外周血管临床介入治疗现状与展望

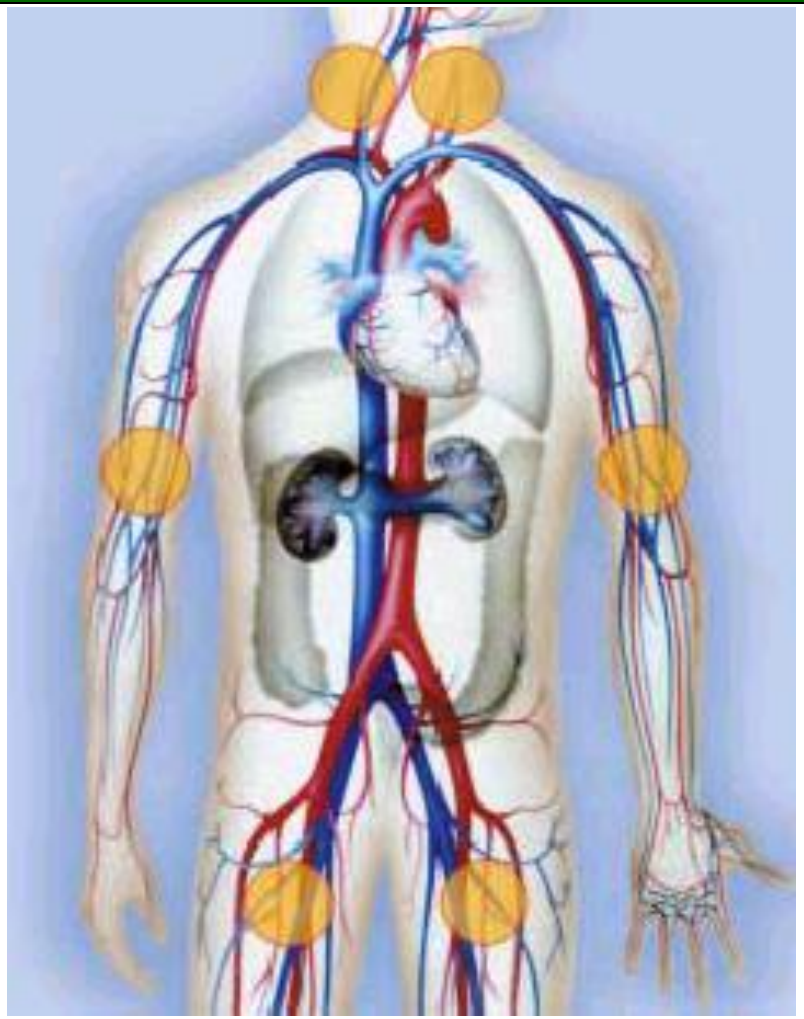
薛冠华

上海仁济医院血管外科

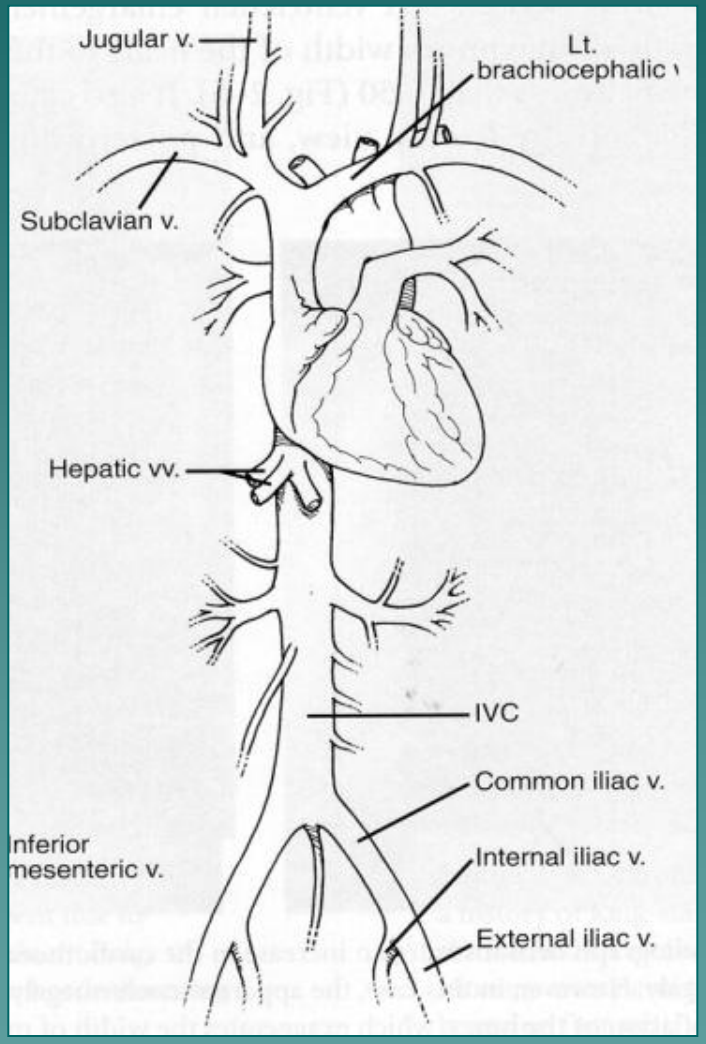
血管外科

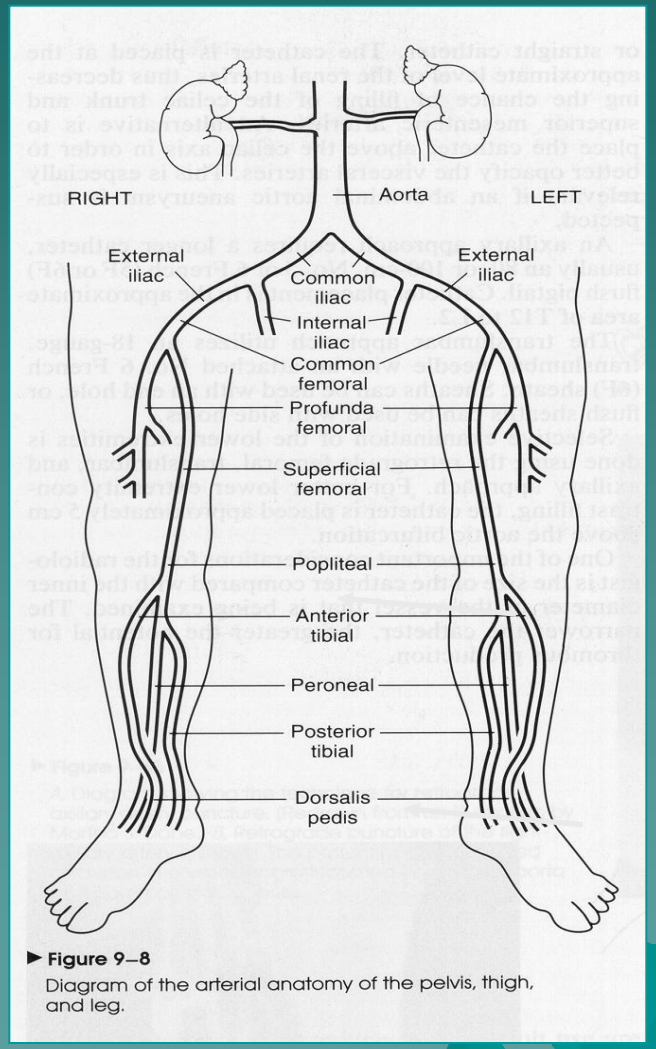
- 周围血管外科
  - ⑩动静脉
    - 双下肢
    - 颈、肾
  - ⑩血管瘤、动脉瘤
  - ⑩血透通路——尿毒症
  - ⑩糖尿病足

血液循环



下肢的血液循环





► **Figure 9–8**
Diagram of the arterial anatomy of the pelvis, thigh, and leg.

发展史

- 年轻学科
- 60年代末，起步
  - 取栓术，转流术等
- 80年代，发展
  - CT、DSA、MRI、Doppler、血管镜及动脉插管和经皮血管腔内成形术(PTA)技术

腔内介入发展史

- 1964年，Dotter首例经皮腔内血管成型术（PTA）标志着腔内技术治疗血管疾病的开始。
- 1983年~1989年，Dotter、Palmaz、Gianturco等相继研制多种支架，使PTA技术走向成熟。
- 1990年，Parodi应用腔内修复术（Endovascular Aneurysm Repair，EVAR）治疗腹主动脉瘤取得成功，标志着血管腔内技术在扩张性血管病的微创治疗中取得重大突破。
- 1994年Dake将EVAR技术成功应用到胸主动脉瘤和夹层使EVAR的应用范围进一步扩展。

有关血管疾病

- AAA
- 下肢动脉硬化闭塞症（ASO）
- 血栓闭塞性脉管炎（TAO）
- 急性动脉栓塞
- 外伤引起的血管损伤缺血
- 糖尿病足
- 急性深静脉血栓形成
- 布-加综合症
- 静脉曲张

发病率

- 严重心血管病患者中，75%以上伴有周围动脉阻塞；
- 在60岁以上的人群中，由外周动脉阻塞引起的慢性下肢动脉缺血发生率为17%~20%；
- 截肢率高达5%以上，吸烟尤其合并糖尿病时超过20%。
- 静脉病的发生率则为动脉病的10倍。

足部坏疽

腹主动脉瘤(Abdominal aortic aneurysm, AAA)

- EVAR已成为AAA常规。从形态学讲，多种产品的多种设计已能满足约80%AAA的解剖学要求
- 2001年美国数据统计，7172例EVAR术后30天内死亡率1.3%，而开放手术组为3.8%(P=0.001)。虽然**腔内组多数病人年老体弱，**但是死亡率仍然比开放组低，说明EVAR的微创优势。
- 两项随机对照研究也显示开放与腔内的围手术期死亡分别在6.2 %比2.1 %和4.6 %比1.2 %[2-3]。**EVAR的5年生存率在64%～75%之间，开放手术在64%~77%之间，二者无明显差异。**但再次手术率EVAR高于开放手术(10-30%vs.8-13%)。原因在于EVAR术后内漏并发症，

