How should manage acute in-stent thrombosis during femoropopliteal recanalisation

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Potential conflicts of interest

Speaker's name: Yann Goueffic

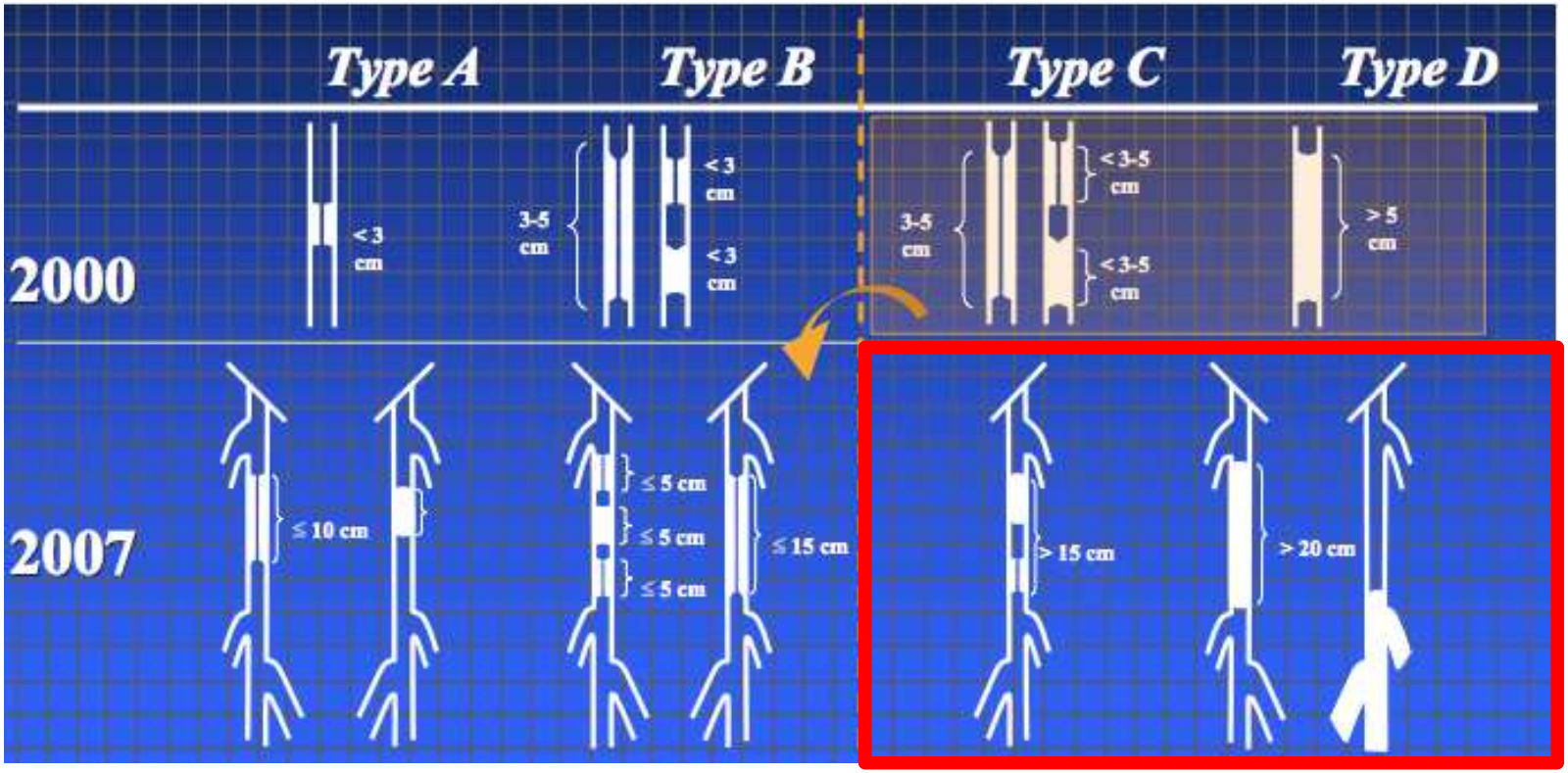
☑ I have the following potential conflicts of interest to report:

Consultant: BIOTRONIK, MEDTRONIC, PEROUSE

Honorarium: COOK, CORDIS, JOHNSON & JOHNSON

Institutional grant/research support: COVIDIEN, ST. JUDE MEDICAL, TERUMO

TASC Working Group. TransAtlantic Inter-Society Consensus 2007 (TASC II)

