VESSELS

Kenneth Alonso, MD

Arterial structure

- The intima normally consists of a single layer of endothelial cells sitting on a basement membrane underlaid by a thin layer of extracellular matrix
- The intima is demarcated from the media by the internal elastic lamina.
- The media of elastic arteries (e.g., the aorta) has a high elastin content
- Vessels expand during systole and recoil during diastole
- Large vessels
- May become ectatic with aging

Arterial structure

- In muscular arteries, the media is composed predominantly of circumferentially oriented smooth muscle cells
- Regulated by inputs from the autonomic nervous system, and local metabolic factors
- The adventitia lies external to the media and in many arteries is separated from the media by a well-defined external elastic lamina.
- The adventitia consists of loose connective tissue containing nerve fibers and the vasa vasorum (small arterioles that are responsible for supplying the outer portion of the media of large arteries with oxygen and nutrients.

Capillaries, veins, lymphatics

- Capillaries are approximately the diameter of a red cell
- They have an endothelial cell lining but no media
- Variable numbers of pericytes, cells that resemble smooth muscle cells, typically lie just deep to the endothelium.
- Veins have larger diameters, larger lumens, and thinner and less organized walls than do arteries
- Lymphatics are thin-walled channels lined by specialized endothelium
- Provide conduits to return interstitial tissue fluid and inflammatory cells to the bloodstream.

Varicose veoms

- Varicose veins are abnormally dilated, tortuous veins produced by prolonged, increased intraluminal pressure leading to vessel dilation and incompetence of the venous valves.
- The superficial veins of the upper and lower leg are commonly involved because venous pressures in these sites can be markedly elevated (up to 10 times normal) by prolonged dependent posture
- 10-30% of adults
- Stasis, congestion, edema, pain, and thrombosis.
- Secondary ischemia leads to stasis dermatitis (brawny induration from edema and extravasation of red cells)

Thrombophlebitis

- Venous thrombosis and inflammation
- 90% involve deep leg veins
- Periprostatic venous plexus and pelvic venous plexus
- Large veins in the skull as well as dural sinuses
- Prolonged immobilization of limb as major risk factor
- Local manifestations, including vein dilation, edema, cyanosis, heat, erythema, or pain may be entirely absent
- Pulmonary embolism is the most common complication and may be the presenting sign

Thrombophlebitis

- Migratory thrombophlebitis (Trousseau sign)
- Usually with adenocarcinoma but may be seen with Burger's disease and antiphospholipid syndrome
- Mucin producing adenocarcinoma
- Mucin interacts with L- and P- adhesion molecules, producing platelet rich microthrombi
- Cancer cells also produce tissue factor
- Cancer procoagulant (cysteine protease), noted in 85% of cancer patients, directly converts factor X to Xa
- Hypoxia induces PAI-1

Thrombophlebitis

- Coagulation disorders include:
- Factor C deficiency
- Factor V Leiden deficiency (protein C resistance)
- Prothrombin G20210A mutation
- Antithrombin III deficiency (usually related to oral contraceptives)
- Antiphospholipid syndrome

Lymphedema

- Lymphedema increases the hydrostatic pressure in the lymphatics distal to the obstruction and causes increased interstitial fluid accumulation.
- May be congenital
- Usually secondary to obstruction
- Persistent edema and subsequent deposition of interstitial connective tissue leads to a peau d'orange (orange peel) appearance of the overlying skin.
- Rupture of dilated lymphatics leads to milky accumulations of lymph designated as chylous ascites (abdomen), chylothorax, and chylopericardium.

Arterial injury and repair

- Associated with endothelial cell dysfunction or loss
- Stimulates smooth muscle cell recruitment and proliferation and associated matrix synthesis
- Neo-intimal smooth muscle cells are motile, undergo cell division, and acquire new biosynthetic capabilities.
- Regulated by local growth factor and cytokine secretion of inflammatory cells
- Results in intimal thickening.
- Fibromuscular hyperplasia is a developmental defect.

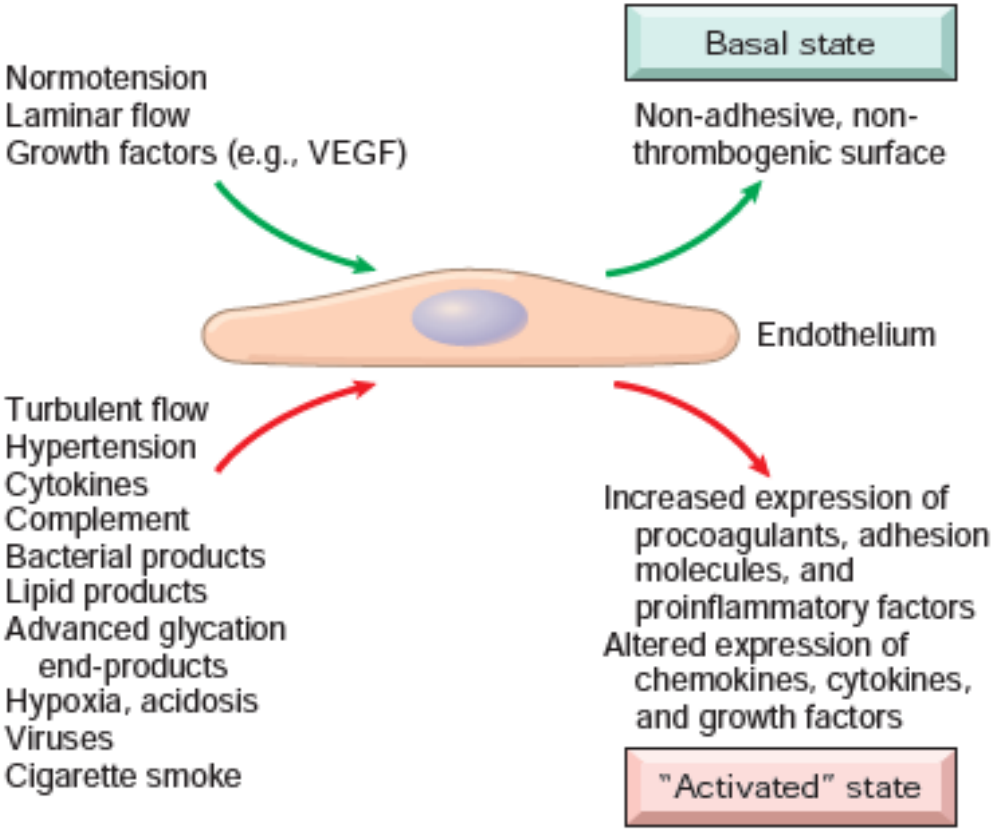

Figure 11-2 Basal and activated endothelial cell states. Normal blood pressure, laminar flow, and low growth factor levels promote a basal endothelial cell state that maintains a nonthrombotic, nonadhesive surface with appropriate vascular wall smooth muscle tone. Injury or exposure to certain mediators results in endothelial activation, a state where endothelial cells develop a procoagulant surface that can be adhesive for inflammatory cells, and also express factors that cause smooth muscle contraction and/or proliferation and matrix synthesis. VEGF, vascular endothelial growth factor.

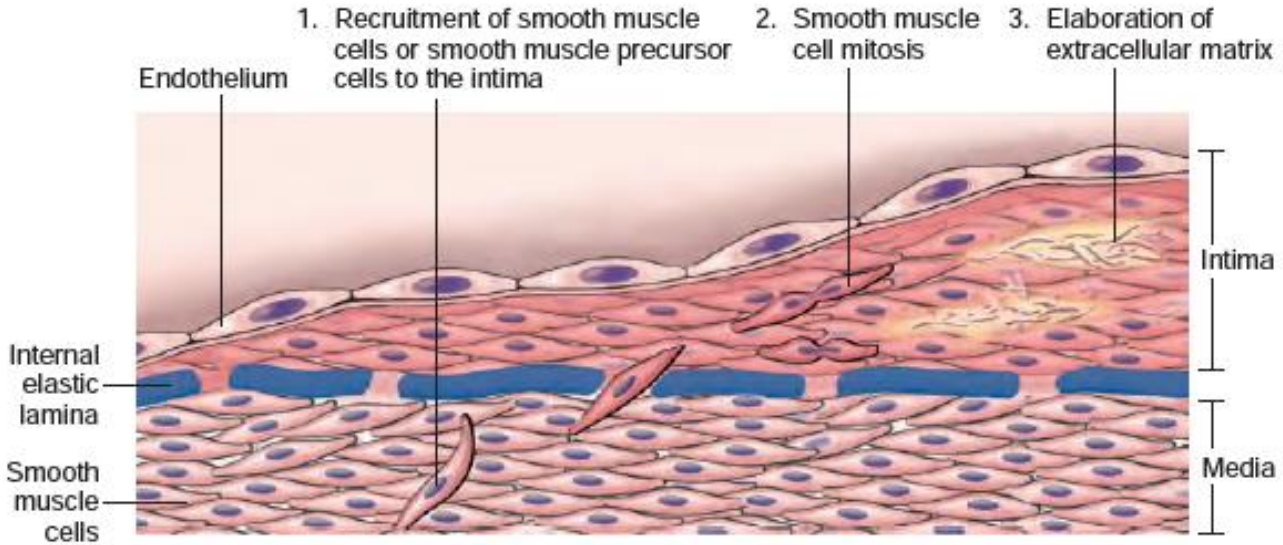

Figure 11-3 Stereotypical response to vascular injury. Schematic diagram of intimal thickening, emphasizing intimal smooth muscle cell migration and proliferation associated with extracellular matrix synthesis. The new intimal cells are shown in a different color to emphasize that they have a proliferative, synthetic, and noncontractile phenotype distinct from medial smooth muscle cells.

