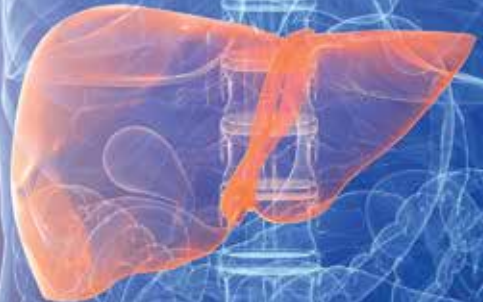


ALL ABOUT **DIGESTIVE** AND **LIVER** DISEASES

IMPORTANT CONDITIONS
AND THEIR MANAGEMENT



Centre for Digestive & Liver Diseases (CDLD)
Singapore General Hospital, Block 1, Basement 1

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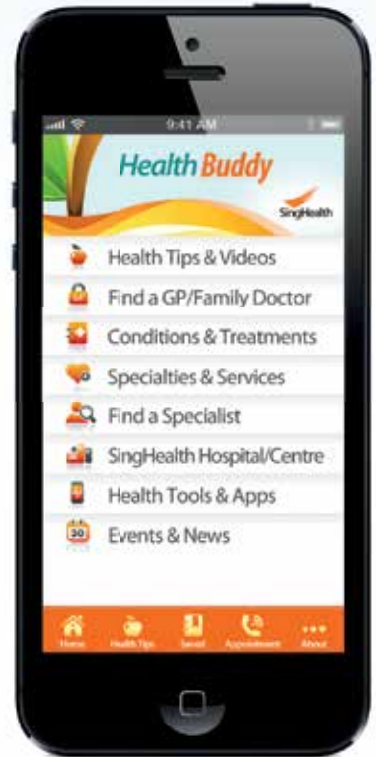
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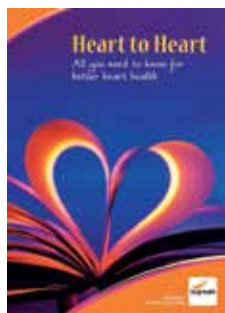
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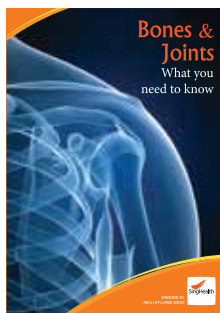
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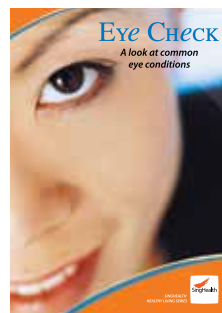
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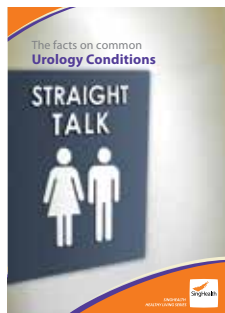
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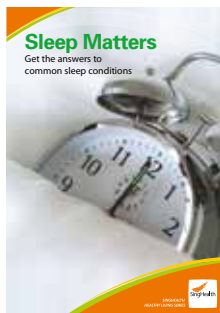
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FOREWORD

This booklet is prepared for general practitioners, patients and their caregivers. It focuses on digestive and liver disorders, both of which are common complaints in the general practitioners' clinics. To give a sense of what common digestive complaints are, the Centre for Digestive and Liver Diseases (CDLD) has approximately 140,000 patient visits annually.

The booklet is divided into two main sections:

1. common complaints and symptoms, and;
2. common diseases assessed by the four component departments of CDLD.

We believe this format will make the booklet easy to read and more targeted.

The articles are contributed by specialists from the four departments, namely: Gastroenterology & Hepatology, Hepatopancreatobiliary Surgery, Colorectal and Upper Gastrointestinal. The CDLD is the first multidisciplinary clinic in the SingHealth campus and effectively marries the medical and surgical aspects of digestive care. It is meant as a one-stop facility for patient assessment and is a step in the right direction for academic medical care.

Dr Victor Lee

Director

Centre for Digestive and Liver Diseases
Singapore General Hospital

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COMMON COMPLAINTS & SYMPTOMS

CHANGE IN BOWEL HABIT

What constitutes a change in bowel habit?

A change in bowel habit means any alteration in an individual's stool frequency, calibre or consistency. Virtually everyone will experience changes in their bowel habits at some point in their life as it may manifest due to stress or a change in the environment. However, it may also be a sign of a more serious underlying condition and warrants further investigation should it be persistent.

What causes a change in bowel habit?

Possible causes of a change in bowel habit include:

- 1. Dietary intake:** for example, excessive or inadequate fibre intake, intake of milk products, inadequate fluid intake
- 2. Lack of exercise or physical activity**
- 3. Changes in lifestyle:** for example, pregnancy, travel, change of job
- 4. Medications:** for example, painkillers, cough medications, antibiotics
- 5. Infection:** for example, gastroenteritis
- 6. Neurological problems:** for example, stroke, diabetes, parkinson's disease
- 7. Colorectal diseases:** for example, colorectal cancer, inflammatory bowel disease
- 8. Previous surgery:** for example, previous colon resection, removal of gallbladder
- 9. Irritable bowel syndrome**



Medications can cause a change in bowel habits.

What tests do I need to undergo?

Changes in bowel habit that are due to dietary or lifestyle changes generally do not require further testing. However, in patients with associated 'alarm signs', we will perform further investigations.

These are patients with:

- associated rectal bleeding or mucoid stools
- abdominal pain or swelling
- loss of weight and/or appetite
- family history of colorectal cancer or polyps

These patients should undergo evaluation of the colon in the form of an optical colonoscopy, CT colonography or barium enema. Individuals above the age of 50 years are also advised to undergo a colonoscopy for screening for colorectal cancer. In addition, patients with diarrhoea from suspected infection or antibiotic use may also benefit from special tests on their stools.

When colonic evaluation is normal and yet patients remain symptomatic,

further tests for suspected functional bowel disorders may be performed. These tests include:

- **anorectal manometry:** to assess anal muscle tone
- **transit marker studies:** time taken for stools to empty
- **defecography:** to assess completeness of stool emptying



Individuals are advised to undergo colonoscopy to screen for cancer.

How to treat the change in bowel habit?

Treatment for changes in bowel habit depends on the cause and the severity of the condition, and often needs to be tailored to the individual's needs. It may be treated with any combination of dietary and lifestyle modifications, medications such as laxatives, antidiarrhoeal medications or steroids for patients with inflammatory bowel disease. Treatments may also include bio-feedback exercises for patients with functional bowel disorders or even surgery. Surgery is necessary for patients who are diagnosed with existing medical conditions such as colorectal cancer, rectal prolapse or in recalcitrant slow transit constipation.



Treatment needs to be tailored to one's needs.

Role of GPs

General Practitioners (GPs) should assess the history and medications thoroughly to see if there is any possible cause for the change in the bowel habits. A complete physical examination should also be carried out to assess for any

masses within the abdomen or rectum. An early referral should be made to the specialist outpatient clinic for endoscopic evaluation if there is any suspicion of colorectal cancer.

PER RECTAL BLEEDING

I see blood in my stools!

Blood in the stools is always abnormal and should be properly assessed by a doctor.

Blood may manifest in various forms, from fresh red blood, to dark red blood, to black-coloured stools, to blood that cannot be detected with the naked eye. This is an indicator of the site of bleeding within the gastrointestinal tract and helps to direct the mode of investigation. Black-coloured stools point to a possible source of bleeding within the stomach or small intestines (ie the upper gastrointestinal tract), while fresh or dark red blood suggest a possible source within the colon (or lower gastrointestinal tract).

The volume of blood in the stools determines the urgency of investigation as a large amount of blood being expelled per rectum may result in severe anaemia that may be life-threatening. On the other hand, even a small amount of blood in the stools may be due to underlying colorectal cancer and also warrants early investigation.



Blood in stools warrants early treatment.

What are the causes of per rectal bleeding?

Common causes of blood in the stools include:

- a. Haemorrhoids:** commonly known as piles. They are enlarged and

COMMON COMPLAINTS & SYMPTOMS PER RECTAL BLEEDING

engorged blood vessels in and around the anus, and may be associated with pain, itching or sensation of a lump.

b. Diverticular disease: sac-like protusions of the intestinal wall that usually do not cause any symptoms. However, bleeding from diverticular disease may sometimes be massive and life-threatening in nature.

c. Colitis: inflammation of the wall of the large intestines, that can be due to infection or insufficient blood flow (ischaemia). The elderly are most often the ones affected by ischaemic colitis, due to their underlying medical conditions.

d. Angiodysplasia: a vascular abnormality of the gastrointestinal tract that is due to degeneration of blood vessels. The bleeding is painless, and can sometimes be massive. Though the bleeding stops spontaneously in more than 90% of patients, it is often recurrent.

e. Colorectal cancer: the most common cancer in Singapore. It may also be associated with a change in bowel habits or loss of weight and appetite. The

diagnosis of this may sometimes be confounded by the presence of haemorrhoids, another common occurrence in the Singapore population.



Haemorrhoids are a common cause of blood in the stools.



Patients showing symptoms of per rectal bleeding should undergo a colonoscopy in addition to a digital rectal examination.

What tests should I go for?

All patients showing symptoms of per rectal bleeding should ideally undergo a colonoscopy for evaluation of the large intestines. This is in addition to a digital rectal examination and a direct visualisation of the lower rectum and anus with a proctoscope that your doctor can perform in the outpatient clinic.

A colonoscopy involves inserting an optical endoscope via the anus into the large intestines to inspect the

inner lining of the colon for any of the conditions mentioned earlier. It may be done under sedation and is a relatively safe procedure. Pre-endoscopic preparation with bowel cleansing medications is required.

Alternative investigations include computed tomography (CT) colonography or a CT mesenteric angiography in cases of massive bleeding.

The best modality of investigation should be discussed with your doctor.

COMMON COMPLAINTS & SYMPTOMS PER RECTAL BLEEDING

How to treat per rectal bleeding?

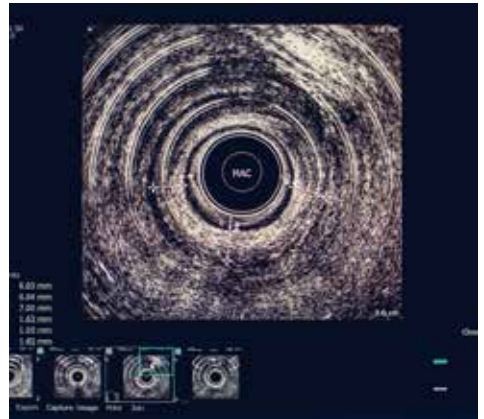
The treatment of rectal bleeding depends on the cause of the bleeding.

Bleeding due to diverticular disease, colitis or angiodysplasia may resolve spontaneously without intervention. However, recurrent bleeding may require endoscopic therapy, and severe massive life-threatening bleeding may sometimes even require surgery.

Haemorrhoids are generally treated with a combination of lifestyle and dietary advice, medications and/or rubber band ligation of the haemorrhoids. This is done in the outpatient clinic. Surgery may be

performed if the bleeding is recalcitrant in spite of medical therapy.

Bleeding as a result of colorectal cancer should be managed with surgery for the primary tumour.



Recurrent bleeding may require endoscopic therapy.

Role of GPs

GPs should perform a digital rectal examination and a proctoscopy in their clinic to look for haemorrhoids or any anorectal tumours. In cases where there is suspicion of colorectal cancer or the cause of rectal bleeding is uncertain, referral should be

made to the specialist for further evaluation. If patients present with massive rectal bleeding, they should be immediately directed to the Accident and Emergency department in a hospital for resuscitation and evaluation.

JAUNDICE



What is jaundice

Jaundice is yellow discoloration of tissues due to accumulation of bilirubin. Normal serum bilirubin ranges from 7-32 mmol/L but jaundice may not be detected clinically until the level exceeds 40mmol/L. Various mechanisms can contribute to jaundice, such as excess bilirubin production, impaired intrahepatic conjugation and secretion, or obstruction in bile flow.

Causes of jaundice

I. Medical

a. Haemolysis

Examples of haemolysis include sickle cell disease, spherocytosis, thalassaemia, where the pathological breakdown of red blood cells results in excessive bilirubin production.

b. Hepatitis: Acute and Chronic

Acute hepatocellular inflammation can be due to a variety of causes, the most common etiology is due to virus. Majority of acute inflammation is self limiting

Causes of jaundice include hepatitis.

without long term sequelae. Some form of hepatitis such as hepatitis B and C, can lead to chronic carrier state, which may maintain normal liver function or progress to chronic liver disease or liver cirrhosis. Other common causes of acute hepatitis are drugs and alcohol abuse.

c. Drug induced liver damage

A wide spectrum of drugs may cause liver damage. Usually they are dose dependent or due to prolonged therapy and most are reversible once the insulting medication is discontinued.

Examples are paracetamol, anabolic steroids, isoniazid and cytotoxic medication such as methotrexate. However, some may progress to hepatic fibrosis or fulminant liver failure.

d. Liver failure: Acute and Chronic

Acute liver failure denotes massive hepatocellular necrosis in a previously normal liver resulting in altered mentation and coagulopathy. It carries high

mortality. Chronic liver failure arises from a background of liver cirrhosis and is associated with portal hypertension, ascites, splenomegaly and gastro-oesophageal varices.

e. Cirrhosis

A chronic disease of the liver marked by degeneration of cells, inflammation and fibrous thickening of tissue. Liver cirrhosis can be categorized according to its aetiology, such as posthepatic (after hepatitis B or C), alcoholic and primary biliary cirrhosis, and cryptogenic if the cause is unknown.

