Reverse Shoulder Arthroplasty: Acute inpatient physical therapy when dealing with multiple comorbidities.

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**Introduction:**

Reverse shoulder arthroplasty (RSA) is a procedure that emerged as an alternative treatment for some shoulder pathology. Previously total shoulder arthroplasty (TSA) was the gold standard for treatment for those with end stage arthritis of the glen humeral joint. Those with other shoulder pathology and had a TSA had higher failure of the components. In 2011 a total of 66,485 patients had undergone shoulder arthroplasty and of these 21,692 cases were RSA1. Reverse Shoulder Arthroplasties were initially recommended for patients with rotator cuff arthropathy, and have since been expanded to patients with massive cuff tears without arthritis, proximal humerus fractures, Rheumatoid arthritis and those who have had a prior TSA or hemiarthroplasty that have failed3. When patients have osteoporosis and other multiple comorbidities RSA is the chosen alternative2. With all of these pathologies the patients who tend to get RSA are older geriatric patients.

An RSA changes the anatomy and biomechanics of the shoulder girdle. Where the convex surface of the humerus usually articulates with the concave glenoid, the RSA places the ball in the socket position and the socket in the ball position. The reversal of the physiological ball and socket configuration of the humerus and glenoid results in medialization and distalisation of the center of rotation of the shoulder joint and increase the deltoid muscle moment arm and allowing recruitment of more deltoid fibers for elevations and abduction4. It prevents superior migration of the humerus on the glenoid and maintains the deltoid muscles resting length. The deltoid can then compensate for rotator cuff deficiencies. There can also be a decrease in pain2.

The physiological changes to the joint and biomechanics, may increase the complication potential. Complications are listed in by the most frequent to the least. Most frequent is scapular notching followed by complications to the glenoid component. Hematomas, infections, instability and fractures of the acromion and then complications of the humeral component4. Scapular notching is an anatomical complication, where a partial portion of the glenoid is worn down. It is not certain if it has any clinical relevance. Glenoid loosening is the most frequent component complication but less frequent than when a person has a standard SA. Risk factors include Female, younger than 70 years and when using a superolateral approach. Hematomas are relatively common but do not affect overall outcome. They do however pose a risk for infection4. Some of the blame of the infection is due to the large amount of dead space left after the repair. The new joint is no longer protected by the rotator cuff muscles as well. Due to the high complication rates they continue to be accepted because of the functional improvements that are gained after. To minimize complications an abduction splint is to be used for at least the first 3-4 weeks to avoid any active movement of the shoulder muscles. Active internal rotation, adduction and extension are discouraged5.

Physical Therapy after RSA is important to implement from day one after surgery until patient is able to gain their most optimal functionality in their shoulder. Therapists need to be aware of different factors that will affect the patient’s rehab. The need to know patient’s preoperative shoulder status, implant used, bone quality, integrity of remaining RC and any other comorbid pathologies. First steps in therapy is to protect the integrity of the joint, and slowly add PROM to the shoulder sometimes up to 12 weeks after surgery. Other focuses can be on ambulation, and training the patient on bed mobility and transfer skills to avoid weight bearing with the surgical upper extremity. After 6 weeks and strictly PROM exercises strengthening can commence5.

**Case Description:**

Patient:

The patient was a 79-year-old female with an extensive medical history. Pertinent to the case is the patient’s severe cardiac history (aortic stenosis, HTN, hyperlipidemia, and murmurs), type II diabetes, anxiety and major depressive disorder, OA of the shoulder, renal insufficiency and Benign positional vertigo. The patient complained of pain in bilateral shoulders. Patient presented to PCP due to a fall at home in which she was on the floor for over 8 hours and unable to get herself up. Thee patient was found to have a fractured right proximal humerus and a complete tear of her right rotator cuff which was repaired using the reverse shoulder arthroplasty. The patient is widowed and lives with her single son who works 40+ hours a week. The patient lives in a two-story house with 3 steps to enter the house and 10 steps to get to her room. Patient’s son stated she was able to get upstairs if needed but usually slept in a recliner and spend most her time sitting in the chair. Stairs had railing on right hand side. The patient did not exercise prior to surgery but could walk at store or in house without dyspnea. Patient did not use AD prior to surgery and needed assistance after falls. Patient was cleared for non-weightbearing for 6 weeks and PROM from therapists.

