

Giant Cell (Temporal) Arteritis

**Chronic, frequently granulomatous inflammation of
medium- and large-sized arteries**

Cranial ischemia and preventable visual catastrophe connect morphology to
clinical urgency

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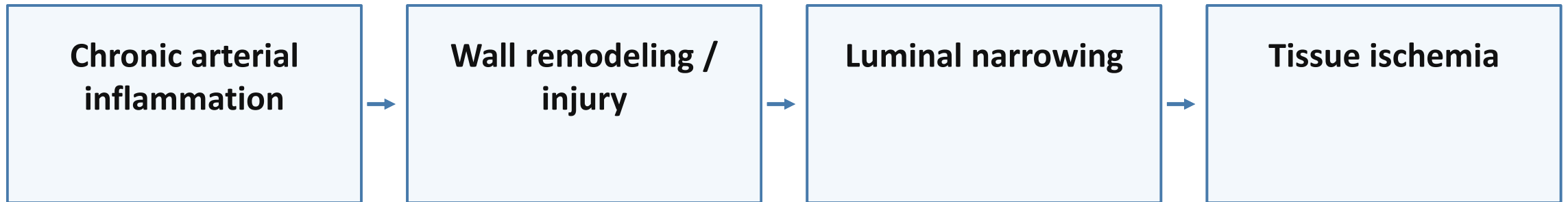
Learning objectives

- Locate giant cell arteritis within the spectrum of vasculitis.
- Explain its immune hypothesis and arterial-wall injury.
- Recognize active and healed arterial morphology.
- Integrate presentation, biopsy limitations, and visual risk.

Large-vessel vasculitis: The parent category

- The aorta and major branches are typically involved.
- The two principal forms are giant cell arteritis and Takayasu arteritis.
- The vessel-size label describes predominance, not an absolute boundary.

Giant cell arteritis: Defining pathology



- Chronic inflammation of arteries, classically granulomatous.
- Predominant involvement of medium- and large-caliber arteries.
- Arterial stenosis and ischemic injury follow wall inflammation and remodeling.

“Temporal arteritis” is an incomplete name

Temporal artery

Accessible for biopsy

Other cranial arteries

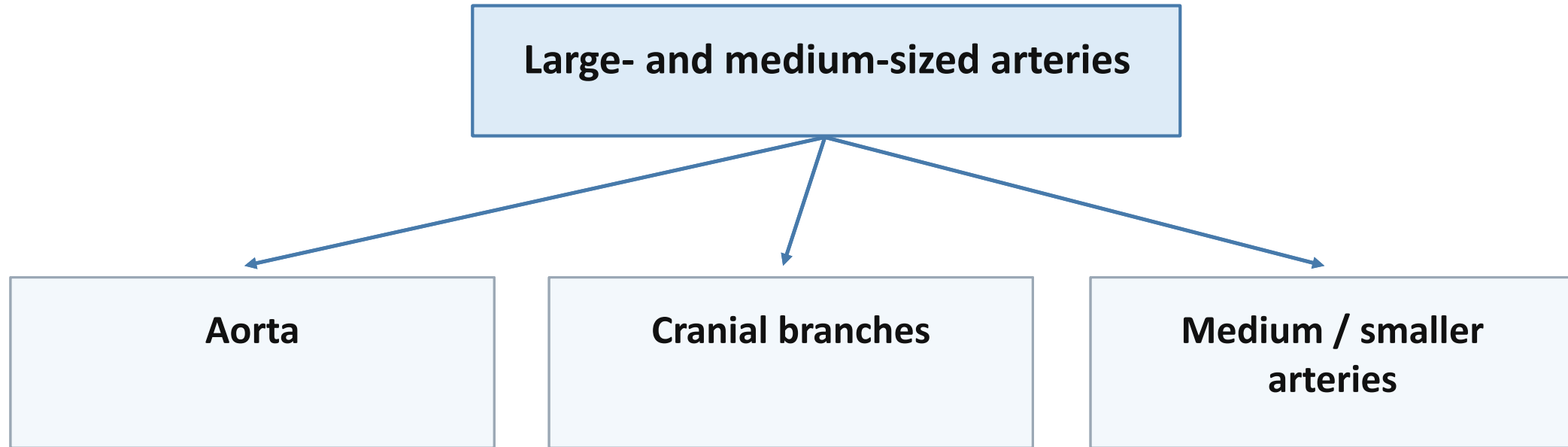
Potential visual and
neurologic consequences

Aorta / major branches

Recognized large-vessel
involvement

- The superficial temporal artery is a useful diagnostic biopsy site.
- Temporal arteries are not the only vulnerable vessels.
- The systemic disease can also affect the aorta and other branches.

Giant cell arteritis crosses vessel-size categories

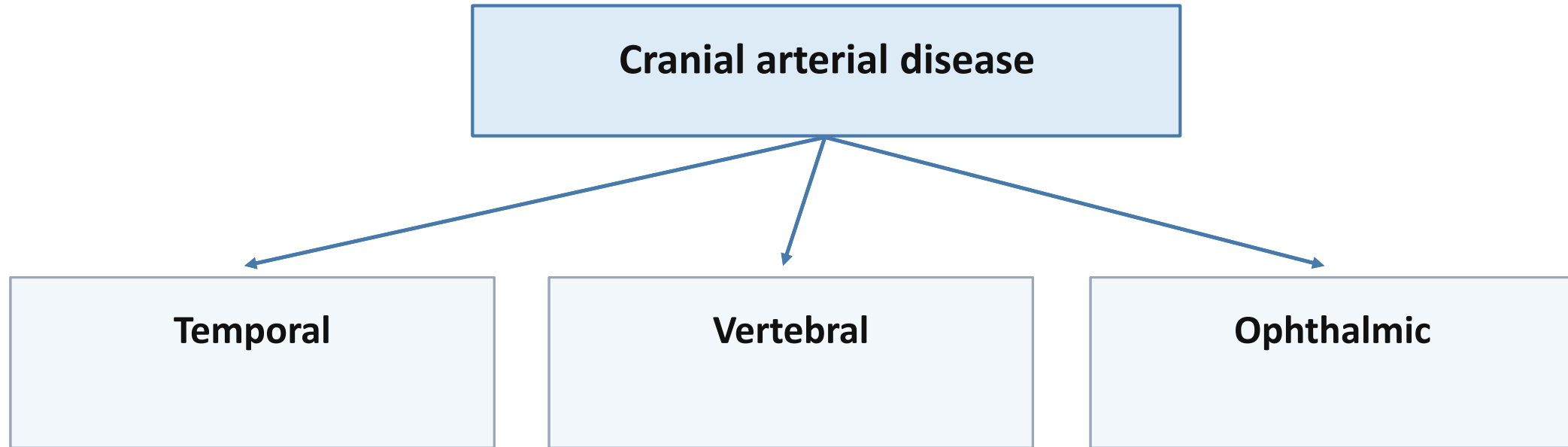


- Despite its large-vessel classification, medium and even smaller arteries can be involved.
- Do not equate the diagnostic biopsy vessel with the full anatomic extent.

