

Glomus tumor

(Glomangioma)

A painful perivascular neoplasm of modified smooth-muscle cells

Clinicopathologic recognition • morphology • differential diagnosis

Dr Abu Suraih Sakhri

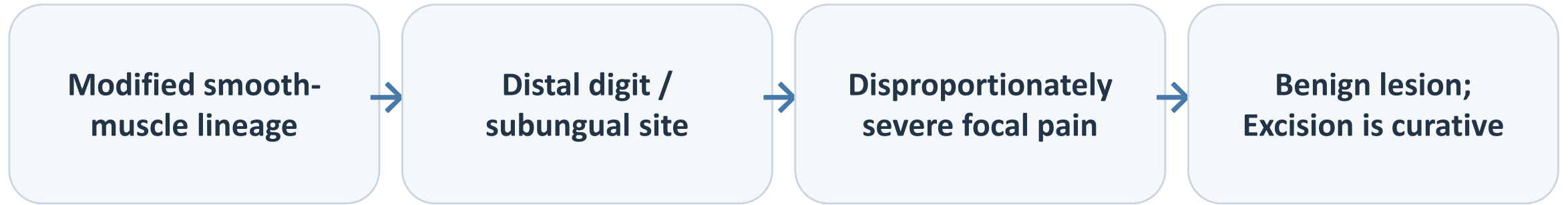
MBBS, MD (Pathology)

www.abusuraisakhri.com

Learning objectives

- Localize the glomus body and explain its vascular function.
- Recognize the clinical pattern of a subungual glomus tumor.
- Interpret the vessel–glomus-cell relationship on histology and immunostains.
- Distinguish conventional glomus tumor from glomuvenous malformation and common mimics.
- Connect complete excision with symptom relief.

The diagnostic signature



- The identity of the lesional cell—not simply the presence of blood vessels—defines this neoplasm.

Where glomus tumor sits in vascular pathology

Benign

Hemangioma • lymphangioma • glomus tumor

Intermediate

Kaposi sarcoma • hemangioendothelioma

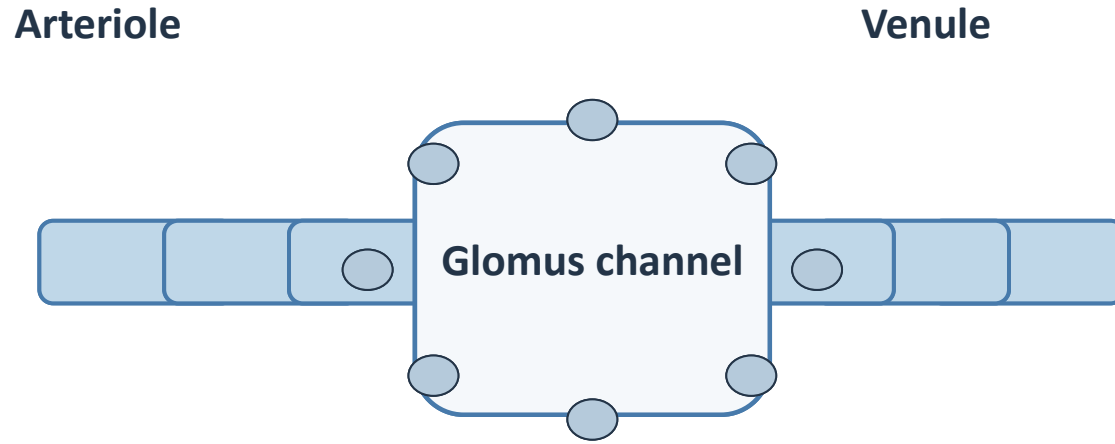
Malignant

Angiosarcoma

A vessel-associated tumor is not necessarily endothelial

Question	Endothelial neoplasm	Glomus tumor
Neoplastic lineage	Endothelial cells	Modified smooth-muscle cells
Basic structure	Vascular channels	Glomus cells near vascular channels
Useful emphasis	Endothelial identity	Perivascular contractile identity

Normal glomus body: The anatomic substrate



Perivascular modified smooth-muscle cells

- A specialized arteriovenous structure in acral tissue.
- Comprises modified smooth-muscle cells arranged around a vascular channel.
- Contributes to regulation of cutaneous blood flow and temperature.

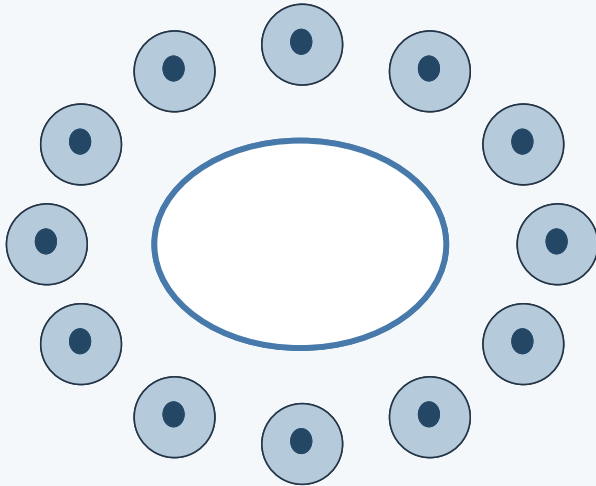
Thermoregulation connects anatomy to function



- The origin is an arteriovenous shunt apparatus rather than a capillary endothelial cell.

