



LECTURE 2: BASIC LOOP FORMATION AND SIMPLE MANEUVERS

Participant Handout

Colonoscopy Without Pain | MEA Physician Symposium
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Speaker: Dr. Samer Al-Dury

LEARNING OBJECTIVES

By the end of this lecture, you will understand:

1. How and why loops form during colonoscopy insertion
 2. The anatomy that predisposes to loop formation
 3. Recognition of loop formation in real time
 4. Simple maneuvers to prevent loop formation
 5. Techniques to straighten loops when they occur
 6. Practical decision-making: when to correct and when to avoid
 7. How loop management directly reduces patient pain
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WHAT IS A LOOP?

Definition

A loop is an unintended bend or coil of the colonoscope within the colon, typically occurring in the sigmoid colon. The scope bends back on itself, creating resistance to advancement and requiring corrective maneuvers.

Why Loops Matter

- Loops are the PRIMARY cause of mechanical pain during colonoscopy
- Loop formation increases mesenteric traction on pain-sensitive ligaments
- Each push on a looped scope increases tension and discomfort
- Loops are PREVENTABLE with proper technique
- Prevention is far more effective than correction

Clinical Pearl

A colonoscope without loops advances easily. A colonoscope with loops requires force. Force equals pain. Therefore: NO LOOPS equals NO PAIN.

THE SIGMOID COLON: WHERE LOOPS LIVE

Anatomical Characteristics

The sigmoid colon is the primary site of loop formation because of its unique anatomy:

- Redundant length — approximately 35-40 cm long on average
- Tight coiling — natural S-shaped configuration
- High angulation — sharp turns and angles
- Mobile mesentery — suspended by a long mesenteric attachment
- Fixed retroperitoneal attachment at rectosigmoid junction

Result: The sigmoid colon can easily accommodate a looping scope with minimal resistance initially, then suddenly resist advancement as tension increases.

Other Loop Sites (Less Common)

- Hepatic flexure — can form loops in elongated colons



- Descending colon — rarely loops unless extremely redundant
- Rectosigmoid junction — critical transition point

Understanding Anatomy = Understanding Loops

When you understand why the sigmoid is vulnerable to looping, you can anticipate and prevent it.

HOW LOOPS FORM: THE PHYSICS

Step-by-Step Loop Formation Process

STEP 1: INITIAL INSERTION (Resistance Phase)

- Scope enters rectum and advances through sigmoid colon
- Scope follows the natural colon path initially
- As you push, the scope advances steadily with minimal resistance
- Patient may feel mild discomfort

STEP 2: TENSION INCREASES (Transition Phase)

- Scope reaches the sigmoid coil where anatomy tightens
- Continued pushing doesn't advance the scope tip much
- Instead, the scope begins to bend within the colon
- You feel increased resistance to your pushing force
- Patient reports increasing discomfort or localized pain

STEP 3: LOOP FORMS (Loop Phase)

- The scope creates a bend or "N" shape in the sigmoid
- Pushing force is now transmitted through the bend rather than advancing the tip
- The mesentery is stretched as the loop tightens
- Additional pushing causes more tension and more pain
- Vision on monitor may become fixed or advance very slowly

STEP 4: RECOGNITION MOMENT (Critical Decision Point)

- You recognize resistance without advancement
- Monitor shows little or no tip progression
- Patient may report significant discomfort
- This is the moment to STOP PUSHING and change strategy

Understanding this sequence helps you recognize loops early and intervene appropriately.

RECOGNIZING LOOP FORMATION: CLINICAL SIGNS

Visual Indicators

- Monitor shows scope tip position fixed or advancing minimally
- Pushing force produces little or no forward movement
- Monitor image quality may decrease due to scope bend
- Colon wall distorts or appears "telescoped"

Physical Indicators (What You Feel)

- Resistance to pushing increases significantly
- Each push requires more force than before
- Scope feels "stuck" or "hung up"
- Hand position changes at colonoscope insertion site
- Insertion hub movement doesn't correlate with tip advancement

Patient Indicators (What Patient Reports)

- Pain or discomfort localized to one area (usually left lower abdomen)
- Pain increases with pushing
- Cramping or pressure sensation
- Patient may request rest or pain relief

Monitor Indicators (What You See)

- Scope bends visibly on screen
- "N" or reverse "N" shape appears
- Mucosal folds appear compressed or accordion-like
- Scope contact with mucosa appears repetitive rather than progressive

Timing Indicators (When It Happens)

- Most common at 15-25 cm insertion depth
- Occurs when sigmoidoscope alone has reached maximum useful depth
- Happens when pushing force exceeds scope flexibility

CRITICAL SKILL: Early Recognition

The moment you feel resistance increase without advancement, STOP. That is loop formation beginning. The earlier you recognize it, the easier it is to manage.

