

# 血管外科醫師



## 與透析室的交會

2023.10.22



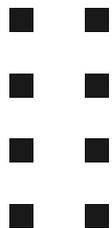
馮品超 醫師

Pin-Chao Feng, M.D.

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長庚大學機械工程博士班  
德仁醫院心臟血管外科主治醫師

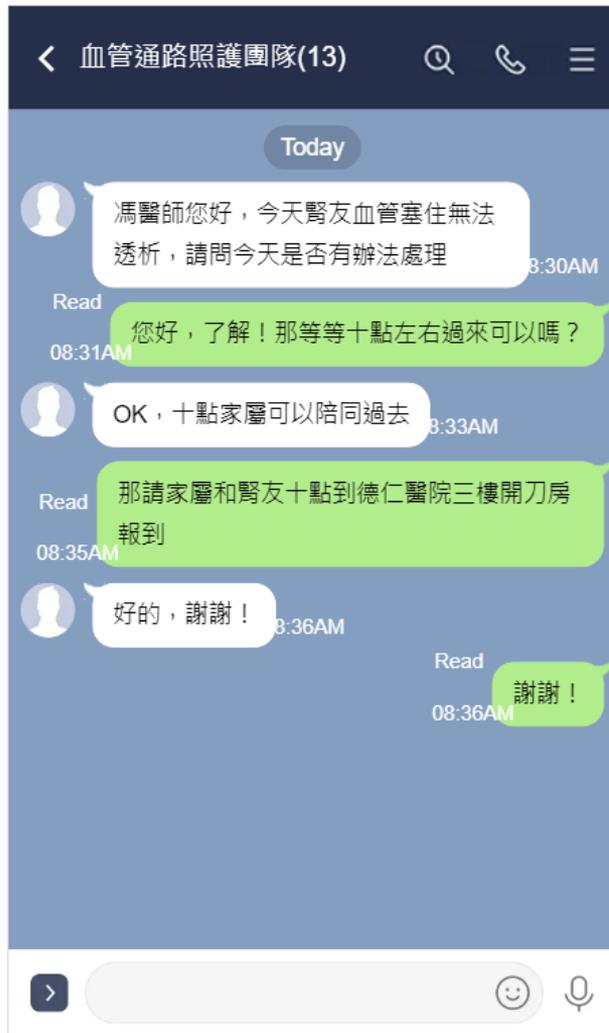




# 血管通路照護 過去與現在

從筆友到朋友

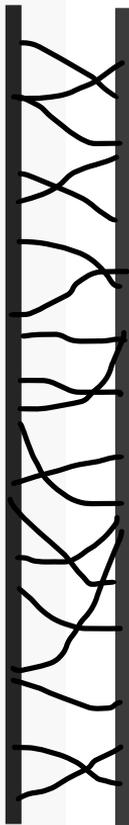








手術房  
血管外科



透析室  
腎臟科醫師  
護理師





## 01

### 瘻管創建

AVF or AVG?

## 02

### 下針時機 / 位置？

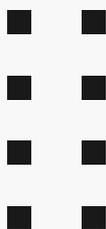
大小 / 深度 / 方向



## 03

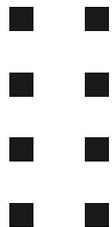
### 狹窄 OR 阻塞？

血栓判定與處理



## 04

### 結論



# 01



## 瘻管創建

**Catheter last but...**

AVF or AVG?





# 2019 update of KDOQI

## ( 指引建議 )

2.4 KDOQI considers it reasonable that the choice of AV access (AVF or AVG) be based on the **operator's/clinician's best clinical judgment** that considers the **vessel characteristics, patient comorbidities, health circumstances, and patient preference**. (Expert Opinion)

最佳臨床判斷 +  
考量血管 / 共病 / 意願





# 2019 update of KDOQI

( 指引建議 )

1. 前臂遠心端 AVF
2. 前臂 loop AVG or 前臂近心端 AVF
3. 上臂 BB AVF or 上臂 AVG



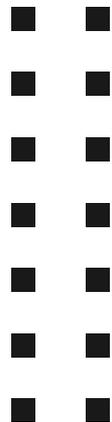
# What are the patency outcomes for arteriovenous fistulas and grafts for hemodialysis access?



