SHOULDER JOINT REPLACEMENT

Dr. Dale Snead-Methodist Sports Medicine-Indianapolis, Indiana

The Patient’s Guidebook for Shoulder Surgery
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The shoulder girdle is one of the most complex and interesting parts of your body. The shoulder joint has a greater range of motion than any other joint. However, it must maintain this mobility at the expense of joint stability. The shoulder girdle is made up of the **clavicle** (collarbone), **scapula** (shoulder blade), and **glenohumeral joint** (shoulder joint) (Figure 1).

The shoulder girdle is attached to the rest of the body by the connection of the clavicle with the sternum (Figure 2). The other end of the clavicle is attached to an outcropping of the shoulder blade known as the **acromion**. This joint is called the **acromioclavicular joint** (AC joint) (Figure 1). The shoulder blade is attached to the rib-cage and spine by several muscles. The shoulder blade is a rotating platform which moves along the chest wall to help position the shoulder joint and the rest of the arm. The glenohumeral joint is a modified ball and socket joint which is the connection between the **humerus** (upper arm bone) and the **glenoid** (socket portion of the shoulder blade). The glenoid is relatively shallow and thus does not contribute a great deal to stability of the joint. The shoulder joint is stabilized in two main ways: muscle forces and **ligaments**. There are four small muscles that attach to the shoulder blade and and the humerus and provide both movement and stability to the shoulder.
How does your shoulder work?

These muscles include the subscapularis, supraspinatus, infraspinatus, and teres minor. Collectively these muscles are referred to as the rotator cuff (Figures 3 & 4). The term “rotator cuff” originates from the fact that the muscles aid in rotation of the movement in the normal joint and their tendons form a cuff around the humerus. When the the four muscles contract together they squeeze the joint together in such a way that when the arm moves the ball remains centered on the socket. Even with extremes of shoulder the ball slides no more than 1/16 th of an inch in any direction!

The muscles do the majority of the work stabilizing the joint, but at extreme positions the muscles are at a mechanical disadvantage and can’t effectively stabilize the joint. This is where the ligaments come into play. Ligaments are tough, fibrous tissue that connect bones with other bones. In normal ranges of movement the ligaments are slack but in extreme positions they become tight and function as sort of a check-reign preventing dislocation of the joint.

The tendon of the biceps muscle may also play a role in stabilizing the joint. The biceps muscle has two upper tendons. The longer of the two tendons goes through a small groove in the front of the humerus and crosses the shoulder joint and attaches on the top of the socket (Figure 4). The tendon is held in the groove by ligaments, which form a pulley system that keeps the tendon from riding out of the groove.

During normal shoulder motion the muscles fire in a synchronous fashion allowing smooth, coordinated movement of the scapula and glenohumeral joint. The power muscles such as the deltoid, pectoralis, and latissimus dorsi work together with the rotator cuff so you can raise your arm. Any change in muscle function disrupts this delicate balance leading to worsening of function of the shoulder girdle.
Shoulder Joint Arthritis

The term arthritis refers to a degenerative condition of any joint which involves gradual loss of cartilage from the joint surface. Cartilage is a “coating” on the end of our bones which forms a smooth, low friction bearing surface. With progressive degeneration the cartilage becomes worn away until joint surfaces are bone on bone. Eventually the bone adapts to these changes by becoming irregular and forming bony protrusions called spurs.

Arthritis is a condition that usually develops slowly over many years. The most common form of arthritis is known as “wear and tear” arthritis also called osteoarthritis (Figure 5). This type of arthritis has no specific known cause other than the joint simply wears out. Post-traumatic arthritis occurs as the result of an injury which damages the cartilage and causes eventual changes identical to osteoarthritis. Rheumatoid arthritis is a unique type of arthritis that effects the entire body. This type of arthritis involves several joints and other organs such as skin, lungs, eyes and intestines.

Initially the symptoms of arthritis are mild causing an occasional ache. As the condition progresses patients mainly notice an increase in the frequency and severity of the pain. Less obvious is a gradual loss of mobility of the shoulder. Eventually pain becomes constant, especially at night, and interferes with even normal activities.

