

Guidelines on the Imaging of Chronic abdominal pain

Introduction

Why a Clinical Practice Guideline?

The practice of radiology has changed remarkably over the past decade globally as well as in Sri Lanka. Chronic abdominal pain is a problem which should be managed in a systematic way without further delaying the diagnosis of causative factor.

Who has developed this guideline?

These guidelines have been developed by Members of the Committee on Guidelines of the Sri Lanka College of Radiologists. The Committee had a wide ranging representation of very senior to junior radiologists and clinicians who has worked in different parts of the country at different levels of hospitals to ensure that the guidelines are applicable throughout the country.

For whom is this guideline intended?

It is intended to guide all the health care providers in institutions where radiological services are offered. Although it is targeted for the institutions under the MOH, guidelines are encouraged to be used in any health care institution where availability of adequate facilities to provide radiological services is ensured.

Objectives

Provide evidence based recommendation to clinicians and radiologists to decide on the best sequence of radiological imaging, by utilizing the available resources efficiently, in order to arrive at a diagnosis, at an early stage, in the management of chronic abdominal pain to reduce morbidity and mortality

How are the guidelines structured?

Two different levels of institutions are identified in these guidelines for easy application. All institutions like Peripheral Units, District Hospitals and Base Hospitals without specialist services are considered together and the recommendations are identified in a different colour. All institutions like Base Hospitals,

Provincial Hospitals, General Hospitals and the Teaching Hospitals with specialist services available are considered separately and recommendations are given in a different colour.

1 Imaging of chronic abdominal pain

1.1 Definition

Chronic abdominal pain is defined as multiple (more than three) attacks of abdominal pain during continuous two or more months period or persistent pain for two or more months, that are sufficient enough to warrant attention.

However, this should not be a strict dividing line, even a person coming for three consultations over a period of one month needs investigation

1.2 Introduction

Chronic abdominal pain is a common complaint of patients seeing a primary care physician and it is a leading reason for surgical, gastroenterological, paediatric and gynaecological referrals. Pain usually has persisted for 3-6 months and may or may not affect the patient's activities or daily routine. Diagnosis can be perplexing as there are many causes that have wider presenting features. Therefore establishing a reasonable diagnosis in patients with chronic abdominal pain poses a significant challenge to the physician.

1.3 Causes of chronic abdominal pain in adults

1.3.1 Common causes that need to be considered at the initial presentation are,

- 1 Organic causes
GORD, Biliary tract disease, chronic pancreatitis, steatosis, endometriosis, cyclic pain, renal calculi
2. Functional abdominal pain
3. Causes of deranged physiology
IBS, bloating with constipation, non ulcer dyspepsia
4. Abdominal wall pain, costochondritis

1.3.2 Less common causes include,

1. Organic
Meckel's diverticulum, tumours arising from abdominal or pelvic organs, diverticulosis cystitis, inflammatory bowel disease, intestinal angina and abdominal migraine
- 1 Referred pain
Herpes Zoster, thoracic disc herniation

2 Diagnostic approach

- 2.1** Attempts should be made to differentiate between organic from functional causes as the latter is commoner than perceived by many physicians.
- 2.2** When the pain is organic, sinister conditions like cancer needs to be excluded early. However think of other common causes such as peptic ulcer disease, gall stones, urinary calculi early pancreatic cancer, diverticular disease, antibioticised appendicitis.
- 2.3** In many patients treatable cause can be identified however in others cause remains unknown. The dull type of abdominal pain usually falls into this category. A logical step in the care in this latter group is reassurance that the pain is real but is not caused by an organic illness.
- 2.4** Careful assessment by taking a precise history and performing a thorough examination should result in an appropriate diagnostic and investigative strategy.
- 2.5** History, examination and investigations should be directed at above mentioned common causes and in the next stage other less common causes should be entertained unless there are alarming symptoms or signs such as loss of appetite, loss of weight, bleeding per orifices, pallor or mass lesions warranting a more vigorous diagnostic approach.

- 2.6** However one should be cautious about waiting for alarming signs as they are late signs of the disease, indicating non curable disease in a majority. Therefore early symptoms and signs such as dyspepsia should always be attended to arrive at a diagnosis.
- 2.7** Avoid unnecessary and expensive investigation that can further complicate the initial presentation.
- 2.8** It is important to investigate abdominal pain of adults and elderly at an earlier stage than in children as the causes are mostly organic in the former group.

