

Cord compression

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THE STORY IN ONE SENTENCE

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“Cord compression is a race against the clock: get an MRI within hours, start dexamethasone (a strong steroid to shrink swelling), and either cut the pressure off with surgery or blast it with radiation—all in under 24 hours—or the person may never walk again.”

Normal anatomy — the body's job

The spinal cord is a soft cable of nerve tissue that runs down the center of your backbone, inside a narrow bony tunnel made by stacked vertebrae (the bones of your spine). It carries every electrical signal from your brain down to your legs, bladder, bowel, and skin below your neck. Think of it like the main power and data line for the lower half of your body.

BODY'S JOB

The cord's job is to send movement commands from your brain down to your leg muscles so you can walk, and to carry feeling signals (touch, pain, temperature) from your skin back up to your brain so you know what is happening. It also runs the automatic nerves that tell your bladder when to squeeze and empty, and your bowel when to hold or release. All these signals travel up and down the cord in organized lanes—motor lanes for movement, sensory lanes for feeling, and autonomic lanes for bladder and bowel control.

1. Your brain decides to move your leg and sends an electrical signal down the motor lane of the spinal cord, like a wire carrying current.
2. The signal exits the cord at the right level in your lower back (the lumbar spine) and jumps to the nerve that plugs into your leg muscle.
3. Your leg muscle contracts and you take a step.

4. At the same time, sensors in your skin pick up pressure or temperature and send that signal back up the sensory lane of the cord to your brain, so you feel the ground under your foot.
5. Automatic nerve fibers in the cord also control your bladder: when it fills, stretch sensors send a message up the cord to your brain (the signal to pee), and when you are ready, your brain sends a command back down the cord to squeeze the bladder and relax the valve, so you empty.
6. All these messages flow smoothly because the cord sits safe inside its bony tunnel, cushioned by discs (soft pads between the bones) and bathed in spinal fluid.

What breaks

Something grows, swells, bleeds, or breaks inside the narrow bony tunnel around the spinal cord and squeezes it. The squeeze cuts off the nerve signals trying to travel up and down the cord, like stepping on a hose and stopping the water flow.

CLINICAL TERM

Spinal cord compression: an external mass (tumor, abscess, a pooled collection of blood (hematoma), herniated disc, or fractured vertebra with bone fragments) compresses the spinal cord within the spinal canal, causing starved blood flow (ischemia) (not enough oxygen reaching the nerve tissue), direct mechanical injury to nerve fibers, and interruption of ascending sensory tracts and descending motor tracts.

How the body compensates

The body does not have good ways to fix a squeezed spinal cord on its own. The reflexes below the injury may spike (hyperreflexia) because the brake signals from the brain are cut off, and the area around the injury swells in an attempt to protect itself—but this swelling actually makes the squeeze worse. Blood pressure may stay normal for a while because the compression is local, not a whole-body shock, so vital signs can look fine even as the cord is dying. The key is to catch the problem in the narrow window before permanent nerve death, because once the nerve cells in the cord run out of oxygen and die, no amount of decompression will bring them back.

1. The squeeze cuts off blood flow (ischemia) to the spinal cord nerve cells, so they start running out of oxygen within minutes to hours.
2. The body tries to protect the injury site by sending immune cells and fluid, which causes swelling (edema) around the cord—but because the spinal canal is a rigid bony tube with no room to expand, the swelling actually increases the pressure and makes the starved blood flow (ischemia) worse, creating a vicious cycle.

3. Reflexes below the level of the injury become exaggerated (hyperreflexia, positive Babinski sign) because the upper motor neuron signals from the brain that normally calm those reflexes are blocked by the compression—so the reflex arcs in the spinal cord fire without any brakes.
4. Blood pressure and heart rate often stay in the normal range because the compression is a local spinal problem, not a systemic circulation collapse—this is the dangerous middle, because the patient can look stable on the monitor while the spinal cord is quietly dying.
5. The patient may still have some strength or feeling at first (incomplete compression), which is a good sign—but if the pressure is not relieved quickly, the partial blockage progresses to complete paralysis and permanent numbness within hours to days.
6. Pain is often severe and worse when lying flat, because lying down increases pressure in the spinal veins and pushes more fluid into the already tight canal—this positional worsening is a red-flag clue that something is squeezing the cord.
7. There is no compensation that buys meaningful time—the window to save the cord is roughly 24 to 48 hours from the start of symptoms, and every hour of delay cuts the chance of recovery.

