



Clinical Guide - Thrombolytic Therapy in Children

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INDICATIONS

Systemic thrombolytic therapy is indicated for arterial occlusions, massive pulmonary embolism, pulmonary embolism not responding to heparin therapy and threat of organ or limb viability. It may also be indicated for acute, extensive deep vein thrombosis.

In neonates less than 6 months of age with arterial occlusion following cardiac catheterization, thrombolytic therapy must be used with caution. Begin unfractionated heparin as per protocol. If possible perform a head CT or cranial ultrasound prior to initiating thrombolytic therapy. If avulsion or dissection of the vessel in question is diagnosed, consult cardiovascular/plastic surgery immediately. If the viability of the limb is in doubt then all investigations and consultations should be expedited. Modifications for individual clinical circumstances may be necessary.

Thrombolytic therapy in children should be initiated and monitored by individuals with expertise in this area.

CONTRAINDICATIONS

Contraindications for thrombolytic therapy include active bleeding, significant potential for local bleeding (e.g. tumour surrounding vessel with clot), general surgery within the previous 10 days, neurosurgery within the previous 3 weeks, hypertension, AV malformations, and recent severe trauma. However in some patients, the need for thrombolytic therapy necessitates treatment despite the contraindications.

PRECAUTIONS

Should be administered in intensive care setting or where health care team members are familiar with thrombolytic therapy and the side effects.

No intramuscular injections during therapy.

Minimal manipulation of the patient (i.e. no bathing, physiotherapy).

Avoid concurrent use of warfarin or antiplatelet agents.

No urinary catheterization, rectal temperatures, or arterial punctures.

Blood samples from a superficial vein or indwelling catheter. If blood sampling is difficult, insert an indwelling catheter for blood samples prior to thrombolytic therapy.

PREPARATION FOR INFUSION

CBC, platelet count, INR, aPTT, fibrinogen. Cross and type for 1 unit of PRBC.

Admit to the pediatric intensive care unit or a designated floor identified for thrombolytic therapy.

Consider sedation depending on the child and clinical circumstances.

Sign for head of bed indicating patient is receiving thrombolytic therapy.

Have the following available in case of localized bleeding: compresses (4x4).

Notify blood bank to ensure recombinant factor VIIa (rFVIIa), Fresh Frozen Plasma (FFP) and cryoprecipitate are available.

Ensure good venous access for drug administration and for monitoring purposes. Consider central venous line placement prior to initiating therapy.

THROMBOLYTIC THERAPY

a) Tissue Plasminogen Activator (tPA)

Use heparin at 10 U/kg/hr during tPA infusion. If patient is not already on heparin, start infusion but do not give a bolus dose. Administer FFP 10 - 20 ml/kg i.v. q 8-12 hours as a plasminogen source either before starting thrombolytic therapy or simultaneously if thrombus is threatening to life, organ viability or limb viability. Give tPA as an infusion at a rate of 0.3 - 0.5 mg/kg/hr intravenously for 6 hours. There are small non-controlled studies in the literature suggesting that lower doses of t-PA may be effective. Re-evaluate radiographically following 6 hours of t-PA infusion (for arterial thrombi use the return of pulses and BP to pre-investigation values).

b) Streptokinase is not recommended in children.

MONITORING

Monitor the response to thrombolytic therapy by the PT/INR, aPTT, and fibrinogen level 4 hours following the onset of the infusion and every 6 - 8 hours thereafter.

Expect the fibrinogen concentration to decrease by at least 20 - 50%; maintain the fibrinogen concentration at approximately 1.0 g/L or higher by infusions of cryoprecipitate (1U/5-10 kg).

Stop tPA infusion if fibrinogen is less than 1.0 g/L and hold until fibrinogen replacement and level is measured at greater than 1.0 g/L.

Maintain the platelet count greater than 100x10⁹/L.

If a patient has received thrombolytic therapy for a 6 hour course, consider treating with heparin alone (at age-related therapeutic doses; < 12 months at 28 U/kg/hr and > 12 months at 20 U/kg/hr) for 24 hours before reinstating another course of thrombolytic therapy. There may be ongoing thrombolysis even in the absence of continued administration of the thrombolytic agent. If the tPA is reinstated, consider re-administering FFP as a plasminogen source.

HEPARIN THERAPY

Concurrent IV unfractionated heparin therapy is recommended during thrombolytic therapy, at a rate of 10 U/kg/hr. If heparin administration was discontinued during thrombolytic therapy, restart heparin infusion whenever thrombolytic therapy is stopped and the fibrinogen concentration is greater than 1.0 g/L. Do not give a bolus and aim for prolongation of the aPTT as per the heparin protocol. (see heparin protocol)

COMPLICATIONS OF THERAPY

Bleeding may occur in 30 - 50% of patients - usually this is oozing from a wound or puncture site and should be treated with local pressure and supportive care.

For severe bleeding, stop the infusion of thrombolytic agent and heparin. Administer cryoprecipitate (usual dose of 1 U/5-10 kg) to increase the fibrinogen concentration. FFP may also be indicated in the presence of severe bleeding. Consider administration of rFVIIa (discuss with Hematology).

For life-threatening bleeding, stop the infusion of thrombolytic agent and heparin, strongly consider administration of rFVIIa. If rFVIIa is not administered, infuse cryoprecipitate as above. The administration of cryoprecipitate can be repeated q 8 hours. Protamine sulfate may be required to reverse the heparin.

This guideline was developed in collaboration with the Canadian Pediatric Thrombosis and Hemostasis Network and reviewed by T.I.G.C. members, based on medical literature and on current Canadian medical practice.

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