

대한당뇨발학회 창립학술대회 2013.2.22 (금)

# 당뇨병성 혈관질환의 치료

## 말초동맥폐색증을 중심으로

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# 당뇨병성 혈관질환

## ■ 미세혈관질환

- 비폐색성 미세순환계의 기능이상
- 콩팥, 망막, 신경 등의 모세혈관 및 세동맥 이상
- 당뇨병성 콩팥병, 당뇨병성 망막병, 당뇨병성 신경병

## ■ 대혈관질환

- 심장동맥 및 말초동맥의 죽상경화성 폐색
- 심장동맥병, 말초동맥폐색증

# 말초동맥

## ■ 협의 ( )

- ▣ 팔과 다리의 동맥

## ■ 광의 ( )

- ▣ 심장과 두개 내 뇌혈관을 제외한 인체의 모든 동맥
- ▣ 대동맥과 그 분지들을 포함한다

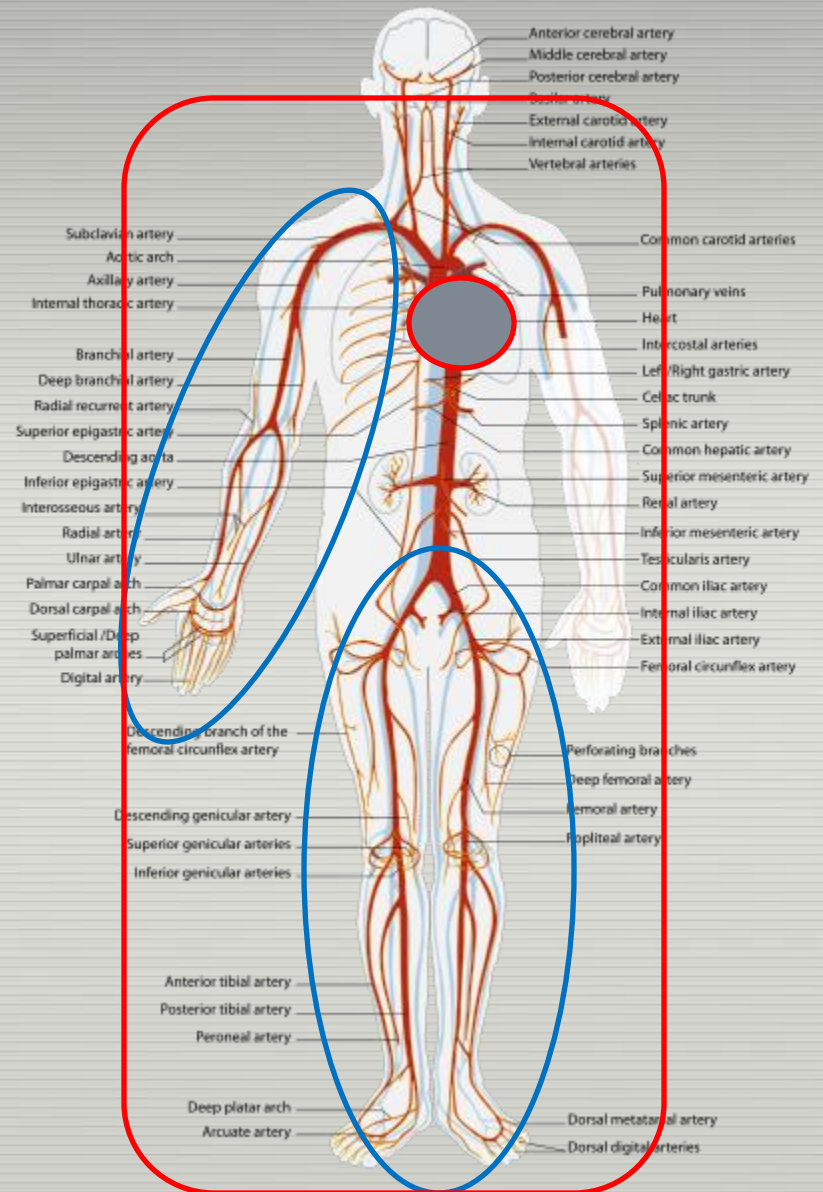
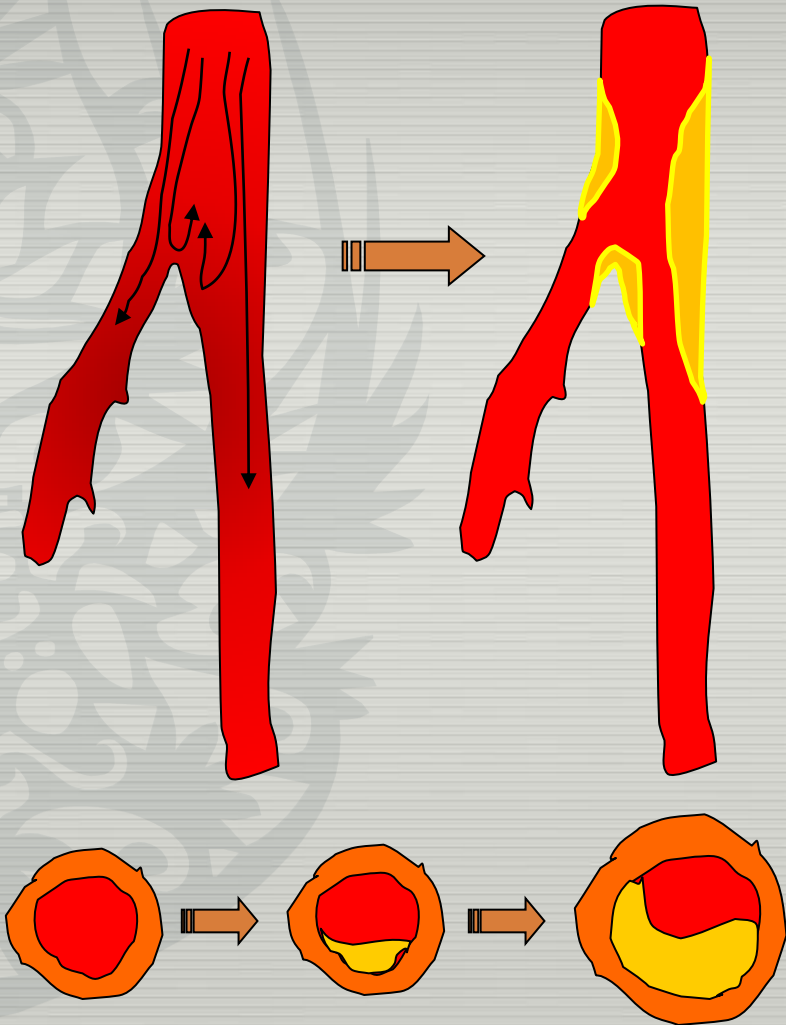


그림 출처: Wikipedia, Arterial System

# 말초동맥폐색증

죽상경화성



당뇨병성



## 당뇨병성

죽상경화성



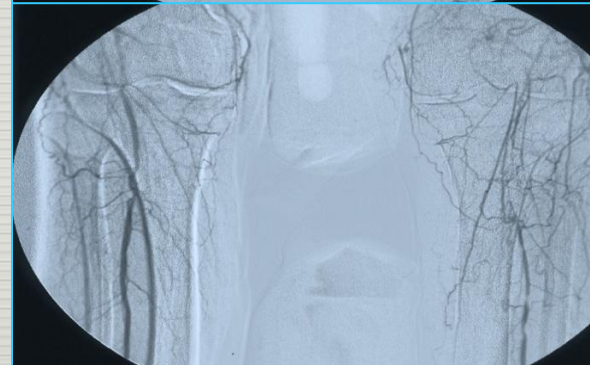
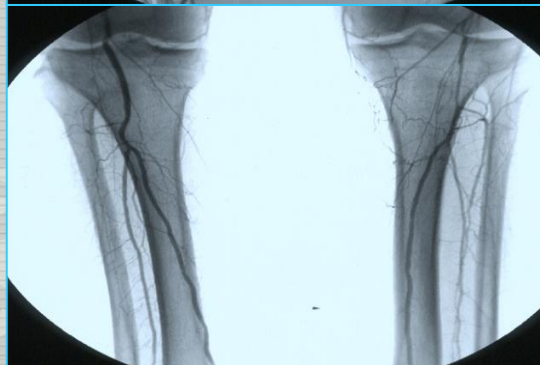


# 당뇨병성 하지동맥폐색증의 특징

## - 당뇨병이 없는 죽상경화증 환자와 비교하면

- 당뇨병을 앓고 있는 기간에 따라 보다 젊은 연령층에서 발생할 수 있다
- 중막의 석회화가 특징적이다
- 이환된 동맥이 보다 광범위하다
- 보다 말단부의 동맥이 잘 침범된다
- 신경병증 및 말단부 감염증과 잘 동반된다
- (동맥혈류가 개선되어도) 하지 절단의 빈도가 높다
- 족부동맥이 보존되어 있는 경우가 많다

# 당뇨병성 하지동맥폐색증의 진행



# 발의 감염, 궤양 및 괴사





# 하지동맥폐색증의 증상

- 무증상: 가장 많다
- 하지의 간헐적 파행증
  - 일정 거리를 걸으면 장딴지(엉덩이)가 아프다가 조금 쉬면 다시 걸을 수 있다
  - 다시 걷다가도 어느 정도 걸으면 다시 아프다
  - 평지는 잘 걸어도 오르막이나 계단을 오르면 아프다
  - 천천히 걸으면 괜찮은데 빨리 걸으면 아프다
- 가만히 있어도 아프다
- 발 및 발목의 궤양, 괴저
  - 외상, 무좀, 발톱 깎을 때 등 발관리 소홀로 많이 발생한다
  - 당뇨발 및 허혈 하지에 동반된 압박궤양

# 하지동맥폐색증의 진단

- 동맥 촉진, 발가락 및 발의 혈류 상태에 대한 진찰
- 발목동맥압지수: 팔에 대한 발목의 혈압비
  - 당뇨병이 오래된 경우 높게 나온다
- 도플러 혈류검사
  - 하지동맥 및 발가락의 혈류파형 검사
- 듀플렉스초음파 검사
  - 이차원 영상 및 실시간 혈류파형 검사
- CT 혈관조영술 (MR 혈관조영술)
  - 콩팥기능이 감소된 환자에서는 주의해서 사용