Domino effect

1. A mass (tumor, abscess, blood clot, herniated disc, or fractured bone) grows or swells inside the tight bony tunnel of the spinal canal and starts pressing on the spinal cord. — The spinal canal is a fixed, narrow space with no room to stretch, so any new mass immediately starts squeezing the soft nerve tissue of the cord, like a hand closing around a garden hose.
2. The squeeze compresses the tiny blood vessels (capillaries and venules) that feed oxygen and glucose to the spinal cord nerve cells, causing starved blood flow (ischemia) (not enough blood flow). — The nerve cells in the cord have a very high energy need and no backup oxygen supply, so even a few hours of reduced blood flow starts killing them, especially in the center of the cord where blood flow is weakest.
3. The blood-starved (ischemic) nerve cells swell and release inflammatory chemicals, which triggers more swelling (vasogenic swelling (edema)) in the tissue around the injury, further increasing pressure inside the canal. — This creates a vicious cycle: the original squeeze causes starved blood flow (ischemia), starved blood flow causes swelling, and the swelling makes the squeeze worse, accelerating nerve cell death.
4. The descending motor tracts (the nerve highways carrying movement commands from the brain down to the legs) are cut off, so electrical signals cannot reach the leg muscles, causing weakness (paresis) or complete paralysis (plegia) in both legs below the level of compression. — Motor signals travel down specific lanes in the cord (the corticospinal tracts), and when those lanes are squeezed shut, the brain's commands never reach the muscles—like cutting a power line.

5. The ascending sensory tracts (the highways carrying touch, pain, temperature, and position sense from the body up to the brain) are also blocked, causing numbness, tingling, or a sharp change in feeling at the level of the squeeze (a sensory level). — Sensory signals traveling up the cord hit the compression and stop, so everything below that point goes numb or feels wrong—patients often describe a tight band around the chest or belly at the exact level where the cord is squeezed.
6. The autonomic nerve fibers that control the bladder detrusor muscle (the muscle that squeezes to empty the bladder) and the urethral sphincter (the valve that holds urine in) are disrupted, causing urinary retention (cannot pee) or incontinence (leaking), and the same happens to the bowel. — Bladder and bowel control depend on coordinated signals traveling up and down the cord; when the cord is compressed, those signals are cut off, so the bladder cannot empty on command or the sphincter cannot hold, and stool may leak too.
7. The saddle area (the skin around the bottom, genitals, and inner thighs—shaped like the area that touches a horse saddle) loses feeling (saddle anesthesia), which is a red-flag sign of severe compression low in the spine (cauda equina syndrome) or a very low cord injury. — The nerves that serve this area exit the very bottom of the spinal canal, so if they are squeezed, the first clue is often numbness in this saddle distribution, along with bladder and bowel trouble.
8. Reflexes below the injury become exaggerated (hyperreflexia, brisk knee and ankle jerks, positive Babinski sign with the big toe going up instead of down) because the upper motor neuron brake signals from the brain are cut off, leaving the spinal reflex arcs firing without control. In the first hours, muscles may be flaccid (floppy) instead, a phase called spinal shock. — Normally the brain sends inhibitory signals down the cord to calm reflexes; when the cord is compressed, those brake signals stop, so reflexes overshoot—or in the very early phase, the whole reflex system shuts down temporarily (spinal shock) before the overactive reflexes (hyperreflexia) kicks in.
9. If the compression is not relieved within roughly 24 to 48 hours, the blood-starved (ischemic) nerve cells in the cord die permanently (infarction), the injury becomes irreversible, and the person is left with permanent paralysis, numbness, and loss of bladder and bowel control. — Spinal cord nerve cells cannot regrow or recover once they die from lack of oxygen, so the window to save function is very narrow—every hour of delay increases the chance of permanent disability, which is why cord compression is always treated as a true emergency requiring imaging (MRI), steroids (dexamethasone to reduce swelling), and urgent decompression (surgery or radiation) within one day.

