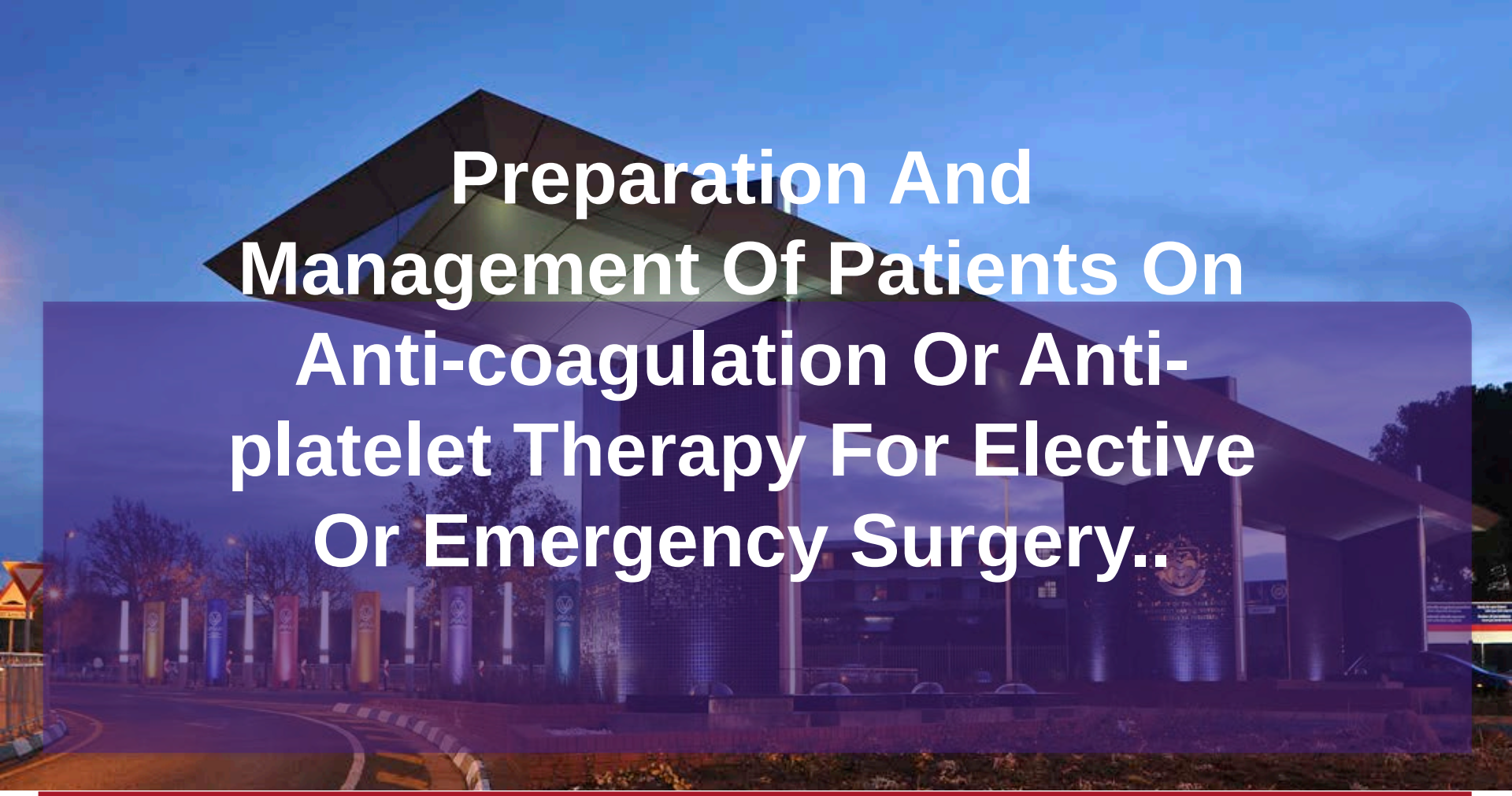

Preparation And Management Of Patients On Anti-coagulation Or Anti-platelet Therapy For Elective Or Emergency Surgery..

