Clinical Case Report Competition
West Coast College of Massage Therapy, Victoria
Winter 2010

Second Place Winner
Devon Michaud

Massage therapy and therapeutic exercise to increase abdominal flexion and muscle balance post TRAM surgery: A case report
# Table of Contents

Abstract ................................................................................................................. 2
Introduction .............................................................................................................. 3
  History .................................................................................................................. 3
  Examination ........................................................................................................... 3
Methods .................................................................................................................. 4
Results .................................................................................................................... 6
Discussion ............................................................................................................... 6
Conclusion .............................................................................................................. 7
Resources ................................................................................................................ 8
Appendix A ............................................................................................................... 9
Appendix B ............................................................................................................. 10
Appendix C ............................................................................................................ 12
Abstract

Objective: Can continuous Massage Therapy treatments combined with regular exercise help restore abdominal flexion and full body muscle balance in a patient who has had one side of her Rectus Abdominis muscle removed during a TRAM Flap Breast Reconstruction?

Methods: Baseline measurements included Plum Line Posture Examination, Manual Muscle Testing, Abdominal Flexion Endurance, Trunk Extension Endurance, Scar Measurements, Thomas Test (Psoas Muscle), and a Verbal Analogue Scale for Irritable Bowel Syndrome (IBS) symptoms. 10 treatments, approximately one week apart, were given utilizing Rood’s Techniques (Roods), Myofascial Release (MFR), Active and Passive Range of Motion (AROM and PROM) and General Swedish Massage (GSM). Home care was given including exercises for core strength, abdominal strength, back and chest stretches, posture and balance. Treatments and homecare increased in intensity each week bringing the patient through a progression to increase her body’s self-reliance.

Results: Within 10 weeks the patient was able to sit-up from a supine, knee-bent position with no assistance if her feet were anchored; she could sit with self-assistance without feet anchored. The patient’s abdominal scarring became more pliable and less visible. The patient experienced a decrease in IBS symptoms and an increase in the sense of general well-being.

Conclusion: Regular Massage Therapy treatments and vigilance in self-exercise can train the body to function normally even when muscles have been surgically removed.

Key Words: breast cancer, TRAM flap, Rood’s, surgery, Breast Reconstruction, Scar Release, Abdominal Flexion Endurance, External Oblique, Internal Oblique, Therapeutic Exercise, Massage Therapy, homecare
Introduction

Breast Cancer is currently the most prevalent cancer among Canadian women. “1 in 9 women in Canada are expected to develop Breast Cancer in their lifetime. 1 in 28 women in Canada will die from it.” These days there are many treatment options for Breast Cancer including Radiation, Chemotherapy, Medication (including Hormone Therapy) and Surgery. Often, a survivor of Breast Cancer will have had her affected breast removed by means of Mastectomy. Many of these women will choose to have reconstructive surgery to give the appearance of two normal breasts.

There are several surgeries that may be utilized for breast reconstruction. The two most common are Implant and Flap. Implants are the use of artificial means to produce a breast mound while Flap surgeries create a mound using a woman’s own body tissues. Muscle and fat is transplanted from one area of the body and moved to the breast area. The common muscles used are Latissinus Dorsi, Gluteus Maximus and Rectus Abdominis.

When the Rectus Abdominis is used, the muscle on one side of the reconstructed breast is cut and reflected to serve as a mound and fat is taken in a “tummy tuck” procedure also to be inserted over the new breast mound. This procedure is known as a Transverse Rectus Abdominis Myocutaneous (TRAM) Flap surgery. Skin, muscle and fat is cut, leaving only 2cm width of Rectus Abdominis on the affected side. The tissue is then tunnelled under the fascia of the anterior thorax, maintaining blood supply but severing mechanical nerve supply. The muscle is then used to form a breast mound while the fat and skin is used to complete the breast. Blood supply to the tissue remains sourced from the epigastric blood vessels. A pedicled TRAM Flap uses blood supplied by superior epigastric vessels; these remain intact via a pedicle (where the muscle remains connected at its origin). With a free TRAM Flap the blood vessels are cut and the flap receives blood supply from the inferior epigastric vessels. Other muscles that may be used in Flap Reconstruction are the Gluteus Maximus or the Latissimus Dorsi.

There are many reasons women choose Flap surgeries over implants, the main one being that they are using their own body tissues and there is little chance of tissue rejection. The main complication of TRAM flap surgeries is the added scarring (abdominal and breast) and the chance of decreased trunk flexion due to severed mechanical nerve supply and decrease size of the Rectus Abdominis muscle. Because of the severity of the abdominal surgery, many women also develop gastrointestinal tract disorders or visceral adhesions as a side effect. Many women undergoing TRAM Flap surgery find themselves unable to sit up unassisted post surgery. The recovery time for a TRAM Flap depends on when it is performed in relation to the original breast tissue removal. The surgery must take place at the time of the mastectomy or else they must wait until the scar tissue has healed before performing a second procedure. TRAM Flap is considered a major surgery with high risk of infection. Patients will spend several weeks in isolation (often in a Burn unit) to reduce risk of infection. Once the patient is released from the hospital the expectancy is over 2 months before full recovery.

