# Below Knee Intervention

## How to Deal with Tibial and Peroneal Artery Disese

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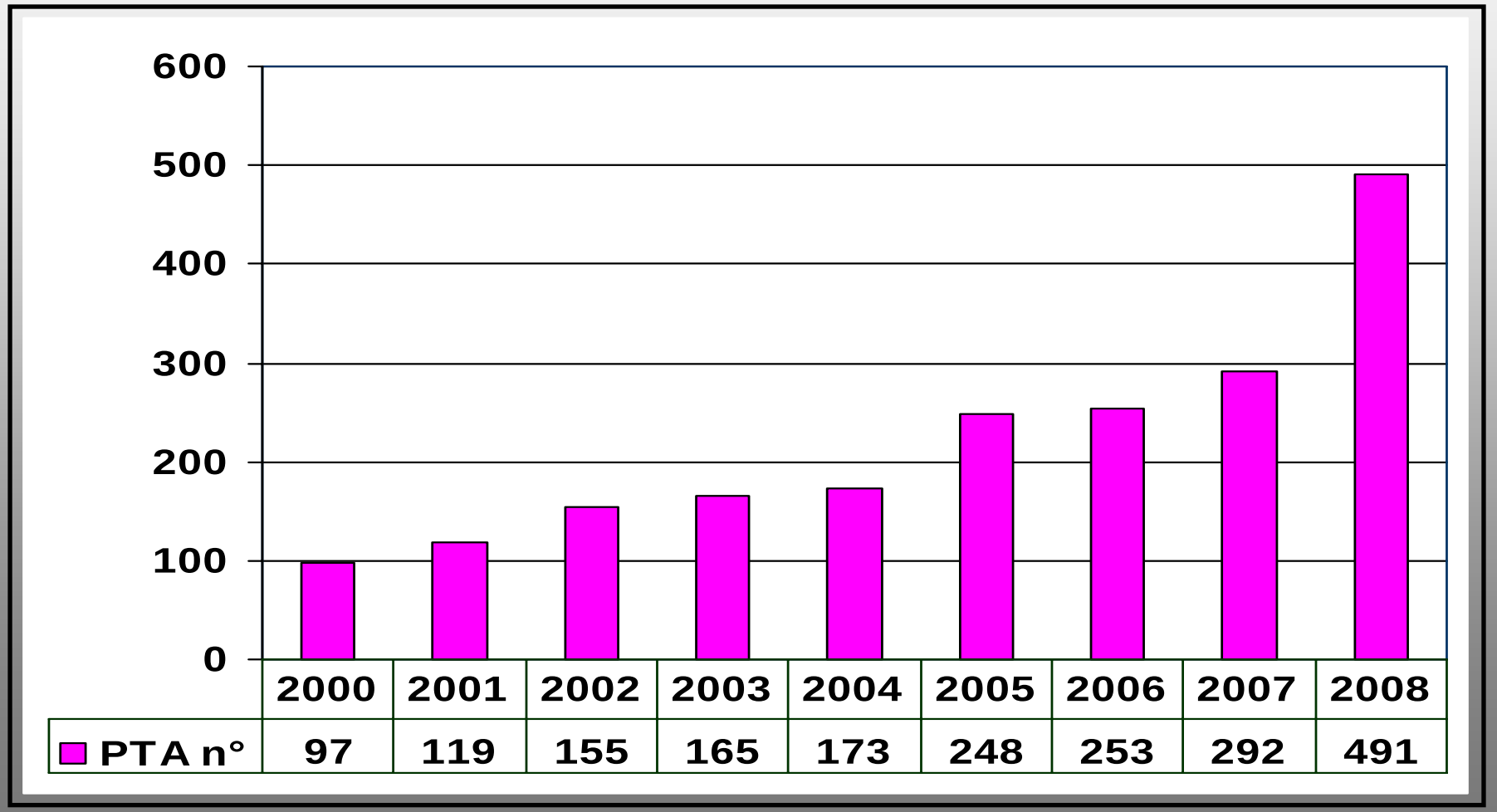
*Ospedale Maggiore Policlinico*