胸主动脉瘤与主动脉夹层

- EVAR已逐步成为降主动脉胸段局限性动脉瘤或Stanford B型夹层动脉瘤的主要治疗手段。
- 随着技术和产品的进步，EVAR技术也正在开始治疗复杂的胸主动脉病变，表现在累及范围广泛的胸腹主动脉瘤、累及弓上分支血管的主动脉弓和升主动脉瘤以及Stanford A型主动脉夹层。
- 用于腔内重建内脏动脉的多侧孔SG或多分支SG已经或即将进入临床应用。人类也已经具有数百例腔内重建内脏动脉治疗胸腹主动脉动脉瘤的经验[7-11]。
- 这些标志着EVAR技术的“第二次革命”，因为它改写了腔内技术无法重建内脏动脉的历史，因此也又一次扩大了EVAR的手术适应症。

动脉瘤

- 腘动脉瘤发病率低，以创伤后假性动脉瘤多见，也包括真性动脉瘤。随着Joestent、Wallgraft、Fluency、Hemobahn等支架型血管的相继问世，使中小血管动脉瘤的腔内治疗成为可能[24]。以孤立性的股动脉瘤为例，如果对病变不进行干涉，将有18%-35%的并发症发生率，主要为远处栓塞或截肢[25]。

创伤性血管治疗

- 血管腔内技术不仅应用在动脉瘤的腔内治疗中，而且还用于创伤性血管病变的腔内治疗。栓塞、支架、SG等都已成功的应用于出血、血管内膜卷曲或夹层、假性动脉瘤和动静脉瘘等创伤性血管病变。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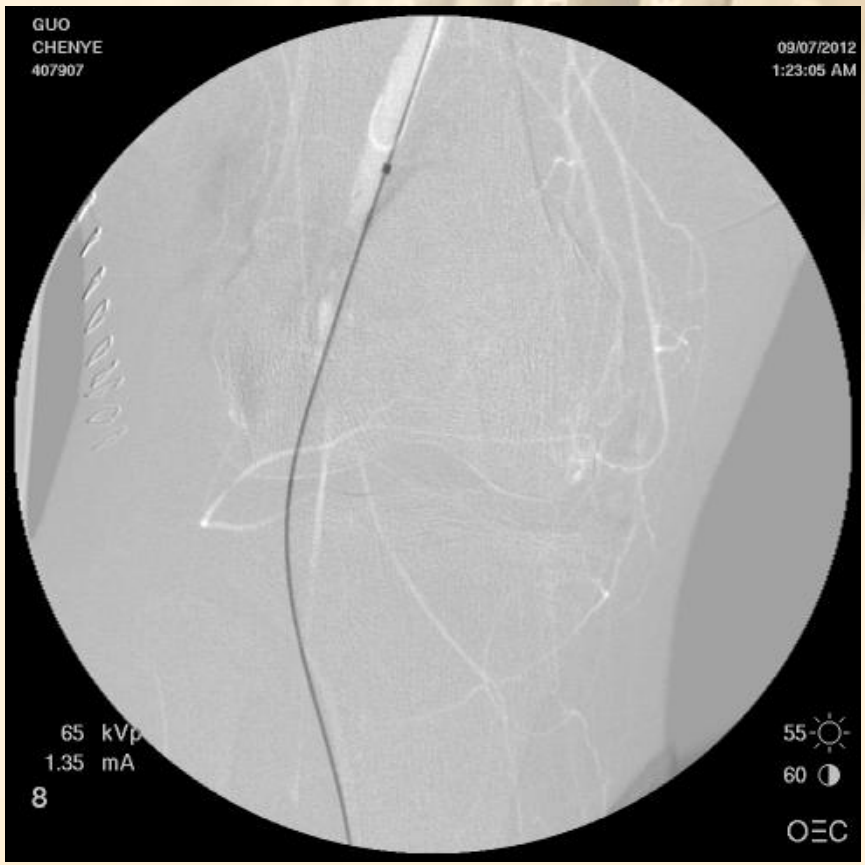
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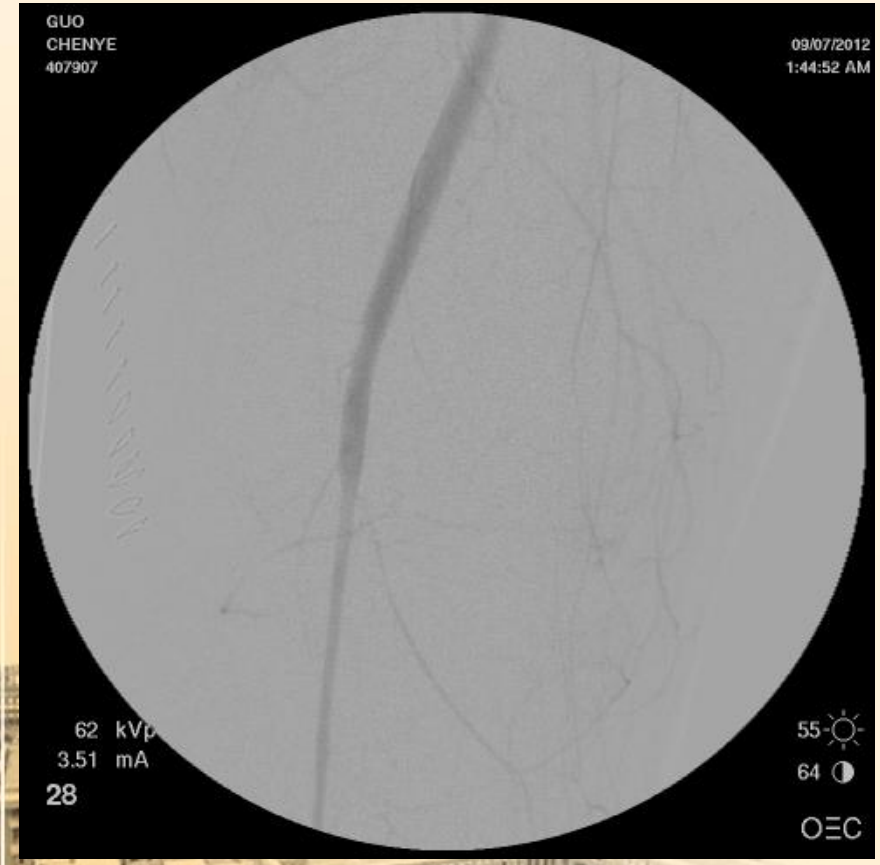
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35
26
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动脉狭窄

- 腔内技术治疗肾动脉狭窄成为主流治疗方法，不仅因为其技术的微创与安全，而且因其具有良好的远期效果。
- 肠系膜上动脉和腹腔动脉的狭窄随着影像技术的发展，诊断率逐步提高。腔内技术在这些动脉狭窄中的应用也日趋增多且效果明确。
- 头臂动脉由于特殊的解剖部位和较低的狭窄发生率，目前腔内技术已成为该部位病变的首选。
- 颈动脉狭窄的腔内治疗是近10年来的新技术，由于该部位的开放式手术显露并不复杂，在腔内、腔外治疗方法的选择上曾出现较大争议。但随着技术的改进，尤其是脑保护装置的应用[30]，以SAPPHIRE为代表的多个著名实验研究结果表明，颈动脉的腔内治疗较传统的内膜切除有更低的中风、心梗、死亡和其它并发症的发生率[31]。

下肢动脉

- 多种技术被应用在股动脉的腔内治疗，包括PTA和/或Stent、激光、消融、内照射、冷冻、药物洗脱支架、覆膜支架等等。从效果上评估，股动脉的腔内治疗有更低的远期通畅率。
- 腘动脉以远病变的腔内治疗远期通畅率更低，但在挽救肢体、降低截肢率方面仍有重要作用。

再狭窄

◆再狭窄问题始终是困绕腔内技术的主要问题。腔内技术的远期效果不仅与病变的部位、长度、技术及病理生理学有关，也与病变的血流动力学有关。**提高腔内治疗的中远期效果是艰巨且需要长期艰苦努力的课题。**

