SOUTHEASTERN NEUROSURGICAL SPECIALISTS

Dr. Khajavi Pre & Post op Instructions for **Adult Scoliosis Surgery (ALIF/XLIF/Posterior fusion)**

Please read these instructions carefully. This document will not only review the preoperative instructions, but also address a lot of questions you may have about your post-operative course. Your significant other or your caretaker should also read these instructions. Understanding what to expect after surgery, what is normal and what is not, will help alleviate any fears or concerns. This document is specific for patients undergoing any kind of adult scoliosis or deformity procedure, but significant variation may exist in your specific case and will be discussed at your pre-op appointment.

PRE-OPERATIVE INSTRUCTIONS:

Your admission will be registered with the hospital by our office. We will contact your insurance company for pre-certification requirements. You will be responsible for inquiring whether a second surgical opinion is required by your insurance. If you have any questions regarding insurance pre-certification, please contact our office.

You will be given Hibiclens (chlorhexidine) solution to use to wash the skin where we plan to make your incision. For your particular surgery this will be:

ALIF: The abdomen from the belly button down

XLIF: Both sides from the lower ribs down to the hip bone

Posterior fusion: Your lower back from the bottom of your shoulder blades to the top of your buttocks.

Use the Hibiclens solution on a wash rag, loofah or sponge to wash the area gently for about 2 minutes. Then rinse thoroughly. If you are not given this at the preadmission testing area, it can be purchased at most any pharmacy.

The evening before your surgery, DO NOT EAT OR DRINK ANYTHING AFTER MIDNIGHT. This includes gum, mints and your morning coffee. The anesthesiologist will not administer anesthesia if you have had anything by mouth after midnight, and your surgery will have to be postponed.

If you are on any medications, please check with the anesthesiologist to see whether you should take them on the morning of surgery. In general, you will be able to take all medications prior to the day of surgery except some diabetes medicines, some blood pressure medicines and all blood thinners. If you are on any blood thinners or steroids, please contact our office. Unless otherwise instructed, you should stop using any anti-inflammatory medications such as NSAIDS (Ibuprofen, Motrin, Advil, Naprosyn, Celebrex, Meloxicam, Diclofenac, Mobic, etc.), any product containing aspirin, and any herbal supplements (such as: St. John's Wort, fish oil or other sources of Omega -3 fats, Vitamin E, etc.), 7 days before your surgery. These substances can cause bleeding problems and serious anesthetic reactions. Steroids must be discontinued in tapering doses. If your cardiologist or neurologist requires you to take aspirin this may be able to be continued before surgery, and in most cases can be resumed immediately after surgery. Please discuss all your medications with Dr. Khajavi's office.

Northside hospital policy re GLP-1 receptor antagonists: If you are taking a GLP-1 receptor antagonist (like Ozempic, Wegovy, etc), you will need to hold your last dose. That means if you take it daily, you must hold it 1 day before

surgery, and if you take it weekly, hold it 1 week before surgery. You should only have a clear liquid diet the day prior to surgery. Please discuss all your medications at your pre-op visit with Northside hospital.

You should consider stocking up on groceries, including easy-to-prepare meals before you are admitted, so that your return home will be as smooth as possible.

PLEASE REMEMBER: It is important for you to be prepared for your discharge so that non-medical issues (like a ride home or someone at home to care for you) do not delay your discharge from the hospital. You will be discharged when the doctor feels you are medically stable, not when it may be convenient. Plan ahead to avoid any problems!

THE DAY OF SURGERY:

Please bring the following items with you to the hospital:
- your insurance card or information
- a list of your medications and dosages
- a list of allergies
- any paperwork given to you by the hospital
- a living will, if you have one prepared (you may prepare one at the hospital if you wish)
- Photo ID
- Comfortable clothes to wear home
- Any discs containing X-rays, CT's, or MRI's that you have not given to the office

Important note: If our office gives you a time to arrive at the hospital, and the hospital gives you a different time, please go with the time given to you by our office. It is best to show up early, since schedule changes can occur due to emergencies or medical issues that may arise with other patients. Although you may be told that your surgery is at a specific time, keep in mind that that unless you are the first case of the day, the time you are given for your surgery is just an estimate. The actual time of surgery will depend how much time it takes to complete the cases before you.