Cohort & Methods	Results		
 <p>Retrospective cohort study</p> <p>8 hospitals in Netherlands</p>  <p>1041 patients</p> <p>Vascular access:</p> <ul style="list-style-type: none"> <li>- Radiocephalic AV fistula (RC AVF)</li> <li>- Upper arm AVF</li> <li>- Arteriovenous graft (AVG)</li> </ul> 	 <p>RC AVF (n = 557)</p> <p>Upper Arm AVF (n = 378)</p> <p>AVG (n = 106)</p>	 <p>Functional Patency</p> <p>1 year      3 years</p> <p>67%      62%</p> <p>83%      74%</p> <p>85%      69%</p>	 <p>Procedures (per year)</p> <p>1.3</p> <p>1.8</p> <p>3.3</p>

**Conclusions** The functional patency of AVFs and AVGs is comparable, although AVGs required more interventions to maintain usability for hemodialysis.

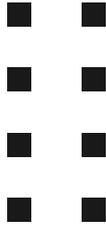
Bram M. Voorzaat, Cynthia J. Janmaat, Koen E.A. van der Bogt, et al. *Patency of arteriovenous fistulas and grafts for hemodialysis access: a trade-off between non-maturation and long-term complications.* Kidney360 doi: 10.34067/KID.0000462020. Visual Abstract by Eric Au, MBBS, MPH, FASN





Cephalic vein

Basilic vein



# 自體慶管成熟影響因子



血管小



女性



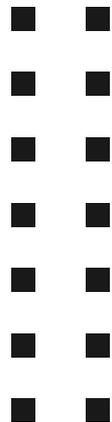
年紀大

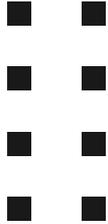


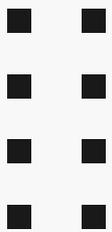
共病 ( DM/HTN )



BMI 高

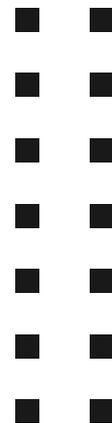


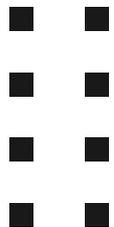




# ePTFE

## 聚四氟乙烯





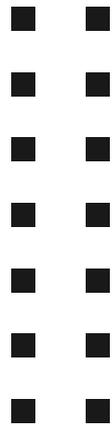
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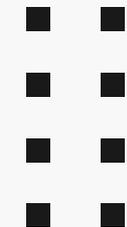
## 下針時機 / 位置？

血管大小（直徑） / 深度 / 方向





「馮醫師，瘻管可以使用了嗎？」



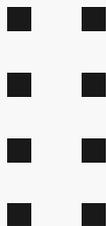


# 血管大小（直徑） / 深度



2006 KDOQI  
Rule of 6s

Vessel inner diameter >6 mm  
Depth <6 mm from skin



2019 update  
of KDOQI

Abandons these criteria  
AVF maturation is primarily  
based on clinical  
judgment