Symptoms · what the patient feels, and why

- Back pain that gets worse when lying down or at night: The tumor or swelling is pressing directly on the spinal cord or the nerves coming off it, and when you lie flat, gravity no longer pulls the pressure away — the squeeze stays constant and pain signals fire more strongly.
- Numbness or tingling in the legs, feet, or around the groin and buttocks: The compressed spinal cord or nerve roots can no longer carry normal touch and position signals up to the brain, so you feel pins-and-needles or lose sensation in the areas those nerves serve.
- Weakness in one or both legs: The motor signals traveling down the spinal cord from the brain to the leg muscles are blocked or slowed by the compression, so the muscles cannot contract as strongly — like a kinked garden hose cutting water flow.
- Trouble walking or clumsiness, stumbling more than usual: Because the legs are weak and the spinal cord is not sending clear position signals, the brain cannot coordinate balance and smooth movement — your legs do not know exactly where they are in space.
- Loss of bladder control (cannot hold urine) or bowel control (cannot hold stool): The nerves at the lower end of the spinal cord control the sphincter muscles that hold urine and stool in; when those nerves are squeezed, the brain loses the ability to keep those gates shut.
- A tight band-like feeling around the chest or belly: The spinal cord carries sensation signals from the torso, and when it is compressed the nerves misfire — the brain reads this confused signal as a squeezing or wrapping sensation even though nothing is actually wrapped around you.
- Electric-shock sensations down the spine or into the arms or legs when bending the neck forward: Flexing the neck stretches an already-compressed spinal cord and the irritated nerve fibers fire all at once, sending a jolt of abnormal signals — this is called Lhermitte sign and shows the cord is under pressure.
- Sexual dysfunction (trouble getting or keeping an erection, or loss of genital sensation): The sacral nerves at the very bottom of the spinal cord control blood flow and sensation to the genitals; compression higher up interrupts those pathways, so arousal signals and reflexes do not work normally.

Focused exam

- Motor strength in both legs (ask the patient to lift each leg, push against your hand, and wiggle their toes): Weakness in both legs at the same time means the spinal cord itself is being squeezed, not just one nerve root. The cord carries all the movement signals from the brain down to the legs, so when it's compressed those signals can't get through and both legs go weak together.

- Sensation level (use a safety pin or your finger and move up from the feet until the patient says they can feel normally): Finding a line across the body where feeling changes — normal above, numb or tingly below — tells you exactly which spinal level is being squeezed. The spinal cord sends feeling signals from each body zone up through specific levels, so the cutoff line maps directly to the compressed spot.
- Deep tendon reflexes with a reflex hammer (tap the knee and ankle tendons): Brisk or hyperactive reflexes mean the upper motor neurons in the spinal cord are irritated by the squeeze, so they fire too easily. If reflexes are absent, the cord has been compressed long enough that the nerves are starting to die. Either pattern confirms cord injury.
- Rectal tone (gently insert a gloved finger and ask the patient to squeeze): Loose or absent rectal tone means the sacral nerves at the very bottom of the spinal cord are pinched. These nerves also control the bladder and bowel, so losing tone here is a red flag that the whole lower cord is compressed and the patient may lose bladder and bowel control permanently if you wait.
- Post-void residual with bladder scanner or straight catheter (measure urine left in the bladder right after the patient tries to pee): More than 100 mL left behind means the bladder nerves are pinched and the bladder muscle can't squeeze all the way. This is one of the earliest and most sensitive signs of spinal cord compression, often appearing before legs go completely weak.
- Perianal sensation (touch the skin around the anus with a cotton swab or finger and ask if the patient feels it): Numbness in the saddle area (the skin that would touch a bike seat) means the sacral nerve roots are compressed. Because these nerves sit at the lowest part of the spinal canal, saddle anesthesia is the last zone to go numb as compression moves down the cord, and it signals that bladder and bowel control are about to fail if they haven't already.

Diagnostics · every test answers a question

- MRI of the entire spine with and without gadolinium contrast → What is squeezing the spinal cord, where exactly is it, and how many levels are involved?
- Complete blood count (CBC) with differential → Is there infection or blood loss?
- Red blood cell (Erythrocyte) sedimentation rate (ESR) and C-reactive protein (CRP) → Is inflammation or infection driving the compression?
- Blood cultures × 2 sets from separate sites → If infection is suspected, what bacteria are in the bloodstream?
- Serum calcium and alkaline phosphatase → Is bone being destroyed by cancer or metabolic disease?

- Post-void residual volume by bladder ultrasound or catheter → Can the patient empty their bladder, or are the bladder nerves already pinched?

