

Sigmoid Diverticular Disease

Mechanisms • Morphology • Clinicopathologic consequences

Dr Abu Suraih Sakhri

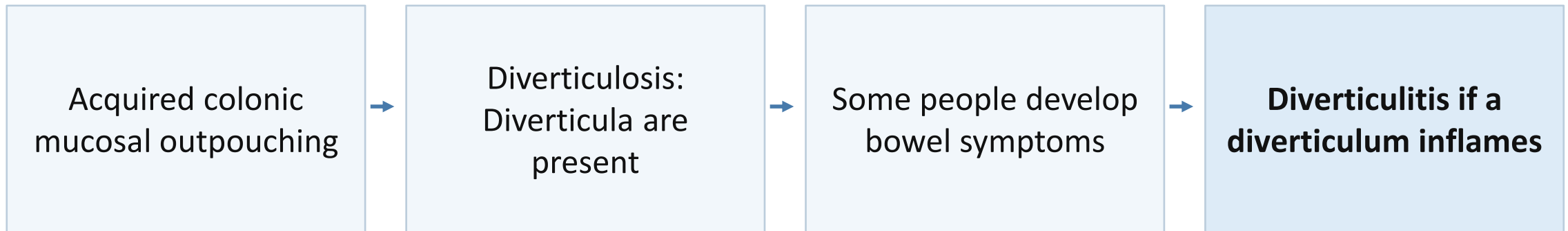
MBBS, MD (Pathology)

www.abusuraihsakhri.com

Learning objectives

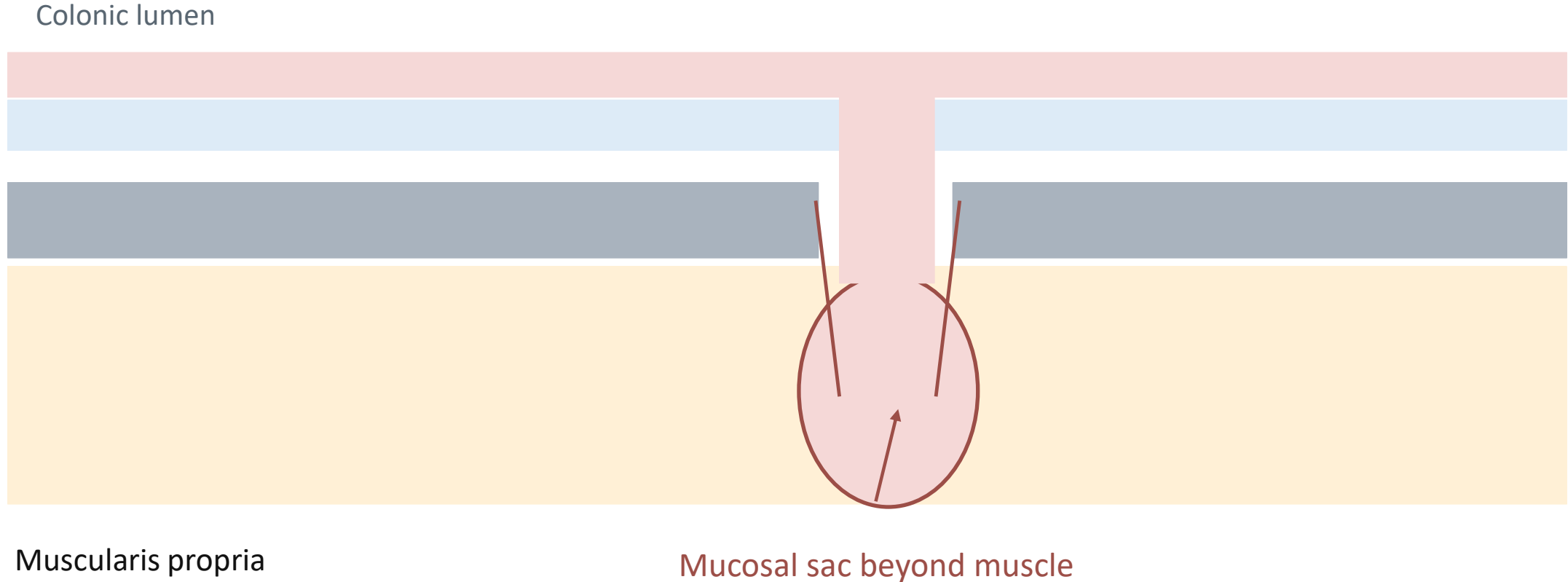
- Distinguish an acquired colonic pseudodiverticulum from a true diverticulum.
- Explain why the sigmoid colon is vulnerable to diverticular formation.
- Recognize gross and microscopic architecture.
- Relate diverticulosis to symptoms, diverticulitis, and serious complications.

The clinical spectrum begins with an outpouching



Presence of diverticula does not itself establish diverticulitis.

A colonic diverticulum is a pseudodiverticulum



Schematic; Not histologic evidence

True versus acquired pseudodiverticula

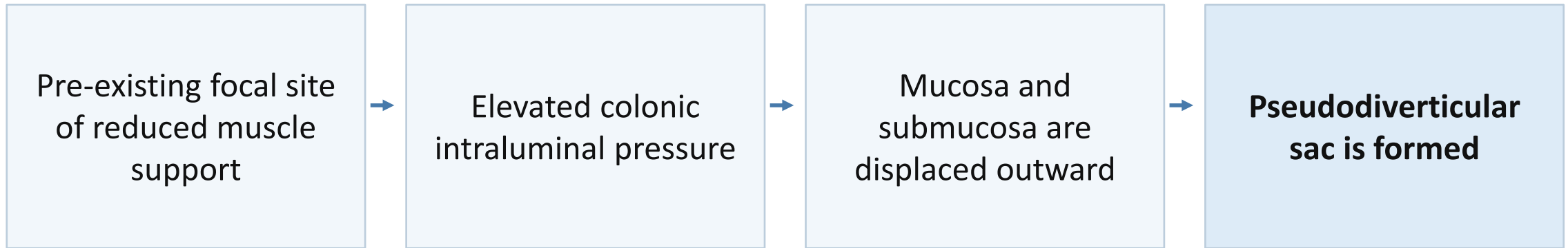
True diverticulum

- Includes all bowel-wall layers
- Congenital example: Meckel diverticulum
- Not the typical lesion of sigmoid diverticular disease

Colonic pseudodiverticulum

- Acquired lesion
- Mucosa and submucosa protrude beyond muscularis propria
- Does not include a complete muscular wall

Colonic diverticula are acquired lesions



The sac forms at a point of weakness rather than by duplication of every wall layer.

Age strongly shapes prevalence

$\approx 50\%$

Prevalence approaches this value

Western adults older than 60 years

Diverticula are rare in people younger than 30 years. The estimate is population-specific, not a global prevalence.