*University of Milan*

*ITALY*

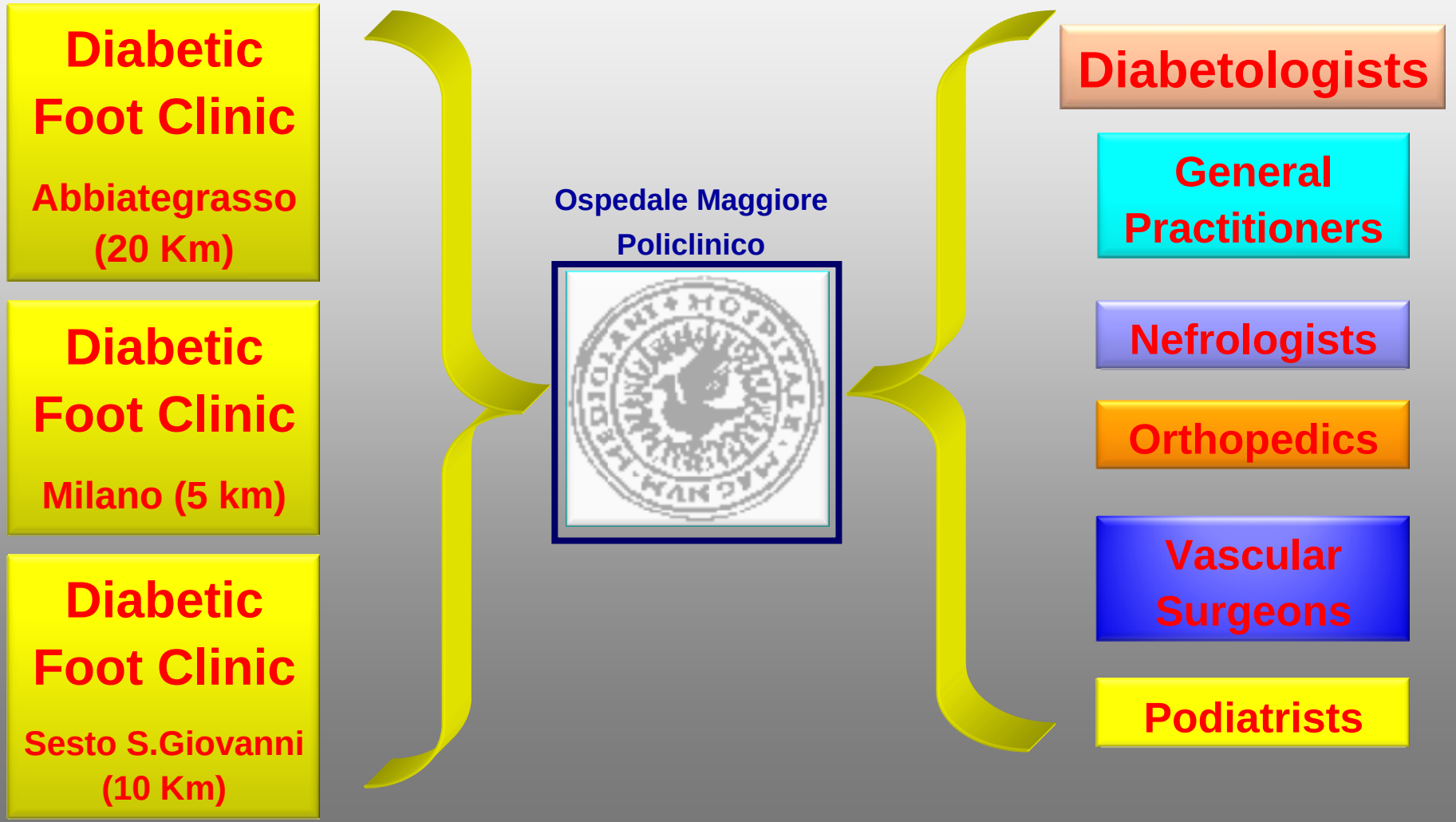
# BTK Endovascular Interventions

## Milano Experience (2000-2008)



# Milano Experience (2000-2008)

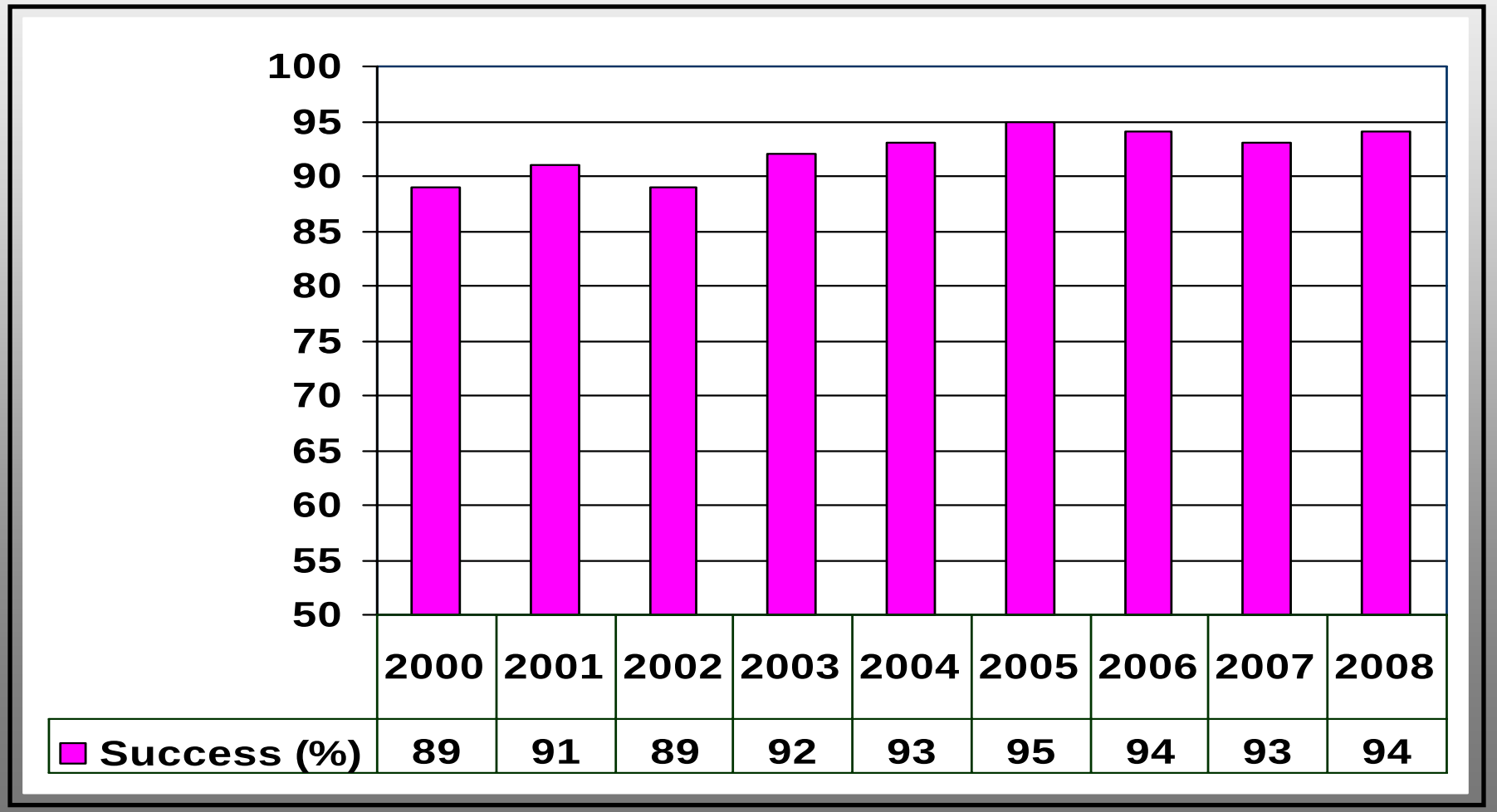
## Hub & Spoke Model



# BTK Endovascular Interventions

## Milano Experience (2000-2008)

# Procedural Success



# BTK Endovascular Interventions

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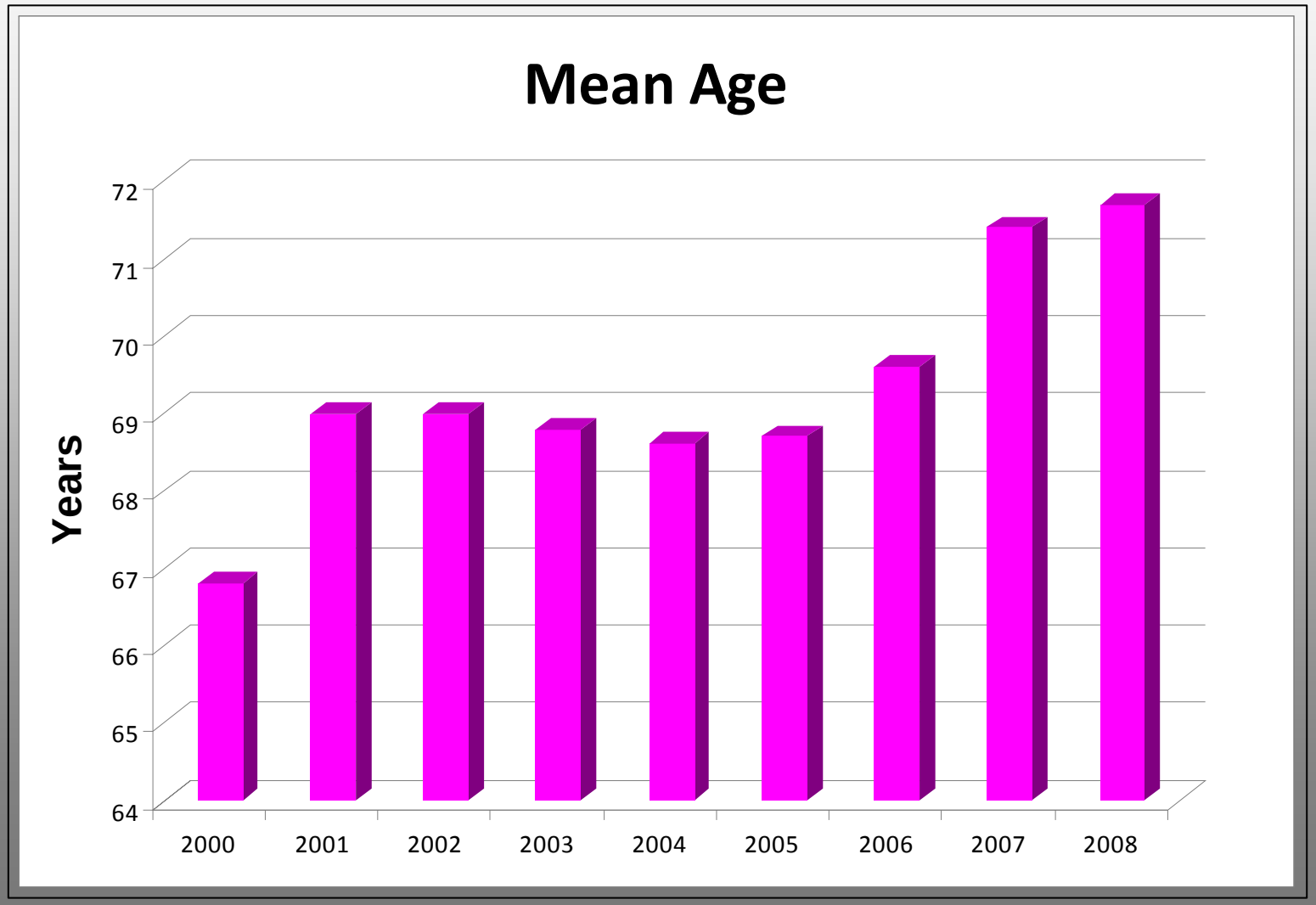

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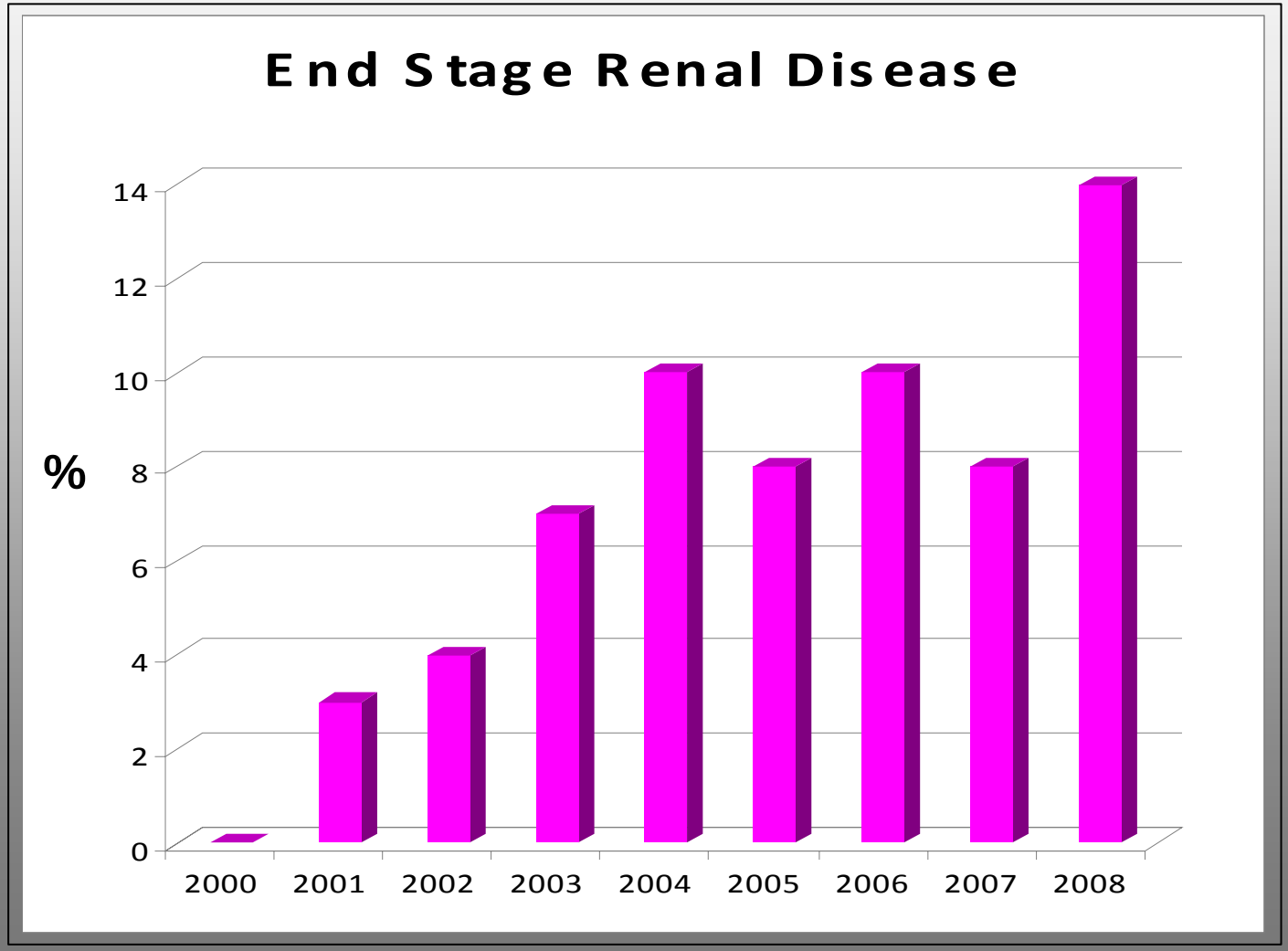

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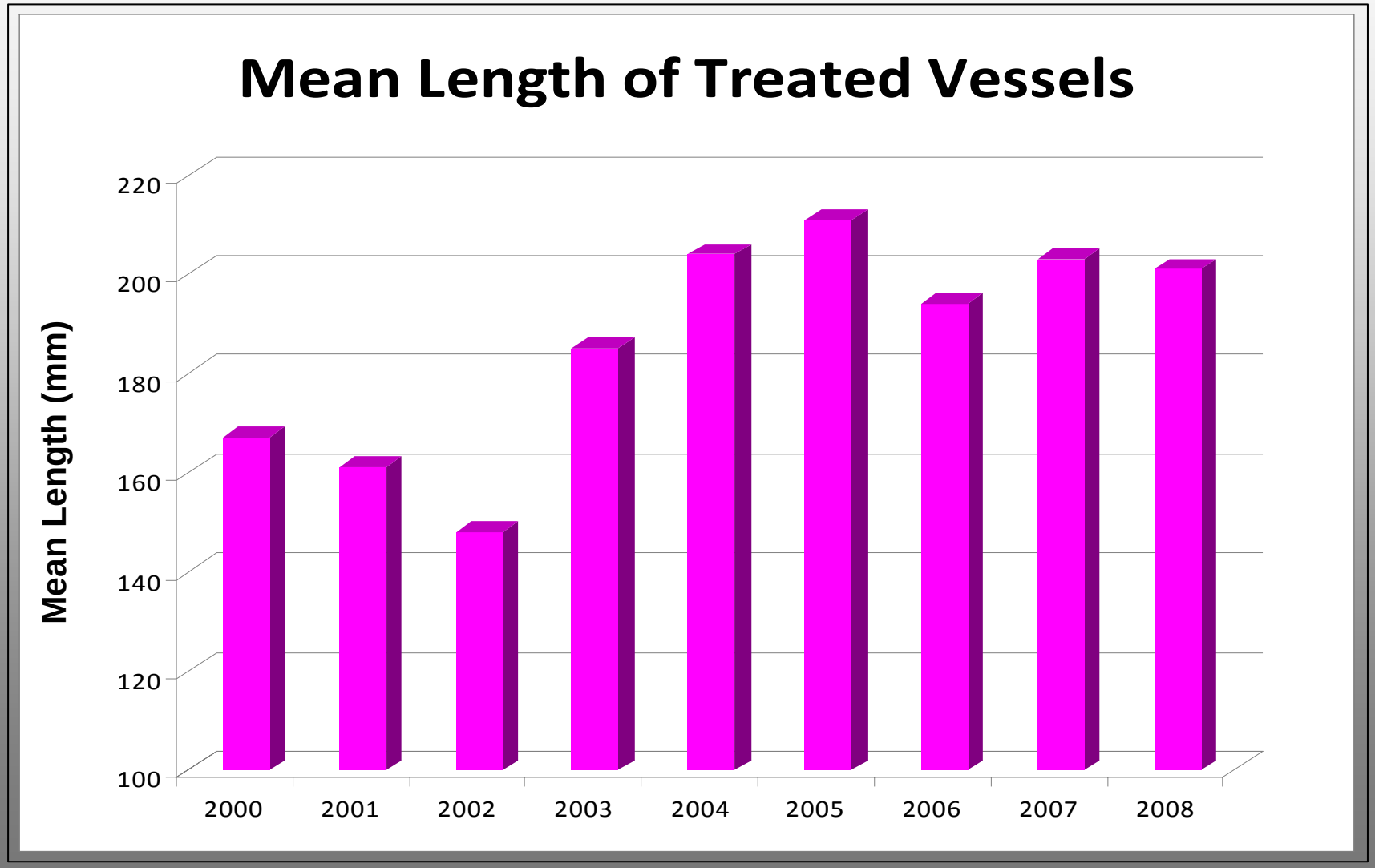
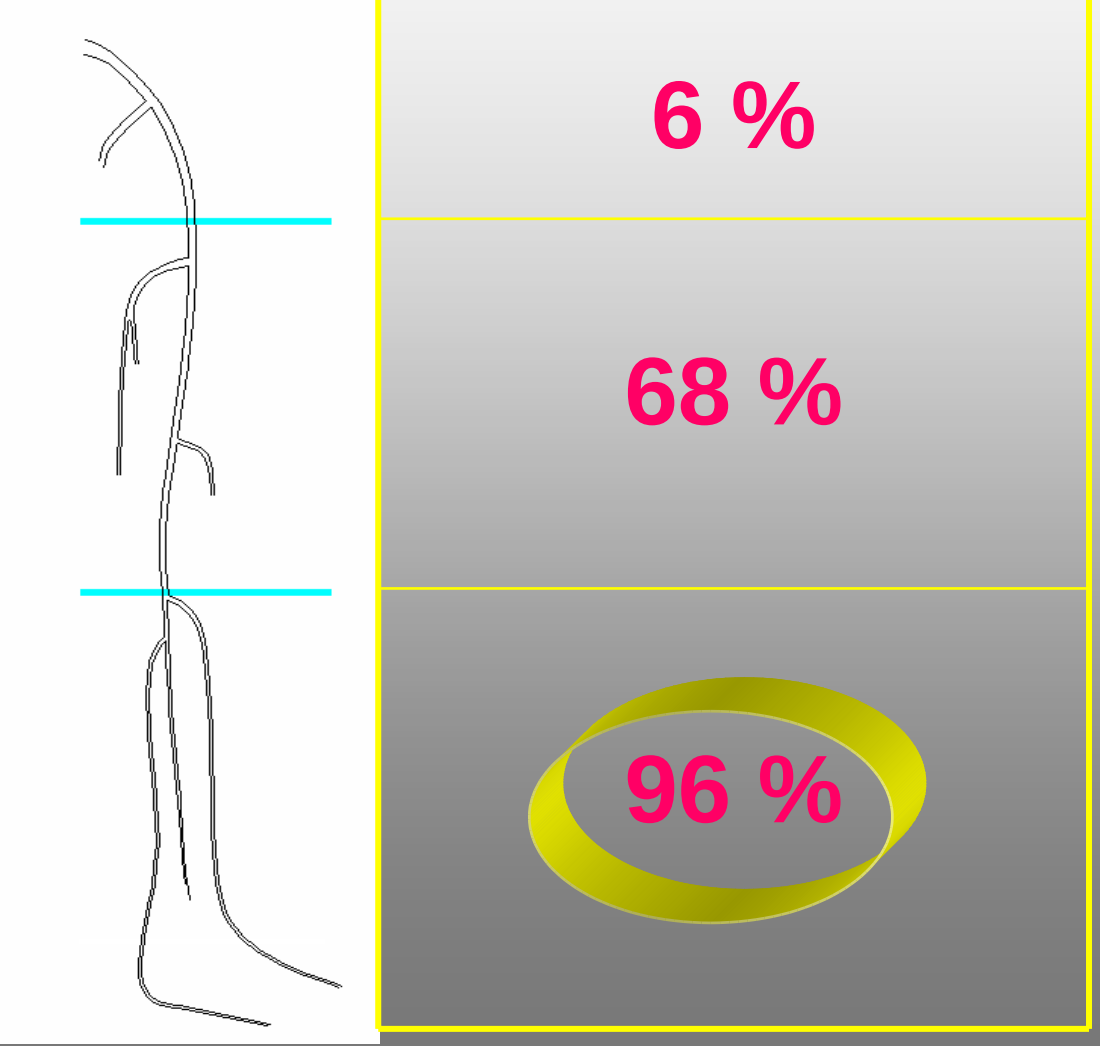
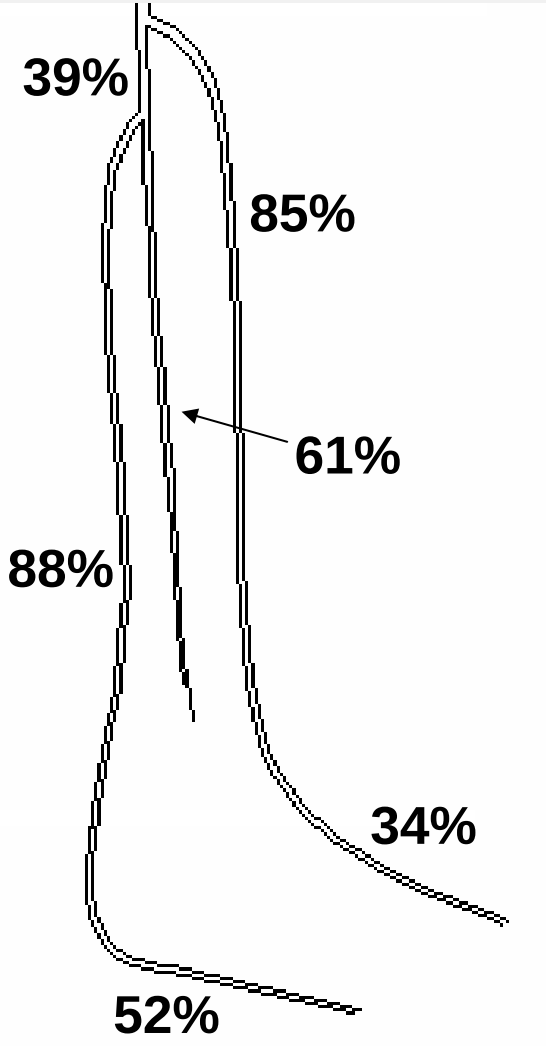