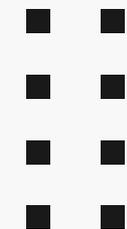
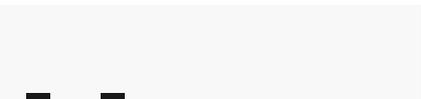
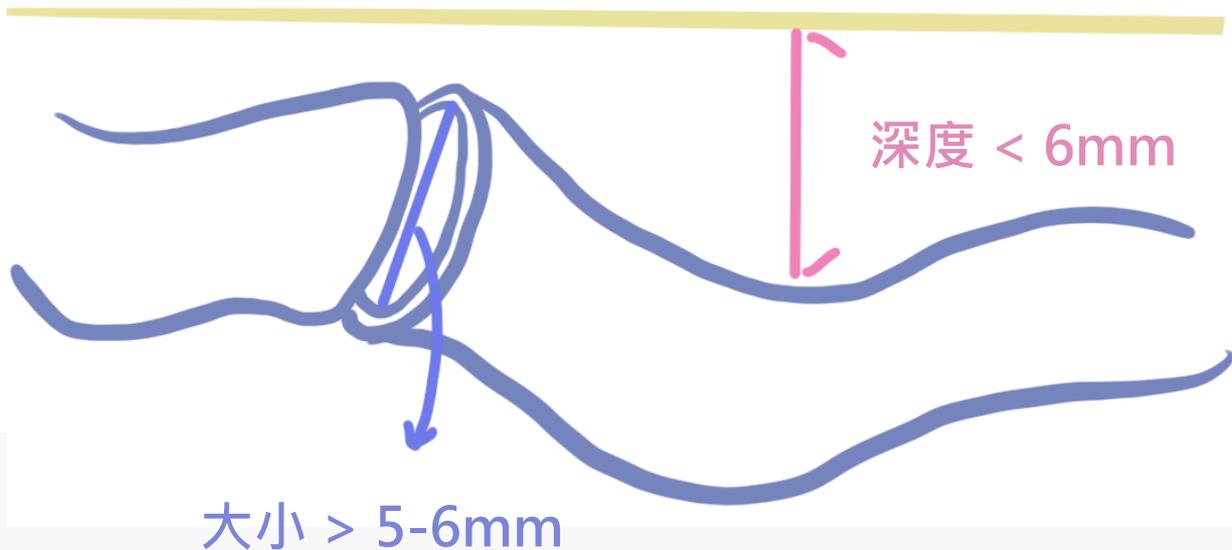
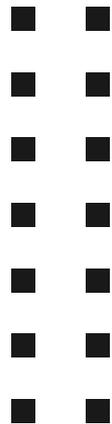
Chinese  
Consensus

Vascular inner diameter >5 mm  
Flow >500 mL/min  
Depth <6mm from skin

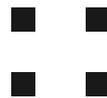
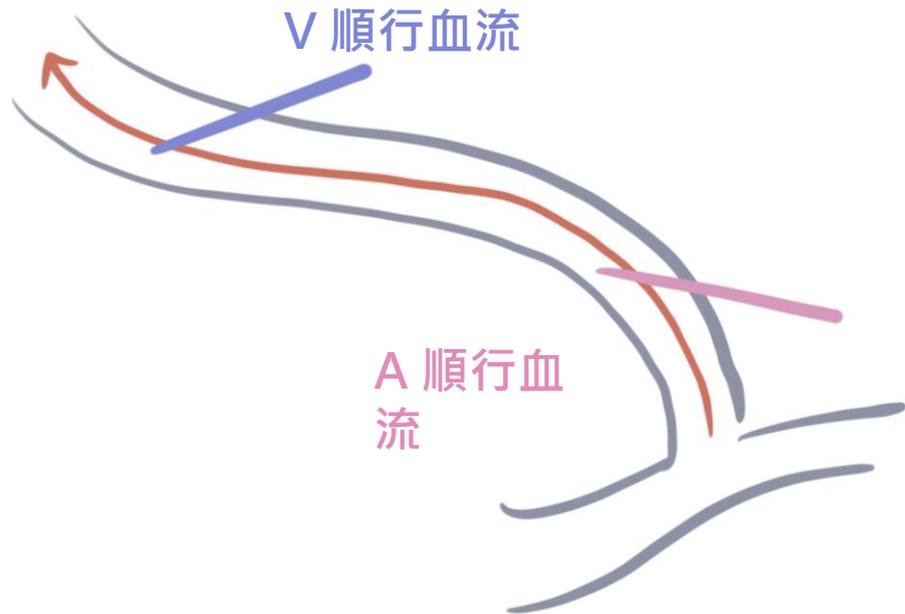
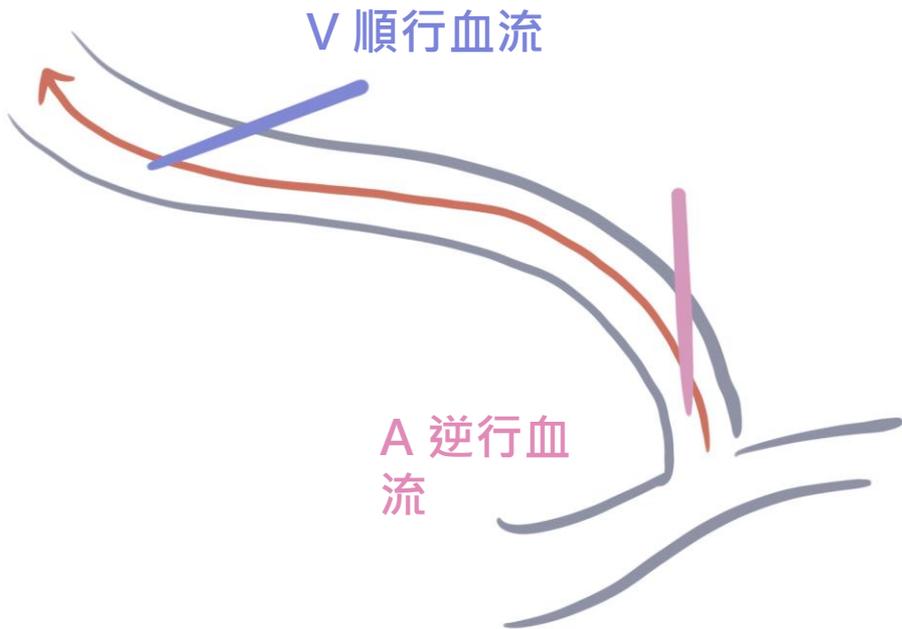