Glomus cells define the tumor lineage

SMA⁺ glomus cells



CD31⁺ endothelial lining

Immunophenotype schematic — not an immunostained section

- Perivascular modified smooth-muscle phenotype.
- The endothelial lining and surrounding glomus cells are distinct populations.
- This distinction anticipates the immunohistochemical pattern.

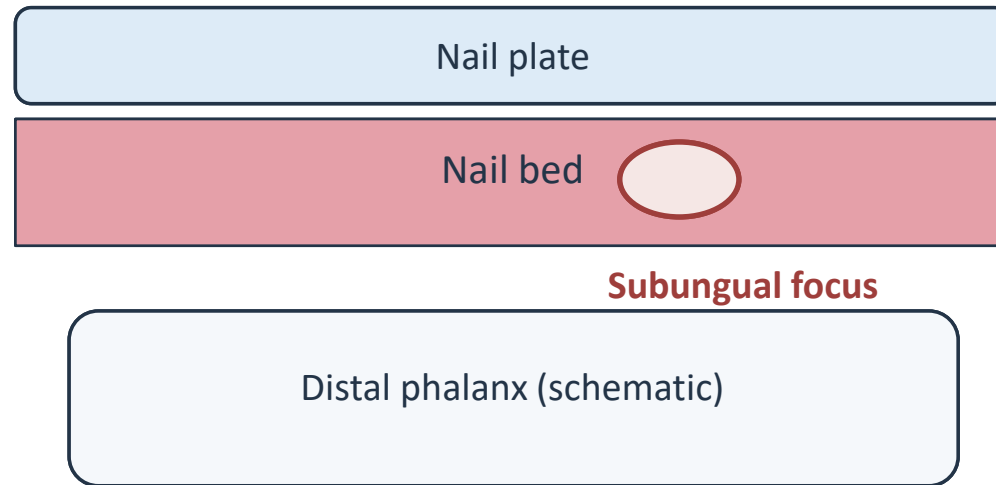
Glomus tumor versus “glomangioma”: Terminology

Term	Usage / caveat	Practical reading
Glomus tumor	Conventional neoplasm	Robbins primary subject
Glomangioma	Used by Robbins in heading	May also describe vascular-rich pattern
Glomuvenous malformation	Often called glomangioma	Distinct clinical phenotype may be meant

Conventional tumor and malformation are not synonyms in every source

Dimension	Conventional glomus tumor	Glomuvenous malformation
Typical pattern	Often solitary	Often multifocal
Typical age	Frequently adult	May present early in life
Typical site	Subungual region common	No strong subungual preference
Pain	Often striking	May be asymptomatic

Anatomic predilection: Distal digits

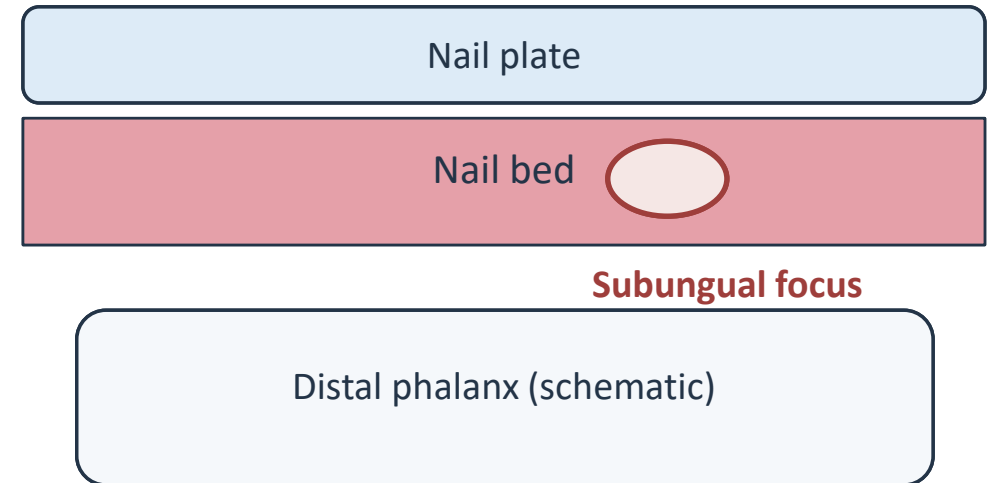


Schematic anatomy — not a clinical image

- Most commonly affects the distal portions of fingers.
- The subungual location is a classic clinical clue.
- Similar tumors can occur outside the nail unit.

A small lesion in a constrained nail unit

- A subungual mass may be difficult to see directly.
- The nail unit localizes tenderness to a small area.
- The examination should relate symptoms to the precise anatomic site.



