions include acute appendicitis, testicular torsion, mid-cycle ovarian pain, femoral hernia, rectus sheath haematoma, diaphragmatic injury, aortic aneurysm and ischaemic bowel. This article provides a review of the literature on commonly missed and misdiagnosed conditions in the acute abdomen which are particularly important for junior surgical trainees.

## Introduction

Acute abdominal pain accounts for 50% of the emergency general surgical workload. Often the cause of an acute abdomen is not obvious and can be missed by a junior doctor in the early part of their training. The same disease or surgical condition can present in many different ways. For example, a patient with acute appendicitis may present as right iliac fossa pain without any clinical signs or, on the other extreme, the patient may present with diffuse peritonitis. Visceral pain, which appears early in abdominal pathology, is poorly localised and may be responsible for part of the delay in the diagnosis. For example, the testes arise from the mesonephros at the level of L2/3 segment and their nerve supply come from the T10 sympathetic segment. Therefore, testicular pain is often referred to other regions of the abdomen and may be ill defined. Similarly, because of pain being referred along the dermatomes, patients with a medical condition such as herpes zoster may get referred to surgeons. This article aims to provide a concise review of commonly missed diagnoses in the acute abdomen where the diagnosis may not be obvious.

## Methods

A review of the literature was undertaken from 1950-2009 in Pub Med and Embase databases using the key words 'acute abdomen' and 'missed diagnosis in acute abdomen'. Abstracts and full text articles

were reviewed when appropriate.

## Various surgical conditions which are commonly missed and misdiagnosed

### Hernia

Femoral and spigelian hernias may be easily missed. If an elderly patient presents with a chronic irreducible hernia and vomiting, then these herniae should be considered in the differential diagnosis and dealt with promptly. An incarcerated painless hernia may still be responsible for intestinal obstruction. The presence of pain in a hernia may indicate incarceration, strangulation or ischemia of the contents, although the degree of ischemia is difficult to determine.

### Groin hernia

As a cardinal rule, hernial orifices should be carefully examined in all cases of acute abdomen, particularly in elderly patients with vomiting. A femoral hernia can be easily mistaken for inguinal lymphadenopathy because of the absence of a cough impulse. Figure 1 shows a laparoscopic view of a femoral hernia illustrating the small size of the defect. Anatomy of the femoral hernia is prone to variation and localising pain and cough impulse may be absent and all these make the clinical diagnosis of femoral hernia difficult.

### Parietal (Spigelian) hernia

This hernia typically appears lateral to the rectus abdominis, either at the spigelian aponeurosis[1], or at the arcuate line (Figure 2). It can be mistaken for an intra-abdominal pathology and the clinical diagnosis may not be obvious in all cases. The hernia slips between the anterior abdominal wall muscles and contraction of the abdominal wall may worsen the pain. A computed tomography (CT) scan may settle the diagnosis when in doubt.

### Intra abdominal hernia

Intra-abdominal or internal herniae can present with features of intestinal obstruction. Morgagni hernia[2], in a congenital diaphragmatic hernia, can present as dyspnoea or pneumonia [3] or with abdominal signs. Hiatus hernia are of two types namely sliding and rolling. Both can present as severe epigastric pain and the rolling type of hernia may contain tormented stomach. Chest X-ray or a CT scan may show the stomach and

intestines in the chest cavity.

### **Urogenital**

Renal or ureteric colic can be confused with intestinal pathology and musculoskeletal pain. In ureteric colic, the urine dipstick is not always positive for blood. Only 85% of patients with ureteric colic show dipstick positive haematuria. Pain from the intervertebral disc compressing the spinal nerves and an abdominal aortic aneurysm may mimic ureteric colic. Unilateral flank pain in a patient with previous deep vein thrombosis or atrial fibrillation could be due to a renal infarct[4]. Another common condition in elderly males is acute urinary retention which can present as a pelvic mass and abdominal pain. As a rule, all patients with a pelvic mass should be catheterised first before re-examination to exclude a distended bladder.

