ANTERIOR CERVICAL DISKETOMY With Allograft And Plating

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General Information

You have a problem that is causing compression of your spinal nerves or spinal cord. The most common form of this problem is a cervical herniated disk. Some people may have in addition to a disk herniation overgrowth of degenerative spurs of bone that may also cause nerve compression. The operations that are done to correct this situation may include an anterior cervical disectomy, or posterior cervical foraminotomy or laminectomy. Dr Heilman performs all of these different operations, but feels that the anterior cervical disectomy and fusion is the best approach for your situation. Below are some imaging samples showing a herniated cervical disk on MRI.

Normal MRI of the spine

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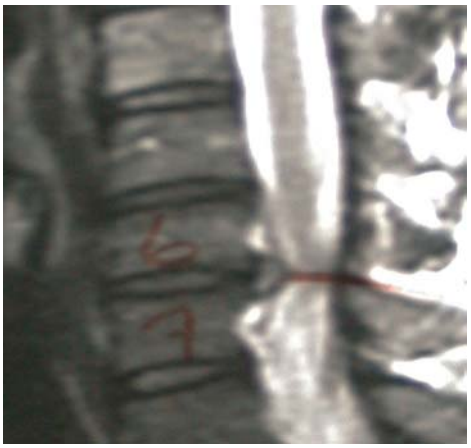
MRI showing foraminal disk on left compressing the nerve



MRI showing herniated cervical disk c 6-7

The operation addresses the compression of the nerve by directly removing the disk or bone spurs. This procedure is called decompression. Following the decompression the spine needs to be stabilized or it will collapse and lead to further problems. This requires a fusion. The cervical fusion is an operation to join together the two bones (vertebrae) surrounding a disc .

These operations are accomplished thru an incision on the front of your neck. The incision is typically placed to one side off the midline, and within a skin crease for cosmetic reasons, but may also be longitudinal (depending on your body size and the number of levels that have to be reconstructed).

During the operation we protect the vital structures of your neck as we approach the spine. This is done by gently retracting them to the side. Once we have the spine exposed we will use special retractors to protect your neck structures while allowing us to complete the operation. We use x-rays to determine the exact level of the disc(s) to be removed. Usually we only remove the disk in-between the vertebral bodies, but in some severe cases, part or all of the vertebral body in front of the spinal cord needs to be drilled out to take the pressure off the spinal cord. This more involved procedure is called a vertebrectomy. Following this part of the operation a bone fusion is performed to replace the disk and or vertebral bodies that have

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been removed. This process is called a fusion. Dr Heilman will discuss the levels and type of decompression you will need.

A titanium plate is usually attached to the spine with screws to allow the fusion to heal more reliably. This provides stability to the area and encourages healing of the fusion. This plate normally stays in your neck forever. Occasionally we need to remove the plate and it can be removed after the fusion is healed. You will be placed into a cervical collar for 1 week and then the collar will be discontinued and a soft collar is used as needed except when you are in a car. If you are a smoker the fusion rate is delayed and we will ask that you stop smoking during the healing period. Occasionally we find that a collar is required if the bones are soft.

Typically you are in the hospital for 1 to 2 days and will return to the office for a follow up visit in 7 to 10 days after surgery. Further follow-ups are at 6 to 8 week intervals or until the fusion is completely healed.

Over the 6 to 12 weeks following surgery the bone graft will grow with your existing spinal bones to provide stability and a fusion of the disk space.

The success of the operation is primarily dependent on 2 factors. First the recovery of the nerve and spinal cord function are dependent on how much permanent damage was done prior to the operation. Most people have excellent return of nerve function for herniated disk involving 1 level. The more levels involved the more difficult recovery is due the multiple nerve roots involved. If your problem is that of spinal cord compression the goal of the operation is to halt the progression of the disease. In this situation , recovery of nerve function is variable. The second goal of the operation is to provide stability to the spine thru a bone fusion. For this fusion to occur you will need to restrict your lifting and sporting activities until the grafts have healed.