Table 11-3 Primary Forms of Vasculitis

	Giant Cell Arteritis	Granulomatosis with Polyangiitis	Churg-Strauss Syndrome	Polyarteritis Nodosa	Leukocytoclastic Vasculitis	Buerger Disease	Behçet Disease
Sites of Involvement							
Aorta	+	–	–	–	–	–	–
Medium-sized arteries	+	+	+	+	–	+	+
Small-sized arteries	–	+	+	+	+	+	+
Capillaries	–	–	–	–	+	–	+
Veins	–	–	–	–	+	+	+
Inflammatory Cells Present							
Lymphocytes	+	+	+	±	±	±	±
Macrophages	+	+	+	±	±	±	±
Neutrophils	Rare	+	+	±	±	±	Required
Eosinophils	Very rare	±	Required	±	±	±	±
Other Features							
Granulomas	± *	Required *	±	–	–	–	–
Giant cells	Often; not required	±	–	–	–	–	–
Thrombosis	±	±	±	±	±	Required	±
Serum ANCA positivity	–	+	+	±	–	–	–
Clinical history	>40 y years old, ± polymyalgia rheumatica	Any	Asthma, atopy	Any	Any	Young male smoker	Orogenital ulcers

*The granulomas of giant cell arteritis are found within the vessel wall as part of the inflammation comprising the vasculitis, but need not be present to render the diagnosis. The granulomas of granulomatosis with polyangiitis are larger, spanning between vessels, and associated with areas of tissue necrosis.

From Seidman MA, Mitchell RN: Surgical pathology of small-and medium-sized vessels. In Current Concepts in Cardiovascular Pathology, Philadelphia, Saunders, 2012.

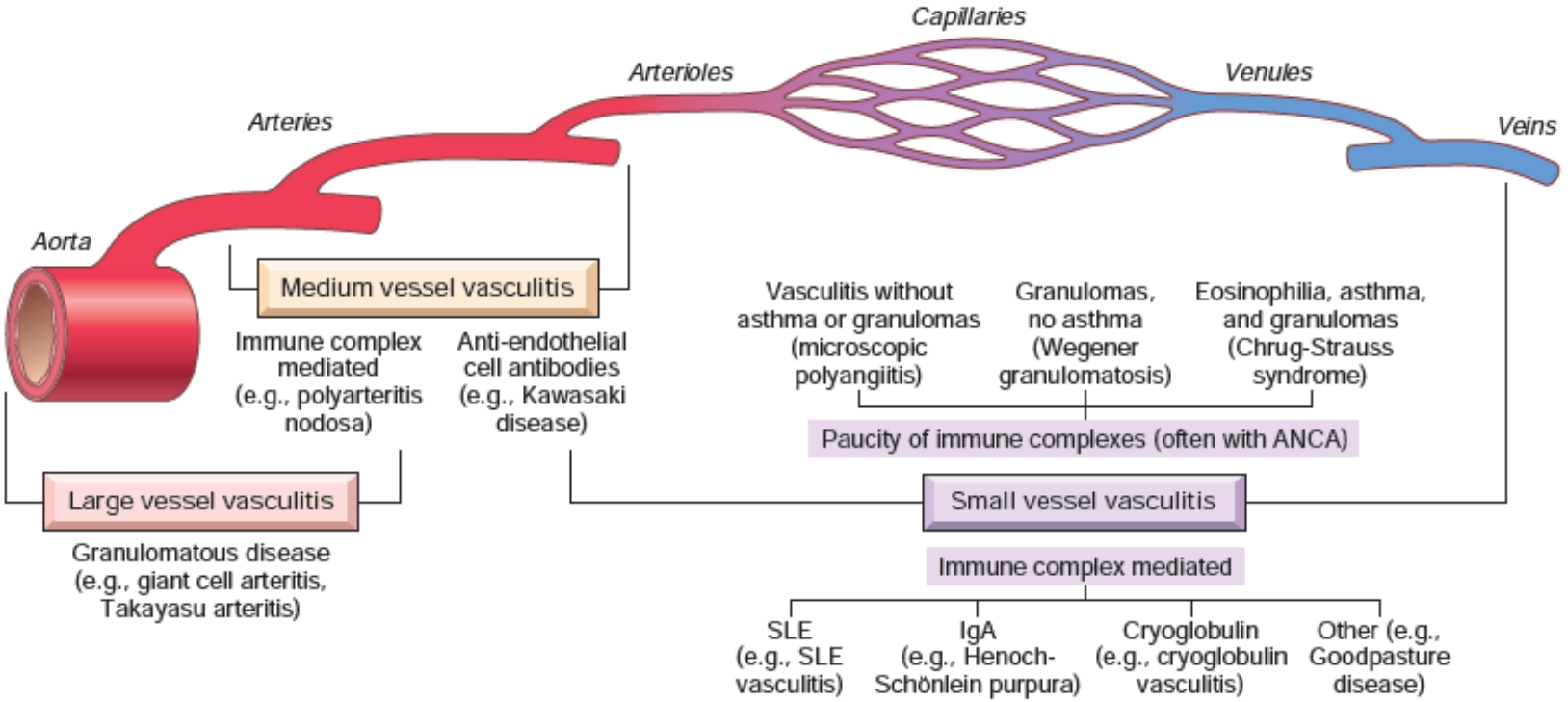

Figure 11-23 Vascular sites typically involved with the more common forms of vasculitis, as well as their presumptive etiologies. Note that there is a substantial overlap in distributions. ANCA, Antineutrophil cytoplasmic antibody; SLE, systemic lupus erythematosus.

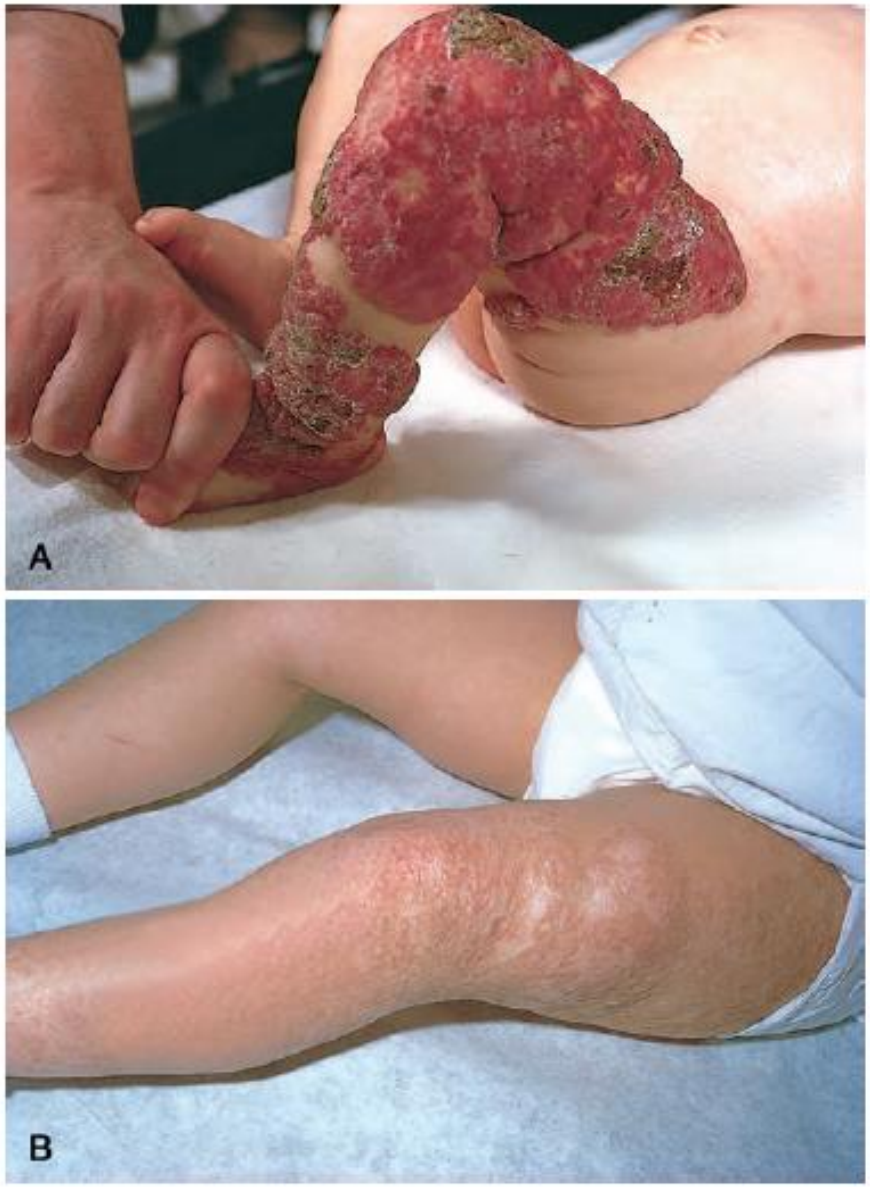

Figure 10-22 Congenital capillary hemangioma at birth (**A**) and at age 2 years (**B**) after spontaneous regression. (Courtesy Dr. Eduardo Yunis, Children's Hospital of Pittsburgh, Pittsburgh, Pa.)