# 血管大小（直徑） / 深度



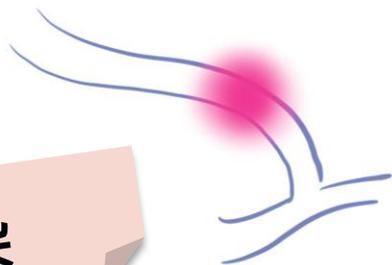
# 下針方向



# 須避開的區域



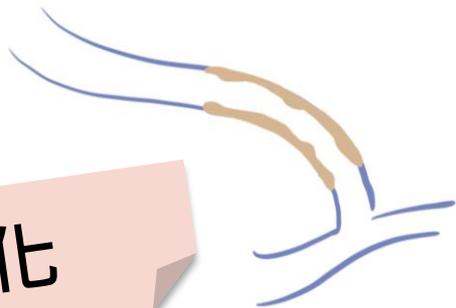
感染



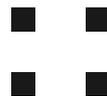
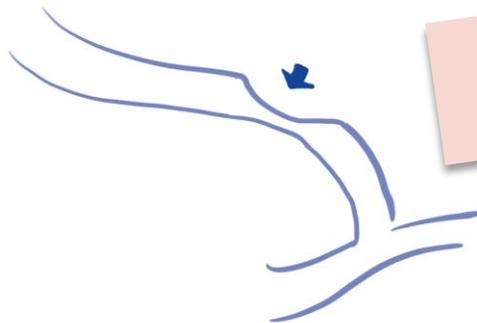
瘤體



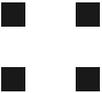
鈣化



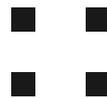
塌陷

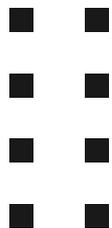


# 須避開的區域（支架）



# 須避開的區域 ( 感染 )





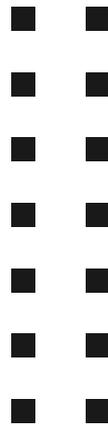
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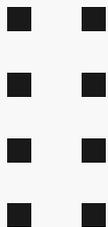
## 狹窄 OR 阻塞？