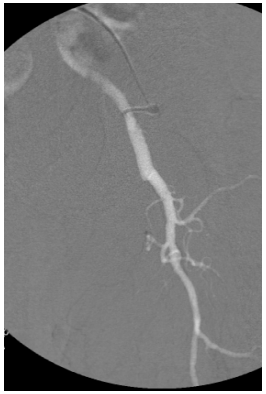


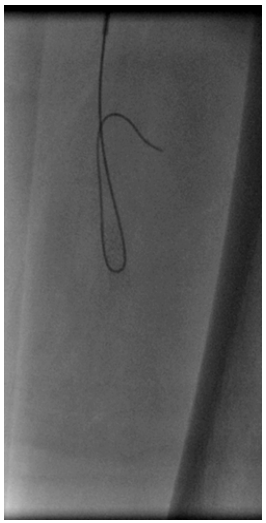
Endovascular repair

Should be discussed

Open surgery

TASC C and D: challenging cases



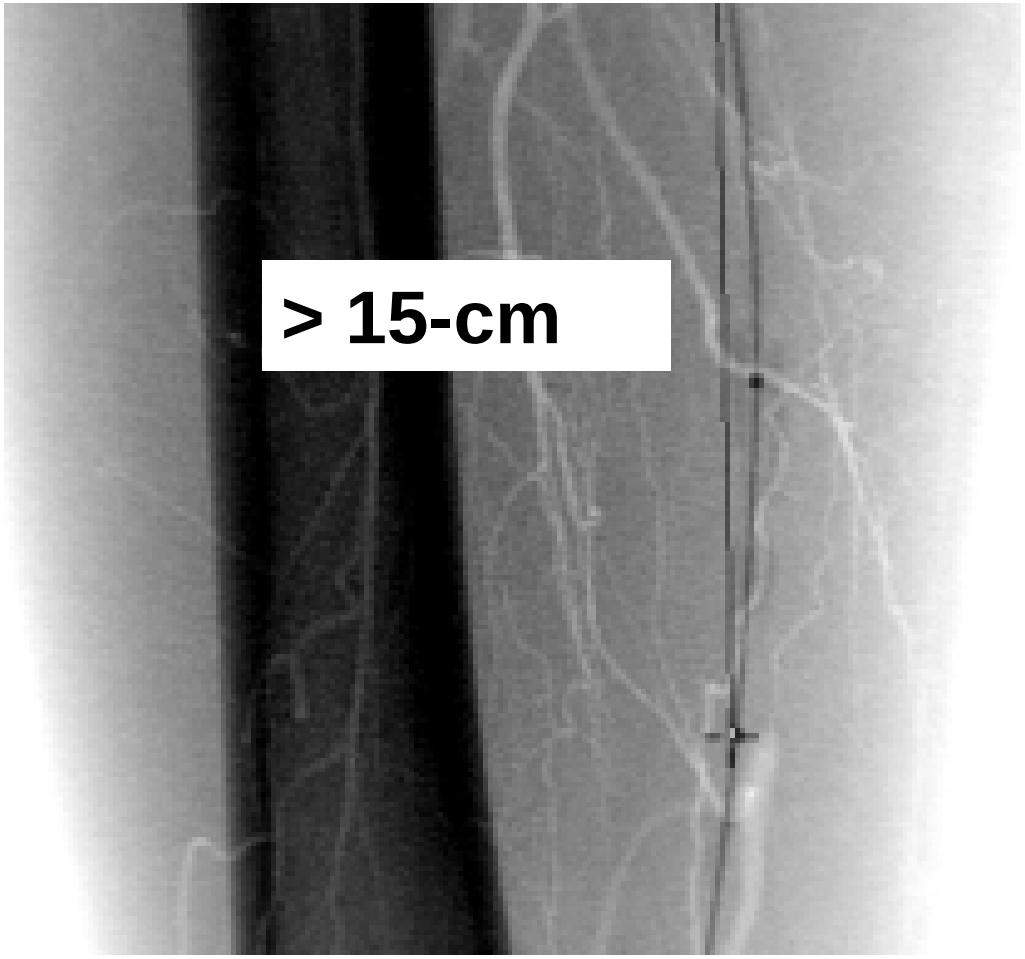


>15-cm
Popliteal involvement
Stenoses – occlusions
Calcifications

CLI by alteration of the re-entry

Entry / Re-entry
Intra and subintimal
Long balloons - stents

After crossing the lesion…



PTA

Bare metal stent

Covered stent

Drug eluting stent

Drug eluting balloon

Bioresorbable stent

Complications

Intraoperative

in-stent thrombosis

Rupture

dissection

Postoperative

In-stent restenosis

In-stent thrombosis

Clinical history

- Male, 55 years-old

- Cardiovascular risk factor:
active smoking (100 packs/year)

- Peripheral arterial disease:
left SFA stenting in December 2011.

