July/ 2024

Department of Health Research
Ministry of Health and Family Welfare, Government of India

Standard Treatment Workflow STW in Interventional Radiology

IMAGE GUIDED DRAINAGE OF INTRA ABDOMINAL ABSCESS

ICD-10-KK65.1,K75.0

CLINICAL PRESENTATION

SIGNS AND SYMPTOMS

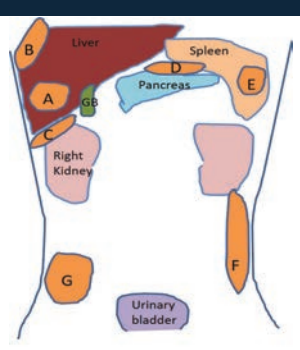
- Pain
- Fever
- Weight loss
- Anorexia
- Local tenderness
- Organomegaly

WHEN TO SUSPECT?

- Patient having unexplained fever especially with chills and rigors
- Local pain: Right hypochondrium (liver abscess), left hypochondrium(splenic abscess, pelvis (post operative status)
- Post operative patient developing fever and increased leucocyte count

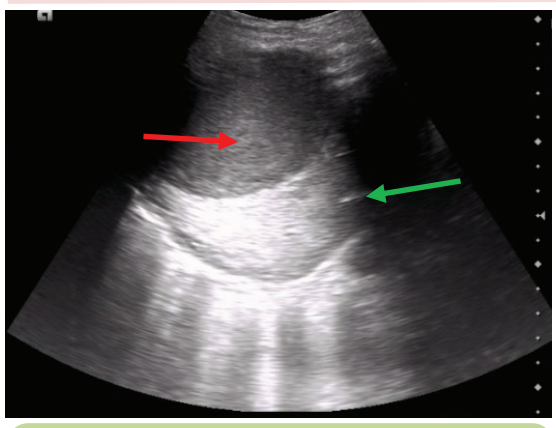
INVESTIGATIONS

	ESSENTIAL	DESIRABLE
HEMATOLOGICAL	CBC CRP ESR	LFTs HIV serology HBs Ag
IMAGING	USG Abdomen	Contrast enhanced CT study of the abdomen

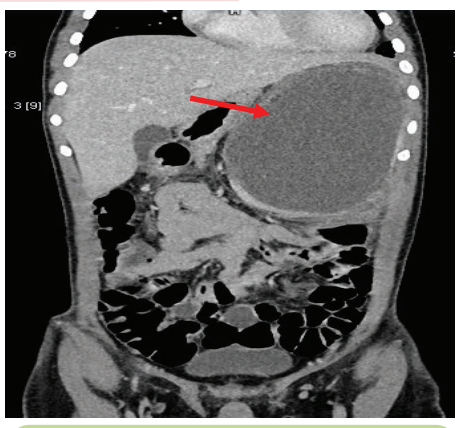


An abscess forms like a round to irregular collection within the liver parenchyma or other abdominal organs/peritoneal cavity

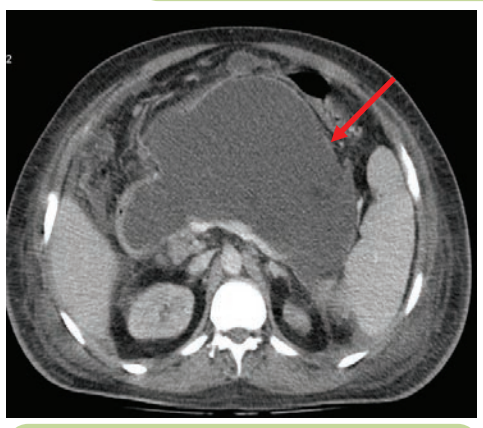
A: Liver abscess
B: Subdiaphragmatic abscess
C: Peri renal abscess
D: Peripancreatic abscess
E: Splenic abscess
F: Paracolic abscess
G: Right iliac fossa/ periappendiceal collection



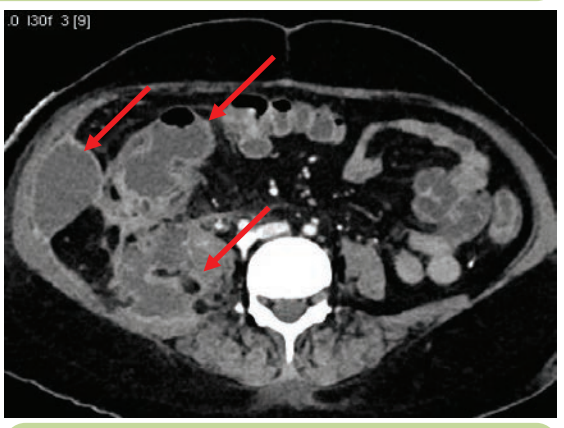
An ultrasound image showing a liver abscess (red arrow) as a well-defined round area appearing less bright than the surrounding liver (green arrow)



A coronal CT scan image of the abdomen showing a large intrasplenic abscess (arrow)



An axial CT scan image of the upper abdomen showing a peripancreatic collection (arrow)



An axial CT scan image of the lower abdomen in a post cholecystectomy patient showing multiple collections (arrows)

MANAGEMENT

Treatment of an abscess depends on its:

- Location
- Size
- Degree of clinical symptoms (patient with septicaemia {tachycardia, hypotension} should be treated aggressively whereas a stable patient can be discharged on oral medical treatment)

- **Medical management**
  - Send the aspirate for microbiological analysis but don't defer treatment for the result of the same
- **Drug dosages:**
  - Inj Metronidazole 500mg IV 6-8 hourly plus inj Ceftriaxone 2gm IV OD for 10-14 days (for liver and splenic abscess)
  - For pancreatic and pelvic/lower abdominal abscesses:
    - Meropenem 1-2gm IV 8 hourly plus Levofloxacin 500-750mg IV daily and Ofloxacin 200 mg for 5-7 days
    - Cefoperazone 1000-2000 mg plus Sulbactam 500-1000 mg (as a combination) IV BD for 5-7 days
- **Surgical management:**
  - To be done in cases of ruptured/impending rupture into the pericardium, peritoneal cavity and pleural cavity
- **Options include:**
  - Laparotomy
  - Chest tube placement/Video-assisted thoracoscopic surgery (VATS)

LIVER ABSCESS

- Right upper quadrant pain
- May present with pleuritic right sided chest pain
- Tender hepatomegaly on examination

RED FLAG SIGNS
- Left lobe abscess
- Segment VIII abscess: can rupture into pleura
- Superficially located abscess
- Abscess volume>100 ml

SPLENIC ABSCESS

- Left upper quadrant pain
- Tender Splenomegaly on examination

PERIPANCREATIC ABSCESS

- Upper abdominal pain
- Patient usually has underlying acute/acute exacerbation of chronic pancreatitis

RED FLAG SIGN
May deteriorate rapidly if splenic vein thrombosis occurs

PELVIC ABSCESS

- Deep seated pelvic abscess
- Common in post operative patients after bowel/ gynaecological surgeries
- Tender lower abdomen/ signs of peritonitis on examination

IMAGE GUIDED DRAINAGE

Consider image guided drainage if the patient has the following despite medical treatment:

- Persistent leucocytosis
- Signs of septicaemia: tachycardia, hypotension
- Impending signs of abscess rupture on imaging

Involves Ultrasound/CT guided placement of catheter in the abscess cavity

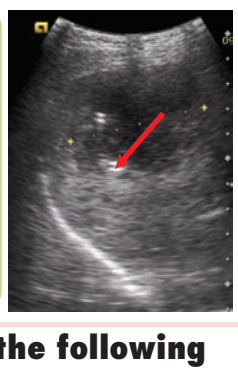
INDICATIONS

- Patient developing tachycardia and hypotension
- Persistent leucocytosis
- Impending signs of rupture of abscess into adjacent cavity(pleural/peritoneal/pericardial)

CONTRAINDICATIONS

- Uncorrectable coagulopathy
- Vital structures in the approach path (large vessel, bowel)

- **Days of required hospitalisation:** 2-5 days
- **Expected outcome:**
  - Relief in pain and tenderness within 6-8 hrs
  - Resolution of fever within 24 hours
- **Associated adverse events that may occur:**
  - Vasovagal syncope (manifested as sweating, hypotension, bradycardia and loss of consciousness)



An ultrasound image showing a drainage catheter (arrow) placed within a liver abscess

How to prevent vasovagal syncope: Ensure the following

- Reassure the patient about the procedure
- Place a large bore(18G/20G) IV cannula in the arm before the procedure
- Keep normal saline infusion bag ready
- Atropine IV to be available for use

How to treat vasovagal syncope

- Raise the legs of the patient to prevent peripheral venous pooling
- Inject Atropine 0.6 mg IV if the heart rate is < 60/min (usually responds to this otherwise the same dose can be repeated after 5 min)

COMPLICATIONS

- Injury to vessels in vicinity of the abscess
- Injury to the pleura in case of liver and splenic abscesses

WHEN TO TAKE OUT THE CATHETER:

- When the output is < 10 ml/24 hours

ALGORITHM FOR IMAGE GUIDED ABSCESS DRAINAGE

Patient with abdominal pain, high grade fever, malaise (suspected intra abdominal abscess)

↓

Laboratory and imaging investigations (Ultrasonography and CT) to confirm the diagnosis

↓ Start medical treatment

Symptoms resolve after 3-5 days

↓

Yes → Follow up imaging ultrasound at 1 month

No improvement/Patient develops signs such as increasing abdominal pain, tachycardia, hypotension → Percutaneous image guided drainage of abscess

Abscess volume > 100ml Superficially located liver abscess at risk of rupture into pericardium/ peritoneum → Percutaneous image guided drainage of abscess

Percutaneous image guided drainage of abscess → Continued medical Treatment

- Immediate step to be taken if warning signs (as shown in red flag) occur: Clamp the drainage catheter (Do not take it out), fast fluid infusion to be started
- Steps to be taken once complication is recognised:
  - Appropriate imaging to look for source of bleeding (CT angiography followed by DSA if necessary)
  - CT thorax if pleural breach is suspected

POST PROCEDURE WARNING SIGNS SIGNIFYING COMPLICATIONS

- Frank blood in the drainage tube (haemorrhage)
- Drop in BP with tachycardia (haemorrhage)
- Patient developing breathlessness/desaturation (pneumothorax)

AFTER CARE IN CASE OF UNCOMPLICATED CASES

Continue with standard medical treatment as mentioned above
Investigation: Ultrasound on day 1 and day 3 post drainage

PATIENT SUITABLE FOR DISCHARGE

Afebrile patient with resolved leucocytosis

FOLLOW UP

Repeat ultrasound at 1 month to look for residual abscess

ABBREVIATIONS

CBC: Complete Blood Count
CRP: C-reactive protein
CT: Computed Tomography
ESR: Erythrocyte Sedimentation Rate
HBs Ag: Hepatitis B surface Antigen
HIV: Human Immunodeficiency Virus
LFT: Liver Function Test
USG: Ultrasonography

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DRAIN THE ABSCESS BEFORE IT DRAINS A LIFE

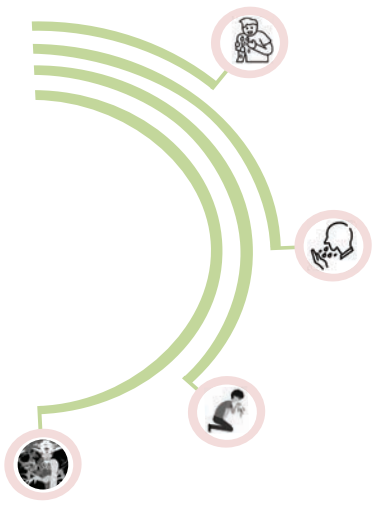
July/ 2024

Department of Health Research
Ministry of Health and Family Welfare, Government of India