LOOP FORMATION TYPES AND PATTERNS

ALPHA LOOP (Most Common)

Characteristics:

- Single bend or fold of scope in sigmoid
- Creates "N" or reverse "N" shape on monitor
- Accounts for approximately 80% of problematic loops
- Forms due to pushing against sigmoid resistance
- Relatively straightforward to correct

Recognition:

- Single point of bend visible on monitor
- Resistance and minimal advancement
- Pain usually localized

BETA LOOP (More Problematic)

Characteristics:

- Scope bends twice, creating multiple folds
- More complex deformation
- Forms when alpha loop persists and you continue pushing
- Requires more sophisticated maneuvers to straighten
- Causes more pain and patient distress

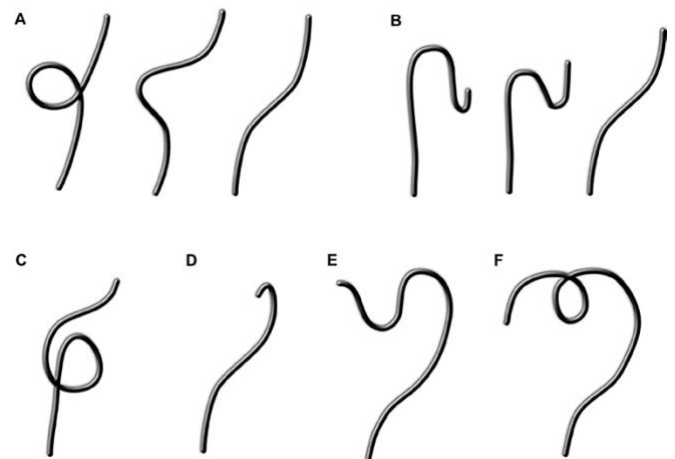
Recognition:

- Multiple bends visible on monitor
- More significant resistance
- Difficulty recognizing scope orientation
- Greater patient discomfort

GAMMA LOOP (Severe)

Characteristics:

- Three or more bends



Loops in colonoscopy. (A) Sigmoid alpha loop and resolution with clockwise torque; (B) Sigmoid N loop and resolution with gradual withdrawal and clockwise torque; (C) Reverse alpha loop; (D) Splenic flexure 'hockey stick'; (E) Transverse loop; (F) Transverse gamma loop. Choy et al, Frontline Gast 2020



- Extremely difficult to advance
- Can cause severe pain and complications
- Often requires patient position change or scope withdrawal
- Usually indicates need to change strategy entirely

Recognition:

- Extreme resistance
- Very limited tip advancement despite significant pushing
- Severe patient pain
- Scope orientation completely unclear

ACCORDION FORMATION

Characteristics:

- Colon folds repeatedly like compressed springs
- Not technically a "loop" but related deformation
- Occurs with excessive pushing on bent scope
- Extremely painful
- Requires immediate strategy change

Recognition:

- Monitor shows repetitive folding pattern
- Severe patient pain
- No advancement despite maximal pushing
- Colon appears compressed rather than opened

Key Point:

Prevention of alpha loops prevents progression to beta, gamma, and accordion formations. Do not let problems escalate.

SIMPLE MANEUVERS: PREVENTION FIRST

MANEUVER 1: MINIMIZE PUSH FORCE (PREVENTION)

Technique:

- Approach sigmoid insertion with reduced push force
- Let the scope advance naturally without forcing
- Use gentle, controlled pushing rather than strong pushes
- Watch for the moment resistance appears
- Stop increasing force before loops form

Rationale:

- Excessive push force is the PRIMARY cause of loop formation
- Gentle advancement follows natural colon path
- Scope naturally straightens as it advances
- Reduced force equals reduced trauma

How to Execute:

- Begin with minimal push force at rectosigmoid junction
- Increase force very gradually
- As soon as resistance appears, STOP increasing force
- Try different approach before increasing force further

Expected Outcome:

- Many colonoscopies proceed without any loop formation
- Patient experiences minimal discomfort
- Advancement continues despite sigmoid anatomy

Clinical Pearl:

If you are pushing hard, you are doing it wrong. If you encounter resistance with force, change strategy, do not apply more force.