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ANTI-THROMBOTICS:

- **Anticoagulants Anti-platelet agents Fibrinolytic drugs**:

MORE COMPLEX

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FACTORS TO TAKE INTO ACCOUNT WHEN MAKING A DECISION

- *Estimate bleeding risk*
- *Estimate thromboembolic risk*
- *Timing of anticoagulation interruption*
- *Determine whether to use bridging anticoagulation*

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ESTIMATE BLEEDING RISK

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Very high risk:

- Neurosurgery (intracranial or spinal surgery)
- Cardiac surgery (coronary artery bypass or heart valve replacement)

High risk:

- Major vascular surgery (AAA repair, aorto-femoral bypass)
- Major urologic surgery (prostatectomy, bladder tumour resection)
- Major orthopaedic surgery (hip/knee joint replacement surgery)
- Intestinal anastomosis surgery
- Permanent pacemaker insertion or internal defibrillator placement
- Selected invasive procedures (kidney biopsy, prostate biopsy, cervical cone biopsy, colonic polypectomy)
- Any procedure lasting >45 minutes

Intermediate risk:

- Other intra-abdominal surgery
- Other intrathoracic surgery
- Other orthopaedic surgery
- Other vascular surgery

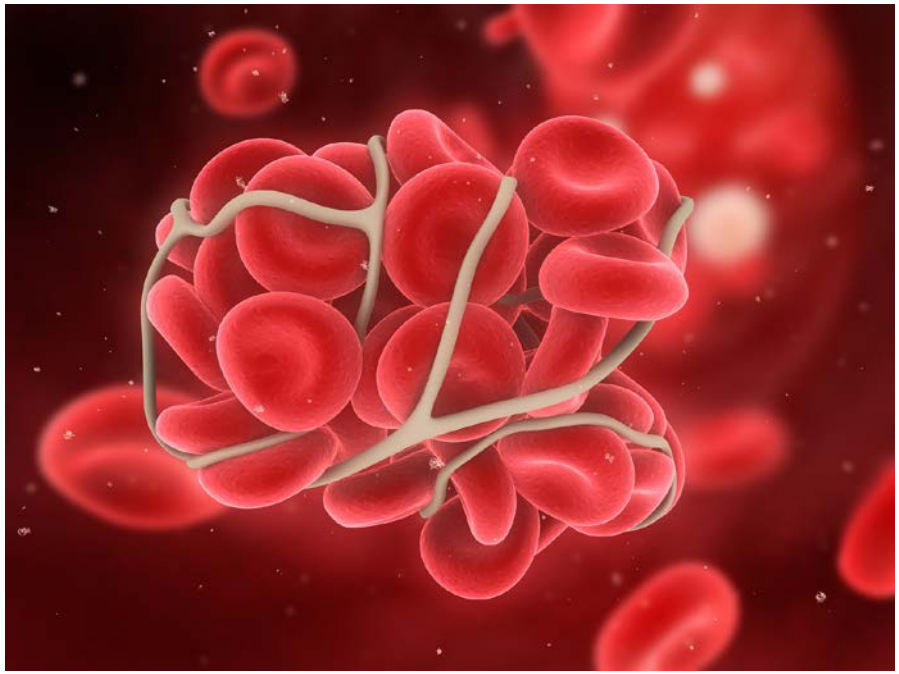
Low risk:

- Laparoscopic cholecystectomy
- Laparoscopic inguinal hernia repair
- Dental procedures
- Dermatologic procedures
- Ophthalmologic procedures
- Coronary angiography
- Gastroscopy or colonoscopy
- Selected invasive procedures (bone marrow biopsy, lymph node biopsy, paracentesis)

Very low risk:

- Single tooth extraction or teeth cleaning, skin biopsy, cataract removal

ESTIMATE THROMBOEMBOLIC RISK



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BRIDGING

High risk:

- Any mechanical prosthetic mitral valve
- Older generation (cage-ball, tilting disc) mechanical prosthetic aortic valve
- Atrial fibrillation (CHADS2 score=5-6)
- Recent (within 3 months) arterial thromboembolism (stroke, systemic embolism, TIA)
- Recent (within 3 months) venous thromboembolism (DVT, PE)
- Prior arterial or VTE during interruption of warfarin
- Selected prothrombotic blood abnormalities (deficiency of protein C, protein S or antithrombin, antiphospholipid antibodies)