Treatment logic

- Dexamethasone 10 mg IV immediately, then 4 mg IV every 6 hours → Dexamethasone is a powerful steroid that shrinks swelling (edema) in the tissue around the compressed spinal cord. The swelling itself squeezes nerve fibers and blocks blood flow, so shrinking it takes pressure off the cord and lets oxygen and signals get through again. Patients often regain some leg strength and sensation within 12 to 24 hours.
- Urgent MRI of the entire spine (cervical, thoracic, lumbar) with and without contrast within 4 hours → MRI shows exactly what is compressing the cord (tumor, abscess, a pooled collection of blood (hematoma), disc herniation, fractured bone), where it is (which vertebral level), and how bad the squeeze is. Imaging the whole spine catches skip lesions (cancer or infection at multiple levels) that you would miss if you only scanned the painful spot. Knowing the cause and location lets the surgical and radiation teams plan the right procedure.
- Emergency neurosurgery or orthopedic spine consult (page immediately, do not wait for morning rounds) → Surgical decompression within 24 hours removes the mass, bone fragments, blood clot, or bulging disc pressing on the cord, and it may also stabilize a broken or crumbling vertebra with rods and screws. Releasing the pressure stops ongoing nerve death and gives the spinal cord a chance to heal. Studies show that surgery within 24 hours of losing leg strength improves the odds of walking again.
- Radiation therapy (10 to 14 daily treatments or a single high dose) if the tumor is radiosensitive or the patient cannot tolerate surgery → Radiation shrinks tumors that are sensitive to X-rays (lymphoma, multiple myeloma, small cell lung cancer, prostate cancer, breast cancer), which gradually releases the squeeze on the cord over 1 to 3 weeks. For patients too sick for surgery or with cancer in bones that would crumble if cut, radiation is the main treatment. It also kills microscopic cancer cells left behind after surgery.
- Indwelling Foley catheter or intermittent straight catheterization every 4 to 6 hours → When spinal cord compression damages the sacral nerves, the bladder cannot empty on its own and urine backs up into the kidneys, causing hydronephrosis (kidney swelling) and infection. A catheter drains the bladder completely, protecting kidney function and preventing urinary tract infections and bladder rupture while you treat the cord compression.

- Pharmacologic venous thromboembolism prevention (prophylaxis) (enoxaparin 40 mg subcutaneous daily or heparin 5000 units subcutaneous every 8 hours) plus sequential compression devices on both legs → Patients with spinal cord compression and leg weakness cannot move their legs, so blood pools in the deep veins and forms clots (deep vein clot formation (thrombosis)). These clots can break off and travel to the lungs (pulmonary a traveling clot lodging in a vessel (embolism)), heart (myocardial tissue death from blocked blood flow (infarction)), or brain (stroke), all of which can kill the patient. Anticoagulation thins the blood just enough to prevent clots from forming, and compression devices squeeze the calves to keep blood moving.
- Empiric intravenous antibiotics (vancomycin 15 mg/kg every 12 hours plus ceftriaxone 2 g daily or cefepime 2 g every 8 hours) if spinal epidural abscess is suspected → Broad-spectrum antibiotics kill the bacteria growing in the abscess (most often *Staphylococcus aureus*, including MRSA, or gram-negative rods) and prevent the infection from spreading into the bloodstream (sepsis) or deeper into the spinal cord itself. Starting antibiotics within hours stops the infection from destroying more bone and nerve tissue while you arrange surgical drainage.

Medications

Dexamethasone · Corticosteroid (a strong anti-swelling medicine)

Dexamethasone calms down the immune system's alarm response and shrinks swelling (edema) around the squeezed spinal cord. When a tumor, blood clot, or infection presses on the cord, the tissue around it puffs up like a bruise, making the squeeze worse. Dexamethasone tells the body to stop sending fluid and immune cells to that spot, which takes pressure off the cord and protects the nerve fibers from dying.

1. Dexamethasone enters cells in the spinal cord area and binds to receptors (landing spots) inside them.
2. It turns off genes that make swelling chemicals like cytokines and prostaglandins.
3. Blood vessels tighten slightly and stop leaking as much fluid into the surrounding tissue.
4. Swelling shrinks, so the cord has more room and gets better blood flow.
5. Nerve cells are less likely to die from low oxygen and pressure damage.

