
TRANSFORAMINAL LUMBAR INTERBODY FUSION (TLIF)

About Your Body

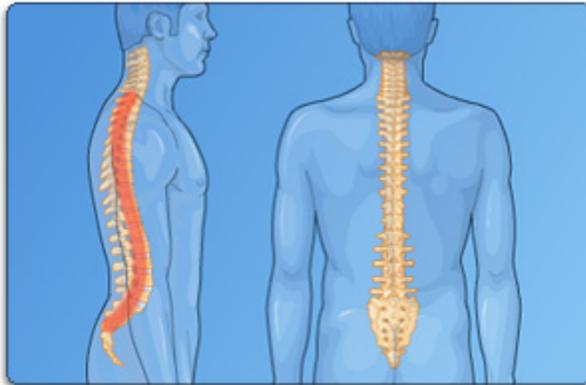
The goal of a TLIF is to reduce pain and improve your quality of life.

- TLIF stands for "Transforaminal Lumbar Interbody Fusion."

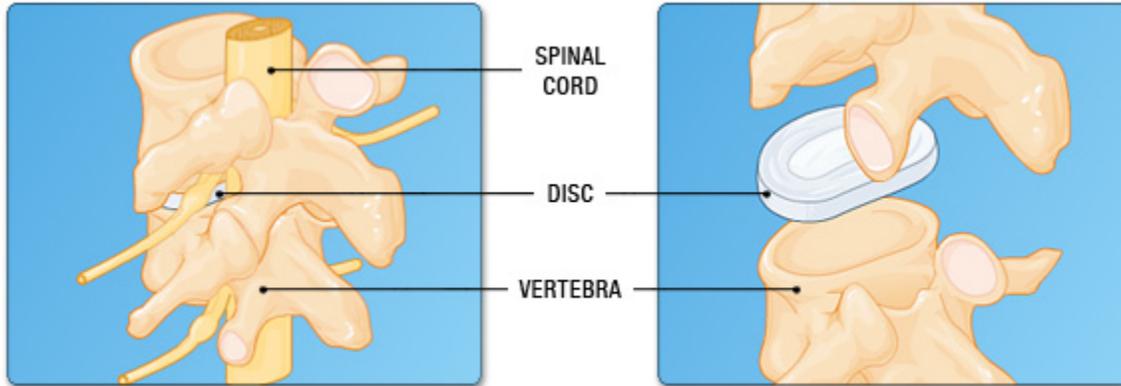
But to make things a lot easier, this can be called **interbody fusion**.

About Your Back

Your spine begins at the base of the skull and runs down your back all the way to your tailbone. Individual bones called **vertebra** are stacked to give your spine its "S" shape. And your vertebrae also help protect your spinal cord and nerves.



As you probably know, your **spinal cord** is made up of millions of nerves that connect your brain to the rest of your body. The nerves in your lower back (**lumbar region**) give you feeling in your legs, butt, and feet. And when pressure is put on these nerves, it can cause pain below the waist. The spinal cord has a tough, fibrous outer layer called the **dura**.



Between each vertebrae are **discs**. The outside of the disc is a ring of tough fiber. And the center is soft and rubbery, sort of like gelatin.

Discs

- Are tough, flexible shock absorbers that cushion the vertebrae
- Add height to your spine
- Keep your vertebrae lined up

Your Condition

You may have pain in:

- Your lower back
- Your hip
- Butt
- The back of your legs

You may also have pain, numbness, or tingling in one or both of your feet. It may feel like there's a stone in your shoe or like your shoe's just too tight. And by now, you've most likely tried everything and anything to relieve your pain. You may have tried:

- Physical therapy
- Shots or medication
- Weight loss or exercise
- A back brace