Upon arrival to the hospital, you will be given a hospital gown to change into. Do not wear or bring jewelry. Do not wear make-up. Do not wear dark fingernail polish. You will be asked to remove dentures and contact lenses before surgery. If you were given a brace before surgery, do not bring it to surgery, leave it with your family member to be given to you right after surgery. You will be discharged from the hospital when you are medically stable to go home or to a rehabilitation facility. It is important for you to be prepared for your discharge so that non-medical issues (like a ride home or someone at home to care for you) do not delay your discharge from the hospital.

Therapy/Rehab:

While in the hospital you will be evaluated by physical therapy and/or occupational therapy. They will make recommendations on assistive devices such as walkers, canes and bedside commodes. They will also make recommendations on rehabilitation requirements if needed such as inpatient, home, or outpatient rehabilitation. After complex spine surgery such as the one you are undergoing, some kind of inpatient or outpatient therapy is generally recommended.

POST-OPERATIVE INSTRUCTIONS:

You will likely receive general discharge instructions from the hospital when you are discharged. If there is any discrepancy between those instructions and our instructions below, please default to our instructions.

After you are discharged from the hospital you will need to call our office to set up your first post-op appointment, if this was not already done pre-op. This will typically be 10-14 days after surgery. Please keep in mind that the initial postoperative visit is generally set up as a telemedicine visit, but if you have staples or sutures that need to be removed, then you'll need to come to the office for that visit. The first postoperative visit is generally set up as telemedicine visit, primarily as a convenience for patients, but you are always welcome to come in and see us in person.

MEDICATIONS:

You will be given a prescription for an opioid (narcotic) pain medication like Norco (hydrocodone/acetaminophen) or more likely Percocet (oxycodone/acetaminophen). You may also receive a muscle relaxer (like methocarbamol), and a nerve pain medication like Neurontin (gabapentin) or Lyrica (pregabalin), prior to discharge. If you are taking medications other than those prescribed by Dr. Khajavi, you should discuss possible drug interactions with your pharmacist or primary care physician.

Opioid pain medication should only be taken when you have pain, and muscle relaxers should only be taken when you have muscle spasm. Nerve pain medication should be taken exactly as directed (usually 2 or 3x/day), and should never be abruptly stopped, but rather should be weaned off slowly based on Dr. Khajavi's recommendations.

Prescriptions are called in and refilled during office hours only (Mon-Thurs 8am - 4:30 pm, Fri 8am - noon), and you can expect a 24-to-48-hour turnaround time for prescription refills. Do not wait until the last minute to request medications. It is your responsibility to keep up with your medication needs. Due to FDA/DEA regulations, we are unable to call in any opioids and most other controlled substances. Opioids require a signed script from a physician and generally must be picked up from our office in person, although the process of being able to electronically prescribe them may be an option.

You should begin tapering off the pain medications within 3-4 weeks of your discharge, depending on the extent and complexity of your surgery. As soon as you are comfortable, take a nonprescription pain medication (i.e. Tylenol) for pain relief. Please keep in mind that the maximum amount of Tylenol (acetaminophen) that you can take in a 24-hour period is 4000 mg, and that there is usually already some Tylenol in the opioid pain medication you are given. **Do not take any nonsteroidal anti-inflammatories (NSAIDs)** such as Ibuprofen (Motrin/Advil), Naprosyn (Aleve), Meloxicam, Diclofenac, Celebrex, etc. for 6 months, as these can interfere with the fusion process. Resume medications you were taking for other pre-existing medical conditions before you came into the hospital, unless otherwise advised by Dr. Khajavi. Do not resume blood thinners until cleared by Dr. Khajavi, usually 7-10 days after surgery. The one exception to this rule is baby aspirin. If you have a heart condition Dr. Khajavi may recommend that you continue daily baby aspirin before and after surgery without missing any doses. Please discuss this with Dr. Khajavi and/or his assistants.