Vasculitides

- Small Vessel Disease
- Polyangiitis with granuloma (Wegner's granulomatosis; with PR3-ANCA and MPO-ANCA)
- Microscopic polyangiitis (MPO-ANCA)
- Eosinophilic polyangiitis with granuloma (Churg-Strauss; with MPO-ANCA)
- Medium Vessel Disease
- Polyarteritis nodosa (without granuloma)
- Kawasaki's arteritis (anti-endothelial cell antibodies)
- Large Vessel Disease
- Temporal arteritis (with granuloma)
- Takayasu's arteritis (with granuloma)

Granulomatosis with polyangitis

- Once known as Wegner's granulomatosis
- 90% Upper respiratory tract involvement (nose)
- 95% Lower respiratory tract involvement (lungs)
- 80% Renal involvement (glomerulus)
- Skin involvement.
- May also see uveitis.
- Necrotizing granulomatous inflammation of the arterioles.
- Hematuria with red cell casts
- Antibodies to PR3-ANCA and MPO-ANCA
- Corticosteroids and cyclophosphamide therapy.
- Mortality 100% if untreated.

Anti-neutrophil cytoplasmic antibodies

- Antibodies to cellular constituents
- Do not form circulating immune complexes
- Not found in vascular lesions ("pauci-immune")
- Anti-proteinase-3 ANCA (PR3-ANCA)
- Was once known as c-ANCA
- Shares homology with microbial peptides
- Anti-myeloperoxidase ANCA (MPO-ANCA)
- Was once known as p-ANCA
- Myeloperoxidase is a lysozomal granule associated with free radical formation
- May be generated by drug (propothiouracil)

Anti-neutrophil cytoplasmic antibodies

- Non PR3 and MPO ANCAs may be seen in other disorders that do not present as vasculitis
- Inflammatory bowel disease
- Sclerosing cholangitis
- Rheumatoid arthritis
- All are upregulated by TNF
- Activated neutrophils lead to tissue damage

Granulomatosis with polyangitis

- Once known as Wegner's granulomatosis
- 90% Upper respiratory tract involvement (nose)
- 95% Lower respiratory tract involvement (lungs)
- 80% Renal involvement (crescentric in glomerulus)
- Hematuria with red cell casts
- Skin involvement.
- May also see uveitis.
- Men
- 40-50 years of age

Granulomatosis with polyangitis

- Necrotizing granulomatous inflammation of small and medium sized arteries
- 95%, antibodies to PR3-ANCA and MPO-ANCA
- Corticosteroids and cyclophosphamide therapy.
- Mortality 100% if untreated.

Anti-neutrophil cytoplasmic antibodies

- Antibodies to cellular constituents
- Do not form circulating immune complexes
- Not found in vascular lesions ("pauci-immune")
- Anti-proteinase-3 ANCA (PR3-ANCA)
- Was once known as c-ANCA
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- Inflammatory bowel disease
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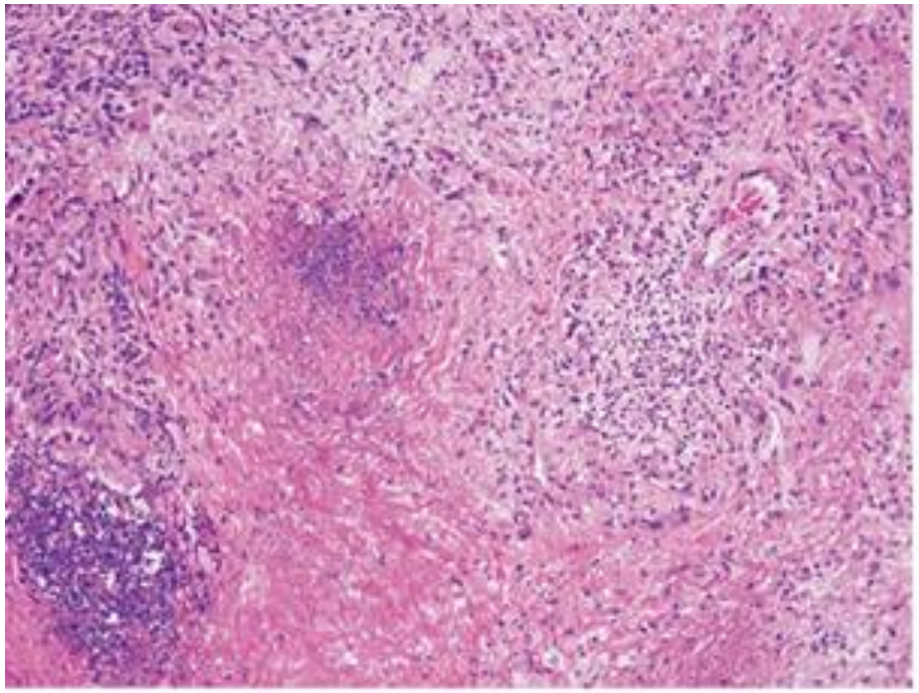
- Rheumatoid arthritis
- All are upregulated by TNF
- Activated neutrophils lead to tissue damage

Granulomatosis with polyangitis



Courtesy of William D. Travis, MD; with permission.
Figure 385-2 Accessed 02/04/2016

- This area of geographic necrosis has a serpiginous border of histiocytes and giant cells surrounding a central necrotic zone.
- Vasculitis is also present with neutrophils and lymphocytes infiltrating the wall of a small arteriole (upper right).

Eosinophil granulomatosis with polyangitis (EGPA)

- Once known as Churg-Strauss Syndrome)
- Presents with nasal polyps or rhinitis
- Asthma is a distinguishing feature
- Progresses to eosinophilia
- Vasculitis develops.
- Mononeuritis multiplex
- Shooting pains and muscle weakness in hands and feet with wrist or foot drop
- 1/3 have pulmonary infiltrates (transient)
- The arteriolar biopsy contains granulomas.
- MPO-ANCA positive.

Limited granulomatosis with polyangiitis

- More common in males
- >45 years of age
- Limited granulomatosis does not involve kidney
- Rarely associated with diffuse pulmonary hemorrhage
- Waxing and waning of pulmonary nodules and infiltrates on chest x-ray is relatively specific

Limited granulomatosis with polyangiitis

- PR3-ANCA positive: diffuse cytoplasmic staining directed against neutrophil serine proteinase 3
- 90% positive in active generalized disease
- 60% positive in limited disease
- MPO-ANCA directed against myeloperoxidase is negative
- If positive, is polyarteritis or crescentic glomerulonephritis

Microscopic polyangitis

- Leukocytoclastic angiitis.
- Type III hypersensitivity.
- Abrupt onset of palpable purpura (erythematous lesions do not blanch on pressure).
- Most common on lower limbs and in dependent areas.
- Cutaneous ulceration and transient arthralgias.
- Vasculitis (and venulitis) with eosinophilia and neutrophilia.
- Fragmented leukocytes present.

