“Don’t worry, we fix:” Pilates for Breast Cancer Recovery with Osteoporosis

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Abstract

The survivability rates of breast cancer have greatly improved over the past few decades; however, researchers have proven that two popular treatments – chemotherapy and hormone therapy – impact bone health, resulting in cancer treatment-induced osteoporosis. Osteoporosis is a condition that results in porous, low-density bones and an increased risk of fractures. Besides the risk of osteoporosis, breast cancer survivors can struggle with other issues including a decreased range of arm/torso motion and pain associated with surgeries, possible lymphedema, fatigue, a loss of proprioception/kinesthesia, etc. This paper focuses on how the BASI Comprehensive Program can help survivors regain arm and shoulder mobility and core strength and improve bone density following cancer treatment. It also includes modifications to accommodate cancer-related osteoporosis, exchanging exercises with flexion for flat back and/or extension.
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Introduction

According to the National Institutes of Health, the incidences of breast cancer continue to rise, with approximately 334,000 new cases annually in the United States alone. Due to new treatments, the survivability rates of breast cancer have greatly improved over the past few decades; however, researchers have proven that two popular treatments -- chemotherapy and hormone therapy directly impact bone health, resulting in cancer treatment-induced osteoporosis. Besides an increased risk of osteoporosis, breast cancer survivors can struggle with a decreased range of arm/torso movement and pain associated with surgeries, possible lymphedema, fatigue, a loss of proprioception/kinesthesia, etc.

Lumpectomy and Mastectomy Considerations

Most breast cancer treatments require some surgery. Depending on the location of the cancer and its advancement, people typically receive either a lumpectomy or a mastectomy (Figures 1 and 2). A lumpectomy removes cancerous lymph nodes along with
a small margin of clean tissue, causing scar tissue under the shoulder joint that may affect
the arm’s range of motion. A mastectomy removes much more breast tissue and multiple
lymph nodes, resulting in disfigurement and significant loss of range of motion and
function along the side of the body including the arm, torso, and sometimes neck.

Breast tissue overlies the top of *rectus abdominis* and *pectoralis major*, and the scar
tissue that results from surgery can cause tightness and pain, making it difficult to move
the arm up, back, to the side, and above the head. It can even affect breathing as the
muscles expand and contract over the rib cage. The muscles that are directly impacted by
surgery include *pectoralis major* (enables arm movement up, rotation down, and to the
side), *serratus anterior* (rotates scapula), *latissimus dorsi* (enables arm movement to the
back and side), *rectus abdominis* (enables forward flexion and assists with deep breathing),
and *external obliques* (enables torso rotation), as shown in Figure 3.

![Figure 3 - Muscles Affected by Breast Cancer Surgery](image)

**Osteoporosis Considerations**

Osteoporosis is a skeletal disorder “characterized by compromised bone strength
predisposing to an increased risk of fracture.” (NIH) The relative strength of bones is
measured by the integration of bone density and bone quality and defined by bone mineral
density rates known as T-scores. Chemotherapy affects bone resorption and a reduction in bone structure, while hormone therapy causes estrogen deficiency. Both treatments harm bone metabolism and lead to an increased risk of fractures in breast cancer survivors. The bones most likely affected are those in the spine, hip, and wrists, as shown in Figure 3. Bone density scans that reveal T-scores of -2.5 or below qualify as osteoporosis. Improving muscle strength through weight-bearing and resistance exercises is essential to improve balance and prevent falls, and thus fractures; however, sudden forward movements or those that add load or strain to a curved spine should be avoided as they may cause spinal fractures.

![Figure 4 - Osteoporosis](image-url)
**Case Study**

Client: Yvette
Female, Age 71

The client is a breast cancer survivor who now has osteopenia (a precursor to osteoporosis) in her back and osteoporosis in her wrists. She is fit and slim, although Pilates is new to her. The client walks and hikes regularly, but is concerned with falling – especially on icy, snowy, or uneven ground (typical in CO). She used to be a dancer with excellent body control and awareness; however, chemotherapy treatments negatively affected her kinesthesia and proprioception. Breast cancer treatments in 2014 included lumpectomy, chemotherapy, and radiation. Client has moderate scar tissue in left armpit and pectoral area that “feels tight” with arm movement.

**Conditioning Program**

At the beginning of the 12-week program, the following goals were established:

- Build core strength to improve functional movement, balance, and stability
- Increase mobility and strength in arms, specifically the left arm that was impacted by the lumpectomy