- Something like acupuncture or a chiropractor

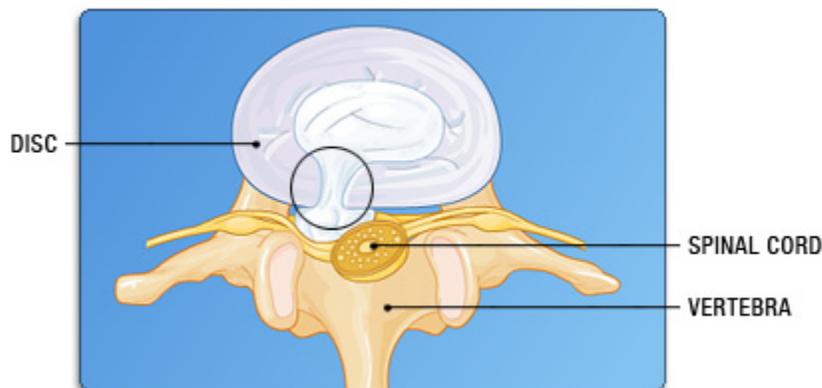
If nothing has worked, you're probably pretty frustrated and fed up.

What is causing your pain?

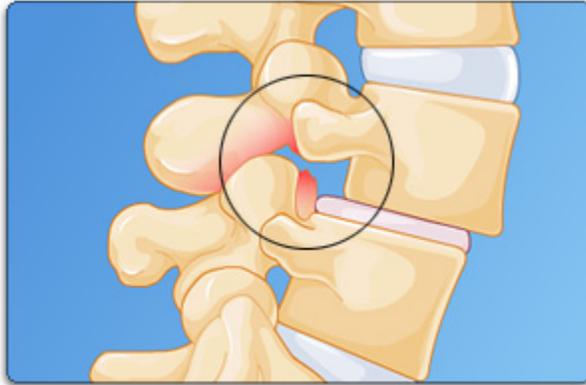
By now your doctor has ruled out a lot of possible causes. So, most likely it's a problem with one or more of your discs.

A healthy disc acts as a shock absorber. But over time, the disc loses water. It cracks and shrinks. It actually becomes less spongy and loses its spring. This is called **degenerative disc disease**. A disc in this condition no longer does a good job of keeping the spine cushioned and stable. And it may cause bone to rub on bone, which can cause back pain.

In fact, your spinal cord can be affected by a bad disc, too. After a while, the tissue next to the spinal cord can thicken. And small bone spurs can also develop. When this happens, the disc can be pushed out of place. This can make the space around the spinal nerves more narrow. And, a smaller space means it's easier for a nerve to be pinched or compressed. That can cause pain, numbness, or leg weakness.



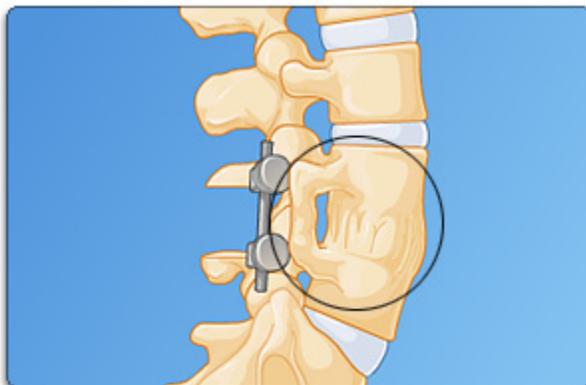
An unhealthy disc can also lead to an unstable spine. It may allow the vertebra above it to slip or tilt forward. Your doctor may call this tilted vertebra **spondylolisthesis**. The spine can also become unstable because of a small crack or a fracture in the bone.



So for many people, **interbody fusion** surgery can reduce the pain caused by these conditions. But still, some lower back pain is a bit of a mystery. And many other factors (like emotional stress) can also cause back pain. That said, if you've tried everything and nothing has helped, then interbody fusion may give you some relief.

How can interbody fusion surgery help?

When the problem disc has been removed, the vertebrae can fuse together to help keep this part of the spine stable. And a stable spine can mean you'll have less pain.