Once the fusion is healed you may resume most activities that don't involve contact such as football. Unfortunately there are 7 levels in your cervical spine and there is a small chance that over time you could repeat the same injury at another level in your neck. The incidence of this is low, but very real.

Advantages:

The anterior approach to decompression and fusion has many advantages. First, the spinal disorder can be corrected without an incision in the muscles surrounding the spine. In general, the operation is safe and complication free. It takes approximately two hours to perform a single-level anterior cervical fusion and about three hours for two-level fusion's. Cervical vertebrectomy are more complex and may require several hours of surgery routinely, blood loss with anterior spinal surgery is minimal.
I have never transfused a patient for a 1, 2, or 3 level disectomy. Complete vertebrectomies may often bleed and we may request you to donate blood prior to surgery. If you are concerned about blood loss please let our office know and we will work this concern out with you

Pain is present after any surgery. The pain after this surgery is very minimal and significantly less than after a posterior laminectomy. Because of the pain and disability with donating your own bone we have moved to using bone bank bone for the majority of our fusions. The bone is safe and we feel with the

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techniques we use it is a very acceptable and preferred alternative to using your hipbone. If you want to use your hip bone let us know and we will plan accordingly. The bone donor site is the most common site of pain, but that is not debilitating. Post operatively narcotics will be used as indicated to make you comfortable. In many patients the narcotics cause nausea and Tylenol or Ultracet is all that we normally use. There is a potential for delayed bone fusion with the use of Non steroidal medications post op and for this reason we don not recommend the use of any non steroidal medication's such as Advil or alieve until your fusion is healed.

Disadvantages:

The primary disadvantage of the anterior cervical fusion is the number of levels that can be addresses is limited to below c2 due to technical reasons. Revision surgery is possible, but is more difficult with this approach. When a fusion is performed the natural motion between the 2 vertebral segments in your neck is lost. This may promote permanent stiffness in your neck. The greater number of levels fused the greater the stiffness . Most patients having this surgery have limited motion before surgery. The amount of post op stiffness that is increased for pre op levels is variable. If stiffness occurs it will be in all directions, but this minimal in 1 level fusion's. This loss of motion is typically not a concern for most patients who undergo fusion of one or two levels if appropriate exercises are performed after surgery. However, loss of motion can be a problem for patients who undergo fusion of three discs or more. Patients with three level fusion's notice a definite reduction in motion of the neck in all planes.

Accelerated degeneration of the discs above and below a fusion is possible. Degeneration will occur naturally in discs with the normal aging process may occur more rapidly when a fusion has been performed.

Complications:

The complication rate of anterior cervical fusion is quite low. The most likely complication is that of a non-union, or Pseudarthrosis. This condition develops if the bone graft fails to heal and motion persists. With instrumentation and allograft, the success rate of a single-level fusion is approximately 95%, and the fusion rate for two level fusions is approximately 90%.

If a Pseudarthrosis occurs, then an additional spinal fusion may be necessary in the future. All other complications are exceedingly rare and occur in less than 1 % of our patients. These complications include recurrent laryngeal nerve palsy which is a stretch injury to the nerves which go to your vocal cords. Patients with this complication experience hoarseness. Another very rare complication is known as Horner's syndrome. This is a stretch injury to a different nerve in the neck which produces dryness of the face, drooping of the eyelid and change in the size of the pupil. Both complications are usually temporary and resolve within six months but can be permanent. Rarely patients will have some numbness around the chin adjacent to their incision. Swallowing after surgery is often difficult for 1 or 2 days but usually recovers to normal rapidly. Some patients will snore for the first few weeks following surgery. Sleeping in a relining chair can help this problem if it occurs.

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Infection is exceedingly rare in anterior cervical surgery but represents a possible complication with any surgical procedure and is treated with additional surgery and prolonged antibiotics. Blood clots can rarely develop in the legs or lungs, which would require blood-thinning medicine.

