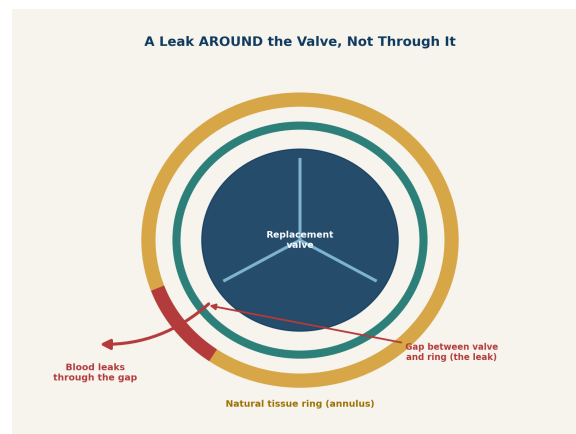


# Understanding Paravalvular Leak

A Leak Around a Replacement Heart Valve (PVL)

A gap lets blood slip around the valve — most are small; some need a fix.



Online: <https://go.riasalimd.com/paravalvular-leak-guide>

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Last Updated: August 2026



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## Names & Terms You Will Hear

| Term                       | Meaning                                                                          |
|----------------------------|----------------------------------------------------------------------------------|
| Paravalvular leak (PVL)    | A leak through a gap between a replacement valve and the tissue ring around it.  |
| Paravalvular regurgitation | The same thing. 'Regurgitation' means blood flowing backward.                    |
| Para- (prefix)             | Means 'beside' or 'around.' The leak is beside the valve, not through it.        |
| Sewing ring                | The fabric rim of a surgical valve. The surgeon stitches it to your tissue ring. |
| Annulus                    | Your own tissue ring that the valve sits in.                                     |
| Prosthetic valve           | An artificial replacement valve — tissue or mechanical.                          |
| Hemolysis                  | Red blood cells breaking apart. The leak jet can shear them.                     |
| Transcatheter closure      | Plugging the gap with a device sent through a thin tube. No open surgery.        |
| Occluder / vascular plug   | The small device used to fill the gap.                                           |
| Endocarditis               | Infection of a heart valve. It must be ruled out as a cause of a new leak.       |
| Heart Team                 | Your cardiologist and heart surgeon. They decide the best fix together.          |

**Around, not through.** The valve's own leaflets may open and close perfectly. A paravalvular leak is in the **gap beside the valve**, where the sewing ring meets your tissue ring. This is different from a leak *through* a worn-out valve — see Dr. Ali's [Living With a Prosthetic Valve](#) guide.