Before Your Surgery

Getting ready for surgery

This can start a few weeks ahead of time. You may have some tests like:

- MRI
- CT scan (also known as a CAT scan)
- Discogram
- Diagnostic nerve blocks

And even though you're having an operation on your back, Dr. Aryan needs to know about your general health and your health history. Let him know if you:

- Have any health conditions
- Are allergic to anything like penicillin or latex
- if you or anyone in your family has ever had a bad reaction to anesthesia

Make a list

Also for your safety, make a list of everything you take. If you can, include how often you take it, and how much you take. Make sure you include:

- Any over-the-counter medicine (like aspirin or Advil[®])
- All prescription medications or shots
- Any herbal supplements or vitamins
- Any kind of recreational drugs

You may need to get some medications out of your system in the weeks before surgery.

Your doctor may ask you to temporarily stop taking anything that can increase the risk of bleeding, such as:

- Aspirin or anything that has aspirin in it (like Excedrin[®])
- Anti-inflammatory medications like Advil or Motrin[®]

And if you take a blood thinner like Plavix[®] or warfarin (also called Coumadin[®]), be sure to talk with your doctor or cardiologist about stopping these drugs for a little while before surgery.

Smoking

If you smoke, please let Dr. Aryan know. Smoking and nicotine products can cause serious problems with the fusion as it heals. Most surgeons ask patients to stop using any nicotine products for at least 6 weeks before and 3 months after surgery. So this means

- No smoking
- No chewing tobacco
- No nicotine patches or gum

This is really important because smoking can cause problems with healing. So if you slip up, don't hide it from your surgeon. If he knows you smoked, he may want to change your treatment plan to improve your chances of healing well.

Donating blood

It is common to need blood during this surgery, so some people donate their own blood a month or so before the procedure. But ask your doctor if he recommends this in your case.

Stay active

Before the operation, do your best to stay as active as you can. In fact, some people even start their physical therapy before surgery. A strong body tends to heal faster.

Planning for recovery

You may need 4 to 6 weeks off. But if you're having more than one area fused, or you have a job that requires a lot of hard, physical activity, you may need to take a lot more time off. So ask your surgeon what he expects in your case so you can make plans.

Comfort and support in the hospital

Plan to stay in the hospital between 2 and 5 days. It's a good idea to ask a family member or a friend to be there with you for comfort and support. Think of this person as your partner in care. Doctors and nurses like to have 1 person as the "go to" person for all communication. He or she should be able to speak up for you, ask questions, and give information about your health. Be sure to introduce this person to your doctors and your nurses so they know it's OK to share your health information with them.

You may need someone to help you with things like grocery shopping or cleaning for the first week or so. And the hospital may arrange for you to have some things like a shower stool, a special raised toilet seat, and a "reacher." If not, these things can be rented.

Sometimes people stay at a rehab center, where there's nursing care. But it depends on your case. If you want to know more about this, please ask your surgeon.

The night before surgery

You'll probably get a list of instructions telling you what to do.

One thing that's VERY important, do **NOT** eat or drink anything after midnight.

- Food in your stomach can be very dangerous if you throw up during surgery.
- So make sure your stomach is EMPTY, or your surgery may need to be rescheduled.
- But if your doctor tells you to take some or all of your regular medications on the morning of the procedure just take them with a sip of water.

Your Procedure

Dr. Aryan will have a specific plan for your operation and recovery. But this will give you a general sense of how surgery will go.

Anesthesia

1. This operation is usually done under general anesthesia, which puts you into a deep sleep.
2. The anesthesiologist will place an oxygen mask loosely over your mouth and nose.
3. You'll get the anesthesia through your I.V. The medication may sting or burn a little bit when it goes in, but don't worry, that's normal. And you'll also get antibiotics through your I.V. to reduce the chance of infections.
4. Very quickly, you'll fall asleep. After this, you really won't remember anything about the procedure.

