FIG. 1: Venn diagram shows combinations of arterial, capillary, venous and lymphatic malformations. A = arterial, V = venous, C = capillary, L = lymphatic. Reprinted with permission.1

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FIG. 4: Radiograph of volar aspect of the wrist of a 24-year-old woman with extensive VM demonstrates numerous phleboliths (arrowhead).

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FIG. 6: A 62-year-old man with repeated hemarthroses of the left knee.  
A: Coronal T₁-weighted magnetic resonance image (MRI), spin-echo sequence, demonstrates nidus of AVM with flow void (arrow).  
B: T₂-weighted spin-echo fat-saturated image in sagittal projection, shows AVM (open arrow) lying between suprapatellar bursa and quadriceps tendon.  
C: Arteriogram of superior medial genicular artery demonstrates dilated feeding artery (curved arrow) feeding the nidus (straight arrow) with early draining veins (open arrow).  
D: Postembolization angiogram demonstrates superior medial genicular artery (black arrow) with distal amputation and almost complete obliteration of the nidus. The embolization was performed with 250–350 µm polyvinyl alcohol particles.

FIG. 7: A 16-year-old male, an avid pianist, who developed painful swelling over the second metacarpophalangeal joint. There was no definite history of trauma.  
A: Downhill brachial arteriogram demonstrates AVM overlying the second metacarpophalangeal joint, with aneurysms (curved arrow) in feeding a metacarpal artery and dilated veins (straight arrow), filling early in the arterial phase because of shunting.  
B: Real-time radiograph shows direct puncture of dilated vein with a 22-gauge angiocath and direct injection of N-butylcyanoacrylate (NBCA) glue into the veins. A suprasystolic tourniquet was applied to the forearm before embolization.  
C: Final digital subtraction angiogram shows almost complete obliteration of the AVM with good distal filling of normal vessels.
FIG. 8: A 29-year-old woman with extensive AVM of the right lower extremity from the lower thigh to the ankle. The AVM was embolized in multiple sessions.

A: Femoral arteriogram with microcatheter lying in anterior tibial artery (open arrow). The popliteal artery (solid arrow) and tibioperoneal trunk (arrowhead) are identified. Multiple dilated veins are seen throughout the field of view.

B: Pulmonary angiogram demonstrates the AVM involving the lateral tibial plateau. The microcatheter has been advanced into a branch of the anterior tibial artery, and the vessel was injected with NBCA glue. The joint line can be seen at the top of the image (solid arrow).

C: Angiogram with catheter in tibioperoneal trunk shows extensive AVM of the calf with enlarged vessels in the nidus (solid arrows) and with early dilated draining veins (arrowhead).

D: Venous phase of arteriogram shows dilated veins and the microcatheter, which was advanced into the feeding artery. Note the glue that had been injected earlier into calf AVM (solid arrow) and into AVM near lateral tibial plateau (curved arrow). The patient developed bone infarction with collapse of the lateral tibial plateau 3 months after embolization.

FIG. 9: A 29-year-old woman with extensive AVM involving the left forearm.

A: Brachial arteriogram demonstrates radial artery (arrowhead) and ulnar artery (straight arrow) filling extensive AVM with multiple feeders arising "en passage" from the radial artery, ulnar artery and palmar arch. Note the enlargement and tortuosity of the feeding radial and ulnar arteries.

B: Unsubtracted version of image in A.

C: Venous phase of brachial arteriogram shows multiple dilated veins.
**FIG. 10:** Capillary-venous malformation of the left forearm in a 21-year-old man.

**A:** Brachial arteriogram centred over left forearm demonstrates radial artery (arrow) and ulnar artery (arrowhead), which are not enlarged. Multiple feeders show tortuous mildly dilated small vessels. There is no early venous filling.

**B:** Late venous phase showing slow filling of persistent dilated veins.
FIG. 11: A 17-year-old female with painful VM of the lower left thigh.
A: Sagittal T₁-weighted spin-echo sequence fat-saturated MRI demonstrates VM (curved arrows) involving the vastus lateralis muscle. Note adjacent periosteal new bone formation (straight arrow).
B: Transverse T₁-weighted spin-echo fat-saturated MRI shows dilated vascular channels (straight arrow) in VM.
C: The nodule was directly punctured under ultrasound guidance with a 22-gauge angiocath. A supersystolic tourniquet was applied to the upper thigh, and contrast material was injected until there was filling of normal feeders to the popliteal vein (straight arrow). This in-volume was then injected as pure alcohol, opacified with metrizamide (Amipaque; Nycomed, Markham, Ont.). Metrizamide is no longer manufactured.

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FIG. 12: A 19-year-old woman with lymphatic malformation of the right axilla.
A and B: Coronal T₂-weighted spin-echo fat-saturated MRIs demonstrate large cystic cavity in right axilla (straight arrows) with malformation extending down over the medial aspect of the right upper arm.
C: Direct ultrasound-guided puncture of malformation with 18-gauge needle (arrow) and injection of a larger pocket of 8 mL of absolute alcohol, opacified with metrizamide powder. The alcohol was left in place for approximately 10 min and then aspirated.