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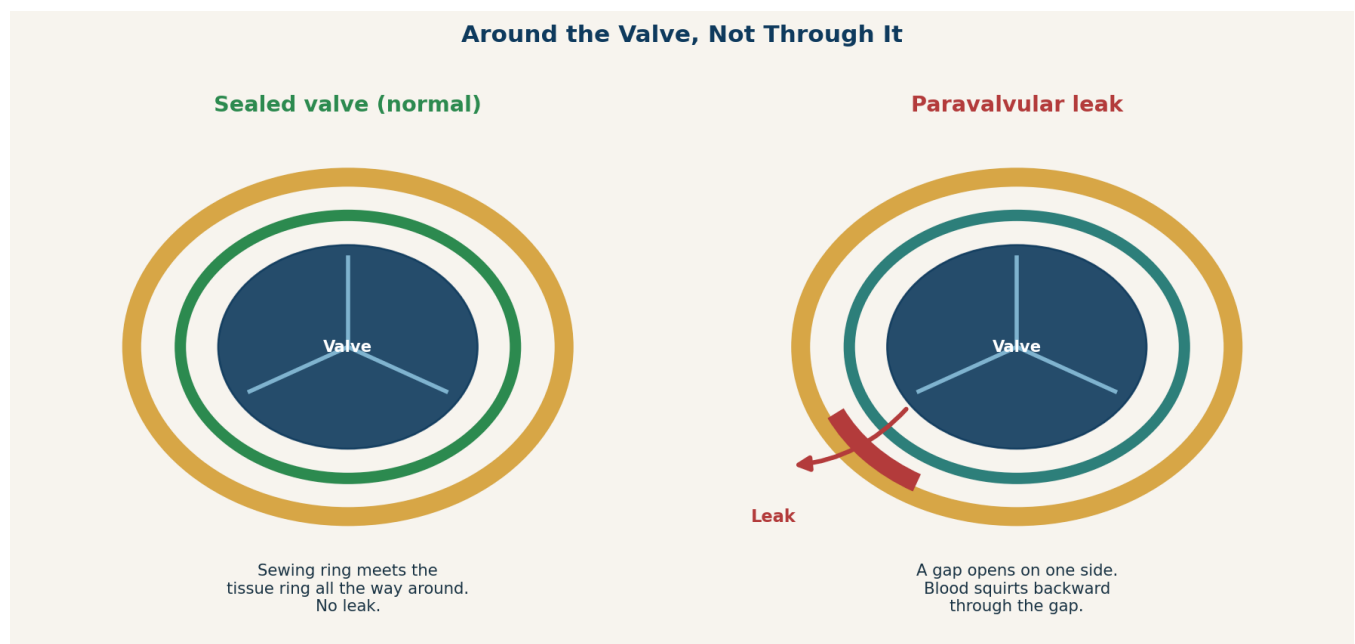
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## What Is Paravalvular Leak?

- A **paravalvular leak (PVL)** is a gap between an artificial (replacement) valve and the natural tissue ring it is sewn or seated into.
- Blood leaks **around** the valve through this gap — not through the valve's normal opening. That is the key difference from a worn-out valve.
- It can happen after **surgical valve replacement** or after **TAVR** (a catheter-placed valve).
- Most leaks are **small**. They cause no symptoms and just need watching with an echocardiogram.
- A **larger leak** causes two main problems: heart failure symptoms and hemolysis (red blood cells breaking apart).
- A new or growing leak always prompts a check for **infection (endocarditis)** as a possible cause.



*Left: a well-seated valve seals against the tissue ring all the way around — no leak. Right: a gap opens on one side, so blood squirts backward AROUND the valve. That is a paravalvular leak.*



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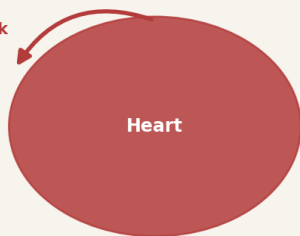
## Why It Matters

- A bigger leak makes your heart re-pump the same blood over and over. Over time this can **weaken the heart** and cause heart failure.
- The narrow, high-speed jet through the gap can **shear red blood cells**. This causes anemia — tiredness, pallor, and dark urine.
- PVL is a recognized complication of valve replacement. It is found in about **5 to 15% of mitral (surgical) valve replacements** (per PubMed-indexed reviews).
- Most small leaks never cause trouble. The point of follow-up is to catch the **few that grow** early.
- When a leak is significant, modern **transcatheter closure** can fix it without another open-heart operation in many patients.

### Two Ways a Leak Causes Trouble

#### 1. Extra volume -> congestion

Blood leaks back

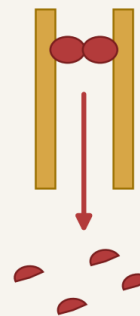


Heart

- Heart must re-pump the same blood
- Lungs and body back up with fluid
- Breathless, tired, swollen legs

#### 2. Narrow jet shears red cells

Narrow gap



Broken red cells

Result: anemia (tiredness, dark urine)

Two ways a significant leak causes trouble. Left: the leaked volume makes the heart re-pump the same blood, backing up fluid (heart failure). Right: the narrow, fast jet shears red blood cells, causing hemolysis and anemia (tiredness, dark urine).