5. Once you're asleep, your doctor removes the oxygen mask and places a tube in your mouth and down your windpipe to help you breathe. You won't feel the tube going in or coming out. But when you wake up, your throat may feel a little sore.
6. A soft tube may be placed in your bladder to drain urine.

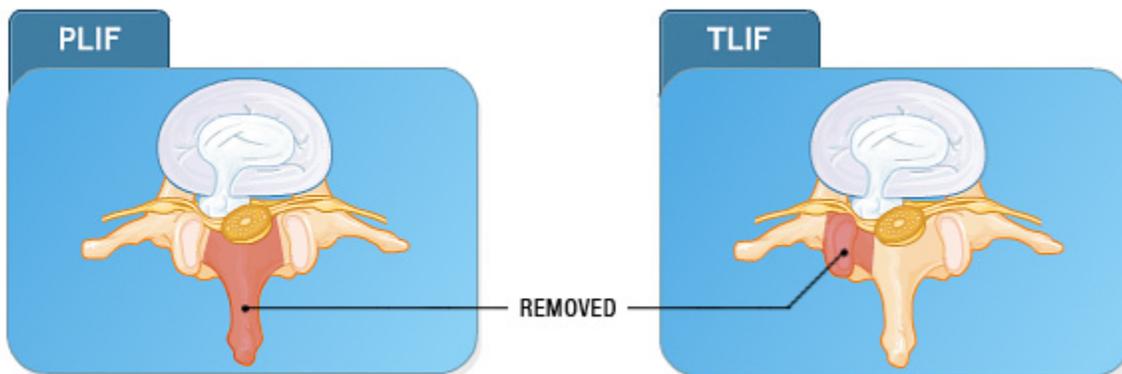
And when everything's ready, they can begin.

Bone graft

The first thing Dr. Aryan will need is a bone graft. Sometimes he'll use a bone substitute or bone from a bone bank. Other times, some of your own bone is taken from the area near your hip. Dr. Aryan generally prefers to use synthetic cages packed with bone morphogenic protein (BMP) your own bone harvested from the same site of surgery. This avoids additional incisions or sites of pain

Interbody fusion

1. Surgery begins with a small cut in the lower back. Exactly where it's made depends on which vertebrae are being fused.
2. To reach the problem disc, a small piece of the vertebra is removed. The piece that is removed is different depending on if you have a PLIF or a TLIF.



3. Dr. Aryan then carefully removes the disc, leaving an empty space that needs to be filled in. This is generally done with a surgical microscope. The space is then filled with:
 - **The bone graft alone:**
The bone graft can be shaped into 3 or 4 blocks and placed in the space.

- **With small cages filled with bone chips:**

The bone graft is ground into small chips and packed inside the cages. Then the cages are placed side by side where the disc used to be.

- **With cages and something called BMP that's dripped onto a small sponge:**

Think of BMP as artificial bone fertilizer. It helps your body grow new bone. So, instead of using a bone graft, the BMP liquid is dripped onto a small sponge and placed in the cages. As before, these cages are placed in the spine. And the small sponges just dissolve over time. Dr. Aryan generally prefers this option.

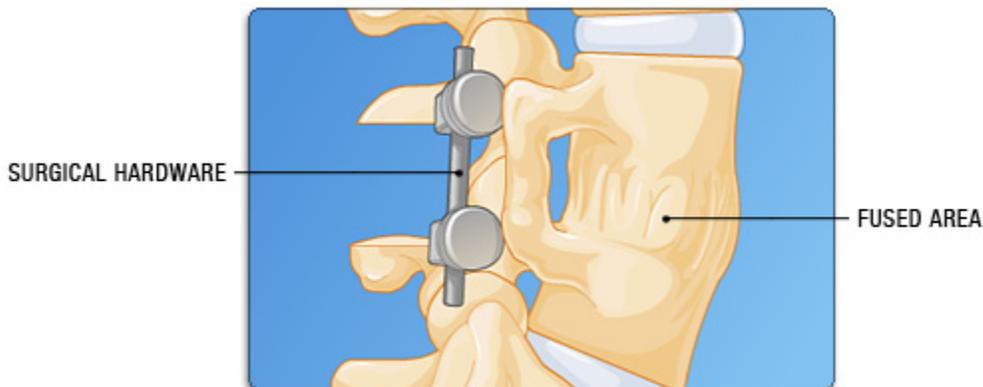
But all of these materials really do the same thing:

- They take the place of the disc.
 - They give your spine height.
 - They help your body grow new bone, so the vertebrae can fuse together.
4. Screws and rods are often placed around the spine for extra support. And this surgical hardware stays in your back.
 5. Sometimes bone graft is also placed along the little wings of bone that stick out from the spine. Your doctor may call this extra bone graft **posterolateral fusion**.
 6. Once he's finished, Dr. Aryan may place a drain. This is removed in 1 or 2 days.
 7. Your back is closed with deep stitches that will dissolve on their own. The skin is closed with staples; these are removed in about 10-14 days.
 8. You may get a shot of medication to numb your back, so you'll have less pain when you wake up.



As you heal

As your body heals, the bone graft will grow between the 2 vertebrae. It'll be as if the 2 vertebrae were welded together or **fused**.



So this surgery does not make your spine normal again. And once the area is fused, there's no movement there. But no movement usually means less pain. Also, it's

common to get more than one set of vertebrae fused. Some people have 2 levels or more fused. Ask Dr. Aryan what will be done in your case.

After Your Surgery

After surgery, you'll wake up in the recovery room.

- Expect to feel groggy and a little out of it.
- If you feel a little queasy or have the chills, just ask your nurse to help you get comfortable.
- Now you may be hooked up to some monitors and your I.V. line for medication and fluids.
- You may have stockings (called TED® hose) or compression boots on your legs to help prevent blood clots. And you may need to wear the TED hose for a few weeks.

Pain Management

Most people do have quite a bit of pain and feel pretty worn out for a few weeks. If the bone graft is taken from the area near your hip, this area will be sore, too. In fact, for some people this area hurts the most. You'll get pain medication that will help.

You may have a button attached to a pain pump.

This lets you give yourself pain medication as you need it. **This button is only for YOU to use.** So make sure anyone who visits you in the hospital knows they should NOT push it for you.

Within the first 24 hours, your nurses will help you get up and walk around. This is important because moving after surgery really does help prevent problems like blood clots.

Going Home

Once Dr. Aryan thinks you're ready, you can go home. Just make sure you have someone to drive you home and stay with you.

Driving

You won't be allowed to drive for at least 2 weeks, maybe longer.

Sitting

It's best not to go for any long car rides. You should get out and walk around every 20 or 30 minutes. This is true of sitting at home too. It's important for you to walk or stand as much as possible. Sitting for long periods of time can irritate your lower back. Try not to sit for more than 20 minutes each hour for the first 3 weeks after surgery.

If you can limit your sitting time, it will definitely help your recovery.

During the first 3 months

It takes about 3 months for the bone graft to become strong and solid. It won't be completely done healing, but it should become pretty strong during this time.

As you heal

Eventually, most people have some pain relief. But as you heal, it's common to have some pain, tingling, or numbness in your back or legs. It can take a little time for your spine to recover.

Medication

Your doctor will prescribe medications to help manage your pain and swelling. Just make sure you understand your doctor's instructions on how and when to take it. And for the first few months after surgery many surgeons ask patients not to take:

- Aspirin
- Anti-inflammatory drugs like, Aleve[®], Advil, Motrin, and Celebrex[®]

These make it harder for the fused area to heal.

But if you take aspirin for other reasons, it's important to let your doctors know so they can treat you safely.

Smoking

It's best to avoid smoking and nicotine products

During the first 3 months, it's very important NOT to harm the fused area as it heals.