瓶 颈

- 长段闭塞的“开通”？
- 再狭窄如何降低？

股腘动脉长段CTO腔内治疗的开通技巧

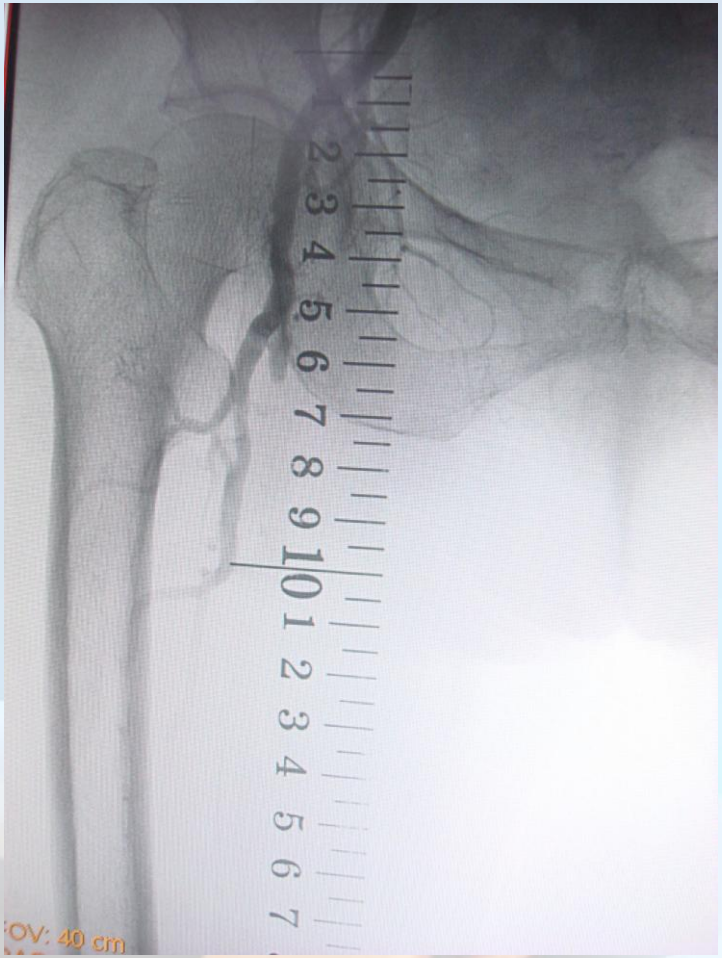
薛冠华

仁济医院

常用技巧

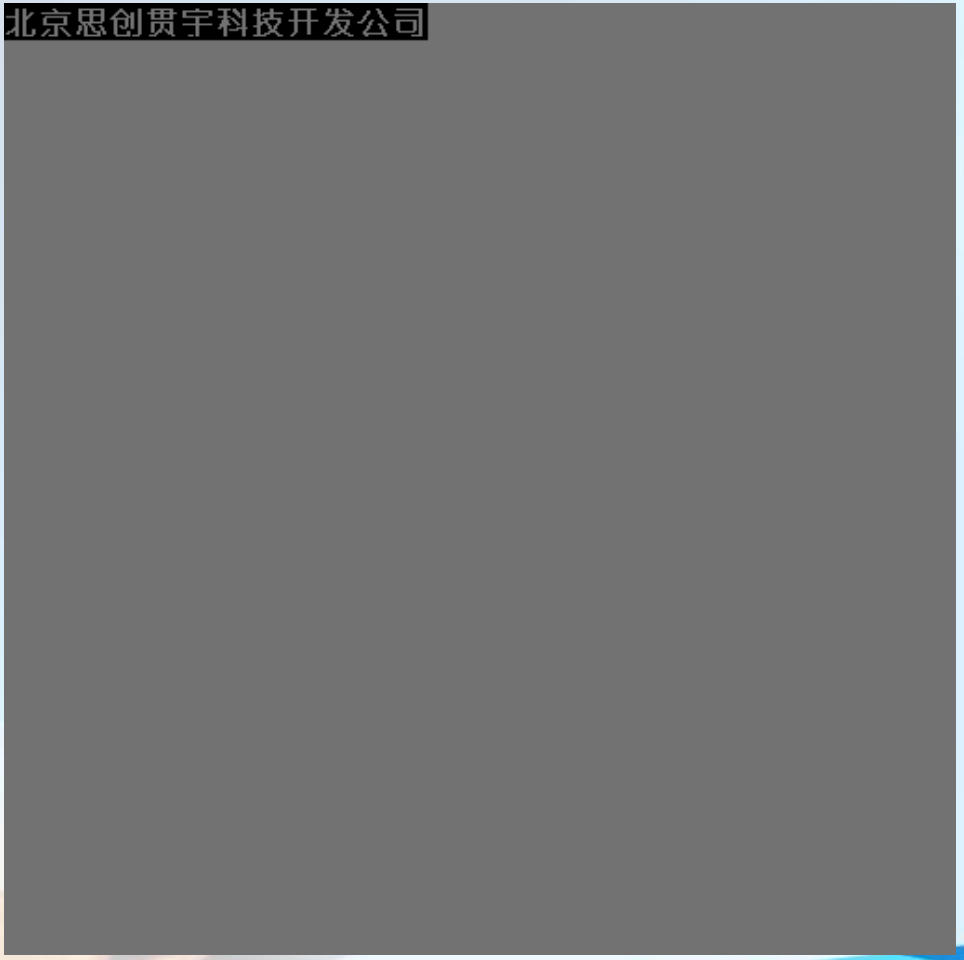
- 常规：CROSSOVER；
- 对于股浅中远端或腘A，或二次可以采用 ANTEGRATE；
- 逆穿：腘A、或小腿3支动脉、足踝部；
- 借助新的器械：OUTBACK、Frontrunner、Silverhawk、PIONEER,AND SO ON；

