The Benefits of Pilates for the Post Cesarean Section (C-Section) Client Presenting With a Diastasis Recti Abdominis (DRA) and Pubis Symphysis Derangement

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ABSTRACT

Following a c-section, significant postpartum rehabilitation is needed to restore abdominal strength and mobility. In addition to recovering from major abdominal surgery, many post c-section clients develop diastasis recti abdominis (DRA) coupled with pubis symphysis derangement as a result of their labor and delivery. A Pilates conditioning program can be developed to help these clients rebuild abdominal stability by incorporating exercises to strengthen the transversus abdominis (TA) and pelvic floor muscles. While exercises are selected to improve pelvic-lumbar stability, there are unique postpartum limitations for this population, including abdominal flexion, thoracic extension, and double-leg hip abduction.

A 12-week Pilates program, designed based on these specific limitations, was found to improve the quality of life for a post c-section client presenting with a DRA and pubis symphysis derangement. The client was able to realign her pelvis, rehabilitate her pelvic floor, and strengthen and stretch her muscles to stabilize her body and eliminate pain in her abdominal, lower-lumbar and pelvic region.
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ANATOMICAL DESCRIPTION

Figure 1. A diastasis recti abdominis (DRA) is a separation of the outermost layer of the abdominal muscles at the linea alba. (Photo courtesy of MuTu System)

A diastasis recti abdominis (DRA) is a separation of the outermost layer of the abdominal muscles, the rectus abdominis (RA), as a result of increased intra-abdominal pressure. As shown in Figure 1, the linea alba or connective tissue between the RA stretches and increases in width. More specifically, a DRA is caused by the stretching of the fascial attachments which surround the RA, as shown in Figure 2. The transversus abdominis (TA) is surrounded by a fascial sheath, the transversalis fascia, which connects anteriorly to the thoracolumbar fascial sheath and posteriorly to the linea alba. This fascial sheath encompasses the internal and external oblique, and divides to surround the RA. In addition, as further illustrated in Figure 3, the
transversalis fascia surrounds the quadratus lumborum, the psoas muscle and the erector spinae. As a result, if left untreated, a DRA can cause postural deviations as the obliques and TA shift backwards to accommodate the widening of the RA, lower-lumbar and pelvic pain, pelvic floor and sacroiliac (SI) joint dysfunction, as well as cosmetic defects such as protruding abdominals.²

Figure 2. The transversalis fascia surrounds the TA, obliques, and RA. (Photo courtesy of Drake et al.)

Figure 3. The transversalis fascia also surrounds the quadratus lumborum, the psoas muscle and the erector spinae. (Photo courtesy of OpenStax CNX)
Studies have shown that between 30% and 70% of pregnant women will develop a DRA. During pregnancy, the ovaries and placenta produce a hormone called relaxin that softens muscles and ligaments. Relaxin produces water retention in collagen fibers, the primary component of the connective tissue in cartilage, tendons and ligaments. The additional water increases the size and elasticity of the collagen fibers, resulting in more supple and pliable joints. The presence of relaxin also causes the connective tissue of the abdominal and pelvic floor muscles to stretch. In fact, it is estimated that the abdominal muscles will stretch over 50% of their original length during pregnancy.\textsuperscript{6,7,8}

The presence of relaxin serves three important functions during pregnancy and delivery, as illustrated in Figure 4:\textsuperscript{2}

1) The pubis symphysis and SI joints are fibrous joints with limited range of motion. Relaxin allows for movement of these joints and the separation of the pelvic bones to enable the passage of the baby through the pelvis. Some women experience a greater degree of separation, called pubis symphysis derangement, especially during the pushing stage of delivery if undue stress is placed on the pubic bone.\textsuperscript{9}
2) Relaxin allows for stretching of the abdominal muscles to accommodate the growing uterus in the abdomen.

3) Relaxin enables the pelvic floor muscles to stretch and relax, allowing the baby to descend through the pelvic diaphragm.

After delivery, as relaxin levels lower, the abdominal and pelvic floor muscles begin to shorten and the public symphysis and SI joints become less pliable. However, a DRA will persist in between 35% and 60% of women during the postnatal period.\(^5\)

The risk of a DRA persisting during the postnatal period is further increased among women who have delivery via a cesarean section (c-section).\(^10\) During a c-section, an incision is made through the fascia to expose the RA. These muscles are spread apart at the linea abla, increasing the risk of a DRA. The transversalis fascia and the peritoneum surrounding the abdominal cavity are also cut to expose the uterus. Finally, an incision is made in the uterus and the baby's head is glided through the opening.