Schematic anatomy — not a clinical image

The classic clinical triad

**Paroxysmal or
severe pain**

Point tenderness

Cold sensitivity

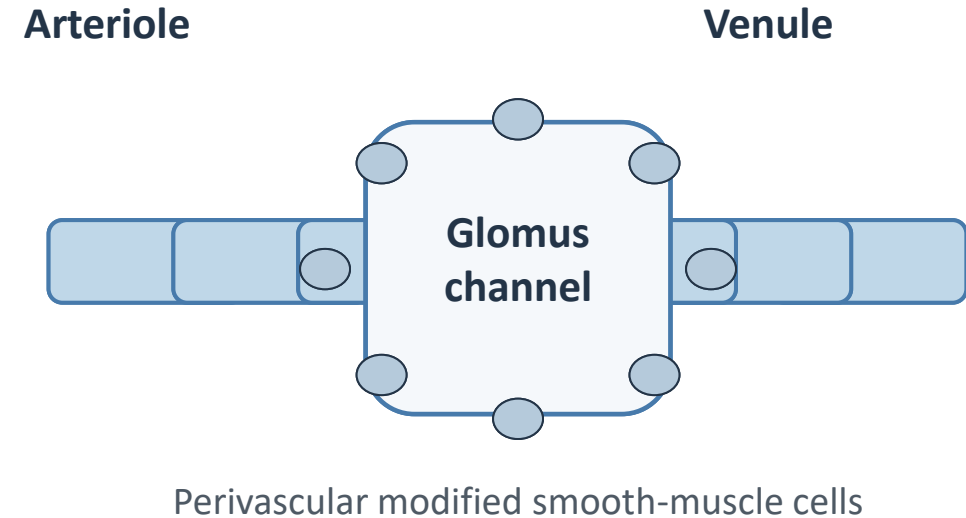
Classic clinical pattern; Confirm with morphology when excised

Why pain matters diagnostically

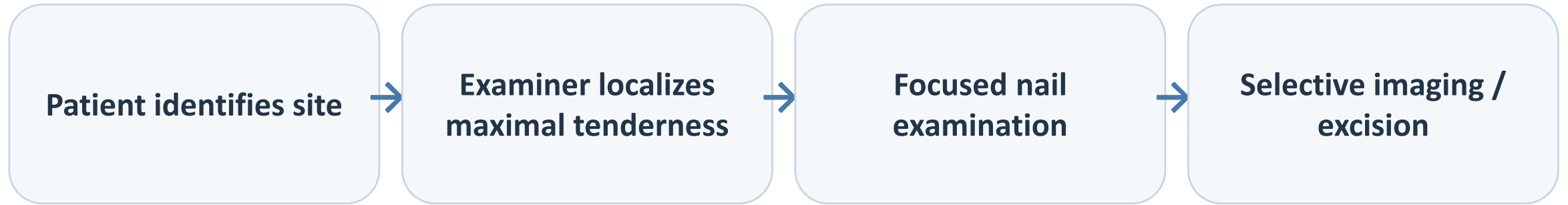
- Conventional glomus tumors are exquisitely painful.
- Pain can dominate the presentation even when the lesion is clinically subtle.
- Symptom severity alone does not imply malignant histology.

Cold sensitivity focuses the history

- Ask whether a cold environment or temperature change precipitates discomfort.
- Relate the symptom to the thermoregulatory origin of the glomus apparatus.
- Cold sensitivity supports suspicion but does not establish a tissue diagnosis.



Point tenderness directs the examination



- Precise localization helps distinguish the source of pain from diffuse digital discomfort.

Visible changes may be subtle

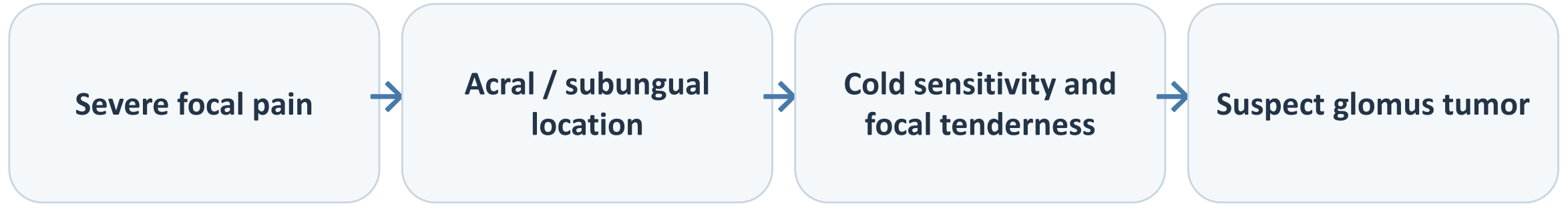
- A small reddish or blue subungual nodule may be visible.
- A normal-appearing nail does not exclude a deeper or tiny lesion.
- The clinical pattern may be more informative than surface appearance.

Glomus tumors are not confined to nails

- Extra-subungual lesions can involve other acral skin and soft tissue.
- Rare tumors have been described in deep or visceral sites.
- Symptoms differ according to location.

- Absence of a subungual site reduces classicality but does not exclude the entity.
- Anatomic site should guide differential diagnosis.

Clinical recognition: Combine independent clues



- None of these individual findings is pathognomonic.

Initial clinical differential

Clinical finding	Possibilities	Discriminator
Focal fingertip pain	Glomus tumor; other local masses	Cold sensitivity and exquisite focal tenderness
Red / blue lesion	Vascular lesion; glomus tumor	Anatomic context and histology
Nail unit lesion	Nail-bed tumor or cyst	Imaging and tissue examination

Imaging is a localization tool

- High-resolution ultrasound can help identify small lesions.
- Magnetic resonance imaging helps define a lesion and its relation to the nail unit.
- Imaging contributes to operative planning, not a replacement for histopathology.

Ultrasound: What it contributes

- Targeted assessment of a painful or poorly visible digital focus.
- Potential localization of a small, vascular soft-tissue nodule.
- Operator- and lesion-dependent technique.

