



Deep Inferior Epigastric Perforator Breast Flap Reconstruction Protocol:

General Information:

Deep Inferior Epigastric Perforator (DIEP) breast flap reconstruction is an autologous breast reconstruction to be considered for patients who are undergoing a mastectomy. The procedure itself uses a flap of composite tissue - which includes the deep inferior epigastric perforator artery and vein, skin, and fat - from the patients' lower abdomen as donor tissue. The flap is then transferred to the chest, where the surgeon, aided by a microscope, will attach the donor tissue blood vessels to the chest blood vessels and reconstruct the breast (Appendix A).

The difference in this procedure from other autologous breast reconstructions, such as a TRAM flap and gluteal myocutaneous flaps, is that the DIEP does not use any of the underlying muscle tissue to move the flap tissue. This results in decreased donor-site morbidity, with a 2-3% risk of flap failure and a 1% risk of abdominal hernia. In addition to decreased morbidity rates, patients also tend to heal faster following a DIEP flap due to the lack of muscle tissue excised.

This procedure can be performed either immediately following a mastectomy, or delayed until the patient has completed adjuvant chemo-radiation therapies. This procedure can also be performed to replace an unsatisfactory or previously failed implant reconstruction. The length of the surgery is typically 6-8 hours for a unilateral DIEP, and 10-12 hours for a bilateral DIEP. The expected length of stay for patients is generally 4-5 days post-operatively.

There are several risk factors that can increase a patient's risk of complications. These include:

- Diabetes
- Autoimmune disease
- Low body fat or morbid obesity
- Prior chest wall radiation – Patients must wait 4-6 months after radiation treatment
- Prior procedure to donor/abdominal area
- Liposuction, scars
- Smoking – Patients must abstain from smoking for 4 weeks pre and post-op

In addition to the specific precautions for the DIEP procedure listed below, any patient who has undergone an axillary lymph node dissection at any time during their course of treatment will continue to have the following lifelong lymphedema precautions:

- Blood draws, vaccinations, and intravenous lines are recommended to be placed on the non-operative arm.
- Blood pressure monitoring is recommended on the non-operative arm.
- Avoid tight fitting clothing on affected arm.
- Avoid carrying heavy items with the affected arm.
- Meticulous skin hygiene and nail care should be maintained to prevent any infection or skin irritation.
- Avoid cutting cuticles on the affected side.

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- Avoid sunburn and insect bites. Use of sunscreen and bug repellent sprays are encouraged.
- No smoking and avoid second-hand smoke.

Deep Inferior Epigastric Perforator (DIEP) Breast Flap Reconstruction Protocol:

The intent of this protocol is to provide the physical therapist with a guideline for post-operative rehabilitation of a patient who has undergone a deep inferior epigastric perforator breast flap reconstruction (DIEP). It is by no means intended to be a substitute for one's clinical decision making regarding the progression of a patient's post-operative course based on their physical exam/findings, individual progress, and/or the presence of post-operative complications. If a clinician requires assistance in the progression of a post-operative patient they should consult with the referring Surgeon.

Progression to the next phase based on Clinical Criteria and/or Time Frames as Appropriate.

Phase I – Immediate Post Surgical Phase (Day 0-Week 2):

Precautions for Day 0 – Week 2 (or until drains are removed):

- No rolling/twisting of trunk.
- No heavy lifting greater than 5 lbs.
- No pushing/pulling with the affected arm, no pulling out of bed.
- No upper extremity range of motion greater than 90 degrees (level of shoulders) on the affected side.
- No pressure over central chest.
- No heating pad or ice over flap at anytime.

