How to reverse unfractionated heparin

Index: Anticoagulation

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Usually, if there is a concern of bleeding that is not life-threatening, cessation of unfractionated heparin (UFH) is enough. When given as an infusion, the anticoagulant effect of UFH reaches steady state within 4-6 hours. So on cessation of an infusion, coagulation should be mostly normally after 4 hours.

Where UFH is given subcutaneously for the purposes of venous thromboprophylaxis, the anticoagulant effect is more prolonged (but also milder considering the dose used).

In the case of an emergency, that is, an acute bleed in a patient anticoagulated with heparin, the antidote is protamine sulfate.

The use of protamine is non-trivial and best performed in experienced hands in a setting where monitoring is available.

**Step 1: Call for help**

To repeat myself, call for some back up, preferably someone who has experience using protamine sulfate. In most major teaching hospitals, this would probably be the medical registrar. Assuming that the setting is reversal of anticoagulation in a patient with an acute bleed, critical care involvement may well be appropriate.

Does the patient need fluid resuscitation?

Remember that this is probably an emergency situation. At the end of the day, don’t delay reversal waiting for help while the patient is bleeding to death.

**Step 2: Secure venous access**

Protamine sulfate can potentially provoke anaphylactoid reactions with cardiovascular collapse, especially if infused too quickly. Monitoring must be available. Resuscitation equipment must be on hand.

Quality venous access must be secured with two large bore (18 gauge or larger) intravenous cannulae.

**Step 3: Calculate dose of protamine sulfate**

Unfortunately, it is not one size fits all and protamine can exert its own anticoagulant effect if used in doses larger than required for reversal (1). To calculate the dose required, first calculate the amount of heparin received in the previous two hours. The dose of protamine
sulfate for reversal for a heparin infusion then is (2):

protamine sulfate 1 mg per 100 units of heparin sodium (received in the previous two hours)

- If the heparin infusion was stopped for greater than 30 minutes but less than 2 hours then use half the dose of protamine sulfate;
- If the heparin infusion was stopped for greater than 2 hours, then use a quarter of the dose.

The maximum dose of protamine sulfate is 50 mg (single vial of the 50 mg/5mL)

For reversal of heparin sodium 5000 units given subcutaneously:

- < 2 hours: protamine sulfate 25 mg
- > 2 hours: protamine sulfate 12.5 mg

Step 4: Start infusion

Inject the calculated dose of protamine sulfate into a 100 mL bag of 0.9% NaCl (saline)

Run at 10 mL/min until completion of infusion

The patient should be monitored for evidence of an hypersensitivity syndrome during and after the infusion.

Step 5: Check PT and aPTT

Obtain blood 15 minutes after the completion of the infusion and check the PT and aPTT to ensure satisfactory reversal.

Rebound anticoagulation can occur so it would be prudent to monitor the aPTT every 4-6 hours for the next 24 hours.

Reference articles

(1) Protamine Sulfate Injection [prescribing information]. MIMS 1 April 2006. Last revised 1/05/1999. [download PDF :: 11 Kb]