II. Surgical (Cholestatic or Obstructive)

a. Ductal stones

This is the most common cause of obstructive jaundice. Most of the ductal stones are secondary to stone migration from gall bladder. Primary ductal stones are less common and are usually associated with bile duct/sphincter complex dysfunction.

b. Pancreatic or biliary malignancy

Head of pancreas cancer, periampullary tumour and cholangiocarcinoma of the bile duct can cause biliary

obstruction. Patients usually present with progressive worsening of painless jaundice or severe jaundice with or without constitutional symptoms. Some may present with sepsis due to ascending cholangitis. Patient with periampullary tumour may be associated with anaemia or upper gastrointestinal bleeding.

c. Benign bile duct stricture

Most of the benign bile duct strictures are due to bile duct injury during cholecystectomy or rarely instrumentational injury such as during endoscopic retrograde cholangiopancreatography. Bile duct stricture can also arise from chronic pancreatitis and sclerosing cholangitis.

d. External compression of bile duct

By tumour masses arises from liver, gallbladder, retroperitoneum or lymph nodes

e. Parasitic infestations

In addition to malignant bile duct obstruction due to biliary or pancreatic cancer, jaundice may also occur in association with extensive liver malignancy, either primary or secondary.

Symptoms

Symptoms may not be specific. A history of hepatitis, drug intake, injection, alcohol intake, sexual contact, and ingestion of raw shellfish and wild mushrooms are some of the causes. In addition to yellow discoloration of skin and sclera, patient may present with upper abdominal pain or discomfort, fever, weight loss, loss of appetite, nausea and vomiting, tea-colored urine, clay-colored stool or skin itchiness.

Diagnosis

Initial investigations aim to establish the diagnosis of hyperbilirubinaemia and to differentiate whether the jaundice is prehepatic, hepatocellular or cholestatic.

The following tests may be performed:

1. Laboratory Tests

- Liver function test
- FBC/FBP
- Urine for urobilinogen (haemolytic) or bilirubin (cholestatic)
- Reticulocyte count
- Serology for viral hepatitis
- PT/APTT

2. Imaging (Non invasive)

• **Ultrasound hepato-biliary system**

Ultrasound is the primary imaging modality of choice in investigating hepatobiliary system, especially in surgical jaundice patient with suspected gallstone disease. It is less expensive and doesn't involve radiation. Contrast enhanced ultrasound can further differentiate liver lesions. However it is operator dependent and certain anatomical location may make evaluation difficult, such as distal CBD and pancreas.

• **Computerised Tomography (CT) Scan**

Contrast enhanced spiral CT is the gold standard for evaluation of space occupying lesion in hepato-pancreatico-biliary system. It is essential in all patients with suspected tumours, not only for diagnostic and staging purpose, also for pre-surgical planning. However, it involves radiation and small risk of contrast induced nephropathy.

• **Magnetic resonance cholangiopancreatography (MRCP)/Magnetic resonance imaging (MRI)**

MRI may provide better definition

as compared to CT scan and may not require contrast. MRCP can better delineate the biliary and pancreatic ductal system. It is relatively more expensive than CT scan.

3. Invasive procedure- diagnostic and therapeutic

- **Endoscopic retrograde cholangiopancreatography (ERCP)**

ERCP is performed under sedation but its diagnostic role in patient with obstructive jaundice is gradually replaced by MRCP which is non invasive and not operator dependent. However, its therapeutic advantage in ductal stone removal or stent insertion in treating obstructive jaundice due to ductal stricture or malignant compression could not be over emphasized. It can also provide direct visualization of periampullary tumour and tissue biopsy, as well as ductal brushing cytology.

- **Percutaneous transhepatic cholangiography (PTC)**

Its advantage lies in assessing obstructing lesion at or proximal to portal hilum in which ERCP is technically not feasible. Besides

diagnostic cholangiography and brushing cytology, as in ERCP, it can be used to insert stent through proximal obstructive lesion.

- **Endoscopic ultrasonography (EUS)**

It is extremely useful for the diagnosis and staging of bile duct and pancreatic pathology. Performed endoscopically, EUS can be used to obtain guided trucut biopsy of suspected ductal, pancreatic lesions as well as adjacent lymph nodes, unlike ERCP which can only provide endothelial cytology.

Treatment

Treatment of jaundice is tailored to identifying and treating the underlying cause. For medical jaundice, the treatment is generally supportive and avoidance of further liver insult. Acute liver failure carries high mortality rate and may require liver transplant if supportive measure failed.

Patients presenting with obstructive jaundice and sepsis requires close monitoring and antibiotic treatment. Biliary decompression via percutaneous transhepatic biliary drainage (PTBD) or endoscopic

drainage may be required urgently for sepsis control. Emergency surgery is rarely required in acute setting. Subsequently surgery may be planned for gallstones/ ductal stone disease in the form of cholecystectomy, laparoscopic or open, with or without CBD exploration.

Definitive surgery, curative or palliative bypass may be arranged for suitable candidate with underlying malignancy after proper evaluation and study.

In general, jaundice is a hallmark of underlying syndrome that requires collaborative management in multidisciplinary approach.



Surgery may be required for gallstones or ductal stone disease.

Role of GPs

When to refer:

As patient may be presenting with wide range of nonspecific symptoms, high index of suspicion is prudent in the investigation for jaundiced patient. It is advisable to refer a patient for further evaluation and investigation if the patient presents with-

- Newly diagnosed jaundice
- Jaundice with signs and symptoms of infection or inflammation

- Painless jaundice
- Jaundice with abdominal mass
- Jaundice with constitutional symptoms

GP management at the clinic:

- GPs may help in monitoring the progression of the disease in jaundiced patient with a diagnosed condition.
- GPs may also help in initial investigation for patient who first presented with jaundice.

IRRITABLE BOWEL SYNDROME AND FUNCTIONAL GASTROINTESTINAL DISORDERS

The most common cause of abdominal discomfort and change in bowel habit (diarrhoea or constipation) is functional gastrointestinal disorder (FGID) which encompasses irritable bowel syndrome (IBS), gastroesophageal reflux and constipation. This is a group of conditions where the way the intestines work is abnormal yet no structural abnormality is detected. It may be caused by abnormality in the hormones, nerves, intestinal bacteria or movement of the intestinal tract. While it generally does not result in

death, the symptom may be very bothersome. There is no “cure” for this condition but the bothersome symptoms can usually be brought under control.

Causes

The causes of IBS and FGID are not completely understood. It may be related to diet intolerance, stress, depression, abnormality in intestinal bacteria content or abnormal intestinal tract movement.



Irritable bowel syndrome can be brought under control by proper medical treatment.



The most common cause of abdominal pain is functional gastrointestinal disorder.

Diagnosis

The doctor would assess the patient with interview and physical examination. The diagnosis of FGID can be made based on the presence of typical symptoms. In the case of IBS, the ROME III diagnostic criteria is used. It defines IBS by the presence of abdominal pain or discomfort for at least three days per month in the last three months associated with at least two of the following features:

- a. Improvement of abdominal pain after passing motion.
- b. Change in frequency of passing motion.
- c. Change in the form of the stool.

Investigations to exclude the presence of structural abnormality may be necessary especially in the presence of “alarm features” such as age more than 45 years old, difficulty in swallowing, blood in stool, unintended weight loss, pain while sleeping at night, fever, personal or family history of gastrointestinal cancer, abnormal physical examination and failure to improve with treatment. These investigations may include blood tests, abdominal scans and endoscopy (intestinal camera tests).

In some instances, further gastrointestinal function tests which assess the movement or the amount of bacteria in your intestines may be performed to establish the underlying cause and guide treatment but it is not necessary in most cases.

Treatment

Irritable bowel syndrome and functional gastrointestinal disorders are longstanding conditions. The symptoms may come and go and even change with time. In the absence of alarm features there is no urgent need for excessive investigations. There is no “cure” but the bothersome symptoms can usually be brought under control by reducing it to a manageable level.

Due the varying symptoms and potential causes, the treatment may require using different methods which include diet, stress and lifestyle management in addition to medications and occasionally surgery. A combination of these treatments is often required for severe cases. Our centre offers a comprehensive and integrated service to manage these disorders comprising of gastroenterologist, gastrointestinal surgeons, psychiatrist and dietitians. Our current resources include:

- a. Integrated multidisciplinary functional gastrointestinal disorder clinic(“IBS Clinic”)
- b. Comprehensive psychological intervention for functional gastrointestinal disorders.
- c. Specialised IBS dietician service for Low FODMAP Diet.
- d. Gastrointestinal function investigations include:
 - High resolution esophageal manometry
 - 24 hour pH impedance monitoring
 - Hydrogen breath test
 - High resolution anal manometry
 - Balloon expansion rectal sensation
 - Pudendal nerve terminal latency test
 - Endoanal ultrasound
 - Magnetic resonance evacuation proctography
 - Gastrointestinal transit studies.

Recommendations for general practitioners

A positive and collaborative long term management relationship between the primary care provider with the patient and the specialist is crucial for successful management of irritable bowel syndrome and functional gastrointestinal disorders.

ABNORMAL BLOOD TESTS

Patients can be referred to a gastroenterologist where the predominant problem is an abnormal blood test result following routine health screening.

By the very nature of these referrals, these patients are either asymptomatic or have very subtle symptoms or signs.

Although some of these issues may have been dealt with in other chapters within this booklet, we will approach these problematic blood test results in a rational and practical manner in this section.



Consult a gastroenterologist if abnormal blood tests occur.

The most commonly referred patients fall into three categories:

1. Raised tumour markers (Alpha-fetoprotein [AFP], carcinoembryonic Antigen [CEA], cancer antigen 19-9 [CA19-9])
2. Anaemia
3. Abnormal liver function tests

Risk Factors/Causes

4. Raised Tumour Markers

a. Alpha-fetoprotein (AFP)

In conjunction with abdominal ultrasonography, it is recommended that alpha-fetoprotein (AFP) be measured at six-monthly intervals in patients at high risk for hepatocellular carcinoma (especially those with liver cirrhosis related to hepatitis B or hepatitis C). A raised AFP is found in 80% of patients with hepatocellular carcinoma and in 40% of these patients, the AFP exceeds 1000 ng/mL.

However, AFP can be raised in other cancers, namely:

- Non-seminomatous germ cell tumours
- Gastric cancer
- Biliary tract cancer
- Pancreatic cancer
- Lung cancer

AFP can be raised in non-malignant conditions like:

- Cirrhosis
- Viral hepatitis
- Ataxia telangiectasia
- Pregnancy

b. Carcinoembryonic Antigen (CEA)

Carcinoembryonic antigen (CEA) is a glycoprotein, which is present in normal mucosal cells but increased amounts are associated with adenocarcinoma, especially colorectal cancer. Levels exceeding 10 ug/L are rarely due to benign disease. Sensitivity increases with advancing colorectal cancer state. However, poorly differentiated tumours are less likely to produce CEA.

CEA levels are useful in assessing prognosis (with other factors), detecting recurrence and

monitoring treatment in patients with colorectal cancer.

Conditions which may have elevated CEA include:

- Colorectal cancer; tumours on the right side of the colon tend to produce higher CEA levels than tumours on the left side
- Breast cancer
- Lung cancer
- Gastric cancer, oesophageal cancer, pancreatic cancer
- Mesothelioma
- Skeletal metastases
- Non-malignant liver disease, including cirrhosis, chronic active hepatitis
- Chronic kidney disease
- Pancreatic disease
- Inflammatory bowel disease, diverticulitis, irritable bowel syndrome
- Respiratory diseases, eg. pleural inflammation, pneumonia
- Smoking
- Ageing
- Atherosclerosis

c. Cancer Antigen 19-9

Elevated levels of CA19-9, an intracellular adhesion molecule, occur primarily in patients with pancreatic and biliary tract

cancers, but may be raised in colorectal, gastric, hepatocellular, oesophageal and ovarian cancers.

Benign conditions such as cirrhosis, cholestasis, cholangitis and pancreatitis also result in elevations, although values are usually less than 1000 u/mL. CA19-9 may be raised in diabetes mellitus.

5. Anaemia

Another abnormal blood test result that requires further evaluation and treatment is anaemia. For men, anaemia is typically defined as a haemoglobin level of less than 13.5g/dL and in women as haemoglobin of less than 12g/dL. Some patients with anaemia have no symptoms but can be symptomatic if the haemoglobin is significantly low.

Anaemia can be categorized as microcytic (MCV less than 80fL), normocytic (MCV 80-100fL) or macrocytic (MCV more than 100fL). The most common cause of microcytic anaemia is iron deficiency anaemia, although hereditary disorders like alpha thalassaemia or beta thalassaemia needs to be excluded.



Abnormal blood test may result in anaemia.

The most common causes of iron deficiency anaemia are:

- A lack of iron in the diet of vegans and vegetarians
- Heavy menstruation
- Pregnancy
- Rapid childhood growth
- Peptic ulcer disease (H. pylori, NSAIDs)
- Gastrointestinal malignancy (colorectal, gastric and small intestinal)
- Coeliac disease
- Crohn's disease
- Colonic polyps
- Haemorrhoids

Macrocytic anaemia may be caused by Vitamin B12 deficiency.