Goals:

- Patients will be independent with:
 - Functional mobility, including bed mobility, transfers, ambulation, and stair negotiation or as per pre-admission status.
 - All surgical and activity precautions.
 - Maintaining oxygen saturation > 95% on room air.
 - Home exercise program per patient handout.
 - Activities of daily living (ADL's) with modifications.
- Promote healing of soft tissue/Maintain viability of flap
- Promote AROM to affected shoulder within precautions
- Restore active range of motion (AROM) of elbow/wrist/hand

Criteria for progression to the next phase (Phase II):

- Tolerates shoulder AROM in all shoulder planes within precautions.
- Demonstrate independent functional mobility within above listed precautions.
- Adequate pain control.

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PERIOPERATIVE AND POSTSURGICAL LINES AND TUBES:

- Supplemental Oxygen: Patient will be on 6 liters of supplemental oxygen from day of surgery until time of discharge to promote increased DIEP flap oxygenation and tissue healing. Patient may be removed from supplemental oxygen beginning on POD #2 during physical therapy treatment sessions only if patient is hemodynamically stable, if the patient is able to maintain their oxygen saturation > 95% throughout treatment session, and if their vitals are monitored throughout treatment session.
- Tissue Oximetry: Patient will be connected to a non-invasive, direct; real time tissue oximeter manufactured by Vioptix to measure local tissue oxygen saturation. (Appendix B) Patient should be connected to the Vioptix monitor at all times during their length of stay.
- Pain Pump: An abdominal catheter, manufactured by ON-Q, will be placed immediately post-operatively, and will remain intact through discharge for the majority of patients. The purpose of this abdominal catheter is to continuously administer local anesthetic to relieve post-operative pain. (See Appendix C)
- Foley Catheter: Patient will have a Foley catheter placed peri-operatively and removed POD #2. The RN will remove the Foley catheter once the patient has demonstrates appropriate ambulation to/from the bathroom.
- PCA: Patient is connected to a PCA immediately post-operatively and disconnected from the PCA on POD #2. The purpose is for improved post-operative pain management.
- Telemetry Monitoring: The patient will be connected to cardiac monitoring for their stay in the ICU, and it is disconnect upon transfer to a floor unit, unless the patient has an underlying cardiac condition that warrants further monitoring.

DAY ONE TO FIVE:

ACTIVITY PERCUATIONS

- Day of Surgery – Strict bedrest, HOB elevated > 45 degrees, knees flexed > 45 degrees, SICU continuous pulse oximetry, flap/Doppler checks Q 15' x 1 hr then Q 30' x 1 hr for the duration of SICU stay. Patient's SICU room will be kept > 75 degrees to promote blood flow to the flap.
- POD #1 – HOB elevated > 45 degrees, knees flexed 45 degrees, OOB to chair w/ assistance. Physical Therapy is consulted before or after the patient has been OOB to the chair with nursing and found to be hemodynamically stable. Physical Therapy evaluation completed POD #1. Patient is routinely transferred from the SCU to a floor unit in the late afternoon.
- POD #2 – HOB elevated > 45 degrees, knees flexed 45 degrees, flap monitoring Q 4 hrs, Foley catheter and PCA are discontinued. Patient is cleared to ambulate short distances with physical therapy and nursing staff while monitoring vitals.
- POD #3 – Ambulation of household distances; stair negotiation if appropriate, and perform gentle range of motion of the shoulders and upper extremity. See Appendix D for exercises. Flap is checked via Doppler Q 4 hours.
- POD # 4 or 5- Patients are allowed to shower; discharge home, usually with 2 abdominal and 1 breast JP drains and ON-Q pain pump without the need for home physical therapy.

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DAY 5-WEEK 2:

- Continue home exercise program per written patient handout.
- Continue appropriate incision care management per MD and RN staff.
- Maintain continue rest with minimal participation in IADL's and limited community negotiation and involvement.

Phase II – Sub-Acute Phase (week 2 -week 6):

Precautions:

- No heating pads or ice over flap at any time.
- Do not wear a bra until cleared by your surgeon at your 3rd or 4th week follow up visit.
- Avoid beverages/foods that are high in caffeine.
- No sexual activity for the first 6 weeks.
- No upper extremity range of motion greater than 90 degrees (level of shoulders) on the affected side until week 6.