- Psoriasis

Clinical and duplex scan presentation

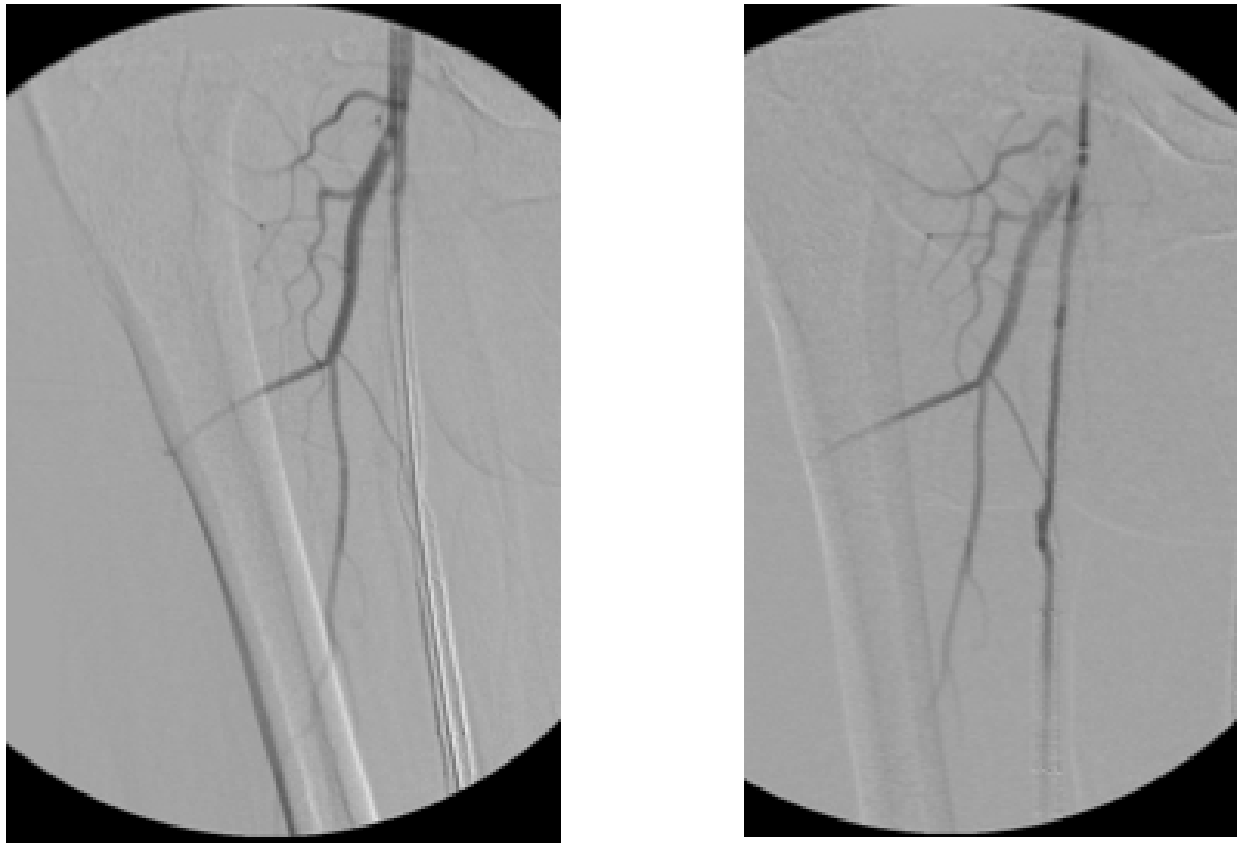
February 2012:

- **CLI:** Refer for a non healing painful ulceration of the left foot (rutherford stage 5)

- **Duplex scan:**
  - The left ankle-brachial index measured 0.48
  - Long in-stent restenosis of the femoro-popliteal arteries
  - Fibular and posterior tibial arteries seem patent

Arteriography by over the bifurcation approach

Recanalization and balloon remodeling



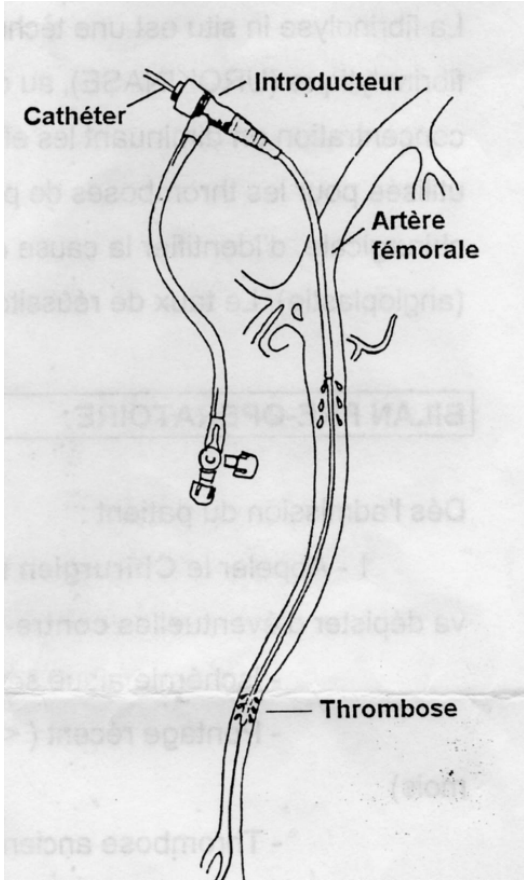
Extensive thrombosis

Thrombo-aspiration (Export® catheter)