NO BRIDGING

Moderate risk:

- Newer generation (bileaflet) mechanical prosthetic aortic valve
- Bioprosthetic aortic valve
- Chronic atrial fibrillation (valvular or nonvalvular) ***and*** at least 1 major stroke risk factor: prior stroke/TIA, left ventricular dysfunction, hypertension, diabetes, or age >75 years
- Prior venous thromboembolism within last 3 to 12 months

Low risk:

- Chronic atrial fibrillation (valvular or nonvalvular) ***and*** no major stroke risk factors
- Prior venous thromboembolism over 12 months ago

TIMING OF ANTICOAGULATION INTERRUPTION

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BLEEDING RISK	TE RISK	RECOMMENDATION
High/Intermediate	High (transient)	Delay surgery if possible until TE risk has returned to baseline
High/Intermediate	High (chronic)	Bridging anticoagulation to minimize the period without it
High/Intermediate	Moderate	Bridging anticoagulation
High/Intermediate	Low	Interruption without bridging
Low	Low	Continue anticoagulation (If on warfarin-confirm INR not exceed therapeutic range)

NO SCORING SYSTEM CAN SUBSTITUTE FOR CLINICAL JUDGMENT IN THIS DECISION MAKING

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DETERMINE WHETHER TO USE BRIDGING ANTICOAGULATION

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- **High-risk patient**: The need to prevent TE will dominate management irrespective of bleeding risk; the potential consequences of TE justifies bridging.
- **Moderate-risk patient**: A single perioperative strategy is not dominant and management will depend on individual patient risk assessment.
- **Low-risk patient**: The need to prevent TE will be less dominant and bridging may be avoided.
- **All patients**: judicious use of postoperative bridging is needed to minimize bleeding that would have the undesired effect of delaying resumption of anticoagulant therapy after surgery.

BRIDGING ANTICOAGULATION REGIMENS:

- “High dose” (therapeutic dose) regimen involves giving a dose similar to that used to treat acute VTE or ACS
- “Intermediate dose” regimen e.g. enoxaparin 40mg bd
- “Low dose” (prophylactic dose) regimen involves giving a dose used typically to prevent postoperative VTE

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WHEN TO USE WHICH DOSES:

- **Therapeutic dose**: Individuals with a potential arterial thromboembolic source (eg, atrial fibrillation, mechanical heart valve) or VTE within the preceding month.
- **Intermediate dose:** Individuals with atrial fibrillation or VTE within the preceding month when bridging is needed but concerns about bleeding are greater.
- **Prophylactic dose:** Generally not used for bridging in patients with atrial fibrillation, because there is no evidence that prophylactic dose heparin prevents stroke in this setting. This dose level may be reasonable in patients who have had a VTE event between within the preceding two to three months.

WHEN TO BRIDGE: PREOPERATIVE, POSTOPERATIVE, OR BOTH

- **Preoperative bridging** – For individuals who are undergoing a procedure associated with a very high bleeding risk (eg, intracranial, spinal, cardiac), not postoperatively, because postoperative bridging increases
- **Preoperative and postoperative bridging** –This practice is based on the high incidence of recurrence without anticoagulation, of approximately 1% per day.
- **Postoperative bridging** – For individuals greater than one month after an acute episode of VTE, postoperative bridging

DRUGS

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Major surgery with low risk for TE: No bridging needed here

- Day -5: stop warfarin (last dose on Day -6)
- Day -1: INR testing (if INR>1.5, administer vitamin k 1 – 2 mg orally)
- Day 0: Resume warfarin on evening after surgery if patient drinking fluids
- Day +1 to +3: Resume warfarin when patient drinking fluids

Major surgery with high risk for TE: Bridging needed here

- Day -5: stop warfarin (last dose on Day -6)
- Day -3: start IV UFH or SC LMWH
- Day -1: INR testing (if INR>1.5, administer vitamin K 1 – 2 mg orally). Last preoperative dose of LMWH 24 hr before surgery.
- Day 0: Stop UFH 4 hrs before surgery, assess postoperative surgical site haemostasis, resume warfarin on evening after surgery if patient drinking fluids.
- Day +1 to +3: Resume UFH or LMWH when hemostasis secured, but not earlier than 12 hrs after surgery. Resume warfarin when patient drinking fluids
- Day +5 to +6: Stop UFH or LMWH when INR within therapeutic range.

