CVAD complications: Occlusion, extravasation, thrombosis

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Speaker Info and Disclosures

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Consultant/Speakers Bureau/Advisory Board for: Angiodynamics, BD/Carefusion, Interrad Medical, Ethicon, Fresenius Kabi

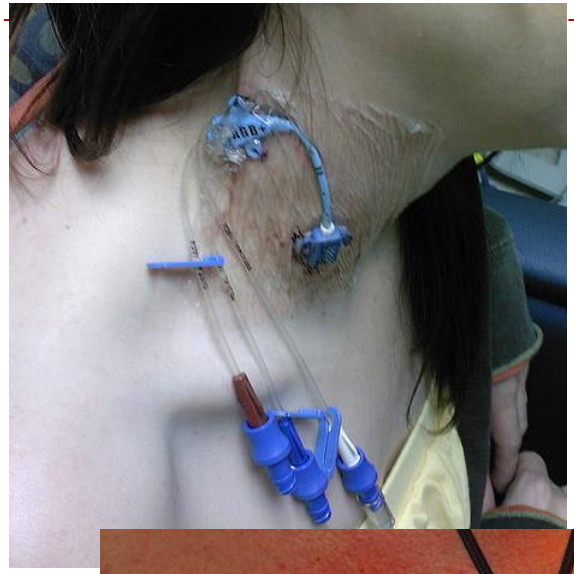
THANK YOU to Angiodynamics for supporting me to be here.

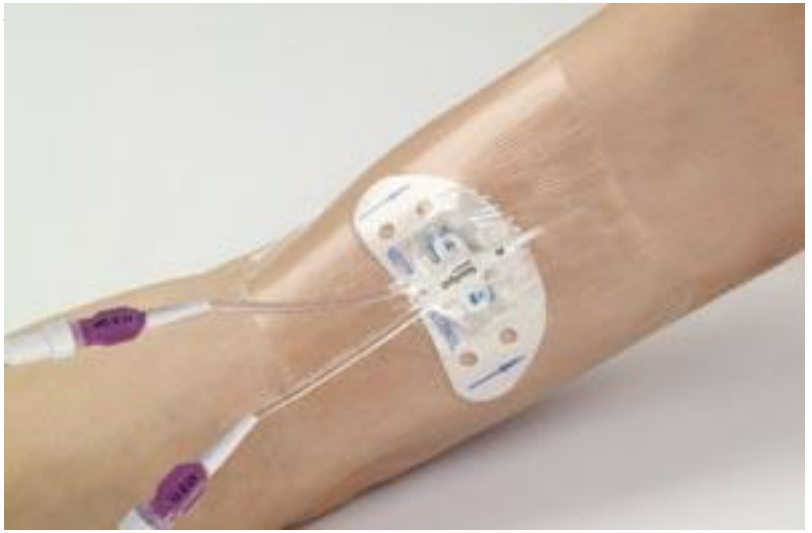
Angiodynamics had no input or involvement in the development of this presentation.
All content and opinion in this presentation is solely independent.

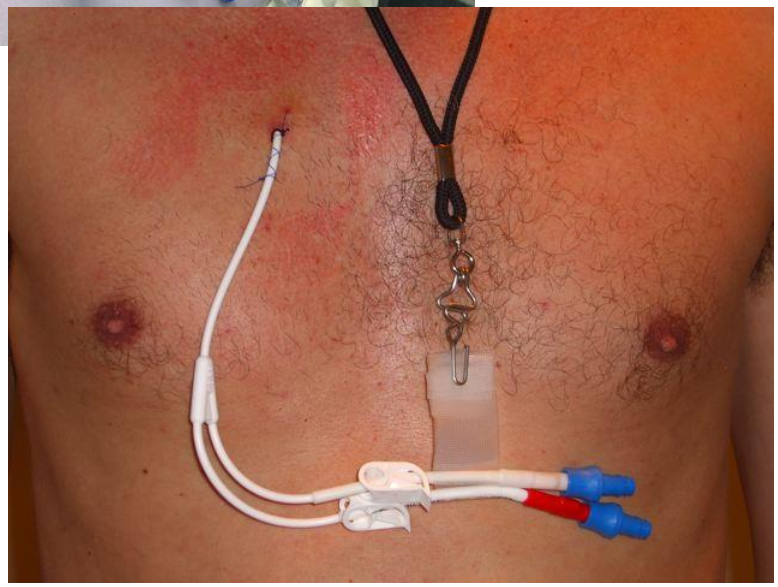
Objectives

1. Define CVAD occlusion, thrombosis and extravasation.
2. Discuss the clinical implications these of CVAD complications on chemotherapy administration and effect on therapy delivery.
3. Discuss intervention strategies for occlusion management.