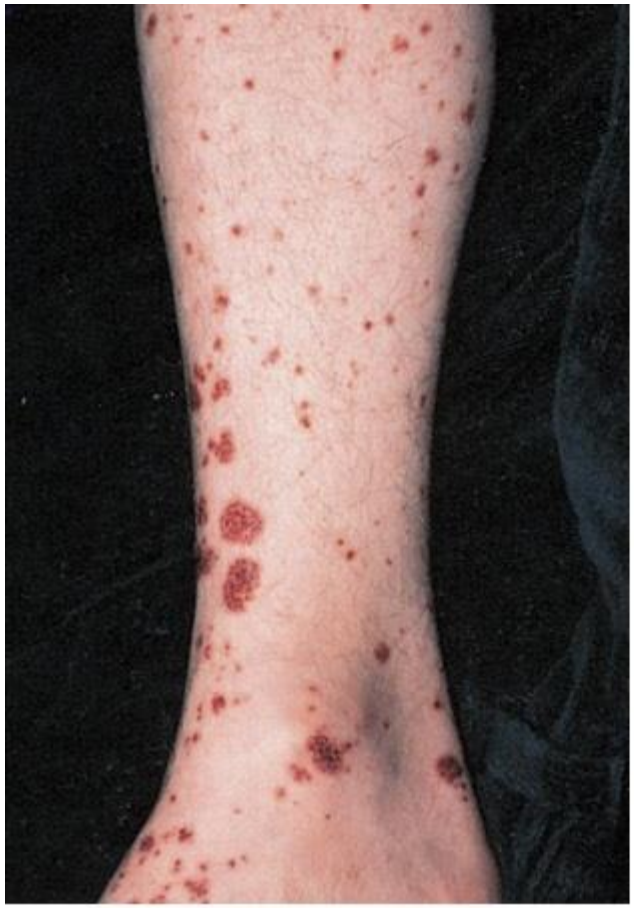
Microscopic polyangitis

- Abrupt onset of purpura, cutaneous ulceration, transient arthralgias, and hematuria.
- Organs involved:
- 80% glomerulonephritis
- 70% weight loss
- 60% skin lesions (palpable purpura in dependent areas; splinter hemorrhages)
- 60% nerve damage (mononeuritis multiplex)
- 55% fever
- 12% pulmonary hemorrhage

Microscopic polyangitis

- Small vessel disease.
- Once known as leukocytoclastic angiitis.
- Vasculitis with eosinophilia and neutrophilia.
- Biopsy does not show granulomas in the arterioles.
- MPO-ANCA positive.
- HBV negative.
- Low complement levels.
- Erythrocyte sedimentation rate elevated.

Microscopic polyangitis



Palpable purpuric papules on the lower legs are seen in this patient with cutaneous small-vessel (leukocytoclastic) vasculitis.

Lesions of same age.

(Courtesy of Robert Swerlick, MD; with permission.)

Fig. e10-70 Accessed 07/16/2010

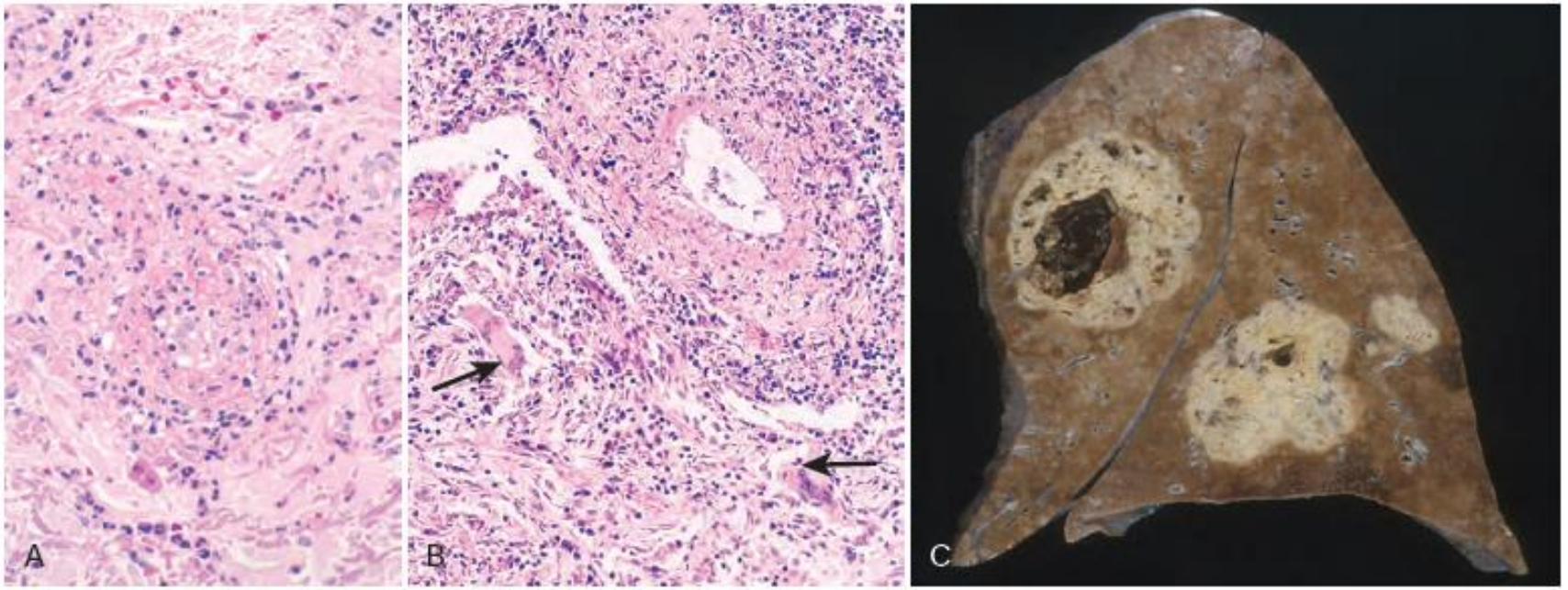
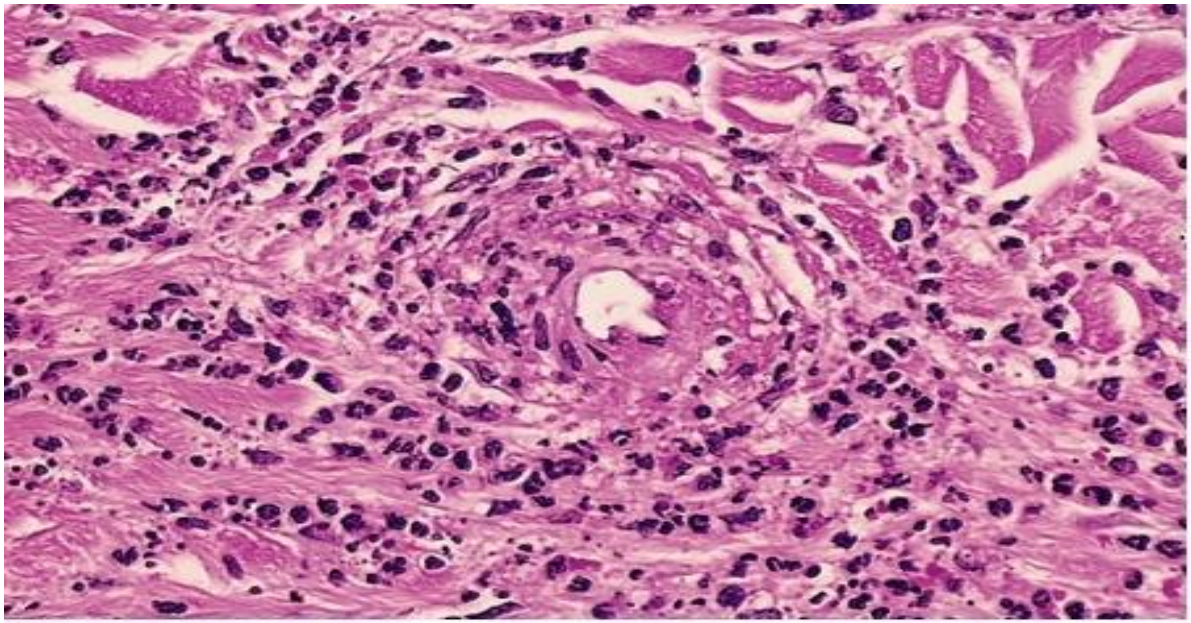


Figure 11-27 Small vessel vasculitis. **A,** Leukocytoclastic vasculitis (microscopic polyangiitis) with fragmentation of neutrophils in and around blood vessel walls. **B** and **C**, Granulomatosis with polyangiitis. **B,** Vasculitis of a small artery with adjacent granulomatous inflammation including epithelioid cells and giant cells *(arrows)*. **C,** Gross photo from the lung of a patient with fatal granulomatosis with polyangiitis, demonstrating large nodular centrally cavitating lesions. (**A,** Courtesy Scott Granter, MD, Brigham and Women's Hospital, Boston, Mass.; **C,** Courtesy Sidney Murphree, MD, Department of Pathology, University of Texas Southwestern Medical School, Dallas, Texas.)