- Don't bend over. If you need to pick up something light, bend your knees and squat. Don't bend at the waist.
- Don't lift anything heavier than a gallon of milk. If you need to pick up something that's even a little heavy, just ask someone to get it for you. Try not to feel like asking for help is a burden on your family or friends. You have to heal.
- If you were fitted for a **brace** or a **corset**, your doctor may have you wear this during the day for some months — it'll support your back and help keep your spine still until the fused area heals. Ask your doctor when and how long he wants you to wear this. Most likely, you won't need to wear it when you sleep.
- You can probably sleep in whatever position is most comfortable for you. But try to keep your vertebrae lined up. Think of your spine like a log. When you move in bed it's best to roll like a log. This way you won't twist your spine.
- You can go ahead with your sex life as soon as you feel ready. Just don't overdo it. And if you have questions about what's OK, just ask your doctor.
- Walk whenever you can. Walking is some of the best medicine. It builds strength and helps you heal.

Physical Therapy (PT)

In PT you'll work with a physical therapist to build up your strength. You may start as early as 6 weeks or you may start after 3 months.

PT is very hard work. **If your pain medication isn't working, speak up.** You may need a different medication. But you'll be more likely to stick with your PT if you can manage your pain.

Discs around the fused area

Because it takes away some normal motion in your spine, over the years you can develop new back pain.

The discs around the fusion now have to do extra work. So over time (anywhere from 5 to 25 years), new pain can develop. Your doctor may call this **adjacent segment disc degeneration**. And it can cause pain later on.

But there are things you can do to help prevent problems:

- Try to stay at a healthy body weight.
- If you smoke, quit.
- Exercise. There are special routines that help support and take stress off your spine. Swimming is especially good for back patients.
- Use common sense when it comes to heavy lifting. But if your job requires it, ask your doctor what he recommends in your case.

If you have problems during recovery, please call your doctor.

Call right away if you have:

- A fever of 101° F or higher
- It hurts or burns when you pee
- It feels like you have to pee a lot
- Pain in your back or legs that gets worse and doesn't go away with rest and medication

Get emergency help if you have:

- Pain, redness, or swelling in one or both of your legs (especially pain in your calf or the back of your knee)
- Your legs feel weak
- You feel numbness in your legs or feet
- Sudden shortness of breath or chest pain
- You notice that fluid from your cut is soaking through your bandage and getting on your clothes or brace
- You have problems with your vision
- You can't control when you go to the bathroom
- Any pain, numbness, or tingling in your groin, or the area around it
- Any new sexual problems, or numbness in that area (like in your testicles, penis, or vagina)

And call if you experience anything unusual. If something just feels wrong, don't be afraid to call.

Risks and Benefits

The main benefit of interbody fusion surgery is to ease your pain.

Once the spine heals, people can have very good pain relief. And they can return to work and most of the activities they love.

Risks

But while it's important to focus on success, like any surgery, there are some risks. This isn't meant to scare you. Understanding what's involved is an important part of any surgery. If you have any questions about how these risks relate to you, please ask your doctor. And while 11 risks are described here, there are some very unusual risks that will not be covered. So please do not consider this list complete.

As your spine heals, there is a risk the vertebrae will NOT fuse together. Sometimes more surgery is needed.

Sometimes the bones in the spine don't fuse together. It's not always clear why this happens. But how your body heals, previous surgery, or trying to fuse more than one area in the spine can all lead to problems with healing. Other times, too much movement in the months right after surgery can cause a cage, a screw, or some other piece of hardware placed in the spine to come loose, move, or (very rarely) break — making it hard for the spine to heal.

Problems with healing are also more common in people

- Who smoke
- Are very overweight
- Have diabetes
- Are treated with chemotherapy or radiation for cancer

The type of bone graft used can also increase this risk.

So if the spine is still unstable after surgery, or if a piece of hardware seems to be part of the problem, more surgery may be needed to replace that part and fuse the bones together.

There is a risk of infection. In rare cases, more surgery may be needed to treat an infection.

