

ACUTE DEEP VEIN THROMBOSIS – CATHETER DIRECTED THROMBOLYSIS - PHARMACO-MECHANICAL THROMBECTOMY



TARGET AUDIENCE	Board-wide
PATIENT GROUP	Patients with symptomatic ilio-femoral acute deep vein thrombosis or subclavian vein thrombosis < 14 days

Clinical Guidelines Summary



If any bleeding issue occurs under anticoagulation, refer as usual to A&E

Acute Deep Vein Thrombosis – Catheter Directed Thrombolysis

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Acute Deep Vein Thrombosis – Catheter Directed Thrombolysis

1. Scope / Rationale

These guidelines are relevant to all healthcare professionals involved in the management of patients presenting with acute subclavian and/or ilio-femoral deep vein thrombosis (DVT) and undergoing catheter directed thrombolysis as treatment or part of their treatment.

The rationale for these treatments are set out by NICE and different UK and international guidelines and aim to reduce post-thrombotic syndrome and occurrence of pulmonary embolism in otherwise young and valid patients (reference section page 10).

This clinical guideline applies to otherwise healthy and mobile patients presenting with symptomatic ilio-femoral deep venous thrombosis or subclavian vein thrombosis. Patients meeting inclusion criteria (page 4) will be offered pharmaco-mechanical +/- surgical thrombectomy followed by catheter directed thrombolysis (CDT) if significant residual thrombus remaining and subsequent venoplasty and stent placement when required. When CDT is required, the treatment is started straight at the end of the thrombectomy procedure or as a sole initial procedure. Placement of a vena cava filter may be required in patients with significant thrombus in the inferior vena cava and/or having experienced an episode of pulmonary embolism. Filter removal is planned before discharge.

It is important to recognise the use of alteplase for thrombolysis of deep vein thrombosis is currently unlicensed.

The unlicensed medicines protocol must be adhered to at all times and patients must undergo documented informed consent in line with current NHSL guidance on unlicensed drugs before treatment is initiated.

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2. Indication for catheter directed thrombolysis (CDT) and patient selection

Patients referred either from UHH admitting team or Tertiary referral through Vascular Fellow on call

Catheter Directed Thrombolysis (CDT) is indicated for patients who have a DVT and meet the following **inclusion criteria**:

- Acute iliofemoral +/- Inferior Vena Cava DVT or axillary/subclavian DVT
- AND
- Onset of symptoms < 14 days
- AND
- Age > 18 years
- AND
- Life expectancy > 12 months

Key:

CDT – Catheter directed thrombolysis
 FBC – Full Blood Count
 HIT – heparin induced thrombocytopenia
 rt-PA - alteplase

Exclusion criteria for thrombolysis

Absolute contra-indication to thrombolysis

- Previous haemorrhagic stroke
- Recent head trauma/brain surgery
- Intracranial neoplasm
- Active bleeding or known bleeding disorder
- Severe hepatic disease

Relative contra-indication to thrombolysis

- Major surgery, trauma or bleeding in previous 3 months
- Pregnancy
- Hypertension (systolic > 160mmHg)
- GI bleed in previous 28 days
- Right to left cardiac/pulmonary shunt

Admitting Team to contact Vascular Fellow on-call (via switchboard/mobile) to discuss case and arrange transfer to Vascular team

Provide Patient with treatment dose of daily tinzaparin 175 Units/kg and discharge until date of planned CDT, which should be within 5 days of diagnosis of DVT. If eGFR < 30mL/minute, consider enoxaparin with dose adjustment for renal function or IV heparin. See following section for dosing advice.

Thrombolysis should be avoided over the weekend unless there is LIMB THREATENING THROMBOSIS (phlegmasia) in which case immediate CDT and/or surgical thrombectomy is indicated. Contact Vascular Fellow/ Consultant on call for advice in these cases.