Standard Treatment Workflow (STW)

IMAGE GUIDED MANAGEMENT OF HAEMOPTYSIS

ICD-10-R04.2



INTRODUCTION

- Haemoptysis refers to the expectoration of blood, originating from the lower respiratory tract
- **LTH - Any haemoptysis that**
  - (1) is > 100 ml in 24 hr
  - (2) causes respiratory failure (SpO2 < 60%) necessitating intubation and mechanical ventilation; or
  - (3) causes haemodynamic instability
- LTH is a respiratory emergency, mortality→50 -100%
- Patient dies because of asphyxiation and not exsanguination
- Optimal diagnosis and treatment→mortality < 20%

ETIOLOGY AND SOURCE OF HAEMOPTYSIS

Pulmonary parenchymal source (65 - 79%)
- Tubercular Pneumonia
- Lung abscess
- Mycetoma ("fungus ball")

Tracheobronchial source (31–57%)
- Bronchiectasis
- Neoplasm

Primary vascular source (1-5%)
- Arteriovenous malformation
- Pulmonary embolism
- Pulmonary artery aneurysm/rupture

Cardiac source (1-5%)
- Mitral Stenosis
- Pulmonary Edema
- CHD with MAPCAS

Miscellaneous and rare causes
- Systemic coagulopathy or thrombolytic agents

Patient with suspected haemoptysis
History & clinical examination
Confirmed hemoptysis
LTH
Chart 2
Non-LTH
Chart 3

Rule out other source of bleeding
- Upper Respiratory tract → alkaline, bright red, foamy blood, breathing difficulty, the sensation of warmth in the thorax
- GIT→hematinized blood, acidic pH, food particles, abdominal pain, nausea

Pseudohaemoptysis
Appropriate supportive care and management

CHART 2

LTH
Resuscitation
Airway, Breathing, Circulation

Consider Intubation in
- Ineffective cough
- Worsening hypoxemia
- Presence of red flag sign

Bad lung down (dependent position-decubitus)
Correct coagulopathy
Reverse anticoagulation
Nebulized Tranexamic acid 1gm f/b 0.5 gm Q8H

Refer to nearest centre having facility of ICU, CT Scan, IR services

RED FLAG SIGNS
- PR > 120/min
- Systolic BP < 100 Mm Hg
- Tachypnoea
- SpO2< 90%
- Deterioration of sensorium

Lab Investigations
BG,CM; CBC; PT-INR; viral markers, KFT, CHEST X-RAY

- PR -60-100/min
- Systolic BP > 100 Mm Hg
- SpO2 > 95%
- Conscious and oriented

Vitals Stable
YES
No
DSA + embolization of BAs/NBSAs/PA/MAPCAS

CTA AORTA +/- CTPA

Normal; No identifiable source	Hypertrophied BAs(90%), NBSAs (5%)	PA aneurysm/PAVM	CHD with MAPCAS	Lung CA
Medical management	BAE by PVA, Embospheres, Glue (Coil and gelfoam for aneurysm/prox occlusion)	PA/PAVM embolization	In consultation with appropriate specialists, plan for MAPCAS embolization	Embolization of supplying artery (PA/BA) as bridge
Fail		Peripheral PA aneurysm →DSA/CT guided glue embolization PAVM→Coil/Plug Embo of feeders (No use of PVA)	Proximal vessel embolization by gelfoam/coil followed by definitive surgery for CHD	
DSA + Embolisation of Bronchial arteries		Fail	Fail	

Fail → Surgery ← Fail

CHART 3

NON LTH
CHEST XRAY

Infiltrate → Antibiotics/sputum C/S
- Resolution → Repeat CXR at 8 weeks
- Non resolution → HRCT/CTA/CECT

Repeat CXR at 8 weeks
- Normal
- Abnormal → HRCT/CTA/CECT

Mass lesion → HRCT/CTA/CECT

Other parenchymal disease → HRCT/CTA/CECT

Suspicion of cardiac disease → ECG+ ECHO → Specific management and treatment

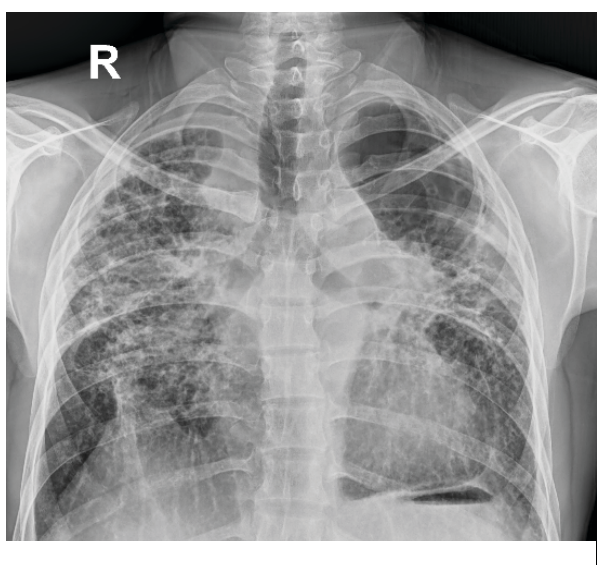
Recurrence/High risk of CA lung

ROLE OF BRONCHOSCOPY

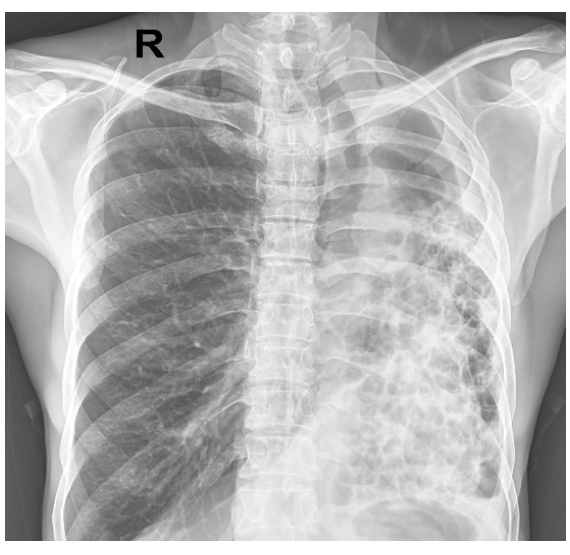
Bronchoscopy may be used for
- Lateralization of bleeding (active haemoptysis within 24-48 hrs)
- Clot extraction
- Balloon tamponade

SURGERY FOR SEVERE/REFRACTORY HAEMOPTYSIS

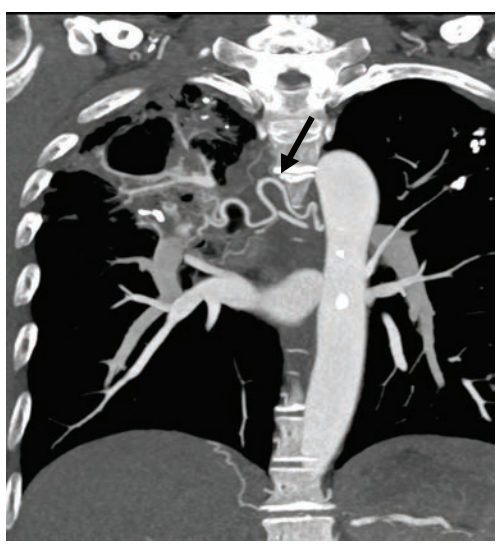
- Cavitating lesion with fungal ball
- In unsuitable anatomy/not amenable for angioembolization/unsuccessful embolization
- > 600 ml/24 hours
- Surgeries: Lobectomy, Pneumonectomy, Cavernostomy
- Large cavity in a patient with very poor pulmonary functions and massive bleeding→Resection and a cavernostomy with cauterization of the bleeding point and packing of the cavity

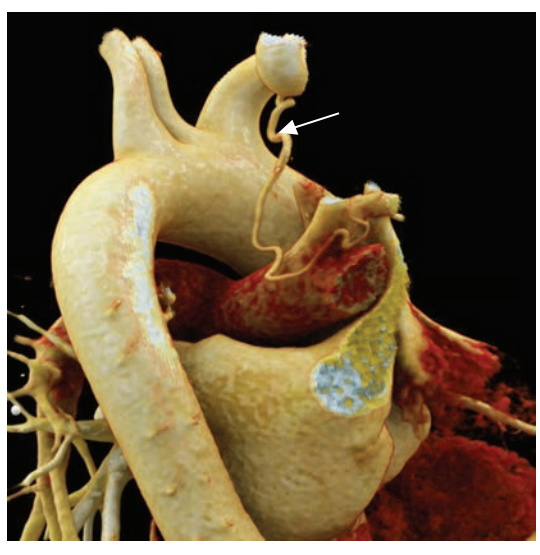


Fibrocalcific lesion



L side-Bronchiectasis





Hypertrophied Bronchial artery in MDCT, MIP and VRT

July/ 2024

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Standard Treatment Workflow (STW)

IMAGE GUIDED MANAGEMENT OF HAEMOPTYSIS

Continued

ANGIOGRAPHIC AND CT APPEARANCE OF ABNORMAL BRONCHIAL ARTERIES-INDICATIONS FOR BAE

1. Hypervascularity of lung parenchyma (most common)
2. Hypertrophic tortuous bronchial or non-bronchial arteries (common)
3. Neovascularisation (common) or peri-bronchial hypervascularity
4. Enlarged main bronchial artery (diameter > 2.0 mm)
5. Contrast extravasation (variable)
6. Bronchial artery aneurysm, pseudoaneurysm (rare)
7. Bronchial-to-pulmonary vein-shunts
8. Pleural thickening > 3 mm adjacent to a parenchymal abnormality
9. Extrapleural fat hypertrophy including enlarged vascular structures
10. 10% of BA may arise from Brachiocephalic, SCA, IMA or abdominal aorta branches

CONTRAINDICATIONS FOR BRONCHIAL ARTERY EMBOLIZATION

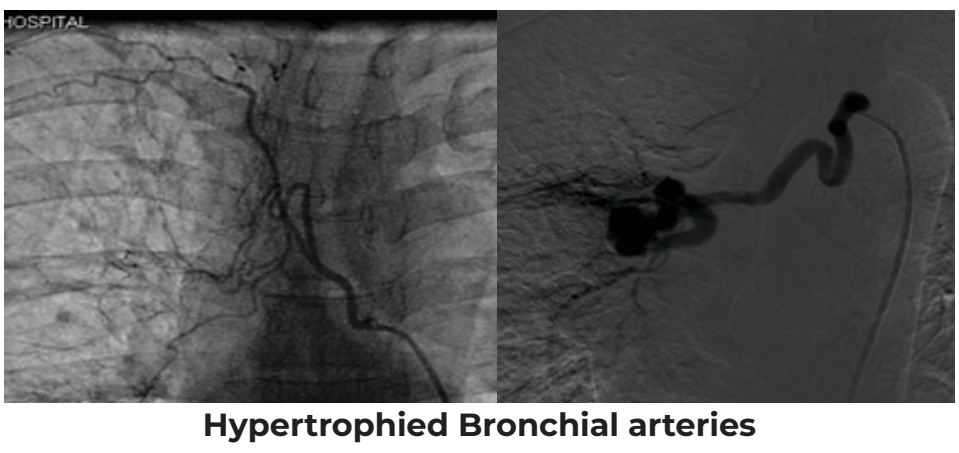
- Documented severe iodinated contrast allergy
- Careful to exclude branches supplying the heart, spinal cord or brain arising from bronchial, intercostal or other non-bronchial vessels
- Congenital PA stenosis (bronchial collateral vessels may provide an essential role in pulmonary parenchymal perfusion)