Another rare complication is bleeding around the surgery area causing acute swelling of the neck after surgery. This is a surgical emergency and is the reason we keep you in the recovery room for 3 hours routinely after this type of surgery. We ask that you do not do stressful lifting or coughing during the first 4 weeks after surgery.

Bone graft:

It will be not be necessary to remove bone from your pelvis if you elect to use the allograft. If you do not want to have the bone bank bone, a graft will be harvested from your pelvis. This is performed at the same time as the operation on your neck through an incision about one to two inches in length. This produces moderate pain in the region of the incision which typically lasts about one to two months. Numbness on the front and side of the thigh beneath the incision can occur. Bone may be obtained from a bone bank. We often times suggest this alternative when multiple levels are fused or the patients body size makes harvesting a bone graft difficult. There is no guarantee the some new disease will not be found that we are currently not detecting today. Bone bank bone has been used safely for 20 years without any signs of rejection or disease transmission.

Instrumentation

Considerable controversy exists regarding the use of plates and screws to stabilize the spine during a spinal fusion. In the past spinal fusion's were performed without plates and screws so that immediate stability was not present. With the newer instrumentation systems, immediate stability is achieved in the operating room that allows for an improved fusion rate, and rapid mobility and lessened need of postoperative bracing. The literature is full of contradicting opinions about when to or not to use instrumentation and how effective the fusion rate is improved. My opinion is there seems to be a marked reduction in the amount of pain patients experience after a fusion operation when instrumentation is utilized.

We now use a slotted plate for our fusions that allows better fusion rates and has eliminated the need for autograph and as much bracing.

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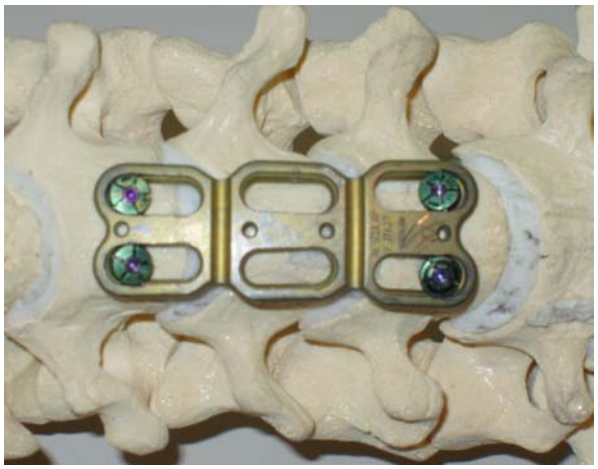

Picture of the Asculap titanium plate on a model

Post op x-ray showing plate after 2 level fusion

There is a complication rate associated with any technique. In proper hands, the complication rate is extremely low. The complications from this type of surgery may include plate or screw dislodgement after surgery, loosing of screws, and plate breakage. If a fusion is slow to heal or does not heal at all then excessive stress is placed across the instrumentation and breakage of the can occur. If the fusion does not heal and the plate breaks some patients are a symptomatic There is the potential as with any surgery, however, for injury to the various structures within your neck.

I feel that the advantages of instrumentation greatly outweigh the disadvantages. However, fusions have been performed for years without plates and screws and plates can be avoided if you are willing to accept a lower success rate and bracing that may include bracing and or a halo. If you have any questions or concerns regarding the use of plates and screws, be sure to notify me so that an appropriate, educated decision regarding your surgery can be made.

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Important pre-operative considerations

Smoking is a major health hazard and delays the fusion of bone. This complication of delayed healing or Pseudarthrosis (failure for the bone grafts to heal—see complications, general) is markedly increased in smokers. If you smoke the most important thing you can do for yourself pre-operatively is to quit as many months before surgery as possible. This will allow your bone grafts to heal as quickly as possible.

