

Osteoarthritis

The slippery cushion inside the joint has worn away, leaving bone rubbing on bone.

THE STORY IN ONE SENTENCE

The slippery cushion inside the joint has worn away, leaving bone rubbing on bone.

“Osteoarthritis is when the cartilage cushion inside a joint wears down faster than the body can fix it, so bone rubs on bone.”

Normal anatomy — the body's job

Your joints are where two bones meet. A smooth, slippery cushion called cartilage covers the ends of the bones so they glide past each other without grinding. A thin lining called the synovium wraps the joint and makes a slippery oil (synovial fluid) to keep everything moving smoothly. Cartilage has no blood vessels, so it cannot really heal once it is damaged.

BODY'S JOB

Cartilage spreads out the load when you walk, run, or lift, and lets bones slide without friction. The synovium keeps the joint oiled. Together they protect the bone underneath and let you move pain-free.

1. Two bones meet to form a joint (like your knee or knuckle).
2. The ends of each bone are capped with smooth cartilage, like rubber coating on wire.
3. The synovium (a thin lining around the joint) makes synovial fluid, a slippery oil that keeps everything gliding.
4. When you move, the cartilage cushions the impact and spreads the weight evenly across the bone.
5. Because cartilage has no blood vessels, it gets its food by soaking up nutrients from the synovial fluid when you move.

What breaks

Years of use — plus a little background inflammation — wear the cartilage down faster than the body can fix it. The bone underneath thickens and grows lumpy bumps, trying to spread out the load.

CLINICAL TERM

Progressive loss of articular cartilage due to mechanical stress and low-grade inflammatory mediators (IL-1, TNF- α , matrix metalloproteinases). Subchondral bone undergoes sclerosis and osteophyte formation. Loss of cartilage integrity and joint space narrowing follow.

How the body compensates

The body tries to protect the damaged joint by stiffening it, thickening the bone underneath, and limiting how far you can move. These strategies buy time but cannot restore the lost cartilage.

1. {'what': 'Subchondral sclerosis (bone thickening)', 'why': 'The bone underneath the worn cartilage gets denser and harder, spreading out the impact so no single spot takes all the load.'}
2. {'what': 'Osteophyte formation (bone spurs)', 'why': 'The body grows bony lumps at the joint edges to increase the surface area and stabilize the wobbly joint, like adding training wheels.'}
3. {'what': 'Muscle guarding and reduced range of motion', 'why': 'Muscles around the joint tighten up to limit movement and prevent further damage. You unconsciously avoid positions that hurt.'}
4. {'what': 'Synovial a fluid collection (effusion) (joint swelling)', 'why': 'The synovium makes extra fluid to try to cushion and lubricate the damaged surfaces. This can cause visible swelling and stiffness.'}
5. {'what': 'Gait or posture changes', 'why': 'You shift your weight or walk differently to take pressure off the painful joint, which can overload other joints (like favoring one knee and hurting the hip on the other side).')}

Domino effect

1. Cartilage wears down faster than the body can fix it. — Years of mechanical stress — plus enzymes released by low-grade inflammation — break the cartilage matrix apart. Because cartilage has no blood vessels, it cannot heal; chondrocytes (cartilage cells) work too slowly to keep up.

2. The bone underneath thickens and grows bony bumps (osteophytes). — With less cartilage cushion, the subchondral bone takes more direct impact. It responds by getting denser (sclerosis) and growing spurs at the joint edges, trying to spread the load and stabilize the joint.
3. You feel pain when you move the joint; the pain gets better with rest. — Cartilage and bone have no pain nerves, but moving the damaged joint stresses the synovium, bone lining (periosteum), and ligaments around it — all of which do have nerves. Resting stops the stress, so the pain fades.
4. Morning stiffness lasts less than 30 minutes. — Overnight, synovial fluid drains out of the cartilage and the joint feels stiff. As soon as you start moving, the cartilage soaks up fluid again like a sponge, and the joint loosens up — usually in under 30 minutes (much shorter than the hour-plus stiffness of rheumatoid arthritis).
5. You hear grinding (crepitus) and feel bony knobs on your fingers. — Rough, worn cartilage surfaces grind against each other, making a crackling or crunching sound. Bone spurs (osteophytes) show up as hard lumps — Heberden nodes at the fingertips (distal interphalangeal joints) and Bouchard nodes at the middle knuckles (proximal interphalangeal joints).
6. The joint loses range of motion. — Bone spurs, thickened bone, cartilage fragments, and tight muscles physically block the joint from bending or straightening all the way.
7. In late disease, the joint twists out of line (malalignment). — The subchondral bone can collapse unevenly, especially if one side of the joint wears faster. The joint tilts — think of bow legs (genu varum) in knee OA — and cannot track straight anymore.
8. Every finding traces back to the same root: the cartilage cushion has worn away. — Pain, stiffness, grinding, bone bumps, limited motion, and twisting are all the body's attempts to protect and stabilize a joint that has lost its smooth, slippery cushion. The findings are not random — they are survival strategies.

