PROCEDURE

Thrombolytic drugs for heart attack

Thrombolytic treatment uses medicine to dissolve a blood clot blocking a heart artery.

PURPOSE
Reopen a blocked heart artery and limit heart muscle damage

PROCEDURE TYPE
Therapeutic, bedside intravenous medicine

WHERE IT IS DONE
Emergency department, ambulance, or hospital bedside

ANAESTHESIA
None

HOW LONG IT TAKES
Seconds to 90 minutes, based on the drug

PREPARATION
Rapid bleeding-risk check; fasting is usually unnecessary

RECOVERY
Hospital stay; no driving until your team clears you

MAIN RISKS
Major bleeding, brain bleeding, allergic reaction, abnormal heart rhythms

RESULTS
Within minutes, using symptoms, ECG, and sometimes angiography

Overview

Thrombolytic drugs are medicines that break down blood clots. They are sometimes called clot-dissolving or fibrinolytic medicines.

During certain heart attacks, a clot suddenly blocks an artery supplying the heart muscle. Restoring blood flow quickly can limit permanent heart damage. The medicine is given through a vein, either as a brief injection or an infusion lasting up to about 90 minutes.

Thrombolytic treatment is mainly used for an ST-elevation myocardial infarction, or STEMI. This is a type of heart attack with a characteristic pattern on an electrocardiogram (ECG), a test that records the heart's electrical activity.

When timely treatment is available, emergency angioplasty is generally preferred. Angioplasty, also called primary percutaneous coronary intervention (PCI), opens the artery using a catheter

and usually a stent. Thrombolytic treatment may be offered when PCI cannot be performed soon enough.

Why the procedure is performed

The aim is to dissolve the clot, restore blood flow and reduce damage to the heart muscle.

Treatment is most likely to help when it is given soon after heart attack symptoms begin. It may be considered when:

Thrombolytic drugs do not reliably treat every blocked artery. Even when the medicine appears to work, you will usually need transfer to a hospital that can perform coronary angiography. This test uses dye and X-rays to examine the heart arteries.

- Your ECG shows a STEMI
- Your symptoms began within the treatment time window
- Timely transfer to a hospital offering emergency PCI is not possible
- Your bleeding risk does not make thrombolytic treatment unsafe

Who should and should not have it

You may be offered thrombolytic treatment if you have a STEMI and PCI would be substantially delayed. The decision balances the benefit of reopening the artery against the possibility of serious bleeding.

Thrombolytic drugs are not used for every heart attack. They are not recommended solely for a non-ST-elevation myocardial infarction, or NSTEMI, because they have not been shown to provide the same benefit in that setting.

Treatment is generally avoided if you have a high risk of bleeding into the brain or another critical area. Reasons may include:

Other circumstances require an individual risk assessment. These include recent major surgery or internal bleeding, pregnancy or recent childbirth, severe liver disease, current anticoagulant use, prolonged resuscitation, or a recent stomach ulcer.

Tell the emergency team about previous strokes, bleeding, surgery, injuries, allergies and every medicine you take. This does not automatically rule out treatment, but it may change the safest approach.

- Previous bleeding inside the brain

- A known abnormal blood vessel or certain tumours inside the skull
- A recent stroke, serious head injury, or brain or spinal surgery
- Active internal bleeding
- Suspected tearing of the aorta, called aortic dissection
- Very high blood pressure that remains uncontrolled

How to prepare

This is an emergency treatment, so preparation is brief. The treating facility's own instructions take priority.

The team will ask when your symptoms started and review your medical history, medicines and bleeding risks. You will have an ECG, blood pressure checks and blood tests. The team may also examine you for signs that another condition, such as aortic dissection, could be causing your symptoms.

Fasting is not usually needed before the medicine itself. However, you may be asked not to eat or drink because angiography or another urgent procedure may follow.

Do not take extra aspirin, stop a prescribed blood thinner like warfarin or apixaban , or make other medication changes unless the treating team tells you to do so. If possible, provide your medicine list and details of any implanted medical devices.

What happens during the procedure

A healthcare professional places a small intravenous line into a vein, usually in your arm. Monitoring equipment records your heart rhythm, blood pressure and oxygen level.

Depending on the drug, the thrombolytic is given as a single injection, several injections, or an infusion. Tenecteplase is given as an intravenous bolus, while alteplase is given using a timed injection and infusion schedule.

You will usually also receive medicines that reduce further clot formation, such as an antiplatelet medicine and an anticoagulant. The exact medicines are chosen for your situation.

The team watches for signs that blood flow has returned. These can include improvement in chest discomfort and changes on your ECG. Temporary abnormal heart rhythms can occur when blood returns to the heart muscle.

If there is no clear evidence that the artery has reopened, you may need urgent rescue PCI.

You will be transferred to a hospital with cardiac catheter facilities if you are not already in one.