SAFETY WATCH

High blood sugar: Dexamethasone can spike glucose, so check levels in people with diabetes. · Infection risk: It weakens the immune system, so watch for fever or new infections (especially if an abscess is possible—get imaging first). · Stomach irritation: Can cause ulcers or bleeding; give with food or a stomach-protecting medicine if used for more than a few days. · Mood changes: Some people feel jittery, anxious, or have trouble sleeping. · Do NOT stop suddenly after several days—taper the dose down to let the adrenal glands (glands above the kidneys that make natural cortisol) wake back up.

Enoxaparin (Lovenox) or Heparin · Anticoagulant (blood-thinner)

Cord compression forces people to lie still, which slows blood flow in the legs and raises the risk of a clot in a deep leg vein (deep vein thrombosis) (DVT—a clot in a leg vein) and pulmonary embolism (a clot lodging in a lung artery) (PE—a clot that travels to the lungs). Enoxaparin blocks Factor Xa, a protein in the clotting chain, so blood stays runny enough to keep moving and clots do NOT form.

1. Enoxaparin is injected under the skin and enters the bloodstream.
2. It grabs onto antithrombin (a natural brake on clotting) and supercharges it.
3. Antithrombin then blocks Factor Xa, a key step in making fibrin (the mesh that forms clots).
4. Blood stays fluid, so clots do NOT form in slow-moving veins.

SAFETY WATCH

Bleeding risk: Watch for blood in urine, stool, or unusual bruising. Use carefully if surgery is planned soon. · Spinal a pooled collection of blood (hematoma): If a patient gets a spinal tap or epidural catheter, enoxaparin raises the risk of bleeding into the spinal canal (which can cause new cord compression). Time doses carefully around procedures. · Kidney function: Dose must be lowered if kidneys are weak (creatinine clearance below 30 mL/min). · Platelet count: Rarely causes heparin-induced a low platelet count (thrombocytopenia) (HIT—platelets drop and clotting paradoxically increases); check count after a few days.

Opioid analgesics (e.g. Morphine, Oxycodone, Hydromorphone) · Opioid pain reliever

Cord compression often causes severe back or nerve pain because pressure on the cord and nerve roots sends alarm signals up to the brain. Opioids latch onto receptors (landing spots) in the spinal cord and brain that gate pain messages, turning down the volume so the person feels less hurt and can rest or tolerate movement during transport and treatment.

1. The opioid enters the bloodstream and crosses into the spinal cord and brain.

2. It binds to mu-opioid receptors on nerve cells.
3. These receptors close calcium channels and open potassium channels, which makes nerves less likely to fire.
4. Pain signals are blocked before they reach the brain, and the brain's alarm reaction is muffled.
5. The patient feels relief and can cooperate with imaging, transport, or positioning for surgery.

SAFETY WATCH

Breathing suppression: High doses can slow or stop breathing, especially in older adults or if mixed with sedatives. Monitor closely. · Constipation: Almost everyone gets constipated; start a bowel regimen (stool softener and stimulant laxative) right away. · Sedation: Can make patients drowsy, which may hide changes in neurologic exam (weakness, numbness). Use the lowest dose that controls pain. · Nausea: Common at first; often improves after a day or two. Anti-nausea medicine may help. · Dependence and withdrawal: If used for more than a few days, taper off slowly rather than stopping suddenly.

Ondansetron (Zofran) or Metoclopramide (Reglan) · Antiemetic (anti-nausea medicine)

Cord compression itself, high-dose dexamethasone, opioid pain medicine, and the stress of the illness can all trigger nausea and vomiting. Ondansetron blocks serotonin receptors (type 5-HT₃) in the gut and the brainstem's vomiting center (the area postrema), stopping the signal that makes you throw up. Metoclopramide blocks dopamine receptors in the same center and also speeds up stomach emptying.

1. Ondansetron or metoclopramide enters the bloodstream and reaches the brainstem.
2. Ondansetron plugs 5-HT₃ serotonin receptors, blocking the 'time to vomit' signal.
3. Metoclopramide plugs D₂ dopamine receptors and also makes the stomach squeeze and empty faster.
4. Nausea fades, and the patient can take medicine by mouth and stay hydrated.