Vitamin B12 deficiency may be due to:

- Pernicious anaemia
- Strict vegetarianism
- Long-term alcoholism
- Intestinal strictures (Crohn's disease), blind loop syndrome and bacterial overgrowth (post-surgery)

6. Abnormal Liver Function Tests

Patients with no or minimal symptoms and abnormal liver function test results are common.

These abnormal liver function tests fall in three main groups:

- i. Isolated hyperbilirubinemia
- ii. Predominantly raised serum alkaline phosphatase (SAP) and gamma-GT
- iii. Predominantly raised alanine transaminase (ALT) and Aspartate transaminase (AST)

i. Causes of isolated hyperbilirubinemia include:

- Hemolysis
- Drugs
- Gilbert's syndrome, Crigler-

Najjar syndrome, Dubin-Johnson syndrome

- Chronic liver disease

ii. Causes of raised serum alkaline phosphatase (SAP) and gamma-GT (Cholestasis) include:

- Primary biliary cirrhosis
- Drugs (tricyclic antidepressants, erythromycin, oral contraceptive pill, anabolic steroids)
- Primary sclerosing cholangitis
- Cardiac failure
- Space-occupying hepatic lesion (hepatoma or secondaries)
- Head of pancreas neoplasm
- Biliary malignancy

iii. Predominately raised ALT/AST ('Hepatic picture') include:

- Non-alcoholic steatohepatitis (NASH)
- Alcoholic hepatitis
- Cirrhosis
- Medication (Statins, Isoniazid, Phenytoin, Paracetamol overdose)
- Chronic hepatitis B, C
- Autoimmune hepatitis
- Acute hepatitis A, B, C, EBV and CMV infection
- Metabolic-Glycogen Storage disorders, Wilson's disease

Symptoms & Diagnosis

Patients presenting with raised tumour markers (AFP, CEA, CA19-9) may have relatively few symptoms.

However, a history of hepatitis B or C, significant alcohol intake and family history of hepatoma would be pertinent in patients with a raised AFP. Besides, through abdominal examination, inspection of the testes in men to exclude non-seminomatous germ cell tumours is useful. Further investigations would include a transabdominal ultrasound and upper gastrointestinal endoscopy would be required in the evaluation of patients with a raised AFP.

If the patient has a raised CEA, a history of smoking and symptoms suggestive of colorectal (per rectum bleeding, change in bowel habits) and lung (cough, hemoptysis) malignancy needs to be inquired for. Cross-sectional imaging (CT, MRI) of the thorax, abdomen and pelvis followed by endoscopy (gastroscopy, colonoscopy) should be performed where appropriate.

Patients with a raised CA19-9 would require cross-sectional imaging to exclude pancreatic and biliary malignancy and a gastroscopy and colonoscopy where appropriate.

Patients with anaemia may be asymptomatic or may experience fatigue, have palpitations or become short of breath.

Symptoms of excessive blood loss (gastrointestinal-per-rectal bleeding, malena or excessive menstruation) should be elucidated. A dietary history is essential. Further evaluation would depend on the likely cause of anaemia and may include endoscopy or referral to a dietician or gynaecologist.

If the predominant problem is that of an abnormal liver function test results, the evaluation would require a complete history of one's lifestyle (including recent travel, transfusions, unprotected sexual intercourse, alcohol intake, diabetes mellitus, obesity, hyperlipidemia, family history) and a thorough clinical examination for stigmata of chronic liver disease, hepatosplenomegaly, ascites and obesity.

The diagnostic algorithm would depend on the predominant problem, for example the exclusion of hemolysis for isolated hyperbilirubinemia is important. However, if the main problem is that of a 'hepatic picture', on liver function tests, viral serology eg. Hepatitis B & C, cytomegalovirus (CMV), Epstein-Barr virus and possibly HIV may be more appropriate. Autoantibody screen eg.

antimitochondrial antibody, anti-smooth muscle antibody and antinuclear antibody should be performed. Exclusion of Wilson's disease or Glycogen Storage disease would be appropriate in some circumstances.

Transabdominal ultrasound is non-invasive and a useful screening test to detect structural abnormalities before

more detailed cross-sectional imaging (CT, MRI, MRCP) is ordered.

Treatment

The treatment of these patients is dependent on the final diagnosis following evaluation.

Role of GPs

General practitioners often refer patients with raised tumour markers (AFP, CEA, CA19-9) for evaluation because cross-sectional imaging and endoscopy (gastroscopy and colonoscopy) are more readily available in a tertiary care facility.

A careful medical history is essential in the evaluation of anaemia because the patient may be referred to a gastroenterologist (if symptoms suggest gastrointestinal blood loss), gynaecologist (if symptoms suggest menstrual loss) or dietician (if dietary insufficiency is likely).

Asymptomatic liver function test abnormalities can often be managed by the general practitioner. If the patient has isolated hyperbilirubinemia, tests

to exclude hemolysis, thalassaemia minor, G6PD deficiency) and a transabdominal ultrasound may all that is required. If the patient has Gilbert's syndrome, reassurance is all that is necessary. If the problem is that of cholestasis or a 'hepatic picture' on liver function tests, blood tests (as listed in the symptom and diagnosis section) may be ordered and a transabdominal ultrasound may be performed before making a referral if necessary.

In most instances, the patient has fatty liver. Life style modifications like good diabetes mellitus control, exercise, weight loss may help. If despite these measures, the liver function test remains abnormal for longer than 6 months, then a referral to the specialist may be considered.

DISEASES

UPPER GASTROINTESTINAL

DYSPEPSIA / UPPER ABDOMINAL PAIN

Upper abdominal pain / discomfort or dyspepsia may be due to conditions affecting oesophagus, stomach, duodenum, gallbladder, bile duct, liver or pancreas. Dyspepsia is not typically related to intake of food.

When accompanied by other features such as nausea, weight loss, lethargy, jaundice etc., alarm should be raised, and referral for expedient work-up be made. Infrequently, the colon, abdominal aorta or spine may be the site of pathology. From the clinical history, the likely cause of pain is usually apparent, such as a bleeding ulcer or gallstones flatulence.

Clinical examination is helpful for differential diagnoses (eg. hepatomegaly suggests hepatocellular carcinoma), and in directing the investigations. Whilst empirical treatment such as anti-acid for presumed gastritis will usually be effective, recurrent or progressive symptoms warrant further work-up.

The various procedures or imaging involved in the initial evaluation of dyspepsia or reflux may include some of the following. Common conditions which may be diagnosed are outlined.

Diagnosis

- a. OGD (oesophago-gastro-duodenoscopy):** oesophagitis, gastritis, ulcer, polyps or tumour may be identified and biopsy taken.
- b. Ultrasound of the abdomen:** gallbladder stones, cysts or tumours in liver or kidney, obstructed bile ducts or mass in pancreatic head.
- c. CT scan of the abdomen & pelvis:** tumours or in solid organs eg. pancreas, lymphadenopathy, occult infections or lesions in spine.
- d. Manometry & pH studies:** reflux and retention of acid in lower oesophagus, and peristalsis and tonic contractions of oesophagus.
- e. Barium meal:** ulcers, polyps or tumours. This may be offered as



Reflux is usually treated with medication.

an alternative to OGD, but it is not possible to perform biopsy nor test for *Helicobacter pylori* infection. Subtle changes including early gastric cancer may be missed.

f. Colonoscopy: polyps, tumours or diverticular disease.

Treatment

Once the cause of the abdominal pain is found, treatment is relatively standard. For e.g., proton pump inhibitor and antibiotics are used for ulcer related to *helicobacter pylori* infection. It is important to appreciate

that common conditions typically respond well to treatment. Hence when symptoms persist or worsen in spite of treatment, further clinical examinations and tests or procedures may be required. Some patients may in fact have functional disorders, which would require longer periods of treatment and monitoring.

Gastro-oesophageal reflux (GORD)

The need to belch is a common experience but a feeling of gas, fluid or even food running up the chest would suggest significant reflux. Reflux may become sufficiently disabling to interrupt social activities, work or sleep.

Reflux may be due to a mechanical problem with the gastro-oesophageal junction or the stomach. The loss of function at the lower oesophageal sphincter allows acid, food or bile to pool in the lower oesophagus repeatedly. This leads to oesophagitis, erosions / ulcers or even inflammatory strictures.

GORD may also be related to herniation of the stomach up the chest ie. hiatal hernia, as the absence of the diaphragmatic pinch by the crura and the negative intrathoracic pressures will encourage retrograde flow of gastric contents.



Stones in gallbladder

Occasionally patients with gastric carcinoma may report reflux rather than early satiety. Patients with reflux symptoms will have OGD, pH studies & manometry for evaluation.

Treatment for reflux is usually effective with medications. Once the acidity of the refluxate is reduced, there usually is good improvement, and with addition of prokinetic medication, most patients will manage with few breakthrough episodes.

Treatment

Surgery is considered for those who remain symptomatic even with medications and life-style changes, or patients who cannot tolerate the

medications. The principles behind surgery for reflux are :

- i. to maintain an intra-abdominal position for the lower oesophagus
- ii. to recreate a sphincter-like wrap at the upper part of stomach to function like a valve (fundoplication).

The operation may be performed either in open procedure or laparoscopically.

The investigations and treatment of various causes for dyspepsia or reflux require time with the doctor for detailed and continued clinical evaluation. Findings on various procedures or imaging require careful correlation with symptoms and well-being. Often the benign causes are effectively treated with standard and uncomplicated treatments.

GASTRIC CANCER

Gastric cancer originates from the cells lining the inner mucosal layer of the stomach. As it grows, it spreads through the muscular and serosal layers of the stomach before metastasizing to lymph nodes and distant organs such as the liver, lungs and peritoneal surfaces.

Data from the Singapore Cancer Registry in 2012 shows that gastric cancer is the 7th most common cancer in males (incidence 5.2%) and the 8th most common cancer in females (incidence 3.7%). However, the incidence of gastric cancer is outweighed by its mortality, which is 4th highest in males (6.9% of all cancers) and 5th highest in females (6.2% of all cancers).

The high mortality rate is because many patients are often diagnosed in later stages of the disease, when treatment is often more difficult and less successful. Therefore it is essential to have a high index of suspicion in order to improve early detection.

Risk Factors and Prevention

Stomach cancer usually presents in patients between 50 to 70 years of age although younger patients have been to known to be affected as well. It is more common in men with Singapore males estimated to have a lifetime risk of 1:50. Known risk factors for gastric cancer include *Helicobacter pylori* infection of the stomach and consumption of salted or preserved (cured/smoked/pickled) foods. Smoking and high salt-intake are also



Eat healthily to prevent stomach cancer.

associated with a higher incidence of gastric cancer.

The syndrome of hereditary diffuse gastric cancer (HDGC) involves a specific gene mutation which is uncommon. However, other patients with a strong family history of gastric cancer may also be at a slightly higher risk of developing stomach cancer. Certain hereditary syndromes such as familial adenomatous polyposis (FAP), Li-Fraumeni syndrome, hereditary non-polyposis colorectal cancer (HNPCC) and Peutz-Jeghers syndrome also increase the risk of stomach cancer.

Prevention of gastric cancer usually focuses on reduction of risk factors such as smoking and consumption of preserved foods, and increasing the proportional intake of fresh fruit and vegetables.

Symptoms & Signs

Gastric cancer often presents with non-specific symptoms such as mild abdominal discomfort or indigestion, bloating, belching, nausea, heartburn or loss of appetite. Gastric cancer may be associated with ulcers that can lead to bleeding presenting as hematemesis or melena. Stomach cancer can also cause slow chronic blood loss which may not be noticed



Early detection helps to improve treatment of gastric cancer.

in the stool, but may present with symptoms of anaemia such as palpitations, shortness of breath and chest discomfort. In patients with advanced gastric cancer, the tumour may cause an obstruction of the stomach leading to early satiety or vomiting.

Diagnosis

Simple tests which raise the suspicion of gastric cancer include blood tests for anaemia and stool for occult blood.

The diagnostic investigation of choice is endoscopy which allows visual identification of suspicious features of the gastric lining mucosa and biopsy for histological confirmation. The typical gastroscopy examination is performed as an outpatient procedure under sedation and local anaesthesia, taking only approximately 10 minutes. Where endoscopy is not available, barium meal X-ray of the stomach is the usual screening investigation for gastric lesions.

Investigations to determine the clinical stage of gastric cancer are performed once the histological diagnosis is confirmed & may include X-rays, CT scans, PET scans and endoscopic ultrasound (EUS).

Treatment

The only curative treatment for gastric cancer is surgery with removal of the stomach and radical excision of all the associated lymph nodes. Patients with early gastric cancer may be suitable for endoscopic resection of the cancer. For early gastric cancer, surgery alone may be sufficient.

The use of adjuvant chemotherapy and radiation therapy is common after surgery for patients with advanced gastric cancer – this reduces the likelihood of tumour recurrence. The chemotherapy options for gastric cancer now include oral-only regimens which are more acceptable to some patients.

In patients who present with large tumours that are locally-advanced which are not suitable for immediate surgery, the option of neo-adjuvant chemoradiation therapy is available in order to prepare them for curative surgery.