<table>
<thead>
<tr>
<th>Block</th>
<th>Exercise</th>
<th>Modification/Rationale/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Movement analysis)</td>
<td>Roll-down</td>
<td>- Hip hinge to prevent stress on thoracic spine</td>
</tr>
<tr>
<td>Warmup</td>
<td>Pelvic Curl</td>
<td>- Low, articulated pelvic curl to prevent too much flexion/load in the thoracic spine (or hip hinge) Note - Client’s doctor recommended some lumbar articulation.</td>
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<tr>
<td></td>
<td>Spine Twist</td>
<td>- Feet kept on floor to lessen load through spinal rotation</td>
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<tr>
<td></td>
<td>Supine</td>
<td></td>
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<tr>
<td></td>
<td>Chest Lift on Step Barrel</td>
<td>- Lift from extension to neutral to activate deep abdominal muscles without damaging thoracic vertebrae</td>
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<tr>
<td>Exercise (Reformer)</td>
<td>Exercise (Reformer)</td>
<td>Note – Arm position in Chest Lift helps to stretch pectoral muscles affected by lumpectomy. Purpose: Warm up for BASI comprehensive program</td>
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<tr>
<td>Foot Work Series</td>
<td>- No modification for any exercises in series Purpose: To warm up client and strengthen client’s hips, knees, and ankles; Emphasis on alignment and pelvic stability.</td>
<td></td>
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<tr>
<td>Abdominal Work (Reformer)</td>
<td>100 Prep 100 - Head remains down through both exercises to avoid load on thoracic spine - Initially performed without straps to ensure full range of arm motion/shoulder engagement and gradually built to standard 1.5 spring resistance Purpose: To strengthen abdominals through static and dynamic movement with focus on pelvic stability</td>
<td></td>
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<tr>
<td>Hip Work (Reformer)</td>
<td>Frog Circles Down/Up Openings - No modifications Purpose: To focus on pelvic lumbar stability through range of motion, as well as hip, hamstring, adductor, and abductor strength</td>
<td></td>
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<tr>
<td>Spinal Articulation</td>
<td>None Spinal articulation is not recommended for osteoporosis</td>
<td></td>
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<tr>
<td>Stretching (Ladder Barrel)</td>
<td>Gluteals Hamstrings Adductors Hip Flexors - Emphasis on flat back - Emphasis on flat back - Emphasis on lifting through small lateral movement - No modification Purpose: To promote lengthening of tight muscles in lower body after exertion</td>
<td></td>
</tr>
<tr>
<td>Full Body Integration</td>
<td>Elephant Flat Back - Light weight on wrists, weight over heels, abs up - Light weight on wrists, weight over heels, abs up</td>
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</tr>
</tbody>
</table>
| (Reformer)                  | (Knee Stretch) Down Stretch | - Light weight on wrists, lifting with lats & abs, emphasis on extension  
**Purpose:** To strengthen core muscles with full-body engagement. Flat back and extension recommended for osteoporosis. |
|---------------------------|-----------------------------|--------------------------------------------------------------------------|
| Arm Work (Reformer)        | **Supine Series**           | - Initial sessions used arm weight (no straps), then light springs, and slowly progressed in tension as full range of motion on scarred side was achieved.  
**Purpose:** To gain range of motion through shoulder muscles shoulder height and below and then building strength. |
| Leg Work (Mat)             | **Gluteals Side Lying Series**  
**Side Leg Lift**  
**Forward & Lift**  
**Forward with Drops** | - No modification for series  
**Purpose:** To promote lower back health, pelvic stability, and balance |
| Lateral Flexion (Mat)      | Side Lifts                  | - No modification  
**Purpose:** To promote safe, functional lateral movement with focus on internal obliques and lumbar mobility. Small movement strengthens without stressing osteo spine. |
| Back Extension (Mat)       | Single Leg Kick             | - No modification  
**Purpose:** To promote safe spinal mobility for osteoporosis, with emphasis on strengthening the entire posterior muscle chain including shoulder & back extensors, gluteals, hamstrings, gastrocnehmiius & soleus while engaging serratus anterior & trapezius to maintain scapular depression |
| (Movement Analysis)        | Roll-down                   | - Hip hinge to prevent stress on thoracic spine |

During the course of the 12-week program, the client reported an increase in arm mobility and strength. She noted that muscle tension in her lumbar disappeared within the first two weeks. In addition, she noticed that her alignment improved significantly. She was
aware when her shoulders rounded forward and core collapsed throughout the day and made attempts to correct her posture. As a result, she felt stronger and more balanced.

**Conclusion**

As a dancer, Eve Gentry discovered Joseph Pilates’ holistic approach to exercise in 1938. So, it’s no surprise that she turned to him in 1955 when she was diagnosed with breast cancer and received a radical mastectomy. Surgery left her unable to lift her arm. “Don’t worry, we fix,” Pilates responded. And he did. Gentry regained full range of motion in her arm and torso and returned to dancing within a year.

Studies show that Pilates is an effective rehabilitation option for breast cancer survivors following surgery and physical therapy. Its benefits extend beyond exercise, engaging the mind, body, and spirit. Pilates can:

- Improve lymphatic drainage through deep, lateral breathing
- Promote better posture
- Build mobility, strength, and endurance through functional movement
- Improve range of motion in arm movement by focusing on scapula-humeral rhythm
- Accommodate practitioners who are fatigued and/or require special considerations (e.g., osteoporosis) because exercises can be performed standing, seated, supine, prone, or side lying and modified as needed

Best of all, Pilates meets people where they are, scaling as appropriate. With moderate modifications to accommodate limited range of arm movement and osteoporosis, Pilates is a safe and effective method for breast cancer recovery.
Bibliography