The second, complication with smoking involves the lungs. Smokers have a higher risk of fluid collection and pneumonia with anesthesia.

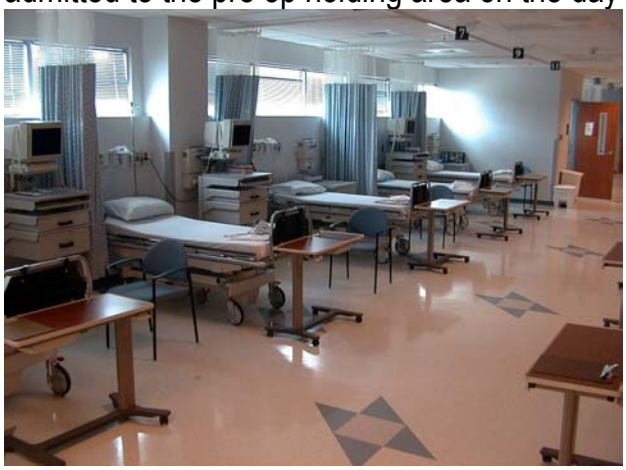
Lastly, your heart and lungs will work better after surgery if you quit smoking . This will allow improved rehabilitation.

Hospitalization

You will need to be pre admitted to the hospital and have an interview with the anesthesiology department before surgery to discuss any problems with your health and general anesthesia .

anethesiology interview

You will be pre admitted to the pre op holding area on the day of surgery. Your family can be with you.



pre op holding and check in

You will be in recovery for 3 hours after your surgery. Your family will be able to visit you during the later stages of this time

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recovery room

Hospitalization for an anterior cervical fusion is short and most patients are discharged the first or second day following surgery. The operation itself is extremely well tolerated by most patients and causes minimal pain due to the absence of an incision in the spinal muscles. Patients typically feel a mild degree of neck pain, but the primary complaint of most patients is simply a sore throat. The sore throat usually lasts about one to two days and then resolves completely. Throat lozenges will be provided to you to ease your discomfort. Some patients have a moderate degree of tenderness around the back of the neck. This is nothing to be alarmed with and usually resolves as the fusion heals.

Chances are that your primary complaint after surgery will be pain at the bone graft site if you do not use bone bank bone. Pain at this site will diminish rapidly but can persist to a lesser degree for a month or two (see bone graft above).

As the pain associated with an anterior cervical fusion is minimal, pain is controlled with oral medicines. If these measures are ineffective then a P.C.A. pump, or patient control analgesia, will be utilized. In this situation, a computerized pump allows you to regulate the amount of pain medicine you receive via your i.v. lines. It will not allow you to over dose on this medication. The anesthesiology service will typically help manage your pain while your IV is in.

The combination of these medicines seems to provide excellent relief of the minimal pain experienced by anterior cervical fusion patients.

Bandages and surgical drains will stay in place until the first or second postoperative morning at which point they will be removed and a light dressing will be applied.

Typically, a urinary catheter is not necessary as patients can walk to the restroom soon after surgery without difficulty. If you experience difficulty with urination (usually older males) then placement of a catheter may be necessary. Removal of the catheter is typically minimally painful , quick affair and typically occurs on the morning after surgery.

Activity in the hospital

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The bone graft is inserted at the time of surgery so that stability of your spine is achieved. Your neck will not fall off and you need not treat your neck like egg shells. Excessive motion of the spine is undesirable, as it will delay healing of the graft and may allow the graft to move if no plate has been used.

A neck collar will be applied to your neck in the operating room while you are asleep so expect a collar when you awake in the recovery room. The collar is to be left in place and removed only by physicians and or nurses. Once you arrive in your room, the nursing staff will assist you with sitting and walking until you are independent. Thereafter, you can stand and walk without concern.