### **Testicular torsion**

Testicular torsion, a common presentation in adolescent boys, can become a medico-legal issue when missed [5]. The patient may present with a supra pubic or an ill-defined abdominal pain and vomiting. In all teenage and adolescent boys with abdominal pain, testicular torsion should be excluded by careful examination. If there is any suspicion of a testicular torsion, the scrotum should be promptly explored, orchidopexy should be performed as soon as possible and both testes should be fixed. Torted hydatid of Morgagni or adnexal torsion [6] can be mistaken for a torsion of the testis. In adnexal torsion a blue dot sign may be present if it is ischemic. A duplex scan may show the arterial flow in the cord and testes however, it cannot reliably exclude torsion. 360-720 degree torsion is required for complete testicular vessel occlusion. Hence all suspected torsion should be explored without delay. Testicular torsion can occur after vasectomy. Torsion of an undescended testis can be mistaken for a groin hernia.

The common misdiagnosis for testicular torsion is epididymo-orchitis. In epididymo-orchitis, the patient may show signs of urinary tract infection and the pain will be less when the testis is elevated. Often the epididymis is enlarged and tender.

### **Prostatitis**

Prostatitis can present as perineal pain. The diagnosis may be obvious only on digital rectal examination. Benign prostatic hypertrophy can be often confused with prostatitis. Prostatic massage and culture of the fluid may confirm the diagnosis. It may require antibiotics such as Ciprofloxacin for at least four weeks.

### **Acute appendicitis**

It is commonly confused with pelvic inflammatory disease and midcycle pain. Depending upon the location the presentation may vary. Pre-ileal appendix

may cause diarrhoea while pelvic appendicitis when it irritates the bladder, the patient may have urinary symptoms. A subhepatic appendix may be confused for cholecystitis while a retrocaecal appendix may mimic Pyelonephritis. With the use of laparoscopy and scans, they may be differentiated.

### **Gynecological**

Any fertile female with abdominal pain, shoulder tip pain and a positive pregnancy test should be assumed to have an ectopic pregnancy. Patients with pelvic inflammatory disease (PID) may get admitted under the care of the surgeons. Usually there will be offensive vaginal discharge and pelvic pain. On bimanual or digital rectal examination, movement of the cervix (cervical excitation) may elicit pain. Intra-uterine contraceptive devices and unprotected intercourse are predisposing factors for PID. Often, because both fallopian tubes are involved, there is absence of migration of pain. Bilateral iliac fossae tenderness, and absence of nausea and vomiting may indicate PID[7]. Ovarian pathology may present with abdominal pain. Mid-cycle pain in the iliac fossa is due rupture of ovarian follicle and release of fluid. Rupture of ovarian cyst, polycystic ovarian disease and endometriosis are common and may mimic acute surgical abdomen.

### **Trauma**

It is easy for surgical conditions to be missed after polytrauma. Aortic transection can be missed after deceleration injuries, specially in patients not wearing a seatbelt and can lead to rapid death[8]. CT aorta is required to confirm an aortic transection. Diaphragmatic rupture following trauma is often missed and can present as visceral herniation[9] at a later date. They should be repaired by direct suturing of the diaphragm with or without a mesh in the acute setting via thoracic or abdominal approach. A pseudo aneurysm can be missed in penetrating injuries[10], in particular after conservatively managed splenic injuries. Unless promptly diagnosed and treated it can present as an abdominal catastrophe from rupture of the pseudo aneurysm. Late haemoperitoneum with ruptured spleen is at least as likely to be due to secondary rupture of a subcapsular haematoma as a false aneurysm of the splenic artery.

### **Rectus sheath haematoma**

These are more common in patients who are on anticoagulants after cough or strenuous exercise. A rectus sheath haematoma can be difficult to diagnose. They can be mistaken for intra abdominal pathology and a CT scan is usually needed to confirm the true nature[11]. Active extravasation of the contrast indicates ongoing bleeding which means the patient may require angio-embolisation. However most

patients with such rectus sheath haematomas usually settle with conservative treatment.

#### **Medical conditions mimicking an acute abdomen**

Common medical conditions mimicking acute abdomen include basal pneumonia, diabetic keto acidosis, hereditary angioedema, purpura, and Herpes Zoster which can mimic cholecystitis or appendicitis but can also be concomitant with these pathologies. In pneumonia the pain may be referred to the upper abdomen but usually does not cross the midline, hence the need for careful chest auscultation. Unilateral chest conditions can produce pain which usually do not cross the midline of the abdomen. Viral and bacterial infections may mimic acute surgical abdomen.