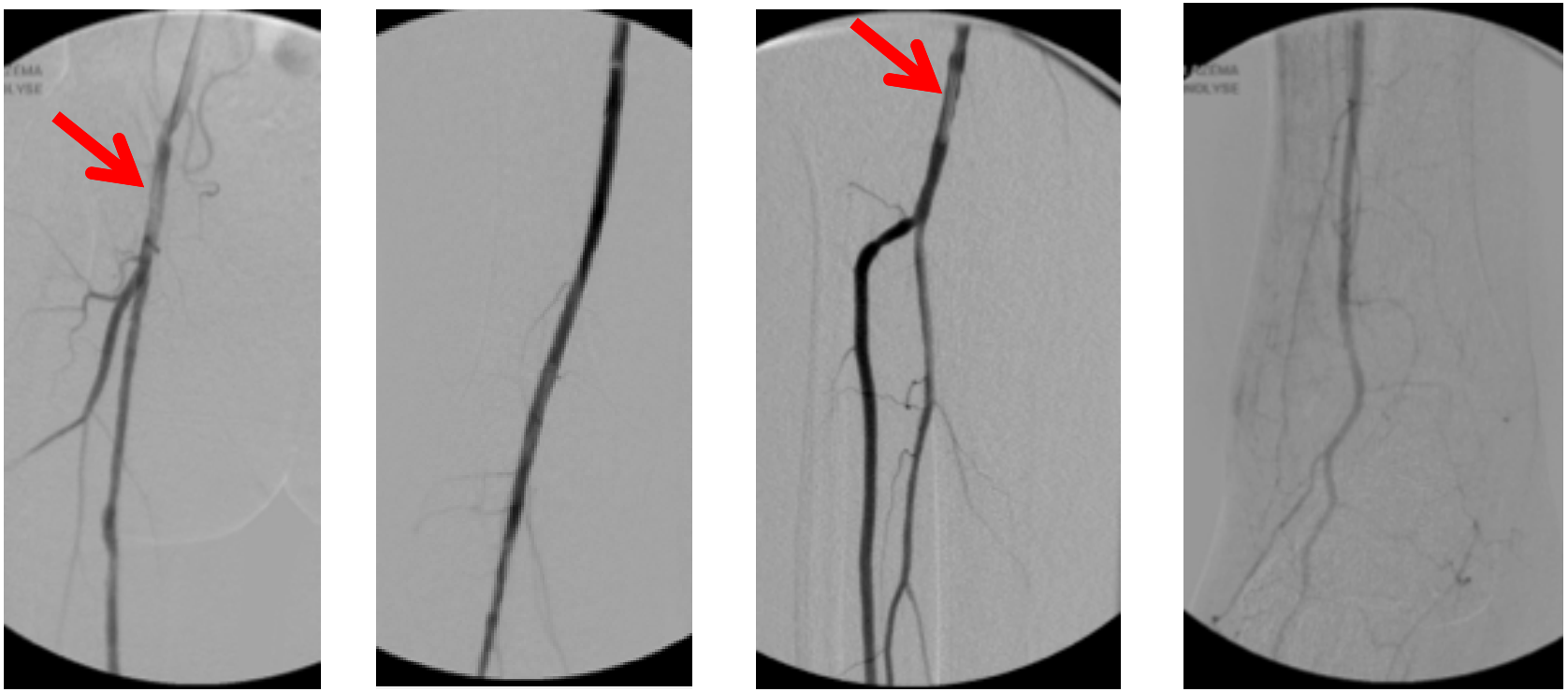
Extensive thrombosis to the deep femoral artery
and the below the knee arteries