# 당뇨병성 말초동맥폐색증의 치료목표

- 증상을 호전시키거나 완치한다
- 병의 악화를 방지한다
- 지체(주로 하지)의 기능을 보존한다
- 삶의 질을 개선시킨다

# 당뇨병성 말초동맥폐색증의 치료방법

## ■ 위험인자 조절

- 혈당: 당화혈색소 <7%
- 콜레스테롤: 저밀도지질단백 <70 mg/dL
- 혈압: 수축기<130 mm Hg, 이완기<80 mm Hg
- 금연

## ■ 발관리

- 적절한 양말, 매일 발 관찰하기, 피부 청결, 보습 크림
- 무좀 치료 및 예방

## ■ 운동요법



# 당뇨병성 말초동맥폐색증의 치료방법

## ■ 약물요법

- 아스피린, 실로스타졸

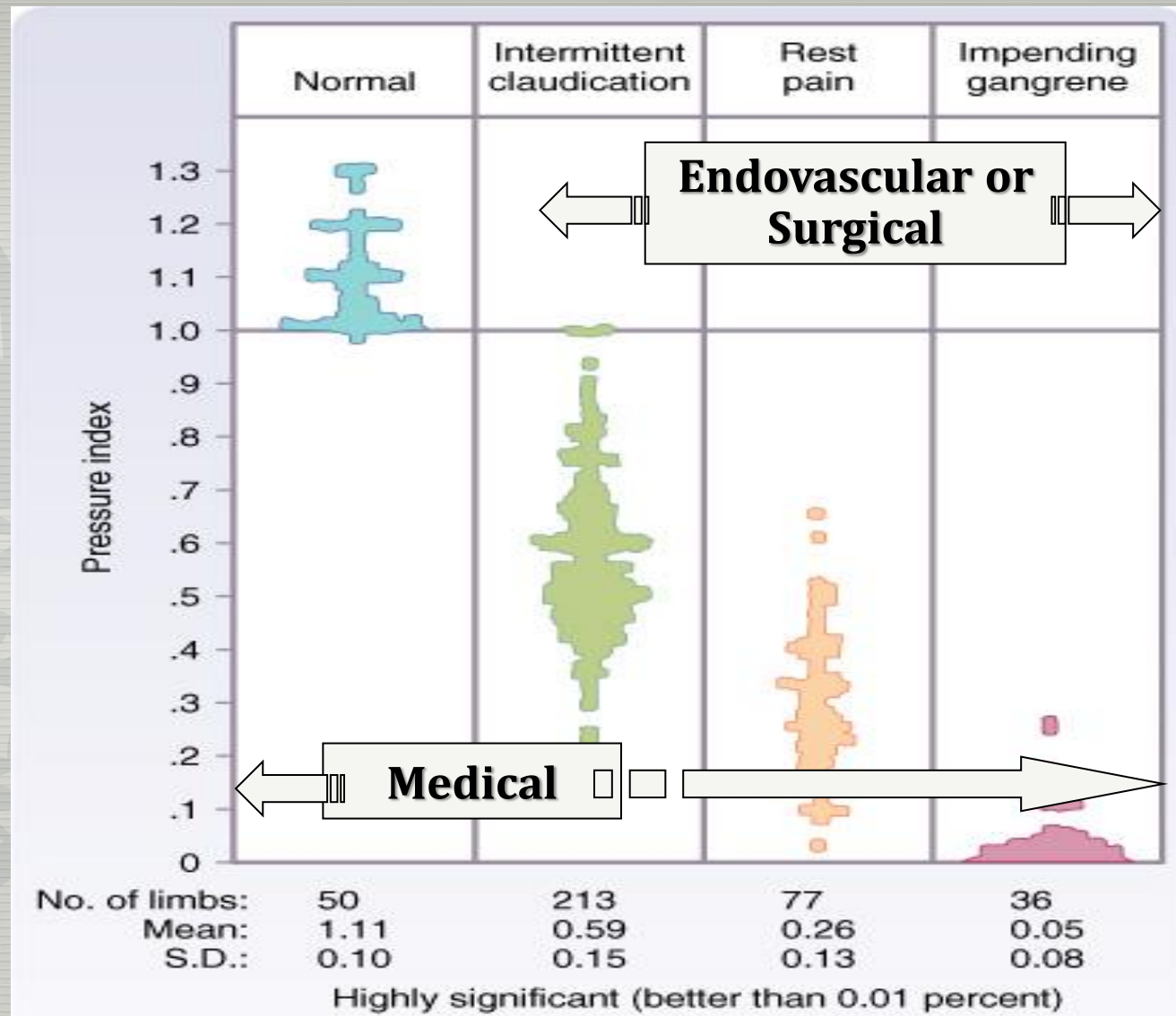
## ■ 동맥재개통술

- 혈관내 치료

- 비교적 큰 동맥에 국소적 협착이나 폐색이 있는 경우
- 혈관성형술, 스텐트삽입술, 스텐트-이식편삽입술

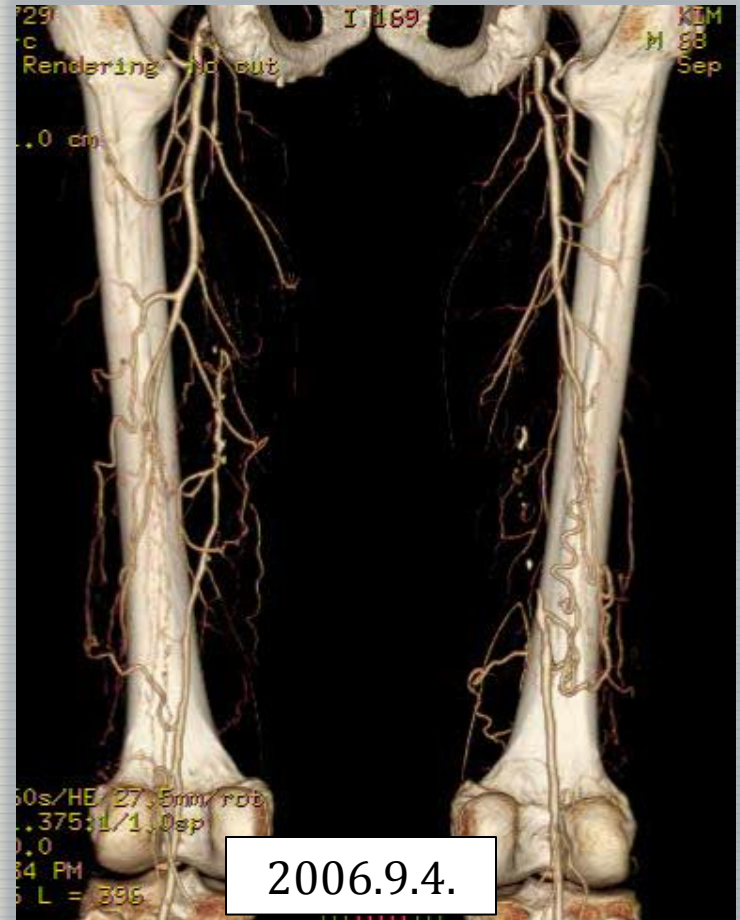
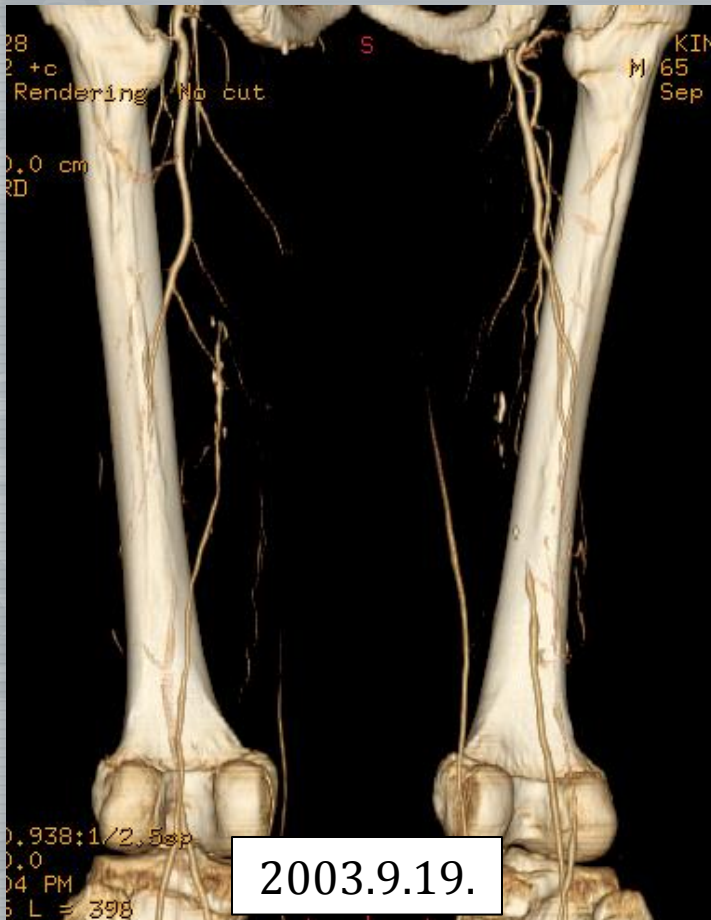
- 동맥우회술

