Vascular Embolization

Definition:

- *Catheter embolization is the technique of occluding a blood vessel to obtain a therapeutic effect.*

GOALS

Embolization may have 3 therapeutic goals:

1. ***Adjunctive goal*** *(eg, preoperative, adjunct to chemotherapy or radiation therapy)*
2. ***A curative goal*** *(eg, definitive treatment such as that performed in cases of aneurysms, arteriovenous fistulae [AVFs], arteriovenous malformations [AVMs], and traumatic bleeding)*
3. ***A palliative goal*** *(eg, relieving symptoms, such as those of a large AVM, which cannot be cured by using embolotherapy alone)*

Indication

- *It may use Alone **or** Combined with surgery or radiation.*

1. ***Active Bleeding:***

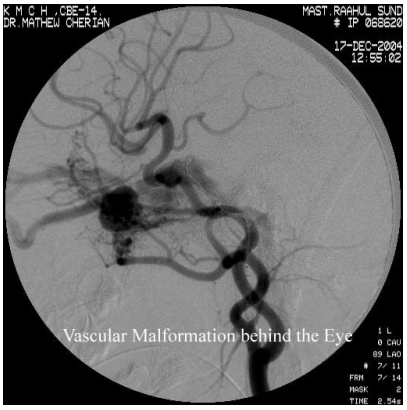
   - *It is the most common use of Embolization.*
   - *Bleeding may be from:*

- *Injury,*
- *Tumor,*
- *Stomach ulcer*
- *Other cause of an emergency basis.*
- *Pelvic pleading*
- *Hemoptysis*
- *Epistaxis*

- *Embolization is a highly effective way of controlling bleeding, especially in an emergency situation.*

2. ***Tumors Embolization:***
   - *If the tumor **c**annot be removed or **d**ifficult & risky to remove.*
   - *Role: occluding B.V. feeding a tumor → control symptoms*
   - *All tumors need a rich supply of blood to continue growing.*
   - *After Embolization a tumor may **s**hrink, or **g**row slowly.*
   - *Combining the embolic material with chemotherapy, → may treat the tumor more efficiently "Chemoembolization".*
3. ***Fibroid Embolization:***
   - ***Uterine** Fibroid, is not malignant, but may cause noisy symptoms as:*
     - *Menorrhagia.*
     - *Pelvis or back Pain.*
     - *Pressure on the bladder or bowel.*
   - *Embolization may be an alternative to the surgical ttt (hysterectomy).*
   - *Because fibroids have a large blood supply ← It will shrink or disappear after embolization.*
   - *Multiple fibroids can be treated in the same session.*
   - *Worldwide success rates of 85 %.*
4. ***Vascular Malformations:*** *& Hemangiomas.*
   - *Embolization is excellent for treating (AVMs).*

- *AVM sites: anywhere in the body, including the brain or spinal cord.*
- *It may cause **P**ain and **L**oss of function; embolization may control these symptoms effectively.*
- *AVMs ttt by embolization → less complication than surgical treatment.*



- *In Cranial AVM , Embolization with newer liquid embolic agents can be curative with lower mortality and morbidity compared to surgery.*

5. ***Aneurysms:***
   - *Embolization may be used to :*
     - *Plug the artery supplying an aneurysm , or*
     - *Obliterate the aneurysm it self.*
   - *Embolization is an alternative to surgery.*
6. ***Varicocele:***
   - *A common cause of male infertility.*
   - *percutaneous embolization of the vein is more appropriate primarily because of its lower morbidity rate.*
   - *Access can be obtained via either the internal jugular or femoral vein.*
7. ***Organ Ablation***
   - ***Splenic embolization** can be used as a preoperative therapy or as an alternative to the surgical removal of the spleen.*
   - *Indications include :*
     - *Posttraumatic bleeding,*

- *variceal bleeding secondary to portal hypertension or Splenic vein thrombosis,*
  - *hypersplenism,*
  - *thalassemia major,*
  - *thrombocytopenia,*
  - *idiopathic thrombocytopenic purpura,*
  - *Gaucher disease, and*
  - *Hodgkin disease.*

- *Renal embolization is an alternative to surgical removal of the kidney, and indications include :*
  - *End-stage renal disease or renovascular hypertension requiring unilateral or bilateral nephrectomy*