HEPARIN

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- **LMWH** should be discontinued 24 hrs before the planned surgery or procedure. If a twice-daily LMWH regimen is given, the evening dose the night before surgery is omitted.
- **UFH**– For therapeutic dose of UFH, intravenous infusion is continued until 4 to 5 hrs before the procedure. If subcutaneous UFH is used, typically with a dose of approximately 250 international units/kg twice daily, the last dose can be given the evening before the procedure.
- **Restarting** - For those undergoing **major surgery** or those with a high bleeding risk procedure, therapeutic-dose UFH or LMWH should be delayed for 48 to 72 hours after haemostasis has been secured.

- For most **minor procedures** associated with a low bleeding risk in which bridging is used (e.g. laparoscopic hernia repair), therapeutic-dose UFH or LMWH can usually be resumed 24 hours after the procedure.

CLOPIDOGREL

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- Antiplatelet drugs probably can be continued for patients undergoing very low or low bleeding risk procedures.
- In patients undergoing intermediate or high bleeding risk procedures, antiplatelet therapy should be interrupted.
- 7-10 days (platelet lifespan) vs. 3-4 days before surgery
- There is no known short-acting antiplatelet drug that can be used, like UFH or LMWH, as bridging antiplatelet therapy.

SPECIAL CIRCUMSTANCES - RECOMMENDATIONS:

Patient with coronary stents requiring surgery:

- Surgery should be deferred for at least 6 weeks after placement of a bare-metal stent and for at least 6 months after placement of a drug-eluting stent *instead of* undertaking surgery within these time periods.
- If the patient requires surgery within 6 weeks of placement of a bare-metal stent or within 6 months of placement of a drug-eluting stent, dual anti-platelet therapy should be continued around the time of surgery *instead of* stopping dual anti-platelet therapy 7-10 days before surgery.

DIRECT THROMBIN INHIBITORS

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DABIGATRAN

Discontinuation

- Dabigatran can be discontinued 2 – 3 days before a surgical procedure.
- Longer in in patients with renal failure (i.e. CrCl <50 ml/minute)
- A normal or near-normal PTT may be used in selected patients to evaluate whether Dabigatran has been adequately cleared from the circulation prior to surgery (e.g. patients at high risk of surgical bleeding).

Use of bridging

- In general, the rapid offset and onset of dabigatran activity obviates the need for bridging anticoagulation.

Restarting

- Since Dabigatran has a rapid onset of action, with peak effects occurring two to three hours after intake, caution should be used in patients who have had major surgery or other procedures associated with a high bleeding risk.

DIRECT FACTOR Xa INHIBITORS

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RIVAROXABAN

Discontinuation – Rivaroxaban can be discontinued approximately 2 - 3 days before a procedure. Routine coagulation tests have not been validated for ensuring that the Rivaroxaban anticoagulant effect has resolved.

Use of bridging – In general, the rapid offset and onset of rivaroxaban obviates the need for bridging anticoagulation.

Restarting – Rivaroxaban can be resumed postoperatively when hemostasis has been achieved, at the same dose the patient was receiving preoperatively.