MANEUVER 2: RECOGNIZE WHEN LOOP MIGHT FORM (AWARENESS)

Key Points:

- At approximately 20-25 cm insertion depth, expect sigmoid resistance
- Monitor for the first signs of increased resistance without advancement
- This is the critical moment for decision-making
- Do not continue pushing blindly at this point

Decision Points:

- Can I advance with gentle force? Then continue gently
- Does resistance prevent advancement? Then consider maneuvers
- Is patient in pain? Then stop and reassess

Timing:

Recognizing the loop BEFORE it fully forms is far easier than correcting it after.

MANEUVER 3: POSITION CHANGE (PREVENTION AND CORRECTION)

Technique:

- Change patient from left lateral to supine (on back)
- Change patient from supine to right lateral

Rationale:

- Different body position changes colon anatomy
- Sigmoid angles differently in different positions
- Can "straighten" the sigmoid without scope manipulation
- Often allows scope to advance past previously resistant point
- Safe and effective for both prevention and correction

How to Execute:

POSITION 1 — LEFT LATERAL (Starting position)

- Patient lies on left side
- Scope insertion through left lower quadrant
- This is where most loops form initially

POSITION 2 — SUPINE (On back)

- Ask patient to roll onto back
- This straightens the sigmoid in many patients
- Scope can often advance past previous resistance point
- Very effective first maneuver for loop

POSITION 3 — RIGHT LATERAL (Right side)

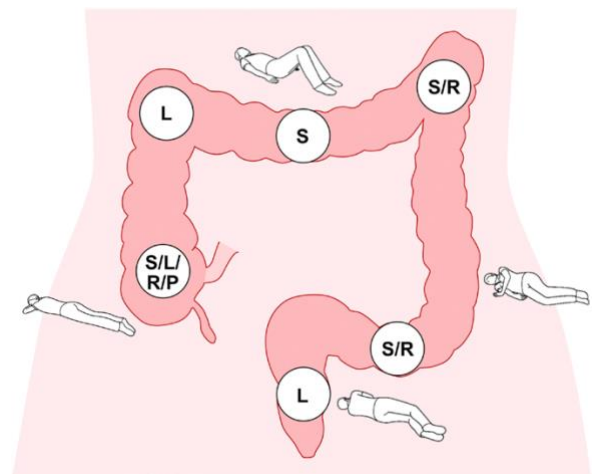
- Patient rolls onto right side
- Further straightens or reorients sigmoid
- Used if supine position insufficient

Expected Outcome:

- Approximately 60-70% of resistant points resolve with position change alone
- Patient often reports relief of discomfort
- Scope advances without additional manipulation

Clinical Pearl:

Before attempting complex maneuvers, always try position change first. It is simple, safe, and often curative.



Position change for colonoscopy insertion and withdrawal. L, left lateral; P, prone; R, right lateral; S, supine. Choy et al, Frontline Gast 2020

MANEUVER 4: TORQUE CONTROL (TECHNIQUE)



Definition

Torque is rotational movement of the scope handle (left or right) to advance the tip without pushing force.

Technique:

- Grasp scope handle firmly with both hands
- Rotate handle slowly and deliberately to the left or right
- Combined with minimal push force
- Allows tip to advance through angulated segments

Rationale:

- Torque advancement follows the natural curves of colon
- Does not force against resistance
- Reduces risk of loop formation
- More elegant than push force alone

How to Execute:

STEP 1: Identify resistance point

- Feel increased resistance without advancement
- Recognize loop beginning to form

STEP 2: Reduce push force to minimal level

- Back off your pushing significantly

STEP 3: Apply gentle torque

- Rotate scope handle left 20-30 degrees
- Apply minimal push force while rotating
- See if tip advances

STEP 4: Continue or reverse

- If advancing, continue gentle torque plus minimal push
- If not advancing, try rotating right instead
- Never force — use gentle alternating rotations

Expected Outcome:

- Scope often advances past previously resistant point
- Patient experiences less pain
- No loop formation if applied early

Clinical Pearl:

Torque is your friend. Master gentle torque early and you will prevent most loops before they form.