Local thrombolysis

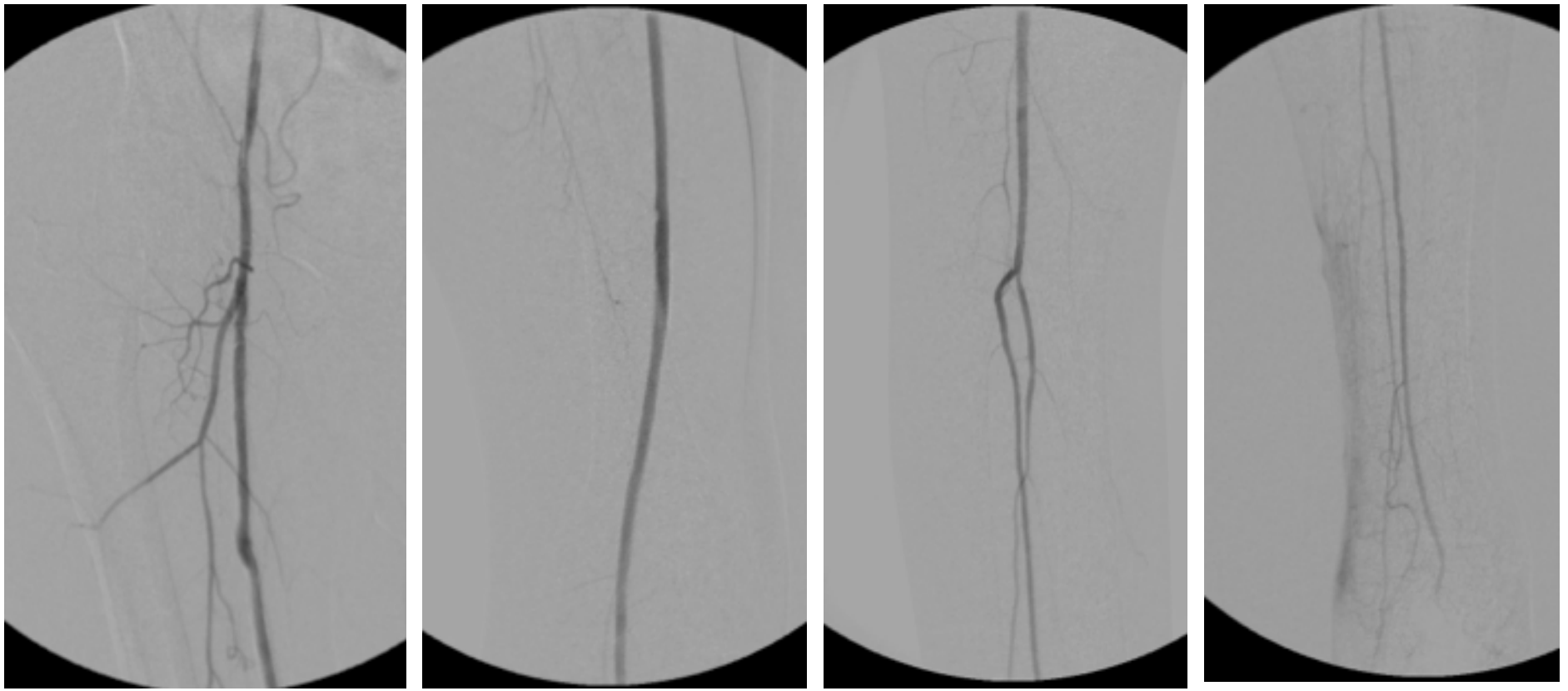
- Straight catheter (angioflux®)
- Urokinase were infused by intra arterial injection using the long sheath @ 1000 UI/kg/h during 8 hours
- Heparin was simultaneously admistrated by intravenous route in dose of 300 UI/kg/24h
- The duration of the treatment was 48h
- Control arteriography were realized @ 24h and 48h



Control arteriography @ 24h



Control arteriography @ 48h



To prevent acute in-stent thrombosis

- Preoperative antiplatelet regimen
- Heparin given intraoperatively (50UI/kg)

To treat acute in-stent thrombosis

- **Open surgery** (fogarty catheter, bypass)
  in case of sensory loss or muscle weakness

- **Minimally invasive management**
  - standard thrombolysis
  - catheter-based percutaneous aspiration thrombectomy
  - mechanical thrombectomy + thrombolysis

Thrombolysis

Its minimally invasive

More complete lysis of small side branches

To treat underlying lesions using PTA/stenting

« A meta-analysis of 3 large randomized controlled trials comparing surgical intervention with standard thrombolysis for the treatment of acute lower extremity ischemia showed that limb salvage and death rates were similar for both treatments, with a higher incidence of major bleeding complications in the thrombolysis group"

Berridge DC, Cochrane Database Syst Rev. 2002

Mechanical thrombectomy

Clinical Investigation

JOURNAL OF ENDOVASCULAR THERAPY

Journal of Endovascular Therapy
2015, Vol. 22(1) 87–95

DOI: 10.1177/1526602814566578
www.jevt.org
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Dutch Randomized Trial Comparing Standard Catheter-Directed Thrombolysis and Ultrasound-Accelerated Thrombolysis for Arterial Thromboembolic Infrainguinal Disease (DUET)