Endoscopy

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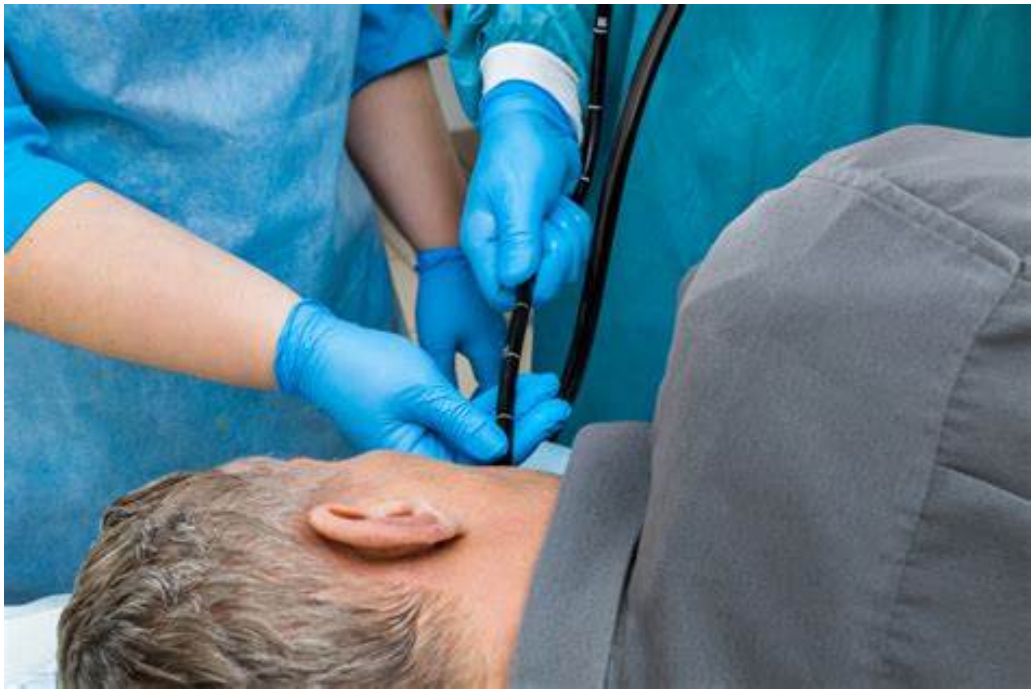
UPPER GIT



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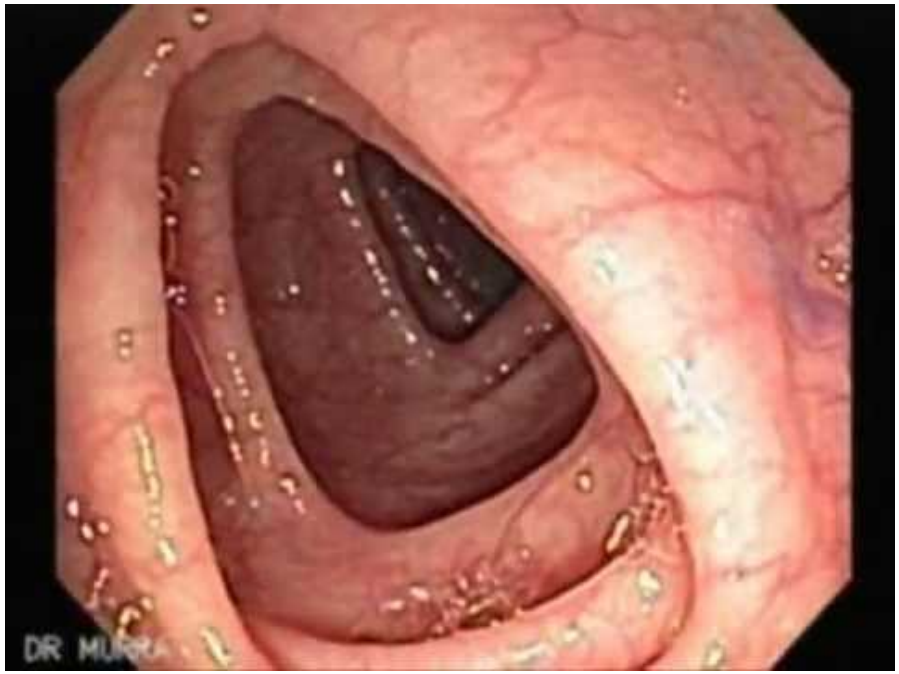
Procedure	Bleeding Risk	Stop Aspirin?	Stop Clopidogrel?
Scope ± biopsy	Low	No	No
Scope + stricture dilatation	Low	No	No
Scope + stent placement	Low	No	Yes
Scope + variceal band ligation	High	No	Yes
Scope + PEG placement	High	No	Yes