MANEUVER 5: ABDOMINAL PRESSURE (TEAM MANEUVER)

Definition

Brief external pressure on the abdomen to change colon position or reduce loop tension.

Technique:

- Nursing team applies gentle to moderate pressure over lower abdomen
- Pressure applied briefly (3-5 seconds), not continuously
- Coincides with your gentle pushing and torque maneuvers
- Redirects colon anatomy to reduce resistance

Rationale:

- External pressure can straighten sigmoid coil temporarily
- Allows scope to advance through resistant segment
- Reduces mesenteric tension
- Often relieves patient pain immediately

How to Execute:

FOR LOOP CORRECTION:

- Nurse applies pressure over left lower abdomen
- You apply gentle push force combined with torque
- Maintain pressure for 3-5 seconds
- Release pressure, assess scope advancement
- Repeat if needed (maximum 2-3 times)

FOR PAIN RELIEF:

- Nurse applies pressure to area of patient pain
- Often provides immediate relief
- You continue gentle advancement

Communication:

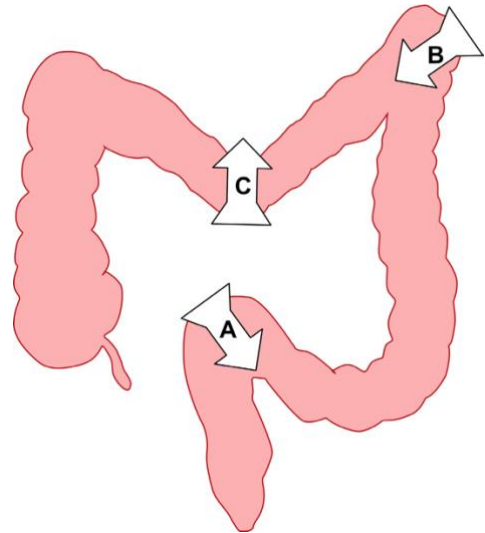
- Say clearly: "Abdominal pressure, please"
- Specify: "Left lower quadrant" or "Over the pain"
- Say: "Release" when done
- Coordinate timing with your maneuver

Expected Outcome:

- Scope often advances when pressure applied
- Pain relief is immediate
- Loop often resolves

Clinical Pearl:

Coordinated team pressure is highly effective. Train your nursing team to apply pressure at the right moment with the right intensity.



Hand pressure during colonoscopy. (A) Sigmoid stabilisation for anterior sigmoid loops; (B) Left upper quadrant pressure for splenic flexure looping; (C) Transverse lift for deep transverse dips. Choy et al, Frontline Gast 2020

MANEUVER 6: WITHDRAWAL AND STRAIGHTENING (ADVANCED TECHNIQUE)

Purpose

Sometimes pulling back slightly while twisting can straighten a loop rather than continuing to push.

Technique:

STEP 1: Recognize loop is formed

- Feel strong resistance with minimal advancement
- Patient reports significant discomfort
- Continued pushing is not working

STEP 2: Stop pushing

- Cease forward pressure completely

STEP 3: Pull back gently

- Withdraw scope very slowly (approximately 5-10 cm)
- This reduces mesenteric tension
- Often straightens the loop passively

STEP 4: Twist while pulling back

- Apply gentle torque (left-right rotation) while pulling back
- This helps colon "unspool" from the scope

STEP 5: Readvance gently

- Once partially straightened, readvance with torque plus minimal push
- Often proceeds without loop reformation

Why This Works:

- Reduces mesenteric tension
- Allows scope to reposition
- Prevents loop reformation



When to Use:

- After position change and pressure have not helped
- When patient pain is significant
- Before attempting more aggressive maneuvers

Expected Outcome:

- Loop often resolves with this technique
- Scope position resets
- Advancement continues with improved trajectory

Clinical Pearl:

Sometimes going backward slightly helps you go forward better. This counterintuitive maneuver is powerful and should be in your routine.