#### **Viral infections**

Viral gastroenteritis may mimic colitis. The tenderness on palpation is usually diffuse in gastroenteritis and other family members may be affected. Herpes Zoster can affect the thoracic and lumbar spinal nerves and may present with abdominal pain in the early stages before the rash appears to make the diagnosis less obvious. Mesenteric adenitis is common in children and is a differential diagnosis for acute appendicitis. There may be an attendant sore throat or respiratory symptoms along with the abdominal pain. The area of tenderness may be more positional and less marked than in true appendicitis. CT scan may confirm the diagnosis. Nevertheless, the diagnosis is usually made at diagnostic laparoscopy or during open appendicectomy.

#### **Bacterial infections**

Patients with a bacillary type of dysentery or food poisoning can present with diarrhoea and vomiting[12]. In dysentery, there may be bleeding per rectum and the patient will be septic. Stool microscopy will show plenty of pus cells and culture may be positive. Quinolones such as norfloxacin are helpful in bacillary dysentery. The differential diagnosis includes inflammatory bowel disease and ischaemic bowel.

#### **Endocrine**

Endocrine causes of abdominal pain include diabetic ketoacidosis, acute adrenal failure, pheochromocytoma, thyrotoxicosis, and thyrotoxic and hyperparathyroid crisis.

#### **Diabetic ketoacidosis**

The cause of abdominal pain in diabetic ketoacidosis (DKA) may be due to electrolyte or metabolic derangement[13]. Whenever a patient presents with non-specific abdominal pain and glycosuria, DKA should be considered. There are instances in which DKA mimicked appendicitis and patients were found to be in coma after appendicectomy[14]. There are also reports in the literature of DKA patients undergoing

laparotomy because of diagnostic error. Appropriate medical treatment of DKA often leads to resolution of the abdominal pain. If the abdominal pain persists after successful treatment of DKA, the underlying cause of the abdominal pain should be sought and treated appropriately. Rarely appendicitis can precipitate DKA.

#### **Hypercalcaemia**

Hypercalcaemia is often secondary to parathyroid problem which is common in renal disease. It may present as 'bones, stones, abdominal groans and psychiatric overtones'. Bones may ache from osteitis fibrosa cystica. Abdominal pain may be due to peptic ulcer (from more acid secretion) or urinary tract calculus. Increased calcium may cause constipation and confusion. The treatment for hypercalcaemia involves hydration, diuretics, and bisphosphonates or calcitonin.

#### **Haematological conditions**

Apart from a sequestration crisis, sickle cell patients may also present with splenic infarct, gallstones and appendicitis[15]. Cholecystitis in a sickle cell patient can be easily mistaken for sickle crisis. Treatment of any underlying surgical cause of abdominal pain may prolong the longevity of patients with sickle cell disease. In certain units, early cholecystectomy in sickle children as young as 6 years old, is often accompanied by prophylactic appendicectomy as this will exclude a surgical cause of abdominal pain in the future. Radiological imaging such as Ultrasound or CT scan should be performed to exclude treatable surgical conditions in all sickle cell patients with abdominal pain.

#### **Hepato-pancreato-biliary**

Serum amylase is rarely normal in acute pancreatitis unless the patient presents at a very late stage; it might not be high enough to be diagnostic. The patient can be misdiagnosed as gastritis or peptic ulcer disease. A serum lipase or CT is helpful if there are clinical concerns[16]. However serum lipase test may not be universally available. An elevated urinary amylase level can clinch the diagnosis as the elevation in urinary amylase level appears slightly later. An ultrasound scan is most helpful in diagnosing cholelithiasis as a cause of gallstone pancreatitis. Patients with known chronic pancreatitis may visit accident and emergency department frequently. They can be easily labelled as acute exacerbation of chronic pancreatitis. A careful history, examination and erect chest X-ray is essential to exclude other pathologies such as a perforated duodenal ulcer. In addition to pancreatitis, small bowel perforation, ischemic bowel and renal failure all can lead to an elevated serum amylase levels. However, in pancreatitis, the amylase

is much more elevated. Retrospective diagnosis of pancreatitis can be diagnosed by measuring urinary amylase once the acute episode has passed. Lipase is more sensitive than amylase for pancreatitis and specific in diagnosing pancreatitis. The lipase is not elevated in non-pancreatic hyperamylasemia such as mumps.