Epidemiologic context: Advanced age

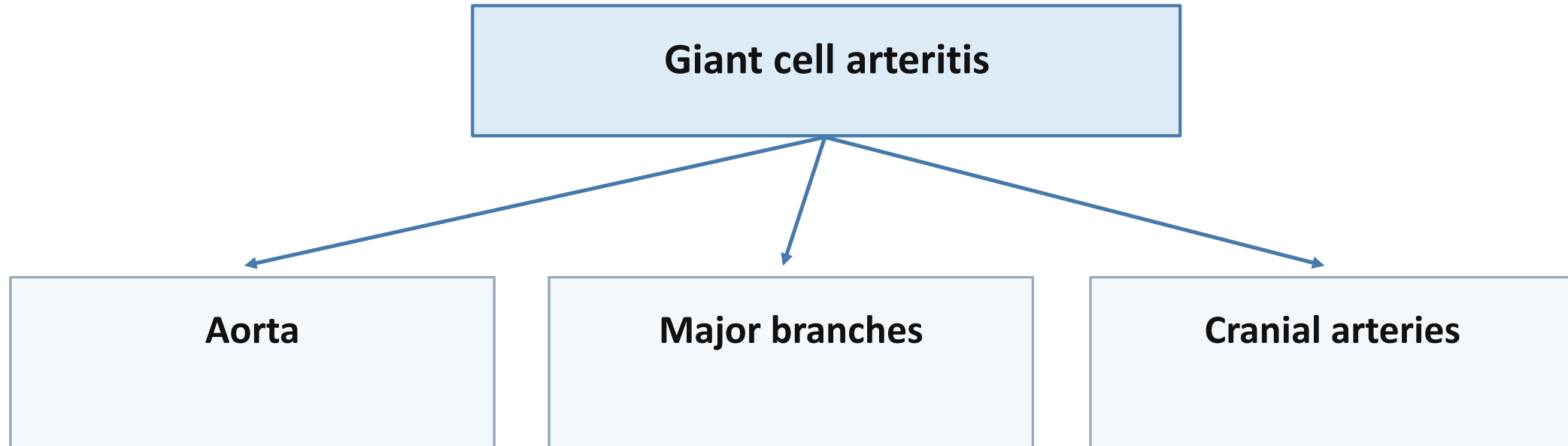
- The condition is rare before 50 years of age.
- It is the commonest vasculitis of elderly adults in the United States and Europe.
- Age is useful context—not a stand-alone tissue diagnosis.

Preferred distribution includes head arteries



- Cranial artery involvement is especially characteristic.
- The temporal, vertebral, and ophthalmic arterial territories are clinically important.
- Symptoms depend on which involved artery becomes flow-limiting.

Aortic disease belongs to the same entity

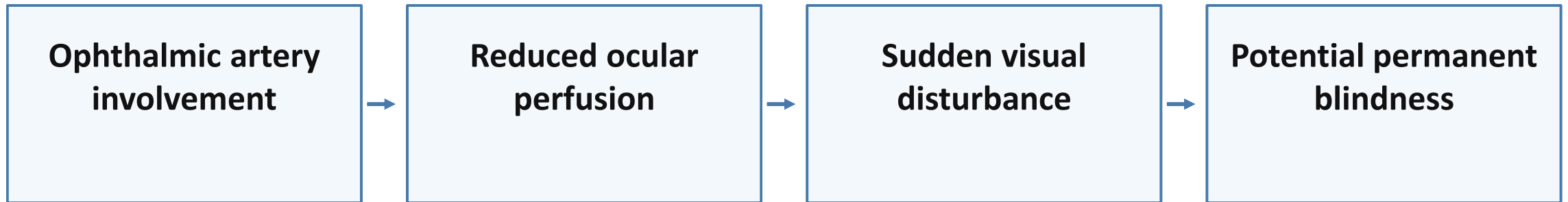


- Giant cell arteritis can involve the aorta: Giant cell aortitis.
- A cranial presentation does not imply disease is confined to the head.
- The large-vessel framework explains its overlap with Takayasu arteritis.

Why the temporal artery matters diagnostically

- Superficial location facilitates tissue sampling.
- The sampled segment can reveal characteristic inflammation and elastic injury.
- Biopsy accessibility—not exclusive disease localization—explains the historical name.

Clinical priority: Protect vision



- Ophthalmic arterial inflammation can abruptly compromise ocular blood flow.
- The resulting visual deficit may be permanent.
- Prompt recognition and treatment when the disease is suspected.

Pathogenesis remains an immune hypothesis

- The implicated vessel-wall antigen has not been identified.
- A T-cell–mediated immune response is considered central.
- Avoid presenting the initiating antigen as established.

The proposed initiating event



- An unknown antigen in the vessel wall is postulated.
- The resulting response involves T lymphocytes and inflammatory mediators.
- The model is supported by morphology and immune associations—not direct antigen identification.

T cells are part of the arterial infiltrate

- Both CD4⁺ and CD8⁺ T lymphocytes are described.
- The cellular infiltrate is within the arterial wall, rather than a purely luminal process.
- T-cell involvement supports immune-mediated rather than purely degenerative injury.

Macrophages help define the lesion

- Macrophages accompany T lymphocytes in affected vessel walls.
- Macrophage-rich inflammation contributes to the granulomatous phenotype.
- The mixture of inflammatory cells explains why giant cells are not mandatory.

IFN- γ is an implicated cytokine

- Interferon- γ as a relevant proinflammatory mediator.
- Its involvement is consistent with T-cell/macrophage-rich inflammation.
- A detailed molecular cascade is not resolved in the supplied source.

IL-17 is an implicated cytokine

- Interleukin-17 is also highlighted in the proposed pathogenesis.
- It adds an inflammatory signaling component to the T-cell model.
- The textbook does not claim that a single cytokine accounts for all pathology.

Antiendothelial antibodies may contribute

- Antiendothelial-cell antibodies are noted as possible contributors.
- Their presence should not be confused with a disease-specific diagnostic test.
- The supplied excerpt provides no cutoff or assay performance metric.

Granulomatous inflammation: A tissue response

- The classic pattern is granulomatous inflammation of arterial media.
- Multinucleated giant cells are one possible component.
- The histologic distribution is strongly associated with elastic lamina injury.