**Evaluation:**

During the initial evaluation that patient demonstrated a diminished level of alertness. The patient had difficulty giving information as to where she was at. She knew that she had undergone shoulder surgery but, she neglected the precautions that she was given to not actively move her right shoulder. Upon presentation that patient was slouched in bed leaning on her right shoulder and complaining of back pain. Due to the position of the bed, the patient was having a difficult time getting comfortable. Pillows and bolsters were put in place during the evaluation so the patient could sit with improved posture. While trying to get the patient to sit at the edge of the bed the patient required moderate assistance of two people to keep her upright. The patient complained of feeling like she was going to fall forward off of the bed and was pushing against the therapists and therapist assistant with her back, to lay back down. During this time, she attempted to use her shoulder that had received the surgical repair. The patient took approximately 5 minutes to sit upright without assistance. Once sitting upright, the patient was instructed to stand up. She then demonstrated similar behavior and reporting the feeling of falling forward while extending her back to around 20 degrees of extension. The patient was instructed to attempt taking steps with moderate to max assist of 2 people and her symptoms continued. Patient was able to get to the restroom and returned to bed. Due to the nature of the patient’s vertigo and altered LOC, getting her right arm out of the sling was not done at this time. The patient was left in a sitting position in bed. Her right shoulder supported by abduction sling and pillows to position her in a position of comfort.

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| **Pain** | 4/10: Patient reports no pain in Shoulder due to block. But has back pain in position she is in. |
| **Posture** | Kyphotic posture when able to stand. Patient reports feeling like she was falling forward and begins to retrograde. |
| **Sitting Balance** | Poor. Unable to sit with upright posture without bolster/pillow support. Patient preferred to lean to her right side and into her surgical shoulder. |
| **Standing Balance** | Due to NWB patient is unable to use FWW and needs mod A x2 for balance. |
| **Range of Motion** | LE: WFL  LUE: WFL  R UE: no extension, IR or adduction, others NT |
| **Strength** | LLE: 4+/5 throughout  LUE: 4+/5 throughout  RUE: Wrist 4+/5, all others NT |
| **Gait** | Patient able to ambulate 20 feet, using shuffling gait and needing moderate assistance of 2 people. Patient is unable to use FWW or other assistive device due to balance deficits. |
| **Tolerance to activity** | Limited endurance noted, patient unable to get herself into sitting position on her own and requests to rest after bed mobility and transfer tasks. |
| **Sensation** | Sensation grossly intact |
| **Integumentary system** | Surgical incision covered with clean and dry dressing |
| **Cognition/orientation** | Patient awake and oriented to time and situation. Patient is agitated, anxious, distracted, fearful and unable to remember or adhere to safety precautions. Patient states desire to leave. |
| **Mobility and transfers** | Moderate to Max assistance. Close supervision in seated upright position. |

**Interventions**

The physical therapist first evaluated the patient only 12 hours after her initial RSA. The physical therapist set up the patient goals to be able to be able to discharge to home. It was also discussed that due to patient orientation and balance she may be more suitable for a skilled nursing facility.

Patient short term goals:

* The patient will be Min Assist for bed mobility.
* The patient will be Min A for transfers, keeping RUE NWB.
* The patient will be able to ambulate with Min A X 150 ft.

Due to the patient’s presentation on post op day, the physical therapist has determined she had multiple mobility limitations it is indicated that she would be seen in the orthopedic acute care unit for up to four days for skilled PT sessions and education on her precautions. She would then most likely transition to a skilled nursing facility. Treatment for the patient would be gait training, bed mobility skills and transfer skills. PROM on the patients RUE would be performed, balance training and patient education.

**Gait Training**

Gait training was initially performed with PT and SPTA giving Mod A and no assistive devices due to patient unable to use FWW as she is NWB with her R UE. R UE is in an abduction sling. The patient was assisted by SPTA using gait belt while patient stood from edge of bed and the patient holding the arm of the PT with her L hand. The patient had difficulty standing and keeping her balance and was using her heels to try to sit down as she reported she felt she was falling forward when she was leaning back approximately 10 degrees. Patient was held up for a couple of minutes and when patient regained balance and was able to ambulate to the bathroom which came to 15 feet. Patient was able to improve with her gait throughout the course of her treatment before discharge the patient was able to ambulate 65 ft with moderate to minimal assistance with one person. It is thought that the patient has improved due to remaining in a seated position upright for 30 minutes prior to treatment to hopefully counter act her positional vertigo. She continues to need constant verbal cueing when ambulating and patient begins to become fearful when the floor pattern changes or nears doorways.