Goals:

- Adequate pain control.
- Resumption of IADL's and work activities per below listed precautions
- Absence of lymphedema on affected extremity

Criteria for progression to the next phase (Phase III):

- Resume baseline IADL's
- Appropriate healing of breast incision.
- Appropriate healing of abdominal incision
- Absence of UE lymphedema where appropriate.

WEEK 2 - 6:

- Patient may return to walking program at a light intensity with minimal arm swing.
- Patient to complete home exercise program.
- Patient may return to wear a bra when cleared by surgeon.
- Patient may incorporate gentle pectoralis major stretching after week 6 (See Appendix D).
- Patient may begin gentle scar mobilization to all incisions beginning week 3 to promote appropriate tissue healing.

Phase III – Intermediate phase (week 6-12):

Precautions:

- No abdominal strengthening until 3 months if patient deemed to be stable per plastic surgeon.

Goals:

- Return to baseline PROM and AROM of the affected shoulder
- Return to baseline strength of the affected shoulder
- Complete healing of surgical sites.
- Complete all ADL's, IADL's, and work activities pain-free in affected shoulder

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Criteria for progression to the next phase:

- Complete healing of abdominal incision
- Complete return of strength to affected shoulder

WEEK 6-10

- Patient may resume all aerobic and strengthening activities performed at their baseline level EXCEPT for abdominal exercises. The American College of Sports Medicine (ACSM) specifically indicates walking and bicycling as two forms of recommended aerobic exercise. The ACSM recommends aerobic exercise 3-5 times/week, however daily exercise may be optimal for patient's who are deconditioned following surgery at lighter intensity or shorter duration of exercises. The ACSM recommends moderate level of activity, which can be achieved by using the patient's 60-80% of their HR maximum, at a duration of 20-60 minutes. (ACSM)
- Patient may begin trunk flexibility light stretching at week 6. (Appendix D)
- Patient may resume upper extremity strengthening, with focus on the following exercises and motions – upper trapezius, lower trapezius, serratus anterior, and shoulder ER. Patient may use theraband to complete these exercises, beginning with light resistance theraband and increasing repetitions and resistance slowly. Begin with 10 repetitions x 1 set, 2x/day and slowly increase to 10 repetitions x 3 sets. (Appendix D)

Phase IV – Advanced strengthening phase (week 12-20):

Precautions:

- Lymphedema precautions as appropriate

Goals:

- Full resumption of baseline physical activities
- No pain with activities.
- Patient will be independent with lymphedema lifelong precautions

Criteria for progression to the next phase:

- Return to prior baseline level of activity

WEEK 12-15:

- Resume abdominal exercises. Examples of exercises to begin your abdominal recruitment include pelvic tilts, bridging with abdominal recruitment, abdominal crunches, reverse sit-ups, quadruped pelvic tilts and sitting w/ alternating UE/LE extension. (Appendix D)
- Resume yoga activities, if performed at baseline, to increase trunk and shoulder flexibility and core strengthening. (Appendix D)