Epidemiology varies across populations

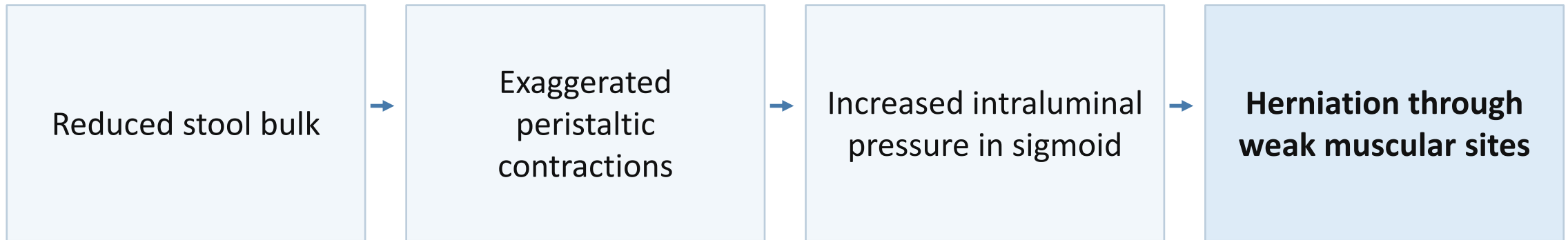
Western populations

- Common in older adulthood
- Sigmoid involvement is typical
- Lower stool bulk from low-fiber diets is implicated

Japan and under-resourced settings

- Diverticulosis described as less common
- Dietary differences are proposed
- The source does not establish a single proven explanation

The sigmoid colon is a characteristic site



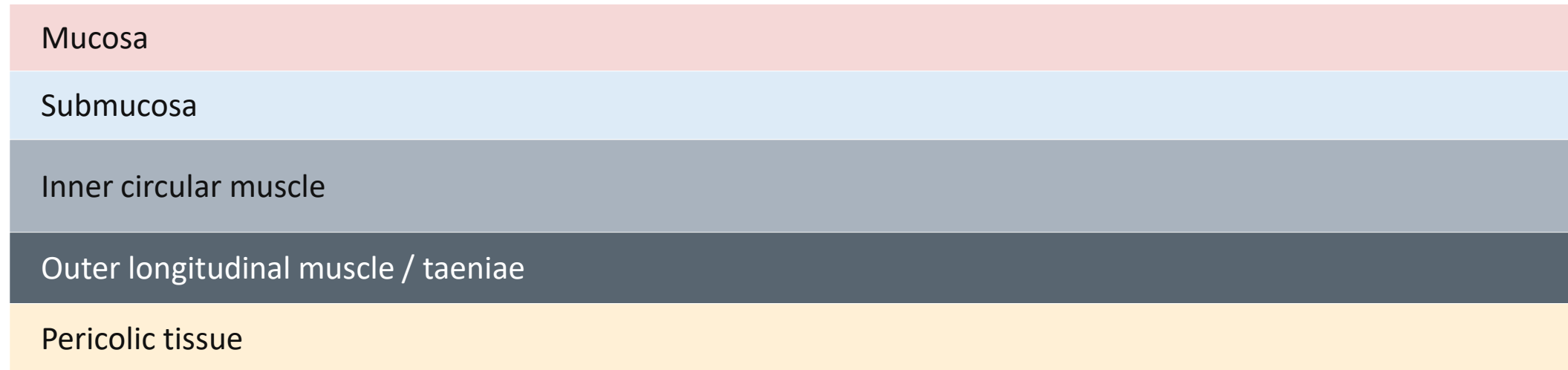
The site of greatest mechanical load overlaps focal structural weak points.

Regional patterns are not identical

Population context	Predominant location described	Interpretive caution
Western populations	Sigmoid colon	Described tendency, not an absolute rule
Asian and African populations	Right colon	Distribution varies by population

The bowel wall has organized supporting layers

Luminal side



Schematic — wall-layer relationships

Two muscular layers have different orientations

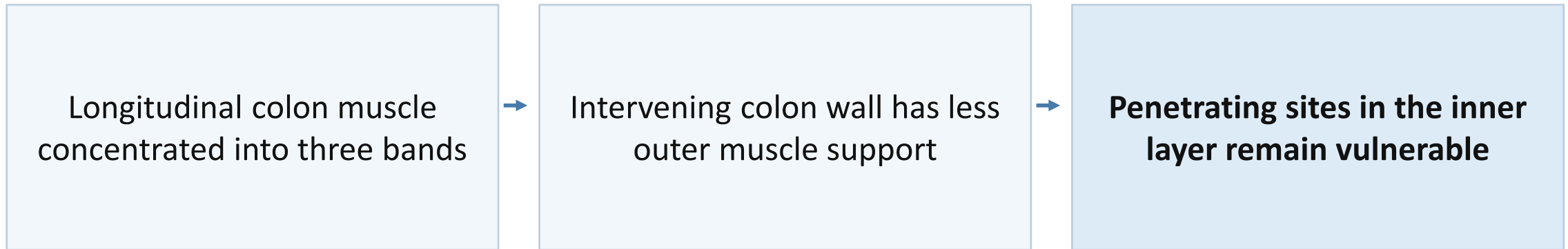
Inner circular muscle

- Surrounds the lumen
- Contains penetrations by vessels and nerves
- May undergo hypertrophy in diverticulosis

Outer longitudinal muscle

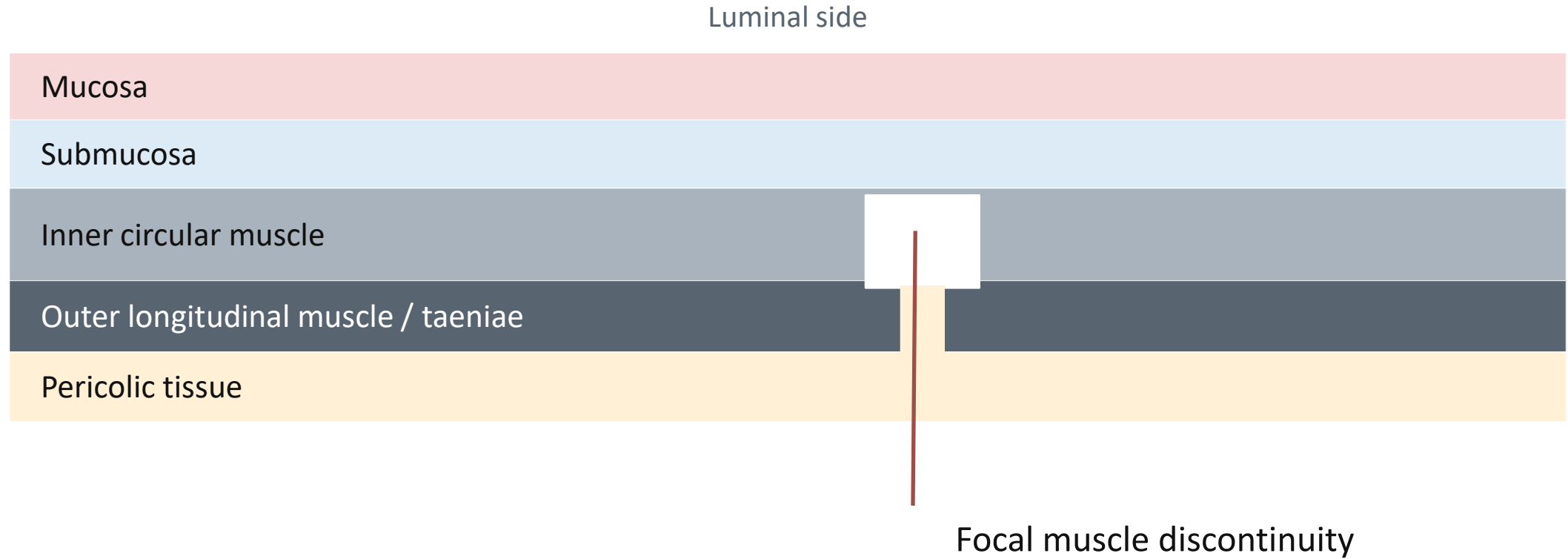
- Continuous coverage reinforces small intestine
- In the colon, longitudinal muscle forms taeniae coli
- Leaves some penetrating sites without reinforcement

Taeniae coli create discontinuous reinforcement



The outer longitudinal muscle distribution is central to colonic susceptibility.