Journal of Endovascular Therapy
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Treatment of infrainguinal thromboembolic complications during peripheral endovascular procedures with AngioJet rheolytic thrombectomy, intraoperative thrombolysis, and selective stenting

Stavros Spiliopoulos, MD, PhD, EBIR, Konstantinos Katsanos, MD, PhD, EBIR, George Fragkos, MD, Dimitrios Karnabatidis, MD, PhD, EBIR, and Dimitrios Siablis, MD, PhD, EBIR, *Patras, Greece*

J Vasc Surg 2012;56:1308-16

Clinical Investigation

JOURNAL OF ENDOVASCULAR THERAPY

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Prospective ✗
RCT ✗
Multicenter ✗
In-tent to treat ✗
Published ✗

Standard thrombolysis
versus
Ultrasound-accelerated thrombolysis
(EKOS EndoWave)

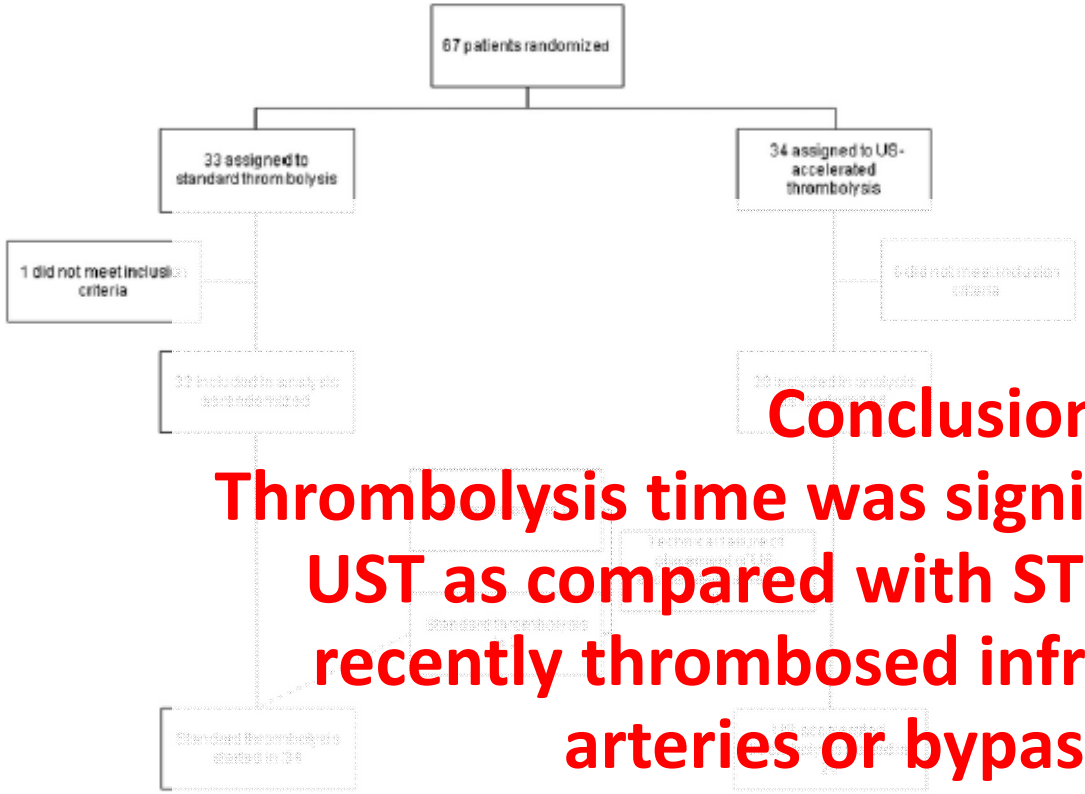
Key inclusion criteria

- Patients with recently (7–49 days) thrombosed infrainguinal native arteries or bypass grafts presenting with acute limb ischemia

Key exclusion criteria

- Acute lower limb ischemia Rutherford class IIb and III

Primary endpoint: duration of catheter directed thrombolysis needed for uninterrupted flow (>95% lysis) in the thrombosed infrainguinal native artery or bypass graft with outflow through at least one BTK artery