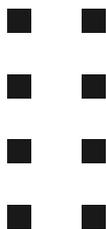
血栓判斷與處理





「馮醫師，血管塞住了嗎？」



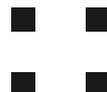


狹窄



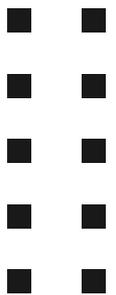
阻塞

	狹窄	阻塞
瘻管聲音	變化	靜止
血塊	通常無	生成
透析	可以 (靜脈壓 / 流速)	無法
介入處理	近期	馬上
手術時間	較短	較長





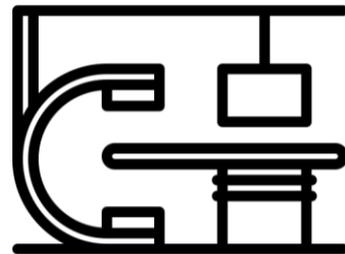
# 狹窄



理學檢查



超音波



血管攝影



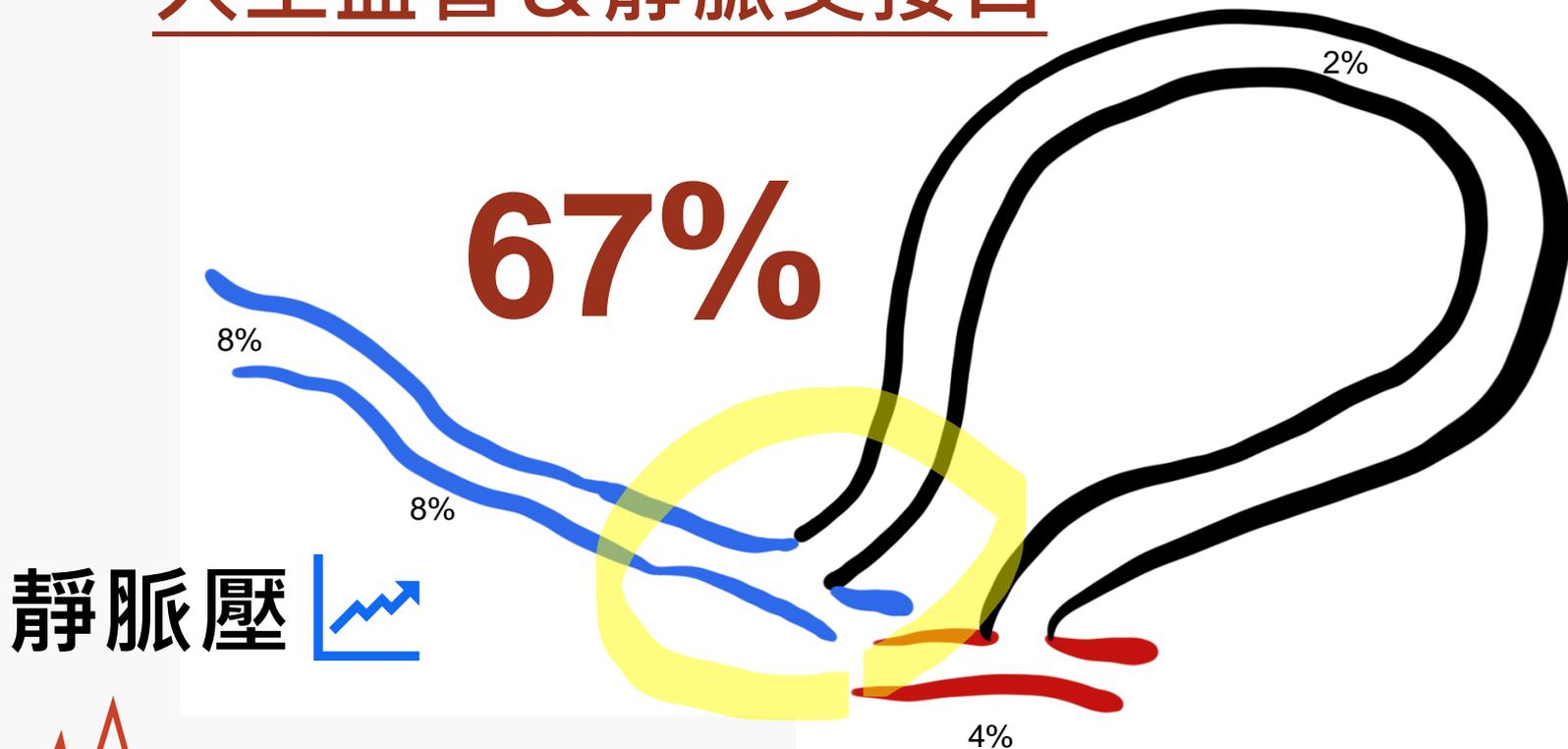