CVADs







Catheter Occlusion

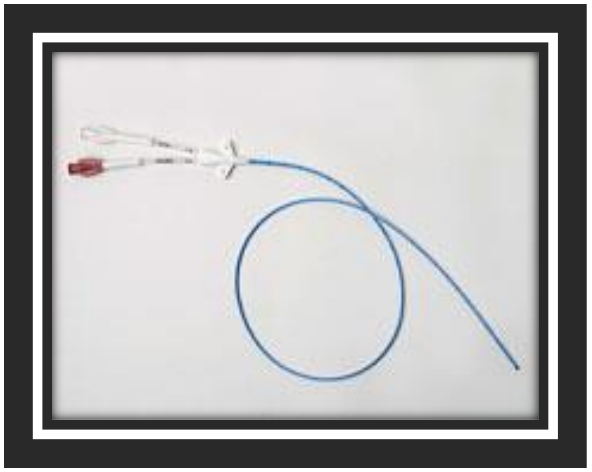
- Obstruction of a CVAD lumen, preventing or limiting the ability to flush, withdraw blood, and/or administer solutions or medications.

(INS CVAD Occlusions, 2013)

Types of Occlusions

1. **Partial:** *Decreased* ability to infuse fluid or aspirate blood
2. **Withdrawal:** Sluggish or absent blood return; flushes without resistance
3. **Complete:** *Inability* to infuse fluid or aspirate blood

Causes of Catheter Occlusions



Mechanical

Chemical

Thrombotic

42%

58%

Stephens, *J Parenteral Enteral Nutrition.* 1995;19.75.

Mechanical

Tubing!

- Kinked line – external (catheter or IV tubing)
- Kinked line – internal (Pinch-off Syndrome)
- Clogged filter, IV tubing

Chemical

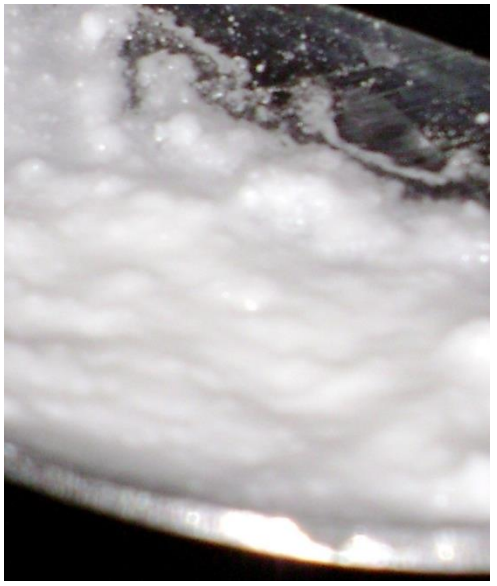
Causes

- Precipitation of medication (drug- to-drug or drug-to-solution **incompatibilities**)
- Precipitation of minerals (Ca-PO4)
- Lipid deposits