During your hospitalization you may be seen by an internist to assist in the care of your medical condition

You will be given 2 collars after surgery. The plastic tan collar is to be worn in the shower. The blue collar is one that is typically worn the rest of the time. Either collar is effective at immobilizing your neck. They will usually be removed at the first post op visit and then only used in the car. They don't have to be on so tight as to make it difficult to swallow or breath. Some patients may actually get arm pain from the brace pressing on the nerves in the shoulder area. If you find this happening let our office know so that we may make adjustments to your neck brace.

It is critical to understand that the most important thing that you can do for yourself while in the hospital is to mobilize quickly. Patients who lie in bed and fail to be aggressive with mobilization seem to have more pain, a higher rate of complications and spend longer in the hospital. Your sifting and walking schedule will begin the night of surgery.

Keep your wound clean and dry until the 4th post-operative morning. Therefore, you will not be allowed to shower while in the hospital.

Discharge requirements

You should be totally independent in rest room activities as well as ambulating in the halls to a distance of approximately 50 yards without difficulty.(2 trips around the nursing pods at Texas Orthopedic Hospital) You must be able to control your pain with oral medicines.

Wound care:

A new, sterile dressing should be applied to your wounds each morning for five days after surgery. It is common to notice a small amount of bloody drainage for the first three days after surgery. You may stop any further bandaging after five days if your wound is dry. Expect a minimal degree of tenderness and swelling around the incision site. Minimal to moderate degree of redness at the incision site and extending to each side of the incision a few millimeters is also to be expected.

If your wound is still draining on the third morning after surgery, it is important that you provide local wound care. Twice a day the bandage should be changed and the wound itself should be cleaned with a sterile Q-Tip dipped in hydrogen peroxide. You should avoid exposing your wound to water until all drainage stops for 24 hours.

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The wound should be kept totally dry for at least four days after surgery. Thereafter, (assuming no wound drainage is present) you may begin showering. Exposure of the wound to water should be limited to a relatively brief shower (not bath tub) for the first two weeks following surgery. Once the wound is totally healed following this two week period, then a bathtub is fully acceptable. As stated in the previous paragraph, do not expose your wound to water if it is draining. Many patients experience dizziness the first time they are in the shower. DO NOT SHOWER ALONE THE FIRST TIME AFTER SURGERY. Also an amazing number of patients fall after surgery while showering. For this reason you must wear your brace (Tan Plastic) in the shower.

Small pieces of surgical tape will be noted across the wound which should be left in place. Typically these tapes come off in the process of showering, etc. In the first two weeks. If any residual tape is in place two weeks following surgery, then feel free to remove them.

If you notice increased tenderness, swelling, redness, or drainage from the wound, notify the office immediately. If you notice any clear fluid draining from your wound or if severe headache develops then you should call immediately as well.

Once the wound is totally healed, about two weeks following surgery, a vitamin E crème, or aloe vera obtained from your local pharmacy will hasten maturation of your scar. It is important to use sun screen on your scars for 1 year. Failure to do so will lead to further scaring.

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Diet:

Your diet should be restricted to foods which are easy to swallow for the first three days after surgery. Many patients experience mild to moderate difficulty swallowing for the first few days after surgery which usually resolves quickly. On occasion, difficulty with swallowing may last as long as two or three weeks. The trouble swallowing is due to swelling of the tissues within your neck and is best managed with patience as well as chewing your food a little better than usual. Drink plenty of liquids with your food and use very small bites.

Collar wear:

The purpose of your collar is to limit motion of your neck and encourage early healing of your fusion. The collar should be worn during the first week to allow the fusion and surgery site to stabilize. When you clean your neck have your head supported on a chair back or pillow. Avoid extending your neck. At times a heat rash will develop under the brace, especially in the summer months. This is basically a moisture problem. Cornstarch applied on the skin underneath the collar seems to be of benefit. A hair dryer placed on the cool cycle can serve to dry the skin quickly. Do not use oils, crèmes, or lotions as this will only aggravate the moisture problem. If a marked rash or irritation develops, notify the office immediately.