# BtK Arteries Disease Pattern

## Prevalence



# BtK Arteries Disease Pattern

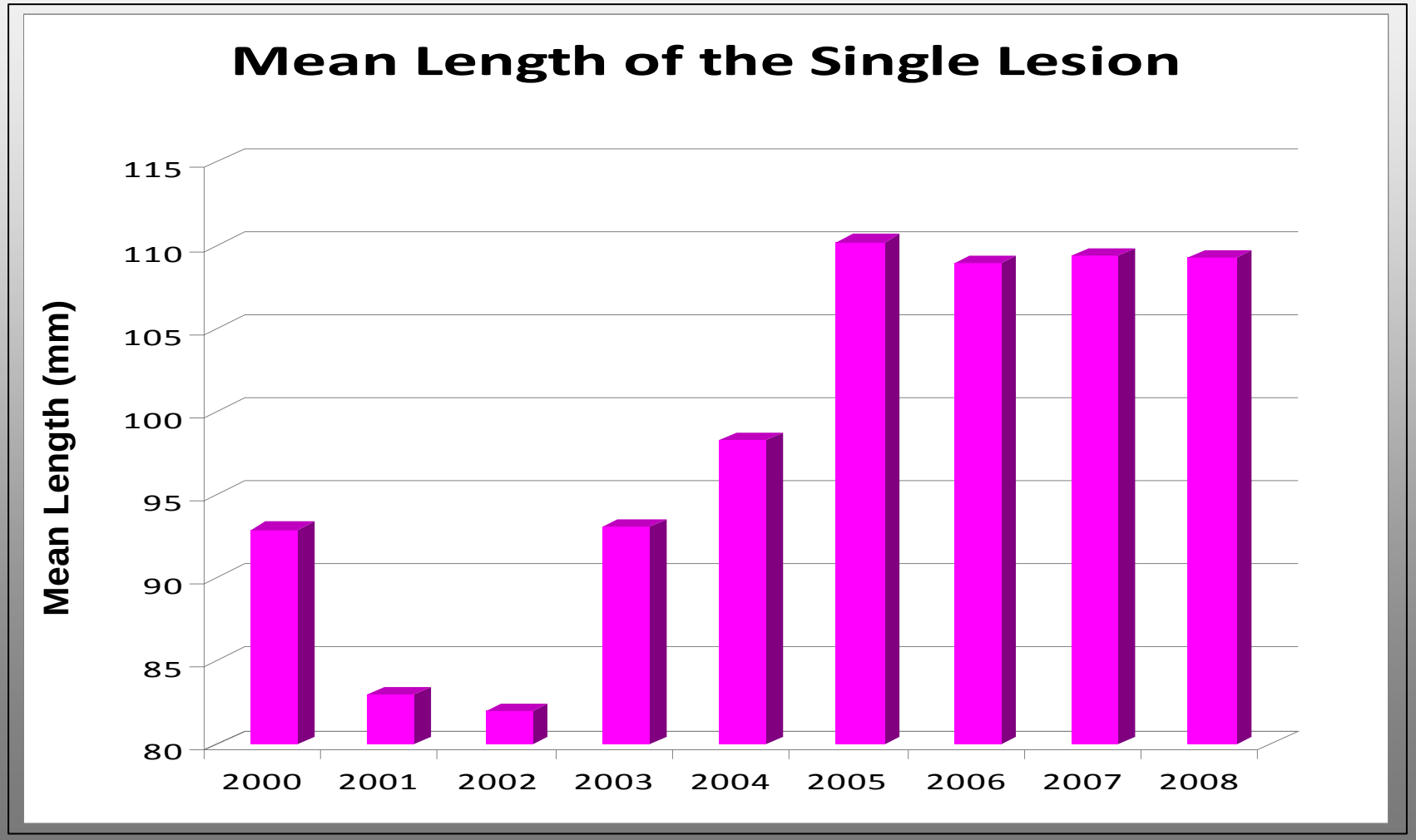



## *Localization & diffusion*

| | |
|---|---|
| 1 vessel | 10 % |
| 2 vessel | 20 % |
| 3 vessel | 70 % |

# BTK Endovascular Interventions

## Milano Experience (2000-2008)



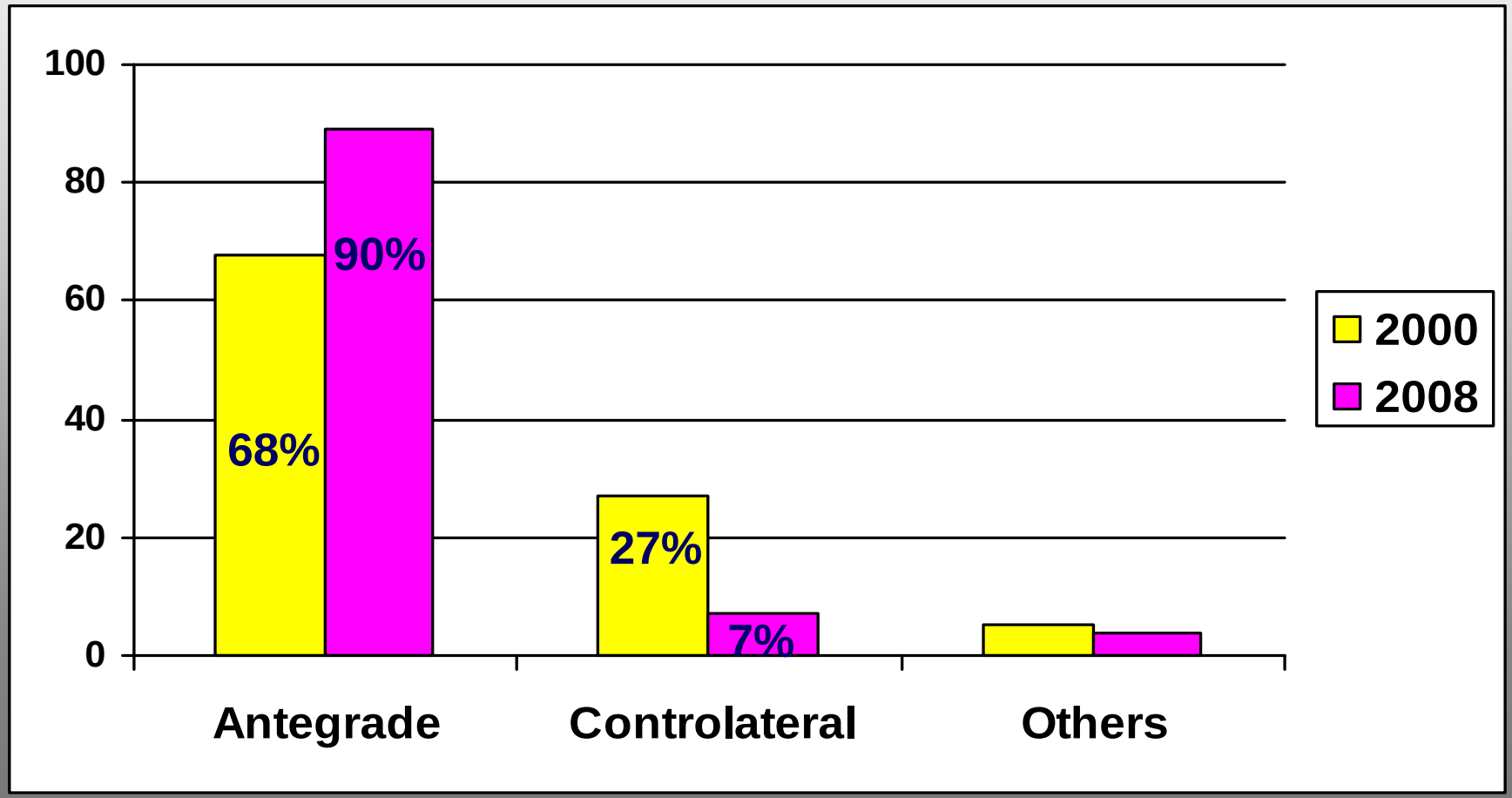
# BTK Endovascular Interventions

## Key Points

- Vascular approach
- “Coronary like” study
- Material improvement
- Availability of different techniques