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3. Patient preparation for catheter directed thrombolysis (CDT)

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History and examination by physician

- Assess severity of symptoms in particular the presence of limb threatening thrombosis (phlegmasia)
- Refer to Vascular Fellow for advice and immediate thrombolysis
- Document baseline neurological status before starting thrombolysis
- Consider after consent pregnancy test when applicable
- IV Pre-hydration if patient remains in hospital until CDT

Imaging

- CT Venogram or MR if available
- DUS for access sites bedside or in vascular lab. Consider surgical exposure if popliteal vein thrombosis
- Vascular team discussion and request procedure via TrakCare

Pre-procedure bloods to be ordered

1. FBC & Biochemistry including UE's and LFT's
2. Group & Save
3. Coagulation screen

Nursing care

- No fasting is required unless patient requires sedation/ general anaesthetic (GA)
- If conscious sedation/ GA is required, patient cases should be planned for "first on the list" to minimise fasting time.

If this is not possible, a defined time should be provided in conjunction with Interventional Radiology availability and consideration given to surgical exposure times when required

Logistic considerations:

- Whenever possible **if GA case plan for next available elective morning list**. Keep patient anticoagulated until then and either discharge or keep in hospital for monitoring symptoms (depending on severity). Preference given to list at beginning of week. **Presentation of phlegmasia is a limb and life threatening condition and justifies CEPOD and same day CDT when required *****
- **Whenever possible aim for joint teamwork and check availabilities including radiographers**
- **Avoid out of hours and weekend CDT whenever possible without compromise on quality of care*****

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4. CDT procedure

NB: Avoid CDT over weekend unless there is LIMB THREATENING THROMBOSIS (phlegmasia) in which case immediate thrombolysis/ surgical thrombectomy is indicated. Contact Vascular Fellow on call for advice for these cases

CDT: Vascular surgeon/interventional radiology consultants will use standard techniques for vessel access and crossing occluded segments

Mechanical thromboprophylaxis (for patients with lower limb DVT):

- Ensure that patient has Flowtron boots in place on both legs and anti-embolic stocking (AES) on contra-lateral limb before procedure
- During procedure: switch off Flowtron on the affected limb. No AES on that limb. Flowtron and AES on contra-lateral limb.
- Post-procedure: Restart Flowtron on the affected leg and place AES as well

Commence CDT with a view to completing the procedure within 48 hours, based on availability of GA lists to facilitate stent placement when required. Keep Flowtron boots on throughout procedure on contra-lateral limb only

CDT – alteplase:

1. Reconstitute alteplase 10mg with 10ml of diluent (water for injections) to make 1mg/ml solution
2. **Prepare 10mg of the reconstituted alteplase in a 500ml bag of sodium chloride 0.9% to make 0.02mg/ml solution. Attach to volumetric pump then attach an extension and connect to venous catheter. Commence alteplase infusion at a rate of 25mL/hour (0.5mg/hour) or 50mL/hour (1mg/hour)** (up to a maximum of 20mg in 24 hours). Replace bag and giving set every 24 hours.
3. To prevent clot formation in the sheath, prepare and **commence heparinised saline solution (5000 units in 50ml) and attach to the sheath** using same method as described above. Set the driver at 2ml/hour (200units/hour). Note that no monitoring of the effects of heparin is required – see box A if more than one catheter for CDT required.
4. Prescribe alteplase and heparin infusions until venogram check has been planned. Continue both infusions until venogram shows no clot residue remains in vessel.
5. Decision to stop thrombolysis must occur after each venogram is obtained (at least 24hrly).

The total thrombolysis treatment must not exceed 96 hours

During CDT

- Prescribe unfractionated heparin 5000 units and repeat doses of 2500 to 5000 units until activated clotting time (ACT) > 200 sec, on completion of procedure (CDT or stent)

On completion of CDT procedure:

- Consultant review to check if CDT has removed all clot AND as a result, will decide as to whether stenting is required based on IVUS and venogram findings.
- Remove access sheath and place AES and Flowtron boots on patient. These stay on patient as they transfer to recovery/ HDU/ ward

Post CDT procedure – once alteplase infusion is complete (whilst in recovery):