特殊细节1 —— 入路



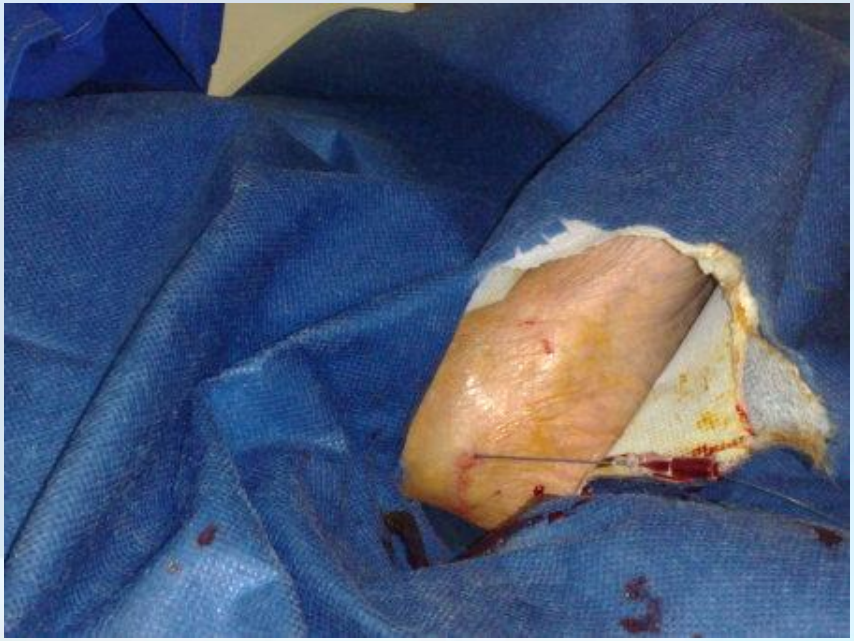

E MEDICAL SYSTEMS

特殊细节2 —— 出路

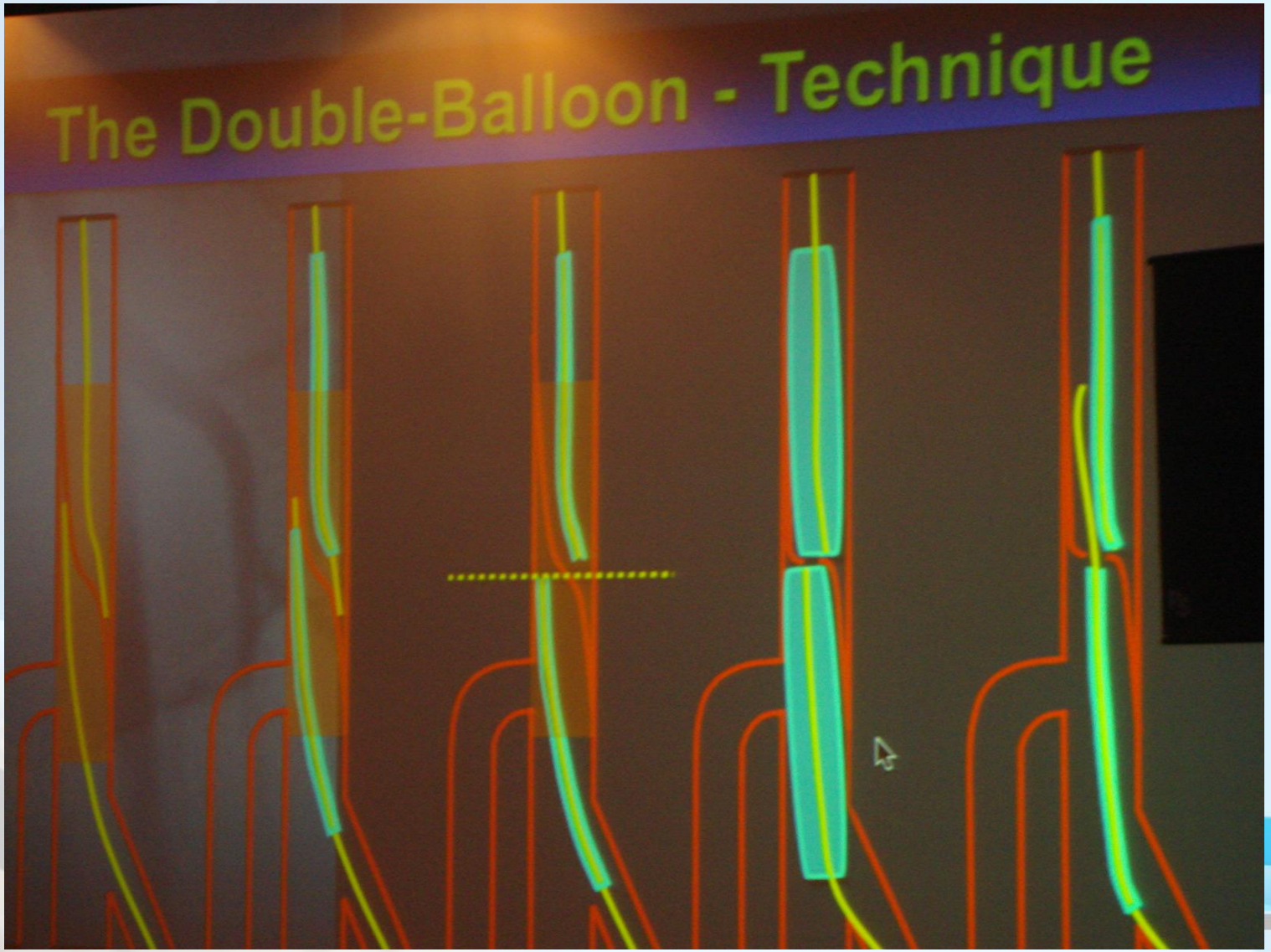


特殊细节2 —— 出路

特殊技巧 —— 细节3



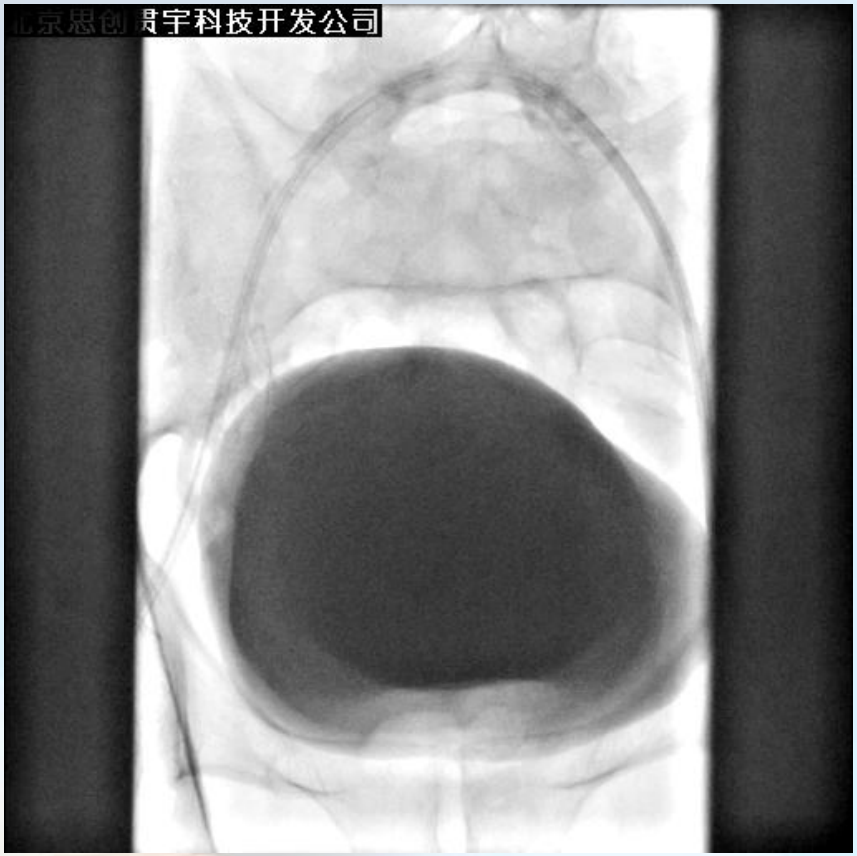
特殊技巧 —— 细节3



特殊技巧 -- 细节4

- OUTBACK

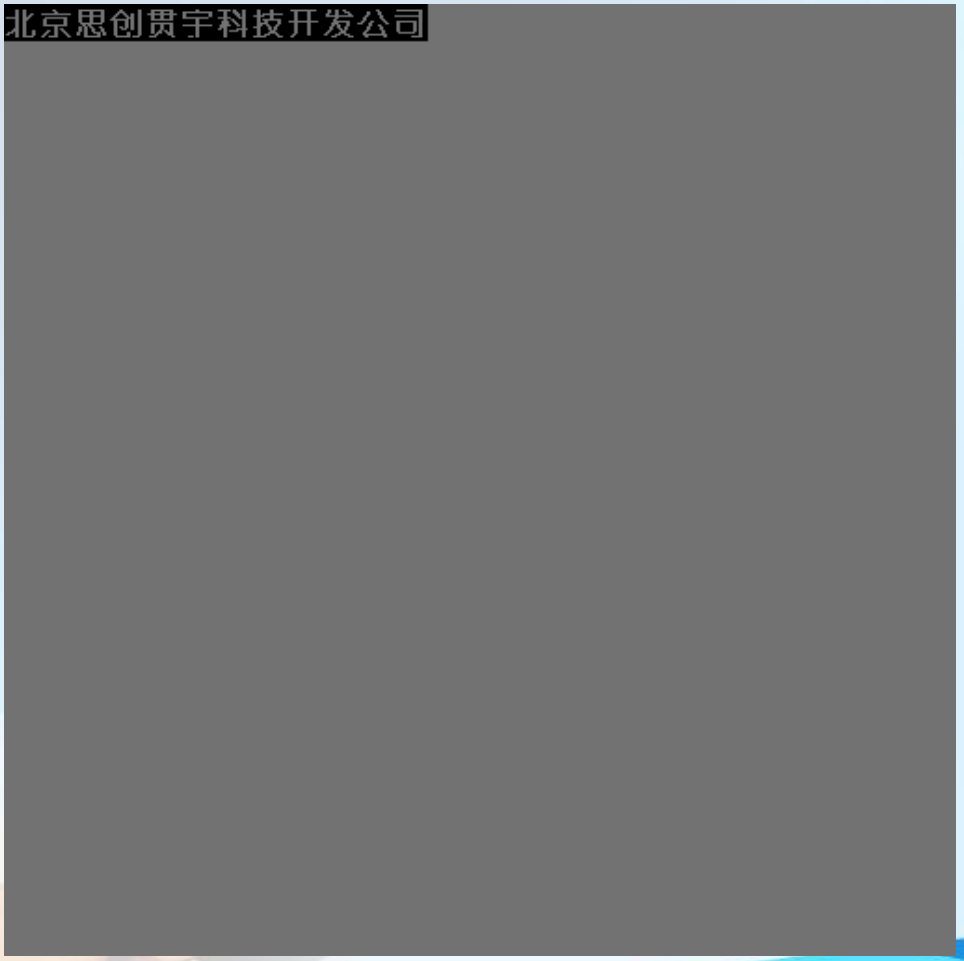
特殊技巧 —— 细节4



特殊技巧 —— 细节4

特殊技巧 -- 细节4

特殊技巧 -- 细节4



特殊技巧 —— 细节4

小 结

- 术前仔细阅读CTA或MRA；蛛丝马迹
- 不要过多在显影的真腔内膜下潜行；
- 合理使用新器械和新技术；
- 考虑性价比；
- 术后处理；
- 获益情况

股腘动脉支架再狭窄的处理与预后

上海交通大学医学院附属仁济医院
血管外科

薛冠华

backgroud

表　多节段病变肢体数（%为占总肢体）

部位	L	R	B	合 计
主+髂 A	2	9	6	23（3.0%）
股A	27	23	30	110(14.1%)
腘A	36	17	35	123(15.8%)
腘下1-2支	74	83	58	273（35.1%）
腘下3支	19	29	33	114（14.7%）
合计	158	161	324	643
	（20.3%）	（20.7%）	（41.6%）	（82.6%）

注：L为左侧，R为右侧，B为双侧；腘下3支指该处以上有病变并累及腘下3支主干，依次类推。

薛冠华等。下肢动脉硬化闭塞症患者肢体血管数字减影片分 析及治疗探讨。中华医学杂志，2009，89（23）：1611-1613

ISR -- Achilles' heel

- use of nitinol stents improve patency rates in most patients with >5 cm long lesions [1]
- primary patency rate 58% 36 ms, shorter than 10 cm satisfactory [2]
- Primary stenting of TASC C and D lesions to be safe and efficient high-sustained clinical improvement and low rate of ISR[3]

- *1 Dosluoglu H, Lall P.Infrainguinal disease treatment: to stent or not to stent.J Cardiovasc Surg (Torino). 2011 Oct;52(5):701-16.*
- *Division of Vascular Surgery, VA Western NY Healthcare System, Buffalo, NY, USA. dosluoglu@yahoo.com*
- *2 Mongiardo A, Curcio A, Spaccarotella C, Parise S, Indolfi C.Molecular mechanisms of restenosis after percutaneous peripheral angioplasty and approach to endovascular therapy.Curr Drug Targets Cardiovasc Haematol Disord. 2004 Sep;4(3):275-87.*
- *Cattedra di Cardiologia, Università Magna Graecia, Catanzaro, Italy. ndolfi@unicz.it*
- *3 Davaine JM, Azéma L, Guyomarch B, et al. One-year clinical outcome after primary stenting for Trans-Atlantic Inter-Society Consensus (TASC) C and D femoropopliteal lesions (the STELLA "STEnting Long de L'Artère fémorale superficielle" cohort). Eur J Vasc Endovasc Surg. 2012 Oct;44(4):432-41.*
- *CHU Nantes, l'Institut du thorax, Service de Chirurgie Vasculaire, Nantes F-44000, France*

the incidence of ISR

- 58 patients (62 limbs)
- claudication 40.3%, critical limb ischemia 59.7%
- TASC C 62.9%, TASC D 37.1%
- median length of treated seg, mean follow-up 17 months
- primary patency 66%, secondary 80.9% 1y
- sustained clinical improvement rate primary 68.5%, secondary 82.6%
- ankle-brachial index 0.58 to 0.94
- **incidence of ISR 19.3%**
- stent fracture and disconnection rate 17.7%
- **ISR in the femoropopliteal artery is common 20% ~40%**

- *Davaine JM, Azéma L, Guyomarch B, et al. One-year clinical outcome after primary stenting for Trans-Atlantic Inter-Society Consensus (TASC) C and D femoropopliteal lesions (the STELLA "STEnting Long de L'Artère fémorale superficielle" cohort). Eur J Vasc Endovasc Surg. 2012 Oct;44(4):432-41.*
- *CHU Nantes, l'Institut du thorax, Service de Chirurgie Vasculaire, Nantes F-44000, France*

In-stent Restenosis (ISR)

- Restenosis
  - >2.4 of the peak systolic velocity ratio by duplex scan
  - >50% stenosis by angiography
- class
  - I focal lesions (≤50mm in length)
  - II diffuse lesions (>50mm in length)
  - III totally occluded ISR

ISR--Reasons?

- thrombosis
- perlifation
- fracture [1]
- longer lesions (stent)[2]
- diabetis,hyperlipidemia [2]
- popliteal artery involvement [2]
- flow-out?
- ??? gene?

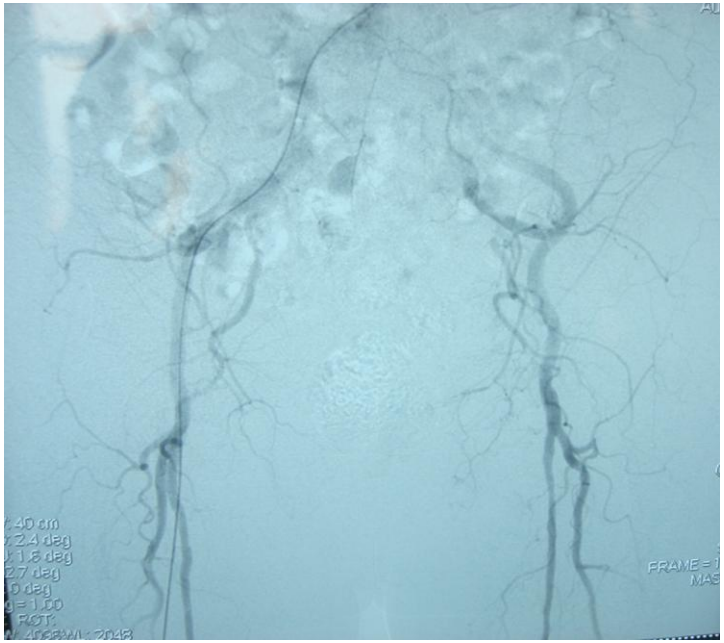
- *1. Scheinert D, Scheinert S, Sax J, Piorkowski C, Bräunlich S, Ulrich M, Biamino G, Schmidt A.Prevalence and clinical impact of stent fractures after femoropopliteal stenting.J Am Coll Cardiol. 2005 Jan 18;45(2):312-5.*
- *2.Clinical and Interventional Angiology, Heart Center-University of Leipzig, Strümpellstrasse 39, 04289 Leipzig, Germany. dierk.scheinert@gmx.de*