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March 16, 2011

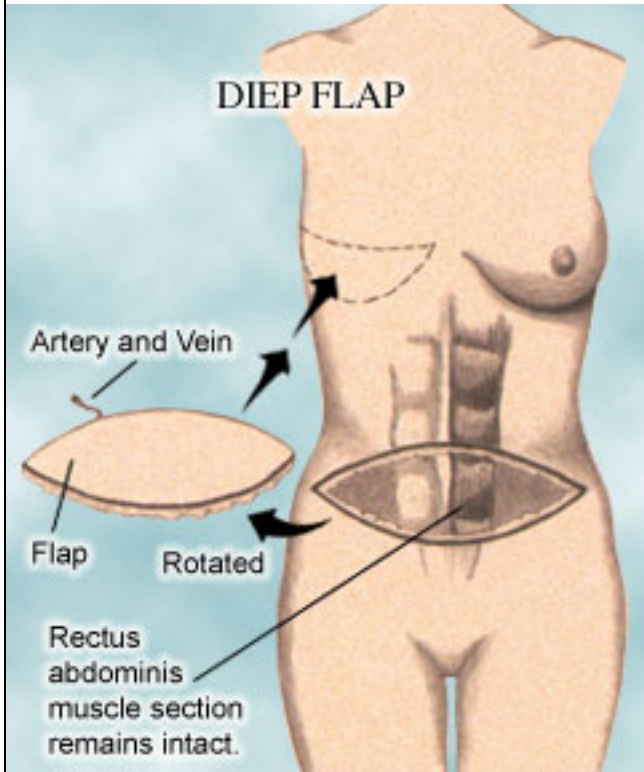
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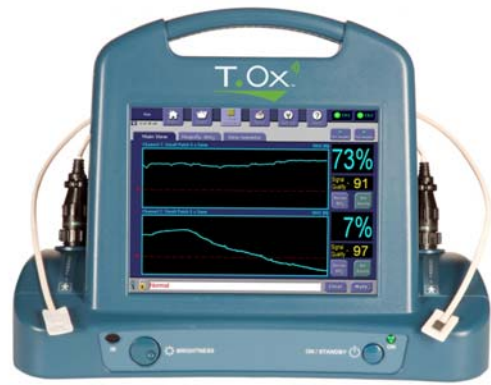
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Appendix A: Image of tissue flap from abdomen to breast



Appendix B: Tissue Oximeter



Distributed by Vioptix.

Appendix C: On-Q Pain Pump



Distributed by I-Flow

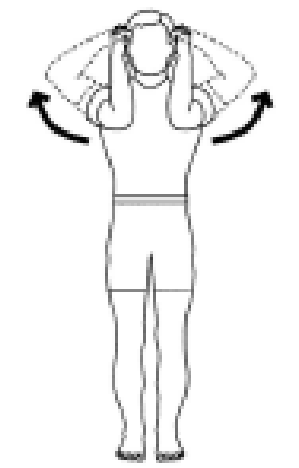
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Appendix D: Exercises

For the following examples of exercises, please consult a physical therapist if you have never performed these exercises. Do not advance to the next exercise phase if you are experiencing difficulties with pain, motion, or strength with your current exercise phase. Please request a consultation to a physical therapist to develop an appropriate exercise program for you.

Phase I: Exercises at Weeks 0-2:



Butterfly Exercise:

- Stand with hands against side of head with elbows touching in front
 - Palms should be turned inward
 - Move elbows out to side until even with the shoulders, not behind the shoulders.
 - **Do not allow elbows to go higher than shoulders**
 - Return to start position and repeat.
- Perform 1 set of 10 repetitions twice daily

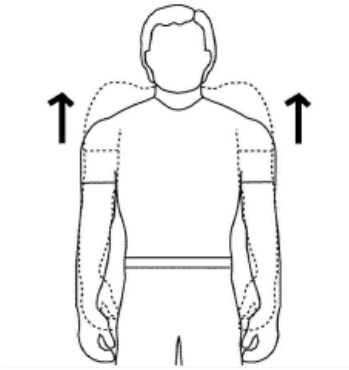


Back Scratch:

- Reach behind back and hold hands together
 - Gently slide hands up back and slowly return to start position
- Perform 1 set of 10 repetitions twice daily

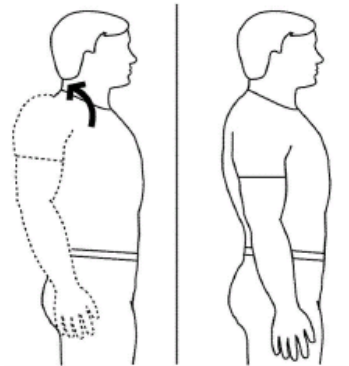
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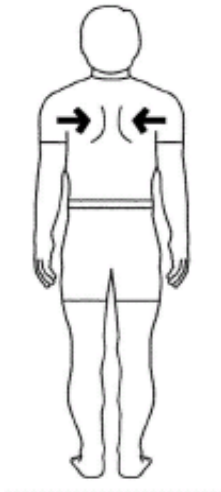
Shoulder Shrug:

- Raise shoulders upward toward ears and hold for 3-5 seconds
 - Return to start position. Focus on relaxing shoulders downward at rest.
 - Inhale as you bring your shoulders up and exhale as you relax your shoulders down
- Perform 1 set of 10 repetitions twice daily



Shoulder Rolls:

- Raise shoulders up toward ears and roll shoulders backwards
- Perform 1 set of 10 repetitions twice daily

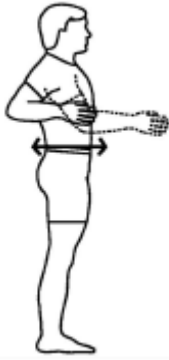


Scapular Retraction:

- Sit or stand as upright as possible
 - Squeeze both shoulder blades together, sticking out chest at the same time
- Perform 1 set of 10 repetitions twice daily

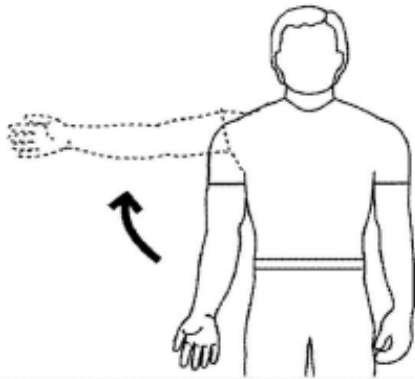
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Arm Saw:

- Bend elbow to 90 degrees
 - Move arm back bending elbow more
 - Move arm forward, straightening elbow
 - The motion resembles a sawing movement
- Perform 1 set of 10 repetitions twice daily

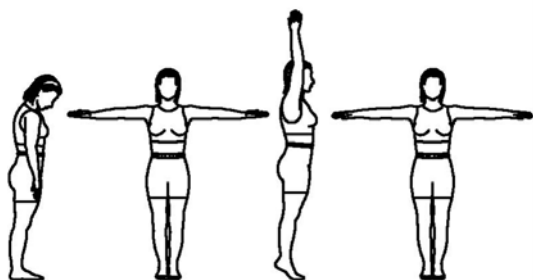


Arm Raises:

- Begin with arms at side, elbow straight, and palm forward
 - Slowly raise arm upward out to the side.
 - Stop at shoulder height (90 degrees).
 - Slowly return to side
- Perform 1 set of 10 repetitions twice daily

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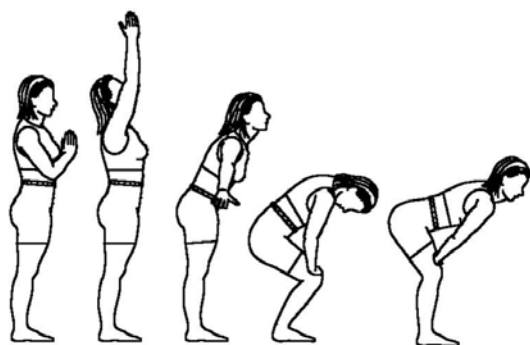
Phase II: Exercises Positions at Week 6: All exercises in this section typically start 6 weeks after surgery. Clearance from your plastic surgeon is recommended prior to initiation of these exercises. Continue all exercises from Phase 1 through your full range of motion.



Breathing Tall Stand Windmill

- Stand with heels and toes together.
- Exhale and let the body relax as shown.
- Begin breathing in while lifting arms out to side and up, keeping palms upward.
- Continue inhaling until arms are overhead while you raise up on toes.
- Exhale by reversing the movement.
- Repeat.