Philadelphia tan collar

Miami J blue collar

Most patient do not require bracing after the first week and this will be discussed with Dr. Heilman at your first follow-up after the x-ray is reviewed. Rarely continued bracing of your neck brace will be required until a solid fusion is seen on the x-ray. This can range anywhere from **six to twelve** weeks and is basically dependent on the ability of your body to form bone. The decision to discontinue brace wear will be made in the office and will be based on the appearance of your spinal X-rays and how you are doing clinically.

Showering:

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Excessive motion of the neck typically occurs during hair washing and you should wear your collar during showering. After your shower the collar should be removed at which point you may sponge-bath and dry your neck. You will have been discharged with two collars so that a dry collar can be applied after sponge-bathing your neck. The wet collar should be placed in a window sill so that it can dry completely.

Activities and Rehabilitation:

Adequate rehabilitation is crucial for a successful result. Many patients with spinal injuries have suffered from spinal pain for months or years and considerable atrophy, or shrinkage, of the muscles has developed. Rehabilitation of the spine to accomplish spinal fitness is absolutely. This rarely requires formal physical therapy.

During the six to eight weeks of collar immobilization, no motion of the neck is allowed. During this period you should engage in an aggressive walking program. While in the hospital ambulation to a distance of 50 or so yards is typically achieved.

Immediately, at the time of discharge, this ambulation program should be continued, walking more and more each day. In general, I recommend three to five episodes of exercise a day. There is no upper limit to the distance.

You may use 3 pound weights for the first 4 weeks with your arms to increased to 5 pounds as tolerated there after.

The only other acceptable exercise during this period of healing is stationary bicycling.

When you are advised by me that your x-rays reveal a solid fusion then range of motion exercises are necessary to restore normal motion to your neck. The best approach here, in my opinion, is a home exercise program so that exercises can be performed several times a day. Many physicians utilize physical therapy but this seems to take much longer (and is expensive) as only one visit to physical therapy can be arranged on a single day. I recommend that patients perform the following motion exercises every hour while awake all day long.

The neck moves in six ways:

1) bending forward
2) unbending backward
3) returning or rotating to the right
4) returning or rotating to the left
5) tilting to the right
6) tilting to the left

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Start with the first exercise above. The patient should bend the neck forward until moderate tightness is encountered and maintain this position for five full seconds. Thereafter, return to neutral position and then repeat this five second activity five times.

These same series of exercises should be repeated for each of the six motions described above.

If you perform the exercises as instructed then near normal motion will be achieved in one to two weeks. Remember, do not start these exercises until instructed to do so by me which will be when your fusion is healed

After normal motion is achieved with the exercises described above you may return to unrestricted activities. If you are a very active person then further rehabilitation is recommended via a swimming program .Swimming three times a week serves well to strengthen the neck muscles.

After normal motion is achieved slow return to routine activities . The return to recreational athletics should be slow and progressive. For instance, golfers should spend a month or so at the driving range progressing slowly with common sense. Once a half-hour of driving range activities is well tolerated, then nine holes of golf is a reasonable step. We would be glad to discuss specific activities with you.

Driving

I recommend you avoid driving while you are wearing your collar for the first six to eight weeks after surgery. This is a considerable imposition but it is not safe to operate a vehicle when you can not turn your neck. During the healing period it is perfectly acceptable to ride in a car while others are driving. Prolonged trips in a car will produce moderate neck ache for the first few months after surgery. Expect slow increased tolerance to driving during the first three months following surgery.

Lifting

I feel lifting weights up to 20 pounds is acceptable during the healing process. Strenuous lifting is to be avoided until a solid fusion is achieved.

Work

Patients who have sedentary jobs often return to work within seven days following surgery as long as transportation by others can be arranged. If your job involves heavy work, then return to work will not be possible until a solid fusion has been obtained.