PROCEDURE DETAILS OF BAE

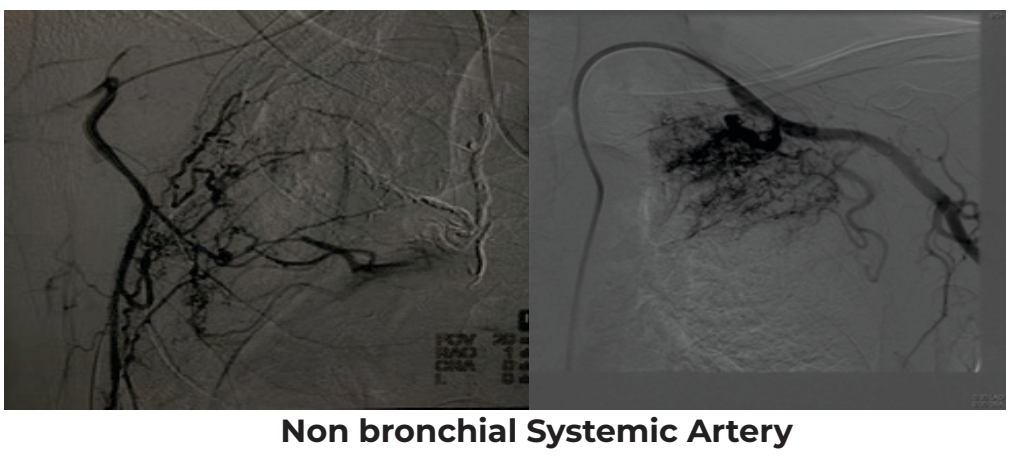
Pre op CTA/Flush DTA and B/L SCA Aortogram
↓
Locate Hypertrophied BAs, search and hook with diagnostic cobra/simmons catheter
↓
Selective hand-injection angiogram→verification of absence of any branches supplying to critical structures
↓
Advance coaxial microcatheter in target vessel distally and access flow dynamics by angiogram through 2CC luer lock syringe
↓
Embolization by pulsatile injection through 1 cc syringe under active fluoroscopy
↓
When resistance/reflux develops, new manual contrast angiogram to be done after flushing residual embolic materials
↓
Locate other BAs and NBSAs and embolise all pathological arteries

EXPECTED OUTCOMES

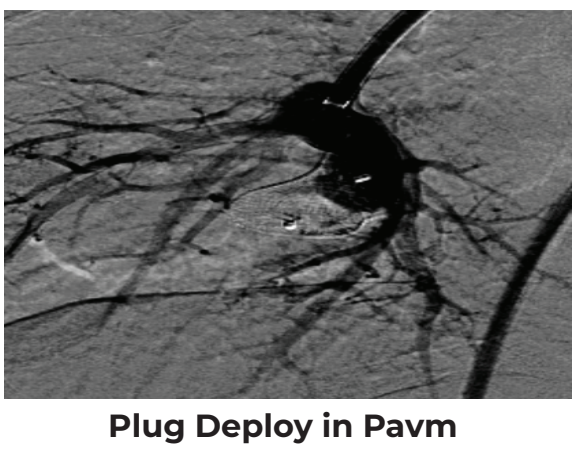
- **Technical success: 90-100%**
- **Clinical success**
  - Within 24 hr- 82-100%; within 30 days-70-92%;
  - 1-yr clinical success- 64-92 %
  - Recurrence: upto 47% [Repeat Embolization to be performed]
- **Predictors of recurrent Haemoptysis are as follows:**
  - Recruitment of non-bronchial systemic collaterals
  - Diabetes
  - Presence of an aspergilloma
  - Feeding vessels from internal mammary artery
  - Multidrug-resistant tuberculosis, co-existent pulmonary interstitial lung disease, patients with malignant diseases
  - Unstable haemodynamics and prolonged coagulation
- **Associated adverse events/complications**
  - Post embolization syndrome-1.7-31%
  - Spinal cord Infarction, bronchial infarction,stroke <1%
- **After care**
  - Pain management: NSAIDS and if required intravenous Narcotics
- **Follow up**:
  - After 1 week; 1, 3, 6, and 12months post-BAE and yearly thereafter
  - Hb
  - Chest Xray



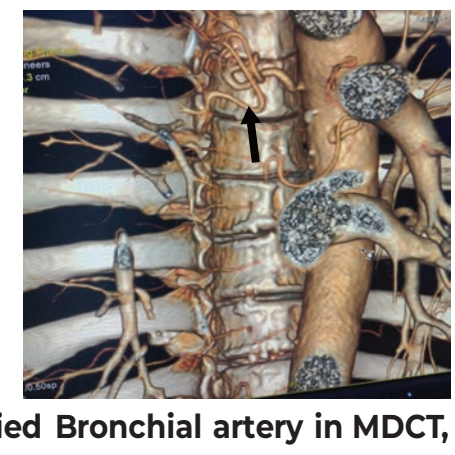
Hypertrophied Bronchial arteries



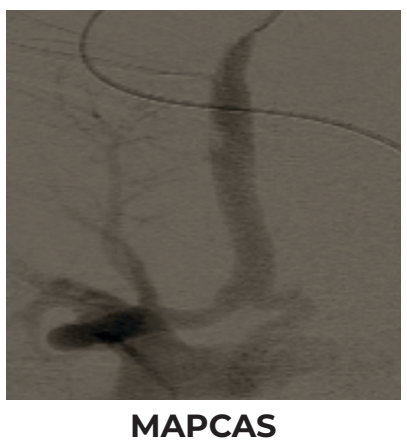
Non bronchial Systemic Artery



Plug Deploy in Pavm



Hypertrophied Bronchial artery in MDCT, MIP and VRT



MAPCAS

ABBREVIATIONS

BA:	Bronchial Artery	**ECHO:**	Echocardiography	**MIP:**	Maximum Intensity Projection
BG:	Blood Grouping	**FB:**	Flexible Bronchoscopy	**MS:**	Mitral Stenosis
CBC:	Complete Blood Count	**GA:**	General Anaesthesia	**NBSA:**	Non Bronchial Systemic Artery
CE:	Clinical Examination	**HB:**	Hemoglobin	**OT:**	Operation Theatre
CHD:	Congenital Heart Disease	**ICU:**	Intensive Care Unit	**PA:**	Pulmonary Artery
CM:	Cross Matching	**IMA:**	Internal Mammary Artery	**PT:**	Prothrombin Time
CTA:	Computed Tomogram Angio	**IR:**	Interventional Radiology	**PVA:**	Poly vinyl Alcohol
CTPA:	CT Pulmonary Angio	**LTH:**	Life threatening Haemoptysis	**KFT:**	Kidney Function Test
DSA:	Digital Subtraction Angio	**MAPCAS:**	Major Aorto-Pul Collaterals	**SCA:**	Subclavian Artery
ECG:	Electrocardiogram	**MDCT:**	Multi Detector CT	**VRT:**	Virtual Reality Technology

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STOP COUGHING OF BLOOD, SAVE LUNGS & SAVE LIFE

July/ 2024

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Ministry of Health and Family Welfare, Government of India

Standard Treatment Workflow (STW)

IMAGE GUIDED THERAPIES FOR PRIMARY LIVER TUMOR

ICD-10-C22.8

PRIMARY LIVER TUMORS

- Primary liver tumors majorly consists of Hepatocellular carcinoma (HCC), Intrahepatic cholangiocarcinoma (IHCC) and combined hepatocellular cholangiocarcinoma (cHCC-CC) HCC being is the most common
- There are no specific signs or symptoms for primary liver tumors
- Radiological and lab investigations are the main tool for the diagnosis

In patients with underlying cirrhosis new onset of ascites, jaundice and/or variceal haemorrhage should prompt investigations to look for HCC

- Patients with pre-existing cirrhosis; are at high risk of developing HCC and should be under surveillance for development
- **Risk Factors**
  - Hepatitis B (33%)
  - Alcoholic liver disease(30%)
  - Hepatitis C (21%)
  - NASH
  - Other causes of cirrhosis
- Serum Alpha fetoprotein: elevated AFP value should prompt imaging work up

DIAGNOSTIC WORK-UP

- LI-RADS classification system should be used for diagnosis
- Multiphasic CT/MRI or contrast enhanced ultrasound is needed for diagnosis
- In patients at risk, if a lesion of size > 2cm with arterial phase hyperenhancement and washout on subsequent phase is diagnostic of HCC
- Biopsy is needed if
  - Equivocal imaging findings
  - Non-cirrhotic liver

INVESTIGATIONS

Essential

Lab investigations
- Liver function tests
- Kidney function tests
- CBC
- PT/INR
- Alpha feto-protein (AFP)

Imaging
- Recent contrast enhanced multiphasic CT/MRI

Desirable
- PIVKA II

Optional
- FDG PET CECT

PATIENT MANAGEMENT

Multiphasic contrast-enhanced CT/MRI
- Tumor characterization staging and presence of extrahepatic disease

IR therapies based on size and number of lesions
- < 3 lesions of < 3 cm: consider ablation
- Lesion > 3cm & < 5cm may consider combination of TACE & Ablation
- Lesion > 5 & < 8 cm consider TACE
- Lesion > 8 cm consider TARE

Portal vein status:
- Portal vein tumoral thrombus: consider TARE/SBRT,
- TACE may be considered for segmental/sub-segmental branch tumoral thrombus

Location of the tumor:
- Tumors at critical location like Perivascular/pericholedochal/exhophytic/subdiaphragmatic lesion
  - Consider TACE
  - Combination of TACE & ablation / MWA in experienced centres

Performance status (ECOG)[ref] PS 0, 1 suitable for IR therapies, PS 2 may consider TARE
Liver function tests: Serum bilirubin >3 mg/dl & AST > five times the upper limit of normal contraindication for TACE
Child-Pugh class: IR therapies should be considered for Child-Pugh class[ref] < B8

ABLATIVE THERAPIES

Chemical ablation
- Ethanol
- Acetic acid

Thermal ablation
- Radiofrequency Ablation
- Microwave ablation
- Cryoablation

Non chemical-non thermal ablation
- Irreversible electroporation

THERMAL ABLATION: INDICATIONS

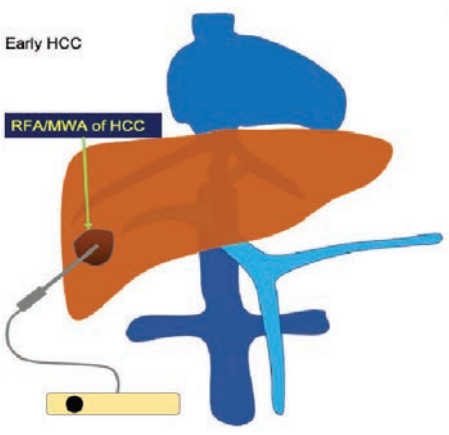
- Very early (single lesion <2 cm) and early HCC single lesion or upto three lesions each less than 3cm
- Ablation may be considered for all primary liver lesions amenable for ablation in following situation
  - Bridging therapy for liver transplantation
  - Residual and recurrent HCC
  - Combination therapy with TACE
  - Repeat ablation should be considered for focal residual lesion < 3 cm along the periphery or within the ablation zone