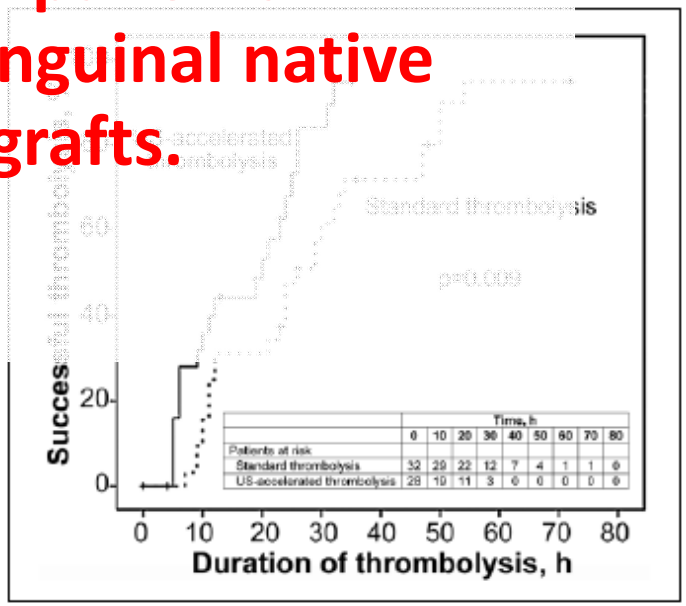
Thrombolysis was significantly faster and required significantly fewer units of urokinase in the UST group, p=0.01)

Conclusion:

Thrombolysis time was significantly reduced by UST as compared with ST in patients with recently thrombosed infrainguinal native arteries or bypass grafts.

Technical success: 27 (84%) patients in the ST group vs. 21 (75%) patients in the UST group (p=0.52).

Perioperative morbimortaity and patency rates: no differnce



Treatment of infrainguinal thromboembolic complications during peripheral endovascular procedures with AngioJet rheolytic thrombectomy, intraoperative thrombolysis, and

18 procedures – 22 arteries

Conclusions: **The use of AngioJet rheolytic thrombectomy and adjunctive local thrombolysis or stenting, or both, under filter protection, is safe and effective for the management of severe thromboembolic complications occurring in the femoropopliteal and infrapopliteal arteries during peripheral endovascular procedures.**

(J Vasc Surg 2012;56:1308-16.)

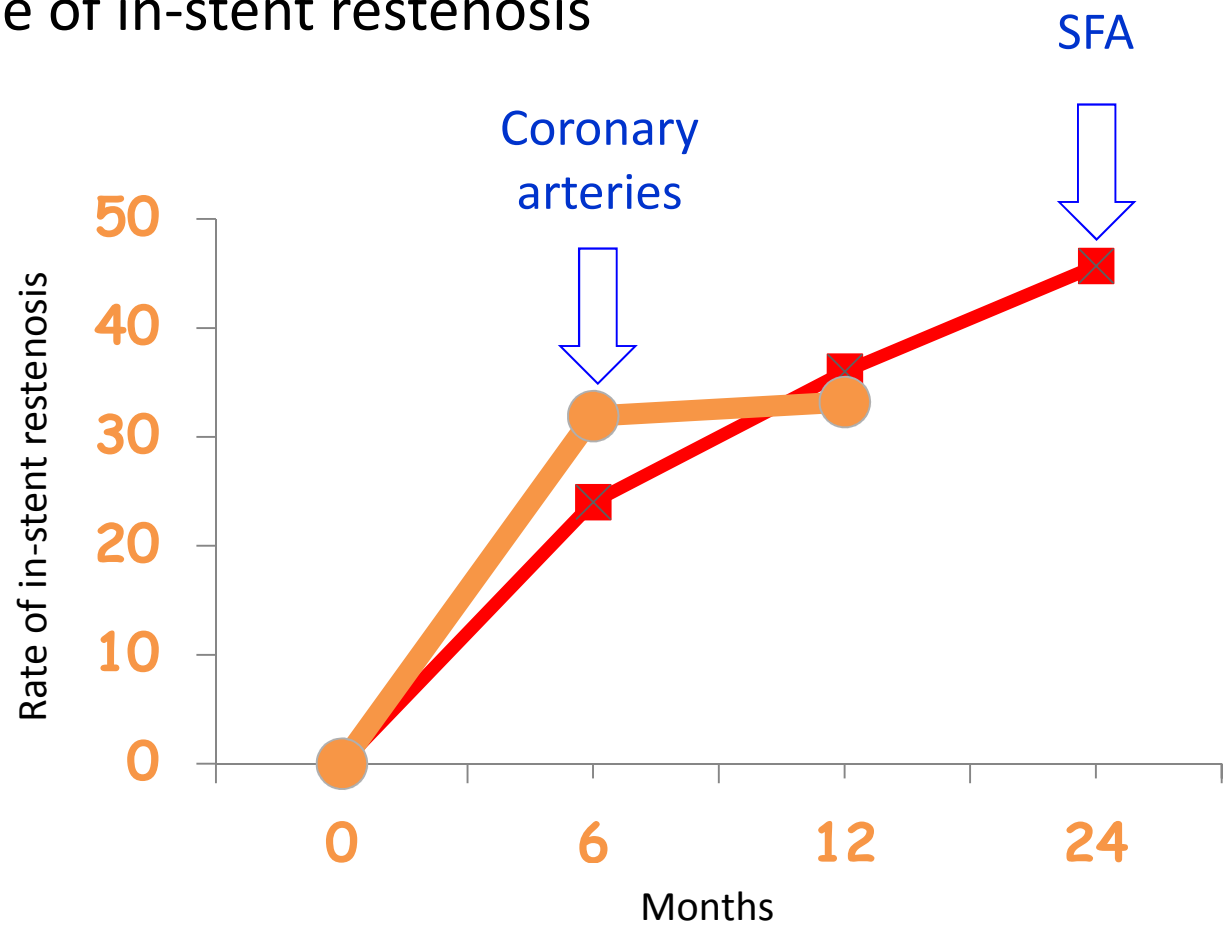
- Excluded occlusive events of the treated vessels detected afew days after the procedure.