Microscopic polyangitis

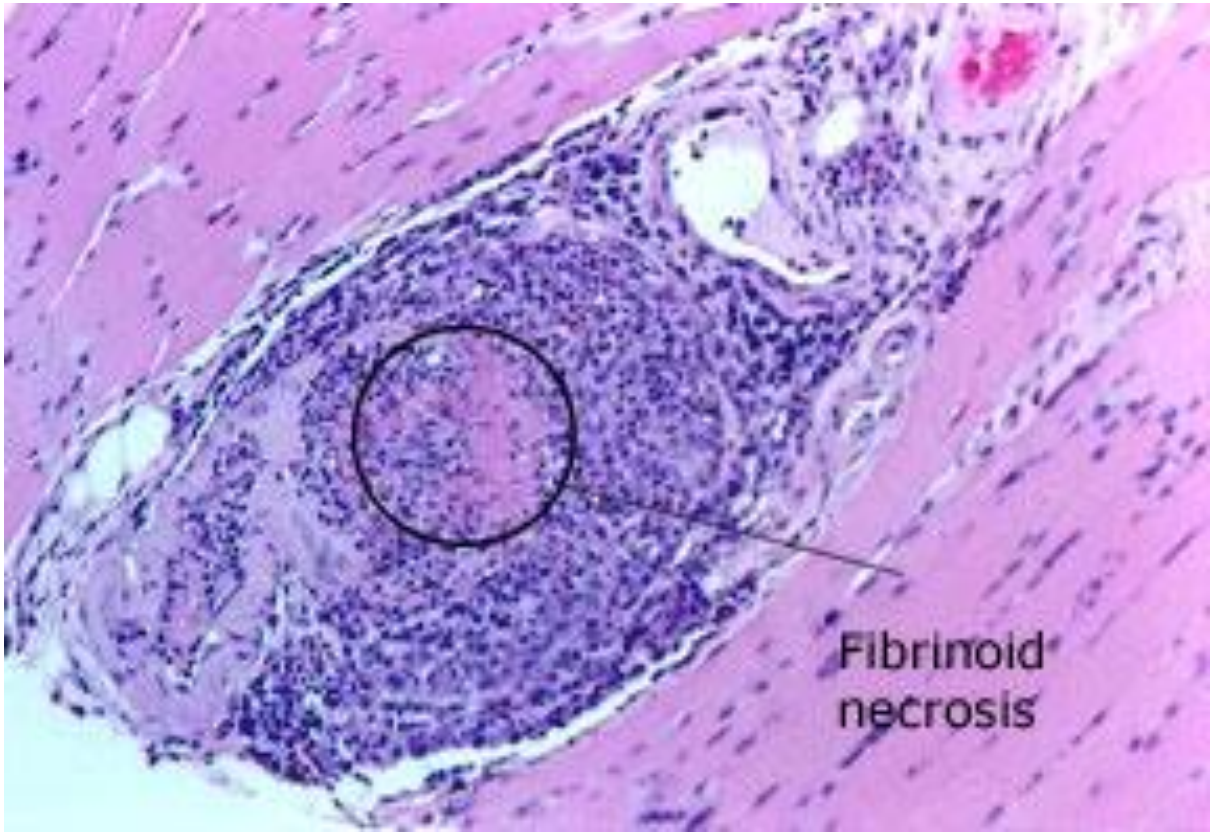


A

Perivenular infiltrate of neutrophils with fibrin deposition. (Hematoxylin and eosin stain, x50 in original magnification.)

Fig. 164-6 Accessed 07/20/2010

Microscopic polyangitis



A blood vessel within the muscle shows an intense inflammatory infiltrate with destruction of the blood vessel wall, confirming the diagnosis of vasculitis.

https://www.hopkinsvasculitis.org/types-vasculitis/microscopic-polyangiitis/ Accessed 02/20/2020

Polyarteritis nodosa

- Men predominate
- Ages 45-65
- Small and medium arteries involved
- Ischemia or infarction of organ
- Commonly involves intestinal tract, heart, eye
- May present with livedo reticularis or palpable purpura
- Mononeuritis multiplex develops
- 50% of those with renal involvement are hypertensive

Polyarteritis nodosa

- Immune complex disease
- 30% precipitated by Hepatitis B
- Also implicated are
- Hepatitis C
- Parvovirus B19
- Group A Streptococcus
- CECR1 mutation in cutaneous form
- Deficiency of ADA2 protein (adenosine deaminase)
- Essential for endothelial and neutrophil development
- 80% 5-year and 67% 10-year survival

Clinical Manifestations Related to Organ System Involvement in Polyarteritis Nodosa

Organ System	Percent Incidence	Clinical Manifestations
Renal	60	Renal failure, hypertension
Musculoskeletal	64	Arthritis, arthralgia, myalgia
Peripheral nervous system	51	Peripheral neuropathy, mononeuritis multiplex
Gastrointestinal tract	44	Abdominal pain, nausea and vomiting, bleeding, bowel infarction and perforation, cholecystitis, hepatic infarction, pancreatic infarction
Skin	43	Rash, purpura, nodules, cutaneous infarcts, livedo reticularis, Raynaud's phenomenon
Cardiac	36	Congestive heart failure, myocardial infarction, pericarditis
Genitourinary	25	Testicular, ovarian, or epididymal pain
Central nervous system	23	Cerebral vascular accident, altered mental status, seizure

Source: From TR Cupps, AS Fauci: *The Vasculitides.* Philadelphia, Saunders, 1981.

Polyarteritis nodosa

Clinical manifestations result from ischemia and infarction of affected tissues and organs.

The course is frequently remitting and episodic

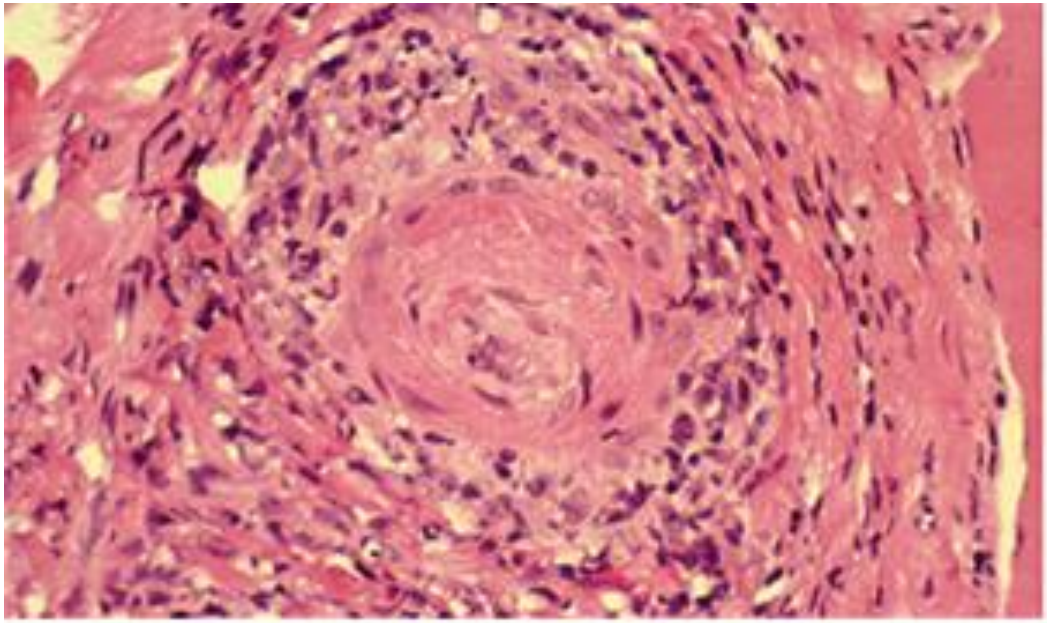
Histopathology:

Transmural inflammation of the arterial wall with a mixed infiltrate of neutrophils, eosinophils, and mononuclear cells, frequently accompanied by fibrinoid necrosis.

Luminal thrombosis can occur.

May develop micro-aneurysms

Polyarteritis nodosa



From a sural nerve biopsy in a patient with Polyarteritis nodosa, who had presented with a mononeuritis multiplex.

Neutrophils are seen infiltrating all layers of this medium-sized vessel, which resulted in vessel occlusion and nerve infarction.

Figure 386e-19 Accessed 02/04/2016

Kawasaki disease

- 80% <4 years of age
- Presents with high fever, conjunctival infection, strawberry tongue, and rash with desquamation of the palms and soles.
- Coronary vasculitis with thrombosis develops.
- May also see coronary artery aneurysms
- Medium vessel disease.
- Dense transmural infiltrate of arterial wall.
- Anti-endothelial cell antibodies
- High dose intravenous immunoglobulins and aspirin are effective. One of the indications of aspirin use in children.

Giant cell arteritis

- Most common cause of vasculitis in adults >50 years of age
- Average age of onset is 72 years of age
- Women (3:2)
- More common in those of Scandinavian origin
- Large vessel disease
- Predilection for temporal arteries (temporal arteritis)
- May involve ophthalmic artery
- May involve aorta

Giant cell arteritis

- Headache
- If pain and stiffness of the hip and shoulder girdles (Polymyalgia rheumatica)
- Jaw claudication
- Scalp tenderness (“It hurts to comb the hair”)
- Fever (16% of fever of unknown origin in older patients)
- Visual changes include amaurosis fugax, blurred vision, eye pain, and blindness.
- Erythrocyte sedimentation rate markedly elevated (100mm/hr).

Giant cell arteritis

- Normochromic, normocytic anemia.
- 20-30% have elevated alkaline phosphatase
- T-cell mediated reaction to vessel wall antigens
- 2/3 have anti-endothelial cell and anti-smooth muscle antibodies
- Temporal artery biopsy shows vasculitis with granulomas.
- Treat with high dose corticosteroids for 6-12 months.
- Treatment begins before biopsy obtained as blindness may develop within 1-2 days of onset.