MANEUVER DECISION TREE: WHEN TO USE WHICH

SCENARIO 1: You encounter resistance at sigmoid insertion

FIRST: Reduce push force and try gentle torque

IF NOT WORKING: Change patient to supine position

IF NOT WORKING: Ask for brief abdominal pressure (left lower quadrant)

IF NOT WORKING: Try withdrawal and straightening maneuver

IF STILL NOT WORKING: Reassess strategy — consider scope withdrawal

SCENARIO 2: Patient reports significant pain in left lower abdomen

FIRST: Stop pushing immediately

SECOND: Ask for abdominal pressure over pain site

THIRD: Try position change to supine

FOURTH: If pain continues, consider scope withdrawal

SCENARIO 3: Loop is clearly formed on monitor

FIRST: Stop pushing

SECOND: Change to supine position

THIRD: Attempt withdrawal and straightening with torque

FOURTH: If loop persists, consider scope withdrawal

Key Principle:

Progress logically. Start simple (reduce force, position change, pressure). Progress to more complex (withdrawal, torque combinations). Never force a loop — respect the anatomy.

WHAT NOT TO DO: COMMON MISTAKES

MISTAKE 1: Continuing to Push Hard Into Resistance

Why It Is Wrong:

- Increases loop tension
- Increases patient pain significantly
- Can cause mucosal trauma
- Creates accordion formations
- Damages patient-physician relationship

What to Do Instead:

- Stop pushing immediately
- Recognize resistance as a signal to change strategy
- Try alternative techniques

MISTAKE 2: Ignoring Patient Pain Signals



Why It Is Wrong:

- Patient pain indicates tissue tension and trauma
- Continuing despite pain increases risk of complications
- Damages trust
- Makes future procedures more difficult

What to Do Instead:

- Respond immediately to pain reports
- Modify technique
- Consider sedation adjustment
- Stop if pain is severe

MISTAKE 3: Only Pushing and Pulling (No Torque)

Why It Is Wrong:

- Linear advancement alone cannot navigate angulated colons
- Overrelies on push force
- Causes loops

What to Do Instead:

- Incorporate torque rotation into every maneuver
- Let scope rotate and advance simultaneously
- This follows natural colon anatomy

MISTAKE 4: Forgetting Position Changes Are Available

Why It Is Wrong:

- Position change is simple, safe, and effective
- Skipping it means trying complex maneuvers instead
- Wastes time and increases patient discomfort

What to Do Instead:

- Always try position change early
- Supine position resolves most sigmoid resistance
- Return to left lateral for subsequent segments

MISTAKE 5: Working Alone (Forgetting Your Nursing Team)

Why It Is Wrong:

- Abdominal pressure is a powerful tool
- You cannot apply optimal pressure yourself
- Nursing team provides critical coordination
- Solo technique means missing key interventions

What to Do Instead:

- Communicate clearly with nursing team
- Request specific pressure at specific times
- Coordinate your maneuvers with team actions
- Remember: comfort is a TEAM outcome

SIMULATOR PRACTICE FOCUS

Today's simulator time, focus on:

SKILL 1: Recognizing Resistance Early

- Feel for the moment resistance begins
- Do not wait until the loop is fully formed
- Practice distinguishing normal resistance from abnormal
- Develop sensitivity to scope movement quality



SKILL 2: Minimal Push Force Technique

- Practice advancing sigmoid with minimal force
- Learn how gentle you can be while still advancing
- Develop muscle memory for controlled, light pressure
- Build confidence that gentle is effective

SKILL 3: Torque Application

- Practice left and right torque rotation
- Combine torque with minimal push force
- Learn the feel of proper torque application
- Practice smooth coordinated hand movements

SKILL 4: Position Changes

- Practice patient positioning maneuvers
- Learn smooth coordination with nursing team
- Understand timing of position changes
- Develop communication for position changes

SKILL 5: Loop Recognition and Response

- If loops form, practice recognition
- Execute withdrawal and straightening
- Practice decision-making: when to correct, when to stop
- Develop pattern recognition for different loop types

SKILL 6: Simulator-Specific Practice

- Use simulator to deliberately create loops
- Practice correcting them under controlled conditions
- Experiment with different maneuvers
- Build confidence before live cases

Goal:

Leave today's simulator blocks with muscle memory for basic loop prevention and simple correction maneuvers.

CLINICAL PEARLS

PEARL 1: Prevention > Correction

It is far easier to prevent a loop than to correct it. Focus on not forming loops rather than becoming expert at fixing them.

PEARL 2: Force Is a Signal

When you feel increased force requirement, that is your signal to change strategy, not to push harder. Respect that signal.

PEARL 3: Position Changes Are Magic

Many problems resolve with patient position change alone. Always try it early before complex maneuvers.