2.9 List of Abbreviations

AAA	-	abdominal aortic aneurysm
		cholangiography
CRP	-	C-reactive proteins
CT	-	computed tomography
CTU	-	computed tomographic urography
DCBE	-	double contrast barium enema
ERCP	-	endoscopic retrograde
GI	-	gastrointestinal
GORD	-	gastro oesophageal reflux disease
GUT	-	genito urinary tract
IBS	-	irritable bowel syndrome
KUB	-	kidney, ureter, bladder
MRCP	-	magnetic resonance cholangio
MRI	-	magnetic resonance imaging
MRI	-	magnetic resonance imaging
		pancreatography
UGIE	-	upper gastro intestinal endoscopy
US	-	ultrasonography

2.10 The choice of imaging should be based on the following,

- Age
- Gender
- Symptomatology and provisional clinical diagnosis
- Availability of imaging modalities
- Cost of imaging modalities
- Radiation hazard (particularly in children and / child bearing age group / pregnant mothers but every body)
- Whether looking for a common or an uncommon cause

2.11 The imaging methods used in chronic abdominal pain and their limitations.

Investigation	Recommendations & Limitations
US scan	Mostly a screening test Diagnostic test for gall bladder disease (X) Not very sensitive for bowel pathology, excluding intussusception. Normal US scan does not exclude disease
Colour Doppler US scan	Detects vascular pathologies such as aneurysms, thrombosis, leaks and dissections (Y)
Plain X – ray abdomen	Useful in chronic calcific pancreatitis (Y) Obsolete in gall bladder pathology
X – ray GUT/KUB	To detect renal calculi / calcifications (X) May miss small / lucent / less heavily calcified calculi
Barium meal	To detect gastric outlet obstruction (Y) Obsolete in peptic ulcer disease. Less commonly used in gastric carcinoma (Z)
Small bowel enema	Useful in small bowel pathology (X) Small bowel enema is reliable and diagnostic in inflammatory and neoplastic diseases.
Barium meal follow through	Small bowel enema has mostly replaced this. But when fluoroscopy facilities are not available this is used to detect pathology in small bowel.
CT abdomen	Useful in characterization and localization of lesions (X) Used in staging malignancies (X) CTU detects small renal / ureteric calculi (X) Investigation of choice in pancreatic pathology (X)
MRI scan	MRCP is useful in bile duct pathology Important in gynaecological pathology such as adenomyosis (X)
MR enteroclysis	Used to detect small bowel pathology as in the case of small bowel enema. Non availability and costs are drawbacks (Z)
Nuclear imaging	Useful in detecting Meckel’ s diverticulum (X) And when the site of bleeding needs to be detected in cases of tumours or angiodysplasias

2.12 Imaging Protocols

This document provides with two imaging protocols. If the pain is attributed to a system protocol 2.6.1 can be selected. If the pain is located to a site rather than specific to a system protocol 2.6.2 can be selected.

2.12.1. Imaging protocols by the Systems

2.12.1.1 Upper GI (gastro oesophageal)

1. Upper GI endoscopy- helps diagnosis of all mural / luminal lesions.
Requires expertise- Invasive
2. US scan- easily available,
Conventional US is less useful for mural / luminal lesions.
3. Endoscopic US -Very informative
Not freely available
4. Barium meal – obsolete in peptic ulcer disease. But used in oesophageal motility disorders contributing to epigastric pain particularly in institutions where UGIE is not available

2.12.1.2. Pancreatico Hepato biliary

1. US scan – the best single investigation often the only one necessary in gall bladder disease. Screening test for pancreatic pathology. Enable the biopsies
2. CT scan- may improve and supplement the findings of US scan. Essential for tumour staging. Imaging method of choice for pancreatic diseases.
3. MRCP – may supplement biliary tract imaging
4. ERCP/Endoscopy- delineates ampullary, pancreatic and bile duct pathology
5. Plain radiography – may be used to detect pancreatic calcifications if chronic calculous pancreatitis is suspected clinically or on US.
Obsolete for gall stones

2.12.1.3. Lower GI pathology

1. Double contrast Barium enema and screening (DCBE) excludes pathology in entire colon, such as polyps, diverticula, carcinoma and motility dysfunction
2. Small bowel enema (Enteoclysis) – detects pathology in small bowel from duodenum to ileo caecal junction. Replaces barium meal follow through study which may still be done in places where facilities for fluoroscopy are not available. Useful in suspected ileo caecal tuberculosis
3. Flexible sigmoidoscopy- detects the lower GI pathology of the left colon
4. Colonoscopy – absolutely necessary for biopsy, interventions like polypectomy, Detects mucosal lesions like flat polyps, angiodysplasia
5. CT Colonography – very useful but not freely available. Detects lesions as in Barium enema, non invasive, may even replace Barium enema if freely available . Insertion of rectal tube, barium solution instillation and screening not required
6. MR enteroclysis – used to detect small bowel pathology such as inflammatory, neoplastic without the hazel of swallowing of Barium solution and radiation from fluoroscopy. Cost and availability are limiting factors.