#### **Gastrointestinal**

Peptic ulcer perforation can be missed and the patient may be treated for acute gastritis or as appendicitis. In fact peptic ulcer perforation and bleeding was found to be a common cause of sudden deaths in elderly who are > 70 years of age. An erect Chest X-ray and occasionally an abdominal X-ray help in these situations showing a pneumoperitoneum. Only in 70% of patients, pneumoperitoneum is seen as air under diaphragm on chest X-ray. Rigler's sign is seen on an X-ray of the abdomen when air is present on both sides of the intestine. An abdominal US scan, CT and or a gastrograffin meal may help in the diagnosis and treatment planning. Patients with sealed duodenal ulcer perforations can be managed conservatively and can present with right iliac fossa pain due to the accumulation of leaked gastric contents. In the elderly, caecal volvulus is often missed. The caecum frequently assumes a 'comma-shape', and is most commonly seen in the central abdomen or the left upper quadrant. Sigmoid volvulus can be confused with pseudo-intestinal obstruction. Meckel's diverticulum containing ectopic mucosa may present as bleeding per rectum in children, can mimic appendicitis when inflamed and can present as small bowel obstruction due to a persistent band.

#### **Mesenteric ischemia**

Acute and chronic mesenteric ischemia can be missed. Acute arterial ischemia has a more dramatic presentation and should be considered in all patients with atrial fibrillation presenting with severe abdominal pain, a very high neutrophilic leukocytosis and elevated lactate in the blood. Mesenteric venous thrombosis typically presents with pain, which is out of proportion with the physical signs. The prognosis for patients with mesenteric ischemia is very poor as it is a reflection of the quality of the vasculature or of a pre mortal low flow state.

Awareness of acute vascular emergencies such as leaking abdominal aortic aneurysm (AAA) and aortic dissections can avoid a fatal misdiagnosis. It may happen in elderly confused patients. Aortic dissection can be mistaken for musculoskeletal pain. AAA can be missed in the elderly particularly who may present like ureteric colic. Leaking AAA may present with back pain or anterior abdominal pain and can be mistaken for acute diverticulitis. The patient may be in shock.

Femoral pulses are often unequal. One may feel a tender, pulsatile mass in the abdomen. Plain abdominal X-ray may show discontinuity of calcification of the aortic wall or the aneurysm itself [17].

#### **Extremes of age**

Vomiting is a manifestation of a variety of pathology ranging from gastritis, intestinal obstruction to remote pathology such as an increase in intra-cranial pressure. It is common for the elderly patient with an acute surgical abdomen to be admitted under the medical team with a diagnosis of gastritis or constipation.

Small children may pose a challenge because of their inability to express their history and similarly in elderly patients who are demented and confused it can be difficult to diagnose the exact cause of the acute abdomen.

#### **Infection**

Apart from infections mimicking acute abdomen, certain infections may feature with spectrum of presentations. Tuberculosis can present in various forms such as an intestinal stricture, right iliac fossa mass, ascites or even bowel perforation and peritonitis. It is more common in the Asian population. Actinomycosis may present with an abdominal wall fistula. Enterocolitis should be considered in neutropenic patients with abdominal pain. Travel abroad and poor hygiene may result in bacillary and amoebic dysentery, which can mimic an acute abdomen.

## Computer aided diagnosis of acute abdomen

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Computer aided diagnosis [18] was used nearly two decades ago but it has been phased out because of the availability of better imaging and biochemical techniques. Diagnostic laparoscopy has contributed significantly to reduce the morbidity of abdominal pain of undiagnosed cause. Computer aided diagnosis may reduce negative laparotomies and negative appendectomies.[19, 20]. It has been shown to reduce the appendicular perforation rates from 23 to 11% by early identification[21]. They may be useful for paramedical staff and the diagnostic accuracy is about 70%[22]. Computer assisted diagnosis may be inaccurate in some conditions such as small bowel obstruction where it is only 22% accurate[23]. Scoring systems such as the Alvarado score and protocols utilising them are helpful in the management of right iliac fossa pain.[24].

## Triaging system

Some hospital have there own triaging system for commonly missed condition in acute abdomen[25]. Such a system using standard frameworks may speed up the referral of acute surgical conditions to be referred to the surgical team rather than the medical team

## Conclusion

Nothing can replace knowledge, experience and thorough clinical examination. Whenever the diagnosis is in doubt, junior doctors should always seek advice from their seniors. Internet searches of specialist sites are another useful tool as there is rarely a problem that has not been encountered before.