Figure 5: X-ray of shoulder with osteoarthritis
What Kind of Surgery is Performed to Correct Your Shoulder Problem(s)

Joint Replacement Surgery

Because the normal smooth surfaces of the ball and socket have been replaced by misshapen bare bone these bones have to be resurfaced. Since there is no current way for surgeons to resurface the bones with new cartilage, synthetic materials must be used. In most cases both the ball (humeral head) and socket (glenoid) are replaced. The humeral head is removed and is replaced by a chromium alloy hemisphere (Figure 6). The hemisphere is attached to a stem which is inserted into the arm bone. The stem size is chosen to make a tight fit into the bone. Over several weeks the bone actually grows into the rough metal surface locking the stem into the bone.

In most cases the socket is resurfaced with a plastic liner which is cemented into the bone. Occasionally there is so much wear of the bone around the socket that a liner cannot be implanted. In these cases only the ball is replaced and the socket is left alone.

How successful are these procedures?

In our general population of patients the success rate has been 90%. This means that 90 out of every 100 patients have dramatically less pain, improved function, and would have the surgery again if they were in a similar circumstance. Ten percent of patients do not improve for a variety of reasons. These individuals are typically no worse than before surgery but they would not have surgery if given the opportunity again.
Potential Risks of Your Surgery

Any surgery that we perform has certain documented risks. These potential problems can arise even when the surgery is carefully planned and performed. The most notable risks are outlined below. Fortunately, the incidence of such complications with elective shoulder surgery is very low. Certain factors may slightly increase your potential risk such as previous operations on the same shoulder or coexisting medical conditions (e.g., diabetes, heart ailments, etc.). Our surgical team will discuss any such condition prior to surgery if it may have a potential impact on your recovery. Dietary supplements, herbal remedies, and blood thinners can also cause surgical complications. They should be discontinued 1 week prior to surgery. The following risks appear in the order of frequency:

Peri-operative risks

1. Anesthetic complications-
   - **Sore throat** only occurs in patients who undergo general anesthetic and is caused by the breathing tube used to provide airflow to your lungs. The soreness is temporary usually resolving in 24 to 48 hours.
   - **Nausea** occurs from the various drugs that are used during anesthesia. The newer drugs have a lower risk and several anti-nausea medications are available to minimize the symptoms.
   - **Shortness of breath** only occurs in 3% of patients who undergo an interscalene block (see section 6 on page 12 for a description). For 12 to 24 hours you may get the feeling that you can’t take a deep breath. This is due to temporary paralysis of the phrenic nerve, which blocks the action of half of the diaphragm muscle. Once the block wears off the feeling disappears.

2. Medications (i.e: Aspirin, NSAIDs (Motrin, Ibuprofen, Advil, Aleve)- These medications are blood thinners and can cause excessive bleeding during and after surgery. They should be discontinued one week prior to surgery. If you have questions regarding the type of medicine that you are taking please contact our office promptly (817-1271). If you are taking Coumadin or Plavix, you must contact your prescribing physician regarding instructions on discontinuing these medications.
**Herbal Supplements/Weight Loss Products.** The use of any weight loss products or herbal supplements must be discontinued **1 week prior to surgery.** These products can interfere with bleeding control and anesthetic medications.

**Serious complications** - More worrisome complications such as severe drug reactions and death are, fortunately, extremely rare. The risk of anesthesia is said to be lower than the chance of being hit by a car!

2 **Operative Risks**

**Bleeding** - Bleeding is expected during surgery because of the generous blood supply to the shoulder. With special instruments we cauterize small blood vessels to minimize bleeding. Blood loss during most shoulder surgeries is less than 1 to 2 ounces.

**Infection** - rarely occurs. The risk has been estimated at roughly 1 in 500 surgeries. If an infection does occur then further surgery and antibiotics may be necessary to treat the problem.

**Nerve damage** - is an extremely rare complication of shoulder surgery. If nerve function is lost it is usually temporary with return of function over a period of time.

**Post-operative risks**

1. **Stiffness** - In a small percentage of patients a condition called **adhesive capsulitis** may occur. This simply means that the shoulder becomes stiff (ie-loses mobility) due to scar tissue formation. This can be a result of poor effort during rehabilitation or more often the stiffness occurs for no obvious reason. In most cases the condition is temporary and resolves with diligent rehabilitation.

2. **Re-Injury** - If you are undergoing a reparative or reconstructive procedure bear in mind that we can’t make your shoulder better than new! If you should fail to comply with your rehab program or sustain a significant injury after surgery the result may be compromised.