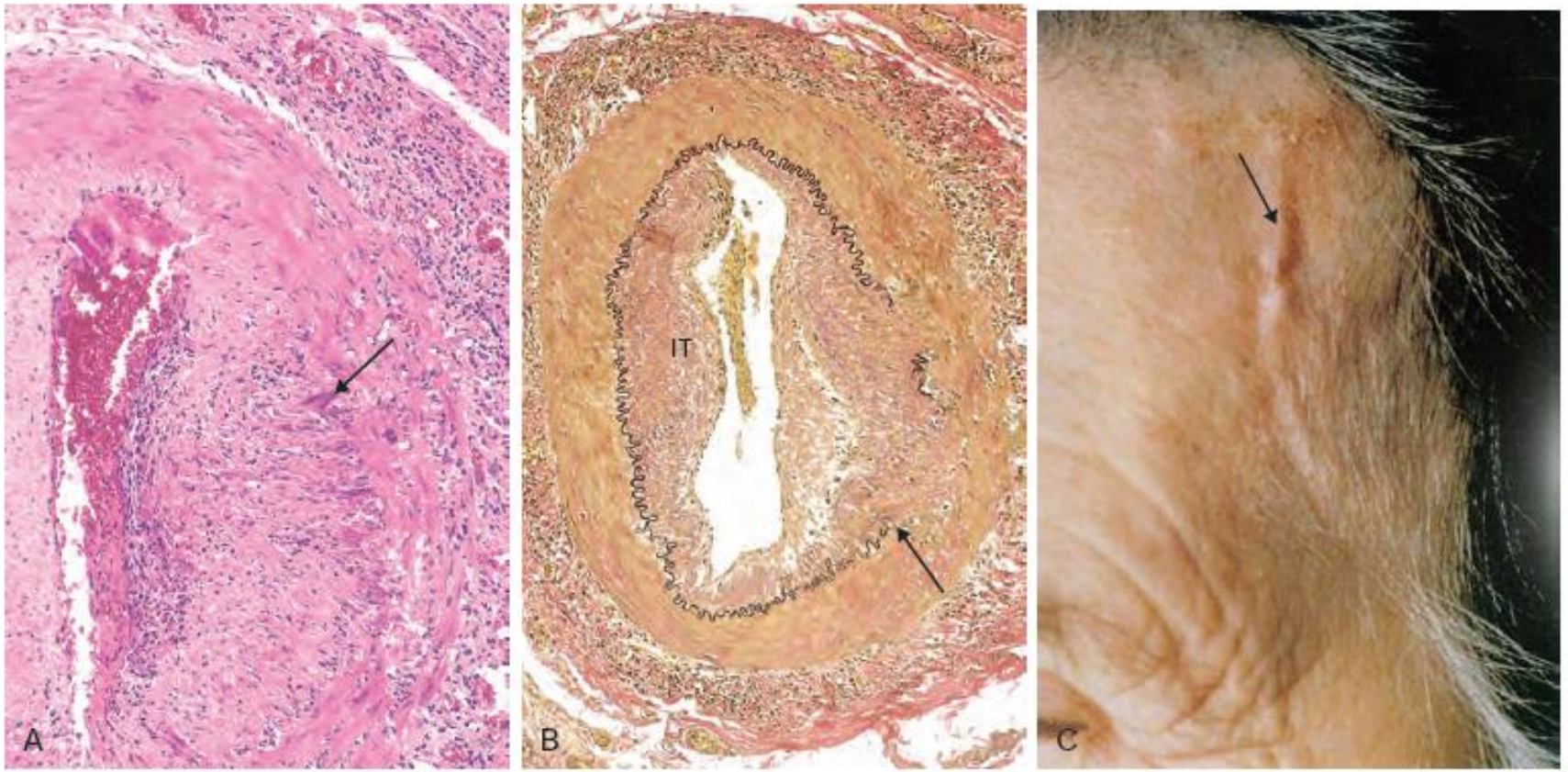
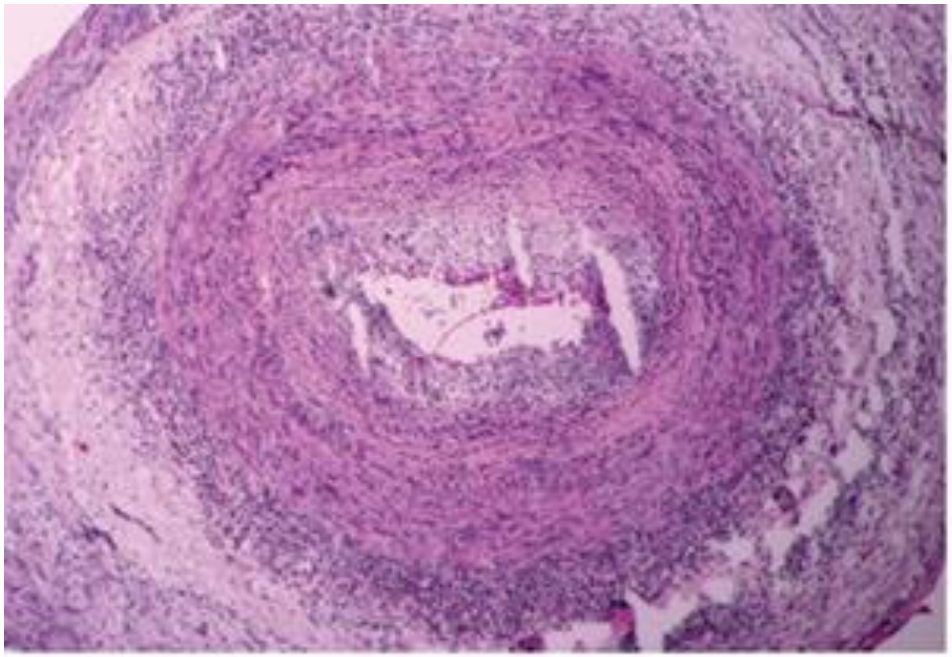


Figure 11-24 Giant cell (temporal) arteritis. **A,** Hematoxylin and eosin stain of section of temporal artery showing giant cells at the degenerated internal elastic lamina in active arteritis *(arrow)*. **B,** Elastic tissue stain demonstrating focal destruction of internal elastic lamina *(arrow)* and intimal thickening (IT) characteristic of long-standing or healed arteritis. **C,** The temporal artery of a patient with classic giant cell arteritis shows a thickened, nodular, and tender segment of a vessel on the surface of head *(arrow)*. (**C,** From Salvarani C, et al. Polymyalgia rheumatica and giant-cell arteritis. N Engl J Med 347:261, 2002.)

Giant cell arteritis



This temporal artery biopsy demonstrates a panmural infiltration of mononuclear cells and lymphocytes that are particularly seen in the media and adventitia. Scattered giant cells are also present.

Fig. 386e-20 Accessed 02/04/2016

Takayasu's arteritis

- Presents with fever, arthralgias, and weight loss
- <40 years of age.
- Predilection for East Asians, women (9:1)
- Vessel pain and tenderness develop.
- Large vessel disease.
- Involves the aortic arch.
- May involve coronary arteries (15%), pulmonary arteries (15%), renal arteries as well.
- Unequal pulses in the extremities
- Claudication
- Fibrosis of affected vessels leads to "pulseless disease."

Takayasu’s arteritis

- Histologically:
- Intimal hyperplasia
- Transmural thickening of aortic wall
- Biopsy shows polyarteritis with granulomas.
- Arterial stenosis and irregularity noted on arteriography.
- Corticosteroids and cyclophosphamide for treatment.