Vasa recta and nerves identify weak points



Schematic — wall-layer relationships

The small intestine has an anatomical advantage

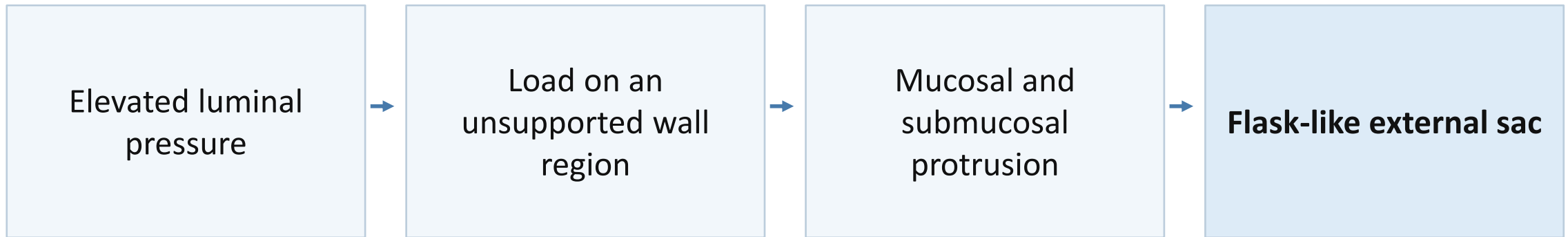
Small intestine

- Discontinuities occur at penetration sites
- An outer continuous longitudinal muscle layer reinforces these gaps
- Less exposed structural weakness at these sites

Colon

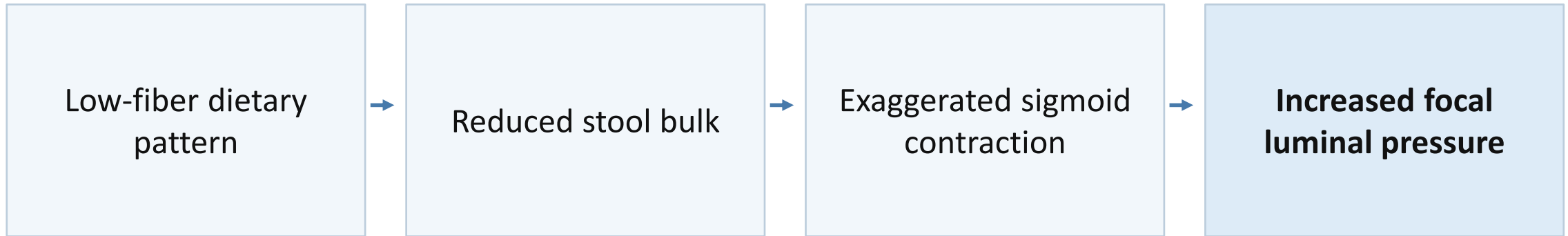
- Longitudinal muscle is gathered into taeniae coli
- Penetrating sites may lack outer reinforcement
- Elevated pressure can force mucosa outward

Intraluminal pressure is the immediate mechanical force



Pressure alone is an incomplete explanation without anatomy.

Low-fiber diets act through stool bulk



This is the proposed pathogenic pathway; It does not prove fiber prevents diverticulitis.

Sigmoid motility amplifies mechanical stress

Peristaltic contraction

A contractile event raises localized mechanical forces within the sigmoid segment.

Pressure-bearing wall

Focal unreinforced sites respond differently from muscle-supported wall.

Structural consequence

Repeated force can favor mucosal herniation at penetrations.

A two-factor mechanism explains diverticular formation

Predisposing architecture

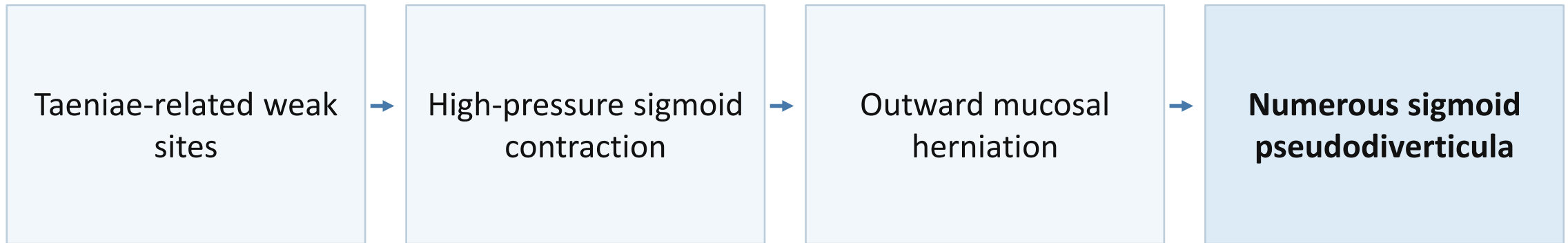
- Nerve and vessel penetration of circular muscle
- Limited outer longitudinal reinforcement
- Localized discontinuities

Driving forces

- Elevated intraluminal pressure
- Exaggerated sigmoid contractions
- Reduced stool bulk as a contributing context

Neither the weak spot nor the pressure explains the lesion as clearly in isolation.

Explain sigmoid predominance from first principles



This mechanism accounts for the characteristic Western pattern.

Gross diverticula are small flask-shaped sacs

0.5–1 cm

Typical described diameter

Gross morphology

The flask-like configuration has a relatively narrow opening and an outward-expanded sac. This is a morphology description, not a clinical size threshold.

Diverticula may appear evenly spaced

Observed pattern

Multiple flask-like outpouchings can be distributed at relatively regular intervals.