Why an immune etiology is favored

Tissue pattern

Granulomatous arteritis

Host association

MHC class II association

Treatment response

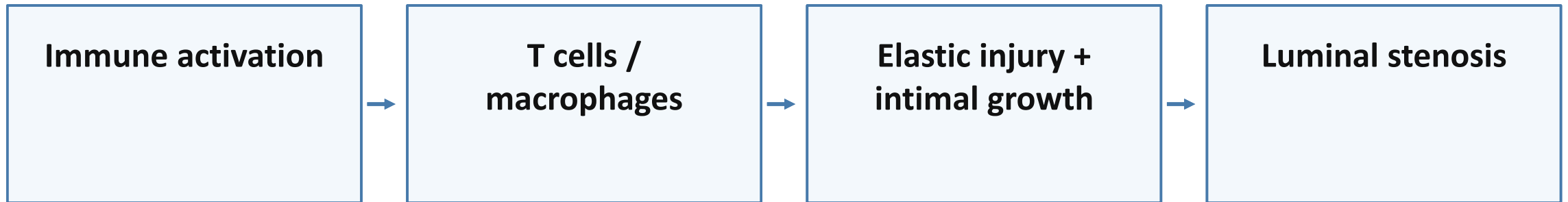
Steroid responsiveness

- Granulomatous wall inflammation.
- Association with particular MHC class II haplotypes.
- Clinical responsiveness to corticosteroid therapy.

What is known—and not known—about selectivity

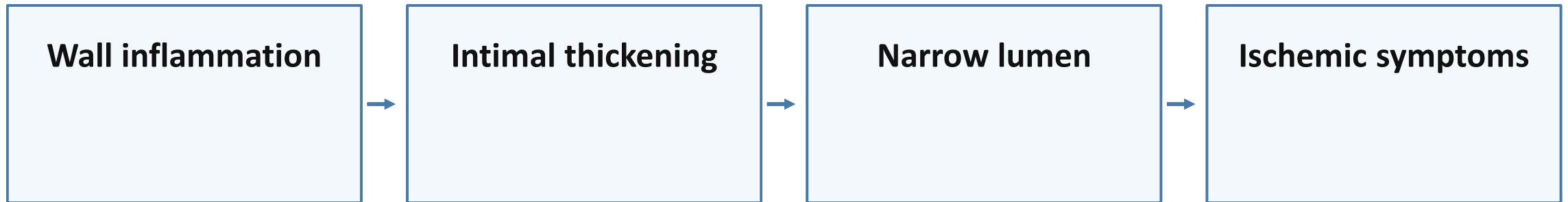
- Cranial arterial predilection is well recognized.
- The reason for the head-vessel preference remains unexplained.
- Distinct embryologic vascular origins and antigens are proposed, not proven.

Pathogenesis and damage: Integrated model



- The initiating vascular antigen is unknown.
- Inflammatory and remodeling processes converge on the internal elastic lamina and intima.

Inflammation and stenosis are linked



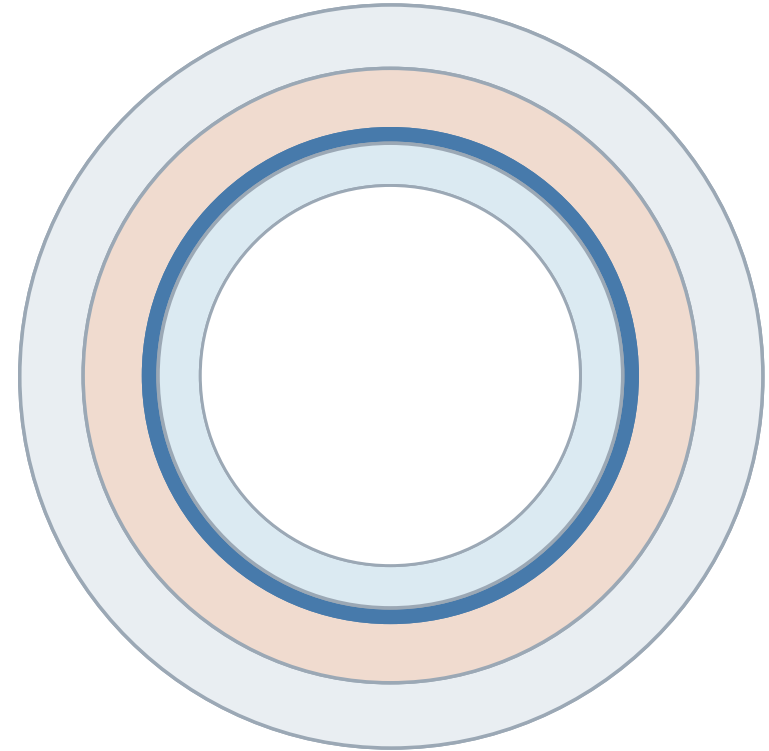
- An inflamed arterial wall develops structural alterations.
- Intimal thickening is particularly important for narrowing the lumen.
- This converts immune injury into impaired regional perfusion.

Mechanism is not equivalent to a biomarker panel

- MHC associations and cytokines are mechanistic evidence.
- The defining diagnosis in the supplied section relies on morphology from biopsy.
- No specific cytokine or antibody assay is endorsed as a stand-alone diagnostic criterion.

Normal muscular artery: Orientation

- A central lumen is separated from media by the intimal compartment.
- The internal elastic lamina marks the intima–media interface.
- Adventitia surrounds the media.

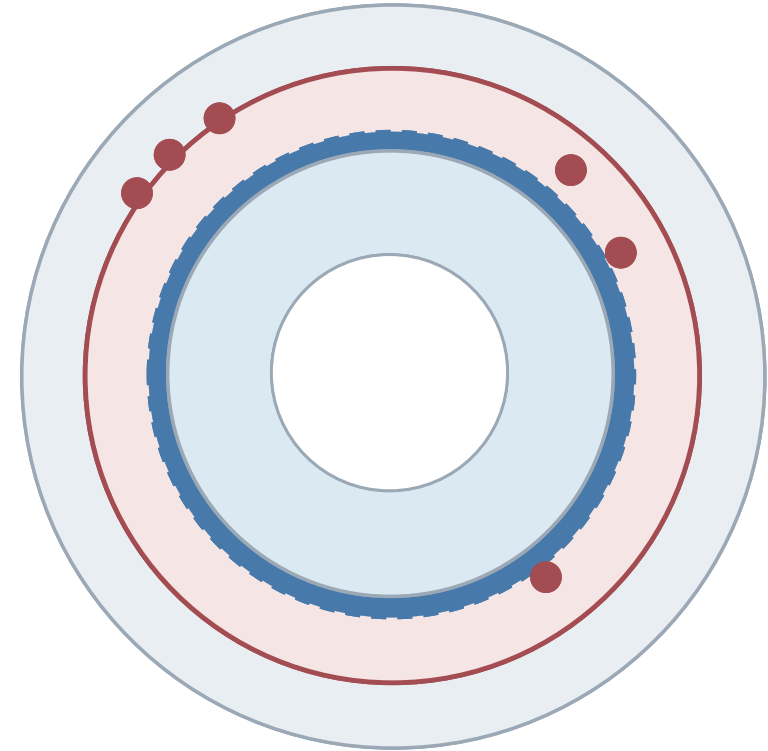


Schematic — normal arterial wall

Layers not drawn to scale.

Active arteritis: The histologic archetype

- Inflammation is concentrated in the arterial wall.
- Granulomatous inflammation typically involves the media.
- Elastic lamina damage and intimal expansion can coexist.