⊕ 狹窄

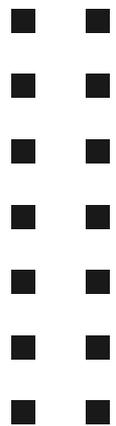
狹窄區域：人工血管（AV Graft）



## 人工血管 & 靜脈交接口



靜脈壓



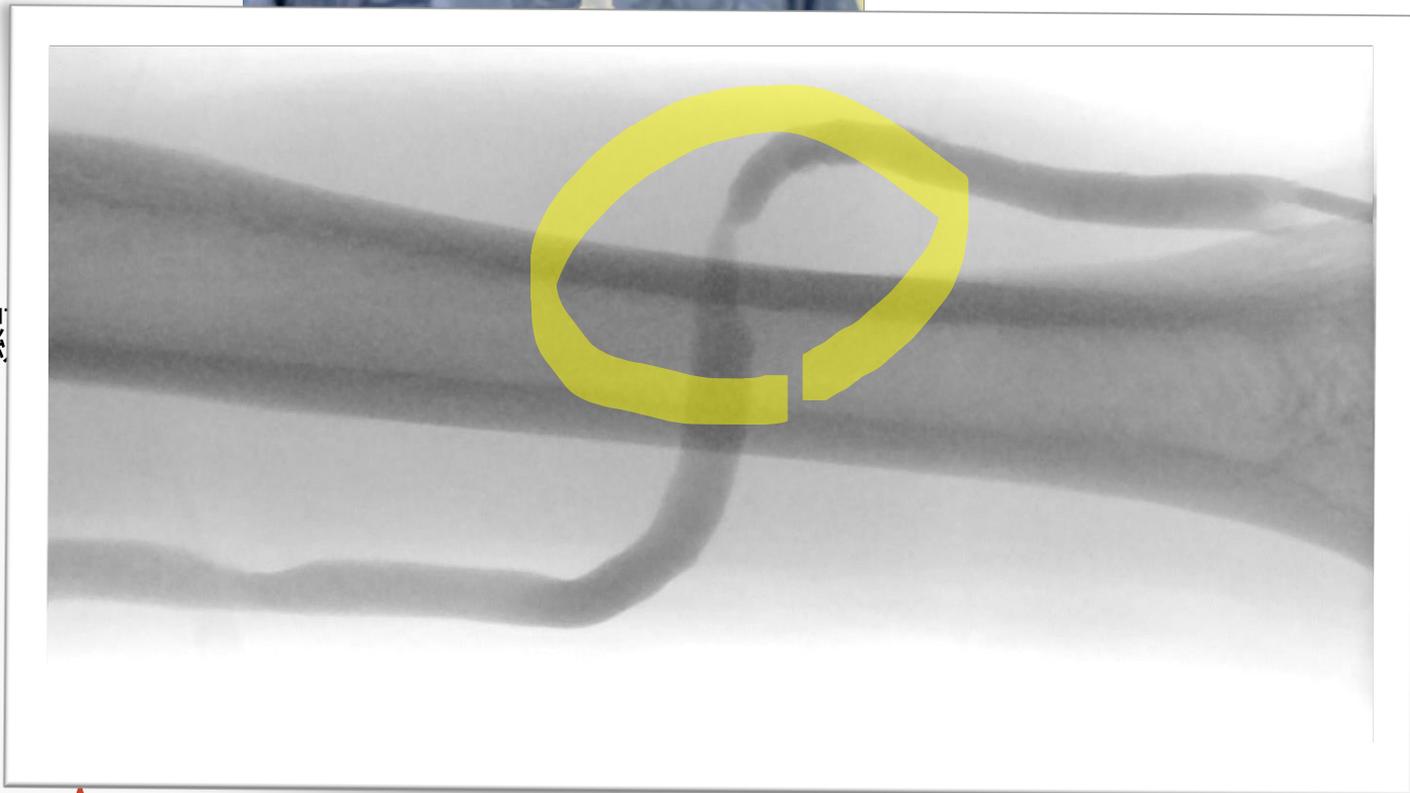
⊕ 狹窄



建立 sheath



⚠ 狹窄



注射點





# 氣球擴張



 狹窄

**Table 13.2.** Clinical Indicators (Signs and Symptoms) Suggesting Underlying Clinically Significant Lesions During Access Monitoring