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## Risk Factors

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Some patients are more likely to develop this condition. Knowing your risk helps your care team take extra precautions.

| Risk Factor                    | Why It Increases Risk                                                                      |
|--------------------------------|--------------------------------------------------------------------------------------------|
| Heavy valve-ring calcium       | Hard, bumpy calcium keeps the sewing ring from sealing flat against the tissue.            |
| Infection (endocarditis)       | Infection can eat away tissue at the sewing ring and open a gap. Must always be ruled out. |
| Mitral position                | Leaks are more common around mitral valves than aortic ones.                               |
| Larger or repeat valve surgery | Scarred or previously operated tissue holds stitches less reliably.                        |
| Technical and tissue factors   | Stitch spacing, ring shape, and fragile tissue can all leave a small gap.                  |
| After TAVR                     | A catheter valve may not seal perfectly against a heavily calcified ring.                  |



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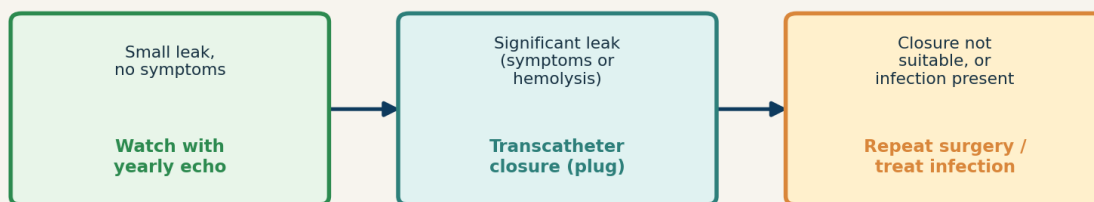


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## Treatment Options

- **Small leak, no symptoms:** watch it. A yearly echocardiogram tracks the leak and your heart size. No procedure is needed.
- **Significant leak (symptoms or hemolysis):** close the gap. The modern first choice at experienced centers is a **transcatheter closure**.
- **Transcatheter PVL closure** sends a thin tube (catheter) to the gap and places a small plug (occluder) to fill it. No chest opening. Shorter recovery.
- **Repeat surgery** is used when transcatheter closure is not suitable, when there are several large gaps, or when other valve work is needed at the same time.
- **Treat any infection.** If endocarditis caused the leak, antibiotics (and often surgery) come first.
- **Heart Team review** is required. Your cardiologist and surgeon weigh closure vs surgery for your anatomy and risk.

### Fixing It: Matched to How Big the Leak Is



*The fix is matched to the leak. Small, silent leaks are watched with yearly echo. Significant leaks are usually closed with a transcatheter plug first. Repeat surgery is the backup, and any infection is treated first.*



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## Transcatheter Closure vs Repeat Surgery

| Feature      | Transcatheter Closure                       | Repeat Surgery                                       |
|--------------|---------------------------------------------|------------------------------------------------------|
| Access       | Thin tube (catheter). No chest cut.         | Open chest again.                                    |
| What it does | Plugs the gap with an occluder device.      | Re-stitches or replaces the valve.                   |
| Recovery     | Short — often 1 to 2 days.                  | Longer — weeks.                                      |
| Best for     | Most significant leaks; high surgical risk. | Several or very large gaps; other valve work needed. |
| Modern role  | First choice at experienced centers.        | The backup when closure is unsuitable.               |



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## Risks, Benefits, and Alternatives

Every choice has trade-offs. Use this table to start the shared decision conversation.

| Option                                  | Risks                                                                                                                                    | Benefits                                                                                                           | Alternatives                                                            |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Watchful waiting (small leak)           | A leak can grow silently. Needs yearly echo and steady follow-up.                                                                        | No procedure and no procedure risk. Most small leaks never cause trouble.                                          | Move to closure if the leak grows or symptoms or anemia start.          |
| Transcatheter PVL closure               | Leak may not fully seal; a second device may be needed. Small risks: bleeding, stroke, device shift. Rarely the device blocks the valve. | No chest opening. Shorter stay and recovery. High device-success rate. Often improves both symptoms and hemolysis. | Repeat surgery if closure is unsuitable. Watching if the leak is small. |
| Repeat valve surgery                    | Open-heart re-operation. Higher risk than the first surgery. Longer recovery.                                                            | Can fully fix several or large gaps. Lets the surgeon replace the valve or treat infection at the same time.       | Transcatheter closure if anatomy allows and risk is high.               |
| Treat infection first (if endocarditis) | Delays closing the gap. Infection itself is serious.                                                                                     | Stops the cause. Clearing infection is required before any durable repair.                                         | Closure or surgery after the infection is controlled.                   |