# BTK Endovascular Interventions
## Milano Experience (2000 *Vs* 2008)

### VASCULAR APPROACH



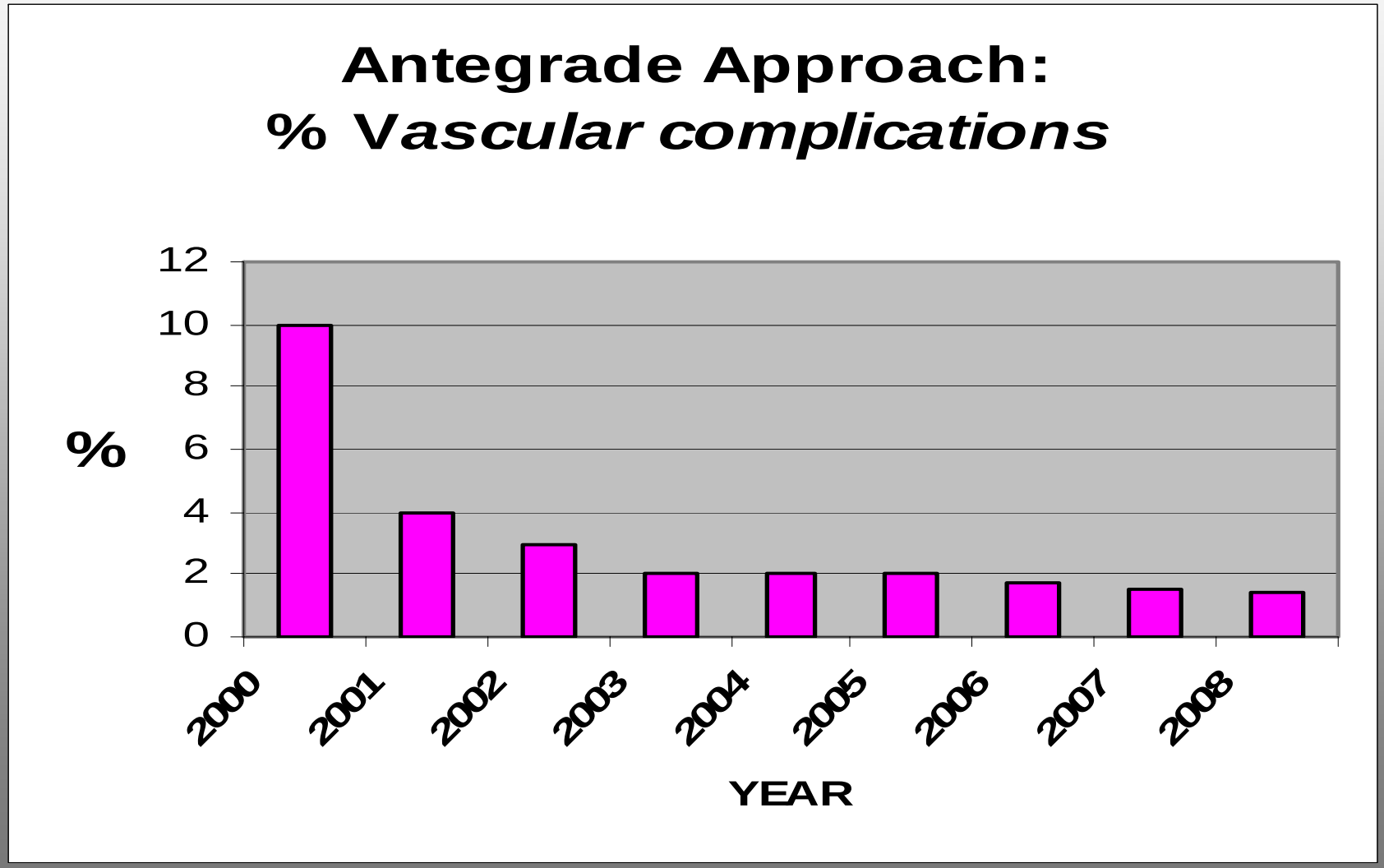
# BTK Endovascular Interventions

# Antegrade approach

| | |
|---|---|
| SFA selective injection | • high quality imaging<br>• less contrast dye (85 ml/procedure) |
| Best endovascular device control | • treatment of CTO<br>• subintimal angioplasty<br>• snaring of wires |
| 4 French introducer sheath | • no closure device<br>• less complications |

# BTK Endovascular Interventions

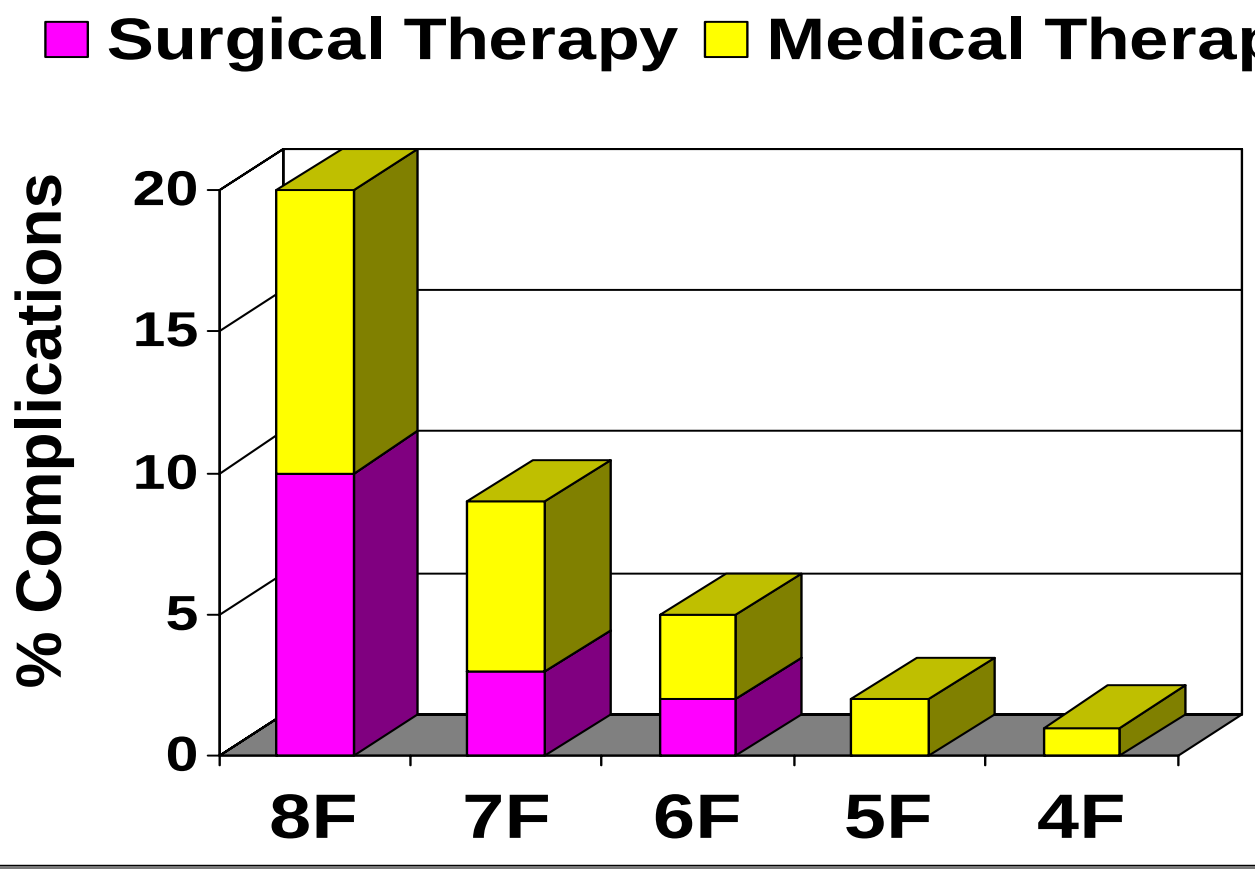
## Milano Experience (2000-2008)



# BTK Endovascular Interventions

## Milano Experience (2000-2008)

### Introducer dimensions and complications

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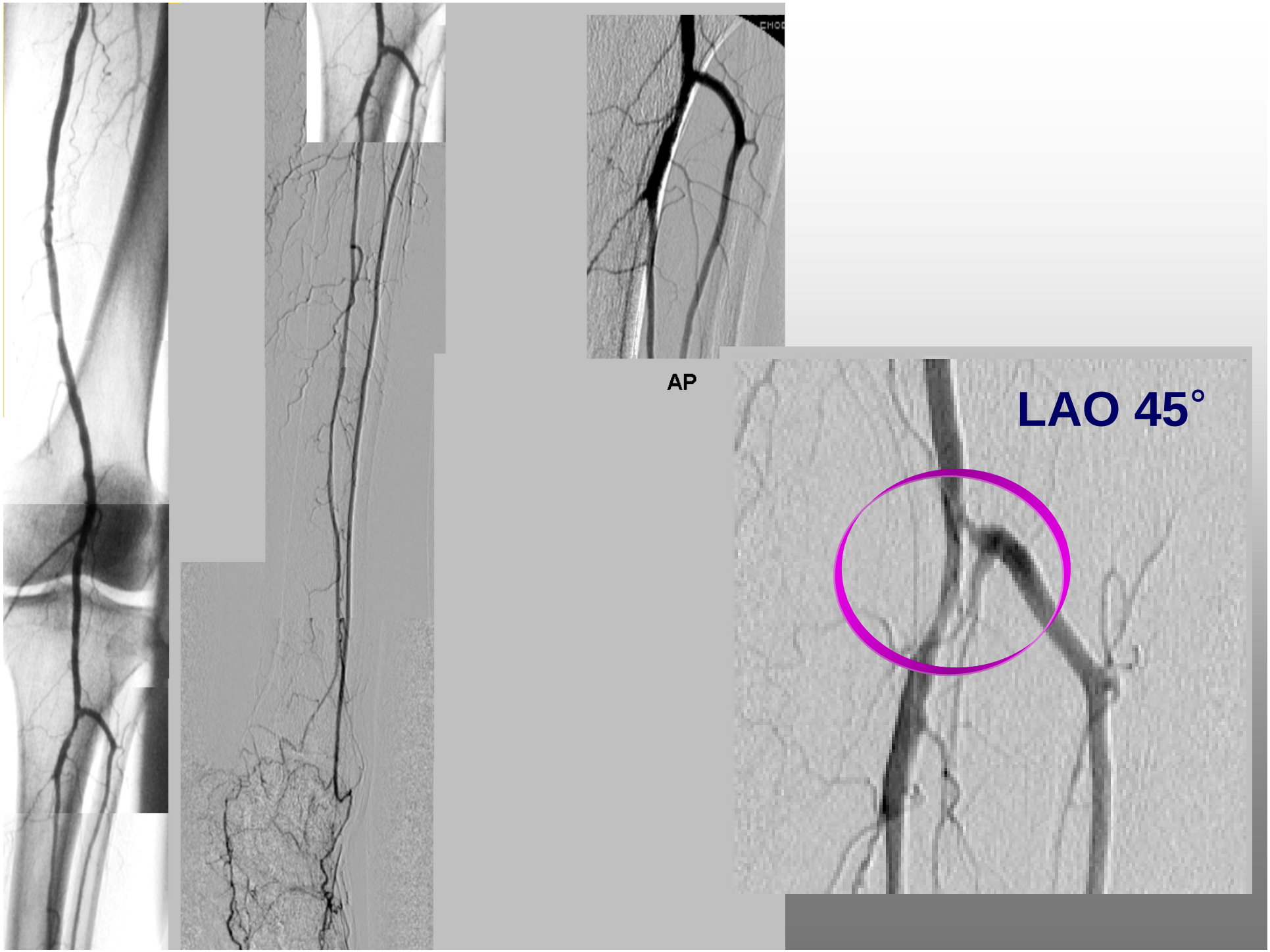
# BTK Endovascular Interventions

## Key Points

- Vascular approach
- **“Coronary like” study**
- Material improvement
- Availability of different techniques

# “Coronary like” Study

**Angiographic evaluation of the arteries of the limb should be done with the same approach of coronary arteries study that is the use of different views (AP, oblique, cranial, caudal projections)**


AP
LAO 45°


OAD 20°
AP
OAS 25°
OAD 30°
OAD 30°

# BTK Endovascular Interventions

## Milano Experience (2000-2008)

## Key Points

- Vascular approach
- “Coronary like” study
- **Material improvement**
- Availability of different techniques