2.12.1.4. Genitourinary tract

1. **US scan** – The primary imaging method of choice . Detects calculi in kidneys, ureters or bladder. Small mid ureteric / renal calculi may be missed on US Easily detects ovarian, uterine, tubal, testicular and epididymal pathology. Transvaginal scan is indicated in gynaecological problems. TRUS is useful in prostatic and seminal vesicle pathology
2. **Plain radiography** – detects radio opaque (80%) renal calculi. This has become the second line investigation in urinary tract following the introduction of US
3. **IVU** – mostly done to demonstrate structural detail of the urinary tract as an adjunct to US scan / if CT is not freely available.
4. **CT scan** – CTU demonstrates small renal and ureteric calculi easily (100% sensitivity). Essential in characterization of mass lesions and staging of tumours in kidneys, ovary, uterus and testis
5. **Nuclear imaging**- absolutely necessary for functional imaging prior to surgical / interventional management of obstructive renal pathology
6. **Nephrostogram**- useful interventional radiological technique to delineate urinary tract in obstructive uropathy mostly to demonstrate the ureter
7. **MRI** – useful in cases of endometriosis and

adenomyosis. In males, rare abdominal pain due to pathology in undescended testis may warrant this

2.12.1.5. Vascular system

1. **US scan** – The primary imaging modality, detects aortic / iliac aneurysms easily and accurately particularly with colour Doppler. Detects complications such as thrombosis, but less sensitive for slow leaking and dissection
2. **CT scan** – absolutely necessary for assessment of aneurysms. Particularly to detect leaking aneurysms causing vague abdominal pain
2. **MRI scan** – detects dissecting aneurysms easily

2.12.2. Imaging protocols of chronic abdominal pain according to the site of pain

2.12.2.1. Chronic right hypochondrial pain

Common causes are gall stones related and are less commonly related to the liver pathology. Chronic liver congestion as in CCF or a space occupying lesions such as primary or secondary tumours of the liver causes dull ache in the right hypochondrium. Referred pain from the spine and costochondritis are among the other possible causes.

1. Establish if the pain is abdominal wall or referred pain or intra abdominal.
2. In cases with established intra abdominal pain, do a sonographic examination and look for gall bladder calculi or other gall bladder pathology or masses arising from organs related to the RHC (liver, pancreas, right kidney / adrenal, hepatic flexure) which could possibly contribute to a RHC mass.
3. If the US is positive for gall bladder calculi without signs of CBD calculi / obstructive jaundice, further investigation is not required. However analysis of symptoms should be carefully made together with a positive US results as gall stones may be only incidental.

4. If the US is positive for gall bladder calculi with signs of CBD calculi / obstructive jaundice, further investigation is required by means of either ERCP or CT abdomen depending on the availability and or presence of associated pancreatic disease (X). MRCP may be used to assess the biliary duct system (Y) as an alternative
5. If the US is negative or that the presence of gall stones alone does not explain the symptoms, then upper GI endoscopy should be done. (X)
6. If the US is positive for a mass you may proceed to the following investigations depending on the organ of origin of the mass (X)
 - E.g. Pancreas / liver / renal / Adrenal – CT abdomen - for characterization and staging
 - Hepatic flexure –
 - Barium enema - for confirmation of diagnosis
 - Colonoscopy – confirmation and histological diagnosis
 - CT- staging

2.12.2.2 Chronic Epigastric / LHC pain

The site of the pain may overlap with RHC and LHC. Common causes include GORD, gastric / duodenal ulcers, chronic pancreatitis. IHD and pain arising from AAA, retroperitoneal lymphnodes, pathology of left lobe of the liver, and epigastric hernia may also cause epigastric pain.

