Catheter-directed thrombolysis for DVT: drugs and dose

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Disclosure

Speaker name: Niels Bækgaard

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

☒ I do not have any potential conflict of interest
Drugs, dose and volume

• Basic guidelines

• Comparative studies

• Classical studies

• Conclusion
Drugs

- Plasminogen
  - Plasmin
  - Fibrin
    - Fibrin degradation products
      - D-dimer

Drugs for fibrin degradation:
- rt-PA (half-life 5 min)
- Urokinase (half-life 20 min)
- Streptokinase
Basic guidelines 2000

• Semba and Panel members
  • “low-dose” recombinant drug (rt-PA) ≤ 2 mg/hr
  • subtherapeutic heparin

• catheter-directed treatment of PAD and DVT
• based on clinical experience of panel members!

Advisory Panel to the Society of Cardiovascular and Interventional Radiology
The US multicenter Registry 1999

- **Mewissen et al.**
  - n= 60 systemic (pedal vein) thrombolysis
  - n= 252 CDT*
  - 70 % iliofemoral DVT

- **Results:**
  - 9.95 million IU urokinase, 67.8 hours
  - 6.77 million IU urokinase, 48.0 hours*

Comparative study 2004

- **Grunwald and Hofmann**
  - 38 limbs with DVT: Urokinase 120,000 U/hr
  - 32 limbs with DVT: rt-PA 0,5 mg/hr

- **Results**:
  - No statistical difference
    - infusion time, success rate, complication rate
  - rt-PA less expensive (p < 0.001)

The Copenhagen study 2010

- **Bækgaard et al.**
- 103 lower limbs with iliofemoral DVT
- rt-PA 1.2 mg/hr = 30 mg/day
- 120 ml infusion/hr
- in average 70 mg rt-PA

**Results:**
- 82% competent veins after 6 years

Long-term results using catheter-directed thrombolysis in 103 lower limbs with acute iliofemoral venous thrombosis. 
Complications, Copenhagen

- **Major bleeding**
  - 1.5%, 2 from puncture sites in the arm, 1 hematoma in the lumbar region

- **Minor bleeding**
  - 25 %, from the puncture site, often some haematuria

- **PE**
  - 0.5 %

- **Death**
  - 0

Safety and efficacy of catheter-directed thrombolysis, **Baekgaard** et al, Phlebology 2012; Suppl 1. 149-54.
The Oslo study 2012

- **Enden et al.**
- 99 lower limbs with iliofemoral DVT: AC
- 90 lower limbs with iliofemoral DVT: CDT
- rt-PA 0.01 mg/kg/hr, max 20 mg rt-PA per day
- 20 ml/hr

**Results:**

- PTS 41% in CDT group and 56% in the AC after 2 years **p=0.047**

The Maastricht study 2013

- Strijkers et al.
- 37 patients with iliofemoral DVT
- Ultrasound-accelerated CTD
- 1mg rt-PA/hr, 35 ml/hr

**Results:**
- 4 bleeding episodes
- sec patency 87 % after 1 year

The Bern study 2014

• Engelberger et al.
• 87 patients with lower limb DVT: US assisted CDT
• 20 mg rt-PA/15 hours
• 35 ml/hr

• Results:
• Sec. patency 96 % after 1 year

Fixed low-dose ultrasound-assisted catheter-directed thrombolysis followed by routine stenting of residual stenosis for acute ilio-femoral deep-vein thrombosis Thrombosis and haemostasis 2014; 111: 1153-60.
Pulse-spray contra continuous infusion 2014

• Foegh et al.
• 203 lower limbs
• CDT for iliofemoral DVT

• Result:
• Pulse-spray/cont. inf.; Hazard ratio 0.15 (CI 0.45-0.48)

The ATTRACT study, US

- **Vedamtam, Comerota**
- 658 patients RCT, 2+2 arms
- 0.01 mg rt-PA/kg/hr
- max 35 mg
- max 30 hours

Conclusion

• rt-PA infusion varies in the existing literature
  • 0.5-1.2 mg/hr, volume 20-120 ml/hr: diff max
  • short life-time
  • 1-2 mg/hour given intra-thrombus
  • as short interval as possible
  • therapeutic-level heparin
  • given as pulse-spray
  • in a volume > 100 ml/hour