# BTK Endovascular Interventions

## New balloons

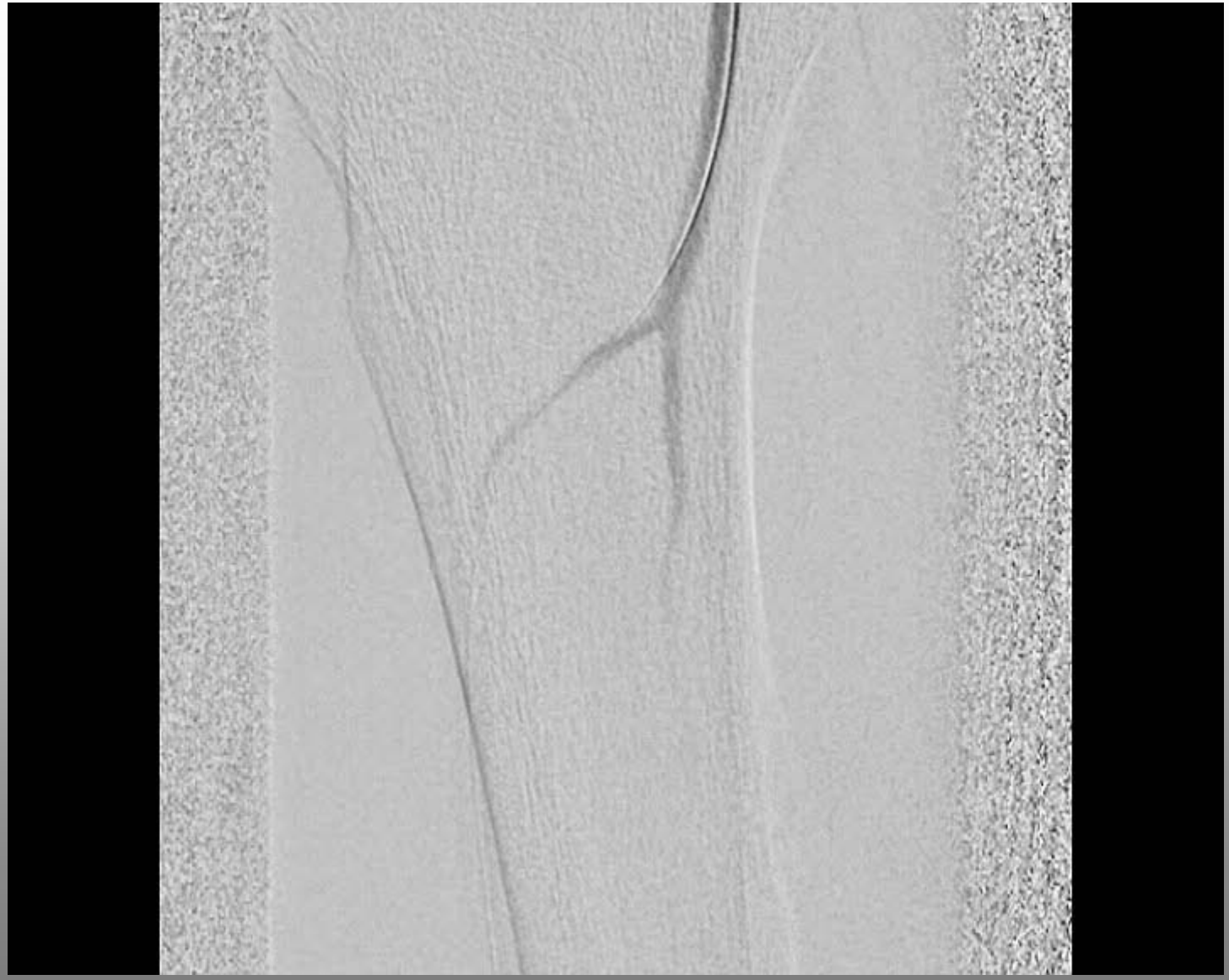
- Low profile balloon with high pushability and trackability to easy cross the lesion
- Vessel conformability
- Flexibility in small collateral branches
- Long balloons (8-21 cm) to reduce procedure times and dissection
- High pressure (13-20 atm)
- Long inflation time (3-5 min.)

# Retrograde approach

## Occlusion of posterior tibial artery

# Proximal anterior tibial artery treatment

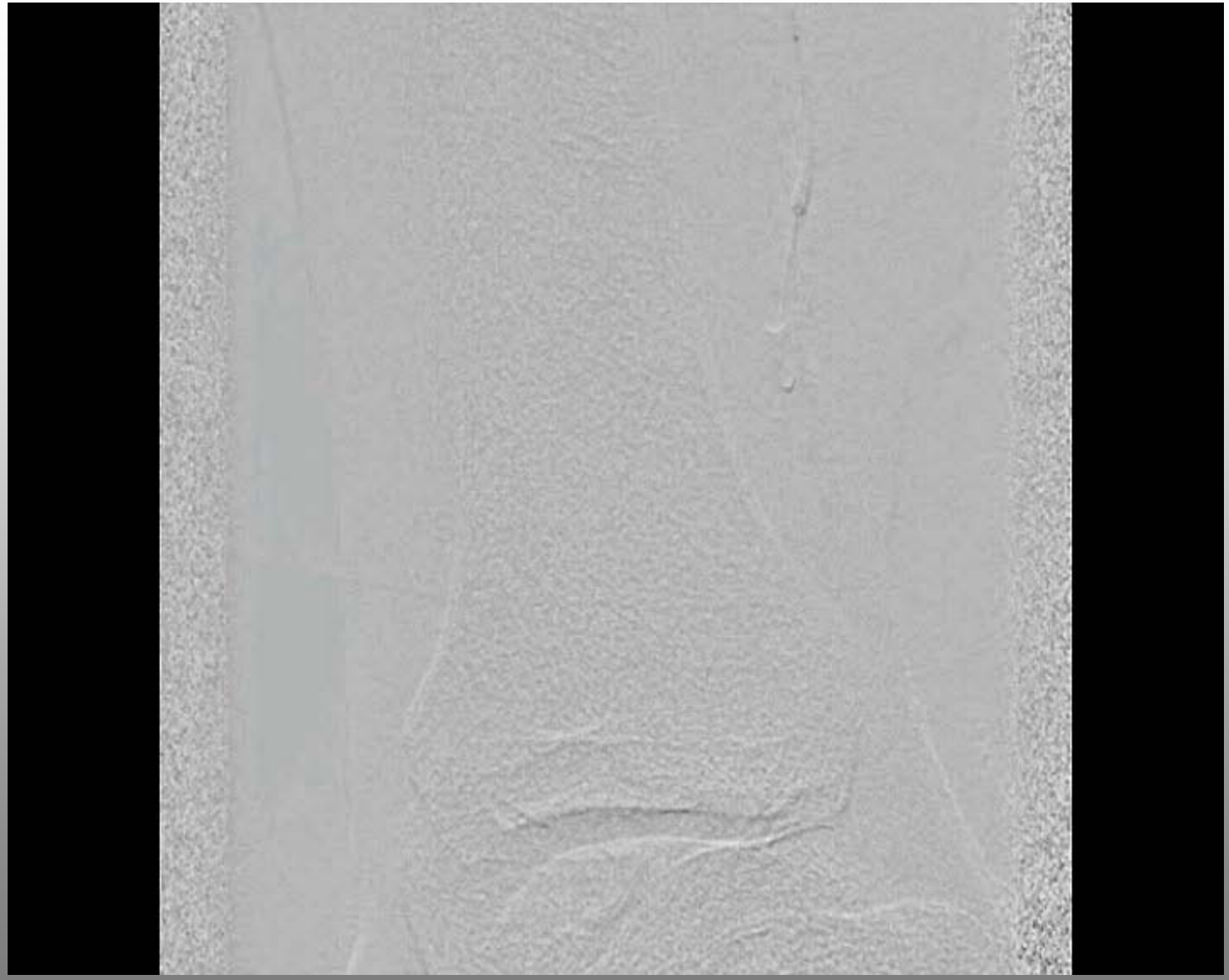
## - Balloon 3.0 x 20 mm at 12 atm



# Treatment of CTO of posterior tibial artery

## Antegrade Approach

- 4F Berenstein catheter (J&J)
- 0.014” wire (PT2 Boston Scientific)

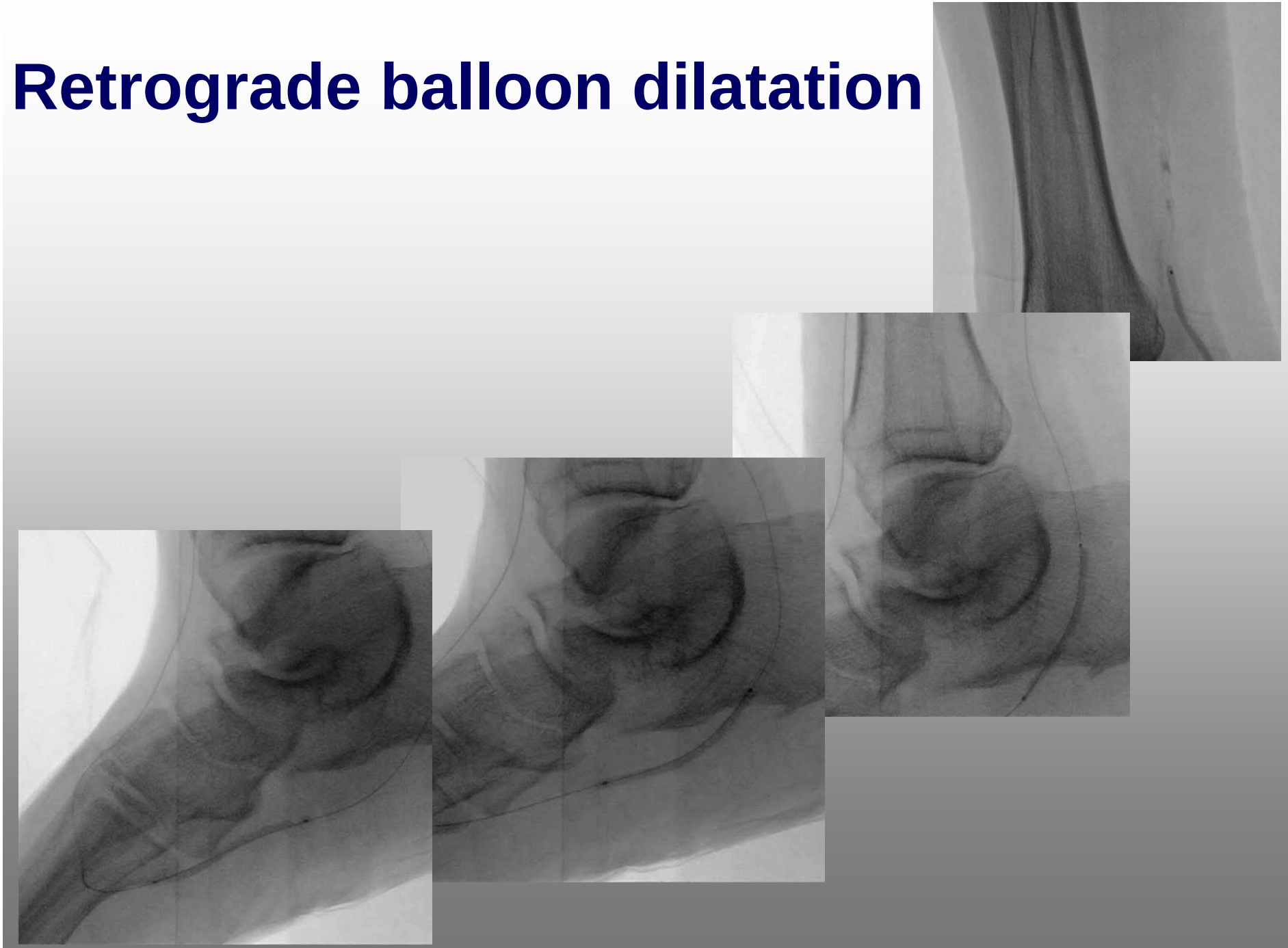


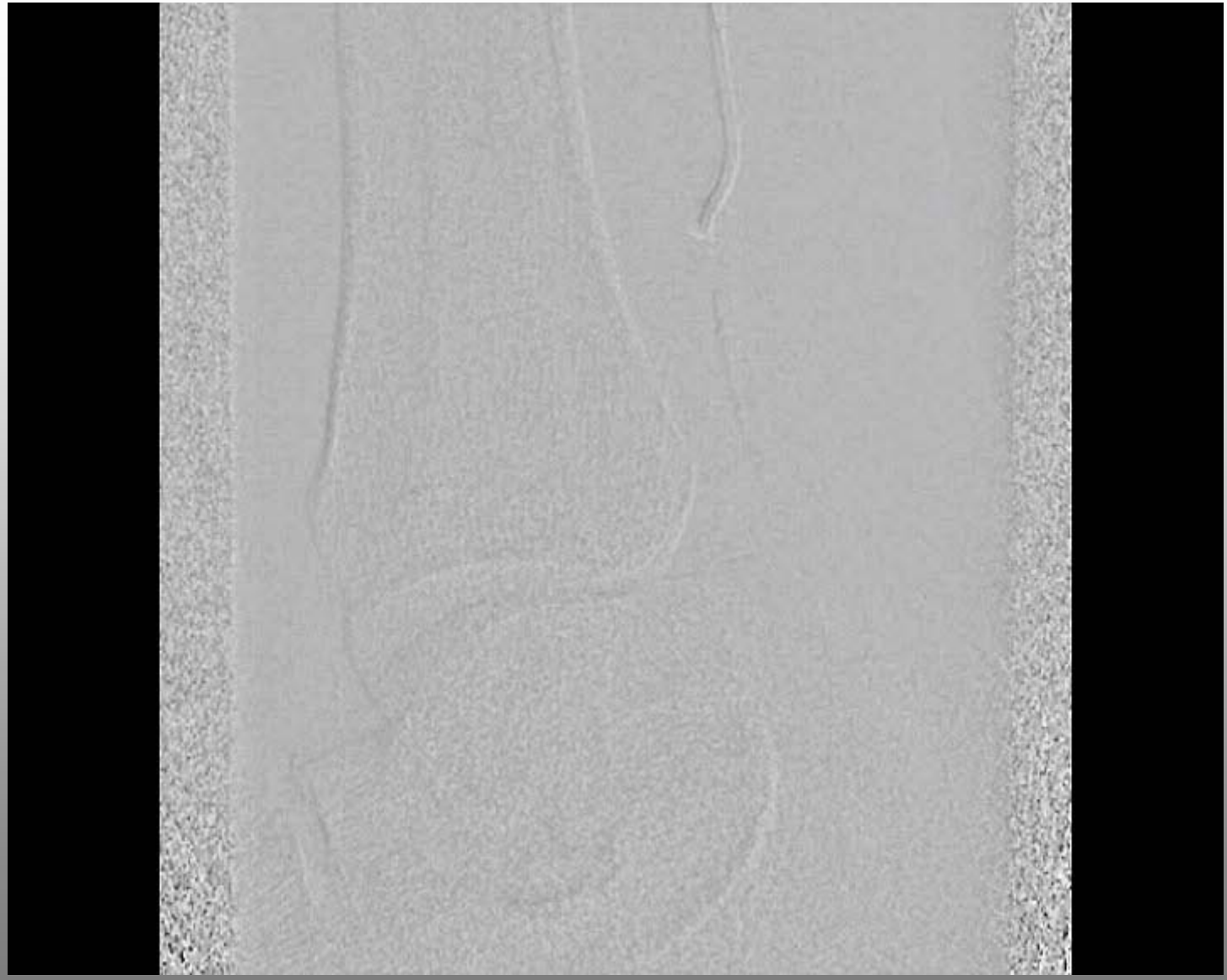
**It is possible to reach our goal from this subintimal position by using the available material?**