In addition to developing a DRA, women who require an emergency c-section after trying to deliver vaginally are often more likely to experience pubis symphasis derangement because undue stress is placed on the pubic bone during the unproductive pushing stage of delivery.\(^9\) As a result, these women experience a unique blend of postpartum symptoms as they recovery from major abdominal surgery (c-section) and the discomfort associated with both a DRA and pubis symphasis derangement.
CASE STUDY

Name: Bessie M.

Sex: Female

Age: 32

Background: This case study is of Bessie M., a 32-year-old female, who delivered a healthy 8lb 6oz baby boy via a c-section six (6) weeks before beginning 12 weeks of Pilates training. Bessie M. was in labor for 37 hours before undergoing an emergency c-section when the baby could not pass through the pelvis and began experiencing distress. As a result of her labor and delivery, Bessie M. experienced pubis symphysis derangement, loosening of the ligaments between the pubic bones, when the baby attempted to descend through the narrow opening of the pelvis as well as a 6cm DRA. The DRA occurred due to the separation of the linea alba during excessive pushing when Bessie M. attempted to deliver the baby through her narrow pelvis and was further exacerbated during the emergency c-section.

When Bessie M. began Pilates training, she complained of localized pain in the pubic area that radiated down the inside of her thighs and into the lumbar area. She also had difficulty walking as a result of the pubis symphysis derangement and struggled with incontinence during coughing, sneezing or laughing as a result of a weakened pelvic floor.

Limitations: Bessie M. continues to experience abdominal discomfort and soreness following her c-section. As a result of the DRA, she must avoid activation of the RA to prevent further separation at the linea alba. This includes exercises that involve lifting the head and shoulders in a supine position (forward flexion) as well as maintaining both legs lifted while in a supine position (e.g., table top legs). This also includes thoracic extension, since care must be taken in preventing the ribcage from flaring. In addition, as a result of the pubis symphysis derangement,
Bessie M. must avoid double leg hip abduction – any action that takes both legs away from each other, especially with added resistance. She also should avoid lying on either hip as this causes her to experience discomfort.

**PILATES CONDITIONING PROGRAM: POST C-SECTION CLIENT PRESENTING WITH A DIASTSIS RECTI AND PUBIS SYMPHISIS DERANGEMENT**

Following a c-section, significant postpartum rehabilitation is needed to restore abdominal strength and mobility. Special care and patience is needed since post c-section clients often find it difficult to reactivate the abdominal muscles and may continue to experience discomfort and soreness.

The main focus of this Pilates conditioning program is to rebuild abdominal stability, incorporating exercises to strengthen the TA and the pelvic floor muscles. The program is designed to help the client improve pelvic-lumbar stability as her body recuperates from the DRA and pubis symphysis derangement.

The following exercises\textsuperscript{11-15} were selected due to the client’s unique postpartum limitations. Specifically, abdominal flexion was avoided as this could exacerbate the presence of the DRA between the already weakened RA muscles. This included the elimination of any exercises that require lifting the head and the shoulders off the ground in the supine position, lifting both legs of the ground into “table top,” and thoracic extension. In addition, this program eliminated any double-leg hip abduction, as this could cause localized pain in the pubic area because of the pubis symphasis derangement.
Bessie M. completed this program during the course of 12 weeks, attending a 1-hour session twice per week.

**Program Goals:**

- Strengthen the TA to help minimize the DRA
- Strengthen the pelvic floor muscles to accelerate recovery from labor
- Stabilize the pelvis as the pubis symphysis heals and is able to realign
- Stretch and strengthen the gluteals, piriformis, and hip flexors to support proper alignment of the pelvis
- Restore proper posture by encouraging neutral pelvic alignment
- Stretch the pectorals to open the chest and counterbalance the tightness from rounding forward during breastfeeding
- Restore proper ribcage positioning by strengthening the muscles attached to the thoracic cage, including the abdominals, pectorals, erector spinae and diaphragm
- Encourage diaphragmatic breathing to reeducate the diaphragm

**Conditioning Program:**

*Warm Up (Mat)*

- **Pelvic Curl** – Emphasis was placed on pelvic lumbar stabilization and returning to a neutral pelvic following each repetition.

- **Leg Lifts** – Emphasis was placed on pelvic lumbar stabilization and hip dissociation while maintaining a neutral pelvis throughout the exercise.
o **Spine Twist Supine** – Exercise was modified such that the feet remained on the mat to avoid exacerbating the DRA and emphasis was placed on maintaining pelvic lumbar stabilization while avoiding hyperlordosis.