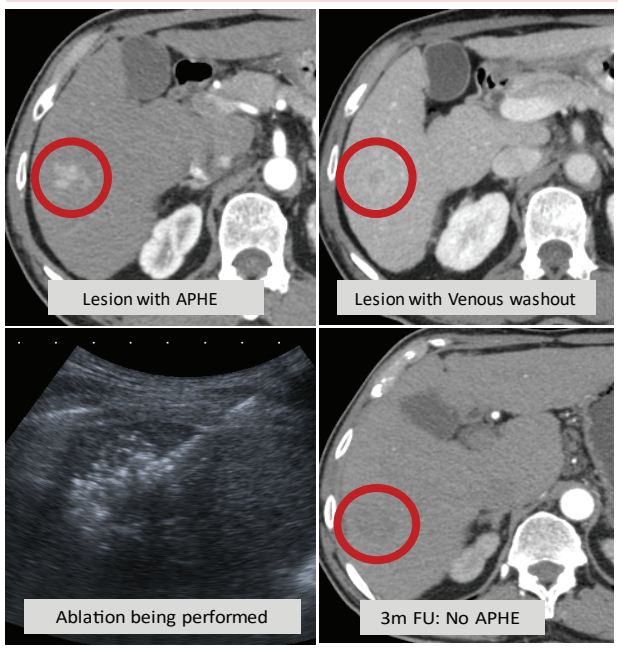
CONTRAINDICATION

- Ascites
- Sepsis and uncorrectable coagulopathy
- Intrahepatic biliary dilatation
- Intravascular invasion or extrahepatic metastatic disease
- Arrhythmias (for IRE)
- Poor PS (>2)
- Severely deranged liver function (CTP class C)

IMAGE GUIDANCE

- USG (contrast optional)
- CT (contrast optional)
- Both CT & USG





POST PROCEDURE COMPLICATIONS

- **Immediate Post procedure:** Bleed/hemoperitoneum

Post procedure appearance of perihepatic hematoma/fluid/ascites suggestive of bleed/hemoperitoneum
If continuous increase in size/volume of hematoma/fluid plan CT angiogram to localize bleeding vessels
If active contrast extravasation noted on CT angiogram plan urgent angio-embolization of the bleeding vessel

- **Post embolization syndrome:** Fever may persist for 2-3 days and pain may persist for 5-7 days
  - Severe/excruciating pain at any point of time should be evaluated with USG and if needed CECT to look for the cause
- **Visceral/diaphragmatic/lung/GB injury:** Rare complications but may be looked for if severe/excruciating pain persists

TRANSARTERIAL CHEMOEMBOLIZATION (TACE)

- TACE: Intra-arterial infusion of cytotoxic agent followed by embolisation of the tumor-feeding blood vessels
- TACE performed in 2 ways
  - **cTACE:** Emulsion of Lipiodol & chemotherapeutic agent is injected into the arteries supplying the tumor
  - **DEB TACE:** Chemotherapy loaded microspheres are selectively injected into the arteries supplying the tumor
- The use of drug-eluting beads has shown similar benefit to conventional TACE (cTACE; gelfoam-Lipiodol particles) and either of the two can be utilized
- TACE is suitable for patients with well-defined nodules and preserved portal flow
- TACE should be performed in a super-selective manner and avoid all possible non-target embolization

TACE INDICATIONS

- Multinodular or single nodule HCC of size > 5 cm with preserved portal flow, preserved liver function and PS=0 (INASL-BCLC/BCLC-2022 stage B)
- In small HCC where ablation is not possible

TACE CONTRAINDICATIONS

- Decompensated cirrhosis (Child-Pugh B ≥8, including jaundice with Serum Bilirubin > 3.0 mg/dl, hepatic encephalopathy, refractory ascites and hepatorenal syndrome)
- Portal vein tumoral thrombus
- Extensive tumor involving both liver lobes
- Untreatable arteriovenous fistula
- Renal insufficiency, including creatinine ≥2 mg/dL or creatinine clearance <30 mL/min

POST TACE COMPLICATIONS

- Immediate post procedure:
  - Arterial injury/dissection (small vessel and minor injury may be left as it is and major vessel injury may require measures like angioplasty and/or stenting)
  - Tumor rupture (Rare) presents as hemoperitoneum/ascites/hemodynamic shock and may be seen in few hours to 24 hours post TACE
- **Post embolization syndrome:** Pain, fever, Nausea/Vomiting – these symptoms are mostly self limiting resolves in 2-3 days and needs symptomatic care (Paracetamol and/or antiemetics)
- If there is deterioration on clinical condition of the patient after TACE (3-7 days) with severe post embolization syndrome then lab investigations (LFT, KFT, CBC and PT/INR) and USG should be done to look for post TACE liver failure
- **Post TACE Liver failure**
  - > 10 times elevation of baseline AST/ALT
  - > 3 times elevation of baseline serum Bilirubin
  - Post procedure hepatic encephalopathy
  - INR elevation > 2.5 of baseline

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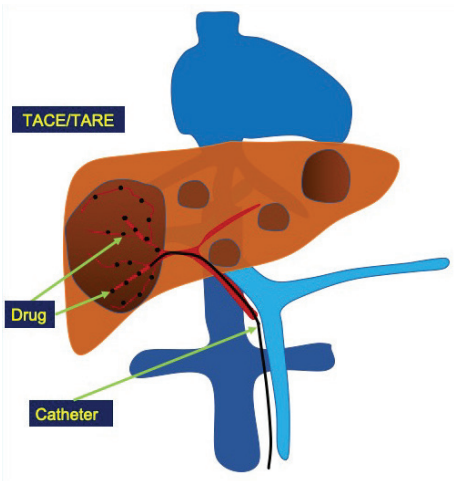
Standard Treatment Workflow (STW)

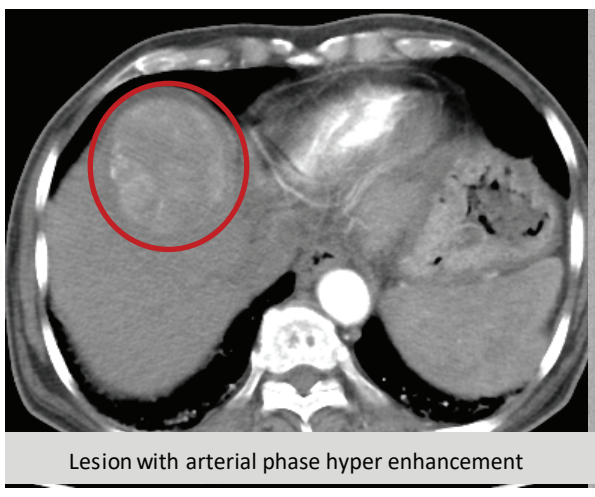
IMAGE GUIDED THERAPIES FOR PRIMARY LIVER TUMOR

Continued

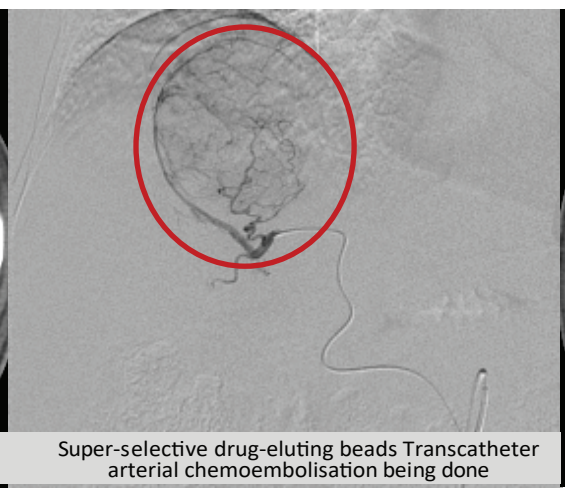
IMAGE GUIDANCE FOR TACE/TARE

- DSA (Cone beam CT optional)

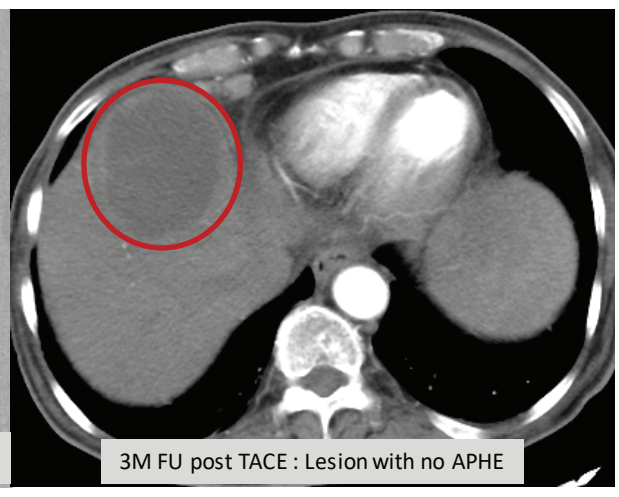




Lesion with arterial phase hyper enhancement



Super-selective drug-eluting beads Transcatheter arterial chemoembolisation being done



3M FU post TACE : Lesion with no APHE

TRANSARTERIAL RADIOEMBOLISATION

- TARE is infusion of radioactive substances or microspheres into the arteries supplying the tumor. It mostly contains yttrium-90 (Y90)
- TARE may be performed in a lobar, sectorial, or segmental approach based on tumor burden and location
- Pre-procedure assessment
  - Assessment of anatomic variant, collateral vessels [prophylactic coil embolisation of gastroduodenal artery, right gastric artery left gastric artery, left gastric artery (optional)]
  - Assessment of degree of shunting to lung.
  - T99m Tc MAA - Macro aggregated albumin- is used for pre-procedure assessment as it has diameter and distribution similar to Y90 microspheres
  - Tc99 (2-5 mCi) microspheres is used in preprocedure assessment - In case of rhenium-188 isotope

TARE INDICATIONS

- Palliation for unresectable HCC with or without PVTT
- Bridge to transplantation
- Neoadjuvant therapy for resection
- Definitive ablative radiotherapy for smaller lesions

TARE CONTRAINDICATIONS

- Lung shunting > 20% or radiation doses to lungs > 30 Gy in single treatment or cumulative dose of 50 Gy
- Severe liver dysfunction (Child – Pugh C), total bilrubin >3mg/dl
- Significant immediate life threatening extrahepatic disease
- Patients with ECOG PS >2

POST TARE COMPLICATIONS

- **Immediate post procedure**
  - Arterial injury/dissection (small vessel and minor injury may be left as it is and major vessel injury may require measures like angioplasty and/or stenting)
- **Post embolization syndrome:** Mild and self limiting resolve in 2-3 days and need symptomatic care (Paracetamol and/or antiemetics)
- Radioembolization-induced liver disease (REILD)
  - It is a rare complications which occurs due to liver injury caused by 90Y microspheres.
  - It develops in 4–8 weeks after treatment and manifests as jaundice and ascites without biliary obstruction or tumor progression.
  - It may be mild or severe
- **Gastrointestinal complications:** Gastroduodenal ulcers and pancreatitis is a rare complication due to non-target reflux of 90Y particles
- **Radiation Pneumonitis:** Rare complication, occurs due to excessive arterio-venous shunting and is seen after 1-6 months of treatment

FOLLOW-UP (Common for all IR therapies)

- Lab investigations (LFT, KFT, CBC) may be repeated after 1-2 weeks of IR therapies to assess infection/liver & kidney dysfunction
- USG abdomen may be done if there is prolonged pain/fever and/or abdominal distension
- Response to evaluation and follow up consists of clinical, biochemical and imaging at 1 month
  - Clinical – General condition, performance status
  - Biochemical – LFT, KFT, CBC, PT/INR, AFP
  - Multiphasic contrast enhanced CT/MRI
    - To assess treatment response as per (mRECIST) criteria at 1 month for Ablation/TACE and 6 or 12 weeks (12 weeks preferable) for TARE