1. In cases of intra abdominal pain, if the history is suggestive of peptic ulcer disease/ GORD, go for UGIE (X)
2. In cases of intra abdominal pain, even if the history is suggestive of peptic ulcer disease / GORD do a sonographic examination (X) to exclude following
 - a. associated gall bladder disease
 - a. associated pancreatic pathology
 - b. masses arising from organs related to the epigastrium (Left lobe of liver, pancreas, stomach, spleen, transverse colon and hepatic flexure)
 - c. renal pathology such as calculi / masses and hydronephrosis due to various causes
- 3 Do a plain radiograph of abdomen if chronic pancreatitis is suspected to exclude pancreatic calcification (Y)
- 4 If the history is highly suggestive of pancreatic pathology CT abdomen should be performed as it is the investigation of choice for the pancreas, irrespective of the findings of other investigations to establish the diagnosis of acute on chronic or chronic pancreatitis and to exclude possible pseudo pancreatic cysts or neoplasms (X)

- 5 Do an X –ray KUB in cases of LHC pain if renal calculi are suspected on the history or on the US scan (Z)
- 6 Barium meal should be done in cases of UGI pathology where UGIE is not available / accessible or an obstructive element is suspected (Y)

2.12.2.3 Chronic RIF pain

RIF pain is mostly due to bowel pathology. Appendicular, caecal and ileal pathology contributes mostly. One must remember other causes such as muscular, commonly psoas abscess or haematoma, vascular pathology in external iliac or common femoral vessels as less common possibilities.

In females ovarian pathologies needs to be excluded as possible cause of pain in this site

1. Do a screening US examination to exclude bowel masses, masses arising from muscles in relation to RIF or possible ovarian masses in females. (X) Colour Doppler should be done to exclude possible vascular pathology
2. If US is positive for a mass lesion, CT scan is done for further characterization and for staging purposes in case of a malignancy. (X)
3. Irrespective of US findings, if the symptoms are suggestive of bowel pathology Barium enema / small bowel enema is recommended depending on the bowel symptoms. (X)

4. Colonoscopy would be performed if the site, character of pain and associated symptoms are suggestive of large bowel pathology and if the facility is available or accessible. (X)

2.12.2.4. Chronic Hypogastric and LIF pain

Hypogastric and LIF pain are mostly gender related. In females mostly ovarian, uterine and tubal causes contribute to the pain. Testicular pathology related to undescended as well as normally located, epididymal, prostatic or seminal vesicular pathology are possible causes in males. Bladder and large or small bowel pathology are common for both categories.

1. Do a screening US examination to exclude masses arising from ovary, uterus or fallopian tubes in females. Prostate or seminal vesicles in males. Urinary bladder or bowel in either sex.
2. If US is positive for a mass lesion, CT scan is done for further characterization and for staging purposes in case of a malignancy.
3. Irrespective of US findings, if the symptoms are suggestive of bowel pathology Barium enema is recommended. Double contrast Barium enema is the preferred method for chronic abdominal pain. Single contrast Barium enemas are performed in elderly debilitated patients (X)
4. Colonoscopy should be performed if the symptoms are suggestive of large bowel pathology (Z)

5. In females with suspected endometriosis or adenomyosis perform MRI if it is available or accessible, as it is the preferred method to assess above (X)
6. CT colonography is performed to exclude polyposis, if the patient can afford and prefers it over a Barium enema. But this may not be available in the public sector hospitals on regular basis (X)

2.1.1.1. Chronic central abdominal / peri - umbilical pain

Central or peri - umbilical pain is mostly due to mid gut pathology. However fair number of functional pain presents with peri umbilical pain, particularly in younger patients. Umbilical hernia and other abdominal wall related pathology needs to be considered in this site.

1. Do a screening US examination to exclude
 - a. masses arising from anterior abdominal wall muscles
 - b. peri umbilical / umbilical herniae
 - c. intra abdominal masses
 - d. renal pathology, particularly in children
2. If US is positive for an intra abdominal mass lesion, CT scan is done for further characterization and for staging purposes
3. Do a small bowel contrast study (small bowel enema) to exclude possible small bowel pathology such as malrotation of bowel, benign neoplasms

2.12.2.6. Diffuse Chronic Abdominal pain

Diffuse chronic abdominal pain is mostly functional. Do US scan, urine analysis, full blood count, ESR and CRP. If above are normal, no further investigations are usually required. However if there are any alarming signs such as bleeding per rectum, loss of appetite and loss of weight, should do further investigations such as CT abdomen, upper or lower GI endoscopy, small bowel studies or Barium enema depending on the symptoms.