# 임상양상에 따른 치료방법



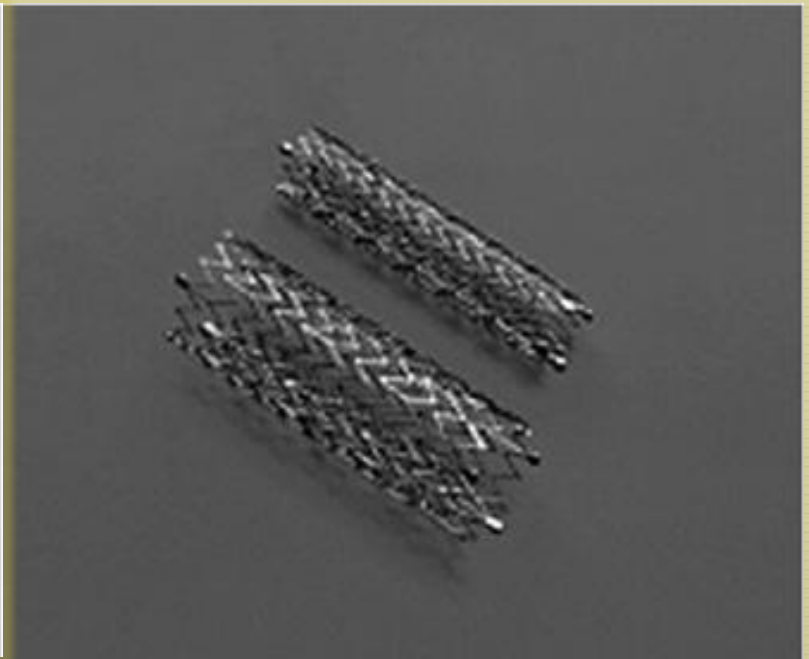
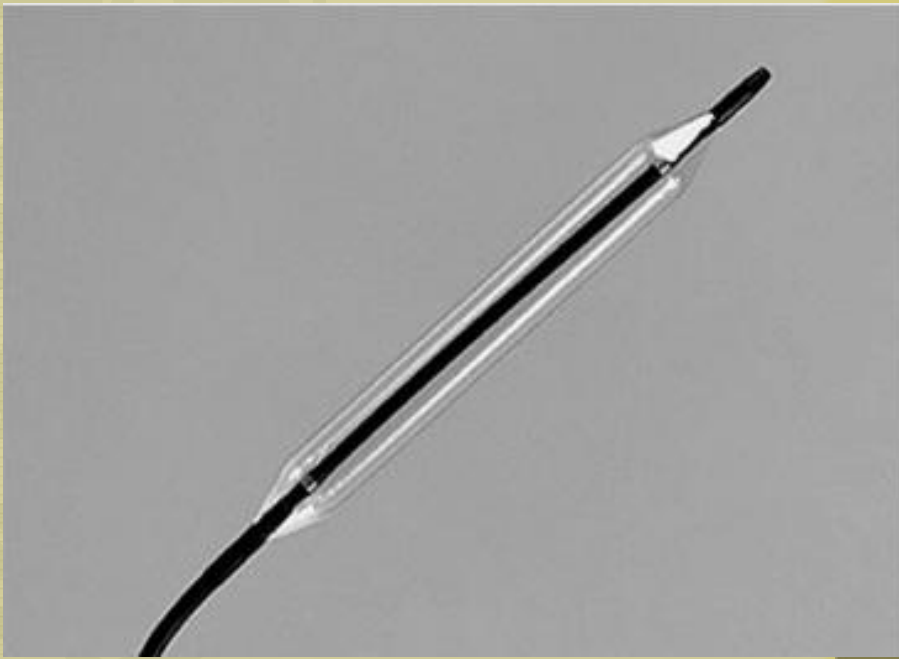
# 보존적 치료

- 74세 남자, 당뇨병 20년
- 2003.8.22. 20분 정도 걸으면 장딴지가 뭉친다.
- 2012.5.9. 50분 정도 쉬지 않고 걸을 수 있다.



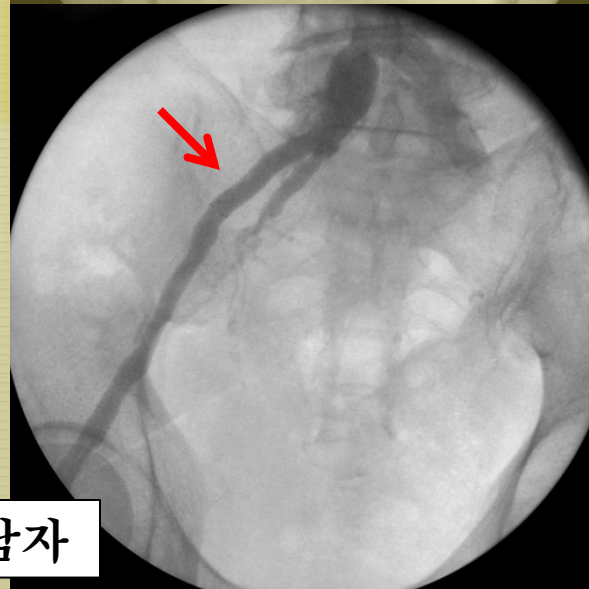
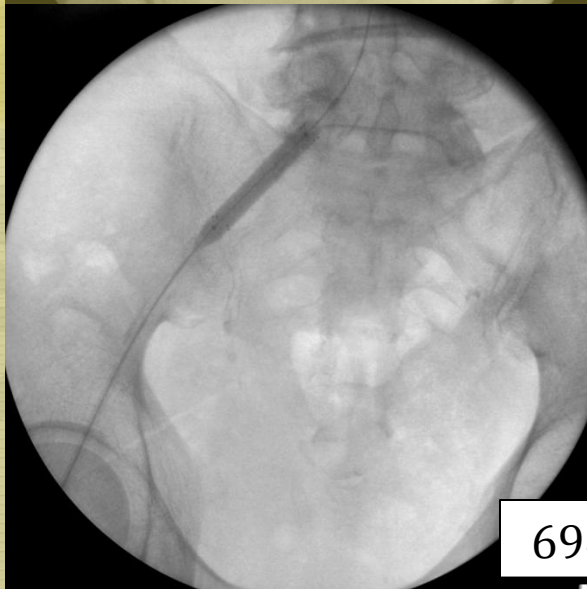
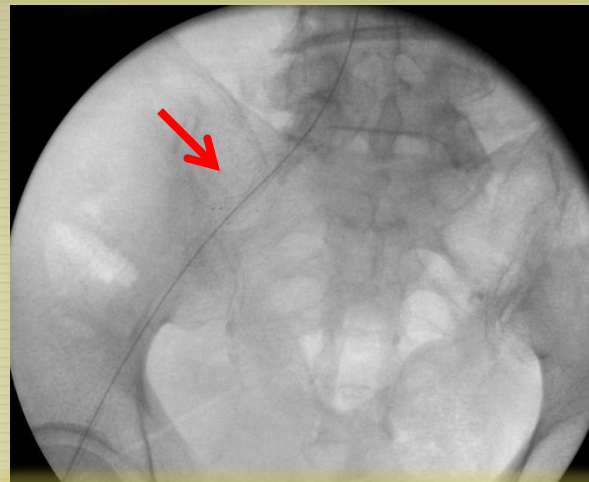
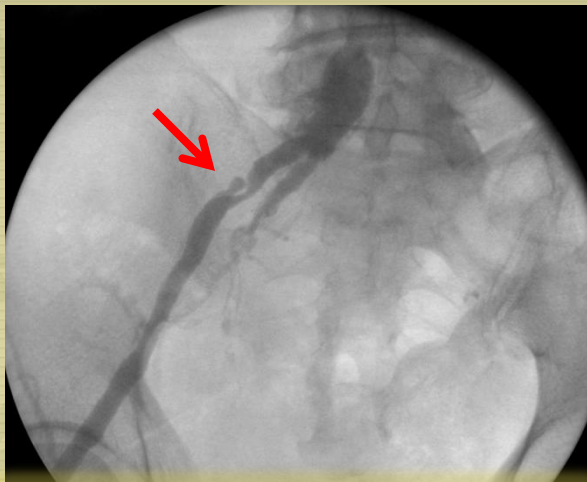
# 혈관내치료 (Endovascular Tx)

- Percutaneous Transluminal Balloon Angioplasty with or without stenting (PTA +/- stent)