Treatment response should be assessed using mRECIST criteria and should be reported as complete response (CR), partial response (PR), Stable disease (SD) and progressive disease (PD)

OUTCOME MEASURES AND LONG TERM FOLLOW UP

- Treatment response should be assessed using mRECIST criteria and should be reported as complete response (CR), partial response (PR), Stable disease (SD) and progressive disease (PD)
- If complete response achieved, then periodic follow-up at 3, 6, 9, 12 months and 6-12 months thereafter same as above
- Partial response at 1 month: plan repeat session consisting of same or different modality
- Progressive disease at one month: change treatment plan based on advanced HCC as per INASL-BCLC/BCLC-2022 classification

ABBREVIATIONS

AFP:	Alpha Fetoprotein	**MRI:**	Magnetic Resonance Imaging
CBC:	Complete Blood Count	**MWA:**	Microwave Ablation
CT:	Computed Tomography	**PET:**	Positron Emitting Tomography
DSA:	Digital subtraction angiography	**PIVKA II:**	Protein Induced by Vitamin K Absence-II
ECOG:	Eastern Cooperative Oncology Group	**PS:**	Performance Status
HCC:	Hepatocellular Carcinoma	**PT:**	Prothrombin Time
IHCC:	Intrahepatic Cholangiocarcinoma	**PVTt:**	Portal Vein Tumoral Thrombus
INR:	International Normalized Ratio	**mRECIST:**	modified Response Evaluation Criteria in Solid Tumors
IRE:	Irreversible Electroporation	**SBRT:**	Stereotactic Body Radiotherapy
KFT:	Kidney Function Test	**TACE:**	Transarterial Chemoembolization
LFT:	Liver Function Test	**TARE:**	Transarterial Radioembolization
LI-RADS:	Liver Imaging Reporting & Data System	**USG:**	Ultrasonography

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☛ HCC: EARLY DETECTION AND TREATMENT IS ASSOCIATED WITH BEST OUTCOME

July/ 2024

Department of Health Research
Ministry of Health and Family Welfare, Government of India

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Standard Treatment Workflow (STW)

IMAGE GUIDED MANAGEMENT OF OBSTRUCTIVE JAUNDICE

ICD-10-K83.1

CLINICAL PRESENTATION
- Jaundice
- Pruritus
- Dark coloured urine & Pale stool

COMMON ETIOLOGIES
- **Non obstructive:** Hepatitis related- viral hepatitis (A,B,C,E,NASH, alcohol, auto-immune cirrhosis)
- **Obstructive:** Mechanical obstruction
- **Benign:** stone, sludge, stricture, worm, primary sclerosing cholangitis, bilio-enteric anastomotic stricture (HJ stricture)
- **Malignant:** Carcinoma GB, hepatocellular carcinoma cholangiocarcinoma, hepatic metastasis, pancreatic head carcinoma, extrinsic compression by lymph node/mass, pseudotumor

KEY TO DIAGNOSIS
- In presence of jaundice
  - High AST/ALT + relatively normal SAP/GGT suggests hepatitis
  - Elevated SAP & GGT + relatively normal AST/ALT suggests obstructive etiology
- USG* abdomen would mostly differentiate between obstructive and non-obstructive causes

Do not suspect obstructive jaundice if:
- AST/ALT elevation > 1000 IU
- ALP/GGT normal/mildly elevated (s/o hepatitis)

- If non obstructive jaundice: refer to district hospital/tertiary care to be managed by physician (medicine/gastroenterologist/ hepatologist)

RED FLAGS
- Cholangitis
  - Pain in right hypochondrium
  - Fever
  - Chills
  - Tachycardia & tachypnoea
- Patients should be administered IV fluids & antibiotics- Cefoperazone + Sulbactam in a ratio of 1:1 administered IV 20-40 mg/kg/day in equal doses over duration of 6-12 hrs

INVESTIGATIONS

	ESSENTIAL	DESIRABLE	OPTIONAL
HEMATOLOGICAL	LFT, CBC, PT/INR	KFT, Screen for Hepatitis B/C markers	Hepatitis A/E markers
IMAGING	USG Abdomen	MRCP, CECT Abdomen	

PHC
Patient with clinical features and/or red flag signs

CHC/DISTRICT HOSPITAL
- Clinical examination; hematological investigations – LFT, CBC, PT/INR and Imaging – USG abdomen
- If cholangitis is suspected – Fluid resuscitation and IV antibiotics and refer to tertiary level care for further management

TERTIARY CARE
- Clinical examination, repeat hematological investigations if > 2 weeks. Imaging – MRCP to confirm diagnosis & look for level of obstruction, CECT abdomen to decide for definitive vs palliative care
- Suspected cholangitis – Fluid resuscitation & I/V antibiotics
- Biliary drainage (PTBD/ERCP) to make patient fit for surgery/palliative care (chemotherapy/radiotherapy)
- PTBD preferred for high CBD/hilar obstruction, ERCP preferred in low CBD obstruction

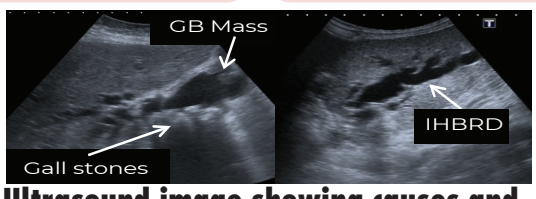
Once the bilirubin starts reducing, the patient can be: taken up for surgery or chemo/radiotherapy or refer back to regional cancer centre

BASIC HEMATOLOGICAL AND USG FINDINGS IN OBSTRUCTIVE JAUNDICE

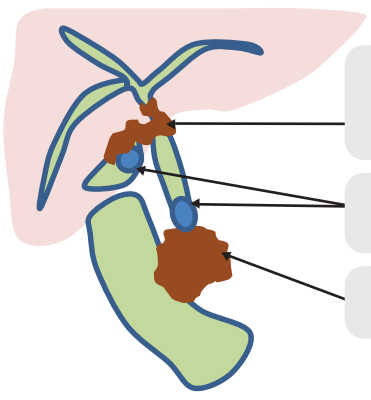
LFT
- Serum bilirubin – Elevated
- AST/ALT – Normal to elevated
- ALP/GGT – Markedly elevated (ALP>GGT)

CBC
- Hb: Normal to low
- TLC: Normal to elevated
- PT/INR: Normal to elevated

***USG ABDOMEN**
- Gall bladder stone/mass
- Dilatation of Common bile duct/intrahepatic biliary radicles



Ultrasound image showing causes and findings in of obstructive jaundice



COMMON CAUSES OF BILIARY OBSTRUCTION

MANAGEMENT

CLINICAL FEATURES

LFT
- Raised serum bilirubin with
- Markedly raised ALP and/ or GGT
- Normal/ mildly raised AST/ALT

If signs of cholangitis: Jaundice with fever, rigor, pain → Urgent referral to higher centre

USG
- CBD/IHBR dilatation
- GB stone/Mass

MEDICAL MANAGEMENT FOLLOWED BY
- USG/MRCP
- Lower CBD obstruction: ERCP
- Higher common bile duct/Hilar Obstruction PTBD#

MRCP
- Ascertain level and cause of obstruction in the biliary tree
  - Lower CBD obstruction: ERCP preferred
  - High CBD obstruction: PTBD# preferred

Choledocholithiasis/other benign cause needing bile drainage
- ERCP
- PTBD# (If ERCP not possible)

Biliary tract malignancy

CECT ABDOMEN
- Identify the malignancy and extent of disease
- Decide for definitive vs palliative care

DEFINITIVE TREATMENT
- PTBD followed by surgery

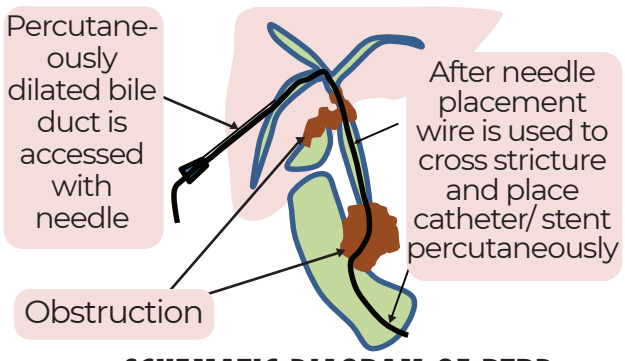
PALLIATIVE TREATMENT
- PTBD# followed by Biliary stenting
- Chemotherapy/Radiotherapy

PERCUTANEOUS TRANSHEPATIC BILIARY DRAINAGE (PTBD)#

INDICATIONS
- Decrease bilirubin to commence appropriate therapy (surgical/palliative)
- Cholangitis (draining infected bile)
- Intense pruritus

DAYS OF HOSPITALISATION
- 1-3 days (non-infected/no cholangitis cases)
- 7-14 days (Cholangitis, can be prolonged in severely septic patients)

CONTRAINDICATIONS
- Deranged coagulation (correct before procedure)
  - Emergent cases: infuse fresh frozen plasma (FFP) - 10ml/kg body weight prior to the procedure
  - Elective cases: I/V vitamin K injection (5-10 mg) - 3 to 5 days
- Ascites (to be dried before therapy)



SCHEMATIC DIAGRAM OF PTBD

PROCEDURAL DETAILS
- **External drainage** for infected cases (aim to establish internal drainage with or without biliary stenting, once the infection is treated. In cases of long-term external drainage – electrolytes should be replaced for ongoing bile salt loss)
- **Internal drainage** using internal external drainage catheter for non infected cases else may be considered for primary biliary stenting

#PTBD IN CHOLANGITIS: IV antibiotics** and fluids to be started before the procedure: Cefoperazone+Sulbactam in 1:1 ratio, 20-40 mg/kg/day in equal doses after duration of 6-12 hrs; Piperacillin 4 gm +Tazobactam 0.5 gms every 8 hrs
- External drainage till cholangitis subsides (normalization of leucocytosis, and draining bile to become clear – golden brown or light green)
- Establish internal drainage once infection is treated
- Plan for definitive/palliative therapy and manage same as described for non-infected patients

OUTCOME MEASURES
Normal bile drainage through the catheter

COMPLICATION
- Development of cholangitis post PTBD

EXPECTED OUTCOMES
Reduction in bilirubin to make patient fit for required therapy

- **Haemorrhagic output** should prompt an immediate evaluation to **rule out vascular injury**

AFTER CARE
- Appropriate antibiotics** : Ofloxacin/Cefixime 200 mg 12 hrly for 3-5 days
- LFT & CBC
- Clinically stable patient with reducing bilirubin can be planned for biliary stenting/ definitive surgery/discharge as per the requirement and suitability

FOLLOW UP
- Follow-up with IR in case of non-reducing or rise in bilirubin/sign of cholangitis/ stent block
- Patients to follow with respective physician (surgeon/medical or radiation oncologist) after successful biliary drainage and normalization of bilirubin

**Respective contraindications, risks and precautions, pediatric dose of antibiotics to be considered before prescription

Patients with obstructive jaundice having no/ minimal IHBRD with distended GB may be considered for percutaneous cholecystostomy in emergent situations. Similarly, cholecystostomy may be a bridge to surgery in patients with pyocele/mucocele of GB

ABBREVIATIONS

ALP: Alkaline Transferase
ALT: Alanine Aminotransferase
AST: Aspartate Aminotransferase
CBC: Complete Blood Count (Hemogram)
CBD: Common Bile Duct
CECT: Contrast Enhanced Computed Tomography
ERCP: Endoscopic Retrograde Cholangiopancreatography
GB: Gall Bladder
GGT: Gamma Glutamyl Transferase
IHBRD: Intrahepatic Biliary Radicle Dilatation
IR: Interventional Radiology
KFT: Kidney Function Test
LFT: Liver Function Test
MRCP: Magnetic Resonance Cholangiopancreatography
NASH: Non Alcoholic Steatohepatitis
PT/INR: Prothrombin Time/International Normalized Ratio
PTBD: Percutaneous Transhepatic Biliary Drainage
SAP: Serum amyloid P
USG: Ultrasonography