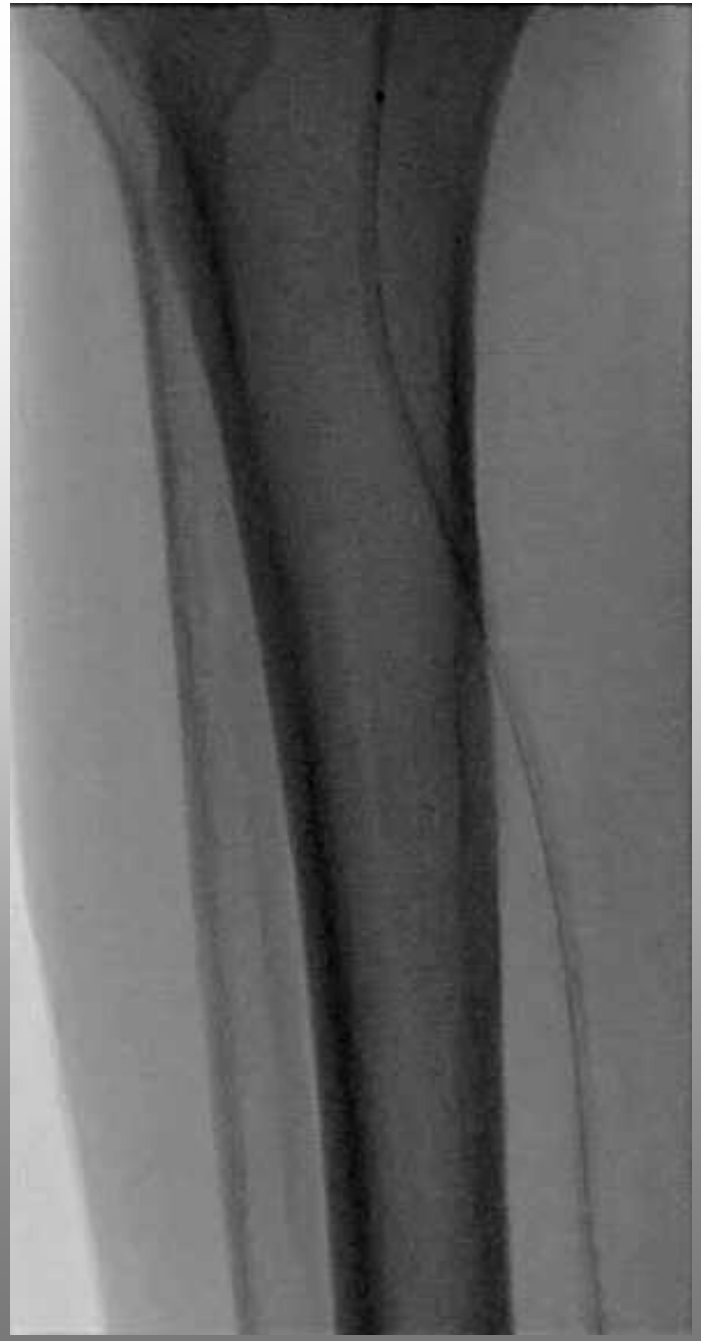
# Retrograde trans-metatarsal approach

- Amphirion Deep 2.0 x 40 mm (Invatec)
- 0.014” wire (PT2, Boston Scientific)

# Retrograde balloon dilatation

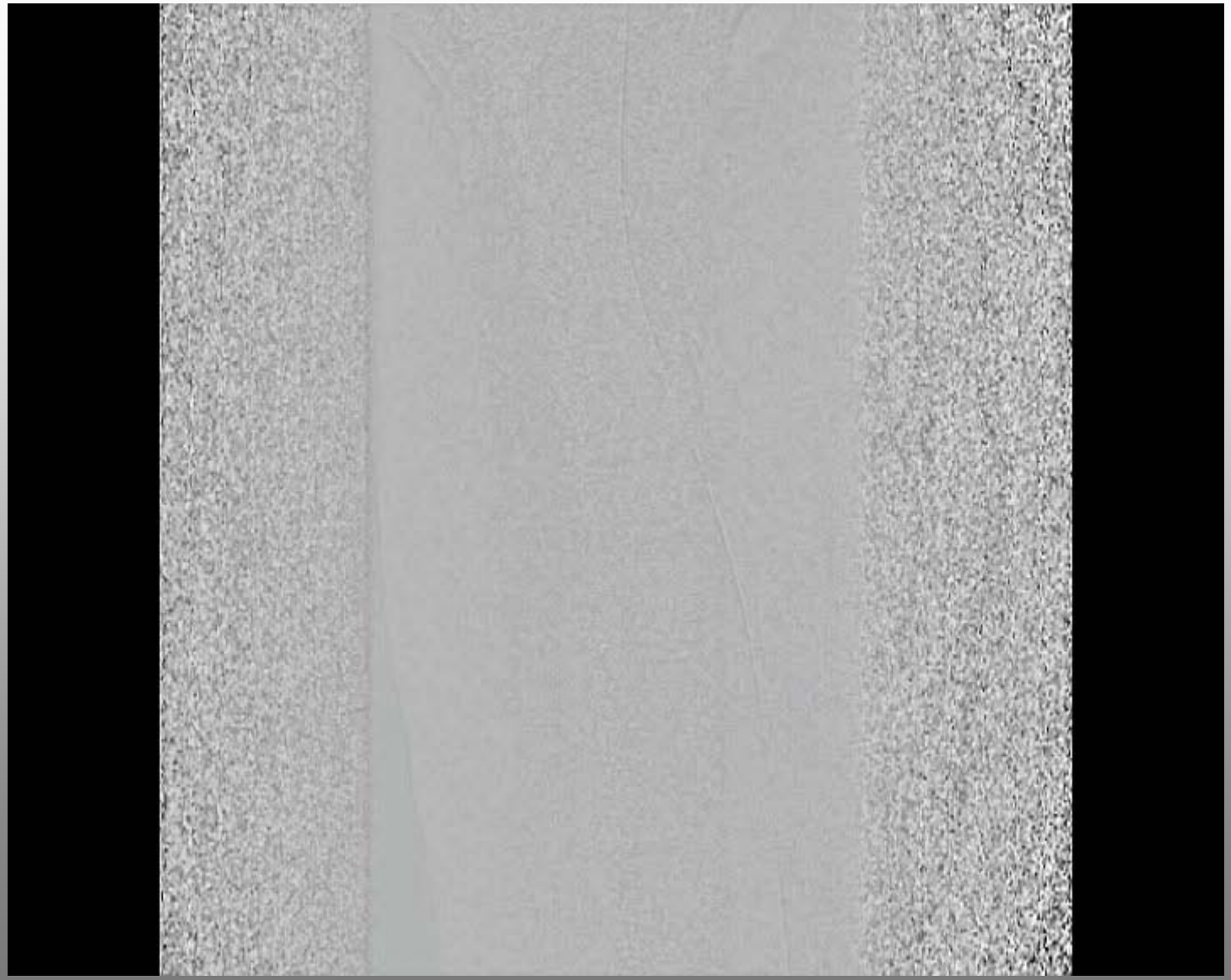






Antegrade balloon dilatation:
Amphirion Deep 2.5x150 mm
15 atm (Invatec)

# Final Result



# BTK Endovascular Interventions

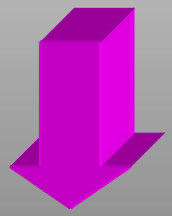
## Key Points

- Vascular approach
- “Coronary like” study
- Material improvement
- **Availability of different techniques**

# BTK Revascularization Techniques

**1° approach = POBA**

***Endoluminal treatment failure***



**Subintimal treatment**

# Subintimal Angioplasty

Indications:

- Predominantly Atheromatous disease
- Not much Ca++
- Long occlusions
- Good distal target vessels (SIA = Bypass)

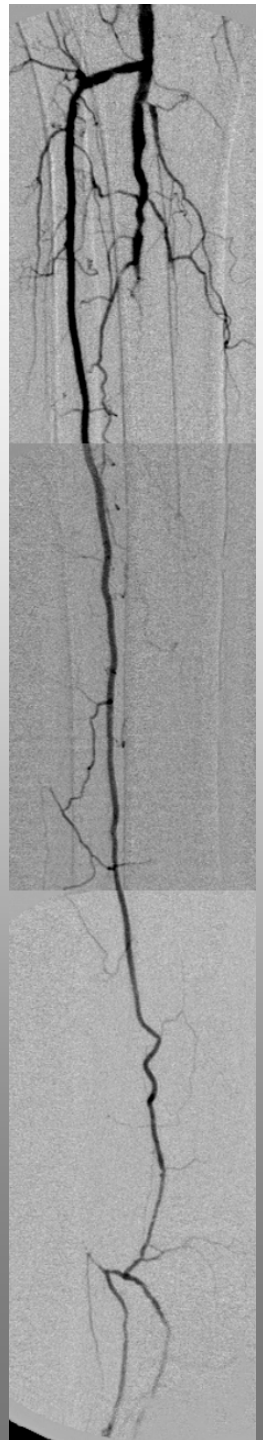
# Subintimal Angioplasty (Tibial)

THE FINER POINTS

- Keep the loop short to avoid perforation
- 0.035 wire/ 4-5F system for strength
- Wire may be in Half-Stiff or Stiff format
- New 1.5mm J wire very effective

# SIA not applicable because:

- With Ca++, high resistance to progression
- Difficult / Impossible to re-enter
- Recoil is common
- Patient made worse due to damage to small collaterals

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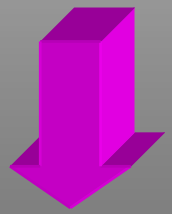
# BTK revascularization techniques