Although Dr. Aryan will take great care to prevent it, you may get an infection in the area where surgery was done, or in other parts of your body (like in your lungs or bladder).

Signs of infection include:

- Redness
- Swelling
- Fluid draining from the area
- Pain that gets worse
- Chills or a fever of 101° F or higher

If you have any of these things, please call your doctor right away. Most of the time, antibiotics get rid of infections. However, sometimes one or more surgeries are needed to clean out an infection. I.V. antibiotics are usually given for many weeks or months as well.

There is a risk of bleeding both during and after the procedure. In rare cases, a blood transfusion or another procedure may be needed.

With any surgery, there is a risk of bleeding during and after the operation. If there is bleeding, in most cases your doctor will be able to control it. But if you lose too much blood, you may need a blood transfusion. And while all blood is checked to make sure it's clean and free of disease, there is still an extremely small chance that you could get a virus or your body could reject the blood. Because it's common to need blood during this surgery, many patients donate their own blood in the weeks or months before the procedure. If blood collects in the area around the spine after surgery, this can put pressure on nerves in the spine. This can cause:

- Numbness in the legs or feet
- You may not be able to control when you go to the bathroom

If you have any of these things, please call your doctor or get emergency help. In some cases, more surgery is needed to relieve the pressure.

There is a risk of injury to the dura (a fluid-filled membrane that surrounds the spinal cord and nerves). In rare cases, more surgery or treatment may be needed.

Because Dr. Aryan needs to work close to the spinal cord and nerves, a **dural tear** can occur, allowing spinal fluid to leak out. If spinal fluid leaks, it usually isn't a serious problem, and Dr. Aryan simply seals the tear during surgery. But if the spinal fluid continues to leak out, you may get bad headaches. If this happens, call your surgeon right away. To give the tear time to heal on its own, you may need to lie flat on your back for a couple of days. In the rare event that a leak does not seal itself off quickly, another surgery may be needed to fix the tear.

There is a risk of nerve injury. In some cases, pain, numbness, tingling, or muscle weakness may be permanent.

If a nerve is injured or pinched during surgery, you may feel numbness, tingling, pain, or weakness in your leg, foot, butt, or back. In rare cases, nerve injury can also cause problems with leaking urine, trouble controlling bowel movements, or problems with sexual functions. And, it's extremely rare, but a muscle in one of your legs could become paralyzed, where you can no longer move that muscle. Any of these problems may go away in the months after surgery, but sometimes these problems are permanent.

There is a risk of blood clots that, in rare cases, can be life threatening.

Blood clots can form in your veins during or after surgery. And in rare cases, a blood clot can travel to the heart or lungs. This can be very dangerous and can even be life threatening. To help prevent clots, your doctor may use things like compression boots or support hose.

Signs of blood clots include:

- Sudden shortness of breath
- Severe chest pain
- Painful swelling in one or both of your legs

If you have any of these signs, call your surgeon or get emergency help right away.

For some patients, this surgery does not relieve or reduce pain. And there is a risk you may develop new back pain.

In some cases, even though the spine heals and the vertebrae fuse, people continue to have pain or they develop new pain. If fusion is done on more than one set of vertebrae, this puts more pressure on the other discs in your back. So many people develop changes in other areas of their spine, which may cause new back pain in the years after surgery. And with some back pain, no one is sure what causes or cures it. So no one can say what your pain will be like or how much you'll be able to do after surgery. But for the best results, follow your doctor's instructions about

- Staying active
- Exercise
- Not smoking
- Following through with your physical therapy

There's a risk of bad or allergic reactions to the anesthesia, medications, or materials that are used. While it's very rare, you can die from a serious reaction.

An allergic reaction happens when your body tries to get rid of something it doesn't want. And it's your body's response that can be serious. Signs can include:

- Dizziness
- Throwing up
- Swelling
- Trouble breathing

You should know that your healthcare team is trained and ready to respond to allergic reactions. But in rare cases, people can die. If you've ever had an allergic reaction, or know you're allergic to any drugs, foods, or materials (like latex), please let your doctors know. And let them know if you or anyone in your family has ever had a serious reaction to anesthesia.