LOWER GIT



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Procedure	Bleeding Risk	Stop Aspirin?	Stop Clopidogrel?
Scope ± biopsy	Low	No	No
Scope + polypectomy <1cm	Low	No	No
Scope + polypectomy >1cm	High	No	Yes

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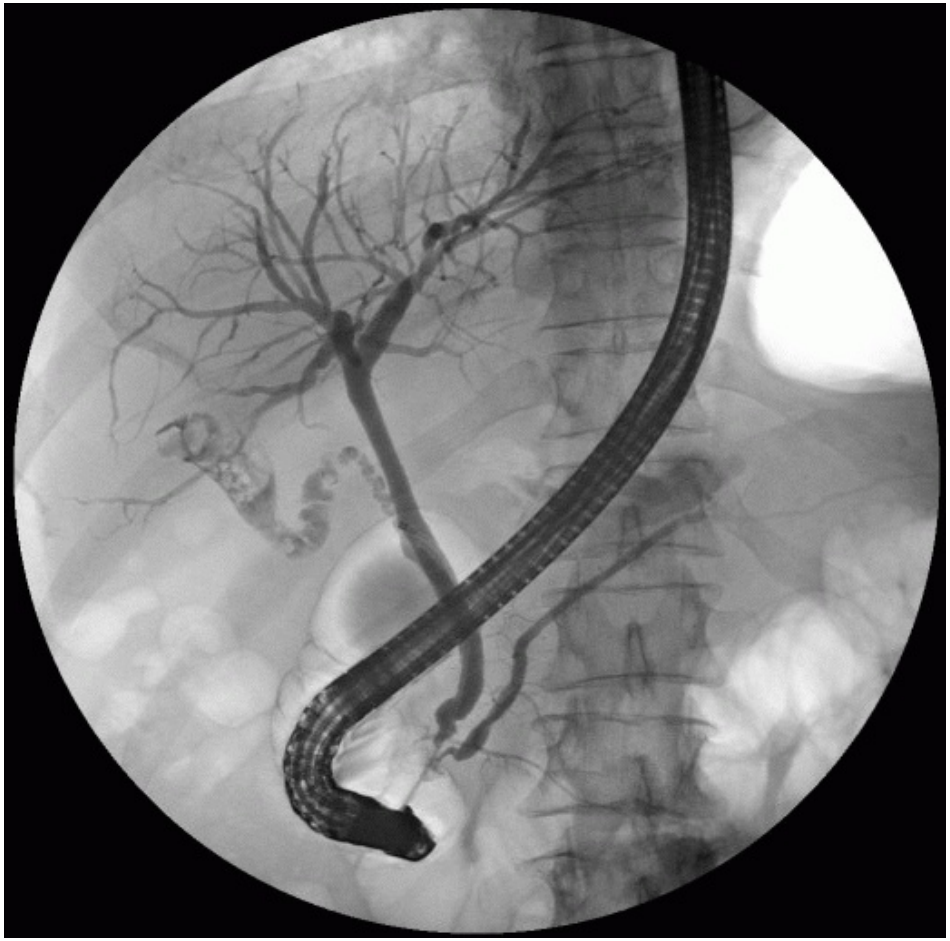
ERCP



Procedure	Bleeding Risk	Stop Aspirin?	Stop Clopidogrel?
ERCP Diagnostic	Low	No	No
ERCP + stent placement	Low	No	No
ERCP + sphincterotomy	High	No	Yes
ERCP + sphincterotomy and large balloon papillary dilation	High	Yes	Yes