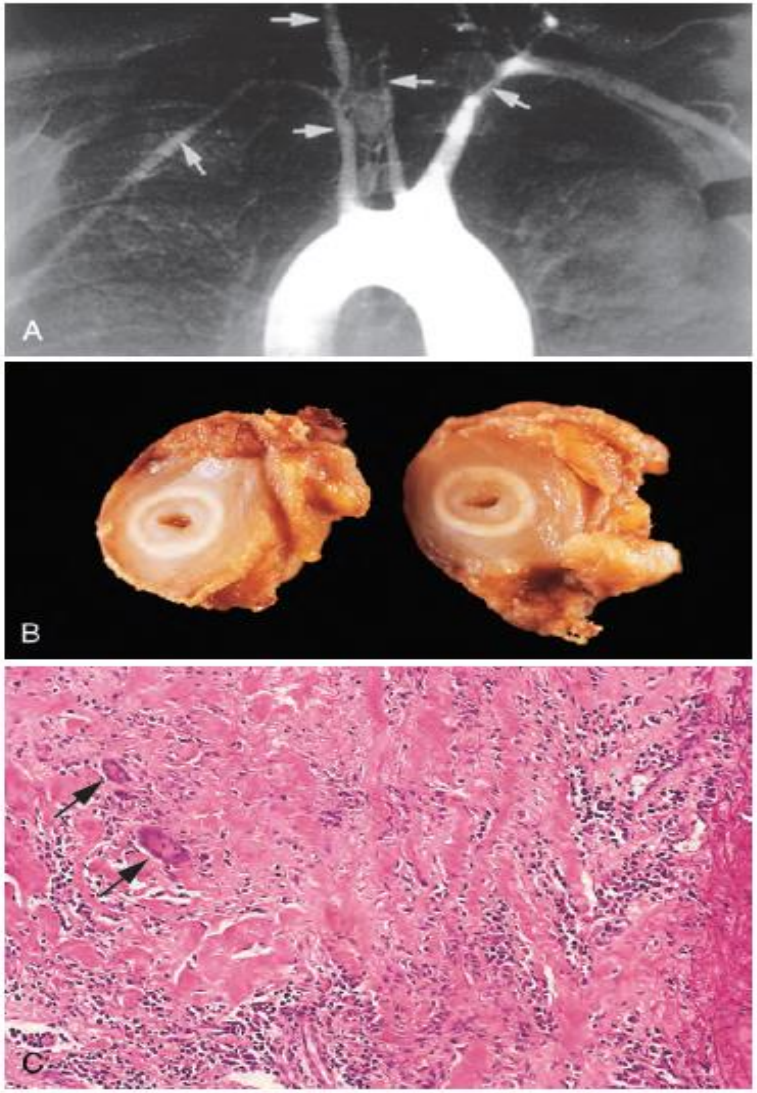
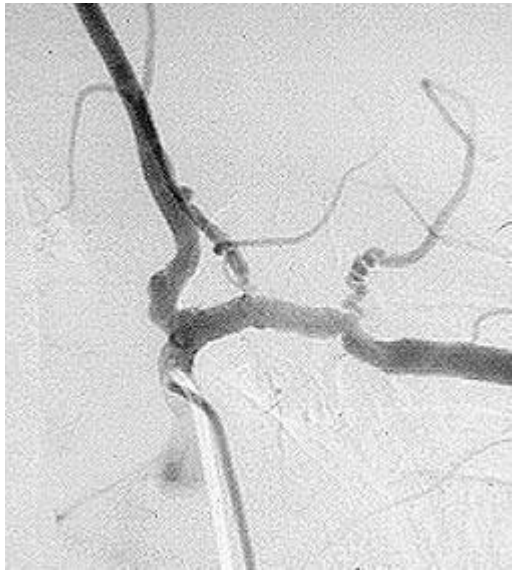
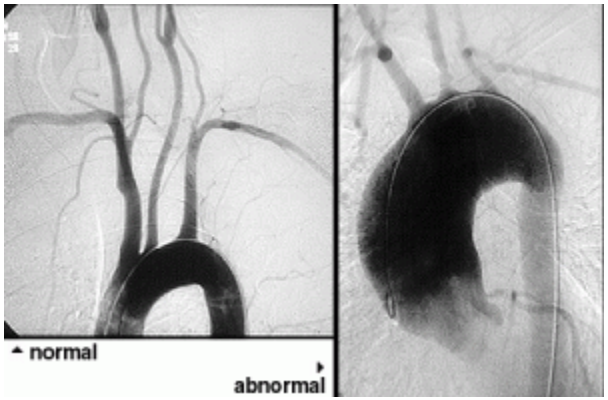


Figure 11-25 Takayasu arteritis. **A,** Aortic arch angiogram showing narrowing of brachiocephalic, carotid, and subclavian arteries *(arrows)*. **B,** Gross photograph of two cross-sections of the right carotid artery taken at autopsy of the patient shown in **A,** demonstrating marked intimal thickening and adventitial fibrosis with minimal residual lumen. **C,** Histologic appearance in active Takayasu aortitis, illustrating destruction and fibrosis of the arterial media associated with mononuclear infiltrates and inflammatory giant cells *(arrows)*.

Takayasu's arteritis



Above: Note the narrowing and irregularities that occur at several sites, and the "corkscrew" configuration of one vessel segment near the junction of the two arteries. These changes, caused by inflammation in the blood vessel wall, sometimes cause complete blockage of the artery.



Right: Normal aortic arch on the left, with narrow, smooth blood vessels. On the right is an example of an abnormal aortic arch in a patient with Takayasu's, with obvious dilation of the ascending aorta on the left side of the picture.

https://www.hopkinsvasculitis.org/types-vasculitis/takayasus-arteritis Accessed 02/20/2020

Henoch-Schöenlein purpura

- 90% Children.
- Presents 10 days after upper respiratory infection.
- Purpuric rash on the extensor surfaces and buttocks.
- May see lower extremity arthralgia.
- Colicky abdominal pain.
- May be associated with intussusception.
- Associated with focal progressive glomerulonephritis.

Henoch-Schöenlein purpura

- Elevated serum IgG and IgA.
- Biopsy shows vasculitis with IgA and complement deposition.
- Responds to corticosteroids.

Focal proliferative glomerulonephritis

- IgA nephropathy
- Most common nephropathy world-wide.
- ages 10 - 29 years
- usually males
- May present with gross or microscopic hematuria after respiratory infection but no evidence of systemic disease
- More common in southern Europe, Asia and Native Americans
- Less common in individuals of Sub-Saharan lineage
- Up to 15% have systemic disorder.
- Related to Hoenich–Schoenlein purpura.

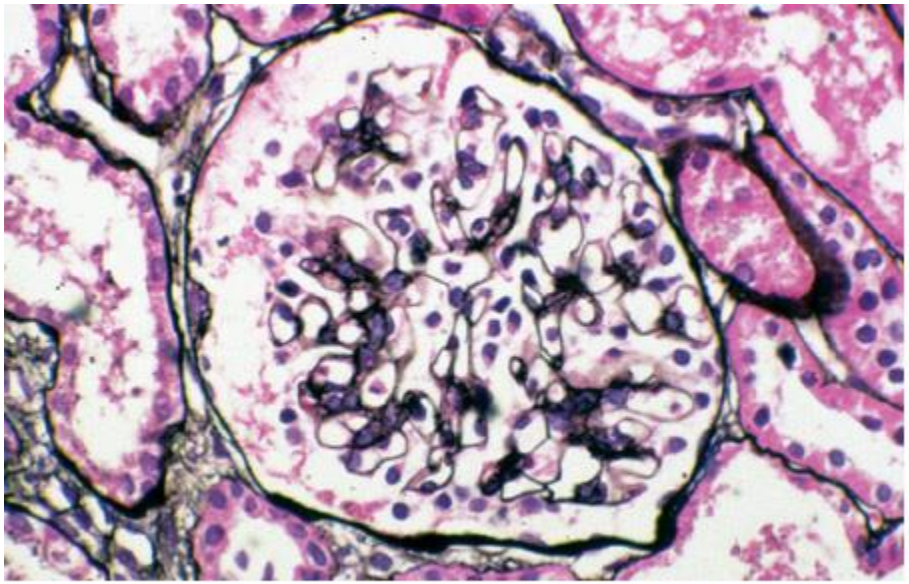
Focal proliferative glomerulonephritis

- Excess amounts of poorly galactosylated serum immunoglobulin IgA1 trigger the generation of glycan specific IgG and IgA autoantibodies,
- Alternate complement pathway activated.
- Focal epithelial cell proliferation.
- No inflammation.
- Polyclonal IgA1 deposition in mesangium.
- IgG, IgM, and/or C3 may be deposited as well.
- Dense deposits in mesangial cells and in paramesangium on electron microscopy.

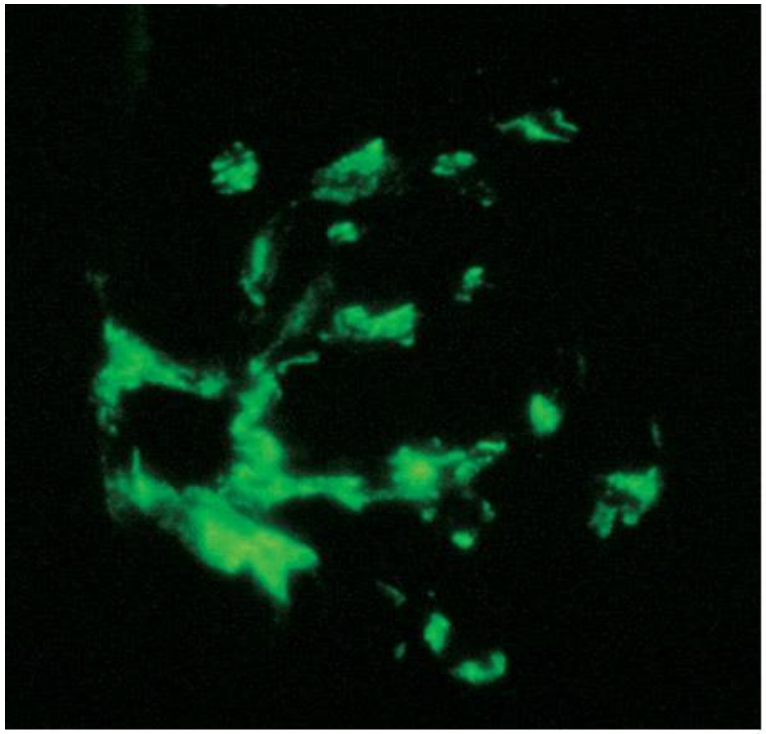
Focal proliferative glomerulonephritis

- Slowly progressive
- 25 - 50% have renal failure at 20 years
- 20% recur after transplantation
- Secondary disease:
- May also see in microangiopathic hemolytic anemia and thrombocytopenia (hemolytic uremic syndrome).
- May be seen in celiac disease or in liver disease where there is defective clearance of IgA complexes.