PEARL 4: Torque Before Push

When advancing into resistance, apply torque BEFORE pushing harder. Torque often resolves the resistance without additional force.

PEARL 5: Patient Pain Is Information

Patient pain reports are critical information. Respond to them immediately. Pain indicates tissue tension that needs to be relieved.

PEARL 6: Comfort Equals Efficiency



Paradoxically, prioritizing patient comfort makes your procedure more efficient. Comfortable patients cooperate better, advance easier, tolerate better.

PEARL 7: Loops Are Your Teaching Tool

When loops form, they teach you about your technique. Analyze each loop: How did it form? What was I doing? How can I prevent it next time?

PEARL 8: Team Communication Matters

Clear communication with your nursing team is as important as your manual technique. Coordinate, communicate, collaborate.

KEY TAKEAWAYS

THE SIGMOID COLON IS THE CRITICAL AREA

- Understand its anatomy
- Anticipate loop formation
- Prevent formation through gentle technique

RECOGNITION IS EVERYTHING

- Early recognition of resistance is your key to success
- Resistance without advancement equals loop forming
- Stop and change strategy at this moment

SIMPLE MANEUVERS WORK

- Reduce force
- Change position
- Apply torque
- Use team pressure
- These four techniques solve most problems

SEQUENCING IS LOGICAL

- Start simple (reduce force, position change)
- Progress to moderate (torque, pressure)
- Progress to complex (withdrawal, straightening)
- Stop when problem resolves

LOOPS ARE PREVENTABLE

- Most loops result from excessive push force
- Gentle technique prevents loop formation
- This directly reduces patient pain

PRACTICE MAKES PERFECT

- Simulator time builds muscle memory
- Repetition develops pattern recognition
- Deliberate practice accelerates learning
- Use today to ingrain these skills

EVIDENCE SUMMARY

Intervention	Effectiveness	Evidence Level	Timing
Reduced push force	Prevents loops	Strong	Prevention
Position change	Resolves 60-70%	Strong	Early correction
Torque technique	Prevents loops	Strong	Prevention/early



Abdominal pressure	Resolves 50-60%	Strong	Correction
Withdrawal/straightening	Resolves 70-80%	Strong	Failed correction
Patient communication	Improves outcome	Moderate	Throughout

REFLECTION QUESTIONS

After this lecture and simulator practice, reflect on:

1. At what point do you currently recognize loop formation? Can you recognize it earlier?

Reflection: _____

2. What is your typical response when you feel resistance? Are you pushing harder or changing strategy?

Reflection: _____

3. How comfortable are you with torque-based advancement? Do you use it regularly?

Reflection: _____

4. How well do you communicate with your nursing team about position changes and pressure?

Reflection: _____

5. In your practice, what is your most common mistake with loops?

Reflection: _____

6. Which maneuver do you need to practice most during simulator time?

Reflection: _____

REFERENCES

1. Rutter CM, et al. Mechanical analysis of insertion problems and pain during colonoscopy. *Endoscopy*. 2013;45(2):109-119.
2. Sinonquel P, et al. Painless colonoscopy: fact or fiction? *Dig Dis Sci*. 2024;69(6):2047-2065.
3. Ahmed JF, et al. Causes of intraprocedural discomfort in colonoscopy: a review and practical tips. *BMJ Open Gastroenterol*. 2024;11(6):e001561.
4. Choy MC, et al. Diagnostic ileocolonoscopy: getting the basics right. *Frontline Gastroenterol*. 2020;11(6):484-491.
5. Jay CL, et al. Colonoscopy pain management: A Bayesian network meta-analysis of randomized trials. *Gastroenterology*. 2025;168(2):289-301.
6. Corley DA, et al. Quality of colonoscopy in practice. *Gastrointest Endosc Clin N Am*. 2023;33(3):433-447.
7. Barclay RL, et al. Colonoscopic withdrawal times and adenoma detection during screening colonoscopy. *N Engl J Med*. 2006;355(24):2533-2541.
8. Ismail FW, et al. Exploring endoscopic competence in gastroenterology training: A simulation-based assessment. *Clinical Gastroenterology and Hepatology*. 2024;22(1):123-134.
9. Ericsson KA. Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. *Academic Medicine*. 2015;90(11):1471-1486.



10. ASGE Standards of Practice Committee. Infection control during gastrointestinal endoscopy. *Gastrointestinal Endoscopy*. 2018;88(2):327-337.

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