2.12.2.7 Chronic lateral abdominal / flank pain.

Pathologies in kidneys or ureters, para colic gutters, flank muscles and ascending or descending colon contributes to this. Preliminary care physician is expected to investigate up to an ultrasound scan examination. Look for associated urinary or bowel symptoms.

1. Do UFR and Ultrasound examination of the KUB as preliminary tests
2. If UFR is positive for infection treat with antibiotics after culture (X)
3. If US is positive for stone proceed with X-ray KUB to determine the density and refer to Surgeon / Urologist.

4. If a mass is found on US, should perform a CT abdomen and pelvis to further characterize and stage in case of a tumour.
5. If US shows hydronephrosis with or without stones proceed with IVU
6. If US is negative and symptoms are suggestive of renal / urological pathology then proceed with CT Urography for small stones / urothelial tumours.
7. Do IVU and or CTU if pain is associated with haematuria irrespective of US findings
8. If the symptoms are suggestive of a bowel pathology do a Barium enema and or colonoscopy.
9. If the symptoms are suggestive of muscular / neurogenic pain then proceed with evaluating the spine including history of trauma, physical examination and plain radiographs of thoracic and or lumbar spine.
10. If there is a neurological deficit or if the investigations are inconclusive proceed with MRI. of the spine.

Chronic abdominal pain in Children

Introduction

More than one third of children complain of chronic abdominal pain. The diagnostic approach to abdominal pain in children relies heavily on the history provided by the parent and child to direct a stepwise approach to investigation.

If the history and physical examination suggest functional abdominal pain, constipation or peptic disease, the response to an empiric course of medical management is of greater value than multiple exclusionary investigations.

The differential diagnosis of abdominal pain in children varies with age, gender, genetic predisposition, nutritional exposure and many environmental factors.

It is imperative to distinguish organic from functional abdominal pain, however these opposing aetiologies are not mutually exclusive in children since psychological complications of organic disease are common.

Definition

Chronic abdominal pain in children is defined as pain of more than two weeks duration

Imaging strategy is based on the possible causes of chronic abdominal pain in children as indicated below

1. recurrent abdominal pain syndrome
2. constipation
3. peptic disorders
4. abdominal migraine
5. inflammatory bowel disease

Imaging of chronic abdominal pain in children

- Do an abdominal and pelvic sonography as a preliminary investigation to exclude non intestinal origins of pain. US is of particular value in detecting small volume of pelvic / intra peritoneal fluid.
- Do other diagnostic tests depend on the pain pattern
- If sonography is negative and if peptic ulcer disease is suspected, upper gastrointestinal contrast study and or small bowel study is performed.
- If peptic ulcer disease is suspected, upper GI endoscopy is indicated

- Barium enema is performed in the context of constipation or chronic intussusception
- Abdominal CT with contrast should be done to evaluate extra intestinal mass lesions, abscesses and retroperitoneal disease. These tests should be performed with extreme caution and after justification. Preliminary discussion with a radiologist is encouraged to reduce unnecessary radiation hazard.
- In cases of chronic diarrhoea, weight fluctuations, fever and joint pain colonoscopy may be performed to exclude inflammatory bowel disease

Reference

1. Health status and management of chronic non specific abdominal complaints in general practice ; British journal of general practice, may 2000 HAM Janssen et al.
2. Chronic abdominal pain in childhood; diagnosis and management; Alan M Lake; John Hopkins University School of Medicine, Baltimore, Maryland.
3. What could be causing chronic abdominal pain; John R. Debanto; vol 106; Sep 1999; postgraduate Medicine.
4. Chronic non-specific abdominal complaints in general practice: a prospective. Study on management, patient health status and course of complaints. Henriëtte AM van den Heuvel-Janssen¹ *BMC Family Practice* 2006, 7:12 doi: 10.1186/1471-2296-7-12.
5. Guidelines on pelvic pain, European association of Urology Feb 2003: M Fall, AP Baronowski, CJ Fowler.
6. David S. Greenbaum. (2007) Chronic abdominal wall pain (CAWP). *Neurogastroenterology & Motility* 19:1, 75-75.
7. M. Camilleri. (2006) Management of patients with chronic abdominal pain in clinical practice. *Neurogastroenterology & Motility* 18:7, 499-506
7. Radhika Srinivasan, M.D., F.A.C.P., F.A.C.G., David S. Greenbaum, M.D., F.A.C.P. (2002) Chronic abdominal wall pain: a frequently overlooked problem. Practical approach to diagnosis and management. *The American Journal of Gastroenterology* 97:4, 824-830