Post surgery scars are visible in the chest (over the breast) across the abdomen and around the navel.

History: This patient was a 52 year old woman. She had been diagnosed with Breast Cancer in May 2001: nine years prior to these Massage Therapy treatments (May 2010). Prior to her Breast Cancer treatments she was highly active in competitive Martial Arts, Running, Hiking and Weightlifting. During her convalescence her activity level dropped. Between June 2002 and October 2003 she underwent chemotherapy, two breast biopsies, two lumpectomies, a lymphectomy, a mastectomy to her left breast, TRAM Flap reconstruction (at the time of the mastectomy) and a complete hysterectomy.

She was declared cancer free in 2008 and was taking no medications at the time of her initial massage treatment. Her main concern, and reason for seeking Massage Therapy, was her decrease in core and abdominal strength. Where she had previously been very fit and strong, since her TRAM Flap surgery she had been unable to sit up, from supine, on her own. She wanted to increase her core and muscle strength and sit up on her own, perhaps even perform repetitions of sit-up exercises.

Examination: The patient presented with scar tissue 50cm long across her lower abdomen and 2cm wide. Another
scar was 2cm wide and circled her navel, which was removed and reattached during the TRAM Flap surgery. The scarring was tight and thick, protruding at her sides in mounds often referred to as “bunny ears.” The scar felt tight to the patient and may have been restricting some of her abdominal contents. She revealed that she had little to no cutaneous sensation in some areas adjacent to the scar.

She complained of IBS symptoms ranging from diarrhea to constipation with gas, indigestion and heartburn. She often found it difficult to control her bowels, having to defecate without warning so always needing to know where the nearest toilet was located. On the first appointment her IBS symptoms were 5/10 on a Verbal Analogue Scale (VAS) 10 being the worst her symptoms could possibly be.

She also had muscle cramps and discomfort in her legs and low back.

On the 1st, 6th and 10th visits I performed a series of tests to determine the severity of the dysfunction and which muscles were affected. On the initial visit a plum-line Posture evaluation revealed hyperextended knees, an increase in pelvic angle, a slight drop in her left hip, decreased lumbar lordosis, anterior abdominal projection, capital side right side flexion of 13 degrees and an elevated right shoulder. She also stood with a wide stance and her chin elevated.

A range of motion to her Lumbar Spine showed a forward flexion of 50 degrees and extension of 5 degrees. Lumbar extension caused pain at 4/10 on a VAS. All other ranges were normal. Manual muscle tests (MMT) showed full hip flexion (grade of 5/5) bilaterally but a weak hip extension with a grade of 4/5 on her right and 3/5 on her left.

The patient performed a Lumbar Extension Endurance Test and received a grade of 5/5. An Abdominal Flexion Endurance test revealed a 0/5 or the inability to perform 1 full abdominal crunch with her hands to her side. The patient also received 5/5 bilaterally when she performed an Oblique Endurance Test.

I also performed a Thomas Test for the Length of her Iliopsoas muscle; she had 0 degrees of hip extension.

From these tests I deduced that her abdominal muscles, specifically her rectus abdominis, were not functioning. As her right rectus abdominis had been moved, this left her left to carry on the work of both, which it had not been doing. With lack of use her left rectus abdominis had atrophied.

With lack of abdominal flexion her dorsal muscles had shortened causing a flat Lumbar Spine and shortening her Psoas major, decreasing hip extension. Aside from weak Rectus abdominis, her Gluteus Maximus and hamstrings appeared to be weak, causing a decrease in hip extension.

The goals of treatment were to increase overall muscle balance in the trunk with a focus on strengthening abdominal flexion and core muscles, allowing the patient to sit-up unassisted. I theorised that since her Rectus Abdominis was not functioning but all of her Abdominal Oblique muscles were functioning fully, that she could train her body to compensate by activating left and right external and internal oblique muscles simultaneously and thereby achieve trunk flexion.

Methods

The patient booked 10 treatments approximately one week apart. She was informed that for the massage to be fully successful she would need to join in the work and that completing homecare was also very important.

All 10 treatments were very similar in nature, all using the same techniques but adding and modifying as the patient progressed. On the first treatment, moving from prone to supine, the patient felt pain in her back which continued for several days, so the rest of the treatments were performed in sidelying and supine.

Each treatment began with Myofascial Release (MFR) crosshands over the lumbar erectors and Quadratus Lumborum muscles. This was followed by light Swedish techniques, also to the low back, to relax the back muscles and allow for better trunk flexion.