**1° approach = POBA**

**Subintimal treatment**

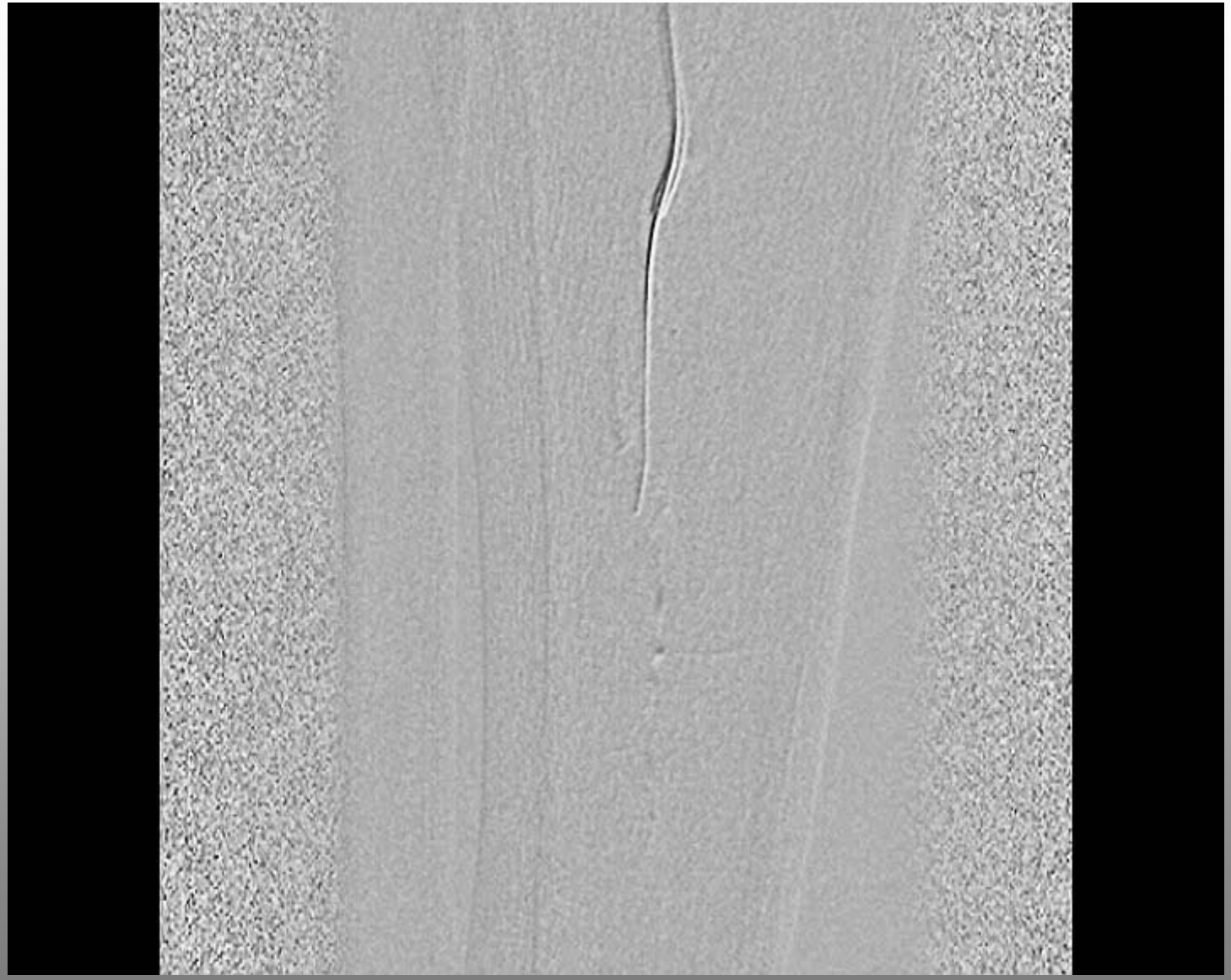
***Subintimal treatment failure***



**Retrograde approach**

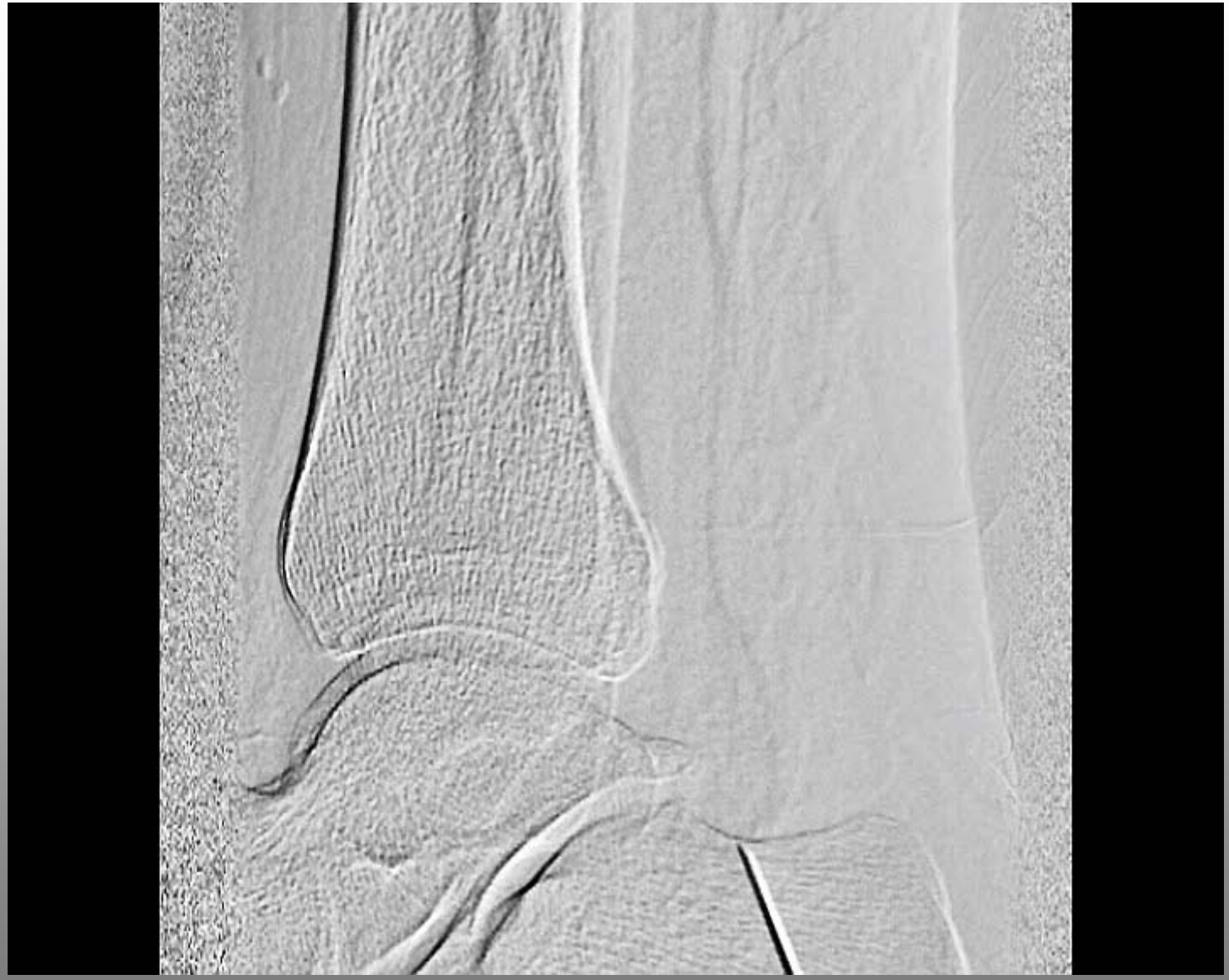
# Retrograde (double) approach

- **Proximal access in SFA (CFA)**
- **Distal access:**
  - **pedal artery → ATA**
  - **retromalleolar artery → PTA**
- **20 gauge needle puncture (the radial needle)**
- **No introducer, wire + low profile OTW balloon (Amphirion Deep – Invatec)**
- **Snare kit to capture wire in SFA**



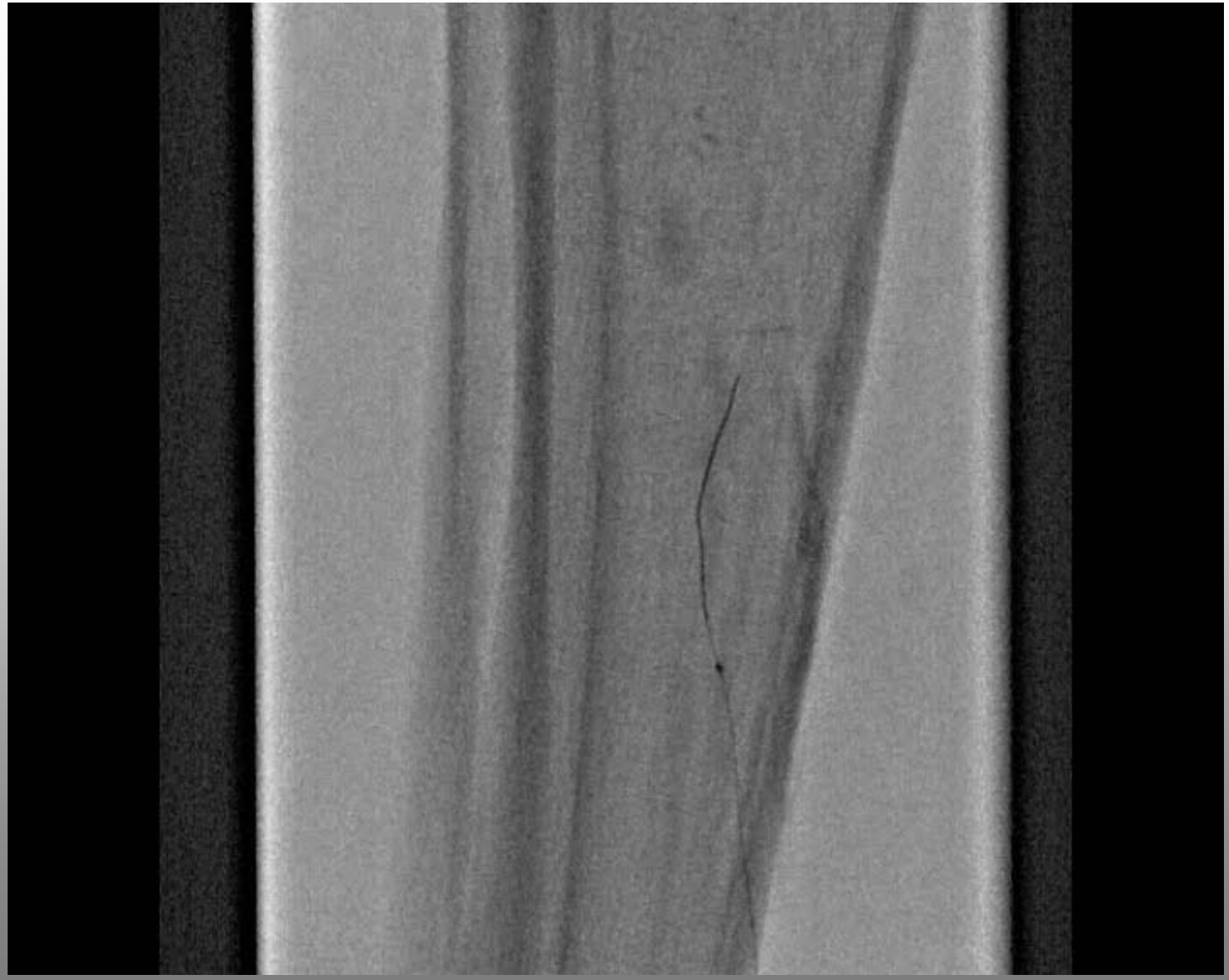
# Distal posterior tibial puncture:

- DSA imaging
- 22 gauge needle
- 0.014” wire (PT2 Boston Scientific)



# Posterior tibial retrograde approach:

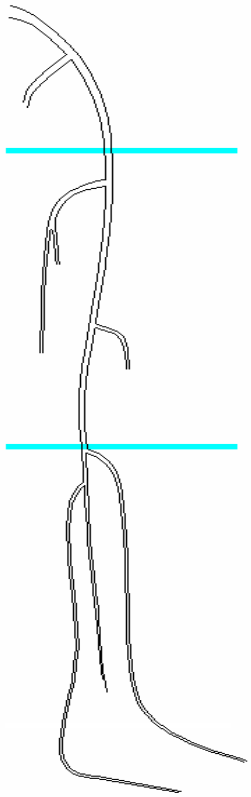
- No introducer sheath
- Amphirion Deep 2.0 x 40 mm (Invatec)
- 0.014” wire (PT2 Boston Scientific)