Symptoms · what the patient feels, and why

- Pain in big joints — hips, knees, hands, or lower back: The protective cushion at the end of each bone (cartilage) wears thin over years of use. Once the cushion is mostly gone, bone rubs on bone inside the joint, which triggers pain.
- Joint stiffness that loosens after you move around: When the joint sits still, fluid inside thickens like cold honey, and small bits of worn cartilage settle. Moving the joint pumps fresh fluid through and clears the debris, so stiffness usually lasts less than 30 minutes.
- Pain that gets worse as the day goes on or after you use the joint a lot: Each time you walk, climb stairs, or grip something, the worn joint surfaces press together. By evening, the lining of the joint is irritated and swollen from all that friction, so pain climbs higher.

- Hard, bony bumps on finger joints — Heberden nodes at the tips or Bouchard nodes in the middle: As cartilage wears away, the bone underneath tries to repair itself but grows extra bone in the wrong places, forming lumps you can see and feel on the sides of the joints.
- Pain at the base of the thumb that makes pinching and gripping hard: The small saddle-shaped joint at the base of the thumb (the carpometacarpal joint) takes a beating every time you pinch or twist. Cartilage there wears out, so the bones grind and the joint aches.
- Joint swelling that feels firm, not squishy: The bone edges thicken and extra fluid collects inside the joint capsule (the sac that wraps the joint). The swelling is firm because it is a mix of bone growth and thick fluid, not pure liquid.
- A grinding or crunching feeling (crepitus) when you move the joint: Rough, pitted bone surfaces scrape against each other where smooth cartilage used to glide. You feel and sometimes even hear the gritty friction as the joint moves.
- Loss of range — you cannot bend or straighten the joint as far as before: Bony spurs grow at the edges of the joint, and the capsule around it tightens. Both changes physically block the joint from moving through its full arc.

Focused exam

- Joint line tenderness and bony lumps — Heberden nodes on the fingertips, Bouchard nodes on the middle knuckles: These bumps are bone thickening where cartilage has worn away. They prove the wear has been going on for months or years, not days.
- Pain with movement that gets better with rest — move the knee and it hurts, sit still and it feels better: This is the core signal that cartilage wear is the problem. Movement grinds bone on bone. Rest lets swelling calm down.
- Morning stiffness that lasts less than 30 minutes and loosens up as you move: Overnight, fluid pools in the joint. Moving pumps it out. This is low-grade swelling, not the severe swelling of rheumatoid arthritis.
- A crackling feel or sound (Crepitus) — a grinding, clicking, or popping sound when the joint moves: Rough bone rubbing on rough bone makes noise. This tells you cartilage is already worn down.
- Limited range of motion — the joint does not bend or straighten as far as it should: Bone thickening and swelling physically block movement. Osteoarthritis makes joints stiffer over time.
- Joint looks normal size, no huge swelling, but the patient winces when you move it: Osteoarthritis causes pain without bright red swelling. This separates it from rheumatoid arthritis or infection.

Diagnostics · every test answers a question

- X-ray of the painful joint (knee, hip, hand) → Has the cartilage worn down? Is bone thickening?
- Red blood cell (Erythrocyte) sedimentation rate (ESR) and C-reactive protein (CRP) → Is there whole-body inflammation like in rheumatoid arthritis?
- Rheumatoid factor (RF) and anti-CCP antibody → Is the immune system attacking the joints?
- Joint aspiration (synovial fluid analysis) if there is swelling → Is there infection or gout causing the pain?
- MRI of the joint (only if X-ray is normal but pain is severe) → Is there early cartilage damage or a hidden fracture?