Expectations:

Recovery from anterior cervical fusion is quite variable. Patients usually achieve a dramatic, remarkable reduction in their pain with minimal associated operative pain. The relief of arm pain present before surgery is usually immediate although numbness and weakness in the arm can require months to resolve fully. On occasion, numbness in the arm can be permanent depending on the duration of symptoms prior to surgery.

Neck pain resolves more slowly after surgery than arm pain. Some patients do not achieve substantial relief in their neck pain until a solid fusion has been achieved. Increased pain with prolonged sitting and driving is

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expected as well. As per the other activities described above, slowly increase your exposure to these activities and expect decreased discomfort with time.

Some difficulty sleeping is commonly described for the first month or so after surgery. I recommend to my patients to avoid naps during the day if you are having problems sleeping. It will help if you find a comfortable sleeping position. I do not like to resort to sleeping medicine.

Once a solid fusion has been obtained and adequate rehabilitation has been accomplished, we expect a dramatic reduction in your preoperative pain. Many patients describe complete relief of pain. There are also a substantial number of patients, approximately 30%, that will persist with ache in their neck with various activities and early in the morning. It should be stressed that this discomfort is minimal in nature and represents a vast improvement over the preoperative pain level, according to most patients. Despite an excellent technical result, a small percentage of patients will have persistent pain and are unhappy with their surgical result. This ranges from 5-10% of the patients who undergo anterior cervical fusion. If this does occur then you will be given the option to consider additional studies in hopes that a separate pain source can be identified.

Long-term restrictions:

There are no long-term restrictions associated with one level anterior cervical fusion operations. As more levels are fused the limitations relate to restricted neck movement. Bunji jumping and jobs required hard hat use and heavy construction may not be possible. Riding horses and 4 wheels drive rough courses should be discussed with Dr Heilman on a case by case basis.

Medications:

The use of narcotic medications is a huge problem for us in that most patients come to our office having been over medicated. Narcotic tolerance and dependency develop extremely easily. In general, we recommend that you discontinue narcotics two to four weeks before surgery.

Ample pain medicine will be given to you while in the hospital to ease operative discomfort. You will be discharged with a course of anti-inflammatory medicine as well as a moderate quantity of pain pills. Mild to moderate pain should be tolerated, and the pain pills should be utilized only when you are unable to cope with your discomfort. Due to the problems of narcotic addiction, no narcotic pain pills will be utilized beyond one month postoperatively.

Office visits:

Upon leaving the hospital, you should call my office and arrange the first postoperative visit which should 7 to 10 days following surgery. You will be seen in the office and x-ray will be done to assess the condition of your fusion. You will be seen again in the office in six or eight weeks following surgery for your second post-operative visit (depending on the appearance of your initial x ray and your clinical condition). A third follow-up will be done to determine when the fusion is healed and to begin rehabilitation .

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Lastly, you are urged to return for a final x-ray at six months following surgery. The long-term appearance of your fusion and prognosis will be discussed, and we strongly urge you to make and keep your six month follow-up visit.

You will need to fill out the following consent

Please initial each page and sign below that you have read all pages of this hand out . You may request an additional copy for your home use.

I have read and understand this handout

As with any handout over time the practice of medicine changes and the updating of handouts may not reflect the exact procedure Dr. Heilman had to perform on you. If you have any questions please contact Dr. Heilman to discuss this further.

Witness_____ I

I have read this handout and understand the operation and risks and benefits_____
Date_____Time_____

Glossary

Anterior: in front of the body

Posterior. In back of the body

Disc: the soft cushion between two vertebrae

Vertebrae: the bones in one's spine, which surround a disc

Fusion: growing together of the two bones surrounding an injured disc so that painful motion is stopped