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## Illustrations

### Illustration 1

Table 1

<b>Aetiology of missed and misdiagnosed acute abdomen</b>	<b>Suggested solutions</b>
1) Lack of a thorough examination  2) Co-morbidities of the patient  3) Confused patient  4) Lack of experience  5) Lack of knowledge  6) Skipping simple tests such as urine dipstick and pregnancy test	Always examine all quadrants including the inguino-scrotal area ,back and chest when appropriate  Get old notes and discuss with patients general practitioner  Imaging modalities may help  Seek senior help  Be systematic and follow the same routine with each patient

## Illustration 2

Table 2

### Authors' experience of missed abdominal diagnosis

No	Condition	Mis-diagnoses	Cause for the missed diagnosis or mis-diagnosis	Outcome
1 )	Herpes zoster along lower thoracic dermatome	Cholecystitis	Back of chest/lumbar region not initially examined	Medical management
2)	Missed caecal tumour ( the patient presented with intermittent abdominal	Ileocaecal valve dysfunction	Caecum was not assessed ( incomplete colonoscopy) and	Admitted with complete small bowel obstruction and
	WebmedCentral > Review Articles abdominal		Plain CT did not show caecal tumour	underwent right hemicolectomy

### Illustration 3

Table 2 continued

#### Authors' experience of missed abdominal diagnosis

No	Condition	Mis-diagnoses	Cause for the missed diagnosis/mis-diagnosis	Outcome
4)	Testicular torsion	Appendicular colic	Patient did not complain of testicular pain and testis was not examined	Resulted in orchidectomy
5)	AAA	Constipation	Confused patient with abdominal pain	Represented with shock and treated palliatively
6)	Cholecystitis in 4 year old	Sickle cell crisis	Being a sickler, it was thought be a crisis	Ultrasound scan helped in diagnosis and abdominal pain disappeared after laparoscopic cholecystectomy
7)	Shock from hepatic failure	ischemic limb	Pale lower limbs from shock	Died from decompensated liver failure
8)	Recent obstruction in long standing ventral hernia	Gastritis	Long standing irreducible ventral hernia. Patient was admitted as gastritis	Hernia repair cured the 'gastritis'
9)	Embolic stroke	Cholelithiasis	Weakness in right arm and leg	CT scan showed embolic stroke

11)	Missed stab injury	Single stab in the renal angle	A conscious patient presented with a single stab in the left lumbar region. The entire back was not thoroughly examined	CT showed another stab injury in the right lumbar region. Patient was managed conservatively
12)	Urinary sepsis	Anastomotic leak	A patient presented with pyrexia 10/7 after anterior resection	Obvious pus in the urinary meatus from urinary tract infection
13)	Perforated appendicitis	Urinary tract infection	A patient lower abdominal pain and dipstick positive urinary infection was admitted under medical team for 5 days	CT scan showed the condition to be an appendicitis with an pelvic abscess

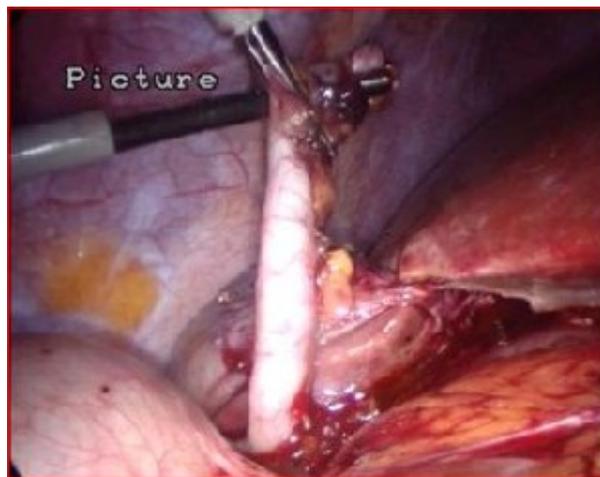
## Illustration 4

Fig 4: CT scan of abdomen in a warfarinised patient showing rectus sheath haematoma