Treatment logic

- Weight loss and low-impact exercise (swimming, water aerobics, biking) → Reduces the load pressing down on worn cartilage and slows further wear. Strengthens muscles around the joint so they absorb shock instead of bone.
- Acetaminophen or NSAIDs (ibuprofen, naproxen, diclofenac) → Blocks pain signals and reduces the low-grade swelling that speeds up cartilage breakdown.
- Topical NSAIDs (diclofenac gel) or capsaicin cream on the painful joint → Reduces swelling and pain signals in hands, knees, and other surface joints without stomach, kidney, or heart risk.
- Intra-articular corticosteroid injection (triamcinolone, methylprednisolone) → Reduces swelling inside the joint so movement hurts less for weeks to months.
- Intra-articular hyaluronic acid injection (viscosupplementation) → Adds slippery fluid so bones glide better and pain with movement drops for weeks to months.
- Duloxetine (an SNRI antidepressant that blocks pain) → Turns down pain signals in the spinal cord and brain so movement hurts less, even though the cartilage is still worn.
- Joint replacement surgery (total knee arthroplasty, total hip arthroplasty) → Removes the worn bone and cartilage and puts in a metal or plastic joint that moves smoothly and does not hurt.

Medications

Acetaminophen (Tylenol) · Non-opioid pain reliever

Acetaminophen turns down pain signals in the brain and spinal cord. It does NOT fix the worn cartilage or stop swelling in the joint — it just makes the pain feel less sharp so you can move more comfortably.

1. You swallow the pill and it enters your bloodstream.
2. It travels to your brain and spinal cord.
3. It blocks enzymes (called COX-2 in the central nervous system) that help create pain signals.
4. With fewer pain signals reaching your awareness, the ache feels milder.
5. It does NOT reduce swelling in the joint itself — it only dims the brain's alarm about the pain.

SAFETY WATCH

Taking more than 3,000 mg per day (or 4,000 mg in some guidelines) can damage your liver, especially if you drink alcohol regularly. · Many cold and headache medicines already contain acetaminophen — always check labels so you do not accidentally double up. · If you have liver disease, ask your doctor before using acetaminophen.

NSAIDs (ibuprofen, naproxen) · Non-steroidal anti-inflammatory drugs

NSAIDs block an enzyme called COX (cyclooxygenase) all over your body. COX makes prostaglandins — chemicals that trigger swelling, heat, and pain in the joint. By stopping COX, NSAIDs lower the swelling and pain in the worn joint.

1. You swallow the pill (or rub a gel into the skin over the joint).
2. The drug enters your bloodstream.
3. It blocks the COX-1 and COX-2 enzymes in many tissues.
4. With less COX activity, your body makes fewer prostaglandins.
5. Less prostaglandin means less swelling, warmth, and pain in the joint.
6. Because COX is also in the stomach and kidneys, blocking it there can cause side effects.

SAFETY WATCH

Can irritate or cause ulcers in your stomach and intestines — take with food if possible. · Can raise blood pressure and increase the risk of heart attack or stroke, especially with long-term use or high doses. · Can harm your kidneys, especially if you are older, dehydrated, or already have kidney disease. · Topical NSAIDs (gels or creams rubbed onto the skin) are safer for your stomach and heart because less gets into your bloodstream.

Topical NSAIDs (diclofenac gel) · Non-steroidal anti-inflammatory drug, applied to the skin

You rub the gel directly onto the painful joint. The medicine soaks through the skin and blocks COX enzymes in the joint tissue below, lowering swelling and pain right where you need it. Very little gets into the rest of your body, so it is gentler on your stomach, heart, and kidneys than pills.

1. You rub the gel onto clean, dry skin over the sore knee, hand, or other joint.
2. The drug soaks through the skin layers.
3. It reaches the inflamed tissue around the joint and blocks COX enzymes there.
4. With less COX, fewer prostaglandins are made locally, so swelling and pain drop.
5. Because only a tiny amount enters your bloodstream, your stomach and kidneys are largely spared.

SAFETY WATCH

Can cause mild skin irritation, rash, or itching where you apply it. · Do NOT use on broken or infected skin. · Still carries a small risk of stomach, heart, or kidney problems if you use large amounts over big areas for a long time, but much lower than pills. · Wash your hands after applying so you do not accidentally get it in your eyes.