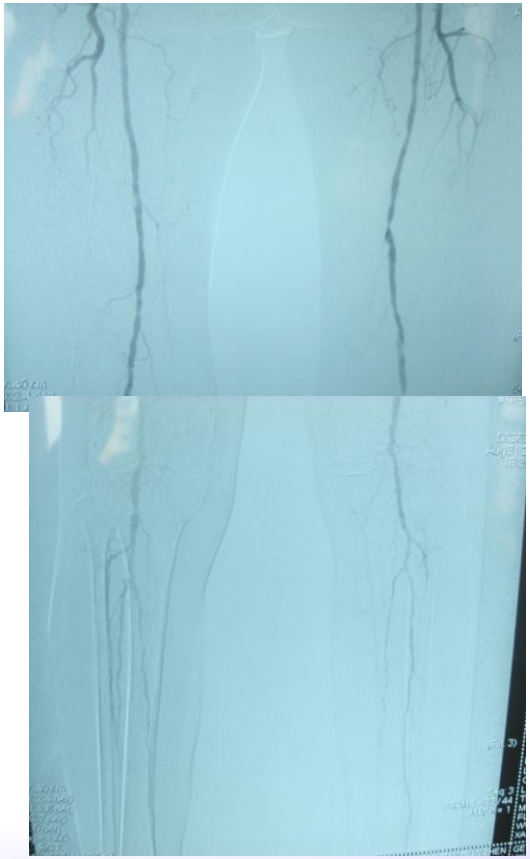
ISR

- 65 patients
- stented segment 16 cm (10-40cm)
- stent number up to 5
- 8 ms no early thrombosis
- ISR 1m 40%, 12 ms 54%
- nondiabetes mellitus 84% 71%
- **diabete** 6 ms 68%, 12 ms 22%
- **stent length/number not associated with restenosis**

- *Sabeti S, Mlekusch W, Amighi J, Minar E, Schillinger M.Primary patency of long-segment self-expanding nitinol stents in the femoropopliteal arteries.J Endovasc Ther. 2005 Feb;12(1):6-12.*
- *Department of Angiology, University of Vienna, Medical School, A-1090 Vienna, Austria.*

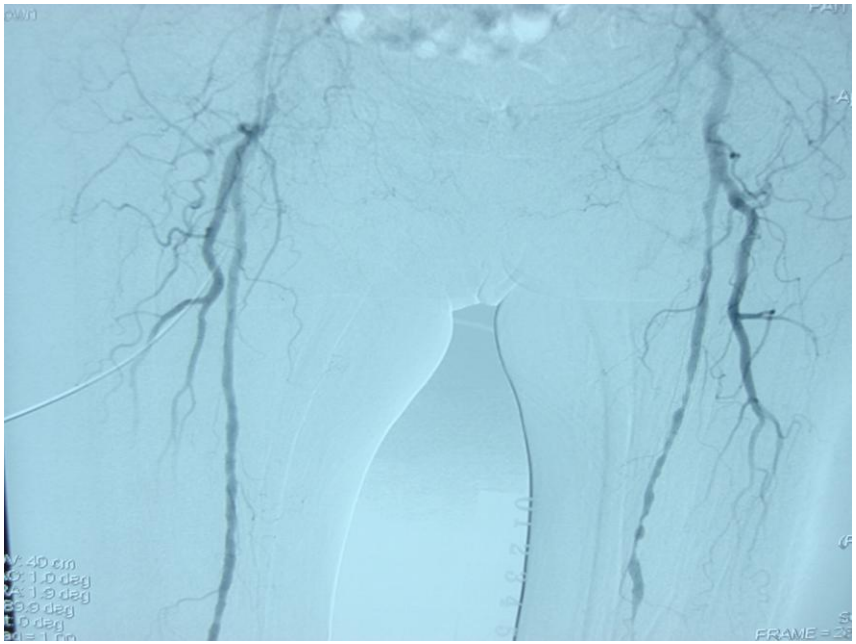
2012-8-31-ISR-after 2 ms stenting

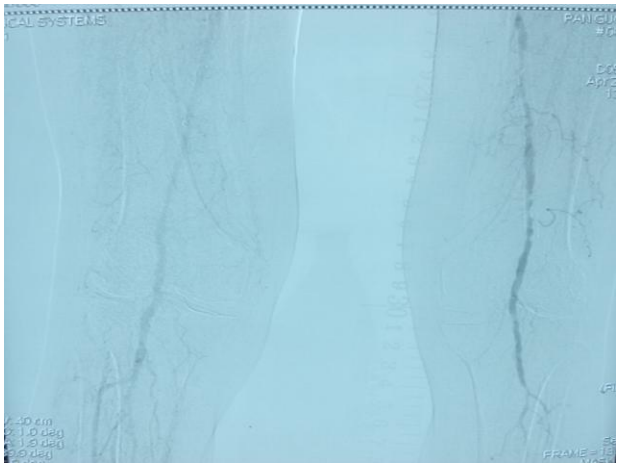


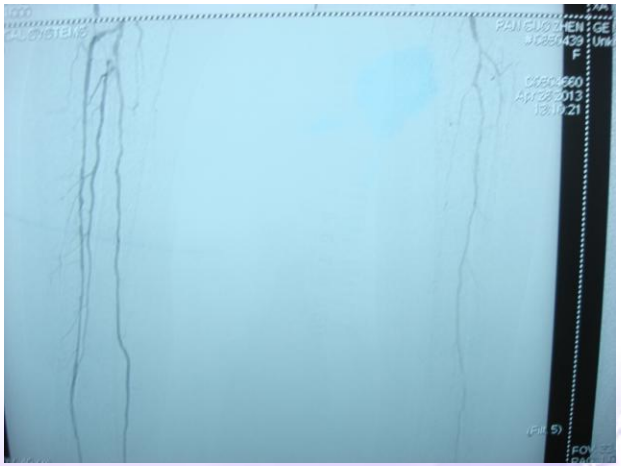


2012-8-31-ISR-after 2 ms stenting

2013-4-26-ISR







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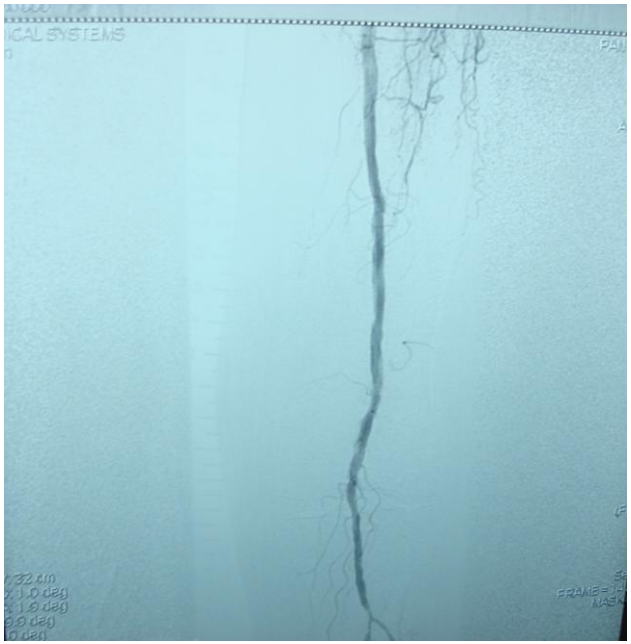
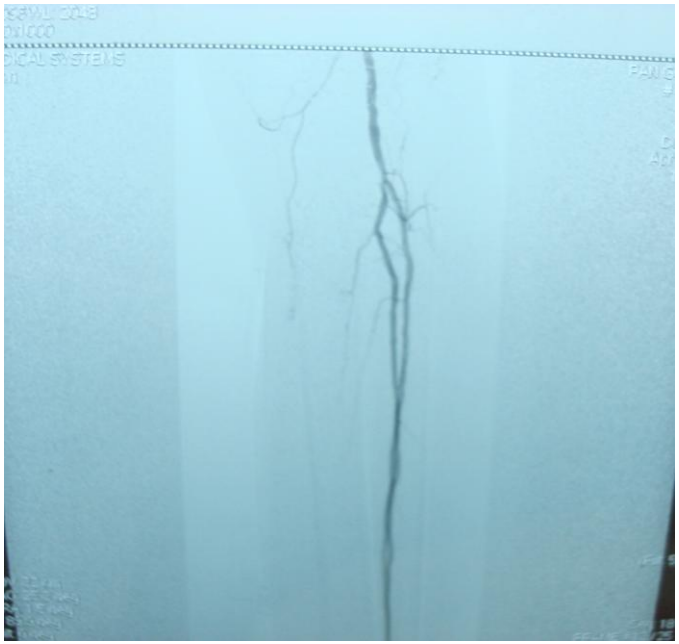
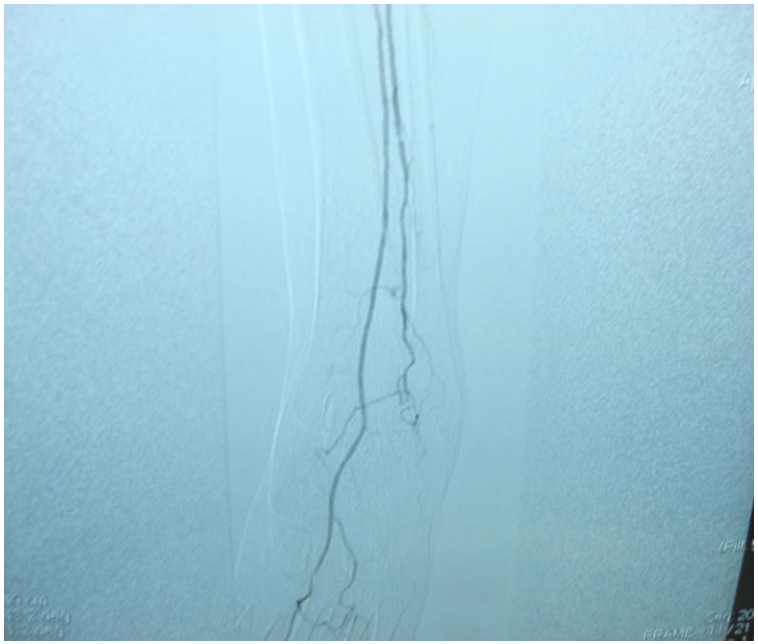