Constipation is a common side effect of opioid pain medication and surgery. You should use an over-the-counter stool softener, drink plenty of fluids, and walk as much as possible. The benefit of walking cannot be overstated. If you do become constipated, you should try Milk of Magnesia, a Fleet's enema, a rectal suppository, or if necessary, Magnesium Citrate (if available, this was recently move to the market concerns about contamination). These are available over the counter at most pharmacies. Please notify the office if your constipation becomes severe.

DRESSING/WOUND CARE:

Your incision may or may not be covered by a dressing. We often use a liquid surgical adhesive to seal the wound after closure instead of sutures or staples. This is usually done for the anterior incision (ALIF) and the side incisions (XLIF). Surgical glue is generally not used on the posterior incisions since those tend to drain more. If there is a dressing over the glued incision you may remove it as soon as you get home.

You will most likely have staples or sutures and a gauze dressing(s) instead of a liquid surgical adhesive on the posterior incision(s), in which case the dressing(s) may be removed 2 days after surgery. There is no need to reapply another dressing(s) or use any special ointment. If there is some slight drainage for a few days after the dressing is removed, then apply clean 4 x 4 gauze with a few pieces of tape until the drainage stops. You may want to apply a loose 4x4 gauze dressing with 1-2 pieces of tape on the incision just to keep the brace from irritating the incision(s). Do you not take a shower until the third day after surgery. If there is any wound drainage, you may shower two days after the wound drainage has stopped. Staples will be removed in about 10-15 days post op at your first postoperative appointment.

When showering, you can use whatever products you normally use. There are no special requirements, except you cannot take a bath or go in a pool for 1 month after surgery.

Finally, if you were told that there was a durotomy at the time of surgery, there are specific instructions regarding bedrest, sitting limitations, and wound drainage precautions which will be given to you at the time of discharge.

PREVENTION OF PNEUMONIA AND BLOOD CLOTS IN THE LEGS:

Pneumonia can occur after surgery when patients do not take big, deep breaths, and from inactivity (sitting too long or even worse, laying down too much). Blood clots (DVT) can also occur after surgery and inactivity plays a major role in their formation. A blood clot in your leg can cause pain and swelling in the affected leg (calf usually), and if its breaks off, can travel to your lungs (PE) and be fatal. Using the incentive spirometer you received in the hospital frequently helps prevent pneumonia but walking as much as possible helps prevent both pneumonia and DVT/PE.

WHAT TO EXPECT AFTER SURGERY:

It is normal for your incision to be sensitive for a few days and for a little redness to occur. A small amount of drainage it's also not uncommon, even if the incision is glued closed. The drainage is usually yellowish or pinkish color, and if it occurs you should just put a sterile 4 x 4 gauze on the incision with a couple pieces of tape. Change the dressing once a day until the drainage stops, which will usually be in a few days. If you notice any excessive redness, swelling, or warmth around the incision, or the drainage is excessive, or appears purulent (pus like), then please call the office. Some bruising around the incision is not uncommon, particularly incisions in the abdomen or flank area, and will improve with time.

It is normal to run a low-grade fever after surgery and is usually due to atelectasis. Atelectasis is when very small areas of the lung are not fully inflated, which causes the temperature. Reasons for atelectasis include not taking enough deep breaths and not walking enough. This can be prevented by performing the deep breathing exercises using the incentive spirometer you were given in the hospital and increasing your activity. You should use the incentive spirometer 15-20 times/hour while you are awake. Several (4-6) short walks a day are encouraged. If you have a fever <u>over</u> 102 or chills, please call the office.