# 동맥 내 스텐트삽입술



69세 남자

# 하지동맥에 대한 혈관내 치료

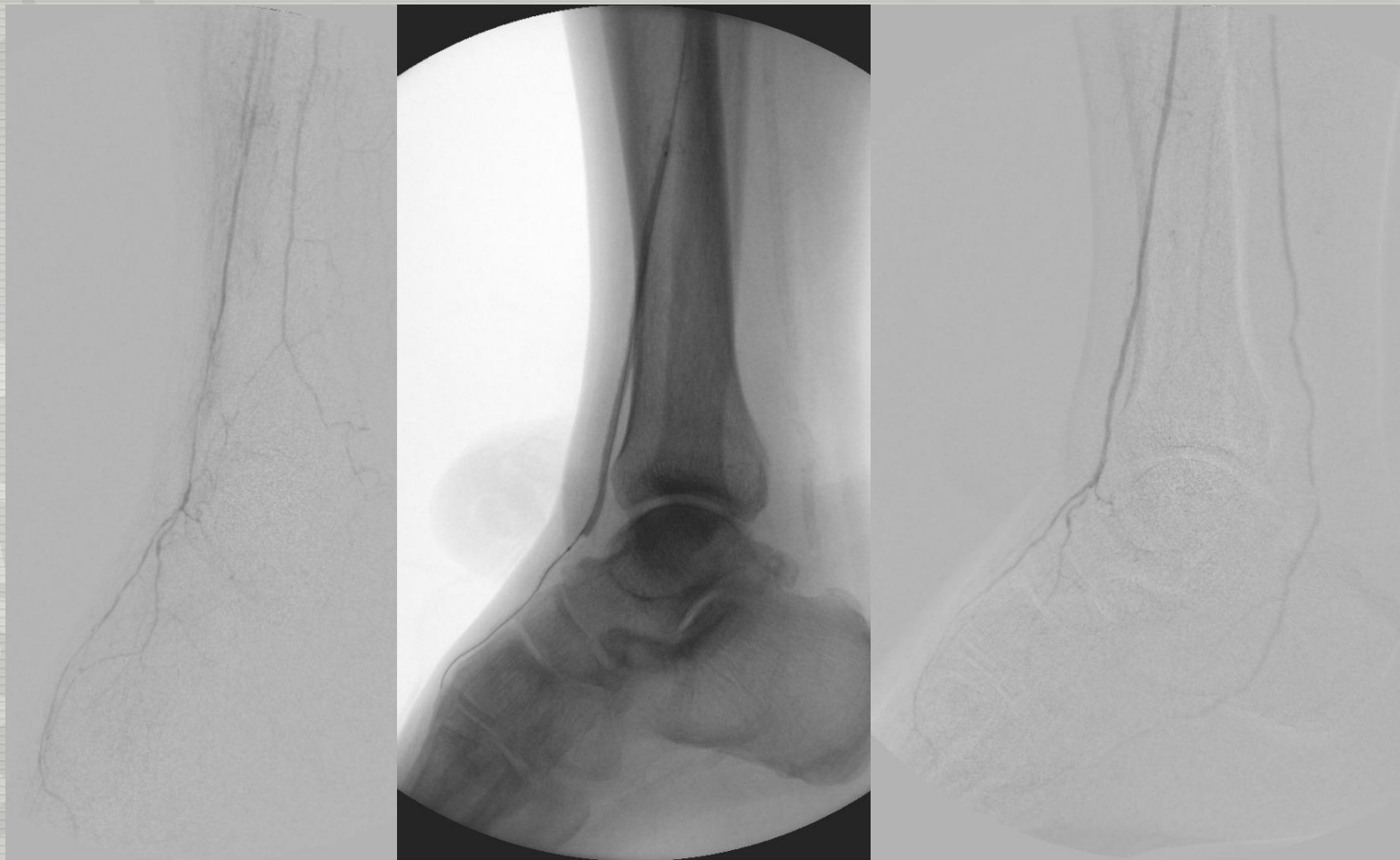
2010.6.18



62세 여자

# 장딴지 및 족부 동맥에 대한 혈관내 치료

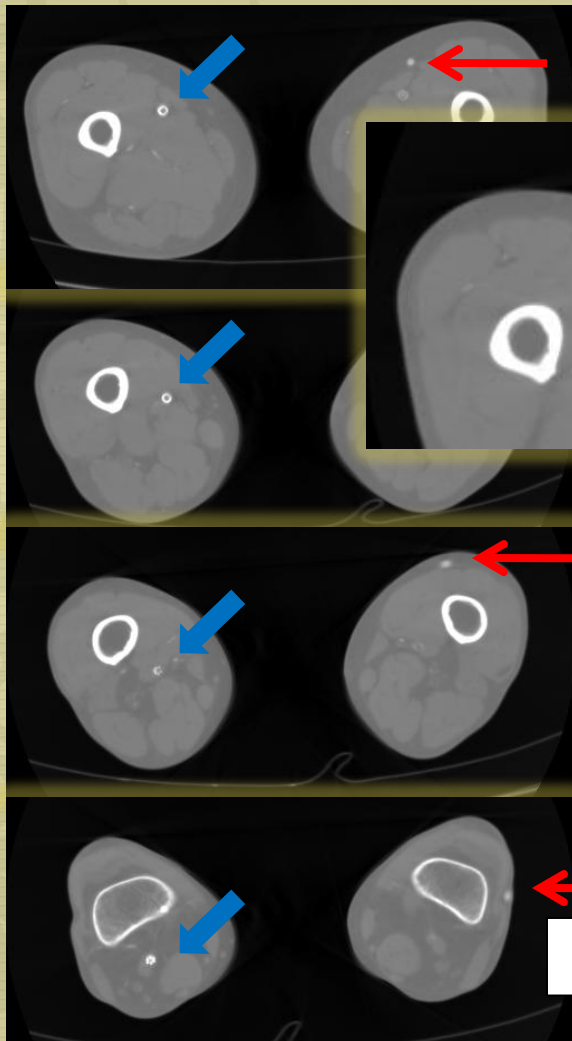
- 54세 남자, 우측 엄지발가락 궤양, 혈액투석 중인 당뇨병 환자



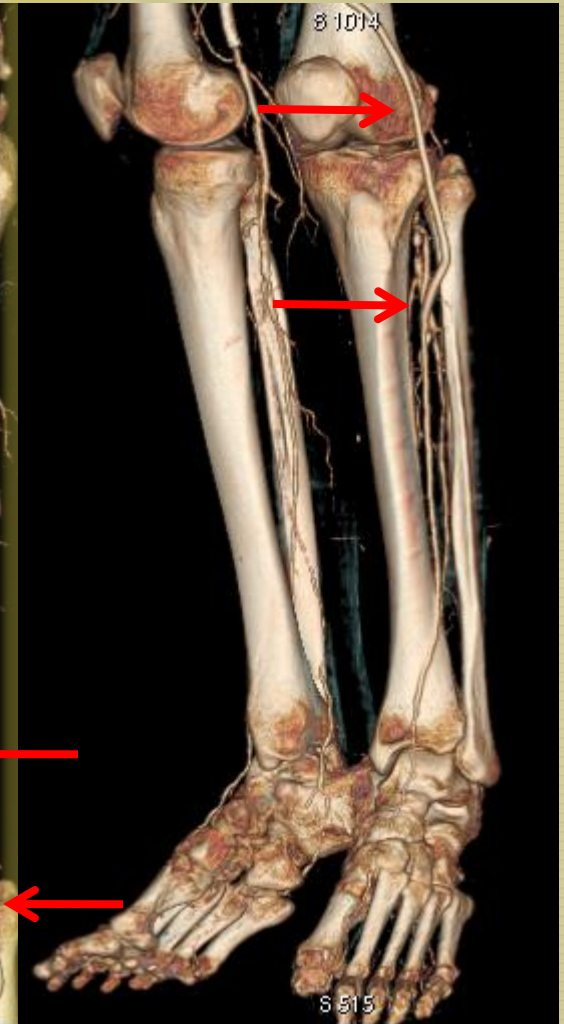
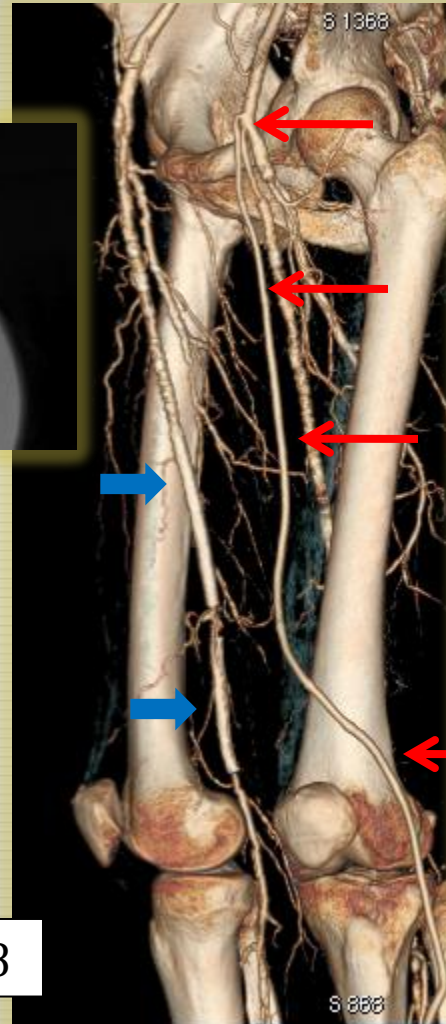


# 하지동맥 스텐트의 조기폐색

2003년 8월 대퇴-앞정강동맥 우회술 ( → ), 2010년 6월 대퇴-오금동맥 스텐트 삽입술 ( → )



2010.11.8





# 장딴지동맥의 혈관내 치료 결과

J Vasc Surg. 2008 May;47(5):975-981. Epub 2008 Apr 18.

## **Meta-analysis of infrapopliteal angioplasty for chronic critical limb ischemia.**

Romiti M, Albers M, Brochado-Neto FC, Durazzo AE, Pereira CA, De Luccia N.

Vascular Surgery Section, Department of Surgery, Health and Medical Sciences Sector, Lusiada Foundation, Santos, Sao Paulo, Brazil.

### **Abstract**

**BACKGROUND:** Percutaneous transluminal angioplasty has been used with increasing frequency in the treatment of infrainguinal arterial occlusive disease. This meta-analysis aimed to assess the middle-term outcomes after crural angioplasty in patients with chronic critical limb ischemia and compare results with a meta-analysis of popliteal-to-distal vein bypass graft.

**METHODS:** Data were retrieved from 30 articles published from 1990 through 2006 (63% of articles published between 2000 and 2006). All studies used survival analysis, reported a 12-month cumulative rate of patency or limb salvage, and included at least 15 infrapopliteal angioplasties. The outcome measures were immediate technical success, primary and secondary patency, limb salvage, and patient survival. Data from life-tables, survival curves, and texts were used.

**RESULTS:** The pooled estimate of success was 89.0% +/- 2.2% for immediate technical result. Results at 1 and 36 months were 77.4% +/- 4.1% and 48.6% +/- 8.0% for primary patency, 83.3% +/- 1.4% and 62.9% +/- 11.0% for secondary patency, 93.4% +/- 2.3% and 82.4% +/- 3.4% for limb salvage, and 98.3% +/- 0.7% and 68.4% +/- 5.5% for patient survival, respectively. Studies with >75% of the limbs with tissue loss fared worse than their respective comparative subgroup for technical success and patency but not for limb salvage or survival. No publication bias was detected.

**CONCLUSION:** The technical success and subsequent durability of crural angioplasty are limited compared with bypass surgery, but the clinical benefit is acceptable because limb salvage rates are equivalent to bypass surgery. Further studies are necessary to determine the proper role of infrapopliteal angioplasty.

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## Meta-analysis of infrapopliteal angioplasty for chronic critical limb ischemia.

Romiti M, Albers M, Brochado-Neto FC, Durazzo AE, Pereira CA, De Luccia N.

Vascular Surgery Section, Department of Surgery, Health and Medical Sciences Sector, Lusiada Foundation, Santos, Sao Paulo, Brazil.

### Abstract

**BACKGROUND:** Percutaneous transluminal angioplasty (PTA) is a minimally invasive treatment for chronic critical limb ischemia (CCLI). This meta-analysis compares results with a

**METHODS:** Data were pooled from 10 studies (1997-2006) using survival analysis. The primary outcome measures were limb salvage, technical success, and patient survival. Secondary outcome measures were limb patency, limb ischemia-free survival, and limb survival. Data were analyzed using survival curves, and test for heterogeneity, publication bias, and subgroup analysis.

**RESULTS:** The pooled technical success rate was 77.4%  $\pm$  4.1% and 48.6%  $\pm$  8.0% for primary and secondary patency, respectively. The pooled limb salvage rate was 83.3%  $\pm$  1.4% and 62.9%  $\pm$  11.0% for primary and secondary patency, respectively. The pooled limb patency rate was 93.4%  $\pm$  2.3% and 82.4%  $\pm$  3.4% for limb salvage, and 98.3%  $\pm$  1.1% and 68.4%  $\pm$  5.5% for patient survival, respectively. Studies with  $>75\%$  of the limbs with tissue loss fared worse than their respective comparative subgroup for technical success and patency but not for limb salvage or survival. No publication bias was detected.

**CONCLUSION:** The technical success and subsequent durability of crural angioplasty are limited compared with bypass surgery, but the clinical benefit is acceptable because limb salvage rates are equivalent to bypass surgery. Further studies are necessary to determine the proper role of infrapopliteal angioplasty.