If a graft from a bone bank is used, there's an extremely small chance you could get an infection or a disease from the graft.

Although bone banks check all grafts to make sure they're clean and free of disease, there is still an extremely small chance you could get an infection or a virus. Antibiotics and more surgery may be needed to clean out an infection.

If a bone graft is taken from the area near your hip, there is a small chance the bone may fracture, or you may develop pain that doesn't go away or keeps coming back.

When a small piece of bone is taken from the area near your hip to be used as a graft, there is a small chance the bone may fracture. A nerve in this area can also be injured, causing pain, numbness or tingling in the hip, or numbness or burning pain in that area. These problems may go away over time, but in some cases they are permanent. These risks increase when a larger bone graft is needed.

There is an extremely rare risk that your eyesight could be damaged or you could lose your eyesight in one or both eyes.

It's extremely rare, but during any major surgery where you're positioned facing down, there's a small risk that blood flow to the eye can be injured. This may cause damage to your eyesight in one or both eyes. Vision problems could appear right after surgery or a few days later. Tell your doctor right away if:

- Your vision is blurry
- You can't see in color
- You have any new problems with your vision

There is a risk of a stroke, heart attack, or death.

How your body handles surgery depends on what kind of condition your body is in. Some bodies are stronger and can handle surgery better than others. Age, illnesses, heart conditions, past strokes, and other things (like being very overweight) may make it harder to perform surgery successfully. It is possible you could have a stroke or a heart attack during surgery or as you recover. These attacks can be mild or severe. Although the risk of death is small, you may die during surgery or the recovery period from any of the risks mentioned earlier, or for other reasons.

Alternatives

The decision to have surgery

Because while surgery helps many people, there's no guarantee it will get rid of your pain completely.

Let's say on a scale of 1 to 10, the pain you feel now is an 8. That's pretty painful. And if other treatments haven't worked, then surgery might improve your pain from an 8 to a 5 or a 6. But you should know that back surgery will NOT get rid of your pain completely. So it probably won't get you down to 1 on the pain scale.

In fact, if you don't feel that a TLIF is the right procedure for you, get a second opinion. Dr. Aryan may even encourage you to do this so you can feel confident that you're making the right decision. And if you haven't already, talk to your doctor about all of your options. Other things to try are:

- Losing weight and exercising
- Physical therapy
- Medications or shots
- Exercise classes (like yoga), or another type of strengthening exercise called "Pilates"
- Things like acupuncture or chiropractic adjustments help with pain

Watchful waiting

One option is to not have surgery and wait and see if your condition improves. This is called "watchful waiting." And sometimes back pain does improve. Over the years, the disc may become more stiff on its own and stabilize that part of your spine. When this happens, the pain may get better or go away. But that could take years, and there's no guarantee it ever will improve. And I know you've tried just about everything to get rid of your pain.

So, when nothing else has worked, what other options do you have?

IDET

In some cases, procedures such as IDET can be done. IDET uses heat to treat a problem disc and sometimes this is successful.

Other fusion procedures

There are other fusion procedures. You may have heard of:

- Posterolateral fusion with pedicle screws
- Posterior Lumbar Interbody Fusion (PLIF)
- Anterior Lumbar Interbody Fusion (ALIF)
- Extreme Lateral Interbody Fusion (XLIF)
- Axial Lumbar Interbody Fusion (AxiaLIF)

But the goal of all of these is to stabilize your spine.

Artificial Disc

For some people another option is an artificial disc. An artificial disc has 2 metal plates that sandwich a strong, plastic core, which can move and slide much like a healthy disc. It replaces the problem disc. This can help relieve pain, and it allows the spine to move naturally. **But an artificial disc is only an option for some people.**

If you want to know if this, or any other options, might be right for you, ask Dr. Aryan.