**Dalteparin to Prevent Clotting in the Extracorporeal Circuit during Haemodialysis**

Dalteparin, a low molecular weight heparin (LMWH), provides safe, efficient, convenient anticoagulation for haemodialysis and is licensed for the prevention of clotting during haemodialysis.
In comparison to unfractionated heparin, LMWHs have a more rapid onset of action, cause less platelet activation and less fibrin deposition on dialyser surfaces than unfractionated heparin. A further advantage is that dalteparin has a convenient dosing regimen of a single bolus dose providing anticoagulation for a haemodialysis session of up to 4 hours. Dalteparin is the LMWH of choice on the NHS Lothian formulary.

**USE:** Patients who are undergoing haemodialysis treatment and who are suitable for treatment with a low molecular weight heparin.

A standard policy regarding use of dalteparin for anti coagulation during routine haemodialysis.
To ensure safe administration of dalteparin for the prevention of clotting during haemodialysis.

**DOSING and ADMINISTRATION**

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| --- | --- |
| **Patient Target/ Dry Weight** | **Dalteparin Dose** – Arterial port at start of dialysis |
| Under 65 kg | 2500 units |
| 65 – 90 kg | 5000 units |
| Over 90 kg | 7500 units |

**Dose Adjustment**

* Consider lower dose for planned haemodialysis treatment of **less than four** hours.
* For patients who experience clotting of the dialysis circuits with 2500 units of dalteparin use 5000units for the next dialysis session.
* For patients who experience clotting of the dialysis circuits with 5000 units of dalteparin use 7500units for the next dialysis session.
* For patients who continue to experience clotting during dialysis despite having 7500 units of dalteparin consider a further dose of 2500 units at the mid-point of the dialysis session.
* For patients who have prolonged bleeding from the needle site post dialysis the dalteparin dose should be reduced to 2500 units for those receiving 5000 units and 5000 units for those receiving 7500 units.
* If concerns persist regarding clotting or prolonged bleeding consider measuring anti-Xa activity.

**Contraindications to dalteparin**

* Patients taking warfarin or on any other anticoagulation should be discussed with medical team before administering dalteparin
* Patients should not be given dalteparin for 24 hours before and after invasive procedures including surgery
* Hypersensitivity to heparin or to LMWHs
* Haemophilia and other haemorrhagic disorders
* Thrombocytopenia
* Recent cereberal haemorrhage
* Severe liver disease
* Acute peptic ulceration
* After major trauma or recent surgery
* Stroke within last 3 months

**Potential side effects of dalteparin**

* Skin rashes (and minor bruising at injection site)
* Systemic allergic reaction
* Excessive bleeding
* Thrombocytopenia
* Skin necrosis
* Hyperkalaemia

**Measuring Anti-Xa Activity**

Routine measurement of Anti-Xa should not be necessary and is indicated only if the dose calculated according to weight and adjusted as given above gives cause for concern due to persistent clotting or prolonged bleeding.

Dalteparin potentiates the inhibition of several activated coagulation factors, especially Factor Xa with its activity mediated via antithrombin III. The half-life of elimination of anti Xa activity is approximately 2 hours with intravenous dosing in patients with normal renal function. The half-life has been reported to be around 5 hours in haemodialysis patients following intravenous dosing.

Anti-Xa activity is measured at one hour and 4 hours post Dalteparin administration at the start of a dialysis sessions.

Anti Xa activity level should be between 0.4 to 0.7units/ml at 1 hour and less than 0.4units/ml at 4 hours.

If the anti-Xa level is above or below the target range, discuss with the medical team (renal registrar/renal consultant) regarding a dose change of dalteparin

**Reversal of Dalteparin**

If severe bleeding occurs during or within 2 hour of completing a dialysis session with dalteparin consider the use of **protamine sulphate** as a reversal agent for dalteparin.

If given intravenously protamine will neutralise 25 to 50% of anti-Xa activity of dalteparin almost immediately.

A dose of 1mg per 100 units of LMWH is recommended on the manufacturer’s guidelines. It should be given neat at a maximum rate of 5mg per minute. Avoid rapid infusion as this can cause severe hypotension and anaphylactic reactions. The usual maximum dose is 50 mg.