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CHOLANGITIS IN OBSTRUCTIVE JAUNDICE NEEDS AN EARLY BILIARLY DRAINAGE

July/ 2024

Department of Health Research
Ministry of Health and Family Welfare, Government of India

Standard Treatment Workflow (STW)

IMAGE GUIDED MANAGEMENT OF STROKE

ICD-10- I63.9

WHAT IS STROKE?
An episode of neurological dysfunction caused by focal cerebral, spinal or retinal infarction or haemorrhage

SYMPTOMS

Numbness or weakness especially on one side of the body	Loss of consciousness or altered consciousness	Decreased vision in one or both eyes	Language difficulties either in speaking or understanding	Difficulty in walking, loss of balance or coordination	
Confusion or loss of memory	Swallowing difficulties	Paralysis of any part of the body, including face	Sudden severe headache with no known cause	Neck pain	Nausea and vomiting

WARNING SIGN (BEFAST)

- **BALANCE**: Loss of balance or coordination
- **EYES**: Sudden blurred or double vision, sudden, persistent vision trouble
- **FACE**: Deviation at the angle of the mouth
- **ARM**: Arm drift
- **SPEECH**: Slurred speech or the inability to speak or understand
- **TIME**: Act fast
- Sudden new onset of headache or loss of consciousness
- Sudden giddiness, vomiting and imbalance

WARNING SIGN (FAST)

- **F**: stands for sudden numbness or weakness of FACE, especially on one side of the body
- **A**: stands for sudden numbness or weakness of ARM or LEG especially on one side of the body
- **S**: refers to difficulty in SPEECH and understanding
- **T**: is the TIME to rush to the hospital

TYPES OF STROKE

Ischemic stroke
Focal cerebral, spinal or retinal infarction

Intracerebral haemorrhage
Focal collection of blood within the brain parenchyma or ventricular system that is not caused by trauma

Subarachnoid haemorrhage
Bleeding into the subarachnoid space

Cerebral venous thrombosis of cerebral venous structure

Transient Ischemic Attack (TIA)
Transient episode of neurological dysfunction caused by focal cerebral, spinal cord or retinal ischemia without acute infarction

INVESTIGATIONS

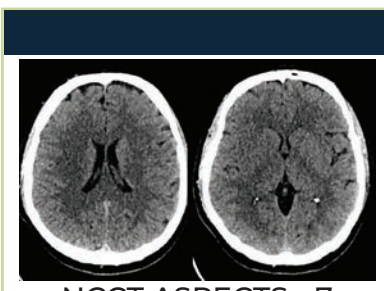
Essential
- CT scan head
- ECG
- Blood Sugar

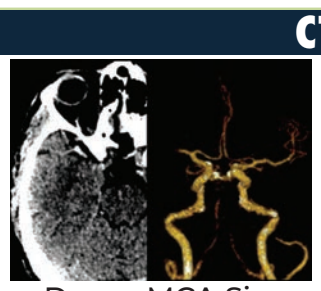
Desirable
- CTA
- Echocardiogram
- Lipids
- Renal Parameter

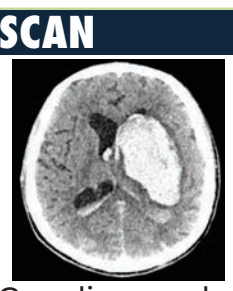
Optional
- MRI/MRA
- Holter Monitoring

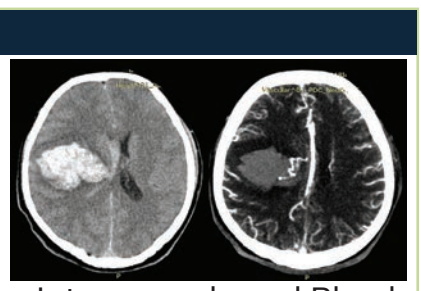
PRELIMINARY MANAGEMENT
- Assess and manage ABCs
- Initiate cardiac monitoring
- Maintain O2 saturation >94%
- Establish IV access
- Determine blood glucose and treat accordingly
- Determine time of symptom onset or last known normal, and obtain family contact information, preferably a cell phone
- Triage and RAPID TRANSFER of patient to nearest district hospital with CT
- Scan facility or Stroke center with facility for thrombolysis
- Referral hospital to be notified to handle the referred patient with stroke

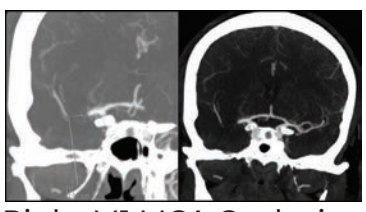
CT SCAN

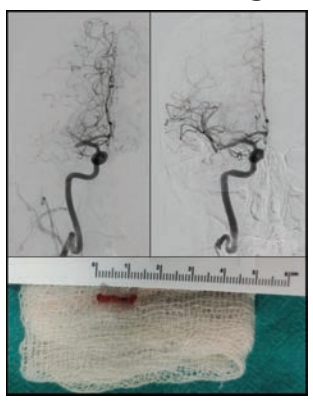

NCCT ASPECTS - 7

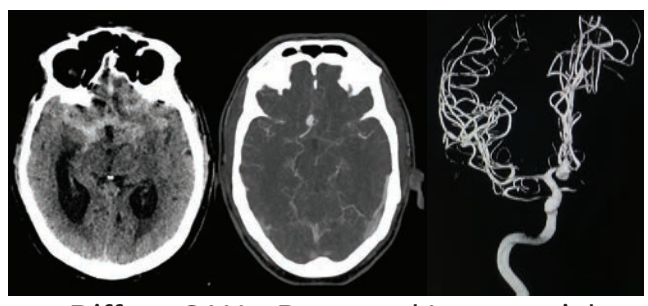

Dense MCA Sign

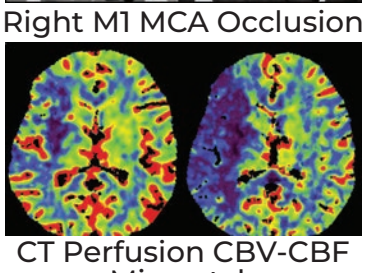

Gangliocapsular Bleed-Likely hypertensive bleed


Intraparenchymal Bleed associated with vascular malformation


Right M1 MCA Occlusion


Mechanical Thrombectomy with removal of clot


Diffuse SAH – Ruptured Intracranial Aneurysm


CT Perfusion CBV-CBF Mismatch

IMAGING- WHAT ALL WE WANT TO KNOW?
- Parenchyma-bleed vs. Ischemia, area involved
- Pipes- Occlusion?, location: 1. Large vessel occlusion vs. Distal branch occlusion
- Perfusion- collaterals? -Multiphase CT angiogram (3rd phase, predicts the outcome)
- Penumbra- Tissue at risk (salvageable tissue)

Assess the 4Ps of stroke as quickly as possible
Time Vs. Information

MANAGEMENT

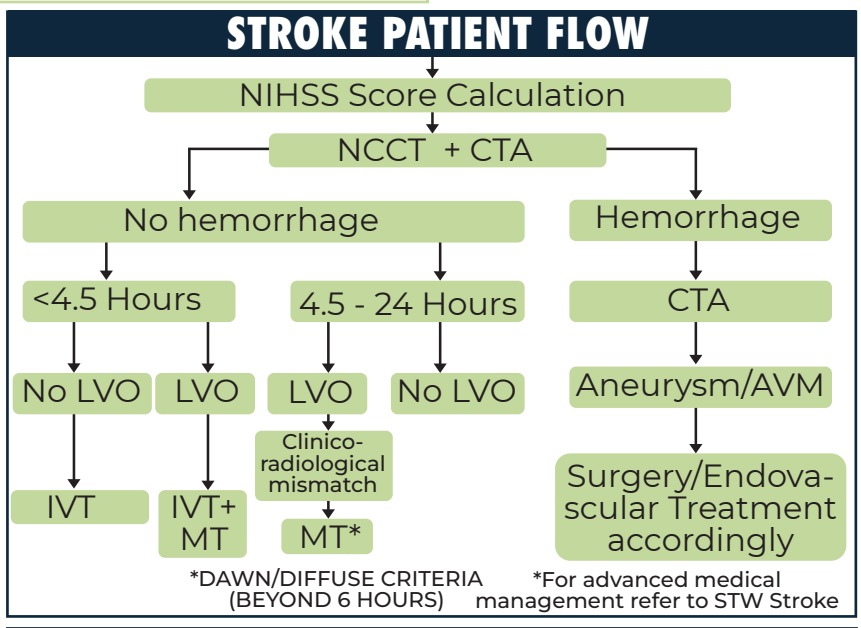
Stroke onset time < 4.5 hrs

ISCHEMIC
- IV tPA (0-4.5 Hrs) or endovascular treatment according to eligibility and availability (.9mg/kg/wt)
- 10% as bolus, remaining 90% as I/V infusion over an hour
- BP maintained below 180/110 mm/Hg

HAEMORRHAGIC
- Dysphagia assessment,
- Blood pressure/blood sugar monitoring and IV fluids.
- Prevention of pneumonia
- Prophylaxis for deep venous thrombosis etc, monitor and record ECG

Stroke onset time > 4.5 hrs
- Rapid Assessment, CODE Stroke, Blood pressure and Blood Sugar monitoring, NIHSS, Intravenous lines
- Endovascular treatment with Mechanical thrombectomy using stent retriever, aspiration, or hybrid techniques (4.5 hrs to 24hrs) according to eligibility