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## Leak Severity, Symptoms, and the Usual Action

| Severity     | What You May Feel                                  | Usual Action                                                |
|--------------|----------------------------------------------------|-------------------------------------------------------------|
| Trace / mild | Nothing. Found only on echo.                       | Watch with a yearly echocardiogram.                         |
| Moderate     | Mild breathlessness or tiredness; mild anemia.     | Closer follow-up; plan a fix if it grows or symptoms start. |
| Severe       | Clear heart failure or marked anemia / dark urine. | Fix it: transcatheter closure first; surgery as backup.     |
| Any new leak | Possible fever or feeling unwell.                  | Rule out infection (endocarditis) before anything else.     |



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## Common Misconceptions

| Myth                                                     | Reality                                                                                                                   |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| A paravalvular leak means my replacement valve failed.   | Not usually. The valve itself often works fine — the leak is in a gap beside it, where the valve meets your tissue ring.  |
| Any leak around the valve needs surgery right away.      | No. Most leaks are small and only need watching. Only a significant leak with symptoms or hemolysis needs a fix.          |
| A leak around the valve is the same as a worn-out valve. | These are different problems. A worn valve leaks through the valve; a paravalvular leak goes around it. The fixes differ. |
| Fixing a leak always means another open-heart operation. | No. Many leaks can now be closed with a catheter and a small plug — no chest opening — at experienced centers.            |
| My anemia can't be from a heart valve.                   | It can. A narrow leak jet shears red blood cells. This is a known cause of anemia after valve replacement.                |
| If I feel fine, the leak doesn't matter.                 | A leak can grow before you feel it. That is exactly why your team keeps checking with echo, even when you feel well.      |
| A new leak is never caused by infection.                 | A new or growing leak always prompts a check for endocarditis. Infection can open a gap and must be treated first.        |

**How the valve was placed:** a paravalvular leak can follow open [surgical valve replacement](#) or a catheter-placed [TAVR](#) valve. It is a separate problem from a leaky mitral valve treated with [MitraClip / TEER](#). A new leak always prompts a check for [infective endocarditis](#).



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# Possible Complications

Knowing what can go wrong helps you spot problems early. Most complications are uncommon, especially with treatment.

| Where / What              | What Can Happen                                                                                                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------|
| Heart (congestion)        | A big leak forces the heart to re-pump blood. This can cause heart failure: breathlessness, fatigue, and swelling. |
| Blood (hemolysis)         | The narrow jet shears red blood cells, causing anemia — tiredness, pale skin, and dark (cola-colored) urine.       |
| Kidneys                   | Severe, ongoing hemolysis can rarely strain the kidneys from the load of broken red cells.                         |
| Valve / device            | During closure, a plug can rarely shift or press on the valve. The Heart Team plans to avoid this.                 |
| Infection (endocarditis)  | Infection can both cause a leak and be a danger on its own. It must be found and treated.                          |
| Rhythm and blood pressure | A failing, overloaded heart can trigger atrial fibrillation and low blood pressure.                                |



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## Two Ways a Leak Causes Trouble

- **1. Heart failure from extra volume.** A significant leak sends blood backward each beat. The heart must re-pump the same blood, so it works harder.
- Over time the chamber stretches and weakens. Fluid backs up into the lungs and body.
- You feel breathless (worse lying flat), tired, and notice swelling in the legs or belly.
- **2. Hemolysis from a shearing jet.** The leak forces blood through a narrow gap at high speed. This shear force breaks red blood cells apart.
- Broken cells mean **anemia**: tiredness, pale skin, and dark (tea- or cola-colored) urine from released pigment.
- Severe, ongoing hemolysis can rarely strain the kidneys. Even without big heart-failure symptoms, hemolysis alone can be a reason to fix the leak.