3. **Failure of the prosthesis** - With time, the plastic socket can wear out and eventually the entire prosthesis can loosen from the bone. This usually occurs after 10 years or more. However, strenuous use of the shoulder can accelerate wear.
Planning Before Your Surgery

Special Tests

It is most likely that you have already had shoulder x-rays by your family doctor or in our clinic. If necessary, you may have to undergo other tests such as an arthrogram, MRI (magnetic resonance imaging), EMG (electromyography), etc. These tests are not always required and are obtained at the discretion of your surgeon.

Pre-operative Physical Therapy

Many patients have had a trial of physical therapy as part of their prior treatment. For certain surgical procedures we may recommend a visit to the physical therapist to learn specific exercises which are to be performed after surgery.

General Medical Check-up

For individuals who have a history of certain medical conditions, (e.g. heart ailments, lung disease, etc.) a visit to the primary care physician may be recommended. This gives your doctor an opportunity to identify any potential health risks and correct them prior to surgery. In some cases surgery needs to be postponed while further testing or treatment is initiated.

Herbal Supplements/Weight Loss Products. The use of any weight loss products or herbal supplements must be discontinued 1 week prior to surgery. These products can interfere with bleeding control and anesthetic medications.

The Night Before Surgery

You should not eat or drink anything after midnight. This is a precaution to avoid anesthetic complications.
The Day of Surgery

Check-in

You will have to register at the hospital on the day of surgery. The specific time and location will be given to you during your office visit or by mail. Please be prompt! **Failure to arrive on time unnecessarily delays not only your surgery but those who are having surgery after you.** If you are significantly late your surgery will be canceled. You will be asked to arrive at least 2 hours before the actual surgery time to allow for the registration process, pre-operative testing, and consultation with the anesthesiologist. After you have registered a nurse will check you into the surgical holding area (Figure 7). She (he) will ask you several questions relating to your past health and take your temperature, blood pressure, etc. You will then be asked to change into a hospital gown.

Anesthesia

The nurse will start an intravenous (I.V.) line which will be used to deliver medications to your bloodstream during and after surgery. Immediately before surgery the anesthesiologist will discuss the details of your anesthetic. In many cases we will ask the anesthesiologist to administer an **interscalene block**. This technique involves an injection of local anesthetic (similar to novacaine) into the base of your neck once you’re asleep. The medication **numbs the nerves which supply the shoulder and arm and hand.** The benefit is two-fold. First, the block lowers the dose of anesthetic required to keep you asleep. Secondly, **the numbness lasts an average 30 hours (12 to 48 hrs) after surgery**, which means you have no pain during this time. **You may or may not be able to move your fingers or you may experience motor paralysis of the entire upper extremity.** Occasionally the nerve which stimulates the diaphragm can also be affected. This may give you the sensation that you can’t take a deep breath. This sensation fades as the block wears off. You may also notice that your entire arm and hand becomes swollen and warm. This is also a temporary effect of the block. **The block does wear off and is not permanent.** Any questions you have regarding anesthesia should be addressed to the anesthesiologist.
Surgery

After you have been prepared, the nurse from the operating room will take you to the surgery area. You will be asked to wear a surgical cap to cover your hair. After being checked in a second time you will be wheeled into the operating room (Please note that you will be asked many of the same questions on several occasions. This is merely to prevent any important information from “slipping through the cracks”.)

The surgical team is composed of the surgeon, his assistant(s), 2 to 3 nurses or surgical technicians and the anesthesiologist. The temperature in the room is typically lower than normal and warm blankets will be provided. Once the anesthesiologist is prepared he will administer medicine which will make you feel relaxed. Afterwards, more medicine will cause you to fall asleep. At this point the anesthesiologist will proceed with an interscalene block and/or general anesthetic.

Surgical time varies from case to case but we will make a time estimate for your family so they can plan appropriately. After surgery Dr. Sallay will talk to family members to update them on your surgery. Please make sure that family members are available at this time.