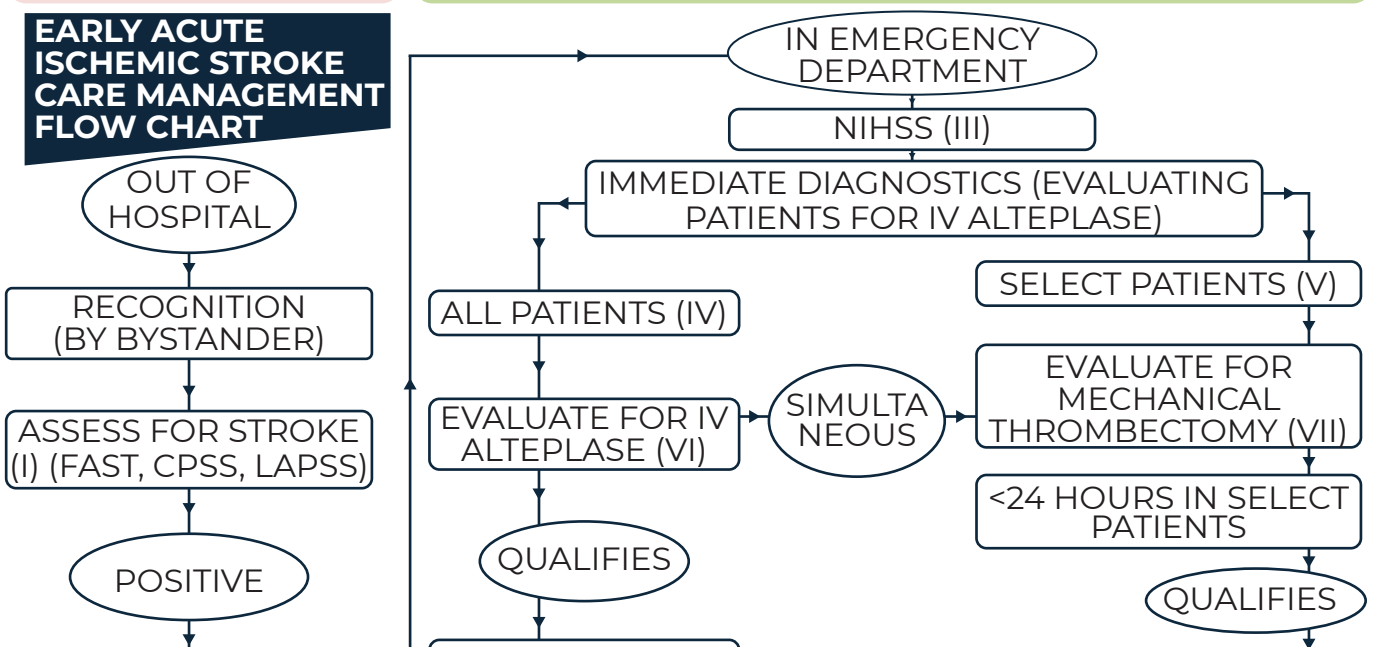
STROKE PATIENT FLOW



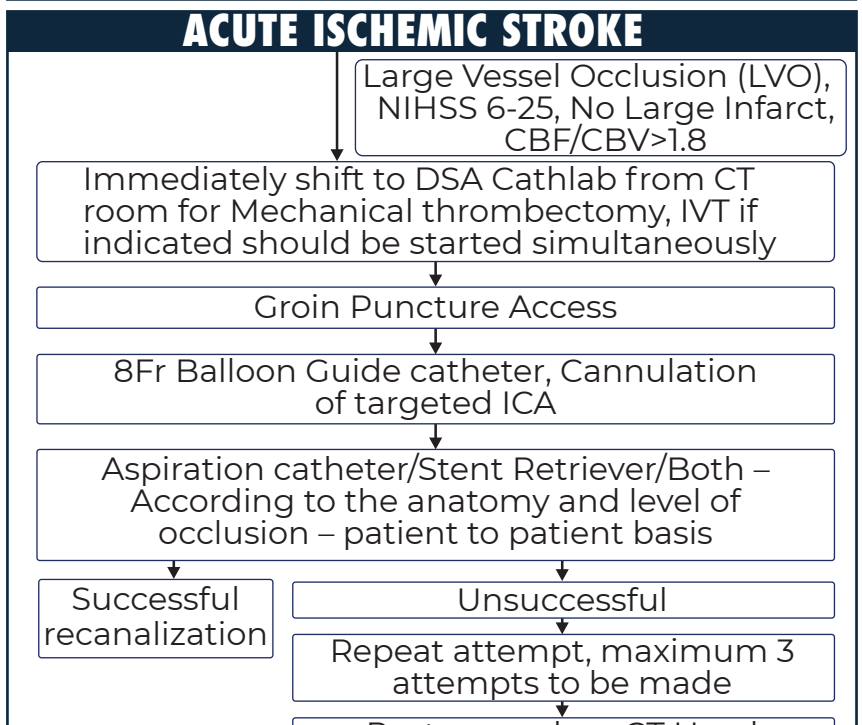
*DAWN/DIFFUSE CRITERIA (BEYOND 6 HOURS)

*For advanced medical management refer to STW Stroke

EARLY ACUTE ISCHEMIC STROKE CARE MANAGEMENT FLOW CHART



ACUTE ISCHEMIC STROKE



ABBREVIATIONS

AVM: Arterio-Venous Malformation
CBF: Cerebral Blood Flow
CBV: Cerebral Blood Volume
CPSS: Cincinnati Prehospital Stroke Scale
CT: Computed Tomography
CTA: CT Angiography
DSA: Digital Subtraction Angiography
ECG: Electrocardiogram
ICA: Internal Carotid Artery
ICU: Intensive Care Unit
IVT: Intravenous Thrombolysis
LAPSS: Los Angeles Prehospital Stroke Screen
MCA: Middle Cerebral Artery
MRA: MR Angiography
MRI: Magnetic Resonance Imaging
MT: Mechanical Thrombectomy
NCCT: Non-Contrast Computerized Tomography
NIHSS: National Institute Of Health Stroke Scale

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TIME IS BRAIN,SAVE NEURONS SAVE A LIFE

July/ 2024

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Ministry of Health and Family Welfare, Government of India

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Standard Treatment Workflow (STW)

IMAGE GUIDED MANAGEMENT OF VAGINAL BLEEDING

ICD-10-H90.5, 072,D25

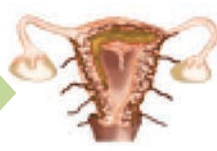
HEAVY MENSTRUAL BLEEDING

Losing 80ml or more in each period, having periods that last longer than 7 days, or both

Uterus preserving treatment for two important causes of vaginal bleeding in women of reproductive age group

POST PARTUM HAEMORRHAGE

500ml after vaginal delivery or 1000ml after Cesarean section



SIGNS AND SYMPTOMS

Look for anaemia

- Primary PPH is within the first 24 hour of delivery and secondary PPH is more than 24 hour after delivery
- Prophylactic IR on patients with an increased risk of massive bleeding at delivery

- Hypotension to haemorrhagic shock and multi-organ failure depending on the quantum of bleeding
- Check for uterine contractility, retained placenta
- Abnormal placenta on imaging

INVESTIGATIONS

	ESSENTIAL	OPTIONAL
HEMATOLOGICAL	Hb, PT, INR, APTT and Platelet count	Thrombo-elastogram (TEG) or Rotational Thromboelastometry (ROTEM)
IMAGING	USG	MRI

MANAGEMENT

FIBROID MANAGEMENT

- **Medical:** NSAIDS, Tranexamic acid, combined oral contraceptive pills, progestogens
- **Interventional Radiology:** Uterine Artery Embolisation
- **Surgical:** Myomectomy or Hysterectomy

FIBROID: IR MANAGEMENT

Indications
- Fibroids with heavy menstrual cycles pain, pressure, and urinary symptoms

Contraindication:
- Suspected infection
- Approximate days of required hospitalisation: 1-3 days

PROCEDURAL DETAILS

- Under conscious sedation or anaesthesia
- Arterial access (femoral/radial)
- Selective internal iliac arterial angiograms and cannulation of hypertrophied (uterine) arteries
- Embolisaton with appropriate agent – PVA particles
- Check angiogram

- **Expected outcomes:** At 12 months, menorrhagia control in 90%–92% of patients and improvement in bulk symptoms in 88%–96%
- Associated adverse events/complications
  - Fibroid expulsion 5%
  - Ovarian failure with amenorrhoea 7.5% of patients, overwhelming majority in women > 45 years of age
  - Uterine sepsis requiring hysterectomy 0.1%
- After care
  - Pain management: NSAIDS and if required intravenous narcotics (Morphine sulfate 30 mg SC /IM/IV), hypogastric nerve block
- **Follow up:** after 3 months; clinical, Hb, USG

- Other image guided minimally invasive treatment for fibroid include HIFU and ablation
- Other gynaecological conditions like adenomyosis also can be managed similarly by UAE

PPH MANAGEMENT

- Medical: Intensive Care Support
  - Uterotonic drugs - Oxytocin infusion: 20 IU in 500 ml RL/NS @ 40-60 drops/ minute
  - Transfusion of blood products
  - Inotropes, ventilation and other organ support
- Interventional Radiology: Uterine Artery Embolisation
- Surgical: Bilateral internal iliac artery ligation or Hysterectomy

PPH: IR MANAGEMENT

Indications
- Uterine atony despite medical treatment
- Vaginal or cervical tear after failed surgical repair
- Persistent hemorrhage after arterial ligation or hysterectomy
- Placenta accreta – including prophylactic treatment

Contraindication:
- Nil; but risk of acute kidney injury to be considered
- Approximate days of required hospitalisation: 2 to 7 days

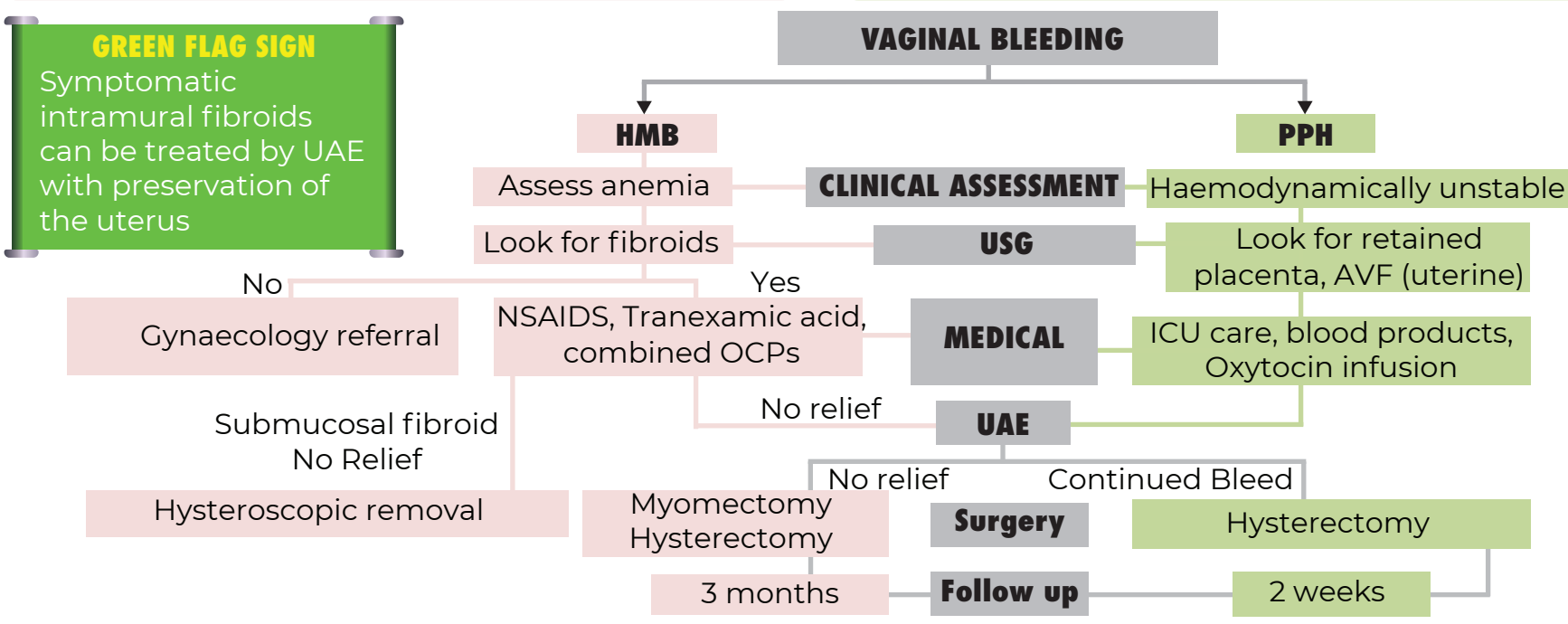
Procedural details
- Under conscious sedation or anaesthesia
- Arterial access (femoral/radial)
- Selective internal iliac arterial angiograms and cannulation of hypertrophied (uterine) arteries
- Embolisaton with appropriate agents – PVA particles, gel foam, histoacryl etc.
- Check angiogram

For patients with placenta accreta
- Prophylactic balloon catheter placement of internal iliac arteries before delivery/caesarean section