- Prescribe analgesia
- Prescribe anticoagulation (tinzaparin 175 units/kg/24hrs given in one injection) so that it can be administered IMMEDIATELY once alteplase infusion has been completed.
- Once alteplase infusion is complete, stop heparinised saline infusion.
- Immediately, give first dose of tinzaparin (175 units/kg/24hrs given in one injection) in Recovery. - -
- Prescribe tinzaparin on HEPMA and medication chart.
- For patients weighting >100kg, **check peak anti-Xa level 3-4hours after 3rd dose**
- Continue treatment dose tinzaparin (175 units/kg once daily) until follow up in Vascular outpatient clinic

NB

Temporary IVC filter placement considered when:

- Pre-existing pulmonary emboli + right heart strain

- Unstable IVC clot

Consider balloon occlusion from jugular access or contra-lateral access

Thrombolysis using Mechanical Thrombectomy should be considered in specific circumstances when lysis is required or lytic is contra-indicated:

- consider EKOS, Angiojet, Penumbra, Inari

- Indicated when large volume thrombus
- In these cases reduced duration of CDT is preferred

Box A:

When placement of two catheters is required the dose of tPA/heparin in each is halved.

On a case-by-case basis, the dose/volume of infusion may be altered. Clearly document details in op note, patient notes and on clinical portal

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5. Ward care AFTER catheter directed thrombolysis

Setting:

- Patients within the inclusion criteria (see page 4) should be managed on the Vascular ward
- High risk patients (those outside standard criteria) should be placed in either Ward 1 Enhanced Care Unit or ICU/HDU depending on their clinical need. This includes patients in whom CDT has been continued for longer than 48 hours when the risk of bleeding complication is increased.

Ongoing management:

Continue on **treatment dose tinzaparin 175 units/kg/24hrs** given in one injection until patient is seen in Vascular OPC. Ward nurses should start to train patient to self-administer tinzaparin. If the patient has renal impairment, characterised by eGFR < 30mL/minute, then start an IV heparin infusion for full anticoagulation.

Monitoring requirements post CDT commencement

Vascular Team to complete the following:

- Check venogram within 24 hours of procedure.
- Ensure continuous alteplase infusion is maintained throughout therapy (prescribe daily until clinical indication to stop)
- Check FBC, renal function, coagulation screen (including Clauss fibrinogen) at least daily
- If fibrinogen levels <0.5, contact Haematology/ Thrombosis team.
- Arrange Duplex check within 24 hours of thrombolysis completion, book on TrakCare under UA lower limb venous. For F/U DUS see appendix XXX.

Vascular nurses to complete the following:

- Monitor heart rate, blood pressure, O2 saturations at 30min intervals for the first 4 hours then 4 hourly.
- Perform baseline neurological observations (Mini GCS). Note patient can move leg/arm whilst infusion is running but pay particular attention not to dislodge catheters in place.
- Monitor urine output
- Ensure continuous alteplase infusion is maintained throughout therapy (put up replacement bags promptly to maintain therapeutic alteplase levels).
- Patients can eat and drink normally. Fasting only required if patient planned for conscious sedation/GA to allow stenting.
- Ensure Flowtron boots and AES are in place.
- Expect haematuria/ haemoglobinuria (haemolysis) as usual

Vascular Fellow and nurses to monitor patient for **signs of excessive bleeding (drop in Hb > 20g/L)**: from any access site, GI bleeding, nasal, urological, PV, PR, intracranial haemorrhage.



If excessive bleeding occurs:

- Contact the Vascular Fellow on call (via switchboard/ mobile)
 - Apply localised compression (if applicable)
 - If there is persistent bleeding: halve the alteplase infusion rate (half of original infusion rate) and order urgent coagulation screen.
 - If bleeding persists despite reducing infusion rate, then half the alteplase infusion rate again (to a quarter of the original infusion rate)
 - If major bleeding:
 - Stop alteplase infusion (Do not stop heparin as required to keep sheath patent)
 - Give tranexamic acid 1-gram IV one off dose
 - Check fibrinogen level. If fibrinogen < 1.5g/L, give 2 pools of cryoprecipitate (requires authorisation by on call Haematologist)
- Contact Haematologist via switchboard for advice.