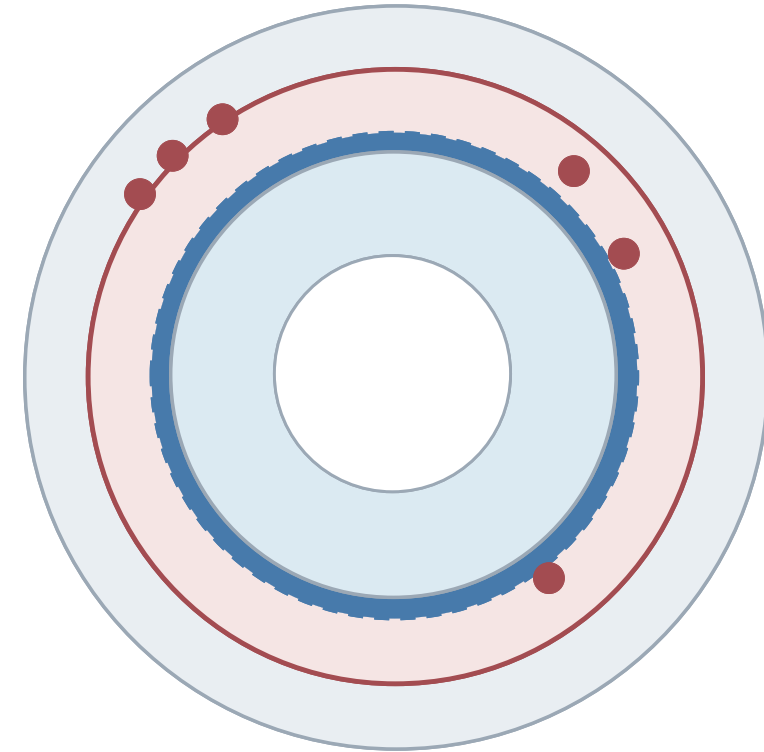


Schematic — active arteritis

Immune dots are illustrative, not cells
on a slide.

Intimal thickening is a key lesion

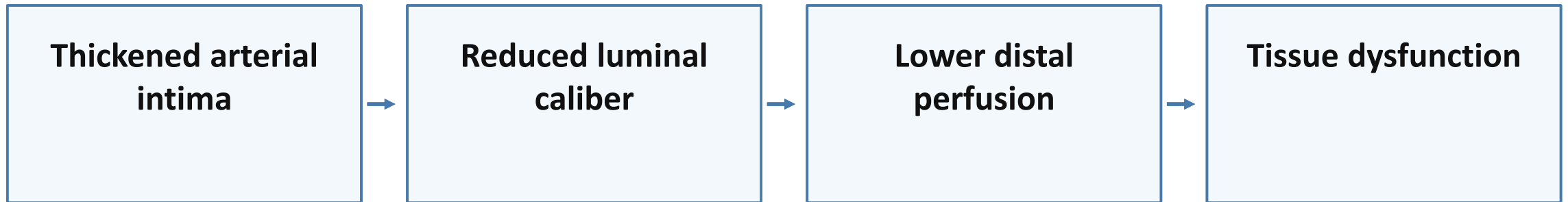
- The intima may expand conspicuously in affected segments.
- Intimal expansion decreases luminal cross-sectional area.
- This structural change helps explain symptoms of arterial insufficiency.



Schematic — active arteritis

Thick intima → reduced lumen
(schematic).

Luminal narrowing links anatomy to symptoms



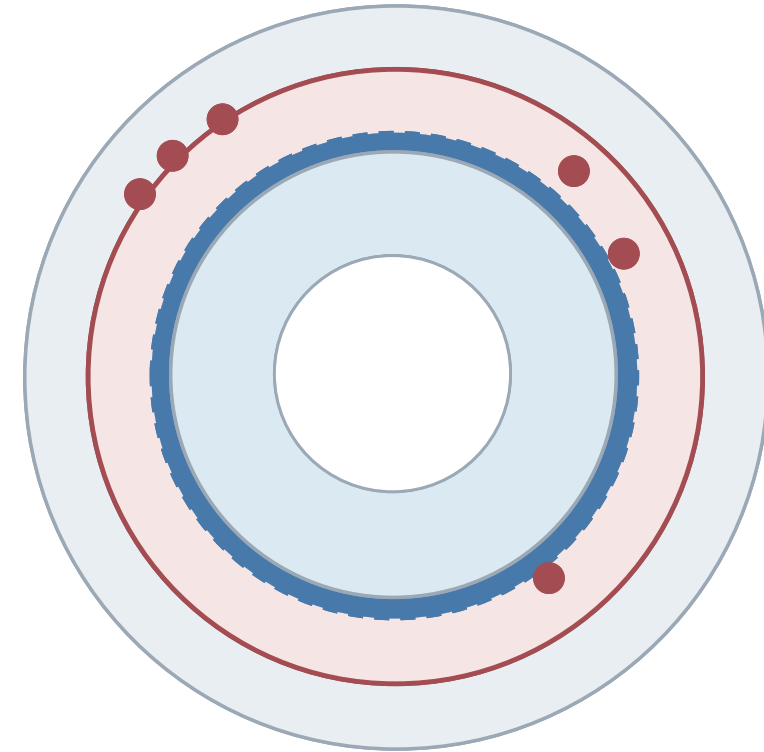
- Progressive wall remodeling restricts downstream blood supply.
- Symptoms depend on the artery and target tissue.
- Cranial artery disease is dangerous because ocular injury can be permanent.

Thrombosis may complicate an inflamed artery

- Occasional thromboses in affected segments.
- Thrombus can further reduce a lumen already narrowed by intimal thickening.
- Thrombosis is not required to identify giant cell arteritis.

Granulomatous inflammation is usually medial

- A classic active lesion contains granulomatous inflammation in the media.
- The internal elastic membrane is an important spatial focus.
- The lesion should be interpreted by distribution and vessel injury—not giant cells alone.

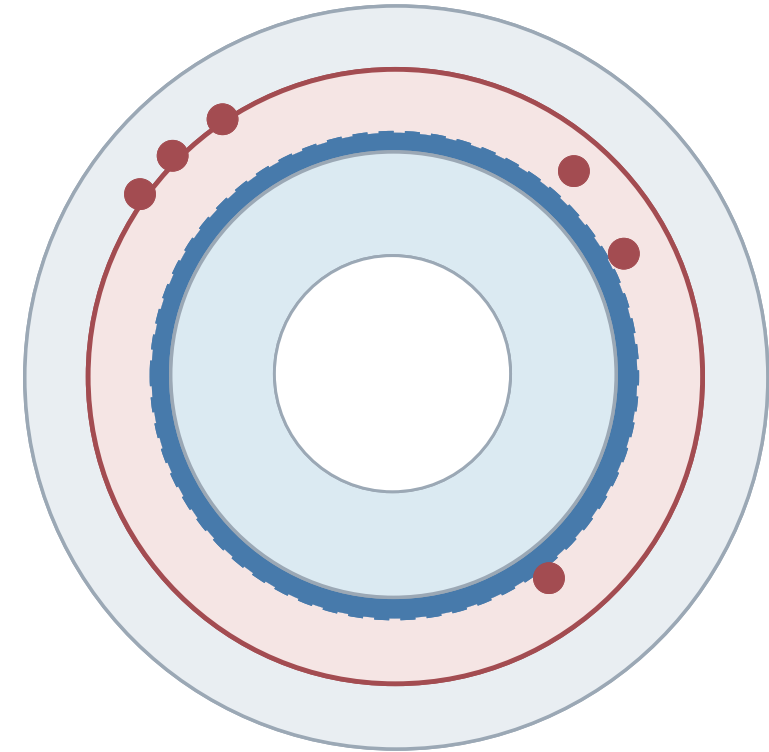


Schematic — active arteritis

Simplified medial inflammatory
distribution.