Advantages:

- *Embolization is less invasive than surgery* , this lead to :
  - *Fewer complications.*
  - *Shorter hospitalization.*

- **Preparation:**
  - *Lab investigations of coagulation profile.*
  - ***Sedative** may give"IV" → less anxiety during the procedure.*
  - ***Shaving** the area of the "groin or arm" where the catheter will be inserted. As The procedure is very similar to angiography.*
- **Technique :**
  - *Local **anesthesia**.*
  - ***Sterilization** of skin area over.*
  - ***Catheter** is inserted into the artery through skin puncture.*
  - *The catheter is then guided under fluoroscopy through the arteries to the area to be examined.*
  - *After the **contrast** material is injected through the catheter and reaches the blood vessels being studied, several films are taken.*
  - *During injection of the contrast agent the patient is asked to **hold his breath** for a few seconds.*

➔***Embolizing material** then injected under fluoroscopic guide in the selected vessel.*

Embolizing materials

- ***Ethanol**: commonest liquid agent, absolute alcohol is mixed with a contrast medium.*

  - *Activates the coagulation system and causes the microaggregation of red blood cells.*
  - *Toxic symptoms occur if large dose leaked to circulation.*

- ***Coils**: Micro & Macro coils*

  - ***Advantage** of being precisely positioned under fluoroscopic control.*
  - *Occlusion occurs as a result of coil-induced thrombosis rather than mechanical occlusion of the lumen.*
  - ***Disadvantage** Collateralization , it can result in the persistence of flow into the vascular territory*

- ***Cyanoacrylate** :*

  - *Rapidly hardening liquid adhesive often referred to as **glue**.*
  - *The substance hardens (polymerizes) immediately on contact with blood or other ionic fluid.*

- ***Sodium tetra decyl sulfate:***

  - *This contains 2% benzyl alcohol and is commonly used for VMs and varices.*

- *Advantages: **L**ess painful for the patient and it is considered to be **L**ess toxic then absolute alcohol.*

- ***Gelfoam:***

  - *A sterile gelatin sponge intended for application to bleeding surfaces for hemostasis or for use as a temporary intravascular embolic material.*
  - *It is water-insoluble, usually absorbed completely (depending on the amount used, degree of saturation with blood, and site at which it is used), with little tissue reaction.*
  - *Gelfoam is supplied in a sterile envelope enclosed in an outer peelable envelope.*
  - *It is available in sizes from 12 mm to 6 cm.*

- ***Tris-acryl gelatin microspheres:***

  - *Are biocompatible, hydrophilic, non-resorbable, and precisely calibrated particles produced from an acrylic polymer and impregnated with porcine gelatin.*
  - *Microspheres are available in sizes of **40-1200 µm,** and they are supplied in apyrogenic sterile sodium chloride solution.*

- ***Other materials:*** *Other less commonly or previously used materials include:*
  - ***Balloons,***
  - ***Ethylene vinyl alcohol*** *Microfibrillar collagen (Avitene),*
  - *Autologous materials,*
  - ***Hot contrast material****, and*
  - ***50% dextrose***
  - *Alginates,*
  - *phosphoryl choline,*
  - *Sodium morrhuate,*

Following the procedure

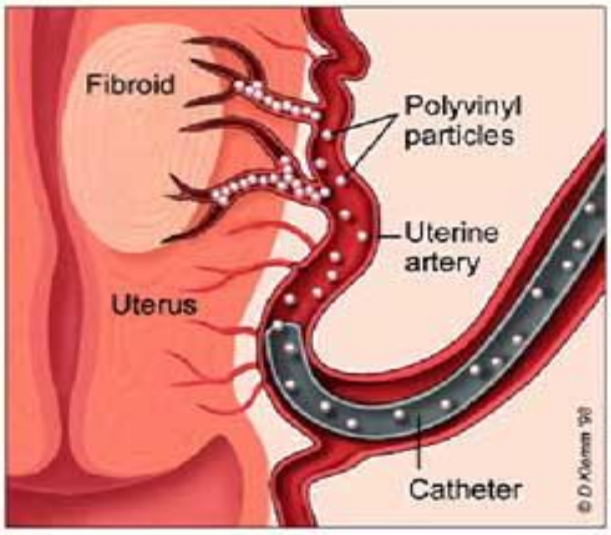
- *The patient is advised to keep the leg that was punctured straight for 6 – 8 hours.*
- *The patient is allowed to walk after 12 hours. At times a closure device may be used to close the puncture site enabling the patient to walk after an hour.*