Single Level Fusion: fusion of the two vertebrae surrounding one disc

Two Level Fusion: fusion of the three vertebrae surrounding two discs

Three Level Fusion: fusion of the four vertebrae surrounding three discs

Pseudarthrosis: non-union or failure of bone to grow together

Allograft Bone Graft: bone form a bone bank used for fusion

Auto graft Bone Graft: Bone harvested from the patients pelvis

Ambulation: the act of walking

C6/7: lowest disc in the neck

C5/6: first disc above C6/7

C4/6: second disc above C6/7

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PATIENT INFORMED CONSENT FOR
ORTHOPEDIC SPINAL RECONSTRUCTIVE SURGERY
DR ALAN E HEILMAN MD PA
FONDREN ORTHOPEDIC GROUP LLP

- **Patient Name:**_____
- **Age:**_____
- **Date:**_____ **Date of Surgery:** _____
- **I have elected to have the following operation by Dr. Heilman and / or associates:**
  _____
  _____
-
- **For the following diagnosis:**
  _____
  _____

- **Dr Heilman has explained this operation in full.**
  I have had the opportunity to have second opinions offered to me.
- **Spine surgery never allows a person to have a normal spine.**
- **The intent of Dr Heilman's surgery is to improve your condition so that you may be able to function better.**
- **Chronic pain is never desirable but may be present after this surgery.**
- **Pain improvement of varying percentages is hoped for and attained in most patients.**
- **No warranty or guarantees have been given that pain or neurological function will return to normal.**
- **You may have continual pain after surgery and may require additional surgery for the removal of disk, bone or implants at the level of surgery or at another level.**
- **Rarely some patients are not better after surgery and their condition may worsen.**
- **If you are having a fusion performed some stiffness will occur and it will be permanent. This stiffness may lead to the deterioration of adjacent levels or disks in your spine over time.**

- **I have read the surgical hand out given to me. Dr. Heilman may have to alter what is written in the handout at the time of surgery if additional findings are found. I understand that Dr Heilman will be the primary surgeon and any assistants will be under his direction.**

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- **Normally Dr. Heilman will try and avoid a bone graft and use your own spine bone with bone bank bone if a fusion is needed. If you prefer otherwise let Dr. Heilman know.**
- **Normally assistants are discussed prior to surgery, but Dr Heilman may find intra-operatively that assistance is needed and arrange for this. I understand that Dr Heilman may have to modify my surgery if additional findings are seen at the time of surgery. I have discussed and directed Dr Heilman to repair these findings as needed. This may alter the levels of surgery, and it may necessitate a fusion with or without instrumentation.**
- **The risks of spinal surgery including death, paralysis, nerve damage, spinal cord injury, bleeding requiring a transfusion, infection and possible osteomyelitis requiring further surgery and long term antibiotics, sterility in males, impotence in males, blood clots in the legs requiring anticoagulation, infection, dural tear, spinal fluid leakage, stroke, vascular injury, hardware loosing and pain, scaring of nerve roots after surgery, chronic pain, injury to the major blood vessels, abdominal herniation after anterior lumbar surgery, recurrent herniation, sympathetic pain, degeneration or instability at adjacent or the same levels of surgery, chronic changes in gait, changes in flexibility of the spine, weakness of muscles, chronic numbness, and bleeding into soft tissues causing compression of the nerves called a hematoma requiring emergency surgery**
- **Cervical operations have additional risks. Those include the above, and the risks of bleeding into the soft tissues of the neck causing compression of the trachea or breathing tube or nerves requiring emergency surgery, swallowing difficulty, horners syndrome with visual changes, hoarseness, and scaring.**
- **<u>THESE RISKS HAVE BEEN DISCUSSED WITH ME BY DR HEILMAN. DR HEILMAN HAS EXPLAINED TO ME THE PROCEDURE I AM HAVING IN DETAIL AND GIVEN ME AMPLE TIME TO ASK QUESTIONS ABOUT THE PROCEDURE. I HAVE NO FURTHER QUESTIONS. AND WISH TO PRECEDE WITH THE SURGERY.</u>**

- **Signed** _____
- **Parent if minor**_____
- **Witness** _____
- **Date** _____ **Time**_____

Modified 9-10-2003

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