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6. Follow up arrangements when discharging patients

Arrange Duplex surveillance as per Duplex protocol in Appendix 1.

Book US on TrakCare



Refer to Appendix 2: Post deep venous procedure flowchart for information



Arrange Vascular OP clinic follow up at 6 weeks following procedure. Vascular FY1 to email secretary when patient is being discharged.



- Prescribe at least 6 weeks of **tinzaparin 175 units/kg/24hrs to be given in one injection** (and sharp bins) on discharge, until follow up in the Vascular OP clinic. An initial 7 day supply will be given by the hospital, to be continued by the patient's GP.
- Ensure patient has been taught how to self-inject tinzaparin and been provided with a patient information leaflet on self-administration.



NHSL patients:

1. Refer to Thrombosis clinic for VTE follow up by letter.
2. Referral form to the NHSL Anticoagulant clinic for initiation of warfarin

Out of area patients:

Discharge patient with letter to GP, asking them to arrange local Anticoagulant clinic for warfarin management, which should coincide with two week duplex scan.

Post discharge:

If there is recurrence of symptoms or abnormal Duplex ultrasound findings, contact the named consultant as soon as possible or out of hours the on call vascular team. Alternatively arrange via vascular secretaries urgent Vascular clinic appointment through switchboard (01355 585000).

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7. Audit

Audit Items	Monitoring methods	Audit review
Adherence to guidelines	Review of all cases performed by Clinical Portal Database Responsible will be the IR and consultant vascular surgeon	Results presented and discussed twice/ year at audit meetings Weekly discussion at MDT
Clinical outcome data	Review of all cases performed by Clinical Portal Database Responsible will be the IR and consultant vascular surgeon	Results presented and discussed twice/ year at audit meetings Weekly discussion at MDT

Data can be entered into specific registries after appropriate consent of the patient in line with NHSL policies.

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8. Appendices

Appendix 1 : Alteplase rt-PA Preparation

To make up:

10mg Alteplase into 500 mL 0.9% NaCl

Use infusion pump at:

- **25mL per hour** for a dose of **0.5mg/hr**

- **50mL per hour** for a dose of **1mg/hr**

Safety rules handling rt-PA alteplase:

- **4 eyes principle:** 1 Person prepares and 1 Person double checks preparation.

- **1 Physician must be present** at preparation (either from the IR or vascular surgery Team) and contacted before preparation is made up.

- **change rt-PA bag every 24hours** (provide 1 extra supply in case change required out of hours to ensure continuous infusion at all times)

If additional alteplase required: contact pharmacy on call via switchboard and notify vascular Fellow on call (BEFORE current running bag is empty).

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Appendix 2 : Duplex Surveillance Protocol

Day One (Pre Discharge Scan)

- 1) Assess inflow vessels and comment on profunda vein and femoral vein.
- 2) Assess venous stent and comment on stenosis. Label anatomical segment affected by stenosis and comment on degree.

Patient should not be discharged if there is greater than 50% stenosis in any anatomical segment.

Two-week Duplex (see Flowchart below)

As for Day One. Scan to be performed at two weeks (or as close to possible).

- 1) If stent is patent with **less than 50% stenosis** throughout then patient can be switched from LMWH to warfarin. Notify Vascular fellow/ consultant to organise.
- 2) If patient has **greater than 50% stenosis** notify Vascular CNS for deep venous disease and the consultant in charge. Patient will require admission for venoplasty and will need to remain on LMWH.

6 weeks and 3 months, 6 months and annual duplex scan

As for Day One. Scan can be within a week either side of date to allow for planning of UA capacity. 6 weeks and 6-month scan to coincide with clinic. Annual scan to be arranged around UA capacity.

If patient has **greater than 50% stenosis** in any segment notify Vascular fellow/consultant. Patient will require admission for Venoplasty.