The internal elastic lamina is a diagnostic landmark

- Active disease may show elastic membrane disruption.
- An elastic tissue stain can highlight loss of elastic continuity.
- Textbook Figure 11.23 describes this relationship; The image was not supplied.



Schematic — active arteritis

Broken blue contour represents elastic injury.

Elastic fragmentation and inflammation co-localize

- Classic granulomatous inflammation is centered near the internal elastic membrane.
- Fragmentation is an important associated finding.
- Interpret loss of elastic continuity with the rest of the wall morphology.

Cells described in active lesions

T lymphocytes

Both CD4⁺ and CD8⁺
populations described

Macrophages

Core component of arterial-
wall inflammation

Giant cells

Characteristic but not
universally detectable

- CD4⁺ T lymphocytes.
- CD8⁺ T lymphocytes.
- Macrophages; Multinucleated giant cells may be present.

Giant cells: Characteristic, not compulsory

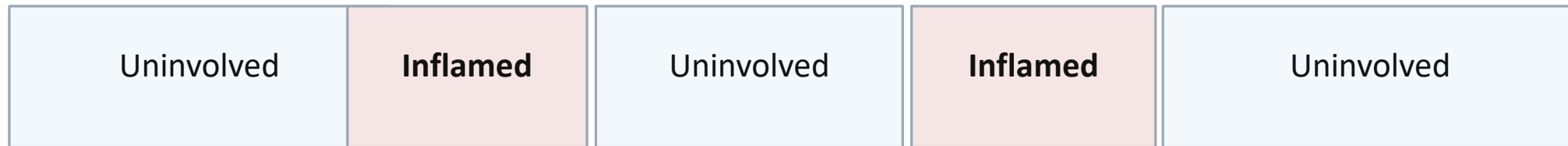
- Approximately 75% of adequately biopsied specimens contain multinucleated giant cells in the Robbins account.
- Absence of giant cells is not a valid exclusion rule.
- Overall arterial-wall morphology remains decisive.

Classic morphology can be incomplete

- Granulomas may be sparse or absent.
- Multinucleated giant cells may be sparse or absent.
- A diagnosis should integrate wall inflammation, elastic damage, and intimal remodeling.

Skip lesions: Inflammation is discontinuous

Longitudinal involvement of a single artery (schematic)

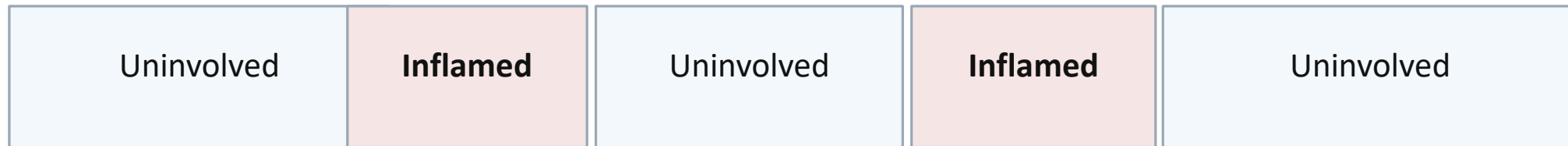


Biopsy location and length determine whether a focal lesion is sampled.

- Changes are patchy along the longitudinal course of an involved artery.
- A sample from an uninvolved interval can miss the lesion.
- This sampling property explains some negative biopsies.

Specimen length matters in a patchy disease

Longitudinal involvement of a single artery (schematic)



Biopsy location and length determine whether a focal lesion is sampled.

- Adequate longitudinal sampling increases the opportunity to encounter inflamed segments.
- The source text has an OCR ambiguity in its numerical length symbol.
- No precise minimum length is asserted here without the original PDF.

Biopsy interpretation requires whole-wall assessment

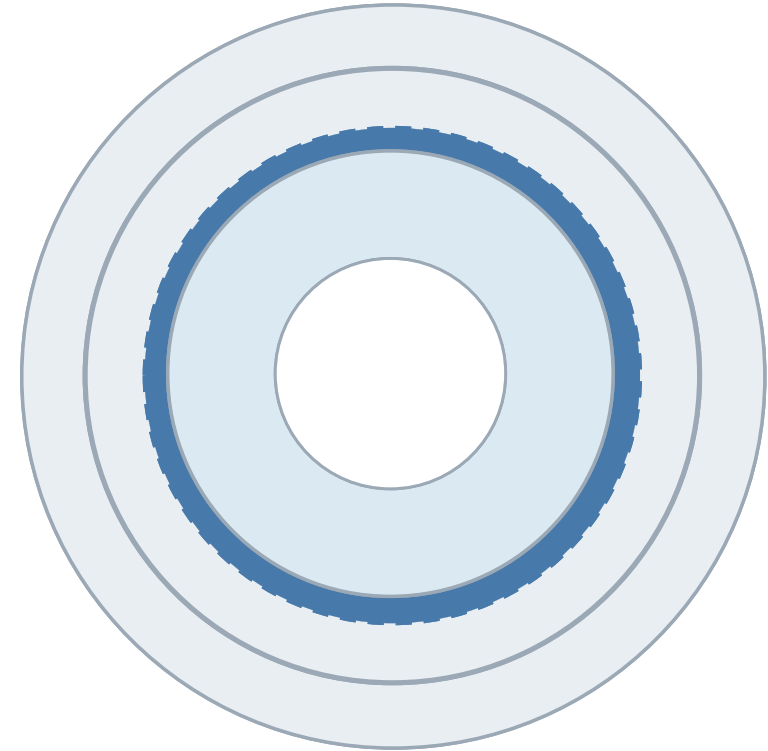
- Look for inflammation in media and surrounding arterial compartments.
- Evaluate the internal elastic lamina and intima.
- Determine whether features represent active disease or healed remodeling.

Active and healed stages are morphologically different

Component	Active lesion	Healed lesion
Inflammation	Often granulomatous; T cells/macrophages	May no longer be conspicuous
Media	Inflammatory injury	Attenuation and scarring
Internal elastic lamina	Fragmentation	Extensive residual fragmentation
Intima	Thickening / stenosis	Persistent thickening

Healed disease: Medial attenuation and scarring

- The media may become thinned and fibrotic.
- Active inflammatory cells need not remain abundant.
- Healed injury must be recognized as structural remodeling rather than active granuloma alone.