**Transfer training and bed mobility**

Bed mobility training involved teaching patient how to log roll and discouragement to actively move her RUE. Educated patient on bed positioning. Patient had preference to slide down in bed and to rest on her right side. This tended to put her arm into more adduction than she should be allowed even with her abduction sling. Patient was given pillows that were placed to jeep her upright in bed. Patient also had a patient care tech to remain in the room due to the patient’s altered cognition. Physician’s believe this is response to pain medication that she is on. Patient needed Mod A x2 for initial transfer skills from sit to stand, and bed to chair transfers. At discharge patient was able to get up in bed and sitting to standing with min/mod assist x1 person. Patient was placed in upright position for extended time before attempting subsequent transfer. Patient tolerated better after sitting upright instead of laying supine in bed.

**Therapeutic Exercise**

Exercises were limited with patient due to patient co-morbidities and current cognitive state. During treatments the patient was taken out of her sling and the therapist performed PROM of shoulder into flexion abduction and some external rotation 15 times each. Patient was instructed in elbow flexion during each treatment and AROM with wrist extension and flexion 15 times each. Other Patients with similar surgeries are given the exercises once before discharge along with pendulum movements of the shoulder back and forth, side to side and in small circular motions, however due to patient status these were not given. Patient participated in the therapeutic exercises two times during her treatments.

**Patient/Caregiver education**

Discussed with the patient’s son and daughter what they can do to help the patient when she is in bed or sitting in her chair. They were surprised at the current state of the patient and her confusion. They had planned on taking her home and to use respite care to provide additional support. Patient and caretakers will be receiving more education on how to assist her when she discharges from transitional care.

**Outcomes**

The patient’s last session with the physical therapist was prior to her transfer to a skilled nursing facility. The patient still exhibits agitation which is thought to be from pain medication. The patient has improved her gait distance along with a decrease assistance level to do so. Prior to treatment the patient was placed in a chair and sat upright for 30 minutes before her treatment. This was to help her normalize her equilibrium due to her vertigo. Once upright for 30 minutes the patient was able to stand without feeling she was going to fall forward. The patient still continued to attempt moving her right shoulder when walking by trying to grab hand rail in the hallway. The patients balance has improved and the patient demonstrated continued improvement throughout treatment.

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| **Pain** | 2/10: Shoulder pain |
| **Posture** | Kyphotic posture when able to stand. Patient reports feeling like she was falling forward and begins to retrograde. |
| **Sitting Balance** | Same as above |
| **Standing Balance** | Patient able to stand for 30 seconds in place before LOB when she has been sitting upright for ten minutes before standing. |
| **Range of Motion** | LE: WFL  LUE: WFL  R UE: no extension, IR or adduction, others NT |
| **Strength** | LLE: 4+/5 throughout  LUE: 4+/5 throughout  RUE: Wrist 4+/5, all others NT |
| **Gait** | Patient able to ambulate 65 feet, using shuffling gait and needing min/moderate assistance of 1 people. Begins to lose balance when getting near doorways. |
| **Tolerance to activity** | Patient able to get to EOB with Min A, but needs constant cueing to not move RUE. Patient able to sit upright in chair supported for 30 minutes at a time. Able to ambulate for 5 minutes at a time |
| **Sensation** | Sensation grossly intact |
| **Integumentary system** | Surgical incision continues to be covered. No redness around the area. |
| **Cognition/orientation** | Patient is not as confused. Patient is alert X3 and continues to be confused with where she is at. |
| **Mobility and transfers** | Min to mod A. Close supervision in seated upright position. |

Discussion:

When a typical patient has either a total shoulder or reverse shoulder replacement the typical treatment of a patient is a single night inpatient stay at the hospital. They are usually seen once by both physical therapy and occupational therapy. They usually are able to reach all goals as follows:

* Ability to be independent in bed mobility and transfer skills.
* Ability to ambulate functional distances on flat surfaces.
* Patient receives education and able to verbalize and demonstrate how to remain within the precautions from the repair. Also, comfortable to be able to perform HEP independently.

Current research indicates that the geriatric population often combines osteoporosis, significant comorbidities and cognitive or functional deficits that may thwart successful rehabilitation. results indicate that age is a critical factor for RSA success. Lower functional outcomes have been obtained in patients older than 80 years. Therefore, we can say that there is a trend seen with these results, indicating lower functional outcomes in patients older than 80 years2.

As patients get older and have multiple comorbidities there needs to be an awareness of whether attempting the RSA should be done or not. Due to the patient’s extensive medical history there were a series of red flags that should have been looked at before undergoing surgery. The treatment plan and undergoing anesthesia caused the patient to establish high confusion and was unable to return home where she could gradually get back to function.

The patient who was the topic of this case study now has increased needs and will be placed in a skilled nursing facility. Even though the majority of RSA end up with good outcomes when a patient presents with the extensive medical history as this patient, there should be a point where the RSA is no longer a viable option.

References

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