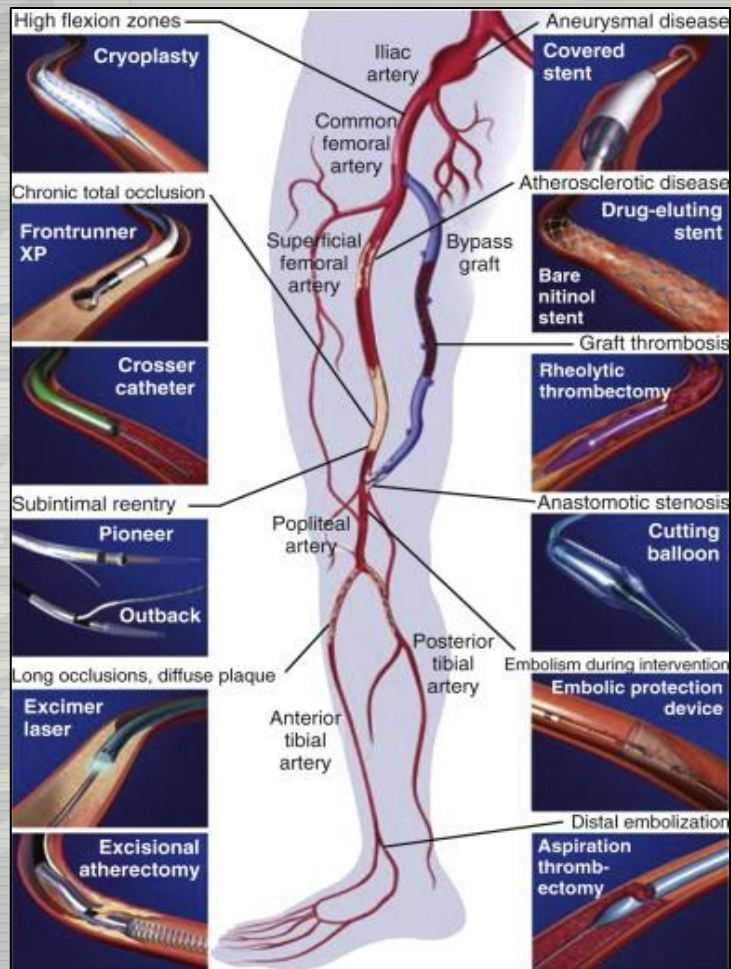
Poor success rate

Poor patency rate

Comparable limb salvage rate

Comparable patient survival

# Dynamic & Challenging ET



## ET for Infrapopliteal Lesion - New Technology

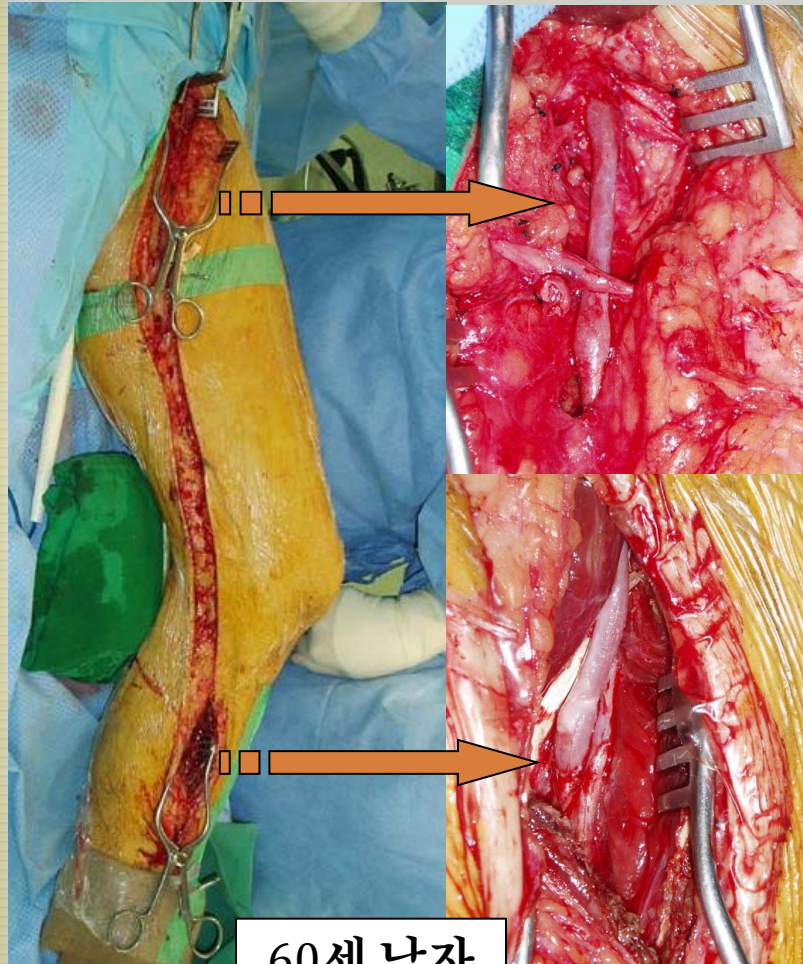
Author, year	Method	F-u, year	Primary patency	Limb salvage	Survival
Vraux et al, 2006	Subintimal PTA	1	46%	87%	74%
Siablis et al, 2005, 2007	SES BMS	1	86.4%	100%	86.2%
		1	40.5%	96%	89.7%
Bosiers et al, 2009	XPERT nitinol stent	2	54.4%	90.8%	-
Bosiers et al, 2010	Cryoplasty	1	55.9%	93.8%	81.8%

SES, sirolimus-eluting balloon-expandable coronary stent;  
BMS, balloon-expandable bare metal stent