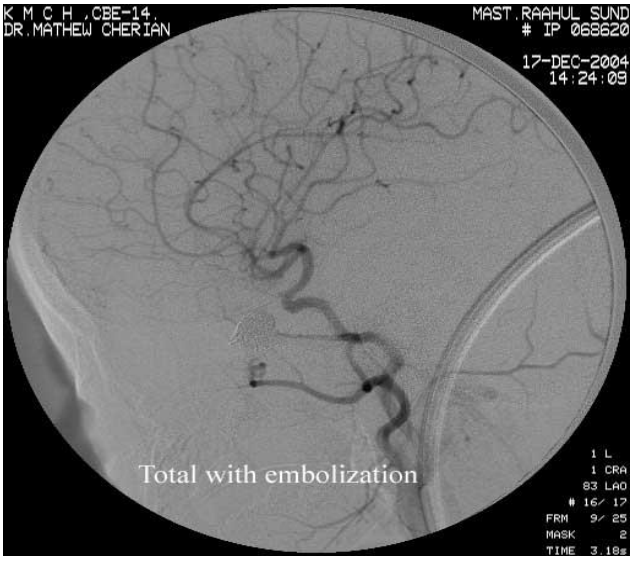
- *Most patients may have some pain for the next few days.*

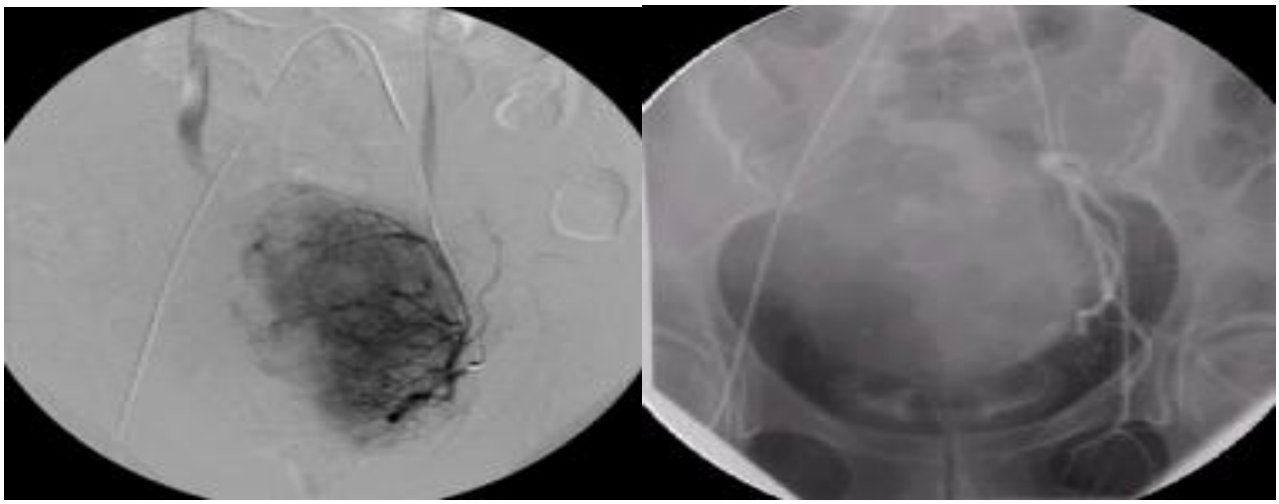
Complications:

Though rare, any vascular Interventional procedure carries the following risks.

1. ***Failure:*** *The procedure may fail and one may have to resort to surgery.*
2. ***Bleeding****, this may be stopped by compression for a few minutes.*
3. ***Ischemia****: A normal vessel may get blocked.*
4. ***Pulmonary embolism****.*
5. ***Allergic*** *reaction: due to used Drugs.*







Uterine Fibroid: Pre & Post embolization

References:

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- *http://emedicine.medscape.com/article/419614-overview#aw2aab6b3*
- *http://emedicine.medscape.com/article/419614-overview#showall*