SAFETY WATCH

QT prolongation (ondansetron): Can rarely cause a dangerous heart rhythm if the patient already has a long QT interval on ECG or takes other QT-prolonging drugs. Use cautiously in heart patients. · Extrapyramidal symptoms (metoclopramide): Can cause muscle stiffness, restlessness, or involuntary movements, especially in young adults and with longer use. Avoid in Parkinson disease. · Constipation (ondansetron): Can worsen opioid-induced constipation. · Serotonin syndrome (rare): If combined with other serotonin-boosting drugs (e.g. SSRIs, tramadol), watch for agitation, fast heart rate, and muscle twitching.

Red flags

- New inability to hold urine or stool, or not feeling the urge to go
- Sudden weakness in both legs or legs giving out when trying to stand
- Numbness spreading into the groin, buttocks, or inner thighs (saddle area)
- Back pain that wakes you from sleep or does not get better with rest
- Loss of balance or falling more often, especially if it started suddenly

Nursing priorities

1. Perform and document a complete neurologic exam every 2 hours: motor strength in all four limbs using the 0-to-5 scale, sensory level with light touch and pinprick, rectal tone if trained, and reflexes — The spinal cord has no extra space; even small increases in pressure cut off blood flow and cause starved blood flow (ischemia) (oxygen starvation) leading to neuron death within hours; serial exams catch deterioration early so the team can rush to surgery or radiation before damage becomes permanent
2. Administer dexamethasone 10 mg IV immediately as ordered, then continue 4 mg IV every 6 hours on time without delay — Dexamethasone (a powerful steroid) shrinks vasogenic swelling (edema) (fluid swelling around the injury) which is often worse than the tumor or abscess itself; reducing swelling restores some cord blood flow and buys time for definitive treatment; delays in steroid dosing allow preventable neuron death
3. Insert a Foley catheter using sterile technique and monitor urine output hourly; if bladder retention is present measure post-void residual before placing the catheter — Cord compression blocks autonomic nerves (automatic body control nerves) to the bladder causing retention (inability to empty); a full bladder stretches and damages bladder muscle permanently within 24 hours and increases infection risk; immediate drainage protects future bladder function

4. Keep the patient flat in bed with log-roll precautions only; do not allow sitting or standing until spine stability is confirmed by imaging and the provider — Unstable fractures or tumor-eaten vertebrae (spine bones) can shift with movement causing instant complete paralysis; log-rolling keeps the spine in neutral alignment and prevents secondary mechanical injury until we know if the spine can bear weight safely
5. Apply sequential compression devices to both legs and administer enoxaparin or other anticoagulation as ordered; document calf size and check for swelling daily — Immobility and paralysis cause venous stasis (blood pooling) in leg veins; clots form within 48 hours in up to half of untreated patients; traveling clots (emboli) (traveling clots) from legs kill by blocking lung arteries causing pulmonary embolism (a clot lodging in a lung artery) so prevention is life-saving
6. Implement pressure injury prevention immediately: turn every 2 hours using lift equipment and adequate staff, place high-risk areas on specialized foam or air mattress, keep skin clean and dry — Paralyzed skin loses all sensation and muscle tone; pressure collapses capillaries (tiny blood vessels) causing tissue death in under 2 hours; stage 3 and 4 ulcers (deep wounds) develop in 24 to 48 hours if prevention is delayed and require months to heal increasing infection and death risk
7. Start a bowel program on day one: stool softener, scheduled stimulant laxative, and digital stimulation protocol; document bowel movements daily on a flow sheet — Neurogenic bowel (nerve-damaged intestine) loses the gut's squeezing waves (peristalsis) (squeezing movement) and tone; stool impaction (hard blockage) happens within 3 to 5 days causing autonomic dysreflexia (dangerous blood pressure spikes) in high cord injuries and bowel perforation (rupture) in anyone; early program prevents both
8. Ensure the patient remains NPO (nothing by mouth) until the surgical team clears them; if surgery is not planned start oral intake only after confirming normal swallow and gag reflex — Emergency decompression surgery (removing pressure from the cord) may happen within hours; food in the stomach increases aspiration risk (breathing in vomit) during anesthesia leading to chemical pneumonia and respiratory failure; keeping NPO maintains the option for immediate surgery

Sources

- ASCO/ASTRO Guidelines on Spinal Cord Compression
- NCCN Clinical Practice Guidelines in Oncology
- Neurosurgery journal consensus statements
- AAN (American Academy of Neurology) practice parameters

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