2013-4-26-ISR





treatment

- PTA
- CDT+PTA
- Stenting
- bypass
- silverhawk
- excimer laser
- cryoplasty
- cutting balloon
- brachytherapy

classification and clinical impact

- 2000,9~2009,12, multicenter
- 133 ISR lesions, 64 patients,
- class I 29% limbs, II 38%, III 33%
- follow-up period 24±17 ms
- death 14, bypass 11, major amputation 1
- class I 49.9%, II 53.3%, III 84.8% recurrent ISR at 2 ys
- class I 15.9%, II 18.9%, III 64.6% recurrent occlusion at 2 ys

- *Tosaka A, Soga Y, Iida O, et al. Classification and clinical impact of restenosis after femoropopliteal stenting.J Am Coll Cardiol. 2012 Jan 3;59(1):16-23.*

silverHawk atherectomy

- 2005,2 ~ 2010,4
- 41 patient (70.9±9.2 ys, 56% males)
- mean 331.63 ds
- TLR target lesion revascularization, TVR target vessel revascularization
- lesion length 126.2±79.3mm, diameter 5.8±0.7mm, severity 90.7%±8.2%
- PTA 97.6%, bailout stenting 24.4%
- ABI 0.66±0.2, 1 m 0.91±0.19, 1 y 0.61±0.28,
- **distal embolization requiring treatment 7.3%**, stent thrombosis 4.9%
- minor amputation 2.4%
- **TLR 31.7%, TVR 34.1%** by medical records and phone calls

- *Shammas NW, Shammas GA, Helou TJ, Voelliger CM, Mrad L, Jerin M. Safety and 1-year revascularization outcome of SilverHawk atherectomy in treating in-stent restenosis of femoropopliteal arteries: a retrospective review from a single center. Cardiovasc Revasc Med. 2012 Jul-Aug;13(4):224-7.*
- *Midwest Cardiovascular Research Foundation, Davenport, IA 52722, USA. shammas@mchsi.com*

silverHawk

- 33 patients, 34 limbs, 35 lesions
- mean age 70 ys,
- mean lesion length 108 mm
- alone success 86% + PTA to 97%, stent 11%
- ABI 0.54±0.26, to 0.77±0.26
- **distal embolization major complication 18%** (6/34)
- **patency 3 ms 86.2%, 6 ms 68%, 12 ms 25%**

- *Trentmann J, Charalambous N, Djawanscher M, Schäfer J-, Jahnke T. Safety and efficacy of directional atherectomy for the treatment of in-stent restenosis of the femoropopliteal artery. J Cardiovasc Surg (Torino). 2010 Aug;51(4):551-60.*

- *Clinic for Diagnostic Radiology, Schleswig Holstein University Clinic, Kiel Campus, Kiel, Germany. j.trentmann@rad.uni-kiel.de*

Mechanical rotation Rotarex

- 78 patients, 64.2±8.3 ys
- Rutherford stage on average 3.36 (2~5)
- mean lesion length 14.7 cm (6~30)
- technical success rate 97.4% (76/78)
- 52/76 (68.4%) PTA, 8/76 (10.5%) stenting
- ABI 0.61±0.17, to 0.85±0.15, 12 ms 0.78±0.16
- **Rutherford stage fell to 1.65 (1~3)**
- 14 (18.4%) restenoses, 2 dissections, no distal embolizations, no amputation or death
- **12 ms promising**

- *Wissgott C, Kamusella P, Andresen R. Treatment of in-stent reocclusions of femoropopliteal arteries with mechanical rotational catheters. Rofo. 2011 Oct;183(10):939-44.*
- *Institut für Diagnostische und Interventionelle Radiologie/Neuroradiologie, Westküstenklinikum Heide - Akademisches Lehrkrankenhaus der Universitäten Kiel, Lübeck und Hamburg. cwissgott@gmx.de*

cutting balloon

- 39 patients, ISR
- peripheral cutting balloon angioplasty(PCBA)
- conventional balloon angioplasty (CBA)
- PCBA 17, CBA 22, average lesion length 80±68 mm
- 6 ms restenosis 65% PCBA v 73% CBA, P=0.73
- ABI 0.83 v 0.75 p=0.26
- maximum walking capacity on the treadmill 117 v 103 m, p=0.97
- **disappointing 6 ms patency rates**

- *Dick P, Sabeti S, Mlekusch W, Schlager O, Amighi J, Haumer M, Cejna M, Minar E, Schillinger M. Conventional balloon angioplasty versus peripheral cutting balloon angioplasty for treatment of femoropopliteal artery in-stent restenosis: initial experience. Radiology. 2008 Jul;248(1):297-302.*
- *Department of Internal Medicine II, Division of Angiology, Vienna General Hospital, Medical School, Waehringer Guertel 18-20, A-1090 Vienna, Austria.*

ePTFE-covered stent-graft (Viabahn)

- 2004~2008
- 27 cases
- the average lesion length 24.5cm
- 52% occlusion, 37% critical limb ischemia
- primary patency rate 1y 85.1%, 3ys 81.4%
- secondary patency rate 96%
- **ISR focal at the proximal and distal edges**

- *Al Shammeri O, Bitar F, Ghitelman J, Soukas PA. Viabahn for femoropopliteal in-stent restenosis. Ann Saudi Med. 2012 Nov-Dec;32(6):572-82.*

- *Medicine, Qassim University, PO Box 6655 Buraidah 51452, Saudi Arabia. oahermas@yahoo.com*

Excimer laser and Viabahn

- 27 patients
- excimer laser and PTA, heparin-coated self-expanding stent graft
- mean lesion length 20.7±10.3 cm
- TASC C and D 81.4%
- **12 ms primary patency 48%**
- ABI 0.58±0.24, to 0.90±0.17
- 12 ms TLR 17.4%

- *Laird JR Jr, Yeo KK, Rocha-Singh K, et al. Excimer laser with adjunctive balloon angioplasty and heparin-coated self-expanding stent grafts for the treatment of femoropopliteal artery in-stent restenosis: twelve-month results from the SALVAGE study. Catheter Cardiovasc Interv. 2012 Nov 1;80(5):852-9.*

- *The Vascular Center, UC Davis Medical Center, Sacramento, California, USA. john.laird@ucdmc.ucdavis.edu*

paclitaxel-coated balloon

- 87 patients, Rutherford class 1~4
- paclitaxel-coated and conventional uncoated
- diameter 5.3±1.1 versus 5.2±1.0 mm
- degree of stenosis 84±11% versus 84±16%
- **proportion of restenotic lesions 36% v 33%**
- mean lesion length 5.7 v 6.1 cm
- 6 ms less late lumen loss 0.5±1.1 v 1.0±1.1 mm, p=0.031
- TLR 3/45 v 14/42 p=0.002 maintain up to 18 ms
- Rutherford class improved , **ABI not different**

- *Werk M, Langner S, Reinkensmeier B, Boettcher HF, Tepe G, Dietz U, Hosten N, Hamm B, Speck U, Ricke J. Inhibition of restenosis in femoropopliteal arteries: paclitaxel-coated versus uncoated balloon: femoral paclitaxel randomized pilot trial. Circulation. 2008 Sep 23;118(13):1358-65.*

- *Charité, Universitätsmedizin Berlin, Martin-Luther-Krankenhaus, Department of Radiology, Berlin, Germany. m.werk@mlk-berlin.de*

CURRENT LITERATURE FOR ALL MODALITIES IN ISR

Table 1: Performance Data for Treating In-Stent Restenosis

Modality	Current Data
PTA	Dick et al (n=22, 27% PP, 41% TLR at 6 months randomized trial to cutting balloon)
Cutting Balloon	Dick et al. (n=17, 35% PP, 32% TLR at 6 months randomized trial to PTA)
Drug Coated Balloon	No peripheral data. PACCOCATH ISR (Coronary data for in-stent restenosis showed significant improvements in PP and TLR at 2yrs).
Brachytherapy	Pokrajac et al. (n=17/28, data not specific to in-stent, but entire population had restenosis 9, 28, 48% at 1, 2, and 3 years, respectively)
Laser	No data. PATENT trial being done in Europe and IDE study in US.
Silverhawk	Zeller (n=43, 54% PP and 47% TLR 1yr, 49% PP and 49% TLR at 18 months)
Stent	None
Drug Eluting Stent	PTX Registry (n=65, 24% TLR at 1yr)
VIABAHN	Kazemi (n=20, 65% PP 1yr), Ansel (n=27, 52% PP at 18 months)

Data presented in RELINE Protocol

Cryoplasty

- 2004~2007
- cryoplasty (Cryo n=37) over balloom (CBA n=39)
- mean length:Cryo 191.7mm, CBA 140.9mm
- additional secondary intervention time
  - Cryo 4.09ms CBA 10.79ms
- recurrent stenosis-free survival
  - 3m Cryo 88.9%, CBA 96.9%
  - 6m Cryo 43.9%, CBA 84.0%
- Cryoplasty ***no benefit*** over CBA

- *Shin SH, Baril DT, Chaer RA, et al. Cryoplasty offers no advantage over standard balloon angioplasty for the treatment of in-stent stenosis. Vascular. 2013 Mar 14.*
- *Division of Vascular and Endovascular Surgery, University of Pittsburgh Medical Center, Pittsburgh, PA 15213, USA.*

brachytherapy

- 2009.7 ~ 2011.4
- 90 consecutive patients (59 men)
- 68.3±10.3 ys, range 43-86
- mean lesion length 24.6 cm
- liquid beta-emitting rhenium-188
- primary patency 6 ms 95.2%, 12 ms 79.8%

- (strontium-90) 42 ms follow
- cumulative restenosis rates 1 y 9%, 2ys 28%, 3ys 40%

- *Werner M, Scheinert D, Henn M, et al. Endovascular brachytherapy using liquid Beta-emitting rhenium-188 for the treatment of long-segment femoropopliteal in-stent stenosis. J Endovasc Ther. 2012 Aug;19(4):467-75.*
- *Center for Vascular Medicine, Park Hospital Leipzig, Germany. office@drwerner.eu*

- *Pokrajac B, Kirisits C, Schmid R, Schillinger M, Berger D, Peer K, Tripuraneni P, Pötter R, Minar E.Beta endovascular brachytherapy using CO2-filled centering catheter for treatment of recurrent superficial femoropopliteal artery disease.Cardiovasc Revasc Med. 2009 Jul-Sep;10(3):162-5. doi: 10.1016/j.carrev.2009.02.005.*
- *Department of Radiotherapy, Medical University of Vienna, Vienna General Hospital, Waehringer Guertel 18-20, A-1090 Vienna, Austria. boris.pokrajac@meduniwien.ac.at*

Medicine

- Ikushima I, Yonenaga K, Iwakiri H, Nagoshi H, Kumagai H, Yamashita Y.
- A better effect of **cilostazol** for reducing in-stent restenosis after femoropopliteal artery stent placement in comparison with **ticlopidine**.