For patients with very advanced or metastatic gastric cancer, options for palliative treatment include stenting or surgical bypass of obstructing tumours, radiotherapy for control of bleeding and chemotherapy for reduction of symptoms and tumour growth.

Prognosis

The prognosis of gastric cancer depends on the stage at the time of diagnosis and surgery. The overall stage of the cancer is determined by the degree of spread through the wall of the stomach (T-stage) and the number of lymph nodes involved by the cancer (N-stage) as well as whether or not there are distant metastases (M-stage).

Patients with metastatic disease in Stage 4 usually require palliative care. Patients without metastases who have had complete removal of the stomach cancer and all the associated lymph nodes have a five-year survival of approximately 26% to 95%, provided they follow the recommended adjuvant therapy. As patients with Stage 1 and Stage 2 cancer usually achieve five-year survival exceeding 70%, the importance of early detection of gastric cancer should not be underestimated.

OESOPHAGEAL CANCER

Oesophageal cancer originates from the cells lining the inner mucosal layer of the oesophagus. As it grows, it spreads through the muscular layers of the oesophagus before metastasizing to lymph nodes and other organs such as the lungs and the liver.

Data from the Singapore Cancer Registry in 2012 shows that oesophageal cancer is the 9th most common cause of cancer-related death in males. The two main histological types of oesophageal cancer are squamous cell carcinoma (SCC) and adenocarcinoma. The majority of oesophageal cancers in Singapore are SCC's although the incidence of adenocarcinomas is slowly increasing.

Risk Factors & Prevention

Oesophageal cancer usually presents in patients above 60 years of age. It is more common in men and smoking is known to be a major risk factor. Alcohol intake and food preservatives are also believed to convey a higher risk of cancer. Chronic heartburn and reflux disease are associated with Barrett's oesophagus, a pre-cancerous condition which is a major risk factor for oesophageal adenocarcinoma.

An uncommon but important risk factor is previous injury to the oesophagus with chemicals found in household cleaning agents or pesticides. Other rare conditions that lead to oesophageal cancer include swallowing disorders such as achalasia and Plummer-Vinson syndrome and hereditary tylosis.

Prevention of gastric cancer usually focuses on reduction of risk factors such as smoking and alcohol intake, and increasing the proportional intake of fresh fruit and vegetables.

Symptoms & Signs

Most patients present with difficulty swallowing which is usually painless in nature although some patients may also have pain. This difficulty will be initially limited to solids before progressing to intolerance of soft foods and liquids before absolute intolerance to oral intake and incessant vomiting or choking.

The dysphagia is invariably associated with significant weight loss and there may be a prior history of chronic heartburn and dyspepsia. Repeated regurgitation may also lead to pneumonia. Hoarseness of voice may also be present indicating either chronic inflammation or cancer spread.

Diagnosis

The diagnostic investigation of choice is endoscopy which allows visual identification of suspicious features of the oesophagus and biopsy for histological confirmation. The typical oesophagogastroduodenoscopy (OGD) examination is performed as an outpatient procedure under sedation and local anaesthesia, taking only approximately 10 minutes. Where endoscopy is not available, barium swallow X-ray of the oesophagus is the usual screening investigation.

Other important investigations to support the diagnosis and to determine the degree of involvement include CT scans, PET scans, bronchoscopy and endoscopic ultrasound (EUS). Some patients may also require a staging laparoscopy or thoracoscopy in order to determine the degree of spread prior to embarking on a treatment regimen.

Treatment

Treatment of oesophageal cancer should be tailored to each patient depending on the location of the



Early diagnosis is vital to detect and treat cancer.

cancer, the stage of the cancer, the patient's general health and state of nutrition. The overall stage of the cancer is determined by the depth of invasion through the esophageal wall (T-stage), the number of involved lymph nodes (N-stage) and the presence of distant spread (M-stage).

Surgery is the traditional mainstay of curative treatment for oesophageal cancer. Provided the patient's overall state of health and nutrition is adequate, early-stage cancers are ideally treated with oesophagectomy to remove the oesophageal cancer with its associated lymph nodes. Surgery can be performed through a combination of incisions in the abdomen, chest and the neck, depending on the location of the cancer and the involvement of surrounding anatomical structures. More recently, minimally invasive surgery using combined thoracoscopic and laparoscopic techniques has been shown to be beneficial. After surgery, patients may undergo adjuvant chemotherapy and/or radiotherapy to reduce the risk of recurrence.

Patients with advanced oesophageal cancer or those with poor general health may still be candidates for curative surgery after a period of tube feeding or intravenous feeding

combined with neo-adjuvant chemotherapy and/or radiotherapy. Some patients who have significant medical conditions not compatible with major surgery, or patients with cancers in the cervical oesophagus (neck) may be treated with definitive chemoradiation therapy.

When there is evidence of distant spread or spread to vitally important organs in Stage 4, then only palliative treatment is recommended. This may involve chemotherapy or radiotherapy to improve symptoms and reduce the tumour size. Options to improve feeding include endoscopic insertion of self-expanding stents to temporarily 'reopen' the oesophagus or insertion of external feeding tubes.

Prognosis

Patients with early disease limited to the mucosa (T1) or precancerous Barrett's oesophagus have the best chance of long-term survival after curative surgery with 5-year disease-free survival rates approaching 80%. Otherwise, the overall 5-year survival rate for oesophageal cancer after surgical resection ranges from 5% to 30%. Early diagnosis is vital as the options and results of treatment vary greatly depending on the cancer stage.

HEPATO-PANCREATO-BILIARY (HPB) AND TRANSPLANT SURGERY

GALLSTONES

The gallbladder stores bile and releases bile into the intestine, where it helps to digest fat at meal times. The gallbladder does not produce bile. Bile is produced by the liver. If the gallbladder is surgically removed, the liver continues to produce bile which similarly flows into the intestines.

Gallstones generally refer to stones that are found in the gallbladder. Gallstones are more common in females than males, in persons that are overweight or those with hemolytic diseases. Gallstones form when the amount of bile and other fluid in the gallbladder become unbalanced. When this happens, some of the chemicals become solid and form stones.

Symptoms

Often there are no symptoms that arise due to the gallstones (asymptomatic), and many patients only come to know that they have gallstones when they get a scan done for other reasons, for example during a health screening. When symptoms arise, they can range from discomfort after eating,



Stones in gallbladder

especially with fatty food, to severe cramping pains over the middle and right of the upper abdominal area. Occasionally, complications can occur due to the gallstones such as infection of the gallbladder or blockage of the bile duct. In such cases, fever and jaundice (yellowing of the eyes) may be experienced in addition to the pain. Migration of the gallstones through the bile duct may also cause blockage of the pancreatic duct which leads to inflammation of the pancreas known as pancreatitis.

Diagnosis

A scan is necessary to confirm gallstones. Most commonly, an



Stones can be detected on CT scan or MRI of the abdomen.

ultrasound is performed. Stones may also be detected on CT scan or MRI of the abdomen. In addition, your doctor will also do a blood test to rule out any obstruction of the bile ducts.

Treatment

Surgery is not necessary in most cases without symptoms as the risk of the surgery is more than the risk of developing symptoms and complications from the gallstones. Once gallstones become symptomatic, they tend to recur and can become worse. Thus surgery is advocated when symptoms develop, or when the patient develops complications from the gallstones such as infection of the gallbladder, obstruction of the bile duct or inflammation of the pancreas due to a stone that had blocked the pancreatic duct.

Surgery to remove the gallbladder is the standard treatment for gallstones. Surgery to remove just the gallstones and leave the gallbladder intact is not recommended as it does not treat the underlying diseased gallbladder.

Laparoscopic cholecystectomy

A laparoscopic cholecystectomy is the procedure of choice for removal of the gallbladder. This is a procedure in which the gallbladder is removed using keyhole (laparoscopic) surgical techniques. In 5-10% of patients undergoing the laparoscopic procedure, there may be a need to convert to the open procedure due to circumstances encountered during the surgery. Such a decision will be made during surgery in order that the surgery proceeds safely and this is not considered a complication.

The operation is performed under general anaesthesia through small incisions in the abdomen. The gallbladder is detached from the liver and clips are applied to the artery that supplies the gallbladder and the duct that drains from it. The gallbladder is then extracted out of the body through one of the incisions.

Occasionally an X-ray, called a cholangiogram, may be performed during the operation to check for any stones in the bile duct or to visualize the anatomy of the bile duct. If there are one or more stones in the bile duct, the surgeon may remove them during the surgery itself or he may choose to have them removed later through an endoscopic procedure called ERCP, or he may convert to an open operation in order to remove all the stones during the operation.

Open cholecystectomy

This is a procedure where the gallbladder is removed through a longer incision on the abdominal wall. This incision is usually oblique and lies below the rib cage.

Risks of the surgery

This is a safe operation with very low complication rates. The risks of surgery include wound infection, bleeding and rarely blood clots in the legs or lungs.

The risks specific to cholecystectomy are as follows:

- Small risk (less than 1%) of an injury to the bile duct, bowel and/or blood vessels, which may require further operative repair of the injury.
- Hernia may form at the incision sites, especially in obese patients. This may require operative repair.
- Small risk (less than 5%) of an undiagnosed stone or stones in the bile duct which may require subsequent procedures to address.

In the event of conversion of the laparoscopic approach to an open procedure, the risks will remain the same as above. However patients may experience more pain and may have a slightly longer stay in hospital.

Post-surgery care

Gallbladder removal is a major abdominal surgery and a certain amount of post surgical pain may occur. Nausea and vomiting is not uncommon. Most patients go home on the same day or the day after the surgery. If the surgery was performed with a open procedure, the patient may have to stay a few days longer.



Patient goes home on the same day after surgery.

Activity is dependent on how the patient feels. Most of the patients can return to work within seven days following the laparoscopic procedure. Some patients may continue to experience abdominal bloating, and some may have increased frequency of stools after the surgery. Both symptoms will usually resolve within a couple of months.

Stones in the bile duct

Stones in the bile duct are often a consequence of gallbladder stones migrating into the bile duct. Sometimes stones may form in the bile duct itself as a primary event. Stones in the bile duct can cause jaundice, infection (cholangitis) as well as inflammation of the pancreas (pancreatitis).

Symptoms

Jaundice refers to yellowing of the skin and the white of the eyes (sclera). The

urine turns dark, and stools may be lighter in colour. When cholangitis is present, there is fever which is often experienced together with feeling cold and intense shivering. Pain is felt over the upper central abdominal region, which may be felt going to the back in the case of pancreatitis.

Treatment

Antibiotics will be given to treat the infection that is often associated with the bile duct obstruction by the stones. Options to remove bile duct stones include endoscopic or operative procedures. The endoscopic procedure is known as Endoscopic Retrograde CholangioPancreatography (ERCP).

Following successful removal of bile duct stones with ERCP, surgery to remove the gallbladder is still recommended to prevent future occurrence of this and other gallstone related problems.

Surgical techniques to remove the bile duct stones include both laparoscopic and open procedures. Occasionally, percutaneous radiological guided procedures may be undertaken to relieve the obstruction due to the stone, or to remove stones that are still present following a surgical procedure.

LIVER TUMOUR

Liver tumours can be benign (non-cancerous) or malignant (cancerous). When cancer is detected in the liver, it can either arise from the liver itself (primary liver cancer), or spread from other parts of the body to the liver (secondary liver cancer). Common benign tumours/nodules in the liver are hemangioma (tumour of blood vessel origin), and Focal Nodular Hyperplasia (FNH), which is strictly speaking not a tumour but an overgrowth of normal liver cells.

Hepatocellular Carcinoma (HCC)

The most common primary liver cancer is Hepatocellular Carcinoma, which often arises from a person who is infected with Hepatitis B. Increasingly, HCC is also seen in patients who have liver cirrhosis secondary to Non-Alcohol Fatty Liver Disease (NAFLD). Cirrhosis from any other causes also places the liver at risk of developing HCC.

Symptoms

Very often, the cancer does not produce symptoms until it is quite large in size. Patients who are known to have Hepatitis B, or have liver cirrhosis will be on regular checkup for their condition. Hence the cancer may be picked up on the regular scans that



Abdominal pain is one symptom of liver disease.

are performed as part of the checkup. Some patients may come to know that they have a tumour in the liver only when they go for a healthscreen and a tumour is detected on scans. When symptoms do arise, the common complaints are pain and discomfort in the upper abdominal region, poor appetite and feeling easily tired, or jaundice.

Diagnosis

When a liver tumour is seen on an ultrasound scan, a CT scan or an MRI is done to further assess the nature and extent of the tumour. Blood investigations will be done to ascertain the function of the liver. Alpha-feto protein level which is a cancer marker for HCC will be carried out with a blood test, as well as blood tests for the

presence of chronic viral Hepatitis B and C.

Treatment

Unlike many other cancers where spread of cancer cells beyond the organ is commonly seen, HCC is often confined to the liver only. However, the treatment for HCC is influenced by the size of the cancer, the number of cancer nodules, whether the cancer has involved the blood vessels of the liver and also the status of the liver in which the cancer arises. HCC often occurs in the liver that is cirrhotic (hardened), and that can impact on the treatment. Hardening of the liver is due to the presence of chronic Hepatitis B or C, or due to other insults to the liver such as alcohol or inflammation due to fat in the liver. Treatment options can be broadly divided into surgery, localized chemotherapy or radiotherapy, ablation techniques and systemic treatment.