The goals of the surgery may have included taking pressure off the nerves (directly or indirectly) to reduce the pain radiating down your legs, to stabilize the spine to prevent your deformity from worsening, and to restore your spinal alignment, in hopes of improving your back pain. As has been discussed, this is a very complex surgery with significant risks, and although the surgery is done in a less invasive way than traditional open posterior surgery, it is nevertheless a long and complicated surgery, it is quite painful, and the recovery process can be a long and difficult one. In general, most of your leg pain should improve after surgery, although this could take some time in some patients. In some

patients there can be temporary or delayed leg pain. This occurs because when we remove the disc and place the spacer in the disc space, we increase the height of the space, which means that the nerves go down the legs can also become stretched, develop some swelling, and then leg pain can begin several days after surgery. This is why we prescribe the nerve pain medications (Neurontin or Lyrica), prevent the occurrence of delayed like pain, or reduce its severity if it occurs. Some back pain is expected after this type of procedure. Treat your pain with the medications prescribed. You can also use ice or heat (do not place directly on the incision) for 10 minutes four times a day. DO NOT SLEEP ON A HEATING PAD. In general, most of your pain should improve over a period of 4-6 weeks. Finally, we generally inject a medication called Exparel around the incision, which is a long-acting numbing medicine like the Novocain you get at the dentist's office. It does not eliminate the incisional pain but reduces it for 3-4 days. Consequently, if 3-4 days after surgery you feel a little bit more pain around your incision, that is quite normal.

Although the nerve compression has been corrected with surgery, and your spine has been realigned and stabilized, it will take time for the nerves, muscle, and tissues around the area of the incision to heal. Therefore, you may experience symptoms like your pre-operative condition. These symptoms can sometimes worsen temporarily and occasionally symptoms do not improve at all due to permanent damage to the spinal nerves.

XLIFs and ALIFs are our preferred fusion method because these procedures allow us to restore disc space height from a collapsed position, and move a slipped vertebra back into a better, more anatomic position. We believe it is imperative for a good long-term outcome to try to restore the alignment of the spine to as normal and anatomic alignment as possible, but as the spine moves, so do the nerve roots. Occasionally, because of this movement, the nerves can get stretched, and you may experience a new or recurrent leg pain in a delayed fashion after surgery, typically 3 to 5 days after surgery. This is particularly common with more than one level cases, large corrections, or in patients that have had previous surgery, as the nerves tend to have some scar tissue. These symptoms are almost always transient and will be managed with increase in gabapentin or Lyrica dose and short-term steroids.

You will be given a "TLSO" or Jewitt brace to wear for 12 weeks. The brace serves as a type of external nonrigid stabilization system, to restrict flexion, extension and rotation, to facilitate healing, reduce the risk of hardware failure, and promote a solid fusion. The brace also will provide some support for certain activities such as going up and down stairs and will also serve as a reminder to you and those around you that you are still in the early postoperative period. The brace should be worn at all times when out of bed. If you are sitting upright in a good chair, you can loosen the brace and let it sit behind you. If you have to go to the bathroom in the middle of the night you can leave the brace off. Do not wear the brace while sleeping / in bed. See the separate brace instructions sheet for more details. You will almost certainly be prescribed a bone stimulator, which helps the bones fuse. You will need to use every day for 9 to 12 months.

It is not uncommon for patients after surgery to feel tired or have a lack of energy. There are several reasons for this, including medication side effects, alteration in sleep cycle, and change in activity level. The best way to combat this is to go for plenty of short walks (preferably outside), minimize the amount of opioid medication taken, and to try not to take naps during the day (so that nighttime sleep is better), and staying involved socially with friends and family. Returning to work is also very helpful, although the timing of that will depend on your surgery any type of work you do. Finally, some patients, particularly older patients, may experience some confusion or memory problems after surgery. This too is usually related to some of the previously mentioned factors that affect energy level. The confusion is usually worse in the hospital and often worse at nighttime but should improve with time. Contrary to popular belief, surgery and anesthesia do not cause dementia/Alzheimer's, so if the patient's confusion or memory problems do not improve, there may have been some unrecognized memory deficits prior to surgery, and consultation with Neurology should be considered.

RETURN TO DAILY ACTIVITIES:

For the first couple of weeks following surgery, you will need to rest and do as little activity as possible, other than walking as much as possible. As previously mentioned you may feel sore and stiff. By the third week, however, you

should begin to feel less pain and stiffness. During your third or fourth post op week, you should be able to take more walks, go out to eat, or go shopping. We would advise you not to walk on the treadmill for the first 1-3 months after surgery and not to walk the dog, as these activities could lead to unintended falls. Do not do any strenuous activities including bending at the waist, lifting, & twisting ("no BLT's"), pushing or pulling. Gradually, over the next couple of weeks you will be able to progressively increase your activities. Use the following as a guideline:

1. Driving. You should not drive for about a week after surgery, but this may vary. You may drive a week after surgery if you are feeling well and you are not taking opioid pain medication. You may ride in a car on short trips. If you must ride over 30 miles, get out and walk every 30-45 minutes. It can be more comfortable for you to lay your seat back when traveling long distances. You should not plan to travel for long distances for at least a month after surgery.