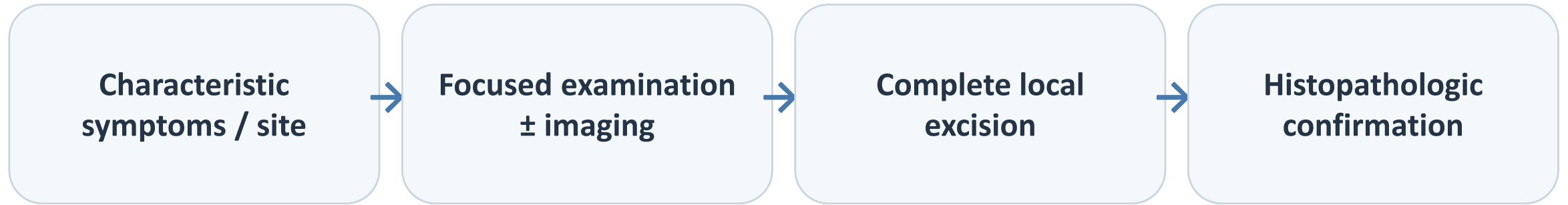
- Report location relative to nail bed and adjacent structures.
- Do not assign a histologic subtype from sonography alone.

MRI: When anatomy needs clarification

- Useful for occult lesions and presurgical mapping.
- Characterizes dimensions, site and soft-tissue relationships.
- Signal characteristics must be interpreted in clinical context.

- Imaging is supportive evidence.
- Definitive diagnosis rests on tissue architecture and cell phenotype.

From suspicion to tissue diagnosis

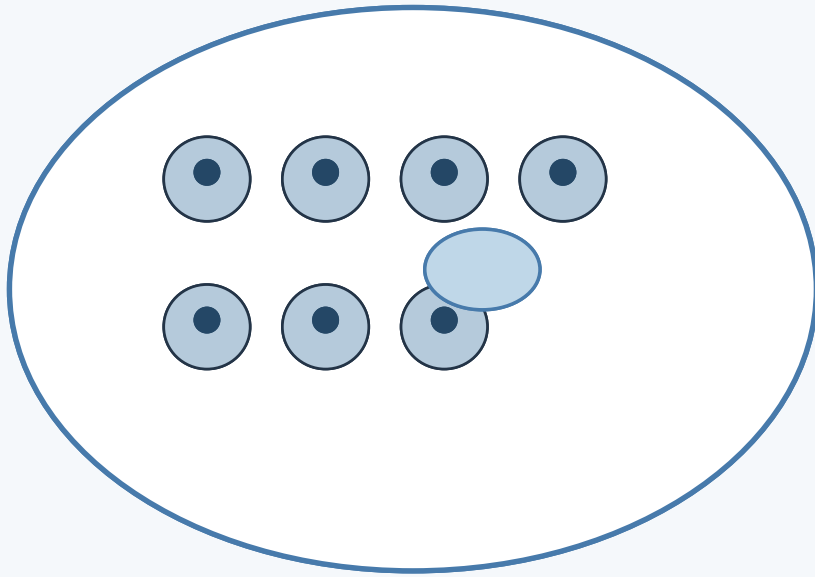


- In a characteristic benign lesion, surgery can be both diagnostic and therapeutic.

Gross pathology: Avoid over-reading the color

- Benign glomus tumors may present as small, circumscribed reddish-blue nodules.
- Appearance reflects the vascular setting but is not specific to glomus lineage.
- Gross examination should document size, location and relationship to tissue margins.

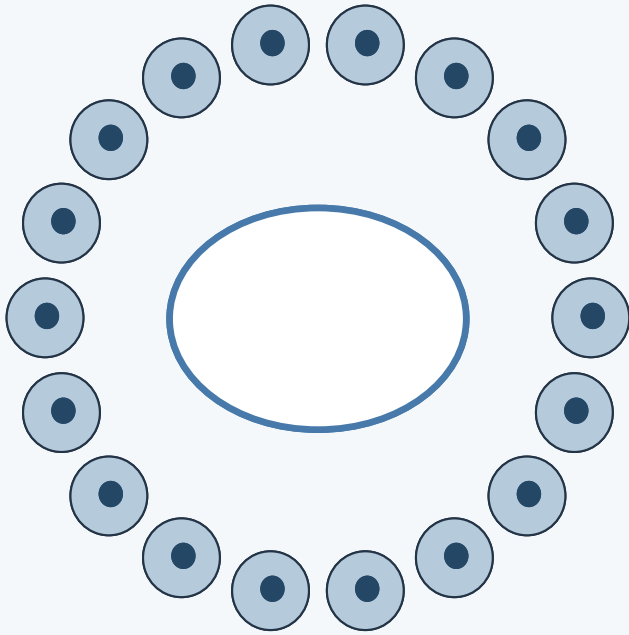
Low power: A discrete, vessel-associated lesion



Original editable histologic schematic — not an H&E specimen

- Typical cutaneous tumors are well circumscribed.
- Recognize vascular spaces within an organized cellular proliferation.
- Determine whether the lesion appears centered on vascular-associated cells.