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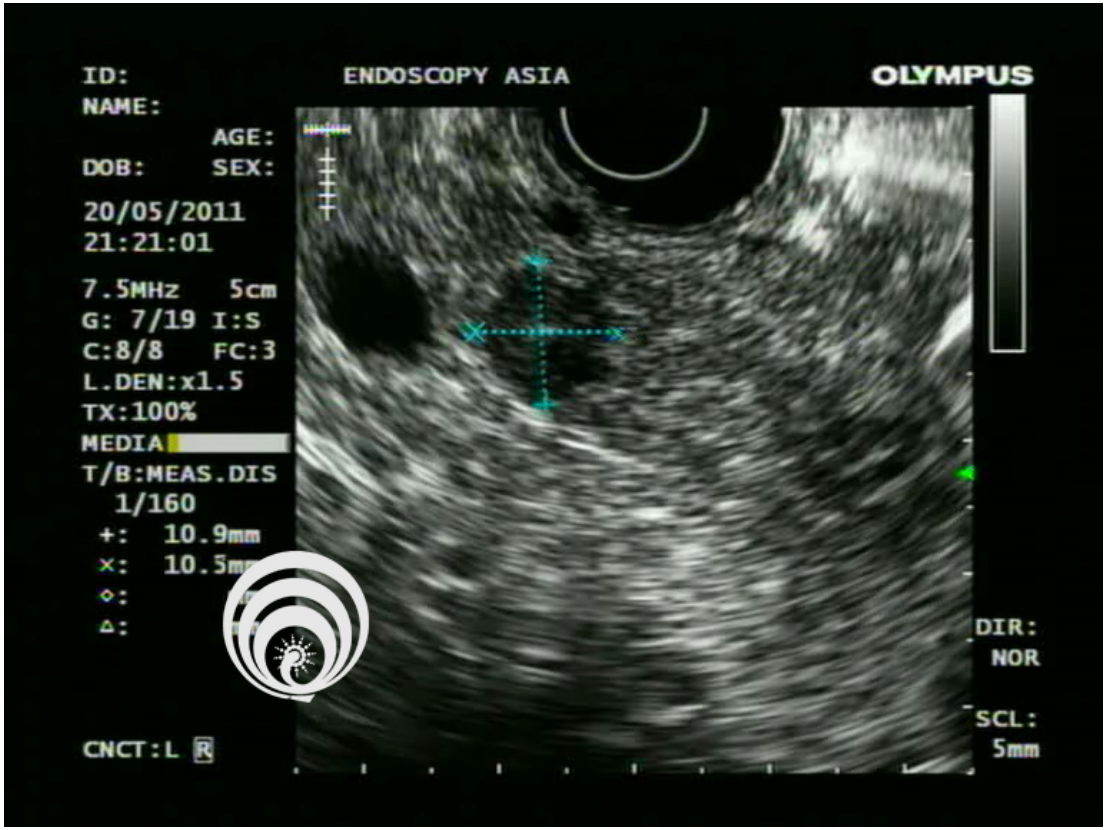
EUS



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Procedure	Bleeding Risk	Stop Aspirin?	Stop Clopidogrel?
EUS Diagnostic	Low	No	No
EUS + FNA solid mass	Low	No	Yes
EUS FNA cysts	High	Yes	Yes

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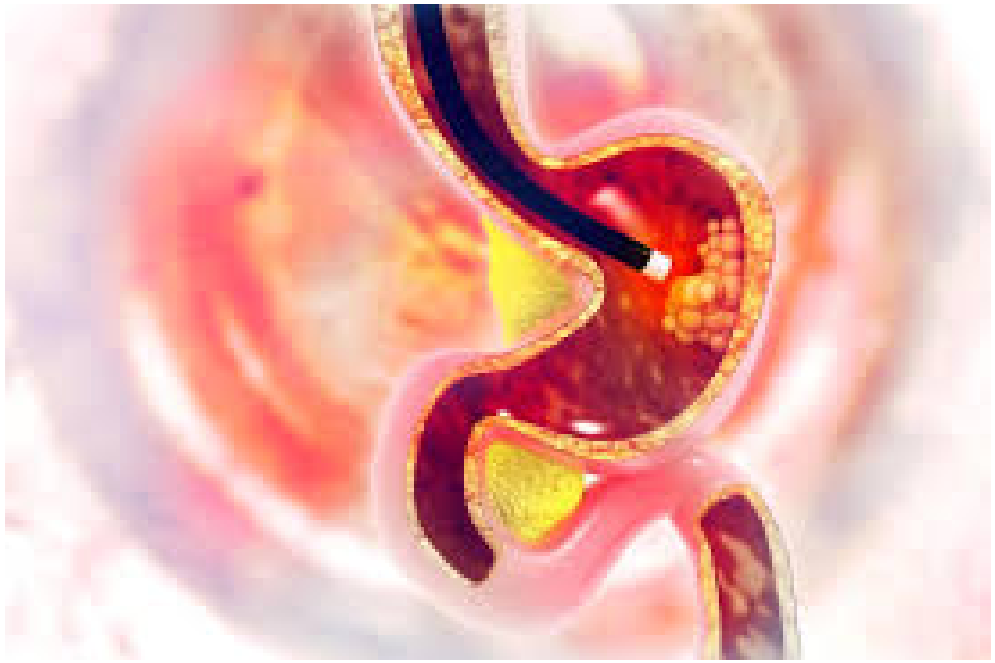
WARFARIN AND ENDOSCOPY