2. Working. If you have a manual labor type job, you should not plan to return to work for 6 months following surgery. If you have a predominantly sedentary job, you can plan to return to work in a part-time capacity after 4-6 weeks. At your one month return office visit, Dr. Khajavi will assess you and determine at what point you may return to work. Caution and common sense should be used to determine whether or not you should engage in any activity.

3. Activity. No lifting, pulling, or pushing objects over than 15 pounds. (Examples: infants, grocery bags, vacuum cleaners, lawn mowers.) Avoid bending at the waist; rather bend with the knees and hips. You will need to wear your brace at all times when not in bed. Avoid twisting motions. Avoid traditional abdominal or back strengthening exercises during this 12 week recovery period. You may climb stairs at any time but use the handrails. It may be advisable to have someone with you the first few times. Avoid sitting for more than 30 minutes at a time as longer periods may aggravate your back pain. When you sit, try to use some type of lumbar support. Remember to maintain good posture. Rest between activities, as you may find that you tire more easily after surgery. This is to be expected, and it may take some time before your energy level returns to normal. You should abstain from sexual activity for at least 2-4 weeks following surgery. Sexual relations are permissible after this period but should not be too vigorous. Use your judgment. Remember: the above lengths of time for sitting and walking will vary with each patient.

4. Exercising. Resuming exercise should be done carefully. Walking is one of the best exercises to improve your overall fitness and endurance level. Start with a few small trips a day and gradually increase the distance according to your tolerance. Don't try to do too much too soon! You will NOT be able to go to the gym, exercise, lift weights, or play sports for the first 12 weeks after surgery, as the fusion needs to heal (bone needs to form). It is permissible to do some simple core muscle exercises, as well as some simple stretches, if there is no bending or twisting at the waist. You can also use a stationary bike about three or four weeks after surgery, which is an excellent option for exercise and core. These can be reviewed with you at your follow up appointments. Formal physical therapy for rehabilitation of your back will not begin until 12 weeks after surgery, at which time they can provide some guidance regarding returning to exercise and sports.

5. Your first follow up appointment is generally the only appointment you will have without x-rays. All subsequent follow up appointments will require x-rays: 4-6 weeks, 12 weeks, 6 months (for some), and 1 year post op. Please make sure your x-rays have been ordered PRIOR to your follow up appointment.

Do not smoke! Remember, smoking is the enemy of fusion!

Recovery Phase: First 3 months post op

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By the time the first month has passed, the surgical or incisional pain for most patients has diminished significantly. Since most of the fusion is taking place during these first 3-4 months, it's imperative to avoid bending or twisting at the waist, or lifting heavy objects/doing strenuous activity, which are activities that can cause the hardware to come loose or break. During this time you will be wearing the brace. Lack of normal activity and wearing the brace can all lead to some stiffness, muscle tightness (back and legs), and weakness or deconditioning of the back and core muscles. This is why patients often complain that although their pre-op leg and back pain are better before surgery, they have a different kind of back pain, which they often describe as "achy", "sore", and "tired". Patients often say they are stiff when they first get up in the morning, get better after an hour or so, but by the end of the day, or after too much activity, their back is sore/tired and they need to lay down. This is quite typical.

To some extent this is the price we pay to keep the spine immobile and promote fusion, and post op physical therapy prescribed 3-4 months after surgery will help rehabilitate those muscles. Below are some strategies to reduce the amount of pain, stiffness, and soreness during this time:

1. Periodically remove the brace when you are sitting still in a good chair. Remember the brace is meant to keep you from twisting or bending, but if you're sitting still, then you don't really need the brace. Doing this will allow your core muscles to be activated. But remember you must be still during these times.