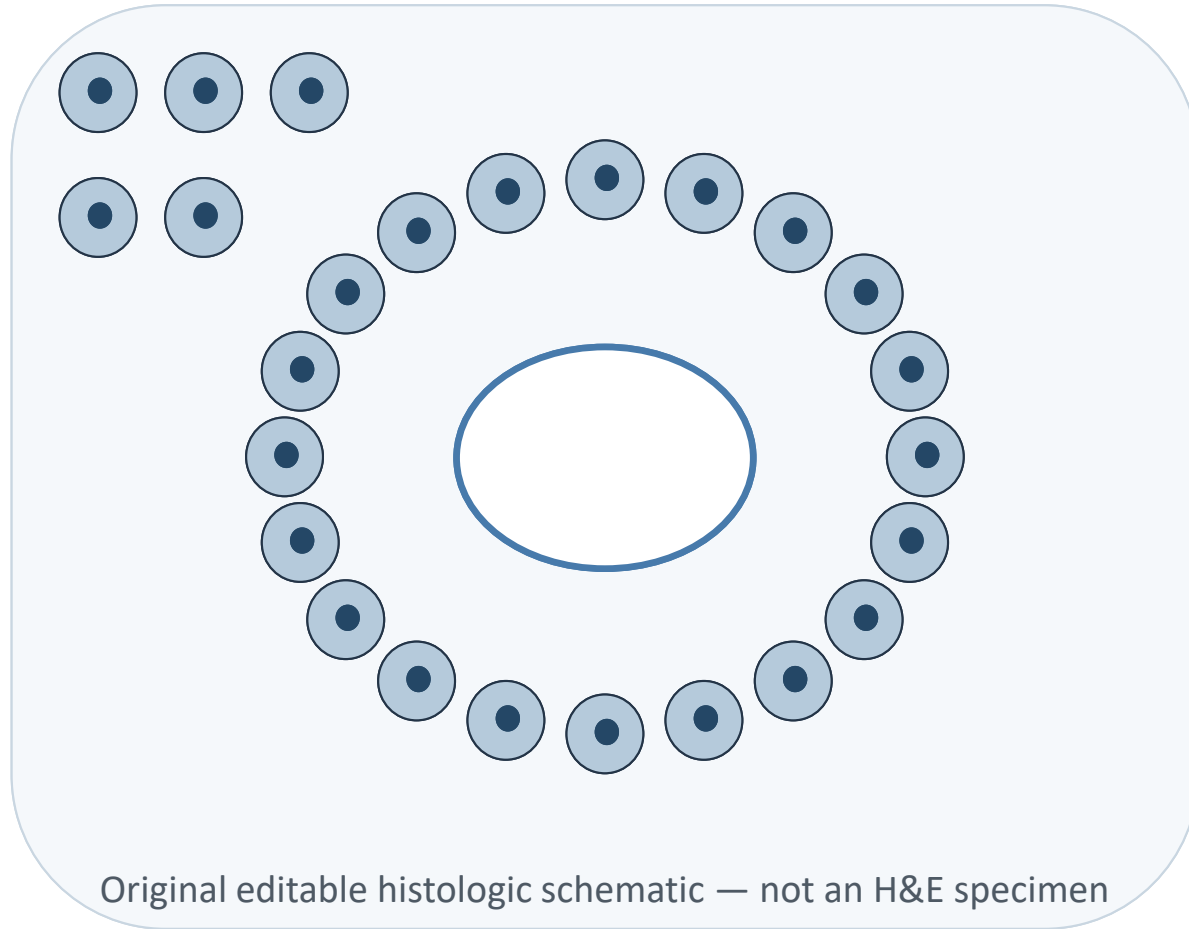
Medium power: Cells around the vascular spaces



Original editable histologic schematic — not an H&E specimen

- Small vessels are surrounded by groups of glomus cells.
- The perivascular arrangement distinguishes the tumor from pure endothelial proliferation.
- Assess the cellular uniformity throughout the lesion.

High power: Cytologic signature



- Round or oval bland nuclei.
- Pale eosinophilic cytoplasm with recognizable cell borders.
- Marked pleomorphism or brisk atypical mitoses is not expected in typical benign lesions.

The critical histologic relationship

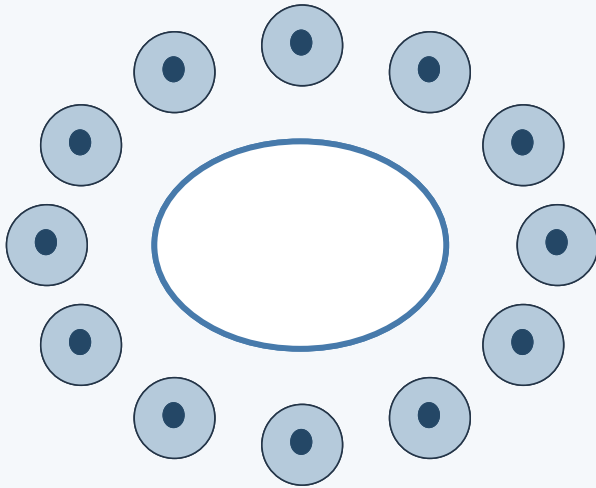
Structure	Identity	How to interpret
Vascular lumen	Blood-containing channel	Architectural component
Endothelial lining	Cells facing the lumen	Not the main neoplastic glomus-cell population
Perivascular cells	Modified smooth-muscle phenotype	Characteristic lesional population

A vessel is not sufficient for classification

- Hemangiomas are defined by proliferation of vascular endothelial channels.
- A glomus tumor contains vascular channels but arises from surrounding modified smooth-muscle cells.
- Evaluate cytomorphology and lineage rather than relying on vessel abundance.