Take home messages

- **Open surgery: first line of treatment in case of acute ischemia with muscle weakness**
- **Intra-arterial standart thrombolysis should be recommanded**
- **For mechanical thrombolisis, the level of evidence is such that it is not possible to draw reliable conclusions**

Take home message: restenosis # thrombosis

Time course of in-stent restenosis



Kastrati A, Circulation, 1993; Schillinger, Circulation, 2007

AUTHORS' CONCLUSIONS

Implications for practice

The evidence is limited and consists of relatively small studies but suggests that intra-arterial rt-PA and intra-arterial urokinase may be equally effective in the treatment of critical limb ischaemia. There is less evidence in favour of intra-arterial streptokinase compared with intra-arterial rt-PA. Intravenous rt-PA appeared to be less effective than the alternative fibrinolytic agents. Complications are related to the individual fibrinolytic regime. Haemorrhagic complications tend to be more prevalent with high dose regimes of intra-arterial rt-PA and are significantly more prevalent with intravenous rt-PA. Overall, the level of evidence is such that it is not possible to draw reliable conclusions.

Table 1. Patient Characteristics.[a]

Characteristic	Standard Thrombolysis (n=32)	Ultrasound-Accelerated Thrombolysis (n=28)
Age, y	64.0±11.8	64.8±12.1
Men	25 (78)	19 (68)
Body mass index, kg/m^2	27.1±3.3	27.3±4.5
History of smoking	25 (78)	23 (82)
Comorbidities		
Diabetes	9 (20)	9 (32)
Hypertension	18 (56)	16 (57)
Hypercholesterolemia	18 (56)	15 (54)
Coronary artery disease	8 (26)	10 (36)
TIA/stroke	5 (16)	2 (7)
Renal insufficiency	2 (6)	5 (18)
Pulmonary disease	8 (25)	5 (18)
ASA class		
I	1 (3)	4 (14)
II	23 (72)	13 (46)
III	8 (25%)	10 (36)
IV	0 (0)	1 (4)

Characteristic	Standard Thrombolysis (n=32)	Ultrasound-Accelerated Thrombolysis (n=28)
Type of occlusion		
Native artery	10 (31)	9 (32)
Bypass graft	22 (69)	19 (68)
Prosthetic	18 (82)	14 (74)
Venous	4 (18)	5 (26)
Duration of symptoms, d	18.7±12.3	18.9±13.0
Walking distance, m	76.3±116.3	48.6±76.6
Occlusion length, cm	29.8±15.9	32.6±15.3
Acute ischemia Rutherford category		
I	19 (59)	15 (54)
IIa	13 (41)	13 (46)
Ankle-brachial index	0.37±0.26	0.24±0.25
Number of outflow arteries		
0	6 (19)	3 (11)
1	7 (22)	7 (25)
2	5 (16)	8 (29)
3	14 (44)	10 (36)
Previous ipsilateral revascularization		
PTA and/or stenting	9 (28)	7 (25)
Thrombolysis	6 (19)	5 (18)
Bypass	22 (69)	19 (68)

Adverse Events[b]	Standard Thrombolysis (n=32)	Ultrasound-Accelerated Thrombolysis (n=28)	p
Death	1 (3)	1 (4)	1.00
Death and severe adverse events	6 (19)	8 (29)	0.54
Death and severe or moderate adverse events	7 (22)	12 (43)	0.10
Severe adverse events			
Myocardial infarction	1 (3)	0 (0)	1.00
Major amputation	2 (6)	2 (7)	1.00
Severe bleeding	2 (6)	3 (11)	0.66
Intracranial	0 (0)	2 (7)	0.21
Compartment syndrome	0 (0)	1 (4)	0.47
Distal embolization	0 (0)	1 (4)	0.47
Other	2 (6)	1 (4)	1.00
Moderate adverse events			
Moderate bleeding	0 (0)	1 (4)	0.47
Pseudoaneurysm	1 (3)	1 (4)	1.00
Iatrogenic dissection	0 (0)	1 (4)	0.47
Renal insufficiency[c]	0 (0)	1 (4)	0.47