Procedure	Clinical Indicators	
Physical examination or check	• Ipsilateral extremity edema	354,365
	• Alterations in the pulse, with a weak or resistant pulse, difficult to compress, in the area of stenosis	378
	• Abnormal thrill (weak and/or discontinuous) with only a systolic component in the region of stenosis	239
	• Abnormal bruit (high pitched with a systolic component in the area of stenosis)	360
	• Failure of the fistula to collapse when the arm is elevated (outflow stenosis) and lack of pulse augmentation (inflow stenosis)	267
	• Excessive collapse of the venous segment upon arm elevation	
Dialysis	• New difficulty with cannulation when previously not a problem	379
	• Aspiration of clots	239
	• Inability to achieve the target dialysis blood flow	360
	• Prolonged bleeding beyond usual for that patient from the needle puncture sites for 3 consecutive dialysis sessions	
	• Unexplained (>0.2 units) decrease in the delivered dialysis dose (Kt/V) on a constant dialysis prescription without prolongation of dialysis duration	

*Kdoqi clinical practice guideline for vascular access:2019 update*

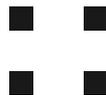


**Table 13.2.** Clinical Indicators (Signs and Symptoms) Suggesting Underlying Clinically Significant Lesions During Access Monitoring

## • 理學檢查

Physical examination or check	Unilateral extremity edema	354,365
	Abnormalities in the pulse, which may be a decreased pulse compress, in the area of stenosis	378
	Abnormal thrill (weak and/or discontinuous) with only a systolic component in the region of stenosis	239
	Abnormal bruit (high pitched with a systolic component in the area of stenosis)	360
	Abnormalities of the fistula, such as venous thromboses (outflow stenosis) and lack of pulse augmentation (inflow stenosis)	267
	<ul style="list-style-type: none"><li>Excessive collapse of the venous segment upon arm elevation</li></ul>	

Dialysis	New difficulty with cannulation when previously not a problem	379
• 透析	<ul style="list-style-type: none"><li>Aspiration of clots</li><li>Inability to achieve the target dialysis blood flow</li><li>Prolonged bleeding beyond usual for that patient from the needle puncture sites for 3 consecutive dialysis sessions</li></ul>	239
	<ul style="list-style-type: none"><li>Unexplained (&gt;0.2 units) increase in the delivered dialysis dose (Kt/V) on previous dialysis prescription without prolongation of dialysis duration</li></ul>	360
	上針困難 / 血塊 / 止血困難 / 清除率	