IHC: Smooth-muscle actin targets glomus cells

SMA⁺ glomus cells



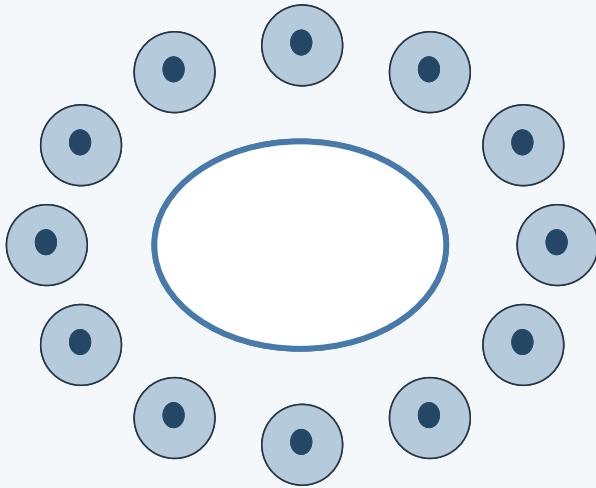
CD31⁺ endothelial lining

Immunophenotype schematic — not an immunostained section

- Glomus cells typically express α -smooth-muscle actin (SMA).
- A perivascular staining pattern should match the morphology.
- SMA positivity does not uniquely establish a glomus tumor.

IHC: CD31 predominantly identifies the lining

SMA⁺ glomus cells



CD31⁺ endothelial lining

Immunophenotype schematic — not an immunostained section

- CD31 highlights the vascular endothelium.
- The neoplastic glomus cells are typically CD31 negative.
- Do not misinterpret highlighted vessels as positivity of the tumor cells.

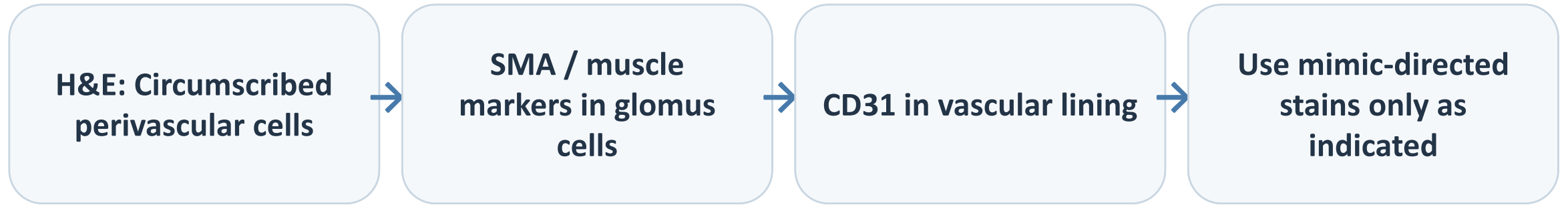
Negative markers are interpreted in context

Marker	Expected typical pattern	Value / limitation
S100	Usually negative in glomus cells	Helps against a neural or melanocytic mimic
Cytokeratin	Usually negative	Supports a non-epithelial lesion
Desmin	Often negative	Aids distinction from mature smooth-muscle lesions

CD34 needs cell-specific interpretation

- CD34 may highlight endothelial elements and sometimes glomus tumor cells.
- Published series document variable lesional CD34 staining.
- Distribution and microscopic identity matter more than treating positivity as binary.

A practical diagnostic staining strategy

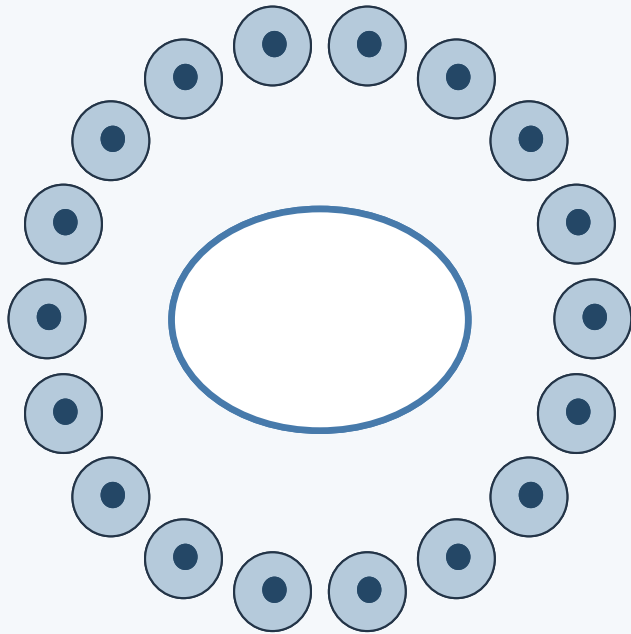


- An immunostain panel should resolve a morphologic question, not substitute for morphology.

Histologic patterns within the glomus family

Pattern	Dominant component	Recognitional clue
Solid glomus tumor	Uniform glomus cells	Cellular cuffs and nests around small vessels
Glomangioma pattern	More conspicuous dilated vessels	Scattered glomus cells investing vessel walls
Glomangiomyoma	Smooth-muscle differentiation	Transition to spindle / muscle-like cells