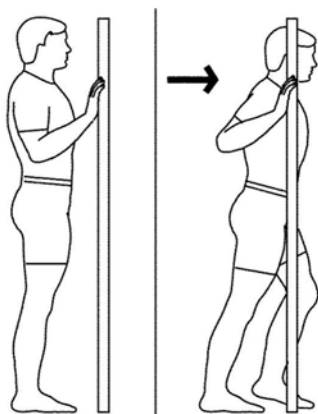
Perform 1 set of 10 Repetitions, once every other day.



Sun Salutation Beginner (part 1)

- Stand, feet together, hands at chest, palms together.
- Inhale and reach arms up overhead, and lower outward to sides while exhaling.
- Bend upper back, knees and hips and place hands on thighs and bend neck downward while continuing to exhale.
- Inhale, look forward with head and straighten back as shown.

Perform 1 set of 10 Repetitions, once every other day.



Stretch Pectoral standing bil at door

- Stand in doorway or in corner.
- Place arms at chest level on sides of doorway as shown.
- Gently step forward, keeping back straight.
- Return to start position.

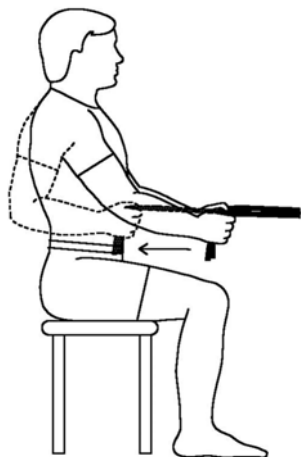
Special Instructions:

Place both hands at waist level or at head level to stretch different portions of muscle.

Perform 1 set of 4 Repetitions, twice a day.
Hold exercise for 20 Seconds.

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Phase III: Exercises at Weeks 6-12:



Resist shoulder retract sit arms down w/elastic

- Attach elastic to secure object.
- Grasp elastic in hands.
- Sit in chair with back unsupported, maintaining proper posture.
- Keep elbows near sides, elbows bent.
- Squeeze shoulder blades together, pulling arms back.
- Slowly return to start and repeat.

Perform 3 sets of 10 Repetitions, once every other day.

Use Elastic.

Rest 1 Minute between sets.

Perform 1 repetition every 4 Seconds.

* May do sitting or standing

Resist shoulder extension bilaterally stand w/elastic

- Secure elastic at waist level as shown.
- Face toward elastic.
- Grasp elastic in hands, and pull backwards, keeping elbows straight.
- Return to start position.

Special Instructions:

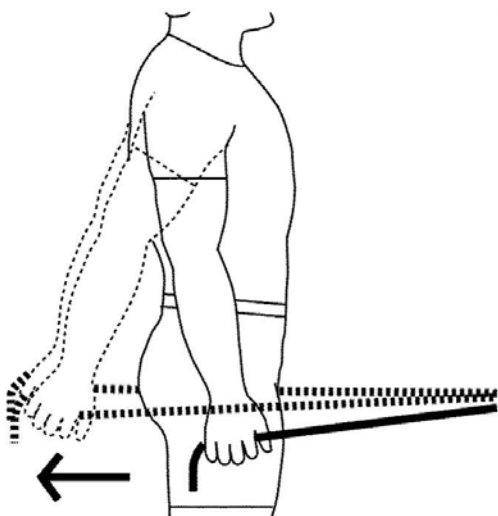
Maintain neutral spine in low back.

Perform 3 sets of 10 Repetitions, once every other day.

Use Elastic.

Rest 1 Minute between sets.

Perform 1 repetition every 4 Seconds.



Resist shoulder bent row w/elastic

- Secure elastic under opposite foot.
- Hold elastic in involved arm.
- Slightly bend hips and knees and support upper body with other arm as shown.
- Pull up on elastic, raising elbow to shoulder height.
- Slowly return to start position and repeat.