Duloxetine (Cymbalta) · Serotonin-norepinephrine reuptake inhibitor (SNRI); chronic pain modulator

Duloxetine raises the levels of two brain messengers — serotonin and norepinephrine — in your spinal cord. These messengers help the spinal cord's own pain-blocking system work better, so pain signals from the joint get turned down before they reach your brain. It does NOT fix the joint itself; it changes how your nervous system reads the pain.

1. You swallow the capsule once or twice a day.
2. Duloxetine enters your bloodstream and crosses into your brain and spinal cord.
3. Normally, nerve cells quickly recycle serotonin and norepinephrine after releasing them. Duloxetine blocks that recycling.

4. With more serotonin and norepinephrine staying in the gaps between nerve cells, the spinal cord's natural pain-blocking pathways become stronger.
5. Pain signals traveling up from the joint are dampened, so you feel less pain even though the joint damage is the same.

SAFETY WATCH

Can cause nausea, dry mouth, drowsiness, or trouble sleeping — starting at a low dose and taking it with food can help. · Do NOT stop suddenly; your doctor will taper the dose slowly to avoid withdrawal symptoms like dizziness or brain zaps. · Can raise blood pressure slightly — check your blood pressure regularly. · Rarely can increase thoughts of suicide, especially in young adults — tell your doctor right away if your mood worsens. · Not safe to combine with MAO inhibitors or certain other antidepressants because of the risk of serotonin syndrome (a dangerous spike in serotonin).

Intra-articular corticosteroid injection (triamcinolone, methylprednisolone) · Steroid (glucocorticoid) injected into the joint

A doctor injects a strong anti-swelling medicine directly into the painful joint. The steroid shuts down many of the immune cells and chemical messengers (like cytokines) that cause inflammation and pain inside the joint. Relief usually lasts weeks to months, but the cartilage damage itself is not repaired.

1. The doctor cleans the skin and numbs the area, then uses a needle to inject the steroid into the joint space.
2. The steroid spreads through the synovial fluid (the slippery liquid inside the joint).
3. It enters immune cells (like macrophages) and other cells lining the joint.
4. Inside those cells, the steroid turns off genes that make inflammatory chemicals (prostaglandins, cytokines, enzymes that break down cartilage).
5. With less inflammation, swelling, warmth, and pain drop quickly — often within a few days.
6. The effect fades over weeks to months as the steroid is gradually absorbed and cleared.

SAFETY WATCH

Can cause a brief flare of pain and swelling in the first day or two after the shot (called a steroid flare). · Small risk of infection in the joint — the doctor uses sterile technique to prevent this. · Repeated injections (more than three or four per year) may weaken tendons, ligaments, and cartilage over time. · Can raise blood sugar temporarily if you have diabetes. · The injection itself can be uncomfortable, but numbing medicine is usually given first.

Intra-articular hyaluronic acid injection (viscosupplementation; Synvisc, Hyalgan, Euflexxa) · Viscosupplement (joint lubricant)

A doctor injects a thick, gel-like fluid (hyaluronic acid) into the joint. Healthy joints naturally make this slippery substance to cushion and lubricate movement. In osteoarthritis, the joint fluid becomes thinner and less protective. The injection temporarily adds back that cushion, which may ease pain and improve movement for a few months. Evidence is mixed — some people feel better, others notice little difference.

1. The doctor cleans and numbs the skin, then injects the hyaluronic acid gel into the joint.
2. The gel mixes with the thin, worn-out joint fluid.
3. It acts as a shock absorber and lubricant, making movement smoother and less painful.
4. It may also have mild anti-inflammatory effects, though the main benefit is mechanical cushioning.
5. The effect lasts a few months, then the body slowly breaks down and absorbs the gel.
6. Some people need a series of injections (three to five, one week apart); others get a single-shot formulation.

SAFETY WATCH

Can cause temporary pain, swelling, warmth, or stiffness in the joint after the injection. · Very small risk of infection (same as any joint injection). · Rarely, people have an allergic reaction if the product is made from rooster combs (avian source) — synthetic versions are available. · Not covered by all insurance plans because evidence of benefit is inconsistent.

Capsaicin cream (topical) · Topical analgesic (pain reliever rubbed onto the skin)

Capsaicin is the chemical that makes chili peppers hot. When you rub it onto the skin over a sore joint, it first causes a burning or stinging feeling. With repeated use, it depletes substance P — a chemical that pain nerves use to send hurt signals to the spinal cord. Once substance P runs low, the pain messages quiet down.