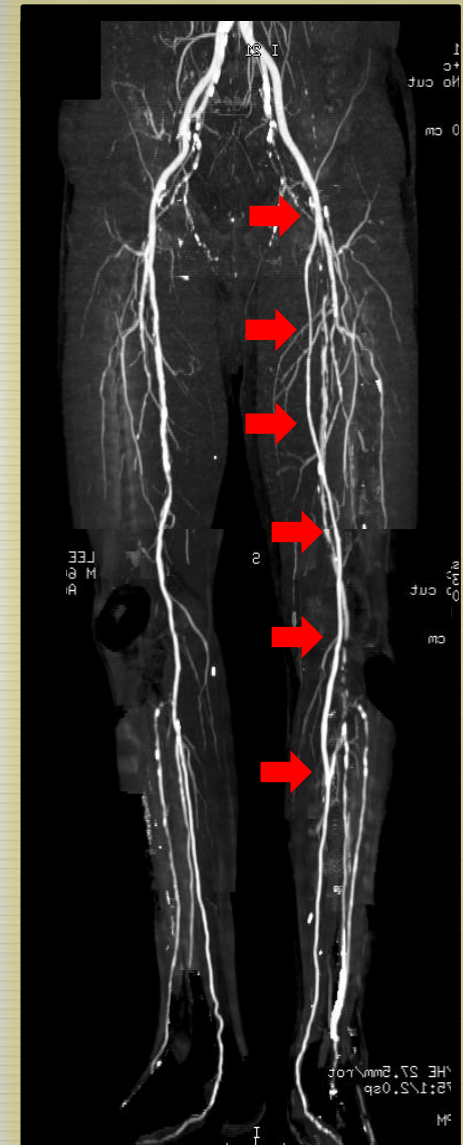


# Reversed Vein 하지동맥우회술

Lt Femoro-PTA bypass with  
reversed saphenous vein graft



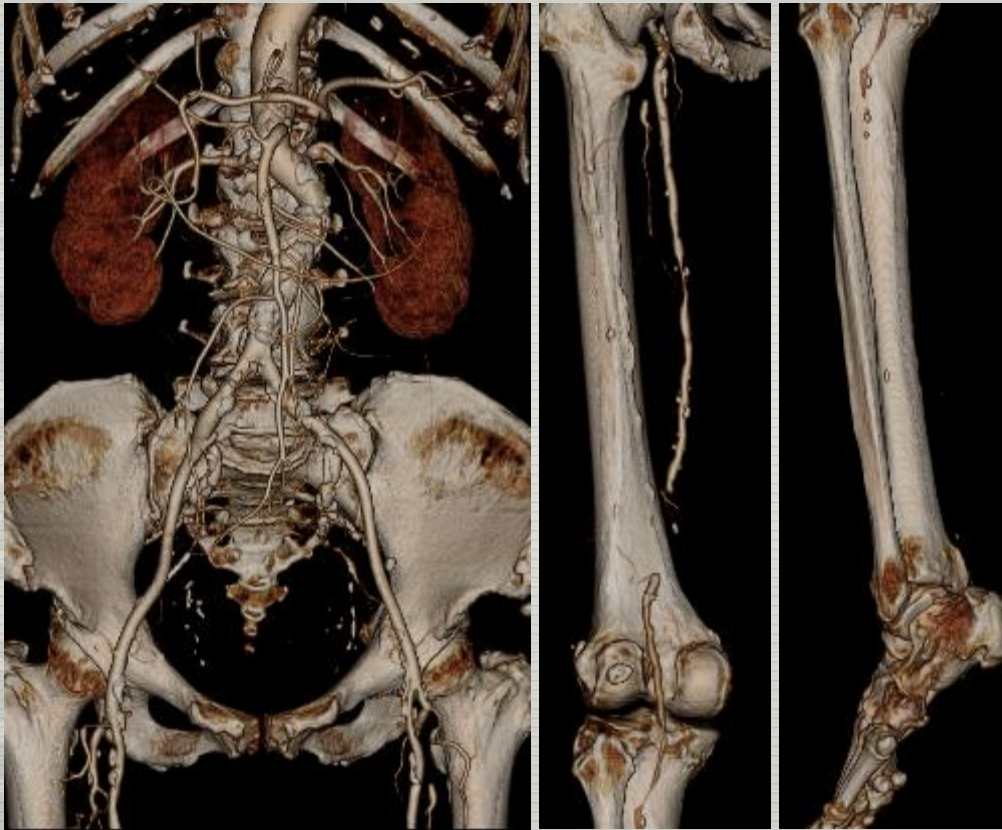
60세 남자



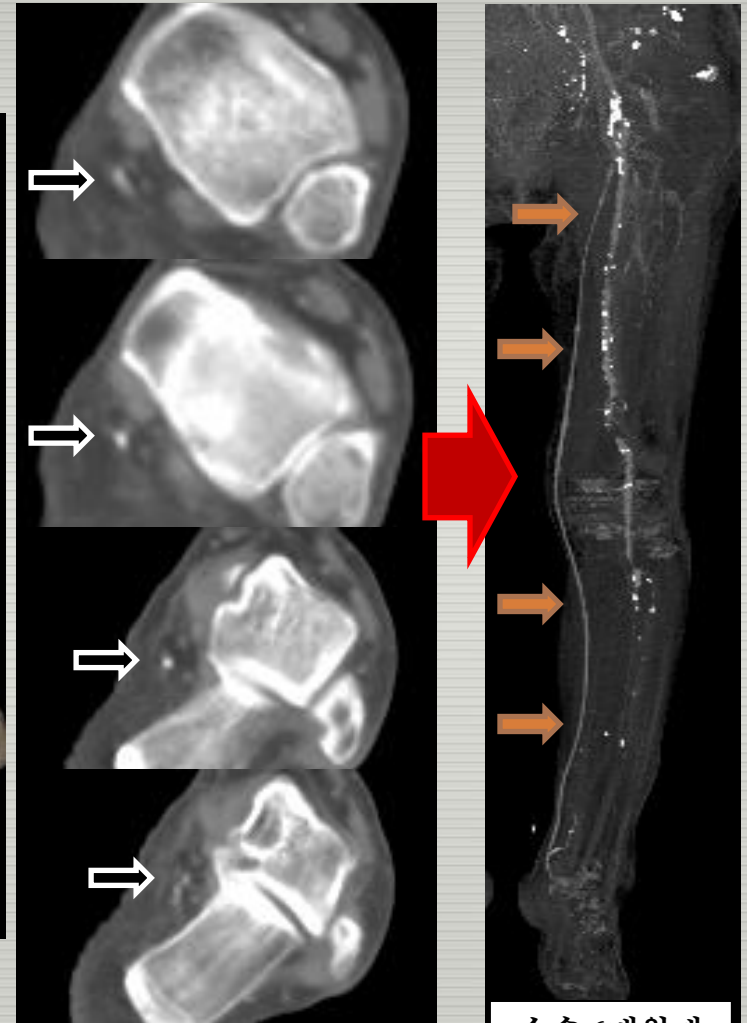


# *In Situ Vein* 족부동맥우회술

- 여자 74세, 좌측 엄지발가락의 궤양

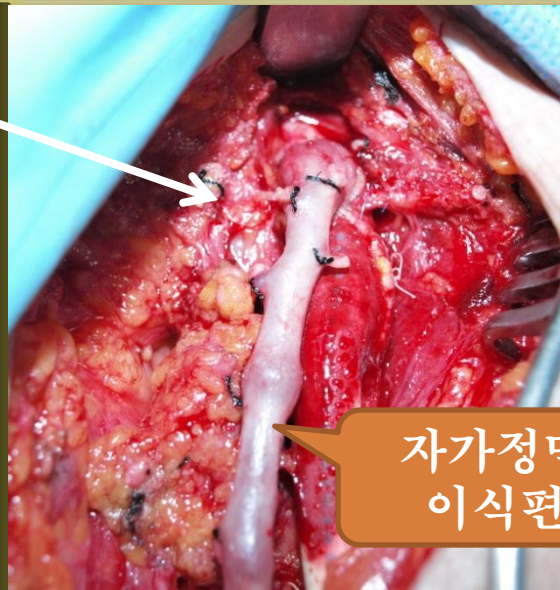


좌측, 후면에서



수술 6개월째

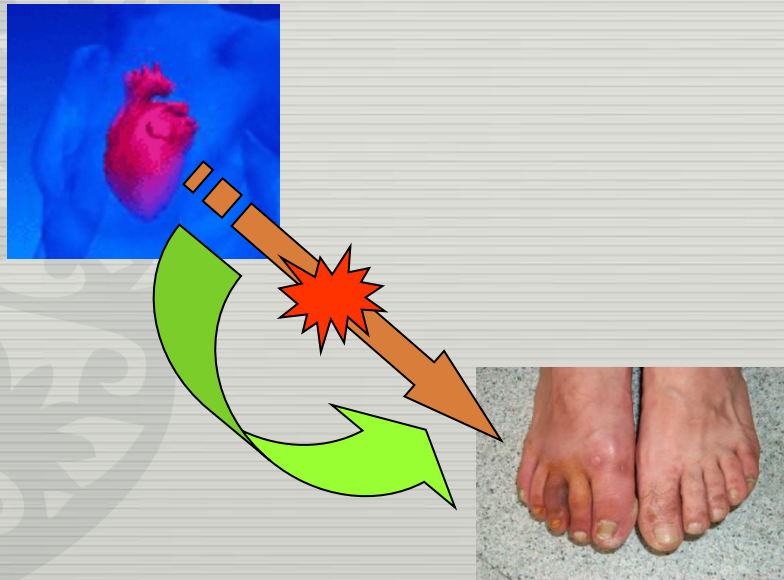
# *In Situ & Reversed Vein* 족부동맥우회술





# 동맥우회술의 결과에 영향을 미치는 인자

- Inflow artery
- Graft
- Outflow (Run-off) artery



## ● Bypass graft

- **Autogenous vein**
  - Reversed or In situ
  - **GSV**, SSV, arm vein
- Prosthetic graft
  - PTFE
  - PTFE + Vein cuff
- Biologic graft
  - Human umbilical vein
- Cryopreserved vein

# 당뇨병 환자의 하지동맥우회술 (KNUH)

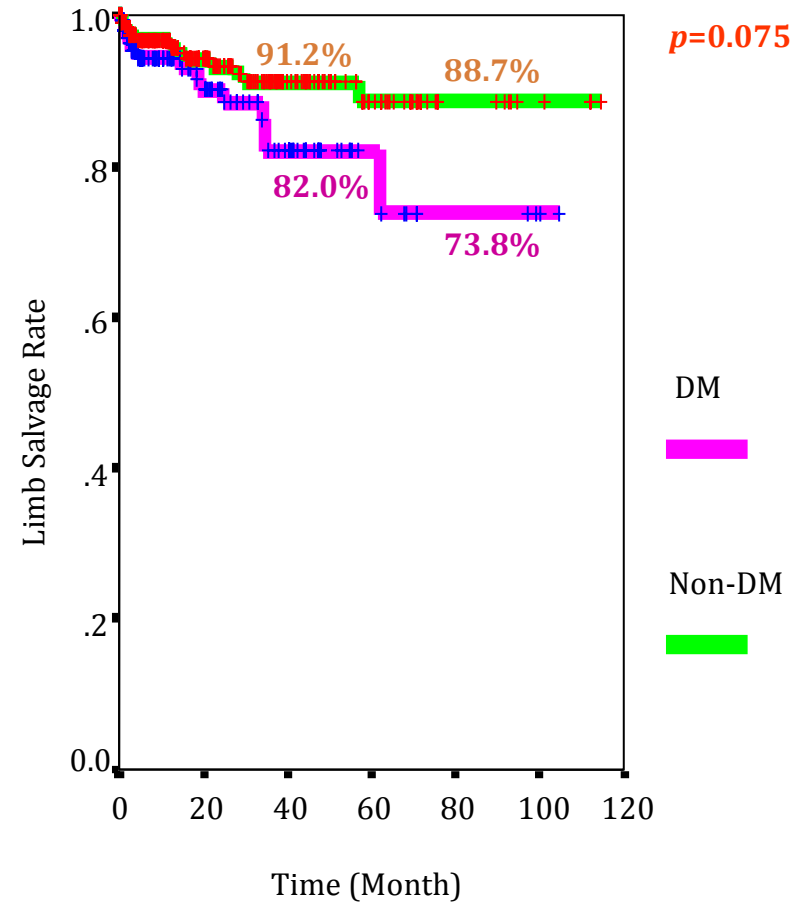
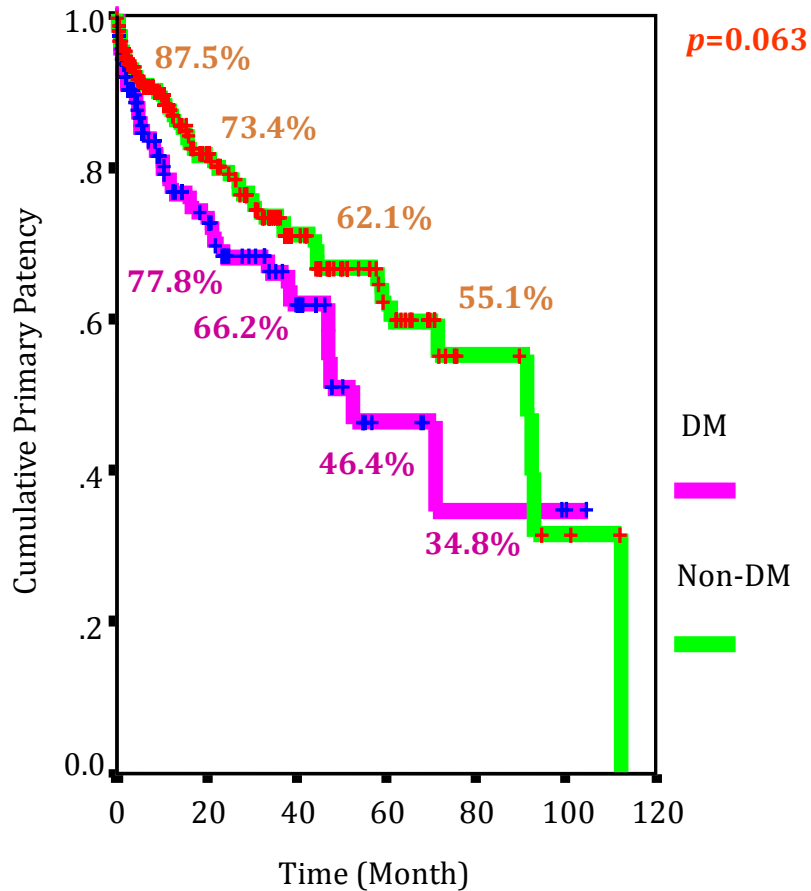
■ From Mar. 1993 to Jun. 2003, n=400

	DM group (n=154)	Non-DM group (n=246)	<i>p</i>
Number (limb)	154 (38.5%)	246 (61.5%)	
Male	141 (91.6%)	222 (92.3%)	NS
Age (year)	66.0 ± 8.5	67.8 ± 8.0	NS
Follow-up (month)	19.1 (1 -104)	24.3 (1 -113)	
Indications			NS
Claudication	63 (40.9%)	92 (37.4%)	
CLI	91 (59.1%)	154 (62.5%)	