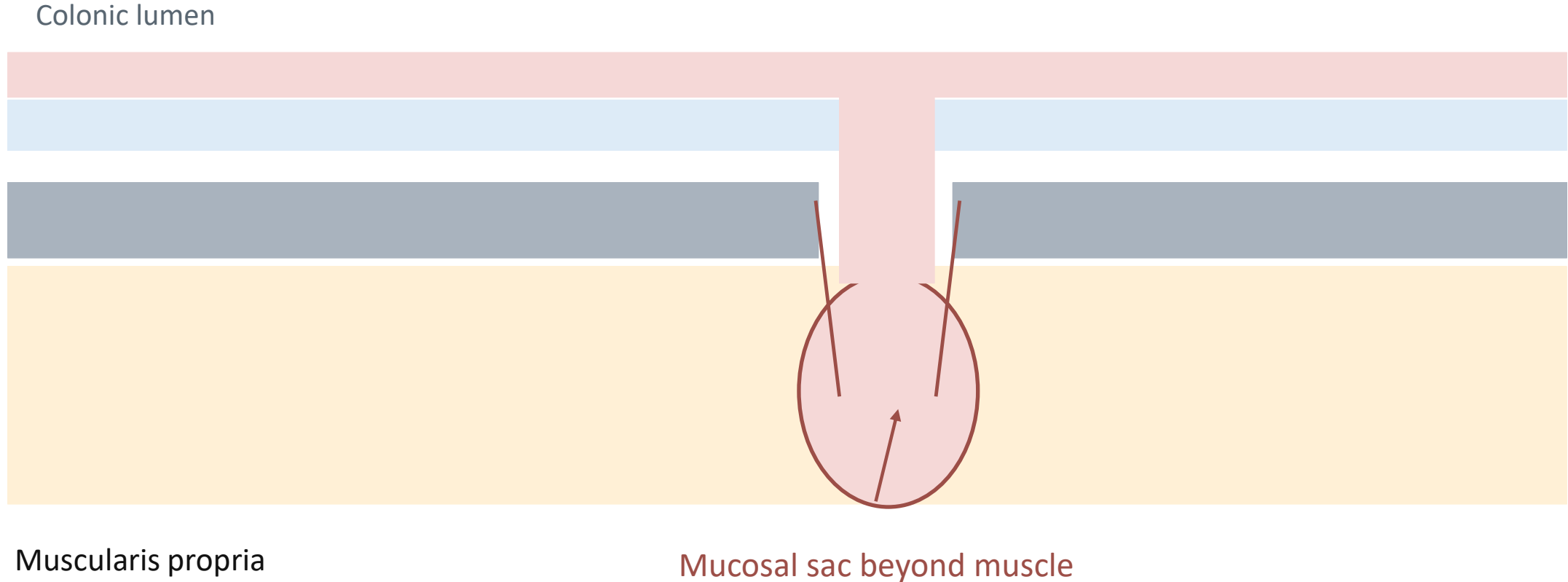
Anatomic explanation

Penetrating nerves and arteries recur in an organized pattern along the colonic wall.

Clinicopathologic meaning

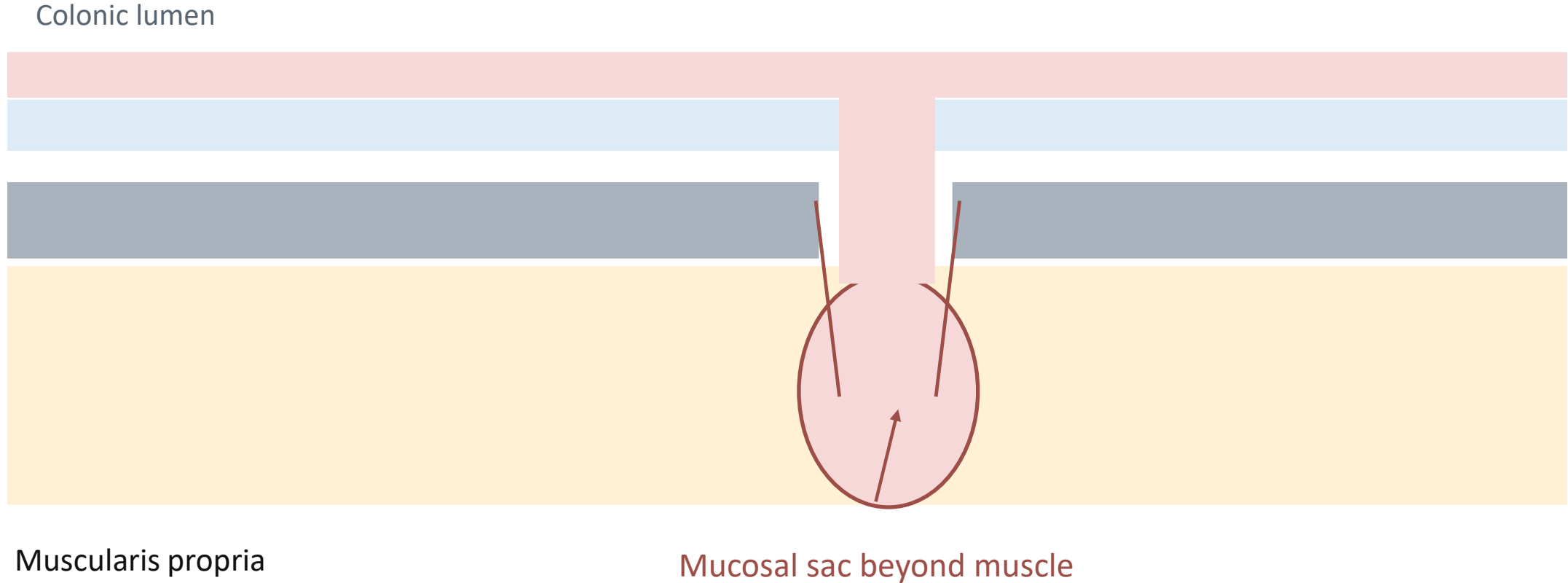
Distribution reflects wall architecture rather than random erosions.

