

EXAMPLE OF A PROTOCOL FOR INTRA-ARTERIAL THROMBOLYSIS

PRE-INTERVENTION PROCEDURES

Patient

Blood work

Serum electrolytes, complete blood cell count, INR, aPTT*, fibrinogen, creatinine, hepatic function.

Ongoing medical treatments

Stop ongoing treatment with anticoagulants, NSAIDs, ticlopidine, clopidogrel, ticagrelor, prasugrel, and nephrotoxic medication.

Additional recommendations

Patient needs to be kept on an empty stomach for 8 hours before angiography.

Preparation of the Solutions

UROKINASE

Prepare standard urokinase solution of 50,000 IU/mL in water for injection.

Urokinase solution for the bolus injection of 2,000 IU/kg in 20 minutes

Take the amount of the standard solution (50,000 IU/mL) corresponding to a dose of 2,000 IU/kg.

Dilute with NaCl 0.9% to obtain a total volume of 4 mL.

Urokinase solution for the continuous infusion at 2,000 IU/kg/h for 12 hours of infusion

Take the amount of the standard solution (50,000 IU/mL) corresponding to a dose of 12 X 2,000 IU/kg.

Dilute with NaCl 0.9% to obtain a total volume of 48 mL.

Examples of urokinase dilutions per body weight of the patient:

Patient's weight	SOLUTION FOR BOLUS INJECTION			SOLUTION FOR 12-HOUR CONTINUOUS INFUSION		
	IU urokinase = 2,000 IU/kg	mL urokinase standard solution (50,000 IU/mL)	mL of NaCl 0.9%	IU urokinase = 12 x 2,000 IU/kg	mL urokinase standard solution (50,000 IU/mL)	mL of NaCl 0.9%
60 kg	120,000 IU	2.4 mL	1.6 mL	1,440,000 IU	28.8 mL	19.2 mL
70 kg	140,000 IU	2.8 mL	1.2 mL	1,680,000 IU	33.6 mL	14.4 mL
80 kg	160,000 IU	3.2 mL	0.8 mL	1,920,000 IU	38.4 mL	9.6 mL
90 kg	180,000 IU	3.6 mL	0.4 mL	2,160,000 IU	43.2 mL	4.8 mL
100 kg	200,000 IU	4 mL	0 mL	2,400,000 IU	48 mL	0 mL

HEPARIN

Heparin continuous infusion at 100 IU/kg/12 hours

Prepare a solution of 100 IU/kg in 48 mL.

START THROMBOLYSIS

Urokinase Bolus

At the moment of the initial arteriography, a urokinase bolus of 2,000 IU/kg in 4 mL is administered in 20 minutes (pump speed of 12 mL/h) via a multiperforated catheter placed into the thrombus.

Continuous Infusion

Start the infusion of urokinase and heparin at the same time.

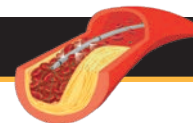
Urokinase:

Intra-arterial injection via the multiperforated catheter (in thrombus) at a pump speed of 4 mL/hour.

Heparin:

Peripheral IV injection or injection into the arterial catheter sheath at a pump speed of 4 mL/hour.

aPTT* = TCA = temps de céphaline activé



DURING THE THROMBOLYTIC TREATMENT

Patient Surveillance

Strict bed rest, do not fold the leg that is being treated, sitting position of 60° if possible. Do not touch the catheter or the bandage.

Every 4 hours: clinical surveillance

Thrombosed limb: progression of lysis: pain, temperature, mobility, sensitivity/sensibility, color

Bleeding: at the access site or any other abnormal bleeding (ears, nose, gums, urine, etc)

Patient's general status: alertness, arterial blood pressure, heartbeat

Every 4 hours: biological surveillance

Complete blood cell count, INR, aPTT, and fibrinogen.

Every 24 hours: radiological surveillance

If required, adapt catheter position according to the progression of the thrombolysis.

Note

In case of temporary ischemic acutization, appropriate pain medication needs to be administered.

Adaptation of the Doses

Revision of the doses

The doses are reassessed according to the clinical, biological, and radiological results. A new solution of urokinase is prepared in line with this decision.

ADAPTATION OF UROKINASE DOSES BASED ON FIBRINOGEN LEVELS

Fibrinogen > 2 g/L	Same dose
Fibrinogen between 1-2 g/L	Half the dose and new biological surveillance after 4 hours
Fibrinogen < 1 g/L	Stop urokinase treatment for 4 hours, new biological analysis after 4 hours After 4 hours, fibrinogen > 2 g/L, restart urokinase at half dose

ADAPTATION OF HEPARIN DOSES BASED ON aPTT* (RATIO) LEVELS

aPTT* ratio between 1 and 1.5	Increase the dose of heparin by 1,000 IU/12 hours
aPTT* ratio between 1.5 and 2	Keep administering the same dose of heparin
aPTT* ratio between 2 and 3	Lower the heparin dose by 500 IU/12 hours
aPTT* ratio between 3 and 4	Lower the heparin dose by 1,000 IU/12 hours
aPTT* ratio > 4	Stop heparin administration Measure aPTT levels again after 4 hours, and readapt the dose

Note

Heparin is co-administered during the whole duration of the thrombolytic treatment at a dose adapted to the aPTT levels.

When interruption of urokinase is required because of clinical and/or biological data:

- Interruption < 12 hours: keep the intra-arterial catheter perfused (eg, with isotonic saline solution)
- Interruption > 12 hours: remove the intra-arterial catheter temporarily

END OF THE THROMBOLYTIC TREATMENT

Timing

- Repermeabilization of the occluded limb
- Biological or clinical complications
- No further radiographic improvement

Note: After the thrombolytic treatment:

The morning after stopping the thrombolytic therapy: complete biological analysis (complete blood cell count, blood electrolytes, INR, aPTT, and fibrinogen).

The patient is put on the appropriate anticoagulant medication.