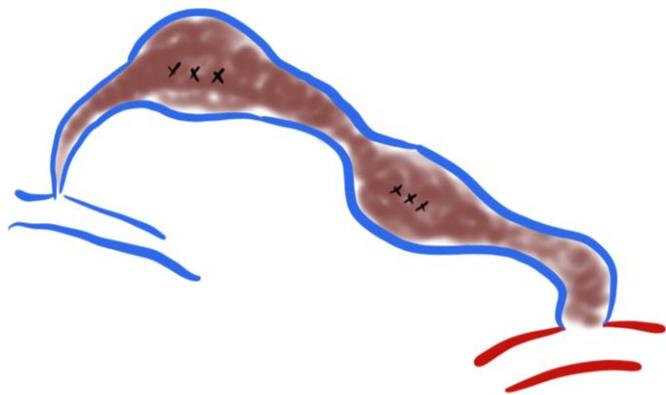




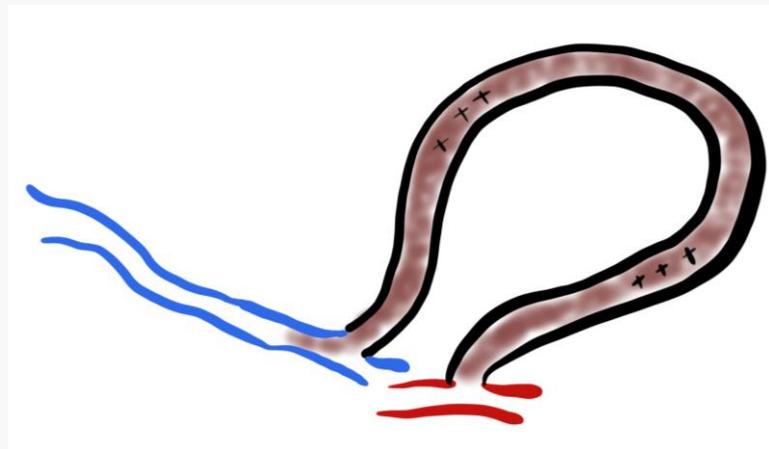


# 🚫 阻塞

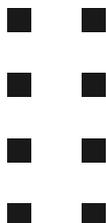
血栓位置



AV Fistula



AV Graft





# 🚫 阻塞

## 治療概念

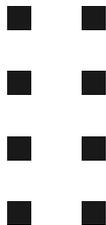


血栓清除



治療病灶

Allon M: Current management of vascular access. Clin J Am Soc Nephrol 2:786–800, 2007  
Akoh JA: Prosthetic arteriovenous grafts for hemodialysis. J Vasc Access 10:137–147, 2009







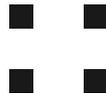
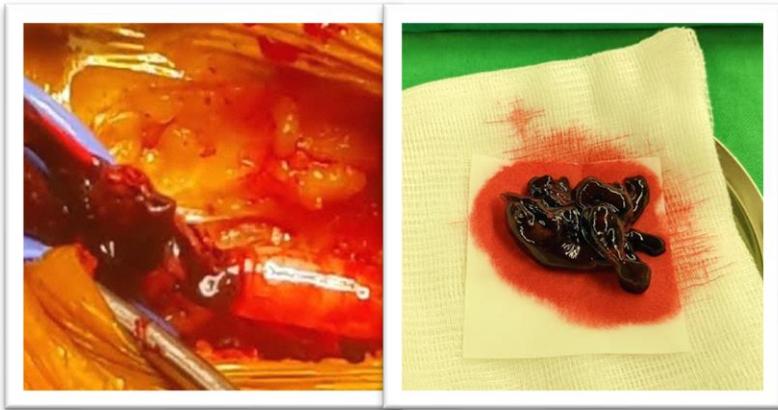
# 血栓清除



傳統傷口



## 取出血栓



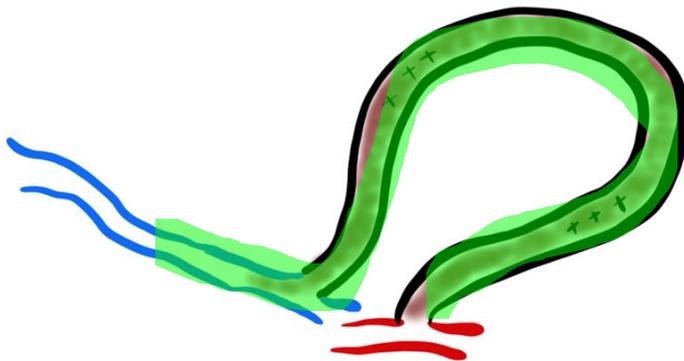
# 血栓清除



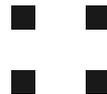
微創針孔



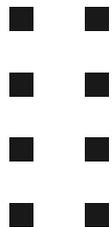
## 溶栓藥物



- 多孔導管
- 溶栓藥物釋放
- 部分血栓吸除







# 04

## 總結

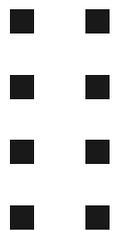
快結束了



# 總結

依照腎友**慶管類型**與**問題**  
計畫治療方針

⋮ 自體 vs 人工  
阻塞 vs 狹窄 ⋮  
傳統 vs 微創 ⋮





# 總結

## 找血管外科的時機



腫脹 / 疼痛



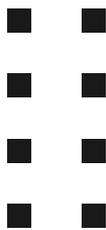
瘻管聲音異常

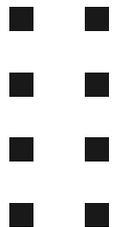


上針困難



流速 / 靜脈壓異常





# Thanks!