The diverticular neck and sac are mechanically distinct



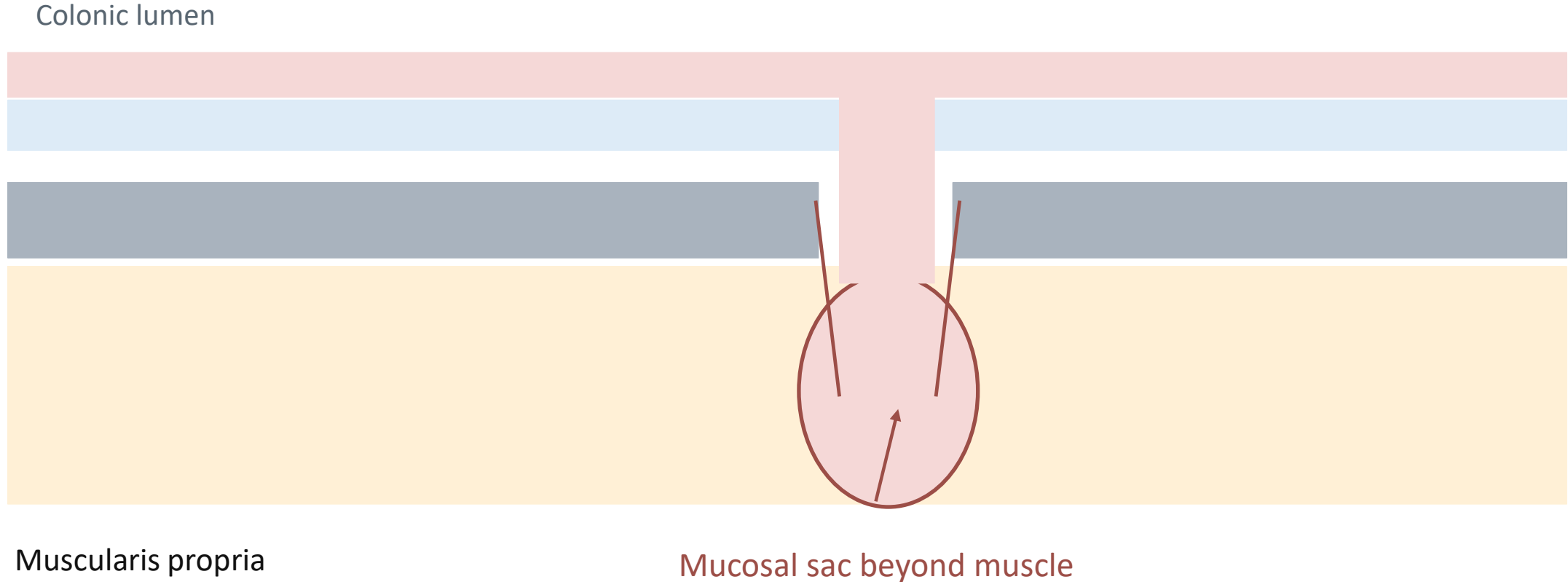
Schematic; Not histologic evidence

Mucosa forms the lining of the diverticular wall



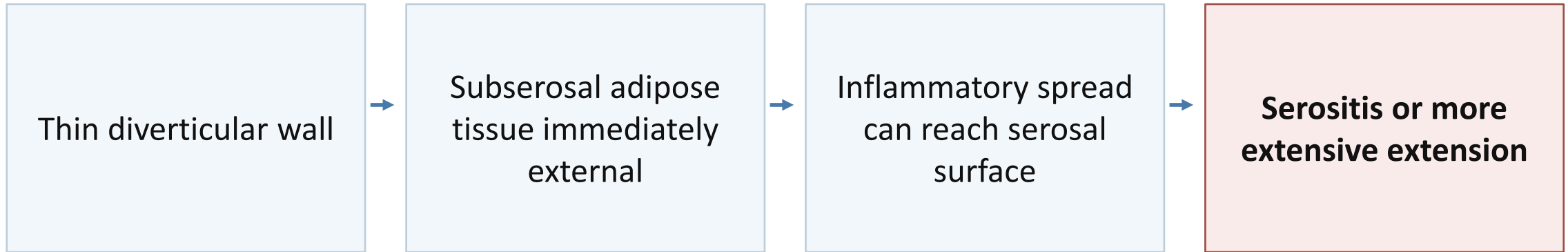
Schematic; Not histologic evidence

The muscularis propria is not a complete sac wall

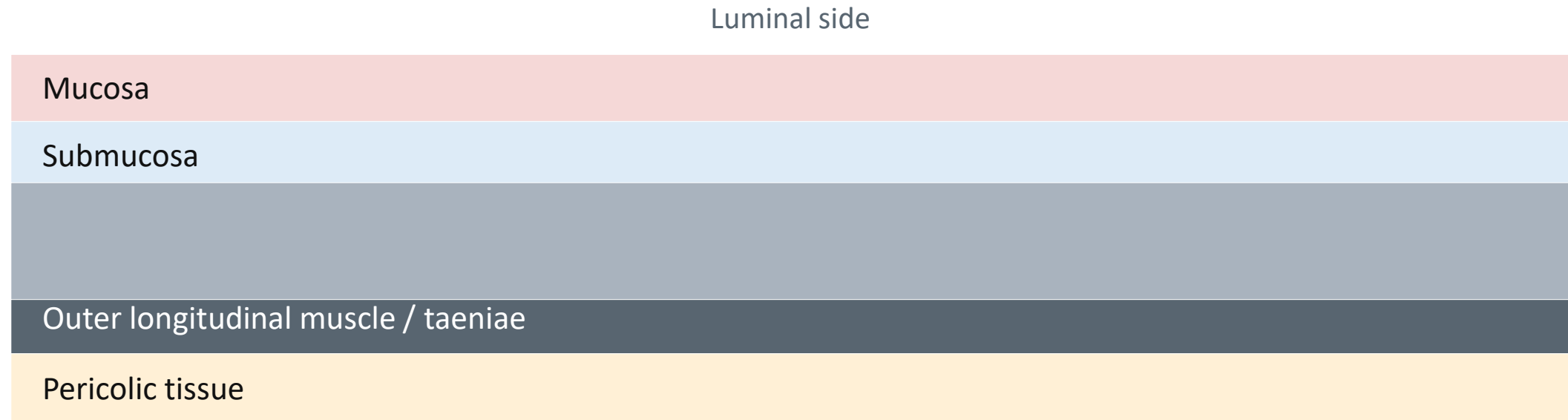


Schematic; Not histologic evidence

Little tissue may separate mucosa from serosa



Circular muscle hypertrophy often accompanies disease



Thickened inner circular layer

Schematic — wall-layer relationships

Gross inspection: Stool-filled diverticular sacs

Luminal appearance

Diverticula may contain stool and occur in a regularly spaced arrangement.