Surgery

Surgery offers the best chance for cure and long term survival of HCC. It can be in the form of resection, which means removal of part of the liver together with the cancer, or a liver transplant. Unlike many other organs where complete removal of the organ (such as both breasts, the entire colon or stomach) is possible,



Surgery is commonly performed for liver cancer.

a person cannot live without a liver. Resection is undertaken when complete removal of the cancer is feasible and yet leaving enough liver intact for the needs of the patient. The operation can be in the form of conventional open surgery where a wound of 15 to 20cm is necessary for the surgery to be performed, or in the form of laparoscopic surgery, where the entire surgery is carried out via keyhole access. Robotic liver surgery is also undertaken in SGH for suitable patients.

Liver transplant

In cases where the cancer nodules are multiple, or where they are recurrent, or where the underlying liver disease is advanced, a liver transplant may be indicated. A donor liver can be from a person who is brain dead

(cadaveric donor) or from a healthy individual who is willing to donate part of his/her liver (living donor). When indicated, a series of tests as well as assessments by various medical specialties is carried out to determine if the patient is suitable to undergo a liver transplant. Following a liver transplant, the patient will be required to take immunosuppression for life to prevent organ rejection.

Localized chemotherapy and radiotherapy

These treatments are undertaken when surgery is not possible. Localized chemotherapy is known as TACE (trans-arterial chemoembolization). It involves delivery of chemotherapy directly to the cancer via a tube inserted at the groin, followed by blocking off of its blood supply. This has the advantage of delivery of a higher dose of chemotherapy to the cancer, whilst minimizing the side effects to the rest of the body. Very often a single treatment session is sufficient, but repeated treatments might be required if the cancer is large, or multiple. Localized radiotherapy with Yttrium 90 is similar to localized chemotherapy. It involves delivery of radioactive materials directly to the cancer via a tube inserted at the groin. Before this treatment is carried out, a series of tests is performed to determine if a patient is suitable for



Robotic liver surgery performed for suitable patients.

this form of treatment. The entire dose of radiotherapy is delivered in a single session.

Ablation techniques

Ablation techniques are suitable for small cancers usually less than 3cm in size. The efficacy of ablation in these small cancers is close to that achieved with surgery. The most common form of ablation technique is Radiofrequency Ablation (RFA). This involves insertion of a thin rod through the liver into the cancer, and using radiofrequency to generate heat which then causes cancer cell death. Another source of energy which is used for ablation is microwave. The access of the rod can be via the skin and guided by ultrasound or a CT scan. In this situation, general anaesthesia may not be necessary. Access of the rod

can also be directly into the liver either via open or laparoscopic (keyhole) surgery, in which case general anaesthesia is required.

Systemic treatment

Systemic treatment is undertaken in advanced cases which are not suitable to the other options as mentioned before. Sorafenib, which is taken daily as an oral medication, is the most commonly prescribed systemic treatment. Occasionally intravenous chemotherapy may be given in selected cases.

Clinical trials

In advanced cancer cases which are diagnosed not suitable for any of the above treatment options, there are trials which aim to determine if new treatment medication is effective in controlling the disease.

Prognosis and surveillance

Patients who are diagnosed and treated for HCC will be on lifelong follow up. This is because even when the cancer tumour is completely removed or ablated, the remaining liver is at risk for forming new cancers due to the underlying liver disease. Follow up treatments are through regular scans and blood test. When new cancers are noted on follow up, treatment can be started early

such that it makes a difference to the outcome.

Colorectal liver metastasis

Spread of colorectal cancer to the liver is the most common type of secondary cancer to undergo liver resection. Whilst modern chemotherapy is highly effective in prolonging the life of patients with metastatic colorectal cancer, very few patients survive beyond three years with chemotherapy alone. Liver resection is feasible in 20% of these cases, and in combination with chemotherapy, offers the best chance for long term survival and cure.

The management of patients with colorectal liver metastasis is a team effort, and requires inputs from surgeons, oncologists and radiologists. Depending on the clinical presentation, liver resection can be performed before institution of chemotherapy, in between rounds of chemotherapy, or at the completion of the chemotherapy regime. When diagnosed at the same time as the colorectal cancer, liver surgery may be performed at the same time as the colorectal surgery.

With modern chemotherapy, liver surgery for colorectal liver metastasis is approaching 50% five-year survival and close to 30% ten-year survival.

PANCREATIC TUMOURS

The pancreas is a deep seated organ in the abdomen which lies horizontally from the right to left, just below the liver. The pancreas is divided into four parts, namely the head, neck, body and tail. Pancreatic tumours include those that are solid in nature, and those that have a large fluid component (cystic tumour of the pancreas). The most common solid pancreatic tumour is a cancer of the lining of the pancreatic ducts known as adenocarcinoma of the pancreas. The next most common type of solid tumour arises from cells in the pancreas which are known as neuroendocrine cells, hence they are known as pancreatic neuroendocrine tumours (PNET).

Symptoms

Symptoms arising from pancreatic tumours depend on their location. In the case of PNET, it also depends on whether the tumours are functional, ie if they produce excessive hormones which cause clinical syndromes. Tumours in the head of pancreas may cause jaundice, pain and vomiting. Tumours arising from the neck, body and tail of pancreas may be silent when small, and only produce symptoms of pain and discomfort when they get bigger.

Diagnosis

Diagnosis of a pancreatic tumour is on imaging, most commonly with a CT or MRI scan. If a cancer is suspected, additionally tumour markers CA 19-9 and CEA may be performed. Although these tumour markers may indicate the presence of a cancer, a normal level does not exclude a cancer, nor is a raised level confirmative of one.

In the case of PNET, the tumour markers that are associated with it are Chromogranin A and Pancreatic polypeptide. Furthermore, when a pancreatic neuroendocrine cancer is suspected, further imaging with a radionuclide scan may be performed to examine if the cancer has spread. Confirmation of the type of tumour may be obtained through a biopsy. This is commonly done via endoscopy with the aid of an ultrasound (endoscopic ultrasound-EUS).



Chemotherapy after surgery may improve survival rates.

Pancreatic ductal adenocarcinoma

This is the most common cancer of the pancreas. Tumours in the head of pancreas often cause jaundice whilst those in the rest of the pancreas cause abdominal pain as the predominant symptom.

Pancreatic Neuroendocrine Tumour (PNET)

Most PNET are small and non-functional. The most common functional tumour is an Insulinoma, which produces insulin in an excessive manner. This can cause fainting and sweating spells due to low blood sugar levels. Surgery is indicated for functional tumours. For non-functional tumours, the indication for surgery is based on the risk of cancer which is related to the size of the tumour, and also on the risk profile of the patient as well as the risks associated with the surgical procedure required.

Cystic tumour of the pancreas

This entity is also known as cystic neoplasm of the pancreas. Cystic tumours in the pancreas can be benign, malignant or potentially malignant. When a cystic tumour in the pancreas is deemed to be benign, surgery is performed when symptoms are present that are attributable to the tumour. Else such tumours can be left alone. When a cystic tumour is deemed malignant,

surgery is indicated. When a cystic tumour is deemed to be potentially malignant, the treatment will depend on the magnitude of the risk of turning malignant, the safety profile of the surgery that is required, the fitness of the patient for surgery as well as the age of the patient. Very often, this category of cystic tumour is further assessed with an endoscopic ultrasound (EUS).

Treatment

Prior to surgery, additional procedures to decompress obstruction of the bile ducts if present might be undertaken. This can be done with a tube inserted into the bile duct via endoscopic (ERCP) access, or with a tube inserted directly through the skin into the liver known as Percutaneous Transhepatic Biliary Drainage (PTBD).

The operative procedure depends on the location of the tumour.

Whipple's operation

Also known as pancreaticoduodenectomy, this operation is undertaken for tumours arising from the head of pancreas. It entails removal of the head of pancreas, together with part of the stomach, the first part of the small intestine as well as the bile duct. In some cases, the stomach may not be

removed, and this is known as pylorus preserving pancreaticoduodenectomy (PPPD).

Distal pancreatectomy

This is done for removal of pancreatic tumours that are located in the neck, body or tail of pancreas. The spleen may also be removed as part of the operation, but it may also be left intact when the nature of the tumour allows it. This operation is often carried out via laparoscopic (keyhole) access. Robotic surgery is also done for this type of surgery. Large tumours with extension beyond the confines of the pancreas may still require conventional open surgery.

Chemotherapy and radiotherapy

These may be administered following

surgery to improve the chances of disease free survival and cure. In cases where the cancer has already spread, or is too extensive for surgery, or where the cancer has recurred, chemotherapy and occasionally radiotherapy is offered as a palliative treatment.

Follow-up

Patients who have been operated on for pancreatic cancers will be on surveillance for possible recurrence of the tumour. This is done through scans as well as blood tests for cancer markers. Patients will also be monitored for possible development of deficiency of digestive enzymes or blood sugar regulatory hormones that are produced by the pancreas.



Patients need to be monitored for possible recurrence of cancer tumours.

SURGICAL (OBSTRUCTIVE) JAUNDICE

Yellowing of the skin and whites of the eyes, light-coloured stools and dark urine could be signs of obstructive jaundice – a condition where normal drainage of bile from the liver to the small intestines is blocked.

Obstructive jaundice is not a disease in itself but a symptom of an underlying condition involving the liver, the gallbladder or the pancreas. It will usually require surgical intervention, and is also known as surgical jaundice.

Gallstones, which can easily be removed by surgery, are the most common cause of obstructive jaundice.

The liver produces bile to digest food and deliver waste products to the intestines for elimination. When bile drainage is obstructed, bilirubin – a byproduct of red cell recycling – builds up in the liver and spills over to the bloodstream, causing the skin and whites of eyes to turn yellowish.

It is important to distinguish between the possible causes of obstructive jaundice. While the common causes are related to gallstone disease, the more sinister causes are related to cancer (pancreatic cancer, bile duct cancer, or less commonly liver cancer).



Jaundice patient may have weight loss.

One of the main distinguishing symptoms between benign and malignant causes is pain. Painful obstructive jaundice is usually related to gallstones, while painless obstructive jaundice tends to be related to tumours. The reason for this difference is that stones tend to harbour bacteria and cause bile duct infection, resulting in pain and fever.

Interestingly, as pain is not a key feature for malignant causes, patients with tumours tend to seek expert help later. Such patients may also have worrisome symptoms of weight loss and loss of appetite.

Two types of jaundice (surgical and medical jaundice)

Obstructive jaundice is one of two types of jaundice (surgical or medical jaundice). Patients with medical

jaundice will have yellowing of the skin, without dark urine or light-coloured stools. Medical jaundice can be related to:

- Hepatocellular jaundice, caused by a liver condition such as hepatitis and liver cirrhosis; and
- Haemolytic jaundice (blood disorder), a result of sudden rapid increase in the breakdown of red blood cells due to thalassaemia, autoimmune disease or malaria.

All these types of jaundice lead to an abnormal increase of bilirubin, causing the yellowing of the skin.



Watch out for signs such as fever and nausea.

What causes obstructive jaundice (or surgical jaundice)

As mentioned above, there are both benign and malignant causes of obstructive jaundice.

- **Benign causes:** Gallstones or cysts in the bile ducts (choledochal cyst), narrowing of the bile ducts (bile duct strictures), pancreatitis (inflammation of the pancreas).
- **Malignant causes:** Cancerous tumours in the pancreas, bile duct, gallbladder and liver.

Malignancy can result in complete blockage of bile drainage with significant itching due to accumulation of bilirubin and malnutrition as bile is part of the digestive system.

Signs of obstructive jaundice

Watch out for a yellowing of the skin and the whites of the eyes, which may be followed by a skin itch. As the condition worsens, other symptoms may appear:

- Severe abdominal pain
- Fever
- Chills
- Vomiting and nausea

Treatment of obstructive jaundice

Depending on the underlying cause, the doctor may initially prescribe pain medications and antibiotics to treat infections, especially if the cause is related to gallstone disease. Diagnostic imaging and blood tests will usually be able to distinguish the various causes of jaundice. Definitive treatment will depend on the cause of the jaundice.

If gallstones are diagnosed, laparoscopic cholecystectomy or keyhole surgery is recommended for the removal of gallstones. Endoscopic removal of stones obstructing the bile duct is sometimes necessary prior to laparoscopic surgery to fully clear all the stones. Endoscopic stenting is also sometimes necessary as a temporary measure to relieve the bile duct obstruction and clear any bacterial infection before definitive surgery.

If the root cause of obstructive jaundice is a malignant tumour, the long-term outcome of such patients is best served if the tumour can be surgically removed.

Such surgery is a major undertaking and patients are best served when managed by hepatobiliary pancreatic

surgeons (surgeons specialising in liver, pancreas and biliary problems). The outcomes of major pancreatic, biliary and liver surgeries are much improved when performed in a high-volume dedicated surgical centre.

Unfortunately, the majority of patients with malignant tumours may not be suitable for surgery, hence, chemotherapy and/or radiotherapy will be the next best option. For such patients, obstructive jaundice can be relieved by inserting a stent by endoscopic guidance or radiologic guidance, once the diagnosis of cancer is established.