Recovery and what to expect afterward

Pain: Chest discomfort should be reassessed immediately after treatment. Improvement can suggest restored blood flow, but pain alone cannot confirm success. New, persistent or worsening pain needs prompt evaluation.

Eating: You may initially be asked not to eat or drink in case urgent angiography is needed. Once the team decides it is safe, you can usually resume food and fluids.

Activity: You will remain on heart monitoring and may need bed rest at first, especially while the bleeding risk is highest. Activity is increased gradually. Cardiac rehabilitation can help you rebuild fitness and lower future heart risk after discharge.

Driving: You cannot drive home. Driving restrictions after a heart attack differ according to your recovery, local licensing rules and whether you had further procedures. Wait until your healthcare team confirms that you may drive.

Going back to work: Timing is based on the amount of heart damage, your recovery, further treatment and the physical or safety demands of your job. Discuss a staged return during follow-up rather than choosing a date immediately.

Risks and possible complications

The main risk is bleeding because thrombolytic drugs interfere with the body's ability to maintain blood clots. Bleeding may occur around intravenous lines, from the digestive or urinary tract, or at a recent wound.

Bleeding inside the brain is uncommon but can cause a stroke, permanent disability or death. The team screens carefully for factors that increase this risk.

Other possible complications include:

Frequent blood pressure, neurological and bleeding checks help the team identify problems quickly. Unnecessary injections and invasive procedures may be limited after treatment to reduce bleeding.

- Low blood pressure
- Abnormal heart rhythms as blood flow returns
- An allergic or swelling reaction, depending on the drug

- Failure to reopen the blocked artery
- Reblocking after initial improvement

Results and follow up

The first results are assessed within minutes using your symptoms, ECG and heart rhythm. These findings can suggest whether the blocked artery has reopened, but coronary angiography gives more direct information.

If treatment appears unsuccessful, urgent rescue PCI is usually considered. If it appears successful, transfer for angiography and possible PCI is still normally part of the treatment plan.

Blood tests and imaging may be used to estimate heart muscle damage and check how well your heart pumps. Before discharge, your team will discuss medicines, activity, cardiac rehabilitation and risk factors such as smoking, blood pressure and cholesterol.

Routine follow-up usually reviews your recovery, medication effects, heart function and return to daily activities.

Alternatives

Primary PCI uses a catheter, balloon and usually a stent to open the artery. It is generally more reliable than thrombolytic medicine and causes less bleeding inside the brain, but it requires a suitable cardiac catheter laboratory and trained team. A long transfer delay can reduce the advantage of waiting.

Transfer for PCI without thrombolysis avoids the bleeding risk of a thrombolytic drug. The trade-off is that the artery remains blocked during transport, which may allow more heart muscle damage if the delay is substantial.

Medical treatment without immediate clot removal may be necessary when thrombolysis is unsafe and PCI is unavailable or not appropriate. Medicines can reduce further clotting and ease the heart's workload, but they may not quickly reopen a fully blocked artery.

Emergency coronary artery bypass surgery creates a new route for blood around blocked arteries. It is major surgery and is not the usual first treatment for STEMI, but it may be needed when coronary anatomy or complications make PCI unsuitable.

When to call your healthcare team

During your hospital stay, tell staff immediately about new pain, bleeding, a severe headache, weakness, numbness, difficulty speaking, confusion, faintness, breathing difficulty, or swelling of the face or tongue.

After discharge, contact your healthcare team promptly for routine concerns such as increasing bruising, minor bleeding that keeps returning, medication side effects, or questions about activity and work.

Call emergency services for:

Do not drive yourself to emergency care.

- New or returning chest pressure or pain
- Sudden weakness, facial drooping, speech trouble or confusion
- A sudden severe headache or collapse
- Vomiting blood, coughing blood, or heavy uncontrolled bleeding
- Severe shortness of breath or loss of consciousness

Common questions

Will I be asleep?

No. Thrombolytic medicine does not require anaesthesia or sedation. You will normally be awake while the team monitors you.

Can I drive home?

No. A heart attack and thrombolytic treatment require hospital care. After discharge, follow your team's advice and local driving rules before driving again.

How painful is it?

Placing the intravenous line may briefly sting. The medicine itself is not usually painful. Heart attack discomfort may continue until blood flow improves, so report any ongoing or worsening pain immediately.

When will I know if it worked?

The team looks for improvement within minutes using your symptoms and ECG. Angiography may later confirm whether the artery is open.

Will I still need a stent?

Possibly. Thrombolysis may dissolve the clot without fixing the narrowed area underneath it.

Angiography can show whether PCI and a stent are needed.

What if the drug does not work?

You may need urgent rescue PCI to open the artery mechanically. This is why transfer to a hospital with cardiac catheter facilities is usually arranged.

Sources

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