*NS, not significant; CLI, critical limb ischemia*



# 하지동맥우회술의 결과 (KNUH)

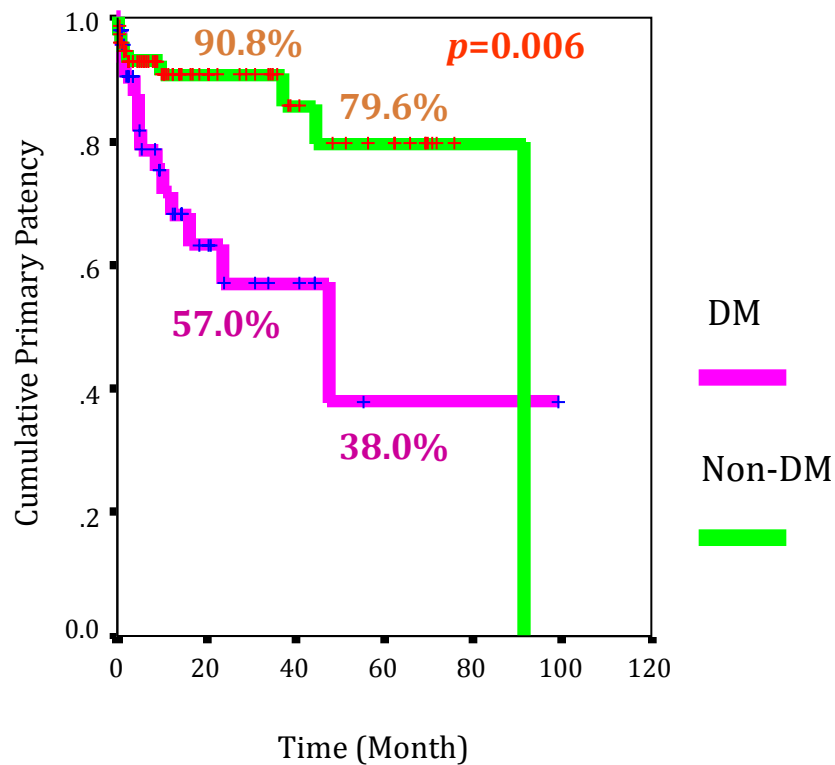


# 장딴지 및 족부 동맥우회술의 결과 (KNUH)

Total graft

DM (n=48)

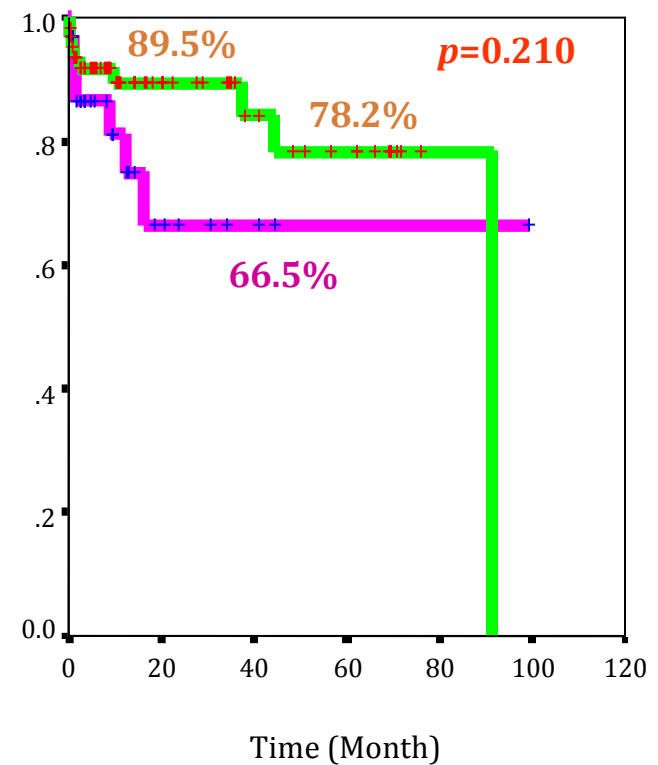
Non-DM (n=83)



Vein graft

DM (n=34)

Non-DM (n=64)



# Comparison of the results after lower extremity bypass between DM and non-DM patients

Author, year	N	% DM	Patency	Limb salvage	Survival
Veith et al. 1986	845	62%	ND	ND	-
Hurley et al. 1987	259	48%	DB	DB	ND
Rutherford et al. 1988	249	42%	DB	-	-
Thomas et al. 1988	73	34%	ND	ND	ND
Shah et al. 1988	681	57%	ND	ND	-
Taylor et al. 1990	516	43%	DB	DW	ND
Rosenblatt et al. 1990	171	50%	ND	-	-
Budd et al. 1990	373	29%	ND	-	-

DM: diabetes mellitus, ND: no difference, DB: significantly better in diabetic patients, DW: significantly worse in diabetic patients

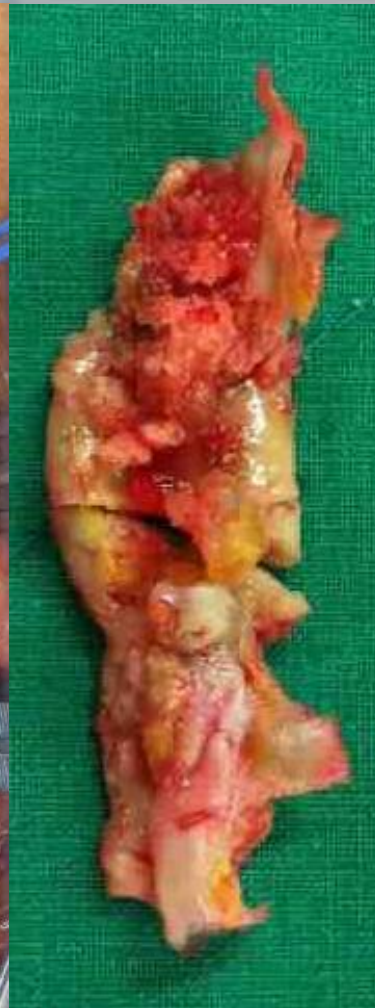
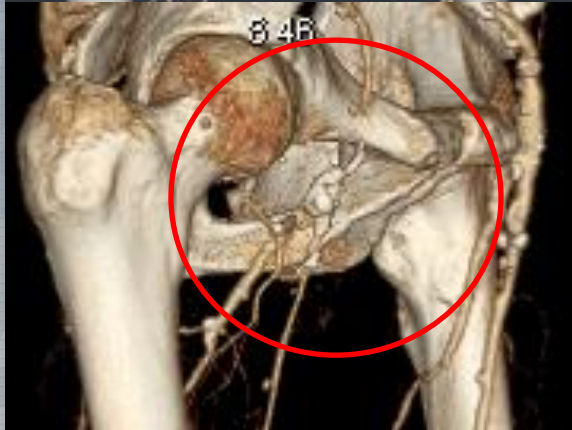
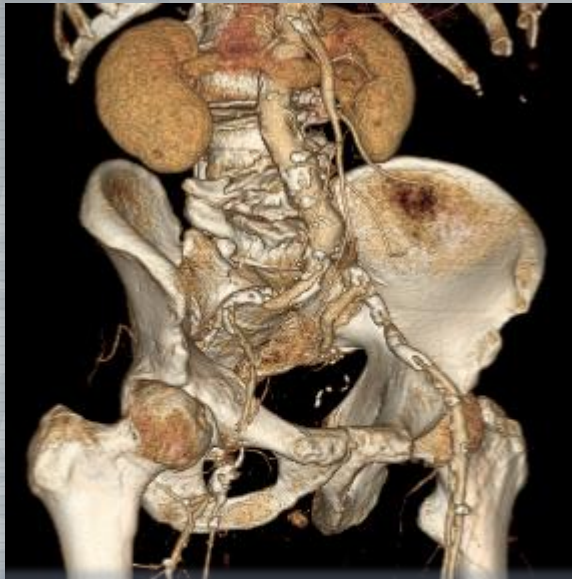
# Hybrid Treatment

- **Challenging and dynamic**
  - Endovascular treatment (ET) + Open surgery
- **Various options**
  - ET for iliac lesion + endarterectomy or bypass
  - ET for femoral lesion + distal bypass
  - Femoropopliteal bypass + ET for distal lesion
  - .....
- **Reports**
  - **Limited to iliac and femoral lesion**
  - **Major role of CFA**



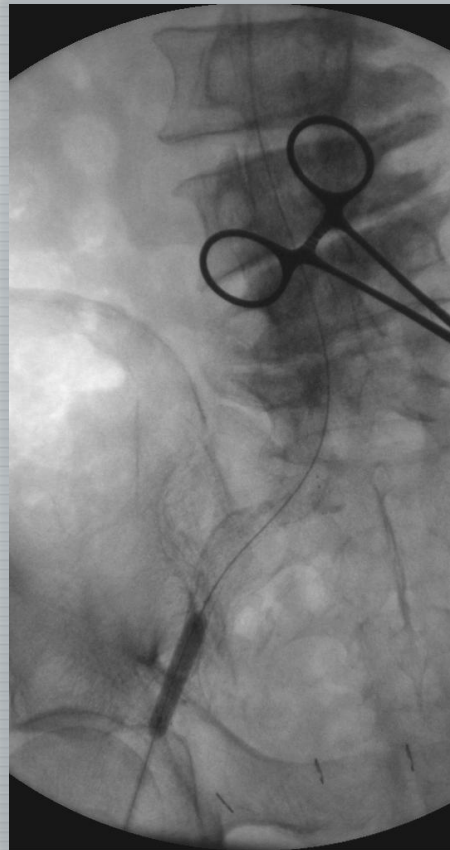
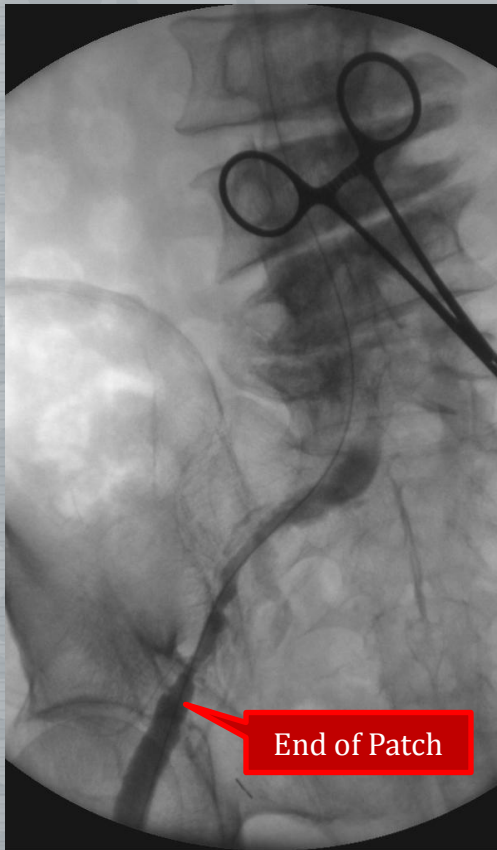
# Hybrid Treatment