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- Avoid using Vitamin K to reverse anticoagulation before elective procedures because this delays therapeutic re-anticoagulation after procedure.
- Warfarin can usually be stopped for 4-7 days and then be restarted the following day.
- 1% risk of thromboembolic events after temporary warfarin cessation (Garcia, Arch Intern Med 2008)
- High risk patients for thromboembolic events should consider bridging therapy with low molecular weight heparin.

Condition	Associated diagnosis	Management
Atrial fibrillation	None	Hold warfarin 3-5 days before procedure. Restart warfarin within 24 h.*
	Mechanical valve(s) and/or history of cerebrovascular accident, transient ischemic attack, or systemic embolism	Hold warfarin and start UFH when INR ≤2.0. Stop UFH 4-6 h before procedure and restart after procedure. Resume warfarin on the evening of the procedure and continue both agents until INR is therapeutic.* Therapeutic doses of SQ UFH or LMWH may be considered in lieu of IV UFH.
Valvular heart disease	Mechanical bileaflet, aortic valve	Hold warfarin 48-72 h before procedure for a target INR <1.5. Restart warfarin within 24 h.*
	Mechanical mitral valve or mechanical aortic valve plus any of the following: atrial fibrillation, previous thromboembolic event, left ventricular dysfunction, hypercoagulable condition, mechanical tricuspid valve or >1 mechanical valve	Hold warfarin and start UFH when INR ≤2.0. Stop UFH 4-6 h before procedure and restart after procedure. Resume warfarin on the evening of the procedure and continue both agents until INR is therapeutic.* Therapeutic doses of SQ UFH or LMWH may be considered in lieu of IV UFH.

Emergencies

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WARFARIN:

- If ***semi-urgent*** warfarin should be withheld and ***vitamin K*** administered. Usually no need for FFPs.
- If ***immediate reversal*** use ***prothrombin complex concentrates (PCCs)*** or ***plasma products (e.g. Fresh Frozen Plasma***) along with ***vitamin K***.
- However, there is a thrombotic risk associated with these products, and they should be used only if there is life-threatening bleeding and prolongation of the INR by a vitamin K antagonist.

DIRECT THROMBIN INHIBITORS (e.g. DABIGATRAN) AND DIRECT FACTOR Xa inhibitors (e.g. RIVAROXABAN):

- Dabigatran – (Half life=12 to 17 hours); five half-lives will have elapsed by day 2.5 to 3.5 after the last dose.
- Rivaroxaban – (Half life=7 to 17 hours); five half-lives will have elapsed by day 1.5 to 3.5 after the last dose.

ANTI-PLATLET AGENTS:

- Administering 5-10 units of platelets can be done.

Conclusions

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CONCLUSIONS

- A team of health care providers which include the surgeon, anaesthetist, internist/haematologist, nurse and the patient.
- Effective communication - health care providers and the patient
- The type of anaesthesia to be used
- Confer on the adequacy of postoperative haemostasis and safe time to resume postoperative bridging anticoagulation.
- The patient should be provided with clear instruction regarding the perioperative stopping/starting of warfarin and LMWH.

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Thank You
Dankie
Enkosi

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