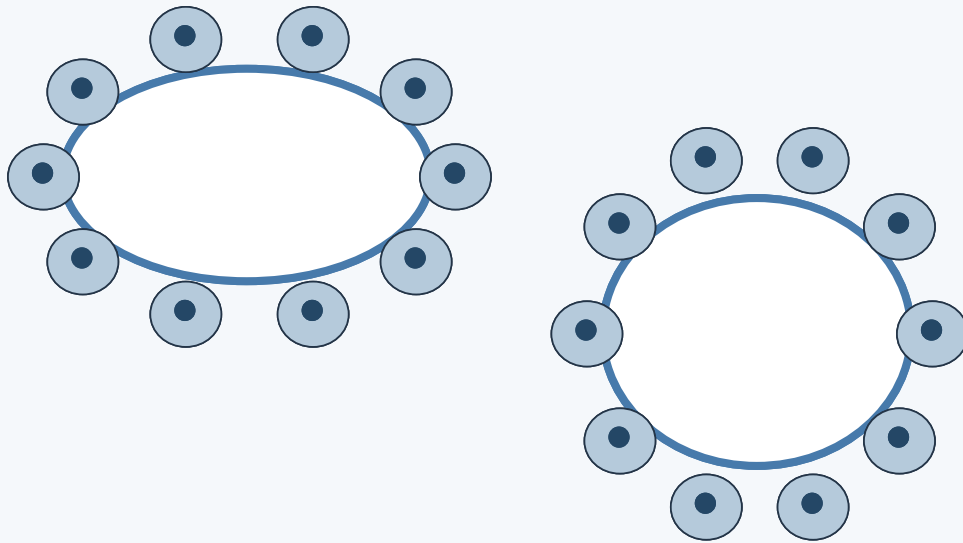
Solid-type architecture



Original editable histologic schematic — not an H&E specimen

- Cell-rich proliferation predominates over vascular spaces.
- Uniform glomus cells encircle small vascular channels.
- The benign pattern should remain cytologically bland.

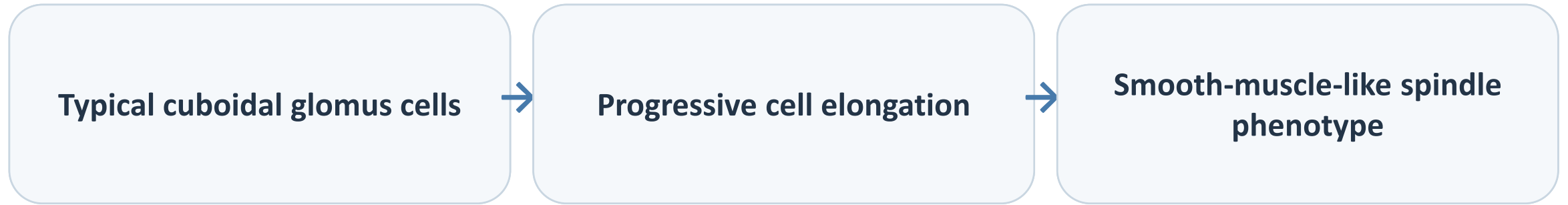
Vascular-rich glomangioma pattern



Original editable histologic schematic — not an H&E specimen

- Dilated venous channels become a dominant structural feature.
- Glomus cells invest vascular walls in one or several layers.
- Interpret the name in clinical context: Malformation terminology may overlap.

Glomangiomyoma: Smooth-muscle transition



- A morphologic variant, not a reason to assume aggressive behavior.

Glomuvenous malformation: Clinical clues

Feature	Glomus tumor	Glomuvenous malformation
Multiplicity	Often solitary	May be multifocal
Time of presentation	Often adult	May begin in childhood
Architecture	Cell-rich perivascular nests	Dilated veins invested by glomus cells

Glomuvenous malformation: Why the distinction matters

- “Glomangioma” can denote either a vascular-rich histologic pattern or a glomuvenous malformation in some sources.
- A multifocal, early-onset plaque-like lesion raises a different clinical pattern from the classic solitary subungual tumor.
- Specify the lesion type and clinical context rather than relying on a single ambiguous synonym.

Eccrine spiradenoma: An epithelial mimic

Feature	Glomus tumor	Spiradenoma
Architecture	Glomus cells and vessels	Two epithelial cell populations; ducts may be seen
Helpful stains	SMA in glomus cells	Epithelial marker positivity
Shared potential clue	Painful skin nodule	Painful skin nodule

Intradermal nevus: A cellular mimic

Feature	Glomus tumor	Melanocytic nevus
Cytology	Bland round glomus cells	Nevomelanocytes can appear similar
Vessel relation	Perivascular glomus-cell arrangement	No defining cuff of glomus cells
Helpful markers	Smooth-muscle actin	S100 / Melan-A

Other perivascular tumors: Morphological approach

Entity	Shared feature	Separation principle
Myopericytoma	Perivascular myoid cells	Specific growth pattern and cell shape
Angioleiomyoma	Smooth-muscle / vessel relationship	Mature smooth-muscle differentiation
Myofibroma	Myoid perivascular cells	Distinct biphasic architecture

Capillary hemangioma: The endothelial comparator

Aspect	Glomus tumor	Capillary hemangioma
Lineage	Perivascular smooth-muscle-like	Endothelial
Pattern	Glomus cells investing vessels	Numerous thin-walled capillaries
Primary distinction	Cell identity	Vascular-channel architecture

Cavernous hemangioma: Enlarged vascular channels

Aspect	Glomus tumor	Cavernous hemangioma
Typical architecture	Cellular perivascular lesion	Large dilated blood-filled spaces
Vascular prominence	Variable by variant	Structural hallmark
Core diagnostic question	Are glomus cells present?	Are dilated endothelial spaces dominant?