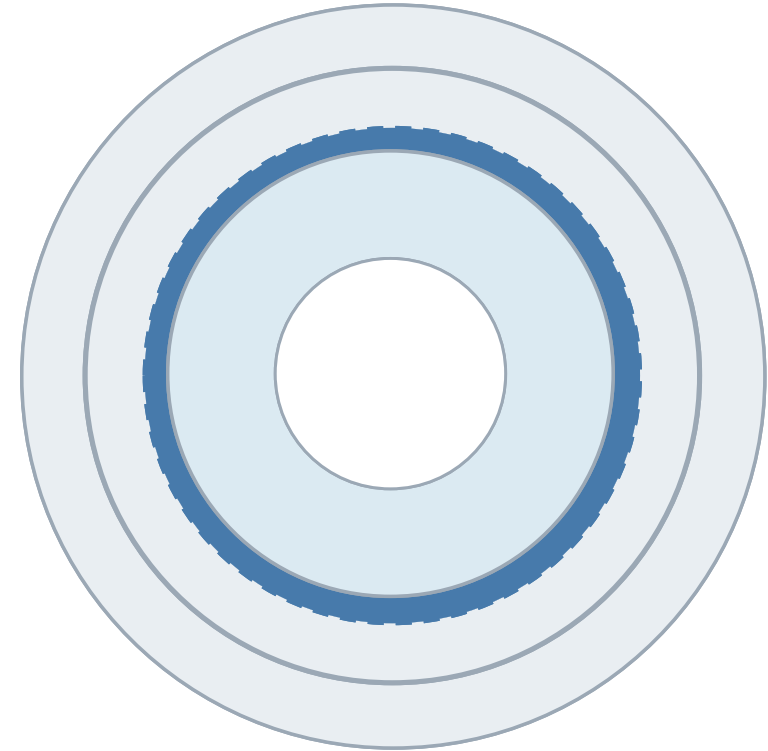


Schematic — healed remodeling

Gray wall denotes scar/attenuation, not a real stain.

Healed disease: Persistent intimal thickening

- Intimal thickening persists after acute inflammatory activity.
- The resulting stenosis can outlast visible inflammation.
- The arterial wall therefore records the history of injury.



Schematic — healed remodeling

Structural narrowing may remain.

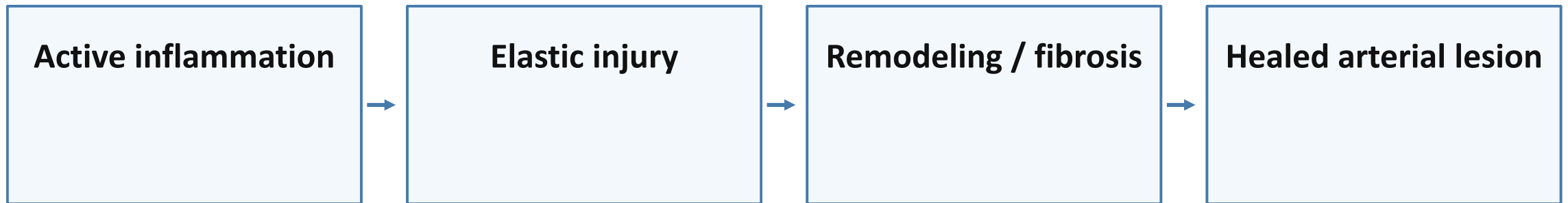
Healed disease: Adventitial fibrosis

- Adventitial fibrosis is an additional healing feature.
- This may coexist with medial scarring and elastic lamina loss.
- The diagnosis rests on the combination and anatomic context.

Healed disease: Extensive elastic loss

- The Robbins description includes fragmentation over more than 30% of the elastic lamina circumference.
- This accompanies medial scarring, intimal thickening, and adventitial fibrosis.
- No single threshold should be detached from the full histologic pattern.

An active–healed continuum



- Active granulomatous medial injury can resolve into structural scarring.
- Elastic fragmentation and intimal thickening bridge the two descriptions.
- The schematic depicts conceptual evolution—not a measured patient time course.

What Figure 11.23 would demonstrate

- H&E: Giant cells and degenerating internal elastic membrane in active disease.
- Elastic tissue stain: Focal lamina destruction and intimal thickening.
- Clinical photograph: Thickened, nodular, tender temporal artery.

Morphologic pitfalls at the microscope

- Treating absence of giant cells as exclusion.
- Ignoring focal distribution within the submitted artery.
- Failing to assess elastic membrane damage and healed change.
- Overinterpreting one isolated feature without clinical context.

Clinical presentations: Systemic or localized

Constitutional

Fever, fatigue, weight loss

Cranial pain

Facial pain or temporal
headache

Ocular

Diplopia through complete
visual loss

- Some patients present only with nonspecific constitutional symptoms.
- Others present with focal cranial arterial pain.
- Abrupt ocular symptoms define a particularly high-risk phenotype.

Constitutional symptoms

- Fever may be the presenting clue.
- Fatigue and weight loss may dominate the early complaint.
- These findings alone are nonspecific; Arterial features guide suspicion.

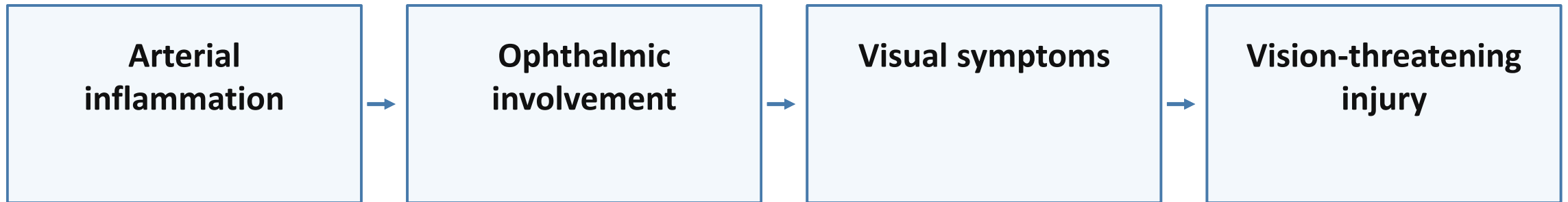
Headache and facial pain

- Headache is often most intense along the superficial temporal artery.
- Facial pain may be part of the cranial presentation.
- The anatomic distribution helps connect symptoms to the artery.

The temporal artery may be tender

- Palpation may be painful along the superficial temporal artery.
- Robbins Figure 11.23 describes a thickened, nodular, tender arterial segment.
- The palpable lesion is a clinical correlate of arterial inflammation.

Ophthalmic arterial disease



- Visual symptoms reflect involvement of the ophthalmic arterial circulation.
- Onset may be abrupt.
- Because deficits can be permanent, visual symptoms are a high-priority warning.