Post-Anesthesia Recovery Unit (PACU)

When you awaken from the anesthetic you will be in the PACU. A nurse will be assigned to monitor your progress and address your needs. If you have had a block you will notice that your shoulder and arm are paralyzed. Don’t panic! This is an expected result of the block. After you have stabilized you will be transferred to your room or the second stage recovery area in preparation for discharge. It is only at this time that your family members will be able to see you. Family members are not allowed in the main recovery area until you are awake from the anesthesia.
What to Expect after Surgery

Sling/Brace Wear

After surgery you will be given a sling. The purpose of the sling is to protect the tendon repair. The sling must be worn at all times for 4 – 6 weeks, except during therapy exercises and showering. You may loosen the sling and use your arm for light waist level activity with the arm at the side (eating, washing your face, putting in contacts, using a keyboard). You may bend your elbow keeping the shoulder still. You may not lift your arm away from your body, lift heavy objects, or perform forceful repetitive activities.

Driving

You should not drive until your shoulder is out of the sling and you have full control of your shoulder muscles. Until that time you may not have the ability to react rapidly in an emergency situation. You should refrain from driving for 4-6 weeks.
What to Expect at Home

Medications and Pain Management

If you have had a successful block you will have no pain for an average of 30 hours (12-24 hrs.). Occasionally the numbnness can last longer. When the block wears off you will feel a “pins and needles” sensation in your hand and arm. In most cases you will regain use of your hand first, then your arm, and lastly your shoulder. When you have normal feeling in the skin just above the elbow take some oral pain medication. Once the block wears off completely the pain medicine will have already taken effect. This prevents an abrupt transition from essentially no pain to severe discomfort. If the block is still in effect when you go to bed take the pain medication immediately before you go to bed. Remember for the first 24 to 48 hours it is wise to stay ahead of your pain. Don’t be too timid or proud to take your medication regularly during this time. The following is a list of the common medications prescribed:

**Norco:** Dosage is 1-2 tablets every 4-6 hours as needed for pain. Norco is a narcotic pain relievers which alter your perception of pain. These medications can make you feel sleepy therefore you should not drink alcohol, drive, or operate machinery while taking them. Norco can cause nausea, particularly if taken without food. Always take your medications with food. Additionally some patients will notice constipation. To minimize this be sure to drink plenty of fluids, especially fruit juices. Itching is also a side effect in some patients. Over the counter Benadryl can be used to minimize the symptoms. Norco contains acetaminophen so, to avoid toxicity, do not take additional medicine containing acetaminophen when taking Norco. Once your pain has reached a more manageable level you may switch to using an over-the-counter medication such as Tylenol. Anti-inflammatory medications (ie: Relafen) will help with swelling, stiffness, and pain.

**Torodol:** Dosage is 1 tablet (10 mg per tablet) every 6 hours with a meal. This is an oral anti-inflammatory that helps with swelling, stiffness and pain.
Cryotherapy

Cryotherapy (cold therapy) is just as important in your pain management as the medications. You should apply ice to your shoulder frequently, especially for the first several days after surgery. In most cases you will be provided with an ice cuff. This device is a vinyl bag which is contoured to your shoulder and can be filled with ice water from a thermos (Figures 8 and 9). The cold helps to decrease inflammation and therefore pain in the shoulder. You should use the Cryo/Cuff liberally especially the first few days after surgery taking breaks for showers eating, etc. At night time you don’t have to sleep in the cuff, although if you wish to do so that’s OK. Remember that cold therapy is one of the most effective pain control strategies.

Wound Care

In surgery we apply a sterile dressing sealed with a plastic protective covering. You do not need to change the dressing. Leave the dressing on until you return for your first visit after surgery. You may shower with this type of dressing, however, you may not submerge your shoulder in a bath tub or a pool. If your dressing should accidentally come off or get wet call our office. In many cases a small amount of blood will be soaked up by the gauze resulting in a red spot. This is normal. If the dressing is saturated with blood, however, you should call our office.
Sling/Brace Wear

After surgery you will be given a sling. The purpose of the sling is to protect the tendon repair. The sling must be worn at all times except during therapy exercises and showering. You may use your arm for light waist level activity with the arm at the side in the sling. You may bend your elbow keeping the shoulder still. You may not lift your arm away from your body, lift heavy objects, or perform forceful repetitive activities.

Physical Therapy Exercises

You will be given physical therapy exercises, which will be individualized based on your type of surgery and any special circumstances. Therapy is every bit as important to your recovery as the surgery itself. Be sure to perform your exercises diligently as instructed. A therapist will provide specific rehabilitation instructions. You may be instructed to begin some simple exercises the day after surgery. An outline of the exercises is included in this packet. If you are having trouble doing your exercises please call our office.