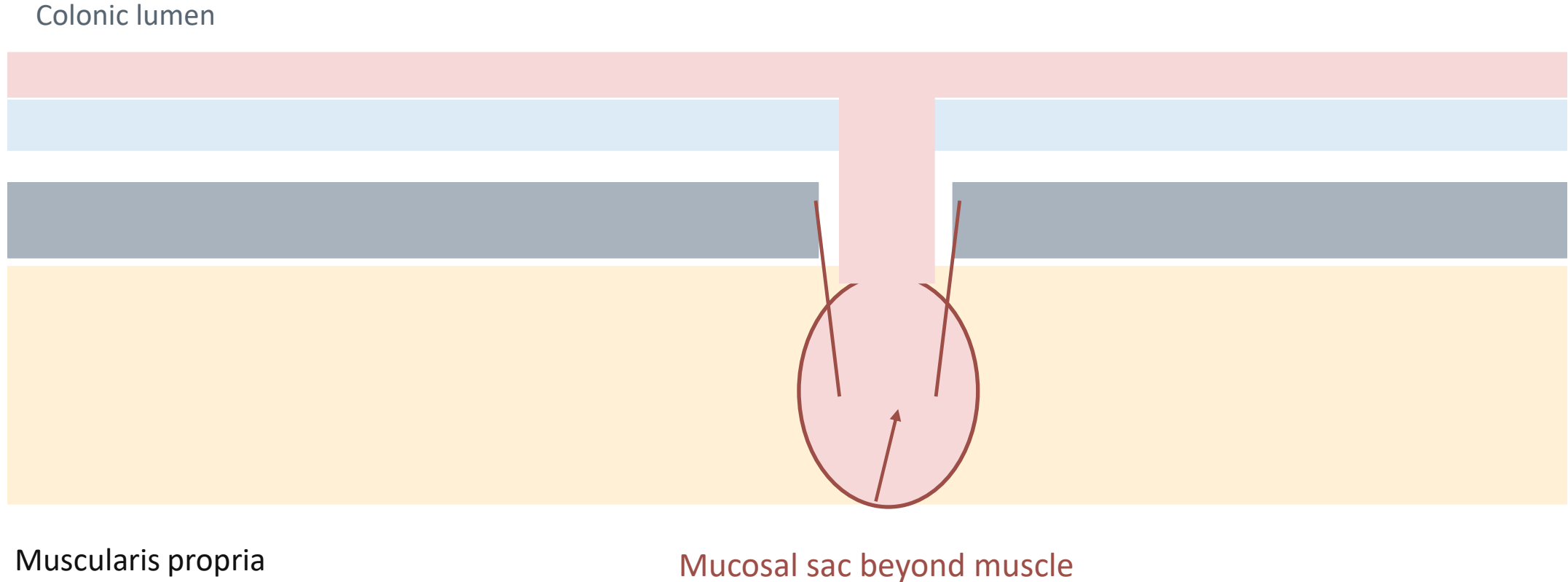
Cross section

Mucosa is seen protruding through the muscularis propria.

Interpretive limit

This slide illustrates reported features; It is not a reproduced textbook specimen.

A cross section explains the pseudodiverticulum



Schematic; Not histologic evidence

Microscopic recognition relies on wall-layer relationships

- Identify mucosa extending beyond the expected contour of the muscularis propria.
- Look for an interruption or severe attenuation of the intervening muscular wall.
- Recognize that a thin pericolic soft-tissue interface may lie beyond the sac.
- Do not label this schematic as authentic H&E morphology.

Diverticulosis and diverticulitis are different states

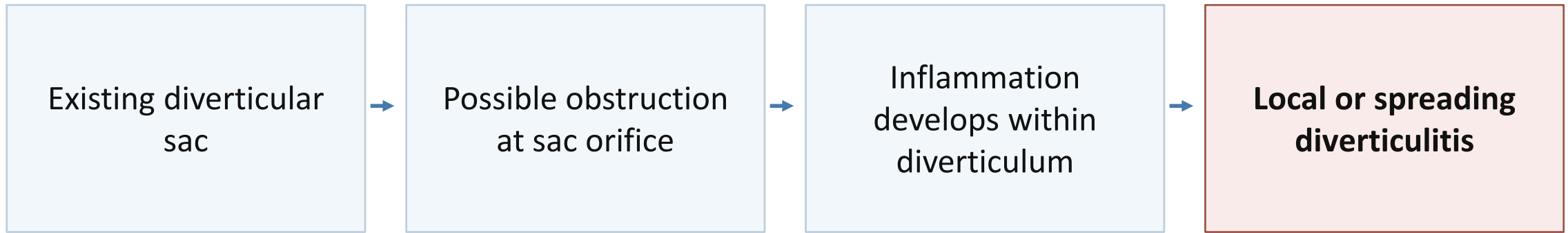
Diverticulosis

- One or more acquired diverticula are present
- Many affected individuals have no symptoms
- Inflammation is not implied by this term

Diverticulitis

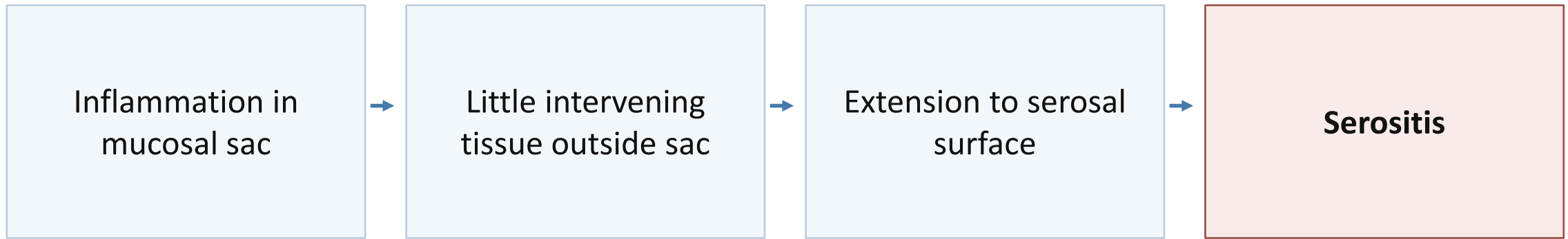
- Inflammation develops within a diverticulum
- Obstruction of the diverticular orifice is a possible trigger
- Inflammation may extend to surrounding tissues

Orifice obstruction may initiate diverticulitis

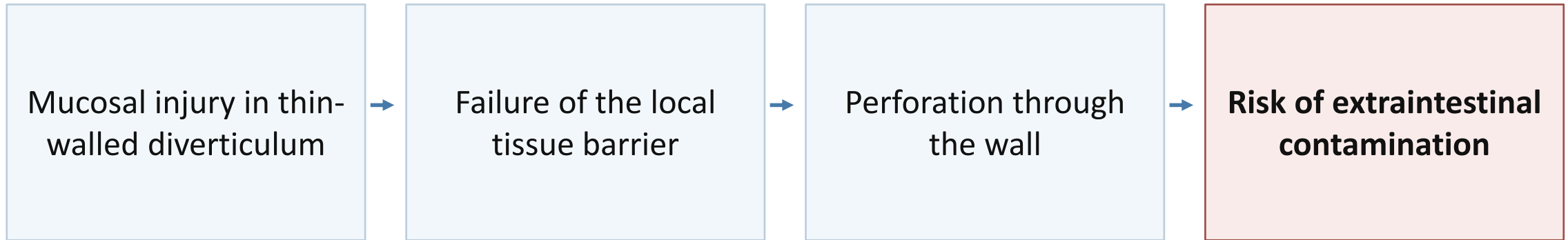


Obstruction as a possible cause, not a necessary event in every case.