IgA nephropathy



(ABF/Vanderbilt Collection.) Fig. E9-6 Accessed 03/01/2010



There is variable mesangial expansion due to mesangial deposits, with some cases also showing endocapillary proliferation or segmental sclerosis (left). By immunofluorescence, deposits are evident (right).

Burger's disease

- Once known as thromboangitis obliterans
- 20-40 year old men
- Heavy smokers
- Antibody to some element in tobacco hypothesized
- A similar lesion has been described in marijuana users
- Common in Orient, Middle East, South Asia
- Rare in blacks

Burger's disease

- Presents with claudication or Raynaud's phenomenon
- Necrosis and gangrene of distal digits
- "Corkscrew" appearance of vessels on angiogram
- Histology:
- Acute and chronic inflammation, accompanied by luminal thrombosis.
- The thrombus can contain small microabscesses composed of neutrophils surrounded by granulomatous inflammation.
- May recanalize lumen
- My extend into veins and nerves
- STOP SMOKING

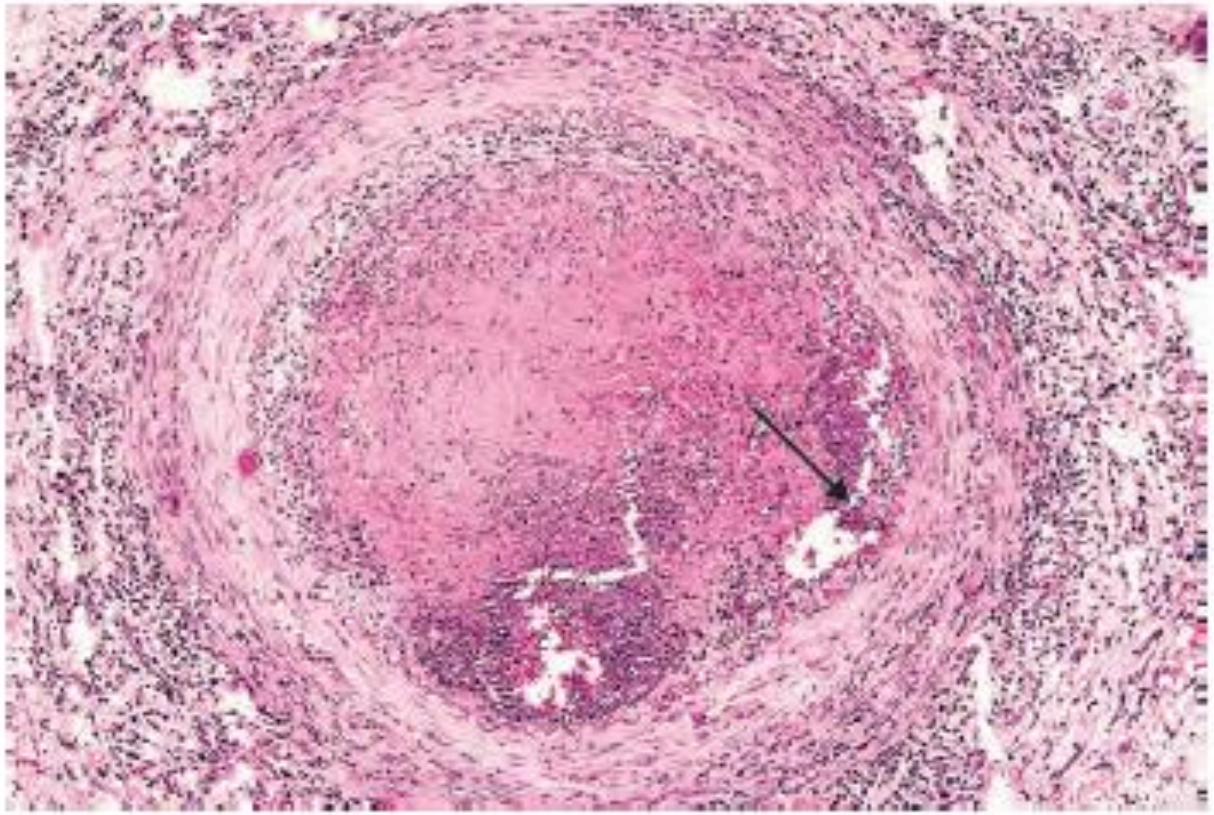


Figure 11-28 Thromboangiitis obliterans (Buerger disease). The lumen is occluded by a thrombus containing abscesses *(arrow)*, and the vessel wall is infiltrated with leukocytes.

Hypersensitivity vasculitis

- Symptoms may be a response to drug exposure (penicillin, aspirin, amphetamines, thiazides, immunization)

  OR infections (streptococcal throat, infection, endocarditis, tuberculosis, hepatitis, staphylococcal)

  OR tumor antigens.
- If drug induced, responds to drug withdrawal and corticosteroid therapy. Treat underlying illness.

Cryoglobulin related vasculitis

- Cryoglobulins have high affinity binding at 4C
- When circulate to warmer tissues, may precipitate
- Type I cryoglobulin
- Does not bind to the Fc fragment of IgG
- Does not easily activate complement
- Asymptomatic until protein concentration causes hyperviscosity syndrome.
- Associated with lymphoma, Waldenström's macroglobulinemia, and multiple myeloma.

Cryoglobulin related vasculitis

- Both types II and III cryoglobulins bind to the Fc fragment of IgG.
- Both types are called mixed cryoglobulins.
- In type II, the immunoglobulin is monoclonal
- Associated with lymphoproliferative diseases
- In type III, the immunoglobulin is polyclonal
- Both types can occur in patients with rheumatic diseases and chronic infections.

Cryoglobulin related vasculitis

- Type II and III cryoglobulinemia frequently present as vasculitis
- Recurrent lower extremity purpura,
- Glomerulonephritis
- Mononeuritis multiplex
- Hepatitis C is the principal cause of mixed cryoglobulinemia.
- Cryoglobulinemia is said to be essential when there is no identifiable underlying disease.

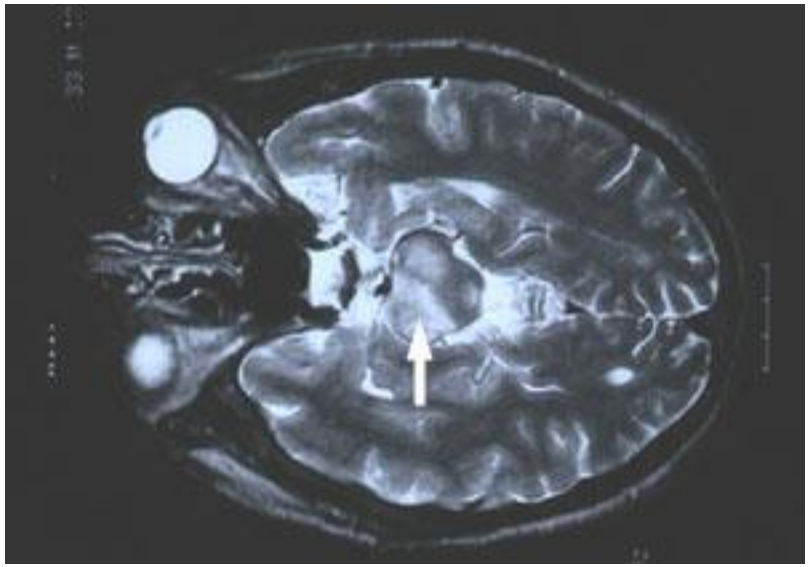
Behçet's disease

- Involves arteries of all sizes and veins as well
- Leading cause of blindness in Japan
- Common in Central Asia
- Anterior uveitis (pain, blurred vision, light sensitivity)
- Posterior uveitis (retinal damage)
- Aphthous ulcers (oral, genital, cecal)
- Erythema nodosum (often ulcerate)
- White matter demyelination
- Aseptic meningitis
- Pulmonary artery aneurysms

Behçet’s disease

- HLA-B51 predisposes
- H. pylori implicated
- May see pathergy (prick with sterile needle and pustule will develop within 24 hours)
- Topical steroids, colchicine, and immunosuppressive agents employed

Behçet's disease



MRI demonstrating central nervous system involvement (white matter changes in the pons).

https://www.hopkinsvasculitis.org/types-vasculitis/behcets-disease/ Accessed 02/20/2020

Beçhet's syndrome

- Recurrent oral and genital ulcers, conjunctivitis, arthritis, and focal neurologic deficits.
- Inflammatory.
- Erythrocyte sedimentation rate elevated.
- Non-specific changes on biopsy.
- Type III hypersensitivity.
- HLA-B5 association
- Responds to corticosteroids, colchicine, dapsone, azathioprine, chlorambucil, and cyclosporine.