If obstructive jaundice is left untreated, there is a high risk of infection when bilirubin overflows into the bloodstream. In addition, it is vital to distinguish the various causes of obstructive jaundice. Painful jaundice is usually associated with gallstone disease. Painless jaundice associated with tumours can lead to delayed treatment as patients generally feel okay.

To prevent jaundice resulting from gallstone disease, eat a healthy, balanced diet and reduce your intake of fatty foods and alcohol.

COLORECTAL SURGERY

COLORECTAL CANCER

Colorectal cancer refers to cancer of the colon (the main part of the large intestine) or rectum (the final ~15 cm of the large intestine). Often, benign (non-cancerous) growths (polyps) may appear within the colon and rectum. Over time, these polyps can turn malignant and develop into cancer.

Most patients diagnosed with colorectal cancer are older than 50 years old. However, patients who were diagnosed at an early age (for example, at age 20-40) may have a hereditary form of colorectal cancer, such as familial adenomatous polyposis (FAP).

Below is a summary of possible risk factors associated with colorectal cancer.

- **Age:** The incidence of colorectal cancer increases for people of age 50 and above.
- **Family & personal history:** The patient was previously diagnosed (and treated) colorectal polyps or cancer. Relatives of people diagnosed with colorectal

cancer, and particularly in cases where genetic colorectal cancer syndromes have been diagnosed e.g. FAP or hereditary non-polyposis colorectal cancer (HNPCC).

- **Diet:** Patients on a diet low in fibre and/or high in fat are thought to develop colorectal cancer more easily than those who are not. Consumption of alcohol and tobacco smoking are also linked to increased risk of developing colorectal cancer.
- **Inflammatory bowel disease:** This refers to a group of uncommon conditions (ulcerative colitis and Crohn's disease) that cause chronic inflammation in the colon and/or rectum. Such patients do have an increased risk of developing colorectal cancer.



Unexplained weight loss may be a sign of colorectal cancer.



Regular screening helps prevent cancer.

There are warning signs which the patient should look out for and seek medical advice early. They include:

- Blood in the stools
- A change from your usual bowel habit (pattern)
- Abdominal pain or discomfort
- Anemia (low blood count)
- A presence of a mass (lump) in the abdomen
- Unexplained loss of appetite and/or weight

Regular screening is still the main key in detecting colorectal polyps

or cancer early. In Singapore, the recommended age of screening is 50 years old for individuals with no symptoms. Patients with a strong family history of colorectal cancer are advised to start screening earlier than the recommended age. Screening tools currently available include:

- 1. Faecal Occult Blood Test (FOBT)**
– A positive FOBT requires a diagnostic workup with colonoscopy to examine the entire colon in order to rule out the presence of a malignant lesion.
- 2. Double contrast Barium Enema** – X-rays that show extra detail in the large intestines than normal (plain) x-rays.
- 3. Computed Tomographic Colonography (CTC)** – Advanced x-ray study using computer reconstruction to show details in the large intestines.
- 4. Colonoscopy** – A procedure that examines the colon and rectum using a special flexible camera inserted through the anus. This is the most accurate of all tests and also allows procedures such as removal of small polyps and biopsy of any abnormal areas.



Main treatment for colorectal cancer is surgery.

The mainstay of treatment for colorectal cancer is surgery. This aims to remove the tumour as well as the surrounding lymph nodes. Most of the time, the two ends of the cut section can be joined together to restore continuity of the colon and rectum. In recent years, keyhole (laparoscopic) surgery can be performed which avoids long scars after surgery.

A full detailed microscopic examination of the tumour is performed to determine the stage of the cancer. Depending on the stage, chemotherapy with or without radiotherapy may be required.

Locally, the mortality (death) rate of colorectal cancer has seen a slight decline over the past decade. This is likely due to the progress in treatment

of colorectal cancer, as well as increased awareness for screening. As a result, more patients are treated at an early stage of the disease with a 5-year survival rate of as high as 95% in Stage 1 colorectal cancer. Therefore regular screening is important and early medical advice should be sought before it is too late.

If you have any of the above-mentioned symptoms or signs, it is advisable to consult a general practitioner (GP) first. A referral to a specialist center for further investigation is warranted should there be no resolution of symptoms despite initial treatment by the GP. It is also advisable to be seen by a specialist should you have risk factors or if there is suspicion of colorectal cancer.

PERIANAL CONDITIONS AND ITS TREATMENT

These perianal conditions include haemorrhoids, anal abscess, fistula and anal fissure.

What are haemorrhoids?

Haemorrhoids, commonly known as piles, are abnormally engorged and swollen blood vessels in the anus and lower rectum.

What is anal abscess and fistula?

An anal abscess is an infected cavity filled with pus found near the anus or rectum. An anal fistula is a small tunnel connecting the anal gland from which an abscess arose to the skin of the buttocks outside the anus.



Low fibre diet can cause piles.

What is an anal fissure?

An anal fissure is a small tear in the lining of the anus. It can cause pain, bleeding and/or itching.

Risk Factors / Causes

Multiple factors can result in a person developing symptomatic piles and these are generally associated with any condition that can cause an increase in the intra-abdominal pressure.

- Persistent straining during bowel movement and sitting on the toilet for a long period of time.
- Chronic constipation and diarrhoea.
- Pregnancy.
- Low fibre diet.
- Obesity.
- Intra-abdominal or pelvic tumour.

An anal abscess usually results from an acute infection of a small gland just inside the anus, when bacteria or foreign matter enters the tissue through the gland. Certain conditions, for example, inflammation of the intestine or colitis, can sometimes make these infections more likely.

After an abscess has been drained, a tunnel may persist connecting the anus or rectum to the skin. This is known as anal fistula. Persistent drainage of pus

from the outside opening may indicate the presence of this tunnel.

An anal fissure is usually caused by a hard and dry bowel movement which tears the anal lining. Other causes include diarrhoea, inflammation of the anorectal area, viral or bacterial infection and cancer.

Symptoms

Haemorrhoids

- Bleeding from the anus on defecation or straining, usually bright red in colour, due to trauma on the haemorrhoids during defecation.
- Sensation of prolapse of the haemorrhoids through the anus during defecation.
- Presence of lump at the anus, secondary to thrombosis in external piles or prolapsed internal piles which cannot be pushed back into the anus.
- Pain over the anus during defecation.
- Itch in the anal canal. This can be due to the presence of stool and constant moisture in the anal canal.

Anal abscess and fistulas

- Symptoms of both ailments include fever, constant pain, redness and swelling around the anal area. Other symptoms include discharge of pus (which often relieves the pain) and fever.

Anal fissure

- Pain at the anus during and/or after bowel movement.
- Bleeding from the anus after bowel movement.

Diagnosis

- Diagnosis of haemorrhoids requires a bedside proctoscopy, insertion of a short, straight, hollow tube after lubrication into the anus. The obturator is removed and allows visualisation of the interior of the lower rectum and anal canal.
- Anal abscess and fistula are usually diagnosed via bedside examination of the anus and perianal area. Occasionally, further imaging investigations such as endoanal ultrasound or magnetic resonance imaging are required for surgical planning in complex cases.
- Anal fissure is also diagnosed by bedside examination of the anus.



Medicine can be used to treat small bleeding piles.

- Colonoscopy is sometimes performed to exclude other conditions.

Treatments

1. Treatment of haemorrhoids depends on the severity of symptoms. Simple preventive measures include adequate fibre and water intake to allow regular bowel movement without straining.
2. Oral medications and topical suppositories are used for treatment of small bleeding piles.
3. Outpatient rubber band ligation is effective for moderate-sized bleeding piles and prolapsing internal piles.
4. Haemorrhoidectomy is surgery to remove excessive tissue

causing bleeding and protrusion not amenable to conservative management. It is the best method for the permanent removal of large, prolapsed haemorrhoids. This can be performed in the conventional manner, or through stapled haemorrhoidectomy.

5. Transanal Haemorrhoidal Dearterialisation (THD) is a procedure involves using an ultrasound to locate the problematic blood vessels and stitching the piles.
6. Anal abscesses are usually treated with an operation to make an opening over the abscess to allow drainage of the pus. This can be done as a day surgery except in cases where they are big or deep in which they will need to be hospitalised for a few days for dressing.



To prevent piles, drink adequate water daily.



Anal fistulas are treated by surgery.

7. Surgery is the mainstay of treatment for anal fistulas. Fistula surgery usually involves cutting a small portion of the anal sphincter muscle to open the tunnel and convert the tunnel into a groove that will then heal from within outward.
8. Occasionally, a suture is left in the fistula first followed by a second operation to cut the fistula at a later period.
9. Most anal fissures heal by themselves without need for an operation. Application of special medicated cream, use of stool softeners, avoidance of constipation, and the use of Sitz baths (soaking the anal area in plain warm water for 20 minutes, several times a day) help to relieve the symptoms and allow healing to occur.
10. When conservative management fails, surgery to cut a portion of the anal muscle helps the fissure to heal by preventing pain and spasm.

Role of GPs

When to refer

- Non-interventional management in a general practitioner setting with oral medications and topical suppositories has failed.
- Patients presenting with recurrent symptoms to the general practitioner require an alternative form of treatment.
- In cases of large thrombosed or prolapsed piles or heavy bleeding with significant drop in haemoglobin level, refer to the hospital for first-line surgical management.
- All anal abscesses and fistulas should be referred for surgical management.
- If patient has associated symptoms such as change in bowel habits or stool calibre, loss of appetite or weight and sensation of incomplete emptying, suspicious of other diseases, further investigations are required.

- When a patient has a family history of colorectal cancer, consider opportunistic screening colonoscopy.

GP management at the clinic

- In mild haemorrhoid disease, preventive measures, oral medications and topical suppositories can be prescribed.
- Symptomatic anal abscesses and fistulas should be started on antibiotics. When there is fever or chills, suspicious of systemic sepsis, patient should be referred to emergency department for early surgical management.
- More than half of anal fissures will heal with preventive and topical treatment over a few weeks. The fissure needs to be re-examined for associated conditions if it fails to heal and referred to specialist outpatient clinic for further investigation and management.

PELVIC FLOOR DISORDERS

What are Pelvic Floor Disorders?

Pelvic floor disorders are a group of conditions that affect both men and women, and can involve more than one pelvic organ. This can lead to problems ranging from leakage of urine or faeces, to difficulty passing urine or stools.

Risk Factors / Causes

- Childbirth
- Previous surgery around the anal region
- Neurological diseases
- Trauma to the anal region
- Congenital disorders
- Pelvic organ prolapse
- Inflammatory bowel disease
- Irritable bowel syndrome

Symptoms

- Soiling of underwear with stools while sleeping or before reaching the toilet
- Leakage of urine when laughing, coughing or sneezing
- A feeling of dragging or heaviness in the pelvic area

Diagnosis

As multiple pelvic organs can be affected at any one time, a multidisciplinary approach is essential to assess and treat patients in order to provide the best outcomes.



GPs should refer patients to SGH Pelvic Floor Disorder Service for treatment.

Treatment

Established in 2008, the SGH Pelvic Floor Disorder Service is a seamless, multidisciplinary service that aims to provide holistic and integrated care by experts in the fields of Colorectal Surgery, Urology and Obstetrics & Gynaecology.

We offer:

- Comprehensive investigations conducted in a state-of-the-art pelvic floor laboratory and urology centre
- Individualised behavioural training and counseling
- Wide range of standard treatment and cutting-edge surgical options
- One-stop multidisciplinary management and treatment planning for complex pelvic floor disorders



Effective treatments available for pelvic floor disorders at SGH.

Role of GPs

Effective treatments are available for pelvic floor disorders with improvement and restoration of bowel control. The type of treatment depends on the cause and severity of the patient's symptoms.

As treatment and investigations required often have to be individualized to the patient, and

more than one treatment modality and specialist care required for the successful treatment of pelvic floor disorders, general practitioners should refer patients with pelvic floor disorders to the SGH Pelvic Floor Disorder Service for the necessary investigations and treatment of this complex condition.

GASTROENTEROLOGY

INFLAMMATORY BOWEL DISEASES

What is inflammatory bowel disease

The inflammatory bowel diseases (IBD) are diseases in which parts of the digestive tract becomes spontaneously inflamed and ulcerated. These diseases are: Crohn's disease, ulcerative colitis and indeterminate colitis. These are recurring relapsing conditions that can usually be controlled with medication. People with IBD continue to lead normal, active and productive lives.

Risk Factors/ Causes

The exact cause of IBD is unknown. It is thought that the immune system in genetically predisposed people

react in an inappropriate way to environmental factors and causing the individual to develop IBD.

a. Genetic factors: Genes associated with IBD are not found in every IBD patients. Different genes have also been found in different ethnic populations. Likewise, having a suspected IBD gene does not mean that one will definitely develop IBD.

b. Environmental factors: Lifestyle and diet are thought to contribute to development of IBD. Smoking has been associated with Crohn's disease. The presence of certain bacteria in the gut has been associated with IBD. It is thought that the composition of bacteria in the intestines is dependent on the diet, and the diet of Singaporeans has changed over the last 50 years as the country progressed from a developing to a developed economy.



Individuals with inflammatory bowel diseases lead normal and active lives.

c. Individual immune response: The over-reaction of the immune system plays a role in the development of IBD.