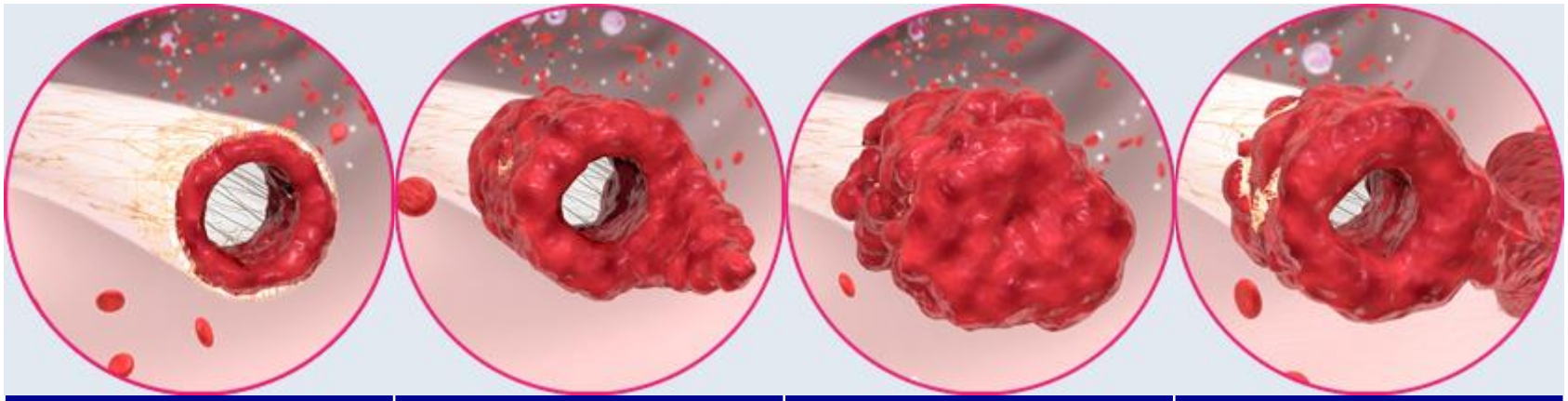
Assess

- Flush solution
- Lock solution
- Medications, drugs
- Lipids, TPN
- “Other”…

“Other”