- Expected outcomes: successful haemostasis > 95%
- Associated adverse events/complications: ovarian failure, uterine sepsis, uterine infarctions (rare; less than 2%)
- After care
  - **Medical:** ICU care till bleeding arrests and organ failures are reversed
  - **Investigation:** USG
  - **Criteria and timing for safe discharge:** 3 days after the procedure if uneventful
- Follow up: after two weeks; Clinical, Hb, USG

- Other obstetric conditions like post-abortive haemorrhage secondary to uterine artery pseudoaneurysm, complications of molar regnancy, uterine arteriovenous malformation (AVM) can also be treated similarly

GREEN FLAG SIGN
Symptomatic intramural fibroids can be treated by UAE with preservation of the uterus



RED FLAG SIGN
- PR > 120/min
- Systolic BP < 100 Mm Hg
- Tachypnoea >20 breaths per minute
- SpO2 < 95%
- Deterioration of sensorium

Refer to uterine fibroids and polyps ICD-10-D25 & N84
Refer to Postpartum hemorrhage ICD-72

Timely referral to a higher centre must be considered where facilities for ICU, surgical and IR are available

CONCLUSION

- Uterine artery embolization is a minimally invasive image guided procedure which has an important role in management of select cases of obstetric and gynecological conditions
- It is a uterus preserving procedure
- It has evolving role in case of uterine malignancies

ABBREVIATIONS

APTT: Activated Partial Thromboplastin Time
AVF: Arteriovenous Fistula (uterine)
CECT: Contrast Enhanced Computed Tomography
Hb: Haemoglobin
HIFU: High Frequency Focussed Ultrasound
HMB: Heavy Menstrual Bleeding
ICU: Intensive Care Unit
INR: International Normalized Ratio
IR: Interventional Radiology
MRI: Magnetic Resonance Imaging
NSAIDs: Non-steroidal anti-inflammatory Drugs
OCPs: Oral Contraceptive Pills
PPH: Postpartum Haemorrhage
PT: Prothrombin Time
PVA: Poly Vinyl Alcohol
UAE: Uterine Arterial Embolization
USG: Ultrasonography
VB: Vaginal Bleeding

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KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES

July/ 2024

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Ministry of Health and Family Welfare, Government of India

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Standard Treatment Workflow (STW)

IMAGE GUIDED MANAGEMENT OF VARICOSE VEINS (CHRONIC VENOUS INSUFFICIENCY)

ICD-10-I83. 89

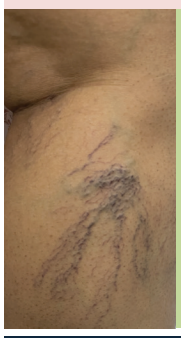
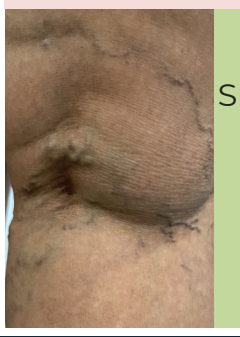
CLINICAL PRESENTATION

SYMPTOMS
- Heaviness/tiredness/aching of the legs
- Itching in legs
- Nocturnal cramps in calf
- Swelling around ankle
- Symptoms worsened after prolonged standing
- Skin discoloration near the ankles
- Abnormal dilated veins in leg
- Bleeding from varicosities in leg
- Non healing leg ulcer

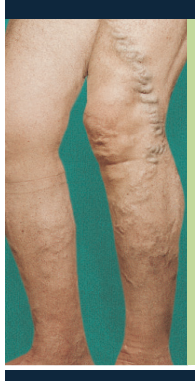
SIGNS (CEAP- CLASSIFICATION)
C1: Telangiectasias or reticular veins
C2: Varicose veins
C3: Edema
C4a: Pigmentation or eczema
C4b: Lipodermatosclerosis or atrophie blanche
C5: Healed venous ulcer
C6: Active venous ulcer

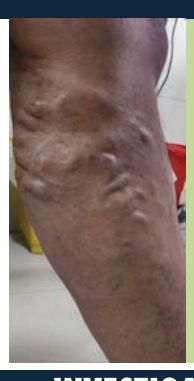
RED FLAGS
- Bleeding from superficial veins
- Venous ulcer
- Recurrent history of superficial vein thrombophlebitis /Cellulitis

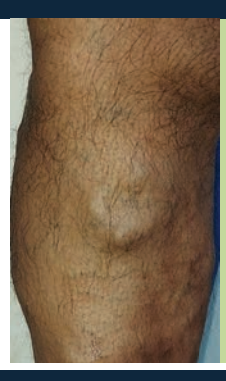
CEAP- Classification C1

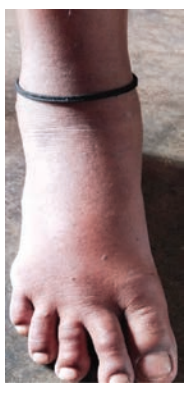
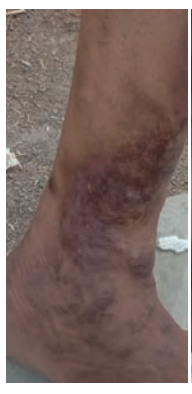
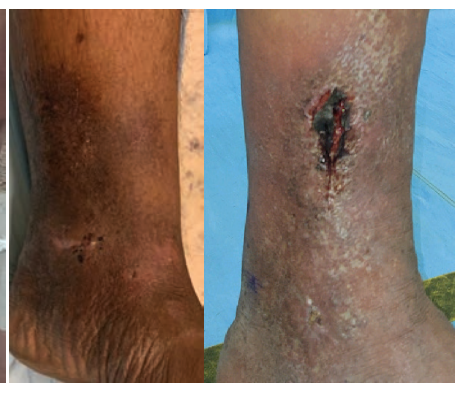
TELANGIECTASIAS	RETICULAR VEINS
 Intradermal spider veins (web-like), <1mm	 Subdermal reticular veins, <3mm

CEAP- CLASSIFICATION C2


Great Saphenous vein with pronounced chronic venous insufficiency in medial ankle area


Circumflex vein: Lateral branch of the greater saphenous vein


Small saphenous vein varicosis

CEAP- C3	CEAP-C4	CEAP-C6, C5= Healed ulcer
		

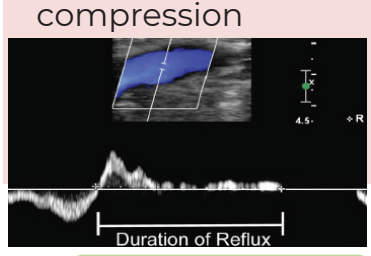
INVESTIGATIONS

ESSENTIAL

Imaging	USG color doppler
Hematological useful for prior to ablation	• CBC • PT/INR • APTT • HBs Ag • HIV • KFT • HCV

If there is proximal obstruction in common iliac vein, CTV or MRV is needed

USG COLOR DOPPLER
- Rule out DVT/Deep vein reflux
- Doppler evaluation in standing
- Define and grade reflux at SFJ/SPJ
- Identify segmental intrinsic reflux in GSV/SSV
- Locate incompetent/ pathological perforators
- Diameter of GSV
- Evaluate truncal and superficial vein varicosities and dilated tributaries
- Incompetent SFJ - retrograde reflux venous flow lasting more than 0.5 sec
- Abnormal GSV - ≥ 4 mm on standing
- Incompetent perforator - ≥ 3.5 mm/ reflux on release of distal compression



ALGORITHM FOR DIAGNOSIS, REFERRAL AND MANAGEMENT

PHC
Signs and symptoms of varicose veins

→ Refer to higher centre

CHC/DISTRICT HOSPITAL
- Clinical examination,
- USG Color Doppler
- Exclude DVT/Deep vein reflux

In appropriate imaging setting

Symtomatic patient with Red flag sign (Bleeding, Venous ulcer) →

TERTIARY CARE
- Clinical examination, USG color doppler
- Endovenous thermal ablation
- Adjuvant medical management

MANAGEMENT

MEDICAL/ CONSERVATIVE
- Mostly adjuvant to endovenous thermal ablation.
- Life style modification
- Graded compression stockings
- Limb elevation, Limb massage, calf pumping exercise
- Micronized purified flavonoid fraction (MPFF)
- Wound care – Unna boots, hydrocolloid dressing, silver coated dressing

SURGICAL
- Limited role
- Subfascial Endoscopic Perforator Surgery
- Phlebectomy

IMAGE GUIDED THERAPY
- Primary modality of treating varicose veins
- Percutaneous endovenous Thermal Ablation Therapy: laser/RFA
- Percutaneous endovenous Non-thermal Ablation Therapy: MOCA/Glue/ catheter guided sclerotherapy
- Percutaneous ablation of Perforators – Laser/RFA
- Percutaneous Guided Sclerotherapy .

CONTRAINDICATION
- Absolute contraindication-
  - Reflux in deep veins
- Relative contraindications-
  - Severe peripheral artery disease
  - Severe hypercoagulability syndromes
  - Advanced liver disease
  - Serious systemic disease

VARICOSE VEINS: IR MANAGEMENT
Procedural details:
- Performed in IR suite
- Under conscious sedation or spinal anaesthesia or local anaesthesia
- Sterile precautions
- Percutaneous GSV access
- Perivenular anaesthesia
- Thermal ablation about 2 cm from SFJ unction
- Management of pathological perforator, SSV, accessory GSV, tributaries and superficial vein as and when required

RECOMMENDATION
- For treatment of GSV reflux in patient with symptoms and sign of chronic venous disease endovenous thermal ablation technique is recommended in preference to surgery and foam sclerotherapy
- For treatment of SSV reflux in patient with symptoms and sign of chronic venous disease endovenous thermal ablation technique should be considered. Access to SSV should be gained no lower than midcalf
- Foam sclerotherapy should be considered as primary treatment in patient with recurrent varicose veins
- When performing endovenous thermal ablation for saphenous reflux trunk, adding concomitant phlebectomy should be considered

MANAGEMENT ALGORITHM: VARICOSE VEINS

C1-C2 GRADE VARICOSE VEINS	C1-C2 GRADE VARICOSE VEINS	C3=-C6 GRADE VARICOSE VEINS
USG COLOR DOPPLER - Competent SFJ - Mild reflux grade I	**USG COLOR DOPPLER** - Grade II/III/IV reflux - Saphenous incompetence	**USG COLOR DOPPLER** - Grade II/III/IV reflux - Saphenous/ Tributary incompetence
Medical Management/ Conservative treatment	Endovenous thermal/ Non-thermal ablation	Endovenous thermal/ non-thermal ablation plus management of perforator, Sclerotherapy, phlebectomy whenever needed

MANAGEMENT OF RED FLAG SIGN
Bleeding from superficial varicose veins: Leg elevation higher than the heart. Application of pressure over the bleeding site followed by a pressure dressing
Referred to tertiary centre for endovenous ablation treatment

VENOUS ULCER
- Wound care/Dressing
- Compression Therapy
- Leg elevation

Referred to tertiary centre for endovenous ablation treatment

ABBREVIATIONS

APTT: Activated Partial Thromboplastin Time
CTV: Computed Tomography Venography
DVT: Deep Vein Thrombosis
GSV: Great Sephanous Vein
Hb: Haemoglobin
HCV: Hepatitis c Virus
INR: International Normalized Ratio
IR: Interventional Radiology
KFT: Kidney Function Test
MOCA: Mechanical Occlusion Chemically Assisted Ablation
MRV: Magnetic Resonance Venography
PT: Prothrombin Time
RFA: Radio-frequency Ablation
SPJ: Sapheno-popliteal junction
SFJ: Sapheno-Femoral Junction
SSV: Short Sephanous Vein
USG: ULTrasonography

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