Symptoms

Symptoms are varied, comprising:

- Classical symptoms include diarrhoea, blood in the stool, weight loss, mouth ulcers and abdominal pain.
- Subtle symptoms include change in bowel habit, failure to thrive in babies, lagging developmental milestones in children, bloating and lethargy.
- Less common symptoms include anal fistulas, passing faeces or air in the urine.

Diagnosis

a. Blood tests: Full blood count, renal panel, C-reactive protein, erythrocyte sedimentation rate (ESR), liver panel and vitamin B12/folic acid/ iron levels in anaemia.

b. Stool tests: Stool culture, microscopy, Clostridium difficile PCR and stool calprotectin



X-rays are used to detect IBD.

c. Imaging

- i. Chest x-ray
- ii. Abdominal x-ray
- iii. Abdominal and/or pelvis CT scans
- iv. Small bowel enteroclysis
- v. CT/MRI enterogram
- vi. Small bowel capsule endoscopy

d. Endoscopy to obtain tissue for biopsies

- i. Colonoscopy and ileoscopy
- ii. Oesophago-gastroduodenoscopy (OGD)
- iii. Small bowel enteroscopy

Treatment

A. Treatment when disease is active:

Patients with IBD get recurrent flares of their condition. Common medicines used during flares include:

- i. Steroids (e.g. prednisolone, budesonide, hydrocortisone) which are given intravenously, orally or topically (i.e delivered to the site of inflammation).
- ii. High dose 5'aminosalicylic acids (5ASA) are used orally or topically.
- iii. Immune suppressants such as: anti-tumour necrosis factor antibodies (eg infliximab/ Remicade or adalimumab/ Humira) and ciclosporin are used in challenging cases.
- iv. Antibiotics have also been used for special cases (e.g perianal fistula)
- v. Special diets (e.g. elemental/ polymeric diets) and infusion of nutrition (i.e. total parenteral nutrition) are sometimes used to treat Crohn's disease patients.



Medicines are used to treat IBD.

- vi. Patients with refractory disease (IBD not responding to treatment) and patients who develop complications may need surgery.

B. Maintenance treatment to prevent flare:

- i. Long term 5ASA are used to prevent and decrease the severity of flares and cancer.
- ii. Medicine that suppress the immune system such as

azathioprine/6-mercaptopurine, methotrexate and anti-TNF antibodies, are good at preventing and decreasing the severity of flares.

- iii. In a very select group of patients, good bacteria (probiotics) is useful.

IBD is a treatable illness that can be kept in remission.

Role of GPs

- GPs should consider referring patients with bloody diarrhoea, and those with recurrent and/or persistent diarrhea and abdominal pain.
- Patients with strong family history of IBD and with above symptoms should also be referred to a specialist.
- GPs management at the clinic should include a detailed medical history (e.g. family history, travel history), full physical examination to look for signs of IBD (e.g. fistula, Crohn's mass) and basic investigations.
- Investigations include blood tests and stool analysis.
- Blood tests include full blood count, renal panel, liver panel and



GPs should refer patients with bloody diarrhoea.

inflammatory markers (C-reactive protein or ESR).

- Stool analysis include microscopy for parasites, culture for bacteria and polymerase chain reaction (PCR) testing for *Clostridium difficile*. New test for checking inflammation in the stool (faecal calprotectin) should also be sent.

ABDOMINAL PAIN

What is “tummy ache”?

“Tummy ache” is a person’s description of abdominal discomfort. Other common terms include bloating, wind, poor digestion or a pulling abdominal discomfort. When assessed by a physician, “tummy ache” is to be differentiated from colic (a squeezing pain) and inflammatory pain within specific organs (for e.g. acute appendicitis or acute cholecystitis).

What are the risk factors and causes of “tummy ache”?

Tummy ache is caused by a variety of factors. Broadly speaking, these



Tummy ache may include bloating and indigestion.

factors can be divided into two distinct groups:

- i. Problems within the digestive tract or “digestive tract diseases”
- ii. Problems involving important organs in the body or “systemic diseases”

In the digestive tract, functional digestive disorders remain the commonest cause of tummy ache. Of significant concern, however are ulcers of the stomach, colorectal malignancies or pancreatic cancers. Although the latter causes are less common, they remain a cause of significant health concerns when symptoms of tummy ache occur.

Functional digestive disorders remain the commonest cause of tummy ache. In Non-ulcer Dyspepsia (NUD) and Irritable Bowel Syndrome (IBS), the problems involve disordered function of the stomach and colonic function respectively.

NUD is commonly related to irregular meals and dietary indiscretion. In a small proportion of patients, *Helicobacter pylori* contribute to symptomatic disease. The cause of Irritable bowel syndrome is multi-factorial in origin. In functional digestive disorders, psychological



Poor diet may be a cause of digestive disorder.

factors play an important role in driving the health seeking behavior. It is important that the role of psychological factors be understood and appropriately addressed in functional digestive disorders.

Systemic diseases are important and significant causes of symptoms troubling the digestive system. As an example, patients with diabetes mellitus often experience poor digestion due to poorly controlled diabetes. Alternatively, patients experiencing insomnia will experience daytime somnolence which will potentially manifest as poor appetite. Lastly, patients with heart failure will experience poor digestion when symptoms of shortness of breath occur.

It is important that the diagnosis of functional digestive disorders not be

assumed. Rather, a positive diagnosis is important in ensuring that significant medical conditions like thyroid disorders, celiac disease or chronic pancreatitis be appropriately managed.

Symptoms

Symptoms of tummy ache include dyspepsia and less commonly, intestinal colic.

Dyspepsia literally means “poor digestion”. This is a common symptom affecting many individuals. It can occur under normal circumstances should an individual overeat, experience dietary indiscretion or experience irregular meals. Dyspepsia may be “ulcer-like” or “dysmotility-like” in presentation.

“Ulcer-like” type dyspepsia is the burning sensation that one experiences during meals. Historically, it was assumed to be related to ulcers in the stomach or duodenum. With the advent of upper gastrointestinal endoscopy, it is seen that ulcers occur only in a small proportion of cases, with non-ulcer dyspepsia occurring predominantly. In situations where the stomach acid refluxes into the esophagus, symptoms of “heartburn” dominate.

“Dysmotility-like” type dyspepsia is commonly encountered. Locally, this

symptom is commonly described as “wind”, a sensation of “bloating”, abdominal distension or “cannot digest”. Dysmotility symptoms can occur with disorders in the stomach or large colon. Less commonly, it occurs with disorders of the biliary tree or pancreas.

When dyspepsia is poorly characterized, it is important for sinister causes to be addressed especially in elderly individuals who are at higher risk of systemic and malignant disease.

Diagnosis

The etiological diagnosis of “tummy ache” is difficult because of its many underlying causes. It is therefore important that a physician be consulted when significant symptoms occur. Often, symptoms of “tummy ache” resolve spontaneously within a period of a few hours or days. An appropriate assessment by a family or general physician is needed should prolonged symptoms occur. A referral is made for specialist care when deemed necessary by a primary care physician.

The diagnosis requires a detailed clinical history and physical examination. Laboratory tests are requested to assist in the diagnostic process. The use of radiology and

endoscopy assist in visualizing the internal organs. Finally, endoscopic assessment allows for biopsies to be taken to confirm certain medical conditions like *Helicobacter Pylori* infection.

Treatment

The treatment of “tummy ache” is divided into “symptomatic treatment” and “definitive treatment”.

The majority of cases of “tummy ache” resolve spontaneously. In such cases, “symptomatic treatment” is adequate



Consult a physician when prolonged tummy ache occurs.

in alleviating the discomfort related to the illness. This can be achieved with mild analgesics or anti-spasmodic medications. As an example, should “tummy ache” occur following an episode of food poisoning, gut rest and fluid replacement therapy would suffice over one or two days. Alternatively, abdominal bloating following a heavy meal would resolve within the day.

In cases where “tummy ache” does not resolve spontaneously or raise concern, further assessment and investigation will reveal a “definitive cause” or etiology. Such cases include non-ulcer dyspepsia, gastric ulcers, duodenal ulcers, symptomatic gallstone disease and irritable bowel syndrome. A positive diagnosis is important in ensuring appropriate management and treatment.

Role of GPs

General physicians and family physicians play a crucial role in the health care system. Experienced general physicians and family physicians “cure sometimes, treat often and comfort always”.

Primary care physicians are the “gate keepers” in the health care industry. As “gate keepers”, primary care physicians ensure timely symptomatic treatment during periods of acute illness. Equally important is the recognition of conditions that require urgent medical attention and hence timely referral to hospitals. By differentiating the cases that can be adequately managed at primary care, general

physicians allow for the hospitals to function efficiently and effectively; this ensures appropriate care for patients requiring hospital care. An effective primary care healthcare system is therefore required for effective tertiary or “hospital” care.

Many cases of “tummy ache” resolve over a few days. In these cases, general physicians alleviate symptoms with medical advice, rest and medicines to relieve symptoms. More important is comfort and care, which is reassuring during periods of illness and recuperation.

In summary, general or family physicians and specialist physicians both contribute to the success of the healthcare system.

LIVER CIRRHOSIS AND PORTAL HYPERTENSION

What is liver cirrhosis?

Liver cirrhosis refers to a shrunken, scarred and hardened liver with failure of liver function. It results from chronic (long-term) damage to the liver from various causes, leading to progressive scarring of the liver over years.

Common causes of liver cirrhosis include chronic viral hepatitis infection (chronic hepatitis B or C), excessive alcohol intake, autoimmune liver disease and fatty liver disease.

Liver cirrhosis is a serious condition because once the liver becomes cirrhotic, the damage to the liver is irreversible. This leads to progressive liver failure, complications of cirrhosis, liver cancer and eventual death.

What is portal hypertension?

Portal hypertension refers to increased blood pressure in the blood vessels supplying the liver (the portal vein). This is a common complication of liver cirrhosis. The hardened liver obstructs blood flow from the portal vein, leading to elevated pressures in the portal vein. This results in enlargement of the spleen (splenomegaly), development of swollen veins in the stomach and esophagus (varices) and accumulation

of fluid in the abdomen (ascites). Most of the symptoms and signs of liver cirrhosis are a result of the development of portal hypertension.

What are the risk factors for liver cirrhosis?

You may be at risk of liver cirrhosis if you have one of the following conditions:

- a. Chronic hepatitis B
- b. Chronic hepatitis C
- c. Chronic excessive alcohol intake
- d. Fatty liver disease (non-alcoholic steatohepatitis)
- e. Autoimmune liver disease (autoimmune hepatitis, primary biliary cirrhosis or primary sclerosing cholangitis)
- f. Wilson disease, hemochromatosis and other rare inherited liver diseases.

What are the symptoms of liver cirrhosis?

Patients with early liver cirrhosis often have no detectable symptoms or signs of disease. Such patients may feel completely well and healthy and are



Liver cirrhosis is a serious condition and may be fatal.

often diagnosed based on abnormal blood tests or liver scans. This condition is known as compensated cirrhosis, which is associated with a favorable median survival of more than 10 years. Patients with early, compensated cirrhosis are often diagnosed on regular ultrasound screening during follow-up for chronic liver disease (e.g. chronic viral hepatitis or fatty liver disease).

Patients with more advanced liver cirrhosis may develop the following signs and symptoms:

- a. Ascites (swelling of the abdomen due to accumulation of fluid)
- b. Pedal edema (swelling of the ankles and feet)
- c. Spider naevi (dilated blood vessels on the upper chest and arms)
- d. Splenomegaly (enlarged spleen)
- e. Hepatic encephalopathy (drowsiness or confusion due to inability of the liver to break down toxins in the blood)
- f. Varices (swollen veins in the esophagus and stomach that develop due to obstruction of blood flow in the liver)

- g. Variceal bleeding (vomiting of blood or passage of black stools due to bleeding from ruptured varices)
- h. Jaundice (yellowing of the eyes and skin) associated with dark, tea-colored urine
- i. Development of liver cancer

The development of such complications signals that the patient's cirrhosis has progressed to a late stage (known as decompensated cirrhosis). Decompensated cirrhosis is a serious condition that needs to be managed by a liver specialist as it can lead to various serious complications such as internal bleeding, life-threatening infections, liver failure and liver coma known as encephalopathy..

How is liver cirrhosis diagnosed?

Liver cirrhosis is diagnosed via the following modalities:

- Liver imaging (ultrasound, CT or MRI of the liver)
- Liver stiffness measurement using Fibroscan®
- Liver biopsy (removal of a small sample of liver tissue for histological analysis)

The doctor may suspect liver cirrhosis in people with risk factors for cirrhosis who have abnormal blood tests, abnormal liver imaging or one of the signs and symptoms listed above.

Liver imaging is highly specific for the diagnosis of liver cirrhosis in which the liver has a shrunken and nodular appearance. Early cirrhosis is more difficult to diagnose as these patients may show a normal liver image during the scan. Early cirrhosis is often diagnosed by liver stiffness measurement (Fibroscan®). Sometimes a liver biopsy is required to confirm the diagnosis of early cirrhosis.

Treatment of liver cirrhosis

Patients with liver cirrhosis will benefit from the following treatment which include:

1. Treatment of the underlying cause of liver cirrhosis

- Patients with alcoholic liver cirrhosis must stop all intake of alcohol
- Patients with chronic hepatitis B and C should be started on antiviral treatment if there are no contraindications



Patients with alcoholic liver cirrhosis must stop all intake of alcohol.