1. You rub a small amount of capsaicin cream onto clean, dry skin over the painful joint.
2. Capsaicin binds to TRPV1 receptors on the tips of pain nerves in the skin.
3. At first, this causes a burning sensation and releases substance P.
4. With regular use (three to four times a day), the nerve endings run out of substance P.
5. Without substance P, the nerves cannot send pain signals as strongly, so the joint feels less sore.
6. It takes one to two weeks of consistent use to feel the full benefit.

SAFETY WATCH

Causes burning, stinging, or warmth on the skin for the first few days — this usually fades with continued use. · Wash your hands thoroughly after applying so you do not accidentally touch your eyes, nose, or mouth. · Do NOT use on broken, irritated, or freshly shaved skin. · Do NOT use with a heating pad, as this can cause severe burns. · If the burning is too uncomfortable, try starting with a lower-strength cream or applying it less often at first.

Red flags

- Sudden, severe joint pain or swelling in one joint that comes on in hours — may be infection or gout instead.
- Fever, night sweats, or unexplained weight loss — raises concern for infection or a different type of arthritis.
- Numbness, tingling, or weakness below the painful joint — suggests a nerve is being pinched and needs urgent evaluation.
- Joint pain plus a new rash, eye redness, or belly symptoms — points toward autoimmune arthritis, not osteoarthritis.
- Pain so bad that it wakes you from sleep or keeps you from walking — may need joint replacement surgery soon.

Nursing priorities

1. Assess pain level using a 0-to-10 scale and ask which joints hurt most during movement and rest. — Osteoarthritis pain comes from bone rubbing on bone without cartilage cushion; tracking pain patterns helps separate it from inflammatory arthritis and guides treatment intensity.
2. Check the affected joints for bony lumps called Heberden nodes (finger tips) and Bouchard nodes (middle finger joints) and check if the thumb base is swollen. — These hard bony bumps form when cartilage is gone and bone grows abnormally; they confirm osteoarthritis and differentiate it from rheumatoid arthritis, which causes soft, squishy swelling.
3. Teach the patient to lose weight if overweight and start low-impact exercise like swimming, water aerobics, or cycling. — Every pound of body weight puts four pounds of pressure on the knee joint; losing weight reduces cartilage stress and exercise strengthens muscles that support damaged joints without pounding them.
4. Give acetaminophen (Tylenol) up to 3,000 mg per day or NSAIDs like ibuprofen or naproxen as ordered, and teach the patient to take NSAIDs with food. — Acetaminophen blocks pain signals in the brain; NSAIDs reduce prostaglandins (chemicals that cause pain and swelling) but can cause stomach bleeding if taken on an empty stomach.

5. Apply topical NSAID gel (diclofenac) or capsaicin (hot pepper) cream to painful joints and teach the patient to wash hands after applying. — Topical NSAIDs soak through skin to block prostaglandins in the joint without stomach side effects; capsaicin depletes substance P (a pain chemical in nerves) but burns if it touches eyes or mucous membranes.
6. Assist with intra-articular (inside the joint) steroid or hyaluronic acid injections and monitor for increased pain, redness, or fever after the procedure. — Steroids reduce inflammation inside the joint space for weeks to months; hyaluronic acid acts like synthetic joint fluid to cushion bones; infection after injection is rare but dangerous and needs immediate antibiotics.
7. Teach the patient about duloxetine (Cymbalta), an antidepressant that treats chronic osteoarthritis pain, and explain it may take two to four weeks to work. — Duloxetine increases serotonin and norepinephrine (brain chemicals) that block pain signals traveling up the spinal cord; it helps when acetaminophen and NSAIDs do not control pain enough.
8. Educate the patient about joint replacement surgery (arthroplasty) for hip or knee if pain limits daily life despite medicines and injections. — When cartilage is completely gone and bone grinds on bone, the joint cannot heal itself; replacing the joint with metal and plastic parts is the only way to stop pain and restore function.

Sources

- American College of Rheumatology (ACR) 2019 osteoarthritis guideline
- Osteoarthritis Research Society International (OARSI) 2019 guideline
- Cochrane systematic reviews on osteoarthritis
- American Academy of Orthopaedic Surgeons (AAOS) 2021 knee osteoarthritis guideline

Last reviewed: 2026-07-07