Toiletting

Toiletting may be a bit difficult. You should not reach behind your back with the operated side for 4 weeks.

Sleeping

You may notice trouble getting comfortable at night, which can last several weeks. Many patients find it helpful to sleep in a recliner or propped up on several pillows in bed. You may sleep on the operated shoulder; this will not damage anything repaired during surgery. However, you probably should not try this for a while because it is uncomfortable.
**Driving**

You should **not** drive until your shoulder is out of the sling and you have full control of your shoulder muscles. Until that time you may not have the ability to react rapidly in an emergency situation. You should refrain from driving for **4-6 weeks**.

**Work**

You may return to light duty work within 1 week in most cases. Return to **full** duty work will be based on your specific job and your progress in rehabilitation. The range is 3-6 months.

**Exercise**

You may begin lower body exercises (exercise bike, StairMaster, weight machines) whenever comfort allows. Running may take several weeks because the impact of running will be painful for your shoulder initially. You should not resume any upper body exercise (except physical therapy) until you have consulted with Dr. Snead.
Common Problems

Pain

Some degree of pain is anticipated with any surgery. If you underwent an interscalene block you will be pain free for 12-24 hours. After the block wears off you will experience normal post surgical pain. **Make sure you take your pain medicine before the block has completely worn off.** Failure to do this results in a sudden change from no pain to a lot of pain. Once you have begun to experience the pain treat it promptly and stay ahead of the pain by regularly taking pain medicine. A common mistake is to wait too long between doses because the pain level seems reasonable. The medicine works much better to prevent the pain rather than treating the pain once it has occurred. Take it regularly for the first 24-48 hours.

Remember some pain is **normal**! However, your pain should diminish day to day. If you notice worsening pain after several days call the office.

Nausea

Nausea and vomiting can occur for several reasons. In the first 24 hours the anesthetic agents you received during surgery can make you nauseous. The anesthesiologist typically administers anti-nausea medications, however, patients can still become nauseated. If you experience nausea at home it may be related to one of your pain medicines. All of the narcotic medicines (i.e. Norco) can cause nausea particularly if you take them on an empty stomach. **Never take your pain medicine on an empty stomach.** Once you become nauseated you may not be able to take your medicines and it may be necessary to take anti-nausea medicine.
Change in appetite/bowel habits

A temporary loss of appetite is observed in some patients. This is typically short lived and improves as you recover. Constipation is commonly associated with a decrease in your activity and your pain medications. The narcotics are especially constipating. You should drink more fluids then usual, especially fruit juices.

Bruising/swelling

After two or three days you may notice significant bruising in your upper arm and sometimes into your chest. This is normal. The blood from the time of surgery slowly leaks out of the deep tissues and takes the path of least resistance under the skin. Because of gravity it ends up going down the arm. Swelling is also expected. Swelling in the shoulder and arm is typical and occasionally the hand and fingers can be effected. The Cryo/Cuff minimizes swelling.

Numbness and tingling

When the block is wearing off you will feel a “pins and needles” sensation. This is normal and will stop once the block has completely worn off. Occasionally patients will get numbness because their sling or brace is in an awkward position. Try loosening or taking off the device to see if this effects the numbness. Prolonged numbness in the arm/hand after the block has worn off occurs in a small percentage of patients. In the vast majority of cases normal feeling returns in weeks and in some cases months.
When to Call the Doctor

If you experience any of the following problems, call our office:

Fever

A low grade fever below 100° F is common. A temperature above 101 ° F, especially if it persists after the first 48 hours after surgery should be reported.

Pain

Pain is expected after surgery. Your pain can be aggravated if you fail to take your medicine as directed or if you are overactive with your shoulder after surgery. If your pain is steadily increasing over consecutive days despite all of the normal pain control measures (see section 1) call our office.

Wound Problems

You should expect some minor bloody drainage to be visible on the dressing. The dressing acts as a wick, therefore, a small amount of blood can make moderate sized spot on the dressing. If your dressing becomes soaked with blood or if you notice any pus drainage call our office.
Important Telephone Numbers and Office Hours

Methodist Sports Medicine Center office hours are from 8:00am to 5:00pm Monday through Friday and 8:00am to 10:00am Saturday. The clinic is closed for official holidays.