Pyogenic granuloma: A reactive-looking comparator

Clinical pattern	Glomus tumor	Pyogenic granuloma
Presenting feature	Focal pain is characteristic	Rapid growth and easy bleeding
Common surface site	Subungual / distal digit	Skin or oral / gingival mucosa
Tissue basis	Glomus cells	Capillary hemangioma-type proliferation

Lymphangioma: Vessel identity changes

Feature	Glomus tumor	Lymphangioma
Cell of origin	Modified smooth-muscle cell	Lymphatic endothelium
Channel content	Vascular spaces within tumor	Frequently few / no red cells
Helpful work-up	Glomus cell morphology	Lymphatic markers in difficult lesions

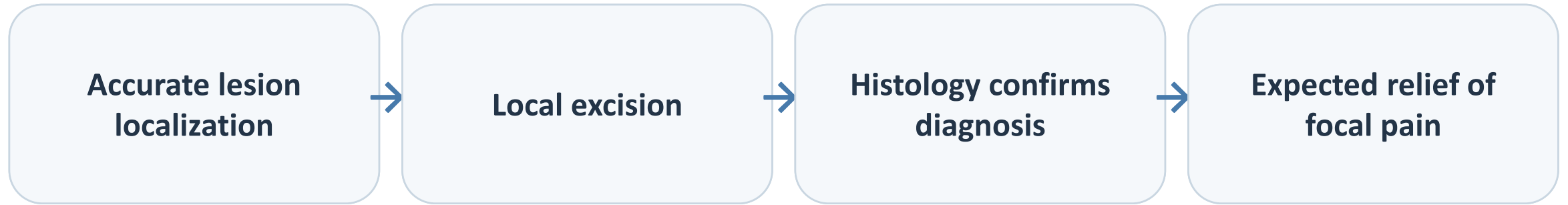
Benignity rests on histology, not only pain

- Conventional glomus tumors are benign in the Robbins discussion.
- Bland nuclei and an orderly perivascular pattern support typical benign morphology.
- Severe pain is a hallmark of presentation, not a malignancy criterion.

Atypical features require a different level of scrutiny

- Prominent nuclear atypia, atypical mitoses or destructive growth are not typical of an ordinary benign glomus tumor.
- Rare malignant glomus tumors are recognized outside the short Robbins paragraph.
- Unusual deep lesions deserve full histopathologic assessment and classification by appropriate reference criteria.

Clinical management: Complete excision



- Excision is curative for conventional benign glomus tumor.

Why technical completeness matters

- A small occult focus can be difficult to target surgically.
- Complete removal is associated with durable symptom relief.
- Persistent or recurrent symptoms warrant reassessment for a remaining or additional lesion.

The pathology report should answer a clinical question

- Identify the lesion as a glomus tumor and describe its histologic pattern when relevant.
- Document size and anatomic site supplied with the specimen.
- Assess atypical findings and resection margins as clinically applicable.
- Clarify “glomangioma” terminology if malformation is being considered.

Case 1: Severe pain beneath a fingernail

- An adult has a small distal finger focus causing intense, intermittent pain.
- Cold exposure precipitates the discomfort.
- Only subtle local discoloration is evident.

Which diagnosis best integrates the symptoms and location?

Case 1: Clinicopathologic interpretation

- A conventional subungual glomus tumor is a leading consideration.
- Anatomical localization may be supported by targeted imaging.
- Histologic confirmation following excision resolves the diagnosis.

Link the symptom pattern to modified smooth-muscle cells in the glomus apparatus.

Case 2: A small nodule with perivascular cells

- H&E shows a circumscribed dermal nodule with uniform round cells around small vessels.
- SMA stains the perivascular cells.
- CD31 highlights the endothelial lining rather than the perivascular cells.

Which cell population is neoplastic?

Case 2: Resolve the lineage

- The modified smooth-muscle-like cells constitute the neoplastic population.
- Endothelial markers delineate the vascular framework.
- The combined architecture and immunophenotype favor glomus tumor.

Lineage is determined by cell-specific morphology and staining.

Case 3: Multifocal blue cutaneous lesions

- A patient describes several cutaneous blue nodules present since adolescence.
- The lesions are not specifically centered on the nails.
- Microscopy reveals dilated venous channels with surrounding cuboidal glomus cells.

What terminology distinction should be considered?

Case 3: Distinguish glomuvenous malformation

- The multifocal, early-onset presentation supports a glomuvenous malformation phenotype.
- The term glomangioma is used for this entity in dermatopathology literature.
- Specify this context rather than treating every “glomangioma” as a solitary painful subungual tumor.

Resolve ambiguous names with architecture and clinical distribution.

Integrated diagnostic reasoning



- Discrepant findings demand reconsideration of the differential—not automatic labeling as a glomus tumor.

Five core teaching conclusions

- Glomus tumors originate from modified smooth-muscle cells of thermoregulatory arteriovenous structures.
- The subungual distal digit and exquisitely focal pain are classic clues.
- Histology demonstrates uniform perivascular glomus cells, not an endothelial neoplasm.
- IHC should distinguish SMA-positive lesional cells from CD31-positive vascular endothelium.
- Complete excision is usually curative; “glomangioma” requires terminology context.

References and source separation

- Primary textbook: Robbins, Cotran & Kumar. Pathologic Basis of Disease. 11th ed. 2026; Ch. 11, pp. 473–474.
- Histology / immunophenotype: DermNet “Glomus tumour pathology” (2013); Mravic et al., Int J Surg Pathol (2015).
- Terminology / variants: DermNet “Glomangioma pathology” (2018); IARC WHO historical pericytic tumor chapter.
- Clinical / imaging: “Glomus tumor: A rare differential diagnosis for subungual lesions” (2024); “Subungual glomus tumor” (2024).