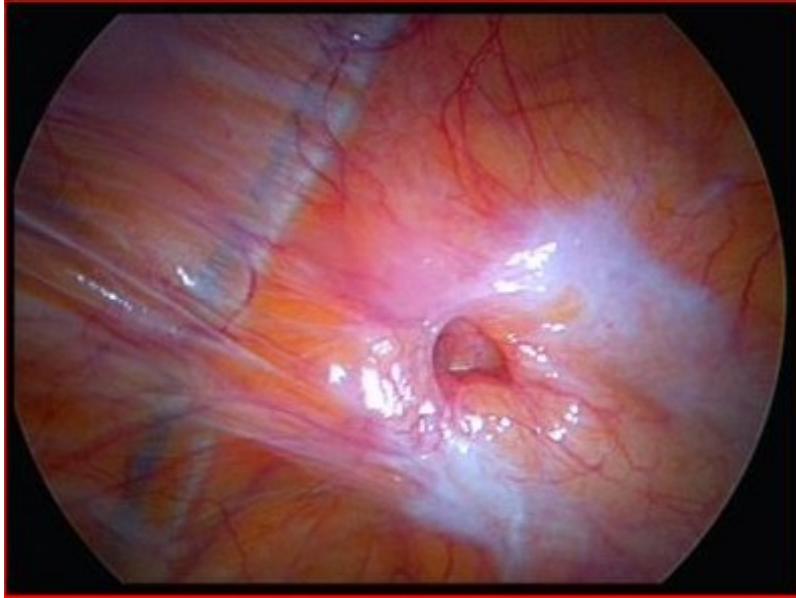
## Illustration 5

Fig 1: Diagnostic laparoscopy showed sub hepatic appendicitis mimicking cholecystitis



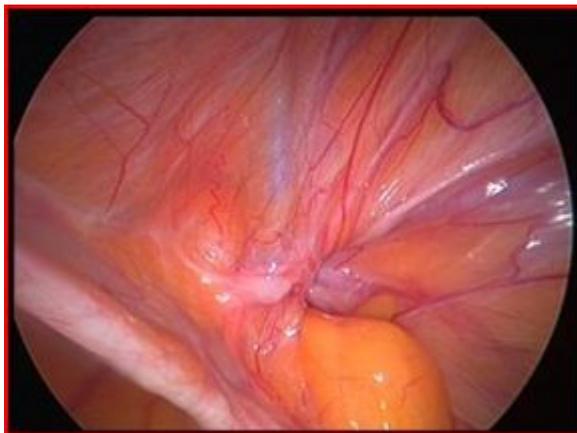
## Illustration 6

Fig 3: Laparoscopy showing spigelian hernia at the level of arcuate line



## Illustration 7

Fig 2: Laparoscopic view of femoral hernia which was diagnosed as an inguinal hernia



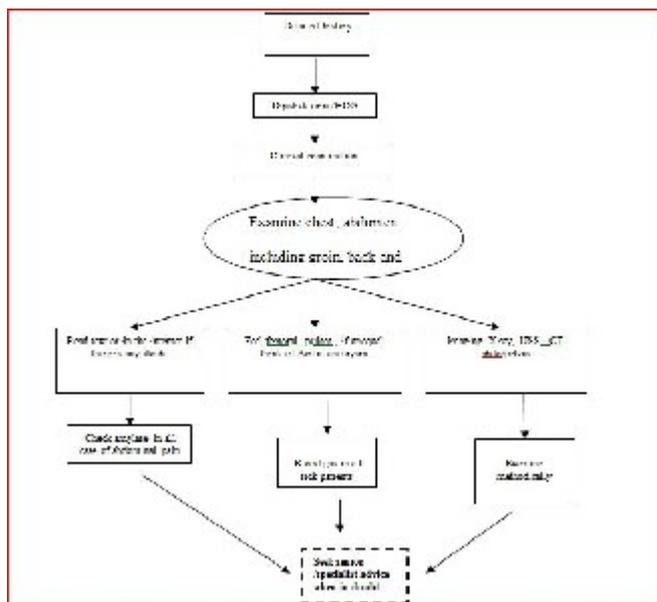
## Illustration 8

Fig 5: CT scan of abdomen in a confused patient showing leaking AAA



## Illustration 9

Fig 6: Flow chart highlighting important areas to minimise surgical mis-diagnosis



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