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## Finding It — Echo, TEE, and Ruling Out Infection

- A standard **echocardiogram** (ultrasound of the heart) is the first test. It shows the leak and how big it is.
- A **transesophageal echo (TEE)** — a small probe passed into the throat — gives a much clearer view of a valve, especially the mitral valve. It is often the key test for PVL.
- **3D TEE** maps the exact size, shape, and location of the gap. This is what the team uses to plan a closure.
- A **CT scan** can add detail and help plan the device and the catheter path.
- **Blood tests** look for anemia and signs of hemolysis (low hemoglobin, high LDH, low haptoglobin).
- **Rule out infection.** A new or growing leak always prompts blood cultures and a check for endocarditis, because infection can both cause a leak and be dangerous on its own.



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## Fixing It — Watch, Transcatheter Closure, or Surgery

- **Watch:** small leaks with no symptoms are followed with a yearly echo. No procedure is needed unless things change.
- **Transcatheter closure (modern first choice):** through a thin catheter, the team places a small plug — an occluder or vascular plug — into the gap to seal it. No chest opening.
- Named devices used to plug the gap include the **Amplatzer Vascular Plug III** and other purpose-built occluders selected to match the gap's shape.
- In PubMed-indexed multicenter series, closure had a **device-success rate near 90%** and improved symptoms or hemolysis in roughly **8 of 10 patients**.
- **Repeat surgery** is chosen when there are several or very large gaps, when closure is not anatomically possible, or when the surgeon needs to fix something else at the same time.
- **Treat infection first.** If endocarditis caused the leak, antibiotics — and often surgery — come before any durable repair. The **Heart Team** makes the final call.



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## Points to Know

If you remember nothing else, remember these key points.

- A paravalvular leak is a gap **beside** a replacement valve. Blood leaks around the valve, not through it.
- It can follow surgical valve replacement or TAVR. It is most common around mitral valves.
- **Most leaks are small** and only need watching with a yearly echocardiogram.
- A bigger leak causes **two problems: heart failure** (congestion) and **hemolysis** (anemia, dark urine).
- A new leak always prompts a check for **infection (endocarditis)**.
- An echo — often a TEE (throat-probe echo) — finds and sizes the leak. CT can help plan a fix.
- A significant leak is usually fixed with a **transcatheter closure (a plug)** first; repeat surgery is the backup.
- Tell your dentist and doctors you have a replacement valve so you can be protected against infection.



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## When to Call Us - and When to Call 911

If you are not sure, call. We would rather hear from you twice than miss a real problem.

- **Call 911** for sudden severe shortness of breath, especially lying flat.
- **Call 911** for chest pain or fainting.
- **Call 911** for stroke signs: face droop, arm weakness, or slurred speech.
- **Call our office** for dark, tea- or cola-colored urine — a sign of red-cell breakdown.
- **Call our office** for new or worse tiredness, pale skin, or feeling breathless with light activity.
- **Call our office** for a fever above 100.4 F — we need to rule out a valve infection.
- **Call our office** if your weight goes up 3 or more pounds in a day or two, or your ankles swell.
- **Call our office** before any dental or surgical procedure to ask about antibiotics.

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## Trusted Resources

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The links below are the trusted resources Dr. Ali used to write this guide and that he recommends you visit for more information. Each is a clickable link in the digital version and a Short.io tracked URL on the printed version.

- [Cleveland Clinic — Paravalvular Leak](#) - Plain-language overview of PVL, its symptoms, and closure options.
- [AHA — Heart Valve Problems and Disease](#) - American Heart Association overview of valve disease and follow-up.
- [Mayo Clinic — Heart Valve Disease](#) - Symptoms, causes, and follow-up for valve disease.
- [Dr. Ali — Living With a Prosthetic Valve](#) - Companion guide on life after valve replacement — including a leak THROUGH a worn valve.
- [Dr. Ali — Infective Endocarditis](#) - How a valve infection presents, and why a new leak prompts a check for it.
- [Dr. Ali — Surgical Valve Replacement](#) - Open-heart valve replacement — the operation a leak can follow, and the backup fix.