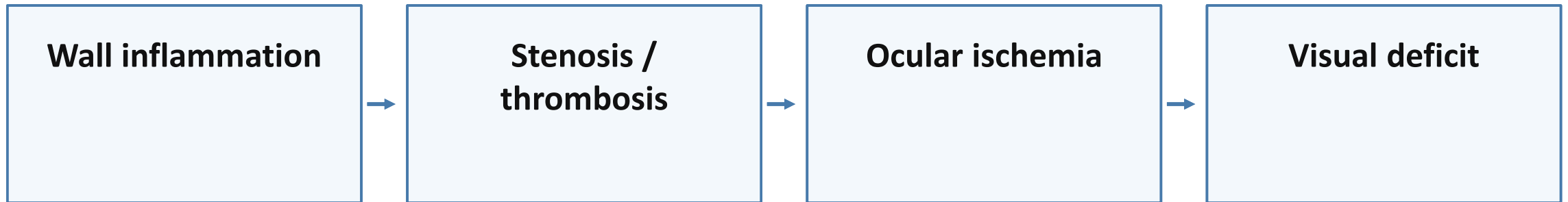
Diplopia is an important ocular symptom

- Diplopia lies within the reported ocular presentation spectrum.
- It can herald arterial disease rather than benign isolated discomfort.
- Ocular symptoms require urgent assessment in this clinical context.

Vision loss can be sudden and permanent

- The severe end of the ocular spectrum is complete loss of vision.
- Abrupt ocular symptoms in about half of patients.
- This makes giant cell arteritis a time-sensitive clinicopathologic diagnosis.

Cranial symptoms and histology fit together



- Arterial wall inflammation explains tenderness.
- Intimal thickening and possible thrombosis explain reduced flow.
- Ophthalmic circulation involvement explains potentially irreversible deficits.

Clinical–pathologic correlations

Clinical observation	Pathologic correlate
Tender temporal artery	Inflamed arterial wall
Temporal headache / facial pain	Cranial arterial involvement
Diplopia / vision loss	Ophthalmic arterial involvement with impaired perfusion
Persistent arterial dysfunction	Intimal thickening and fibrosis

Recognition: The central clinical question

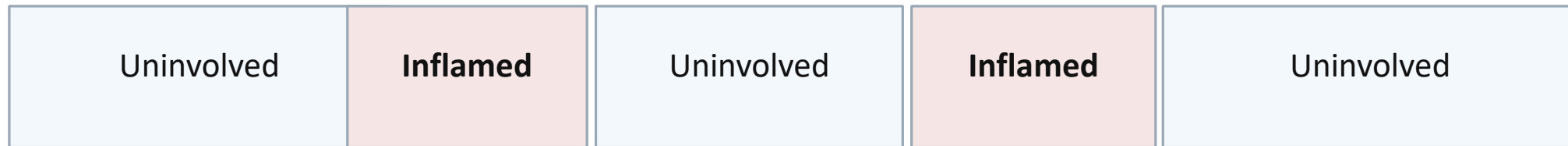
- Is an older patient presenting with new cranial or visual symptoms?
- Could the complaints reflect inflammation of cranial arteries?
- Would failure to act expose the patient to permanent visual injury?

Biopsy and histologic confirmation

- The supplied Robbins section emphasizes temporal artery biopsy.
- Typical histology links immune inflammation to elastic damage and intimal remodeling.
- Clinical suspicion and specimen adequacy remain essential to interpretation.

A negative biopsy cannot rule out the disease

Longitudinal involvement of a single artery (schematic)



Biopsy location and length determine whether a focal lesion is sampled.

- The lesion may be missed because involvement is patchy.
- A negative specimen does not exclude disease even with otherwise adequate sampling.
- Interpret the negative result against the clinical picture.

Diagnostic reasoning with discordant results

- Strong cranial/ocular symptoms can coexist with a negative biopsy.
- Reassess the extent and representativeness of the specimen.
- Avoid converting a sampling limitation into a biological exclusion.

Pathologist's integrated tissue checklist

Assess	Diagnostic question
Media	Is the infiltrate granulomatous or macrophage/T-cell rich?
Elastic lamina	Is there fragmentation, particularly near inflammation?
Intima	Is there pathologic thickening or luminal narrowing?
Healing	Is there medial scarring or adventitial fibrosis?

Clinical urgency does not depend on a perfect sample

- Delay matters when the ophthalmic arterial circulation is at risk.
- Robbins stresses prompt diagnosis and treatment.
- Histologic sampling limitations must be kept in view during management.

Therapeutic implication

- Corticosteroid responsiveness is part of the evidence for an immune mechanism.
- Prompt treatment is important because ophthalmic injury may be permanent.
- The extracted textbook statement about anti-TNF treatment is not presented as a current guideline recommendation.

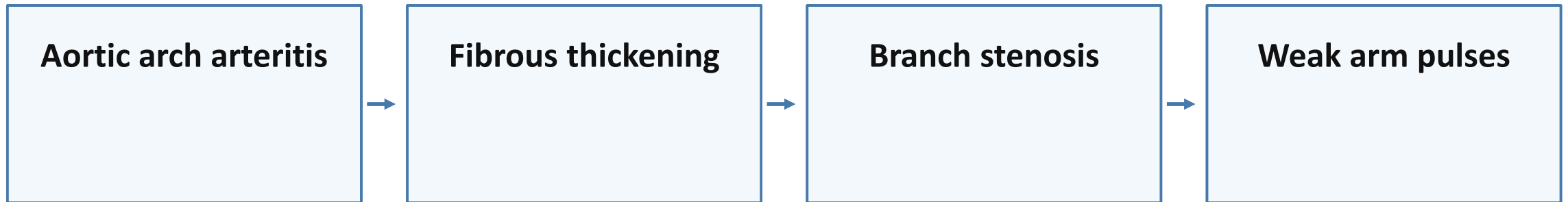
The closest comparator: Takayasu arteritis

Feature	Giant cell arteritis	Takayasu arteritis
Typical age	Older than 50 years	Younger than 50 years
Histologic category	Granulomatous large-vessel arteritis	Granulomatous large-vessel arteritis
Characteristic clue	Temporal/cranial involvement	Aortic arch / great vessels; weak upper-limb pulses
Overlap	Can involve aorta	Shares histologic features with GCA

Why histology alone may not separate them

- Both giant cell arteritis and Takayasu arteritis may be granulomatous.
- Both can involve the aorta and major branches.
- Age and clinical–anatomic pattern are important discriminatory information.

Takayasu: Aortic arch and pulse phenotype



- Transmural fibrous thickening affects the aorta and great vessels.
- Major branch stenosis explains reduced upper-extremity pulses.
- This clinical pattern contrasts with the typical cranial GCA presentation.

Vessel-size classification avoids false equivalence

Category	Predominant arteries	Example in Robbins
Large vessel	Aorta, great arteries	GCA; Takayasu
Medium vessel	Main visceral arteries and branches	Polyarteritis nodosa
Small vessel	Arterioles, capillaries, venules	Microscopic polyangiitis

Case 1: New cranial pain in an older adult

A 72-year-old patient develops persistent unilateral temporal headache and tenderness over the superficial temporal artery. No laboratory data are supplied.