_Foot Work_ (Cadillac) - During Foot Work, emphasis was placed on maintaining pelvic lumbar stabilization and keeping the sacrum anchored along the mat while strengthening and stretching the hamstrings.

- Parallel Heels
- Parallel Toes
- V Position Toes
- Open V Heels
- Open V Toes
- Calf Raises
- Prances
- Single Leg Heels
- Single Leg Toes

_Abdominal Work_

- **Bottom Lift with Roll Up Bar** (Cadillac) – Emphasis was placed on the initial pelvic tilt of the movement, maximizing lumbar flexion as the spine lifted off the mat.

- **Tilt** (Reformer – Short Box Series) – Emphasis was placed on maintaining a co-contraction of abdominals and back extensors throughout the movement. The other exercises in the series were eliminated until the client’s DRA resolved.

_Hip Work_ (Cadillac) - Emphasis was placed on maintaining a neutral spine, pelvic lumbar stabilization and hip dissociation throughout the series.
- **Frog** (Single Leg Supine Series)
- **Circles Up** (Single Leg Supine Series)
- **Circles Down** (Single Leg Supine Series)
- **Hip Extension** (Single Leg Supine Series)
- **Bicycle** (Single Leg Supine Series)

*Spinal Articulation* - Emphasis was placed on the initial pelvic tilt of the movement, maximizing lumbar flexion as the spine lifted off the mat.

- **Tower Prep** (Cadillac)
- **Bottom Lift** (Reformer)
- **Bottom Lift with Extension** (Reformer)

*Stretches* - Emphasis was placed on stretching the pectorals and maintaining trunk stabilization and a neutral pelvis while remaining seated on the stability ball. Care was also taken to prevent thoracic extension during the Overhead Stretch.

- **Shoulder Stretch** (Pole Series)
- **Overhead Stretch** (Pole Series)
- **Side Stretch** (Pole Series)
- **Spine Twist** (Pole Series)

*Full Body Integration* - Bessie M. progressed through the Up Stretch group throughout the 12 weeks and emphasis was placed on the co-contraction of her abdominals and back extensors.

- **Thigh Stretch with Roll Up Bar** (Cadillac)
- **Up Stretch 1** (Reformer)
- **Up Stretch 2** (Reformer)
- **Long Stretch** (Reformer)
- **Up Stretch 3** (Reformer)

*Arm Work* (Reformer) - Emphasis was placed on maintaining trunk stabilization throughout the series.
- **Chest Expansion** (Arms Sitting Series)
- **Biceps** (Arms Sitting Series)
- **Rhombooids** (Arms Sitting Series)
- **Hug-A-Tree** (Arms Sitting Series)
- **Salute** (Arms Sitting Series)

*Leg Work* (Wunda Chair) - Emphasis was placed on maintaining pelvic lumbar stabilization and a neutral pelvis throughout the exercises.
- **Leg Press Standing**
- **Hamstring Curl**

*Lateral Flexion/Rotation* (Wunda Chair) - Emphasis was placed on maintaining scapular stabilization and a neutral pelvis throughout the exercise.
- **Side Kneeling Stretch**

*Back Extension* (Reformer) - Care was taken to prevent Bessie M. from lifting the chest. Emphasis was placed on maintaining abdominal engagement, shoulder stabilization and back extensor control.
- **Breaststroke Prep**
CONCLUSION

After completing a total of 24, 1-hour Pilates training sessions over the course of 12 weeks, Bessie M. reported decreased lower-lumbar and pelvic pain, decreased abdominal soreness and discomfort, and increased abdominal strength. A follow-up examination by her ob-gyn revealed that the DRA has improved significantly, decreasing by 2.5cm (from 6.0cm to 3.5cm). Bessie M. also experienced improved mobility and was able to walk again without discomfort. In fact, the pain radiating down the inside of the thighs and into the lumbar area completely subsided. In addition, she reported that the soreness through her chest was resolved and that she no longer experienced incontinence.

These results indicate that a specialized Pilates training program was successful in improving the quality of life for a post c-section client presenting with a DRA and pubis symphysis derangement. This program helped the client rehabilitate and realign her body following childbirth, while improving the symptoms associated with her DRA and pubis symphysis derangement. Specifically, the client was able to realign the pelvis to the spine, rehabilitate her pelvic floor, and strengthen and stretch the muscles surrounding her pelvis in order to stabilize her body and eliminate that pain in her abdominal, lower-lumbar and pelvic region.
BIBLIOGRAPHY