Diverticular inflammation can reach the serosa

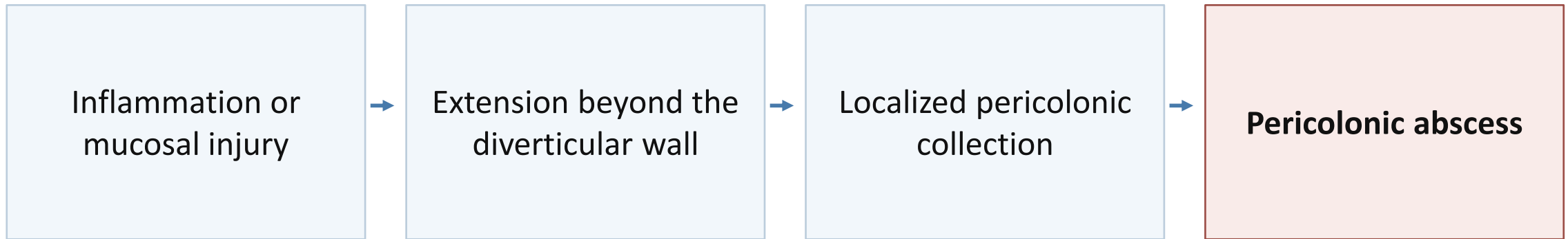


Mucosal injury can progress to perforation

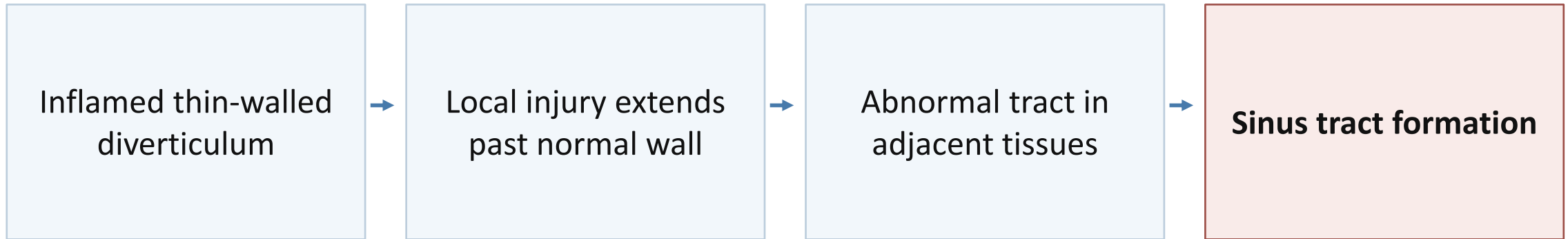


Perforation represents a severe complication, not the usual course of all diverticulosis.

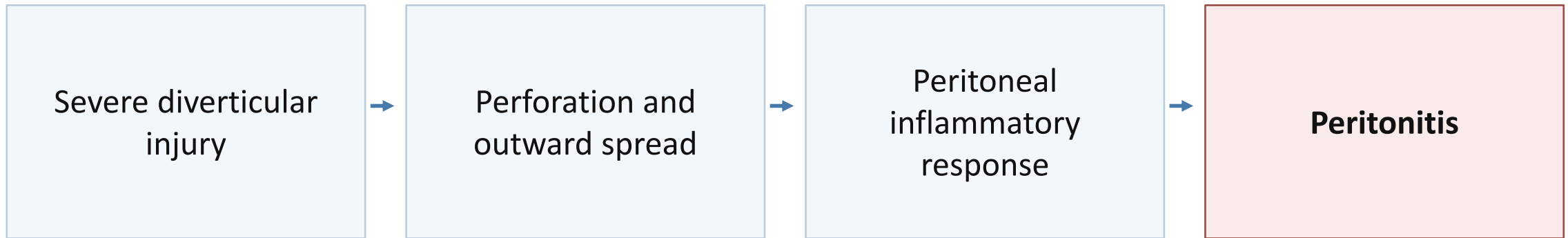
A pericolic abscess is a localized complication



Sinus tracts arise from extension beyond the bowel



Peritonitis indicates extensive inflammatory spread



Potential for peritonitis gives thin-walled diverticula important clinical significance.

Complications follow tissue-boundary failure

Serositis

Inflammation reaches the outer serosal surface.

Perforation

The damaged diverticular wall is breached.

Pericolonic abscess

Localized inflammation forms an abscess next to the colon.

Sinus tracts / peritonitis

Spread may create abnormal tracts or involve the peritoneum.

Most people with diverticula remain asymptomatic

Most affected people

Remain asymptomatic throughout life; A diverticulum itself need not produce complaints.

Symptomatic subset

Manifestations in about one-fifth of affected individuals.

Inflamed subset

Only a minority develop diverticulitis; Severe complications are not the default.

About one-fifth develop manifestations

$\approx 20\%$

Develop clinical manifestations

Denominator: Individuals with diverticular disease

The estimate describes symptoms such as pain, discomfort, altered bowel habits and distention. It is not the proportion who develop diverticulitis.

Pain may be episodic or persistent

Intermittent symptoms

- Intermittent cramping
- Symptoms may vary over time
- An anatomical lesion can coexist with fluctuating discomfort

Persistent symptoms

- Continuous lower abdominal discomfort
- Symptoms do not necessarily prove acute inflammation
- Assess the entire clinical pattern rather than pain alone

Bowel-habit symptoms may predominate

Constipation

A recognized manifestation of symptomatic diverticular disease.

Abdominal distention

May be present with lower abdominal discomfort.

Incomplete evacuation

A sensation of never fully emptying the rectum may occur.

Alternating bowel habits can mimic IBS

Symptomatic diverticular disease

- Known acquired colonic outpouchings
- Constipation may alternate with diarrhea
- Cramping or distention may coexist

IBS-like clinical pattern

- Alternating constipation and diarrhea
- Symptom overlap alone is not definitive
- The source explicitly notes mimicry of IBS

Symptoms do not equal inflammation

Diverticula may be asymptomatic



Some produce pain or altered bowel habit



Diverticulitis specifically implies inflammation

Distinguish the anatomical condition, symptomatic disease, and inflamed disease.

Fiber and prevention require careful wording

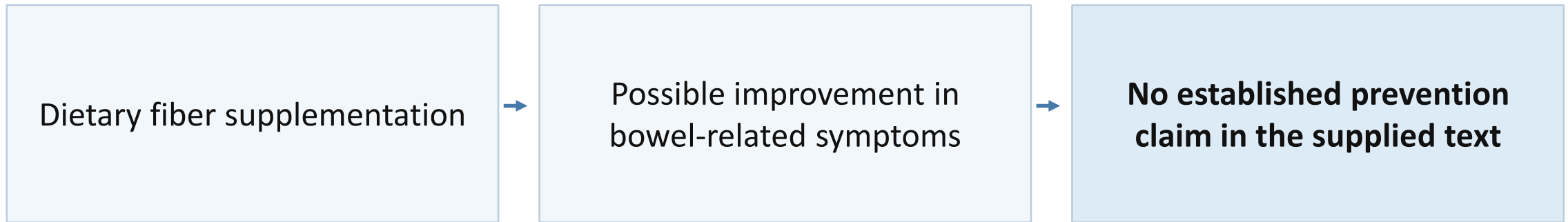
Proposed pathogenesis

- Low dietary fiber may reduce stool bulk
- Smaller bulk may accompany exaggerated contraction
- Mechanistic plausibility supports a hypothesis

Prevention remains uncertain

- Robbins does not establish that high fiber prevents diverticulitis
- A proposed risk mechanism is not proof of prevention
- Avoid translating this into a quantitative effect

Fiber supplementation may alleviate symptoms



Symptomatic benefit and protection from diverticulitis are separate questions.

Many episodes of diverticulitis resolve without surgery

- Diverticulitis most often resolves spontaneously.
- This statement does not imply that every inflammatory episode is harmless.
- Severe disease can cause perforation and extraintestinal inflammation.
- Course and risk depend on the clinical episode; No invented intervention algorithm is shown.