- *Med Devices (Auckl). 2011;4:83-9. doi: 10.2147/MDER.S21629. Epub 2011 Jun 24.*
- *Department of Radiology, Miyakonojo Medical Association Hospital, Miyakonojo, Japan.*

our data

- 2010,3~2013,3 Renji hospital east ward
- TASC C/D, SFA(PA) lesions≥150mm
- stenting treat and follow-up
- 64 patients,71 limbs
- average 73.6 ys, range 53 to 91
- M:F = 42:22
- L:R = 40:31
- average 5.7 ms, (1~29ms)

- stent length average 289mm,(150~500mm)
- stent type: MARIS, SMART,EVERFLEX,LIFESTENT,
- stent numbers: 2.4(1~4)

Duplex

动脉狭窄程度	病变处收缩期流速峰值（cm/s）	收缩期流速峰值比*
正常	＜150	＜1.5:1
30%～49%	150～200	1.5:1～2:1
50%～75%	200～400	2:1～4:1
＞75%	＞400	＞4:1
闭塞	无血流信号	

results

- 36/71=50.7%, stent fracture 3+1cases(6.3%)

class	1	2	3	4
cases	5	16	7	8
%	14%	45%	19%	22%

How to treat?

- 31 cases

class	1	2	3	4
cases	5	16	7	8
PTA	0	8	5	1+1
MED.		8	2	6

2011-12-30


GE MEDICAL SYSTEMS
Unknown
WANG XI JIU
1218368
M
D0014378
Dec 30 2011
14:03:36
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FOV: 40 cm
RAO: 0.6 deg
CRA: 0.6 deg
L: -90.0 deg
Tilt: 0 deg
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WW: 4096 WL: 2048
XA 1000x1000
Seq: 2
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MASK = 1


GE MEDICAL SYSTEMS
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1218368
M
D0014378
Dec 30 2011
14:04:46
(Filt. 5)
FOV: 40 cm
RAO: 0.6 deg
CRA: 0.6 deg
L: -90.0 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
WW: 4096 WL: 2048
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MASK = 1

2011-12-30


GE MEDICAL SYSTEMS
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WANG XI JIU
1218368
M
D0014378
Dec 30 2011
14:34:34
(Fil. 5)
FOV: 32 cm
RAO: 39.4 deg
CRA: 0.9 deg
L: -90.0 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
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XA 800x800
Seq: 4
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MASK = 1


GE MEDICAL SYSTEMS
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WANG XI JIU
1218368
M
D0014378
Dec 30 2011
14:47:44
(Fil. 5)
FOV: 40 cm
RAO: 33.0 deg
CRA: 1.1 deg
L: -90.0 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
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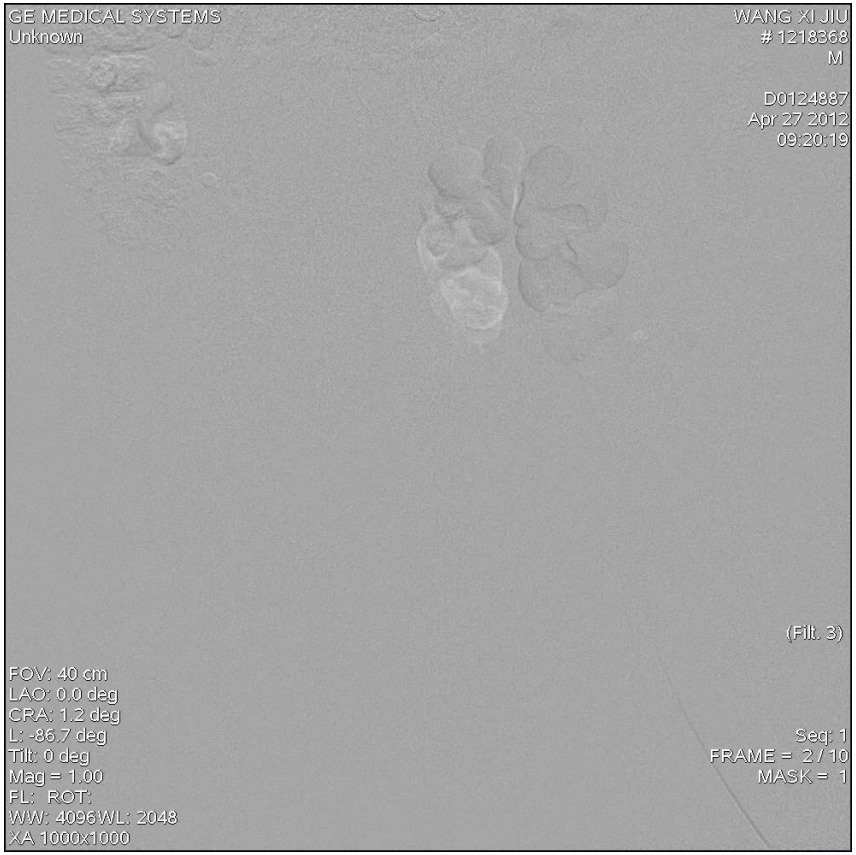
2011-12-30-stenting

2011-12-30-stenting

2012-4-27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M
D0124887
Apr 27 2012
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CRA: 1.2 deg
L: -86.7 deg
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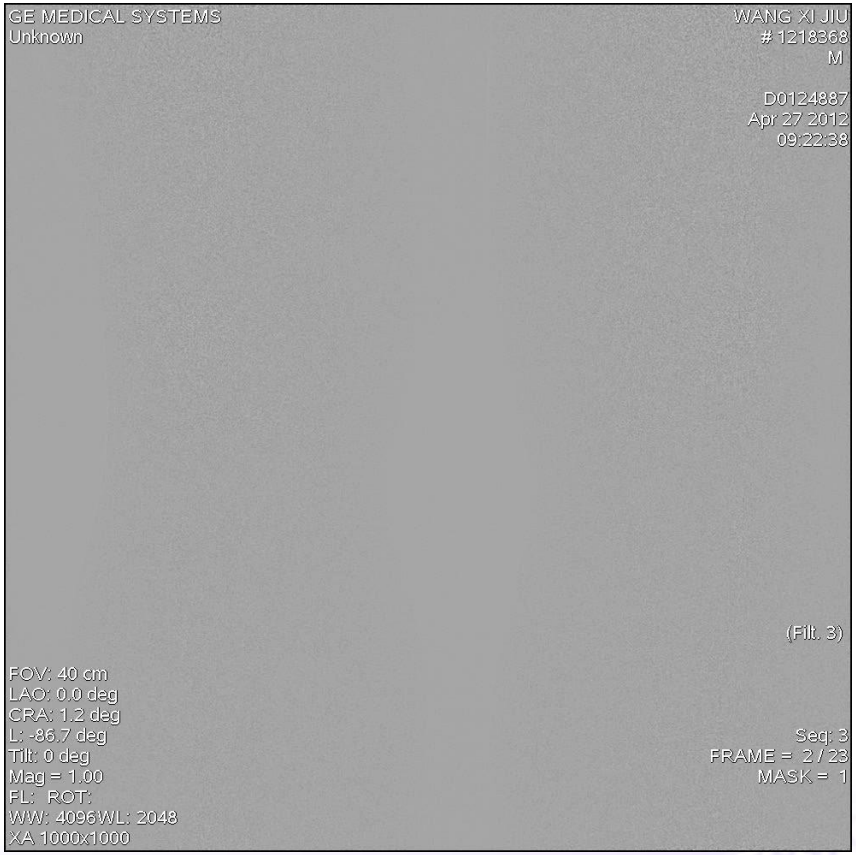
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CRA: 1.2 deg
L: -86.7 deg
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Mag = 1.00
FL: ROT:
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Seq: 3
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2012-4-27-CDT


GE MEDICAL SYSTEMS
Unknown
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#1218368
M
D0124887
Apr 27 2012
09:33:50
(Flt. 3)
FOV: 32 cm
LAO: 0.0 deg
CRA: 1.2 deg
L: -66.7 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
WW: 4096WL: 2048
XA 800x800
Seq: 8
FRAME = 2 / 8
MASK = 1