- Patients with autoimmune hepatitis may require treatment with steroids

2. Treatment of portal hypertension to reduce risk of variceal bleeding by:

- Non-selective beta blocker medication (e.g. propranolol) for lowering of portal pressure to reduce risk of variceal bleeding
- Endoscopic ligation (banding) of esophageal varices to treat acute bleeding or prevent future variceal bleeding
- Endoscopic sclerotherapy

(histoacryl injection) of gastric varices to treat acute bleeding

3. Treatment and prevention of ascites include:

- Maintenance of a strict low salt diet
- Maintenance diuretic medication (e.g. spironolactone or furosemide) to remove excess fluid from the body
- Patients who have persistent ascites that do not respond to medications may require paracentesis, TIPS or liver transplant.



Ultrasound is one of the methods used to detect liver cirrhosis.

4. Treatment and prevention of hepatic encephalopathy include:

- Regular bowel clearance in order to reduce build-up of toxins in the bloodstream that may precipitate encephalopathy
- Avoidance of sedatives that may worsen encephalopathy

5. Surveillance for liver cancer

- Patients with cirrhosis should undergo regular abdominal ultrasound and alfa-fetoprotein (AFP) blood tests at least once every six months

6. Treatment of cirrhosis-related infections

- Cirrhotics need to be closely monitored for infections (e.g. spontaneous bacterial peritonitis) and should be referred for early treatment with antibiotics

7. Early assessment for liver transplant

- Cirrhotic patients who develop decompensation events should be referred for liver transplant.

Role of GPs

All patients with suspected liver cirrhosis should be referred to a specialist gastroenterology unit for confirmation of the diagnosis and evaluation of the severity of the cirrhosis. Specialized tests such as gastroscopy and CT scans are often required in the initial evaluation of such patients.

Once the diagnosis has been confirmed and the appropriate treatment commenced, primary care physicians have an important role to

play in the long-term management of patients with liver cirrhosis, including the following:

- i. Monitoring compliance with dietary restrictions (e.g. low salt diet) and medications
- ii. Optimizing beta-blocker and diuretic therapy to ensure optimal efficacy and minimization of adverse events
- iii. Early identification and treatment of infections (e.g. urinary tract infections or viral infections)

iv. Monitoring for adverse events of medications

Primary care physicians are important partners in the management of patients with liver cirrhosis and are often the first

point of care for many patients. However, because liver cirrhosis is a progressive disease with potential for high morbidity and mortality, all patients with cirrhosis should be on primary follow-up with a gastroenterologist.

CDLD Liver Cirrhosis & Portal Hypertension Service

The SGH CDLD Liver Cirrhosis & Portal Hypertension Service provides comprehensive care for patients with liver cirrhosis by a team of experienced liver specialists from the Department of Gastroenterology & Hepatology. We provide patients with access to a full range of diagnostic modalities and treatments to ensure that they will receive the best available care for their condition. Patients referred to the CDLD Liver Cirrhosis Service will be ensured of the following:

- Comprehensive care by a team of experts in liver disease
- Convenient one-stop access to a full range of multi-disciplinary care, including diagnostic and interventional radiology, hepatobiliary surgery, therapeutic

endoscopy, dietetics and nutrition, pathology and oncology services

- Opportunity to be involved in cutting-edge research and treatment protocols incorporating the latest advances in the management of liver cirrhosis
- Access to a comprehensive array of up-to-date treatments in the field of liver cirrhosis including living and deceased donor liver transplantation

The liver specialists at the CDLD Liver Cirrhosis Service are committed to providing standard-of-care treatment for all patients with liver cirrhosis, specifically those with complications such as ascites, hepatic encephalopathy, varices and liver cancer. Suitable patients will be identified and referred to the Liver Transplant Service for consideration for liver transplant if deemed required.

FATTY LIVER

Non-Alcoholic Fatty Liver Disease (NAFLD) is a common chronic liver disease when excess fat is deposited in the liver of people who drink little or no alcohol. It can range from “good fat” or simple fat to “bad fat” or Non-alcoholic Steatohepatitis (NASH). NASH can lead to liver cirrhosis and liver cancer.

Risk Factors / Causes

- Diabetes
- Obesity (BMI >25 kg/m² in Asian people)
- Increased belly fat (Central obesity)
 - » waistline >90cm in Asian men or >80cm Asian women
- Cholesterol problems
- Hypertension
- Metabolic syndrome



Obesity may be a cause of fatty liver.



Fatty liver is a common chronic liver disease and can be treated by lifestyle modifications.

- Other associated conditions like Obstructive Sleep Apnea (OSA), Polycystic Ovary Syndrome (PCOS), Underactive Thyroid (Hypothyroidism), Underactive Pituitary (Hypopituitary)

Symptoms

NAFLD usually does not cause symptoms. If symptoms are present, it may be non-specific type symptoms of tiredness, nausea and discomfort over the right upper abdomen. However, if NAFLD progress to cirrhosis, signs and symptoms of cirrhosis may appear.



Blood and liver function tests are used to check for fatty liver disease.



Obstructive Sleep Apnea may be an associated condition of fatty liver disease.

Diagnosis

NAFLD is diagnosed by a combination of history, physical examination, blood tests and imaging studies of the liver.

- Liver function tests such as liver enzymes (ALT, AST) may be elevated
- Ultrasound, CT or MRI scan may show fatty liver
- Other blood tests may be needed to predict severity of disease or exclude other liver diseases
- Liver biopsy may be required to stage the disease

Treatment

Treatments may include:

Lifestyle modifications

- Weight loss
- Diet
- Exercise

Treatment of associated factors

- Control of diabetes, hypertension, obesity, cholesterol
- Medications



Food pyramid



Exercises help reduce fatty liver disease.



Eat healthily helps prevent liver diseases.

Role of GPs

With the rising prevalence of NAFLD in tandem with the obesity and diabetes epidemic, GPs are likely to encounter many patients with NAFLD. GPs are vital in identifying patients at risk of NAFLD, especially NASH.

When to refer:

- a. Uncertainty in diagnosis
- b. When there is suspicion of severe disease
 - Age > 50

- Diabetes
- BMI > 30 kg/m²
- Long standing high liver enzymes
- Low Albumin or platelets
- Large liver or spleen

GPs play a pivotal role in initiation/ maintenance of appropriate lifestyle modifications in addition to the optimisation of the multiple chronic diseases associated with NAFLD such as diabetes, hypertension and dyslipidemia, all of which are critical for the care of NAFLD.



GPs are vital in identifying patients with fatty liver.

VIRAL HEPATITIS

What is viral hepatitis

Viral hepatitis is caused by viruses which specifically target the liver tissue. This infection of the liver causes inflammation of the liver and subsequent damage. The type of damage and severity depends on the type of virus.

Viral hepatitis can be broadly classified into two groups: acute which lasts for less than six months and chronic hepatitis which lasts for more than six months.

Risks Factors/ Causes

Acute hepatitis is most commonly caused by Hepatitis A,B,C and E



Hepatitis C is transmitted by infected needles.



Seek treatment early.

although it can also be caused by other non-liver specific viruses.

Common causes of chronic hepatitis are Hepatitis B and Hepatitis C virus.

Hepatitis B: This is the commonest cause of chronic viral hepatitis in Singapore. It is transmitted by contact with infected blood. The common modes being transmission from mother to child during childbirth, having unprotected sex from partners infected with Hepatitis B, transfusion of infected blood products and the use of infected needles.

Hepatitis C: This virus is most commonly transmitted by infected needles and by transfusion of infected

blood products. Sexual transmission is less common.

Symptoms

Acute hepatitis: In the acute phase common symptoms are the same as that of flu which is associated with loss of appetite, nausea, vomiting, tea-colored urine, yellowness of skin may develop depending on the severity of hepatitis.

Chronic hepatitis: This may not cause any symptoms. However if chronic hepatitis persists it may lead to hardening of the liver or liver cirrhosis. Cirrhosis may progress to liver failure or liver cancer and cause jaundice,

abdominal distension, swelling of legs, nausea, vomiting. Sometimes patients with chronic hepatitis may have flares of hepatitis activity causing jaundice, loss of appetite, nausea and vomiting.

Diagnosis

Acute hepatitis is diagnosed after assessing symptoms and doing blood tests to detect the type of virus.

Chronic Hepatitis B and C is usually diagnosed by blood tests. However if the chronic hepatitis was undiagnosed for a long duration, it may lead to hardening of the liver which can be seen on ultrasound scan.



Hepatitis is usually diagnosed by blood tests.



Newer oral medicines will be available to treat chronic Hepatitis C.

Treatment

Treatment of viral hepatitis depends on type of virus and also the nature of presentation.

Acute hepatitis: The liver will recover spontaneously with supportive treatment. Liver failure may develop in rare cases. Treatment depends on the type of virus.

Chronic Hepatitis B: Not all the patients with hepatitis B will require treatment, regular monitoring will identify patients who will need treatment to prevent damage to liver. If there is significant inflammation in the liver the physician may decide to start treatment, in some cases liver biopsy may be needed.

Both oral medicines and injections are used to treat Hepatitis B. The oral medicines are lamivudine, telbivudine, adefovir, entecavir and tenofovir.

The injections are Interferon injections.

Chronic Hepatitis C: The duration of treatment and the type of medicine required depends on the genotype of virus. The common medicines used in the treatment are Interferon and Ribavirin.

Newer oral drugs will be available soon in Singapore. They have the advantage of needing only oral forms and avoiding Interferon injections.

Role of GPs

GPs have a crucial role in the diagnosis and management of chronic hepatitis as most of the patients come to know about Hepatitis B or C during their health screening. Once diagnosed with chronic Hepatitis B or C, the patients should have their liver function tests monitored regularly to assess for inflammation and regular ultrasound to screen for cancer.

GPs may refer the chronic Hepatitis B patient to a specialist if he finds that the liver test is abnormal or if there is an abnormal finding on ultrasound of the liver.

All chronic hepatitis C patients should be referred to a specialist to assess the genotype of virus and also to determine the need for and the timing of treatment.

Acute Hepatitis: All such cases which are symptomatic must be referred to a specialist to determine the cause and identify the patients who may have poor outcomes.

Vaccination: Hepatitis B and Hepatitis A can be prevented by vaccination. Please discuss with your GP or gastroenterologist regarding vaccination.

SERVICES AT THE CENTRE FOR DIGESTIVE AND LIVER DISEASES



ABOUT THE CENTRE

The centre specialises in Gastroenterology and Liver Disease care. It provides a convenient, one-stop service dedicated to complex Digestive and Liver disorders. The clinic also manages benign and malignant diseases of the intestines, liver and conditions in Upper Gastrointestinal and has a team of specialists and surgeons treating colorectal cancer and perianal conditions.

The one-stop multidisciplinary Centre for Digestive & Liver Diseases (CDLD) is located at the Singapore General Hospital, Block 3, Basement 1.

SERVICES WE PROVIDE:

Our experienced team of physicians and surgeons are adept at seeing complex medical cases and performing complex operations of the liver, pancreas, bile duct, gallbladder, colon and internal digestive organs. Besides providing cutting-edge surgical services to our local population, we are also a regional referral centre and a leading centre for clinical research. There are four main specialties in the centre, namely: Colorectal Surgery, Gastroenterology & Hepatology, Hepatopancreatobiliary Surgery and Upper Gastrointestinal.



Colorectal Surgery

- The clinical team manages colorectal cancer from presenting early symptoms to investigations for treatment and surgery.
- The team also treats perianal conditions which include haemorrhoids, anal abscess, fistula and anal fissures.
- The centre also offers minimally invasive (laparoscopic) surgery for selected patients as well as robotic surgery and transanal endoscopic operations.

- Endoscopy and colonoscopy services are commonly offered for patients with per rectal bleeding and with changes in their bowel habits.

Gastroenterology

- Common conditions treated at the centre include inflammatory bowel disease, abdominal pain and other functional bowel diseases, liver cirrhosis and portal hypertension, fatty liver, viral hepatitis and abnormal blood tests.
- The clinic offers services such as colonoscopy and gastroscopy,

endoscopic ultrasonography, capsule endoscopy, double-balloon enteroscopy as well as advanced endoscopic imaging (which includes narrow band imaging and chromoendoscopy).

- The clinic also provides clinical nutrition for patients.

Hepatopancreatobiliary Surgery

- Common conditions treated at the clinic include surgical diseases of the gallbladder, bile duct stones, jaundice, pancreatic cancer and diseases of the liver.
- The centre offers endoscopic and laparoscopic (minimally invasive surgery) procedures for the treatment of stone diseases.



- The clinic also offers pancreatic resections including Whipples procedure, total pancreatectomy, enucleation, disal pancreatectomy and pancreaticoenteric by-pass.
- Our doctors and surgeons are trained in performing complex surgeries for locally advanced cancer.

Upper Gastrointestinal

- Common conditions treated at the centre include dyspepsia or upper abdominal pain, gastric cancer and oesophageal cancer.
- The centre offers comprehensive management of oesophagus, stomach and other upper gastrointestinal cancers which include consultation and surgery.
- The clinic also offers fiberoptic endoscopic service which provides the screening and diagnosis of upper gastrointestinal tract diseases.
- The team of specialists are also trained in managing obesity and upper gastrointestinal motility disorders.

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