Special Instructions:

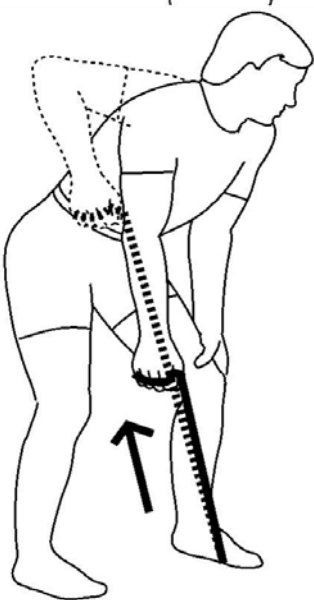
Contract abdominal muscles and maintain a neutral spine, not allowing trunk to twist.

Perform 3 sets of 10 Repetitions, once every other day.

Use Elastic.

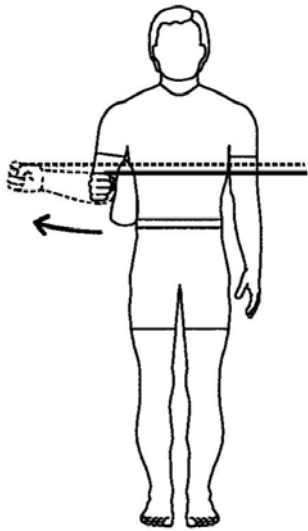
Rest 1 Minute between sets.

Perform 1 repetition every 4 Seconds.



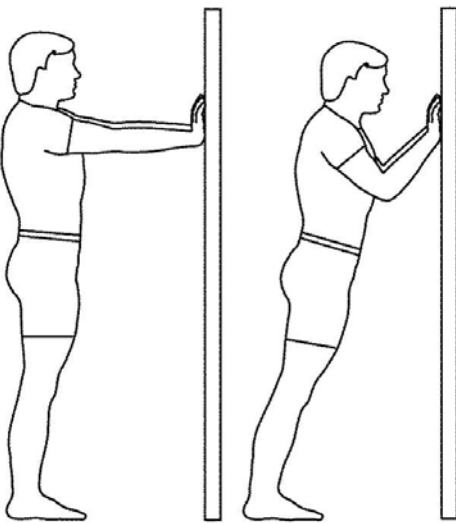
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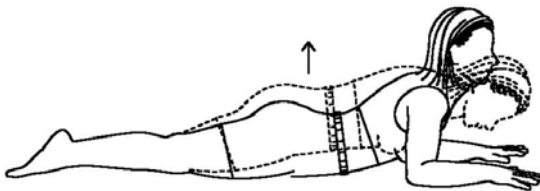
Resist shoulder ER unilateral stand (abd 45) w/elastic

- Attach elastic to secure object at waist level.
 - Place pillow between elbow and body.
 - Grasp elastic in hand, elbow bent to 90.
 - Rotate arm outward and return.
 - Slowly return to start position and repeat.
- Perform 3 sets of 10 Repetitions, once every other day.
Use Elastic.
Rest 1 Minute between sets.
Perform 1 repetition every 4 Seconds.



AROM shoulder push-ups at wall

- Stand facing wall, about 12-18 inches away.
 - Place hands on wall at shoulder height.
 - Slowly bend elbows, bringing face to wall.
 - Push back up to start position and repeat.
- Perform 3 sets of 20 Repetitions, once a day.
Rest 1 Minute between sets.
Perform 1 repetition every 4 Seconds.



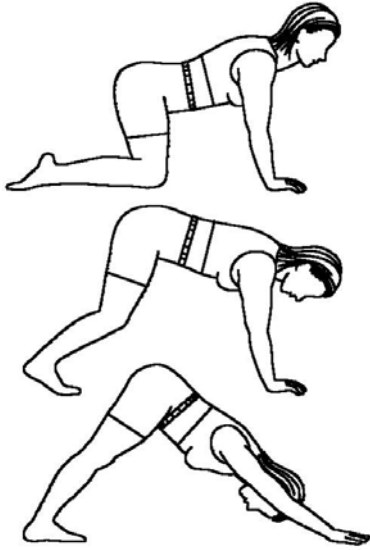
AROM abdominal bracing prone elbow/knees

- Lie face down, upper body supported on elbows with forearms on floor as shown.
 - Tighten up abdominal muscles and lift hips up until trunk is straight, keeping knees on floor.
 - Hold position, lower and repeat.
- Perform 5 sets of 1 Minute, once a day.
Rest 1 Minute between sets.
Perform 1 repetition every 4 Seconds.