GE MEDICAL SYSTEMS
Unknown
WANG XI JIU
#1218368
M
D0124887
Apr 27 2012
10:18:08
(Flt. 3)
FOV: 32 cm
LAO: 0.0 deg
CRA: 1.2 deg
L: -66.7 deg
Tilt: 0 deg
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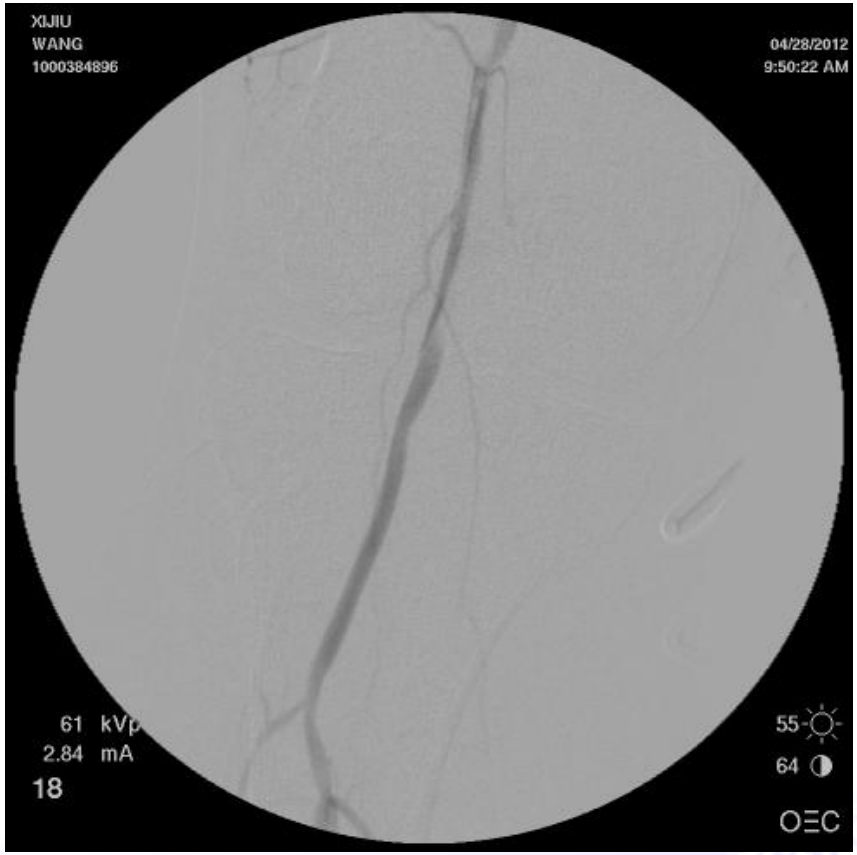
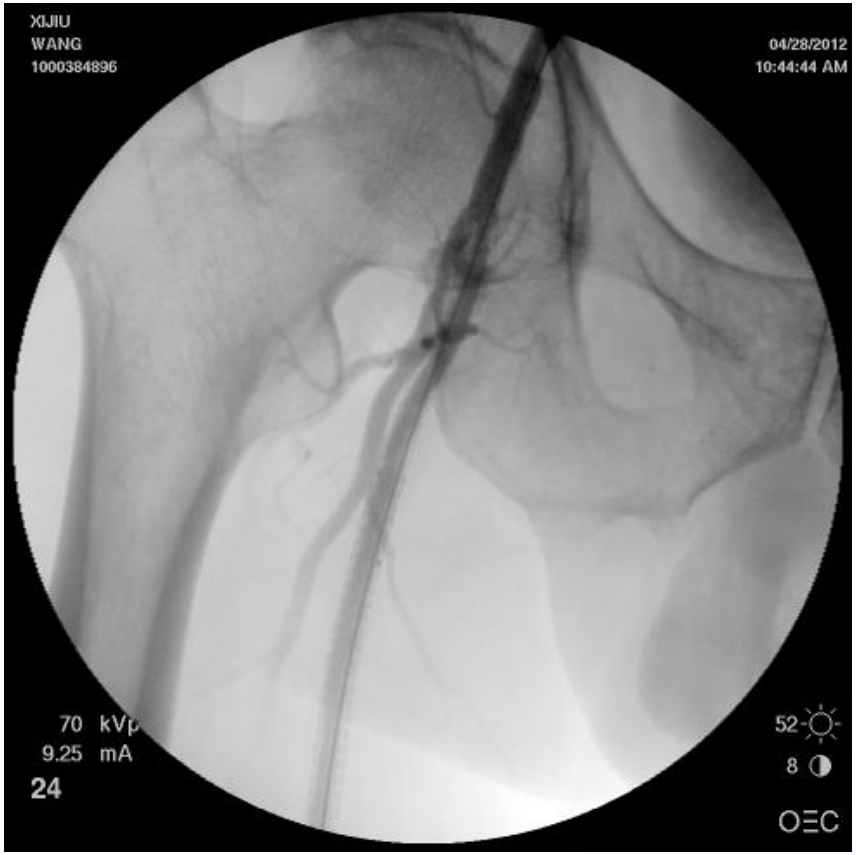
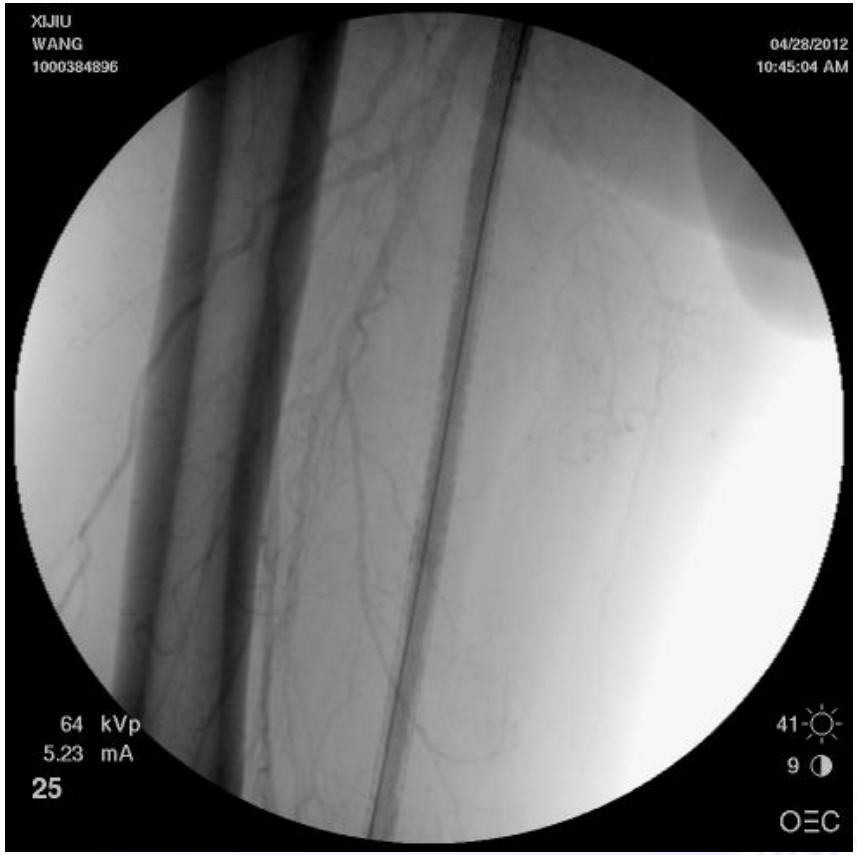
2012-4-28-after-CDT



2013-4-28-stenting





2012-4-28-stenting

2013-4-12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Apr 12 2013
09:26:09
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CRA: 0.5 deg
L: -88.7 deg
Tilt: 0 deg
Mag = 1.00
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Seq: 3
FRAME = 2 / 42
MASK = 1


GE MEDICAL SYSTEMS
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WANG XI JIU
1218368
M
D0486270
Apr 12 2013
09:27:03
(Filt. 5)
FOV: 40 cm
LAO: 0.9 deg
CRA: 0.5 deg
L: -88.7 deg
Tilt: 0 deg
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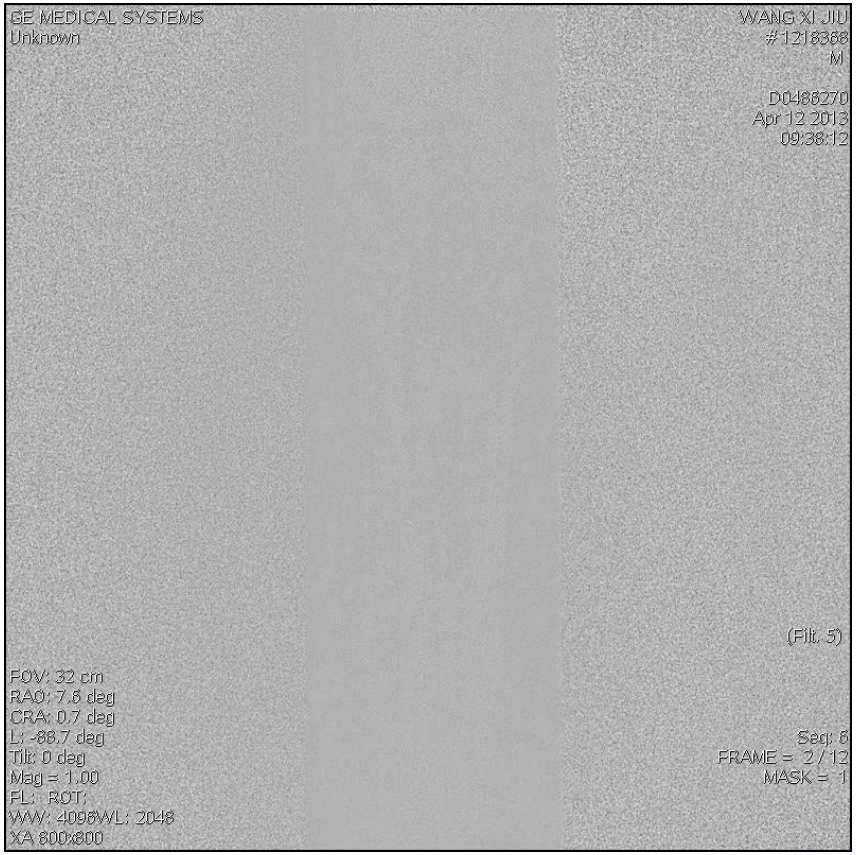
WW: 4096 WL: 2048
XA 1000x1000
Seq: 4
FRAME = 2 / 41
MASK = 1

2013-4-12-PTA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WANG XI JIU
#1218388
M
D0486270
Apr 12 2013
09:38:12
(Fil. 5)
FOV: 32 cm
RAO: 7.8 deg
CRA: 0.7 deg
L: -88.7 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
WW: 4096WL: 2048
XA 800x800
Seq: 8
FRAME = 2 / 12
MASK = 1


GE MEDICAL SYSTEMS
Unknown
WANG XI JIU
#1218388
M
D0486270
Apr 12 2013
10:39:06
(Fil. 5)
FOV: 32 cm
RAO: 20.3 deg
CRA: 0.8 deg
L: -88.7 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
WW: 4096WL: 2048
XA 800x800
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2013-4-12-PTA


GE MEDICAL SYSTEMS
Unknown
WANG XI JIU
#1218368
M
D0486270
Apr 12 2013
10:39:25
(Fil. 5)
FOV: 32 cm
RAO: 20.3 deg
CRA: 0.8 deg
L: -68.7 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
WW: 4096WL: 2048
XA 800x800
Seq: 21
FRAME = 2 / 11
MASK = 1


GE MEDICAL SYSTEMS
Unknown
WANG XI JIU
#1218368
M
D0486270
Apr 12 2013
10:39:42
(Fil. 5)
FOV: 32 cm
RAO: 20.3 deg
CRA: 0.8 deg
L: -68.7 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
WW: 4096WL: 2048
XA 800x800
Seq: 22
FRAME = 2 / 15
MASK = 1

Progress

- coated stent-graft
- drug-eluting balloon(DEB)
- drug-eluting stent(DES)
- biodegradation
- nanotechnology
- gene


prognosis
The Blue River,
Greenland
格陵兰的蓝河


prognosis
Earth sunrise from Space

Thank You !

Welcome to Renji