General clinic telephone number:
Indianapolis: 317-817-1200
Toll Free: 800-867-9250
FAX number: 317-817-1224
Answering Service: 317-817-1200 - After hours call the answering service and ask for Dr. Snead

Dr. Snead’s assistants:
Thomas Krupski, PA-C, MPAS (Physician Assistant) 317-439-9286
Kim Thompson, CST (Clinical Assistant): work 317-208-1570
Pre and post operative questions and scheduling
Lola Gaston (Administrative and Clinical Assist) 317-817-1217

Clinic billing department: 866-942-2687
IU West Hospital Billing: 317-962-8661
Beltway Surgery Center: 317-962-8661
Follow-up Visits

Follow-up visits

You will have an appointment to see Dr. Snead 6-8 days after surgery. During this visit your dressing will be removed and your shoulder will be examined by Dr. Snead. Following the exam you will likely see the therapist to review your exercise program and to add other exercises if appropriate. Most patients are taught a home exercise program which they do in addition to working with the therapist. You will then return for subsequent visits at 1 month, 2 months, 3-4 months, 6 months and 1 year after surgery. At each visit your shoulder will be re-examined and if necessary you will see the therapist to update your home exercise program.

You will periodically receive questionnaires in the mail for patient outcomes purposes. Please make every effort to fill these out and return them to us promptly. This information will be used to improve our understanding and treatment of shoulder problems like yours. We appreciate your time and input in this most important process.

Work

You may return to work within 1-2 weeks if you have a sedentary job. If you have a job which requires manual work (factory, construction, etc.) then you may return to work within 1-4 weeks to light duty. Return to full duty manual work will be based on your specific job and your progress in rehabilitation. The range is 3-6 months.

Sports

Your doctor and therapist will give you specific guidelines to return to sports. You can typically return to running and lower body weight training in 1-2 weeks. Return to weight lifting and sports usually occurs at 3-6 months after surgery.
Rehabilitation Following Shoulder Joint Replacement

Rehabilitation after your shoulder operation is every bit as important as the operation itself. Failure to perform your exercises correctly and frequently can compromise the result of your surgery. Rehabilitation is divided into four main phases.

Phase I (0 to 4 weeks)

After the rotator cuff tendon has been repaired the tendon must heal back to the bone. In the first few weeks after surgery unprotected use of your shoulder, especially using your arm away from your body, can pull on the repair and cause it to fail. On the other hand, if your shoulder were completely immobile for several weeks it would become very stiff. Therefore the goal in Phase I is to protect the repair while maintaining your shoulder range of motion.

All of the exercises in Phase I are passive, meaning that you are moving your shoulder without actually using any of the muscles in the shoulder. Passive motion can be accomplished by using your other arm. Only three exercises are required during this phase. First is the pendulum exercise (Figure 10). This is a warm-up to the other two exercises. Relax your operated arm and let it dangle at your side. Bend forward at your waist allowing the weight your arm to stretch the shoulder. The next exercise is elevation (Figure 11). This can be accomplished by grasping the operated arm with...
the assist hand and raising it overhead. An alternative method uses a pulley system which can be mounted over your door (Figure 12). It is important to relax the muscles in your operated shoulder. If your muscles tighten the exercises can be painful. Steady breathing, exhaling during the elevation, can be helpful.

The final exercise is **external rotation**. This exercise is completed with the aid of a cane or broom handle. The handle is grasped in your assist hand and the butt end of the stick is placed in the palm of your operated side. Gentle force is applied to the stick in order to rotate the operated arm outward (Figure 13). Please note that this exercise is aimed at pure rotation. If your operated arm is not held against your side you will raise the arm away from your body rather than rotate the shoulder.

Each repetition should be performed slowly and patiently. You should push into a range where you can feel some mild discomfort and hold that position for 5 seconds, then relax and repeat the movement. Realize that you will have some discomfort but you should not be in severe pain, this is counterproductive. Try to time your pain medications around your exercise sessions. You should do 10-15 repetitions of all three exercises **four times every day**.

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**Figure 12** Use the unaffected arm to lift affected arm with pulley. Let gravity lower affected arm, but control speed with unaffected arm.

**Figure 13**: Bend the surgery arm to 90º at the elbow. Keep elbow next to body and use the unaffected arm to push surgery arm outward with the wand.