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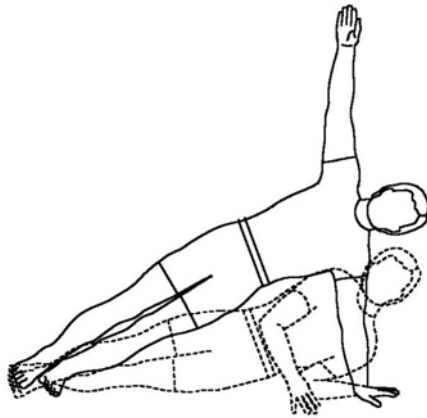
Phase IV: Exercises at Weeks 12+:



Downward Dog

- Begin on hands and knees, palms on floor.
- Turn toes under.
- Lift buttocks upward, straightening legs.
- Feet should be flat on floor and arms are straight, and head is facing floor with neck in line with trunk.
- Hold and repeat.

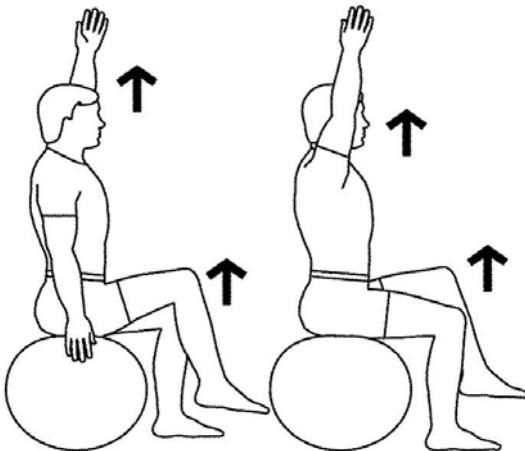
Perform 1 set of 10 Repetitions, once every other day.



Side Plank – Beginner

- Lie on left side, legs straight and left hand on floor near shoulder as shown.
- Push up with left arm, keeping trunk straight.
- Raise right arm straight out and above, fingers straight.
- Hold, lower and repeat on other side.

Perform 1 set of 10 Repetitions, once every other day.



AROM hip marching w/alt arms on Ball

- Sit on ball with hips and knees at 90 degrees.
- Lift up left leg and right arm as shown.
- Lower arm and leg.
- Repeat with right leg and left arm.

Special Instructions:

Maintain proper low back posture.

Perform 3 sets of 20 Repetitions, once a day.

Use Ball.

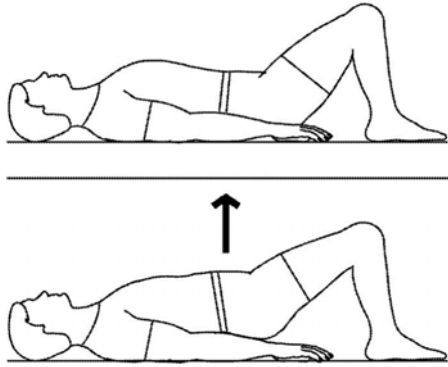
Rest 1 Minute between sets.

Perform 1 repetition every 4 Seconds.

* May perform this sitting in a chair or seated on a ball.

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AROM lumbar bridging bil

- Lie on back with knees bent.
- Do not use your arms (can cross over chest)
- Lift buttocks off bed, hold for count of 3
- Return to start position.

Special Instructions:

Maintain neutral spine.

Perform 1 set of 10 Repetitions, three times a day.

Hold exercise for 3 Seconds.

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