Thrombotic Occlusion - Types



Intraluminal	Fibrin Tail	Fibrin Sheath	Mural Thrombus

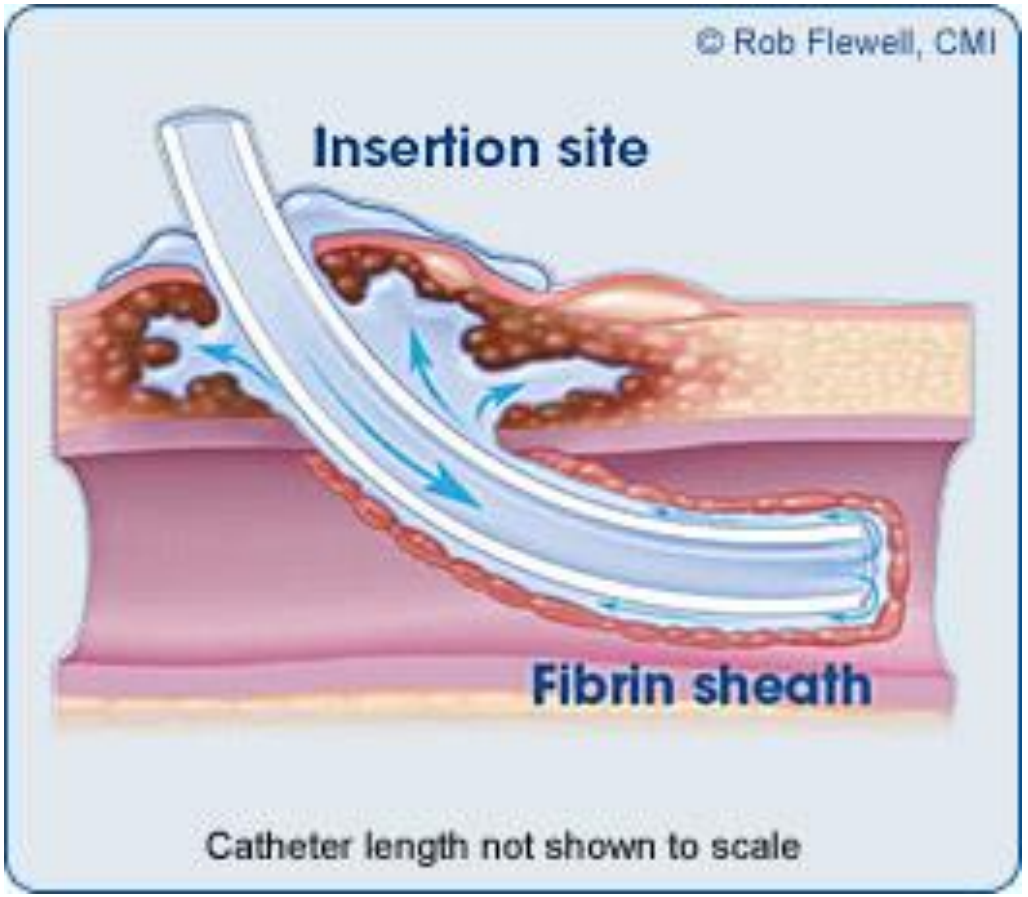
Thrombus – the threads that trap

- “Sticky” feature
- Chemical precipitate

Microbes, bacteria
>>>> INFECTION

http://www.bayerpharma.com/concerns-of-the-heart/tool/images/pic_thrombosis.png

Consider – Where will the fluid go (medication, chemotherapy)



www.cathmatters.com

Infiltration and Extravasation

Infiltration

- Inadvertent administration of a nonvesicant solution/medication into the surrounding tissue
- May cause pain, swelling, discolouration

Extravasation

- If the solution is a vesicant (i.e., some antibiotics, chemotherapeutic agents)
  - More severed effects which may lead to tissue necrosis

Example of extravasation in chest

Mayo DJ. Oncol Nurs Forum. 1995;22(4):675-680.
Herbst S. J Infus Chemother 1995; 6(4):186-194;
INS. J Infu Nurs. 2011;34(1S1-S110)

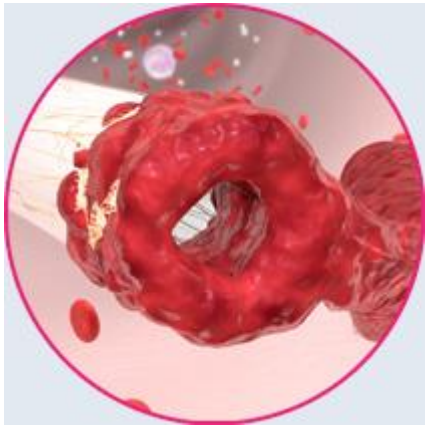
Extravasation

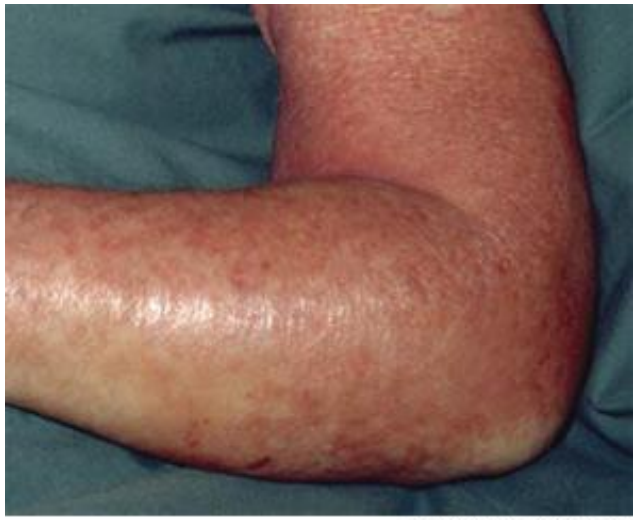
http://www.oncoprof.net/Generale2000/g09_Chimiotherapie/images/extravasation.jpg

http://www.pedagogy-inc.com/Pedagogy/Media/image/Central%20Lines/extravasation%20of%20port%20doxirubicin.jpg

http://download.thelancet.com/images/journalimages/1470-2045/PIIS1470204502009051.gr5.lrg.jpg