2. Do some core exercises that do not involve bending or twisting at the waist. Examples include contracting the abdominal muscles for 10 seconds (bearing down), bicycling in place, leg lifts (6" off the ground), and even lunges. These exercises are difficult after surgery, so be patient, do your best but don't expect to be able to do what you did before surgery (not yet).

3. Try to stretch your hip muscles, hamstrings, quadriceps, and calf muscles every day, but without bending or twisting at the waist. We can show you how to do this, or you can discuss with your physical therapist.

Rehabilitation Phase: 3-6 months post op

At the end of the first 3 months, we will get some x-rays to confirm that you are fused. You will continue to fuse (lay down more bone) for 2 years, but more than half the fusion is completed by now, so the brace is no longer needed, nor are all the restrictions you had during those first 3 months. But you can't go from lots of restrictions to doing any activity you want in one day. This is what the next 3 months is for, the rehabilitation phase. At this time we will ask you to:

1. Wean the brace off gradually over about 7-10 days. Even if you used the above strategies to reduce the amount of back and core muscle deconditioning, some still exists, and taking the brace off too fast may result in some back pain or spasm. By wearing it less and less each day, you give your muscles some time to accommodate.

2. We will get you started in post op physical therapy. This is extremely important and is very different from the therapy you may have had before surgery. They will work with you to get the nerves sliding or gliding (reduce risk of scar formation on the nerves), work to reduce your stiffness, strengthen your back and core muscles, teach you about proper body mechanics and posture, and much more. During the initial 2-3 weeks of rehab you may experience a slight increase in the achiness or soreness of your back, but as your muscles get stronger, that should subside. When you are done with physical therapy, you must make sure to get a home exercise program for your back and core, to do every day. This will help reduce the risk of needed additional spine surgery in the future.

3. After a month of therapy, you can begin to gradually return to the activities you enjoy, but go slowly, using pain as your guide, and seeking the advice of your physical therapist.

Your next follow up with us is usually at the 1 year anniversary of your surgery, with a final set of x-rays (lumbar x-rays and scoliosis x-rays), although for some patients a visit 6 months post op is also recommended.

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PLEASE NOTE: CONDITIONS WILL VARY BETWEEN INDIVIDUAL PATIENTS. IT IS VERY IMPORTANT TO DISCUSS YOUR PARTICULAR SYMPTOMS WITH DR KHAJAVI OR HIS MEDICAL STAFF. THIS INFORMATION SHOULD BE USED AS A GENERAL INFORMATION SHEET ONLY AND SHOULD NOT BE USED IN LIEU OF MEDICAL TREATMENT. THE POST-OPERATIVE INSTRUCTIONS LISTED ABOVE ARE GUIDELINES. DR. KHAJAVI MAY HAVE SPECIFIC DO'S AND DON'TS IN YOUR CASE.

Disclosure / Conflict of Interest Statement:

Collaboration between surgeons and medical device industry has contributed to important advances in spinal surgery. However, some of the collaborations can create situations in which the care of the patient is affected. Dr. Khajavi has served as a consultant for NuVasive, a spinal instrumentation company, since 2004. As one of the earliest surgeons to perform minimally invasive lateral lumbar fusion surgery, Dr. Khajavi receives compensation for activities directly related to teaching and sharing of his experience / results, including reimbursement for travel expenses, meeting registration fees, and a fair honorarium if applicable. Dr. Khajavi also receives payment and/or royalties for product development activities. Dr. Khajavi occasionally receives compensation for certain clinical research projects, but the vast majority of his clinical research receives no compensation or funding. All compensation is at fair market value, and accurately reflects Dr. Khajavi's time, effort, and expertise committed to the activity.

Dr. Khajavi staunchly believes that the patient's interests always come first, and his recommendation regarding surgery is never influenced by his relationship with medical industry. Dr. Khajavi feels patients need to understand a surgeon's exact relationship with medical industry, and to determine whether any conflict of interest exists. Dr. Khajavi welcomes any questions or conversations regarding your specific surgery and the instrumentation utilized.

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