- M/65, Ulcer on Rt toe → Rt CFA endarterectomy & both iliac A stents



# Hybrid Treatment

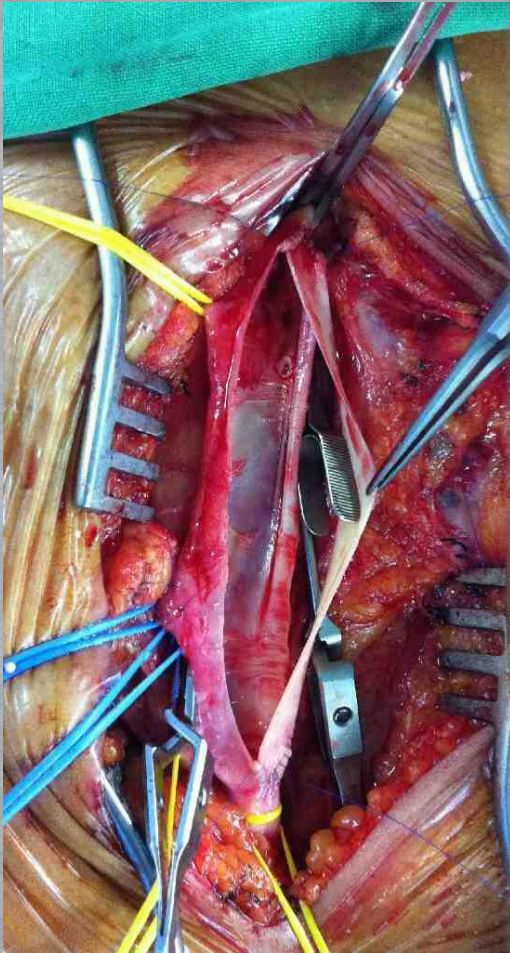
- M/65, Ulcer on Rt toe → Rt CFA endarterectomy & both iliac A stents





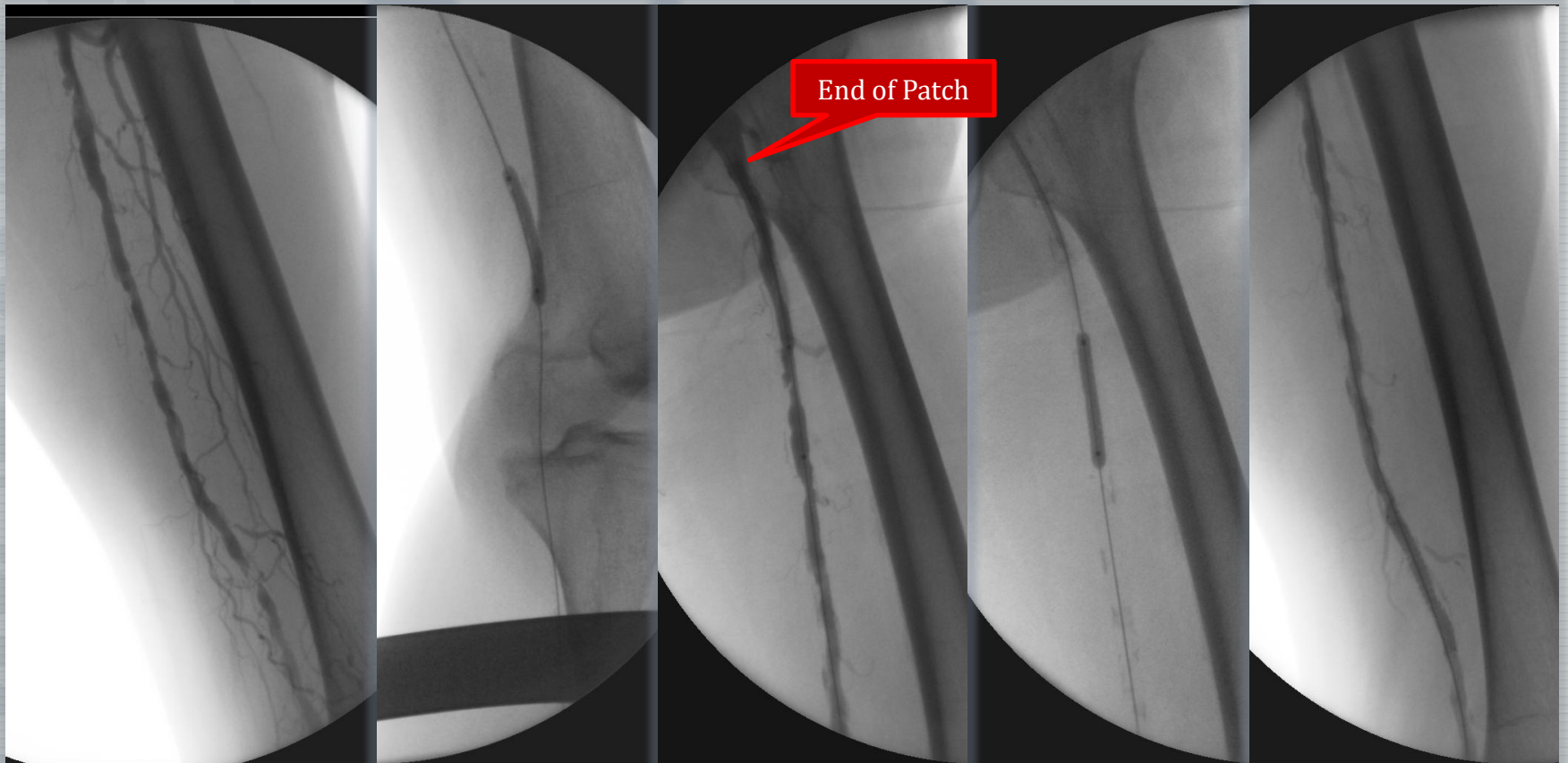
# Hybrid Treatment

- M/80, DM foot ulcers → CFA patch & SFA stent



# Hybrid Treatment

- M/80, DM foot ulcers → CFA patch & SFA stent





# 감염성 당뇨발의 치료 원칙

- 감염된 부위에 대한 처치
  - 배농술, 괴사조직 제거술
  - 광범위 항생제
- 하지의 동맥혈류에 대한 평가
  - 동맥혈류 재개통술
- 절손된 조직에 대한 조직재건술

# 심하게 괴사된 당뇨발



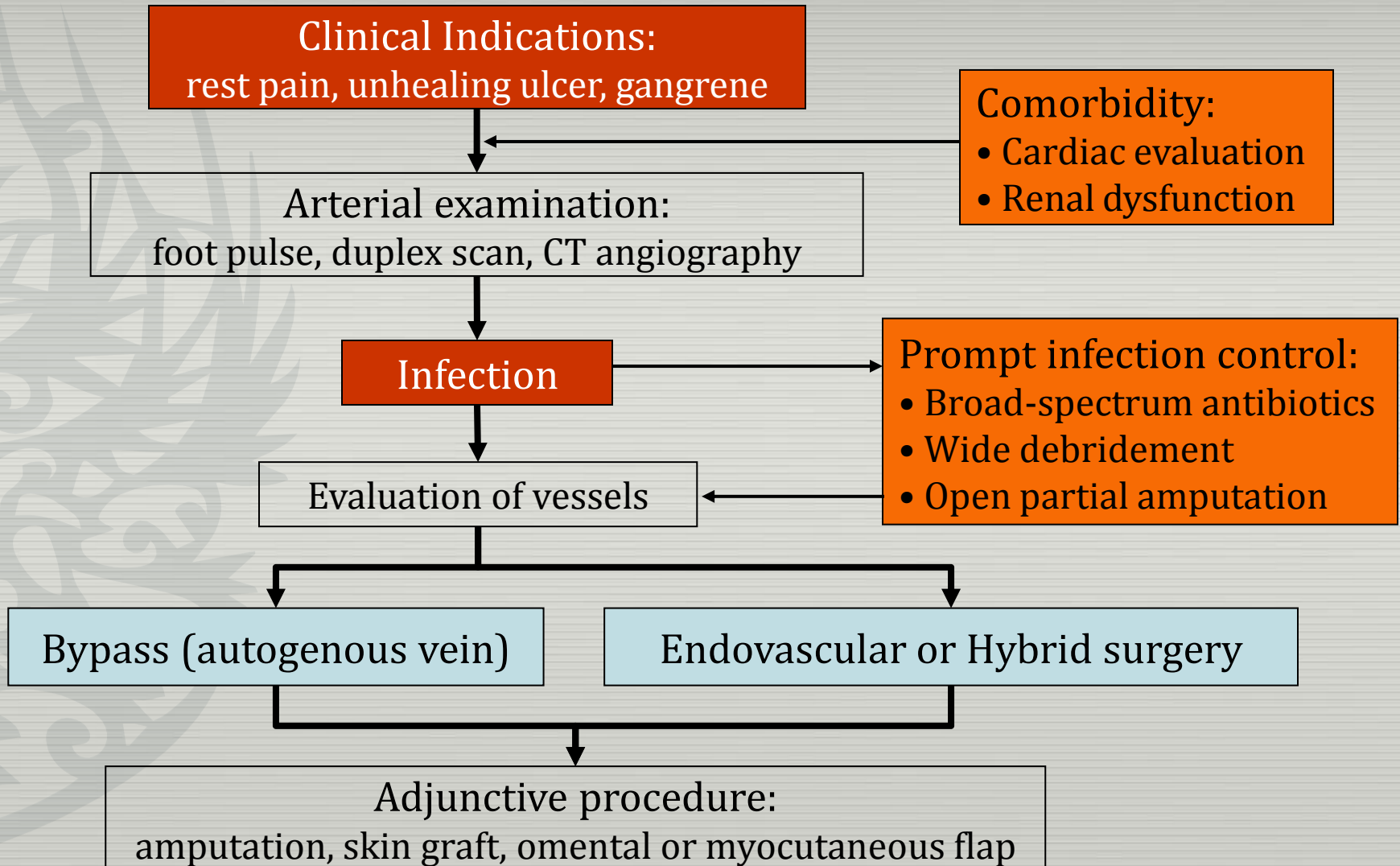
75세 남자

좌측 대퇴동맥-오금동맥간 동맥우회술 후 시행한 발목 보존술

# 당뇨병성 말초동맥폐색증의 관리

- 위험인자를 철저히 관리한다
  - 절대 금연!!!
  - 혈당, 혈압, 콜레스테롤 수치는 정상 범위 유지
- 발관리 철저!!!
- 정기적인 혈관검사
  - 목동맥, 대퇴동맥, 발목동맥
- 상처 발생 시 즉각적인 전문가 진료!!!

# Treatment Algorithm (KNUH)





우리나라의 아름다운 자연을  
마음껏 즐기십시오!!!

강변호