# Final Result

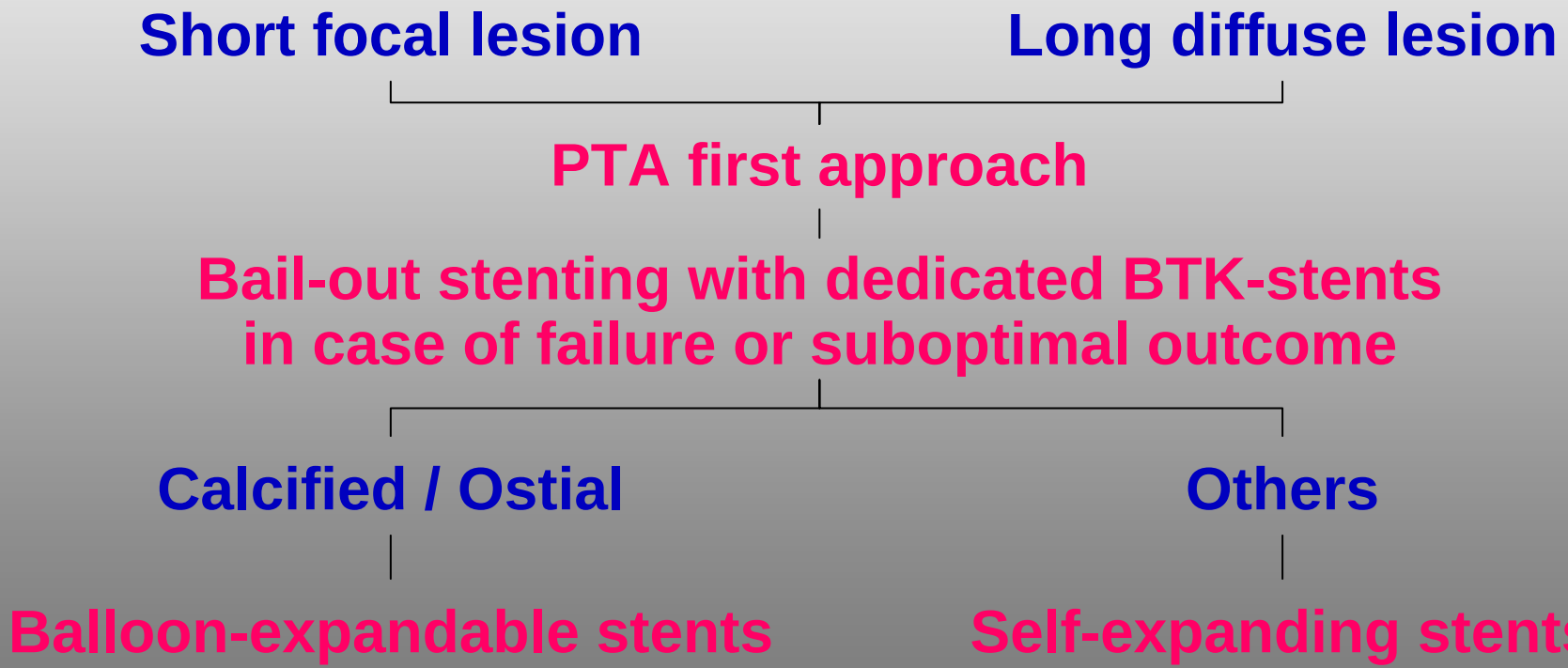
# BTK Stenting in the last 578 procedures

## (1140 lesions)

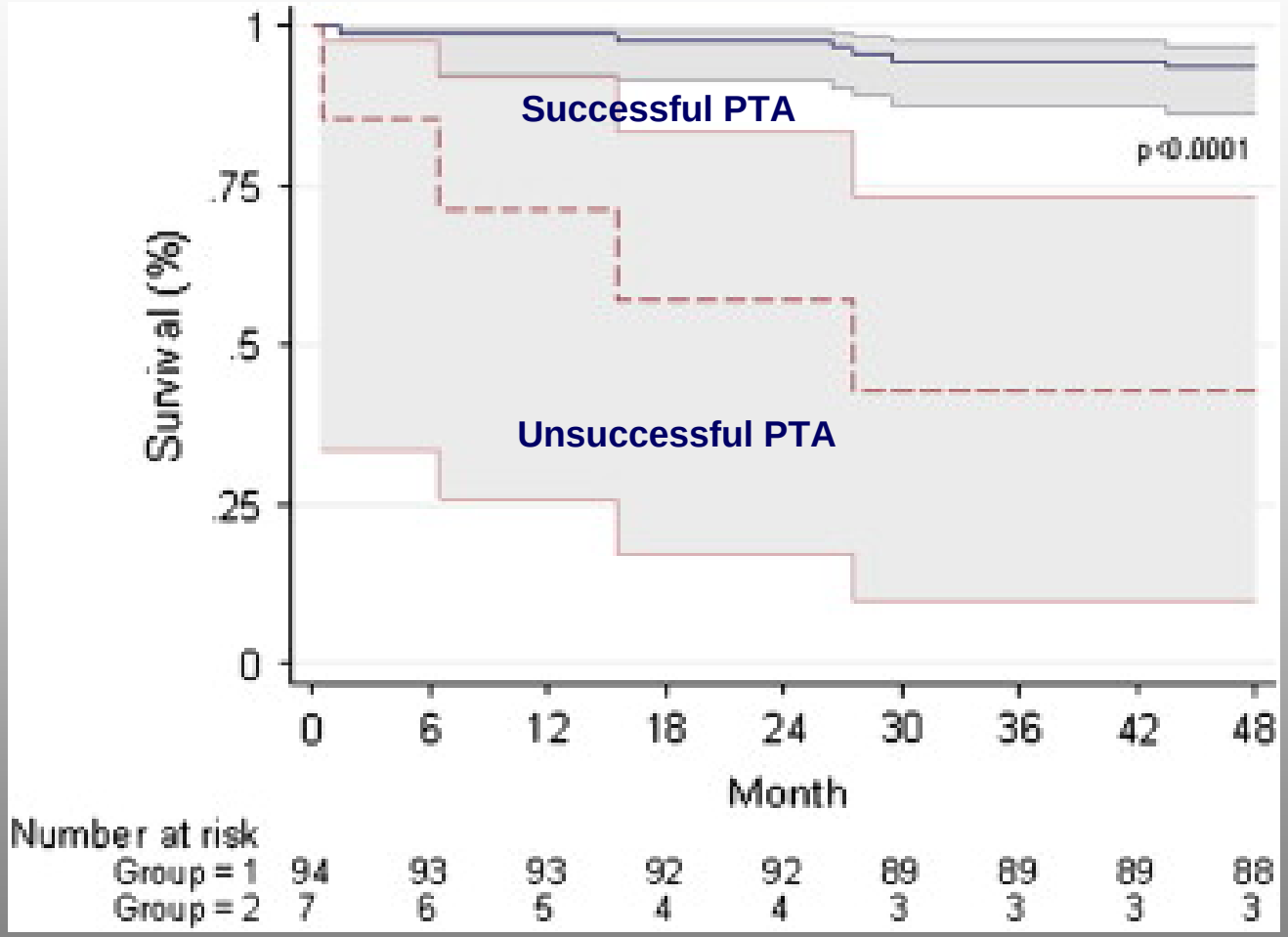
| | Stenting | |
|---|---|---|
|  | 51/57 | 89 % |
| | 205/407 | 50 % |
| | 88/676 | 15 % |

# Diabetic patients with CLI

## Below the Knee Treatment Strategy



# Survival Rate at 2 Years

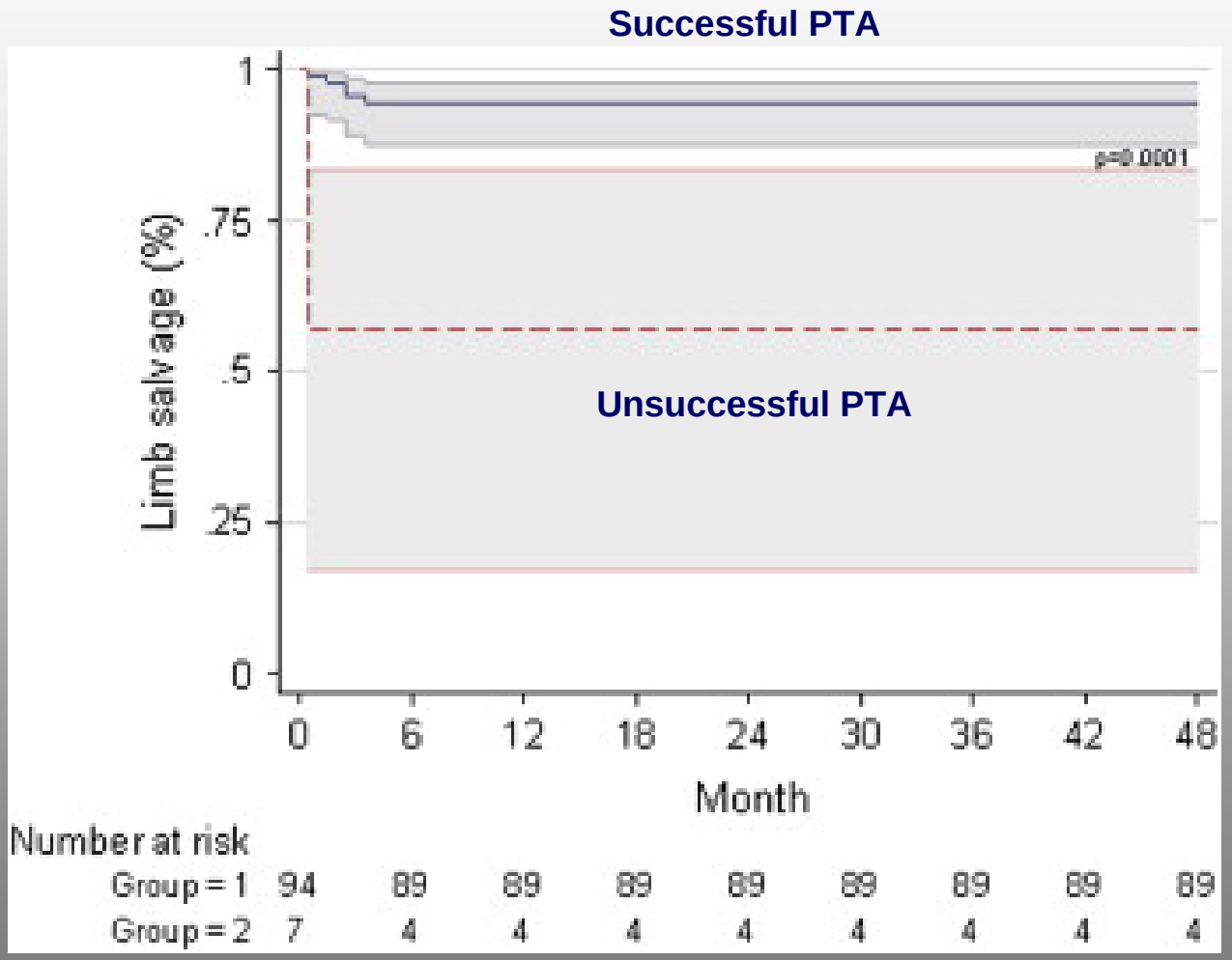



**95%**

**43%**

Ferraresi R, *EJVES* 2009;37:336-42

# Limb Salvage at 2 Year




**95%**

**57%**

Ferraresi R, *EJVES* 2009;37:336-42

# Conclusions

1. In patients with CLI the keys for a successful BTK endovascular procedure are the choice of vascular approach, the selection of materials and the knowledge of all the available techniques
2. Stenting (with dedicated BTK stents) should be considered only for bail-out situation
3. The clinical outcome depends on a proper infection treatment, but the success of the endovascular procedure is of paramount importance

# The miracle of the Saved Foot

**Vincenzo Foppa 1460** ***Sant'Eustorgio Church in Milan***

# Angiographic findings

**397 Patients / 440 Limbs**

- Diabetic patients
- Foot lesions: ulcer/necrosis/gangrene
- Absence of pedal pulses
- $TcPO_2 < 40$ mmHg

# Outcome of PTA of *isolated* BTK lesions in CLI

- Diabetic subjects with ischemic tissue lesions (Rutherford grade III, category 5-6)
- Absence of critical lesion (> 70% diameter stenosis or occlusion) in the OTK arteries
- BTK arteries critical lesions (> 70% of the vessel diameter stenosis in anterior tibial, posterior tibial, peroneal, pedal or plantar arteries)

**Primary End-point:**

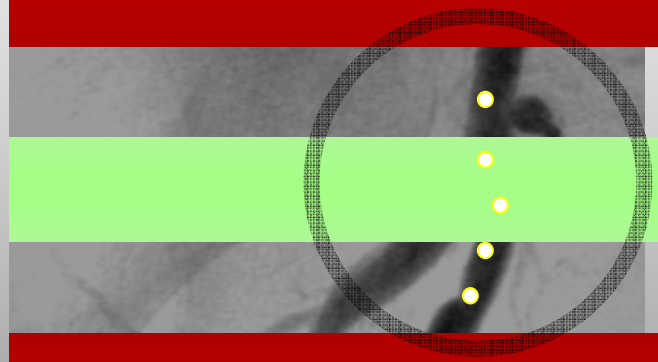
- Survival rate and major amputation rate at 2 year

**Ferraresi R, *EJVES* 2009;37:336-42**

# Antegrade femoral puncture

Danger !!!

retroperitoneal bleeding



**OK !!!**

Danger !!!

groin & thigh hematoma

The right puncture site

# Subintimal treatment in BTK

- **In order to use subintimal approach in BTK vessels we need a good distal patent lumen**
- **0.035” hydrophilic wire**
- **Attention to collateral vessels !!**
- **Subintimal space is larger than true lumen: oversize balloon (0.5 mm)**

# Retrograde approach for PTA

# Treatment of CTO of Tibioperoneal trunk

## Antegrade Approach

- 4F Berenstein catheter (J&J)
- 0.014” wire (PT2 Boston Scientific)