Or worse?: thrombosis





Therapy delay

- Suboptimal therapy
- Delay in therapy

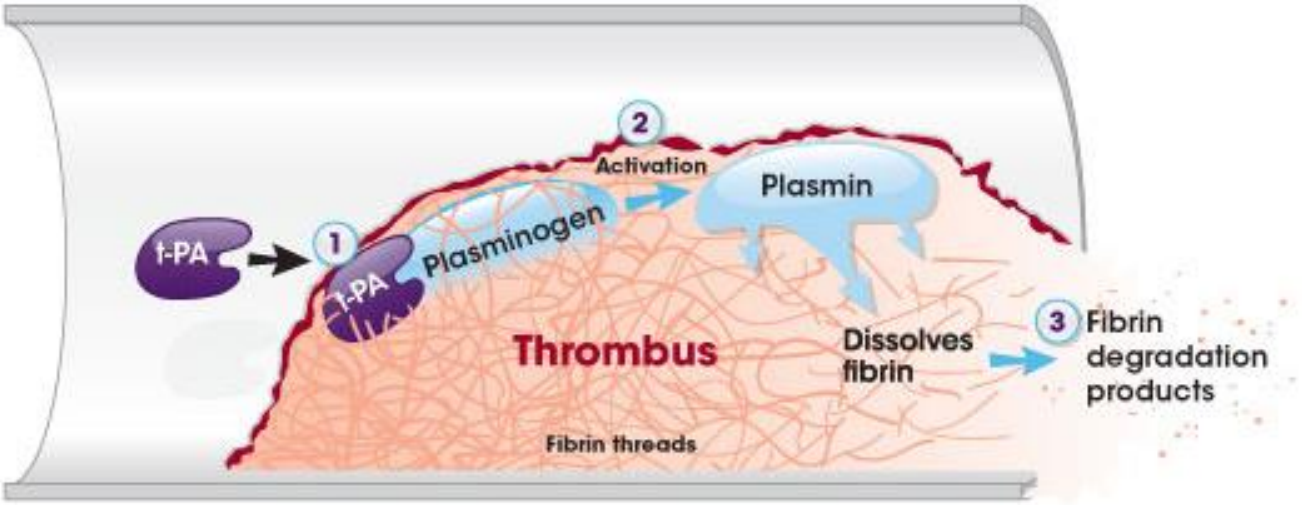
- Inefficiencies
- Ineffectiveness
- Increased hospital stays/services
- Increased health care costs

Intervention Strategies

Management of Chemical Occlusion

Precipitate	Treatment
Lipid residue	70% ethanol alcohol
Acidic drug precipitate Low pH: <6.0; e.g. vancomycin, parenteral nutrition)	Hydrochloric acid 0.1 N HCl.
Alkaline (basic) drug precipitate High pH: >7.0 e.g. imipenem, heparin,	Sodium bicarbonate NaHCO3 (1.0mmol/L) Sodium hydroxide 0.1 mmol/L.
•Instill fill volume of CVAD •Dwell x 20-60 min •May repeat second dose	

Management of Thrombotic Occlusion

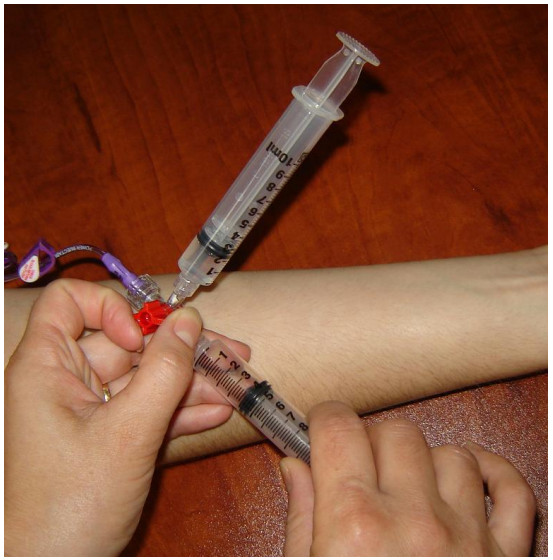


A fibrinolytic enzyme that binds to fibrin in a thrombus & converts entrapped plasminogen to plasmin, thereby initiating local fibrinolysis

Methods of Administration

- Partial/ withdrawal occlusion: Direct instillation with positive pressure
- Complete occlusion: Use negative pressure technique

Stopcock method



Single syringe method

Images courtesy of F. Paquet

Methods of Administration

Increase “contact time”

- Extended dwell time
  - 24 – 72 hours
- Low-dose infusion
  - Slow infusion over 30 minutes to 3 hours
- Push Method
  - Push agent slowly (with NS “chaser”)

Conclusion

1. It is important to be able to identify different categories of occlusion in order to appropriately intervene.

1. The clinical implications of CVAD occlusion on chemotherapy administration and effect on therapy delivery are serious and interventions should be attempted as soon as occlusion is suspected.

Thank you

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