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## Sources Used to Build This Guide

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Every recommendation in this guide is grounded in one or more of the studies, guidelines, or trusted resources below. Short links are tracked so Dr. Ali can see which references patients are reading; nothing personally identifying is captured.

- [Cleveland Clinic — Paravalvular Leak \(Paravalvular Regurgitation\)](#) *[Patient Education]*  
Plain-language overview of leaks around a prosthetic valve, symptoms (heart failure, hemolysis), and percutaneous closure options.
- [Mayo Clinic — Heart Valve Disease & Prosthetic Valve Follow-up](#) *[Patient Education]*  
Patient-facing framing of valve disease, symptoms of a leaking valve, and why lifelong follow-up after valve replacement matters.
- [American Heart Association — Heart Valve Surgery Recovery and Follow-up](#) *[Patient Education]*  
Anchors paravalvular leak as a recognized complication after valve replacement and the follow-up that detects it.
- [2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease](#) *[Guideline]*  
Authoritative basis for when paravalvular leak warrants transcatheter closure vs reoperation and the Heart Team decision; supports transcatheter repair at experienced valve centers for symptomatic patients.
- [MedlinePlus \(NIH/NLM\) — Heart Valve Surgery](#) *[Patient Education]*  
NIH/NLM background on prosthetic valves to frame why leaks can occur at the sewing ring and how they present.
- [Okutucu et al. — Mitral Paravalvular Leak Closure: Transcatheter and Surgical Solutions \(Cardiovasc Revasc Med, 2019; via PubMed\)](#) *[Review]*  
PubMed-sourced review establishing PVL frequency (5-15% of mitral valve replacements), the incomplete sewing-ring-to-annulus seal mechanism, heart failure and hemolytic anemia consequences, and percutaneous closure as first-line therapy for most symptomatic patients.
- [Kalogeris et al. — Transcatheter Closure of Paravalvular Leak: Multicenter Experience and Follow-up \(Hellenic J Cardiol, 2021; via PubMed\)](#) *[Clinical Study]*  
PubMed-sourced multicenter outcomes: about 90% technical (device deployment) success and about 82% clinical success, with significant improvement in symptom class and hemolysis after transcatheter closure.
- [De Bruyn et al. — Hemolysis After Percutaneous Paravalvular Leak Repair \(Acta Clin Belg, 2016; via PubMed\)](#) *[Clinical Study]*  
PubMed-sourced account of the hemolysis mechanism — a metallic device plus high shear stress damaging red blood cells — explaining why a residual leak can drive anemia and (rarely) kidney injury.
- [Custodio-Sanchez et al. — Transcatheter Closure of Paravalvular Leaks: Short- and Medium-Term Outcomes \(Arch Cardiol Mex, 2020; via PubMed\)](#) *[Clinical Study]*  
PubMed-sourced single-center registry: device success in 95% of cases with at least one-grade regurgitation reduction; supports transcatheter closure as a sound alternative in high surgical-risk patients.



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## About This Guide

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**Version:** 2026-08-15

**Reviewer note:** Reviewed against Cleveland Clinic, Mayo Clinic, and AHA paravalvular-leak and prosthetic-valve pages. Ours adds: a clear around-not-through diagram, the two-mechanism split (heart-failure congestion vs hemolytic anemia), explicit infection (endocarditis) rule-out, a severity-to-action pathway, named transcatheter occluder devices, and PubMed-sourced closure success rates.

## Disclaimer

This guide is for educational purposes only and does not replace medical advice from your physician. Recommendations may not apply to every patient. Always follow the specific instructions of Dr. Ali and your care team. In an emergency call 911 or go to the nearest emergency department.



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