6 Month Scan to include full assessment of superficial and deep veins in leg to

Clinics

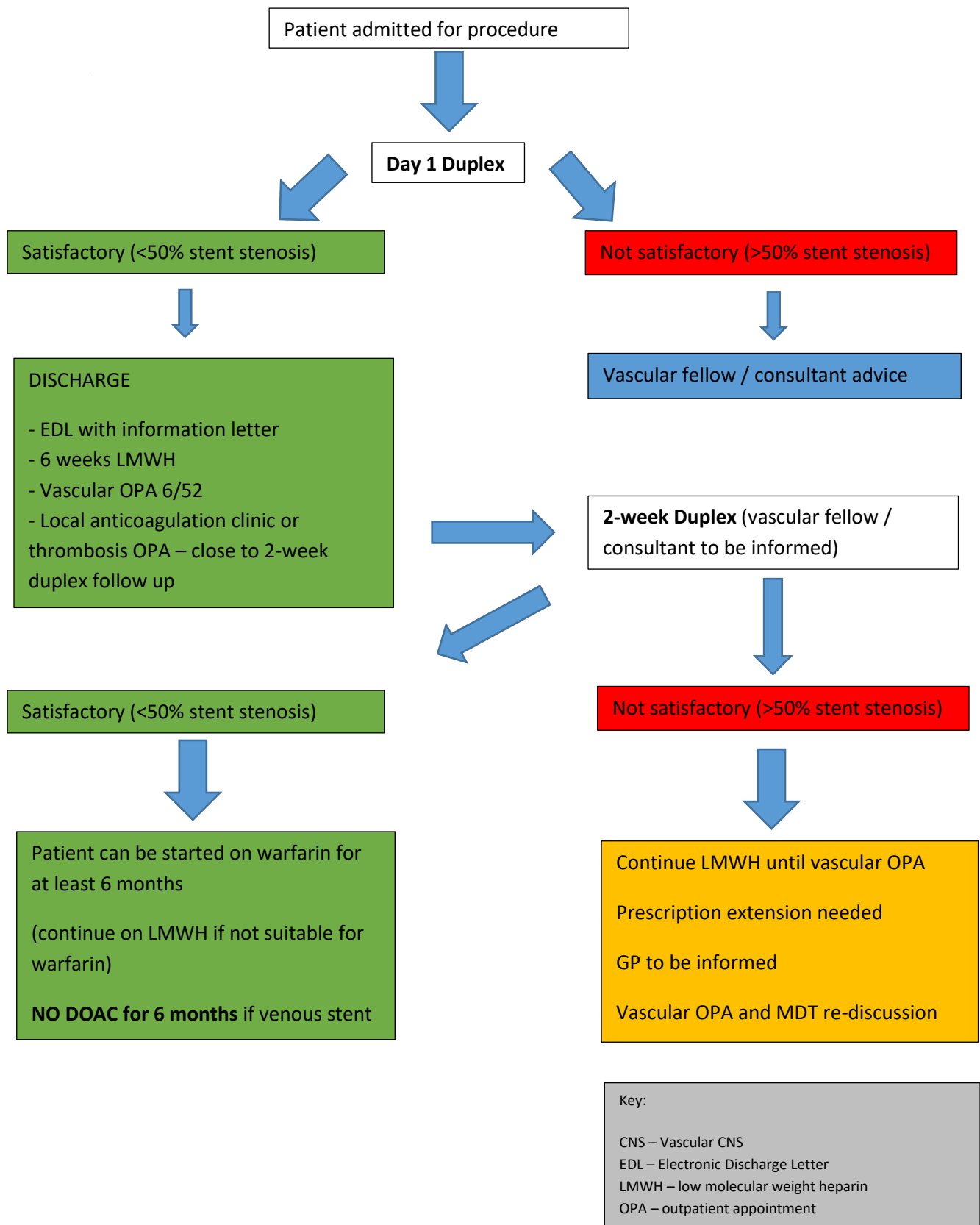
Vascular OPD clinic to coincide with **6 week and 6 months** Scans

Preference for same day scans to be given to patients travelling from afar

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Appendix 3: Post venous procedure flowchart



Key:

- CNS – Vascular CNS
- EDL – Electronic Discharge Letter
- LMWH – low molecular weight heparin
- OPA – outpatient appointment

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References/Evidence

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		<i>e.g. Review, revise and update of policy in line with contemporary professional structures and practice</i>	1
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