Surgery is generally reserved for selected cases

Typical diverticulitis course

- Most episodes resolve spontaneously
- Not every attack requires surgery
- Avoid treating uncomplicated anatomy as a surgical indication

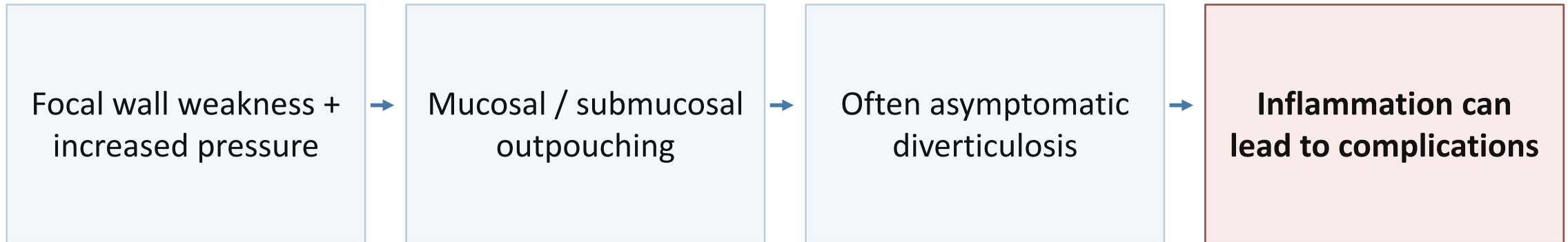
When surgery is considered

- Severe diverticulitis
- Recurrent diverticulitis
- Specific operative thresholds are outside this textbook excerpt

Morphology predicts clinically important complications

Morphologic finding	Mechanistic implication	Possible consequence
Thin diverticular wall	Little separation from serosa	Serositis
Mucosal damage	Wall integrity can fail	Perforation
Pericolic extension	Spread beyond colon	Abscess or sinus tract
Peritoneal spread	Extensive inflammation	Peritonitis

The disease can be reconstructed as a causal chain



Anatomical diverticula precede diverticulitis; Inflammatory complications are conditional.

Applied case: Incidentally identified diverticula

Clinical vignette

- An older adult is found to have multiple sigmoid diverticula.
- There has been no abdominal discomfort or change in bowel habits.
- No inflammatory findings are described.

Interpretation task

What is established from the vignette?

Diverticulosis; Not diverticulitis.

Applied case: Fluctuating bowel symptoms

Clinical vignette

- A patient with known sigmoid diverticula reports intermittent cramping.
- Constipation alternates with diarrhea.
- No evidence of diverticular inflammation is provided.

Interpretation task

Can these symptoms alone establish diverticulitis?

No. The source notes an IBS-like mimic.

Applied case: Pericolic inflammatory extension

Clinical vignette

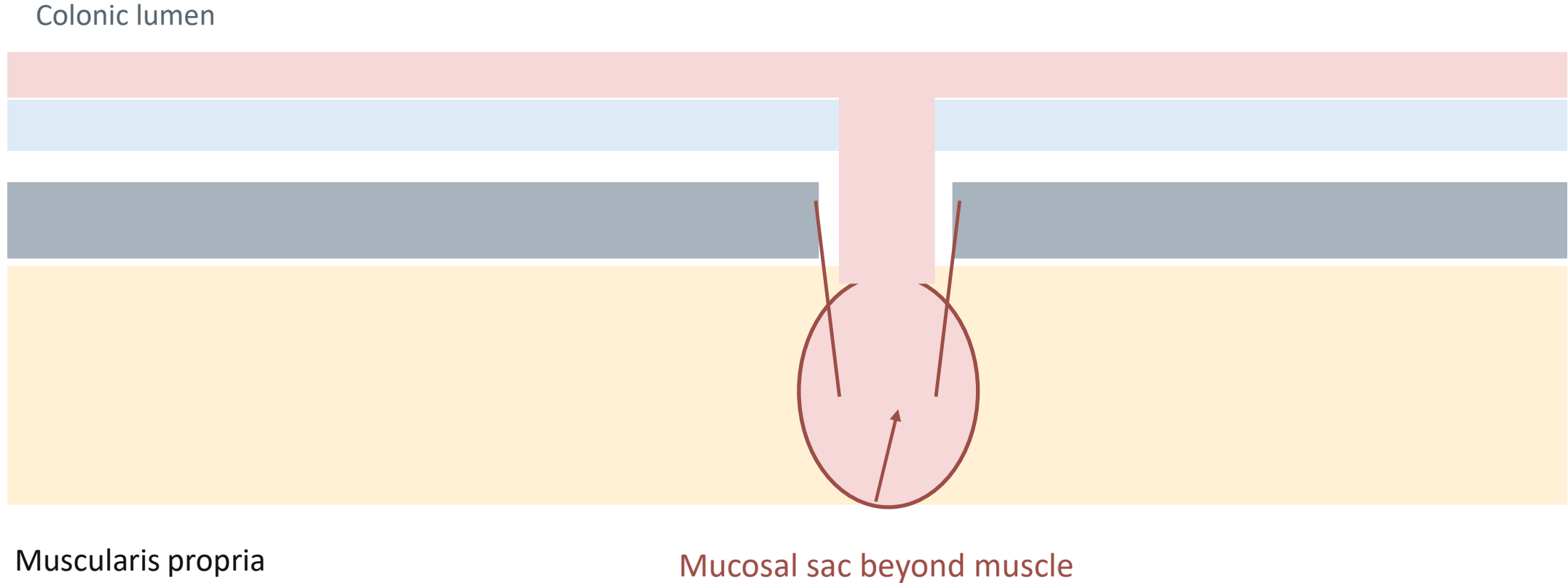
- A diverticulum becomes inflamed.
- Inflammation extends beyond its thin outer wall.
- A localized pericolonic abscess develops.

Interpretation task

Why can spread occur relatively easily?

There is little tissue between sac mucosa and serosa.

Morphologic interpretation: A low-power schematic



Schematic; Not histologic evidence

Differentiate a polyp from a diverticulum

Diverticulum

- Outpouching from the normal colonic wall
- Mucosa and submucosa extend outward through muscle
- A lesion of wall contour and support

Intestinal polyp

- Raised mucosal lesion extending toward the lumen
- May be sessile or pedunculated
- A distinct morphologic concept from an external sac

Clinicopathologic synthesis: Five discriminators

- Acquired pseudodiverticulum: Mucosa and submucosa without a complete muscular wall.
- Focal penetrating neurovascular sites + elevated pressure explain formation.
- The sigmoid is especially involved in Western populations.
- Thin-walled sacs permit serositis, perforation, abscesses, sinus tracts, or peritonitis.
- Most patients are asymptomatic; Inflammation defines diverticulitis.

References and source scope

Robbins, Cotran & Kumar: Pathologic Basis of Disease

11th edition (2026), Chapter 17: The Gastrointestinal Tract

“Sigmoid Diverticular Disease,” printed pages 734–735

Scope and figure provenance

- Content follows the supplied topic extraction and adjacent heading.
- Original textbook Fig. 17.43 was not reproduced; diagrams are original schematic, native PowerPoint objects.