Which disease should enter the differential immediately?

- State the leading pathology-based concern.
- Identify the arterial lesion that could generate symptoms.

Case 1: Pathology-based explanation

- Age and cranial arterial symptoms are compatible with giant cell arteritis.
- The inflamed wall can be tender; Intimal expansion can restrict flow.
- A biopsy may demonstrate granulomatous medial disease and elastic injury.

Case 2: Abrupt visual symptoms

An older patient with recent temporal headache reports newly developed diplopia and rapidly progressive visual difficulty.

Which arterial territory makes this presentation urgent?

- Identify the complication at risk of becoming permanent.
- Explain why delay in assessment is unsafe.

Case 2: Link ocular symptoms to arterial injury

- Involvement of the ophthalmic circulation can impair ocular perfusion.
- Symptoms span diplopia to complete vision loss.
- Urgent management is required because visual loss may be permanent.

Case 3: A negative temporal artery biopsy

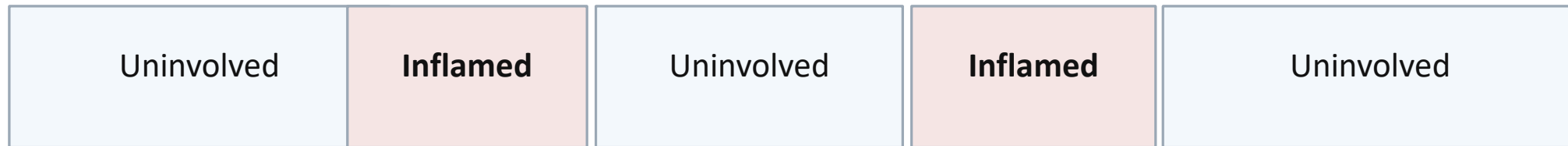
A patient has a strongly suggestive cranial presentation, but the sampled temporal artery shows no diagnostic inflammation.

How should the biopsy result be interpreted?

- Explain the possible false-negative mechanism.
- State whether a negative biopsy logically excludes the disease.

Case 3: Sampling and interpretation

Longitudinal involvement of a single artery (schematic)



Biopsy location and length determine whether a focal lesion is sampled.

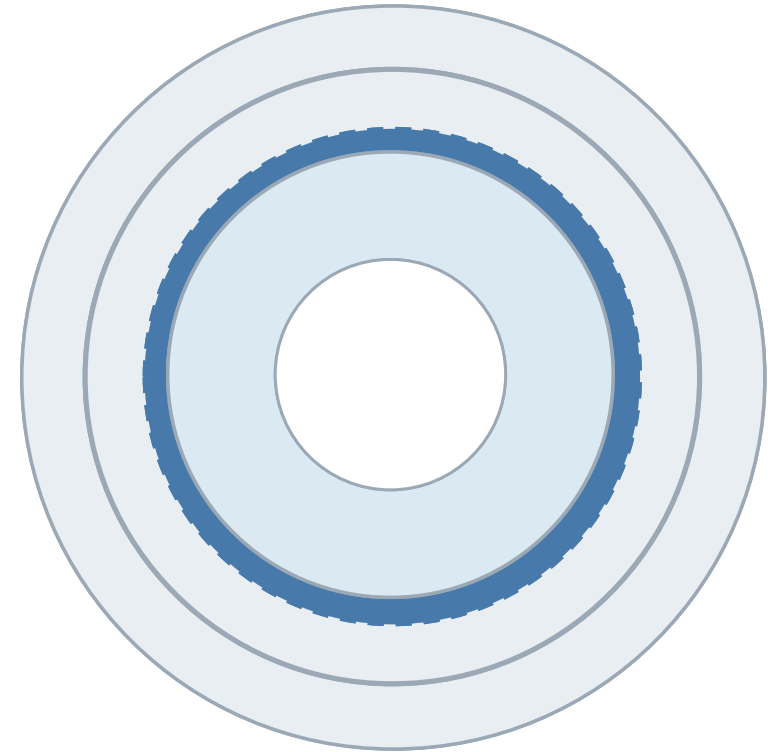
- Inflammatory changes can be discontinuous along the same artery.
- A sample may contain only an uninvolved interval.
- Clinical and pathologic evidence must therefore be integrated.

Case 4: Giant cells are not seen

- The absence of giant cells alone is insufficient to exclude giant cell arteritis.
- Seek medial inflammation, elastic disruption, and intimal thickening.
- Remember that classic lesions do not always contain identifiable granulomas.

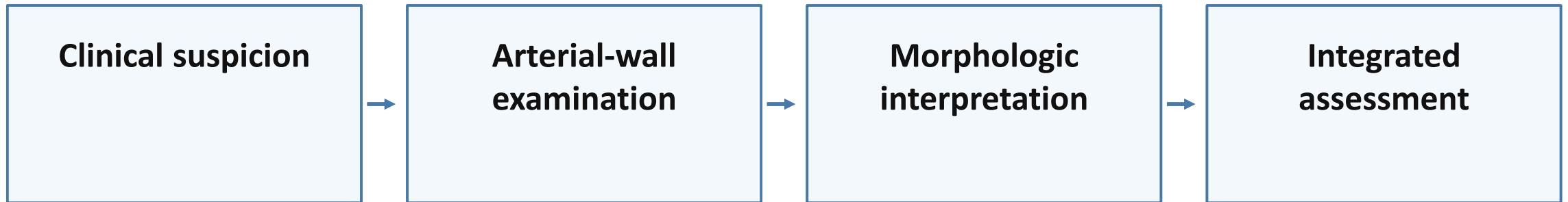
Case 5: Scarred arterial wall

- Medial attenuation and scarring suggest a healed phase.
- Associated intimal thickening, elastic loss, and adventitial fibrosis support prior injury.
- Do not require conspicuous active granulomas in every healed segment.



Schematic — healed remodeling
Hypothetical healed-lesion pattern.

Integrated diagnostic concept



- Clinical context: Older patient with cranial or ocular symptoms.
- Pathology: Segmental medial inflammation and elastic disruption.
- Consequence: Intimal remodeling and ischemic manifestations.
- Limitation: A negative sample cannot exclude patchy disease.

High-yield synthesis

- GCA is a chronic, often granulomatous, immune-mediated large-vessel vasculitis.
- Temporal artery accessibility must not obscure systemic arterial distribution.
- Elastic lamina injury, intimal thickening, and active/healed wall changes are central.
- Visual symptoms demand urgency; Patchy biopsies can be falsely negative.

Primary source and scope

- Robbins, Cotran & Kumar: Pathologic Basis of Disease, 11th edition (2026).
- Chapter 11, Blood Vessels: “Giant Cell (Temporal) Arteritis,” pp. 464–465.
- Parent context: noninfectious / large-vessel vasculitis; adjacent Takayasu section.
- Schematic drawings are original editable teaching diagrams—not reproduced histology.