Once the patient had moved herself into supine I spent some time releasing the scar. Techniques performed to the scar were also fascial in nature: Crosshands, performed with finger tips, both along the length of and perpendicular to the scar. Frictions were performed, with oil to help with the malleability of the tissue.

After back and scar work we addressed abdominal flexion with Rood’s Quick Stretch technique. The patient lay supine with her knees at 90 degrees flexion and her hips also flexed to 45 degrees. Her feet were hip width apart and her pelvis was in a neutral position. She was asked to locate and activate her pelvic floor muscles and her Transverse
Abdominis Muscle. (Hook-Line position) I explained the crosshatch orientation of her external and internal oblique muscles and asked her to try to visualise this within her own body. I then applied a tapping to her oblique muscles, to stimulate them bilaterally, and asked her to try to raise her scapula off the table. After 5 attempts she was able to perform 1 full abdominal crunch.

For homecare the patient was given the first progression of a “dead bug” exercise. Lying in Hook-Line she was asked to begin lifting her feet off the floor on one side and then the other, without shifting her hips, this was intended to increase core strength and control. She was also asked to stand on hands (directly beneath shoulders) and knees (directly beneath hips) and kick her feet back on alternate sides. The purpose of this exercise was to increase the strength of her gluteal muscles and hip extension. Both exercises were to be performed 10 repetitions once a day and with no pain.

When the patient came in for her second visit she had completed her homecare as well as practising abdominal crunches. She performed a full five crunches with her hands to her side bringing the inferior angle of her scapula off the table and receiving a grade of 5/5. Her hip extension MMTs were both a grade of 4/5 before the treatment but reached 5/5 post-treatment.

During the course of 10 treatments the intensity of the abdominal crunches was increased by bringing her scapula one inch past the inferior angle of her scapulae and asking her to cross her arms at her chest.

Overall the patient steadily improved with each treatment. She progressed to abdominal flexion (Rood’s) with hands by her hears, counting to three coming up and three going down to improve control. Contract-relax stretches to her Psoas Major and Rectus Femoris muscles were also added. Homecare exercises progressed through the dead bug. She would lie supine with hips and knees both flexed to 90 degrees. One leg and contralateral arm would extend to be in line with the body and then return to 90 degrees flexion. Then she would repeat on the opposite side.

Progression varied each week as a result of general energy levels and how often she completed her homecare (averaging 3 days per week). Each week her abdominal muscles became stronger, her IBS symptoms decreased in severity and frequency and her scar became less taut and visible. As a result of practicing forward trunk flexion her pectoral muscles became taut and her shoulders began to protrude anteriorly. On the 5th visit I added contract relax techniques to her pectoralis major and minor muscles and added a supine Pectoralis Minor stretch to her home care. The stretch is performed supine lying on a support (yoga bolster or folded towels) that supports the length of the spine from sacrum to occiput but does not support the scapula. The shoulders are flexed to 90 degrees and the elbows are at full extension. The shoulders are then abducted as far as possible letting gravity pull the arms closer to the ground. All muscles are fully relaxed (no contraction). The stretch is held as long as possible, ideally more than five minutes. There should be no pain.

On the 4th and 8th treatments paraffin wax was added to the beginning of the treatments; applying the wax to her hands, feet (for relaxation) and her abdominal scarring. This deep preheat, specific to the abdominal scar, allowed me to work more effectively on releasing the scar tissue.

On the 6th treatment I did a full reassessment of the patient’s progress. She was feeling frustrated with her perceived lack of progress. However, after we compared the results of her 6th visit with those of her first, she saw that progress was being made and she was glad to continue with the treatments. By the 6th treatment the patient received a grade of 4/5 for abdominal flexion endurance, bringing her thorax off the floor 2” past her scapula, and keeping her arms crossed at her chest. Her hip extension had progressed to a grade of 5/5 and her scar had decreased in visibility. The scar was now in four sections: two sections of 10cm in length and 2cm width and two sections of 18cm that were not readily visible. As well the “bunny ears” had softened and blended into the tissue of her flanks. Her Thomas test remained at 0 degrees of extension.

After this treatment I introduced her to the Wall Stand to begin addressing her full body posture. She was asked to
perform this at home for 30 seconds morning and night and given a cue to sit/stand with proper posture any time she stood or sat at the desk at work.

On her 7th treatment the patient was quite tired and test results were not valid. She also had edema in her ankles so basic lymph drainage was used to decrease the severity of the swelling. Her energy increased dramatically after this treatment.

During this treatment I began to encourage the patient to sit-up all the way. We continued with the Rood’s Quick Stretch and crunches but added full abdominal flexion. With the patient lying supine in Hook-Line, I used my bodyweight to pin her feet to the table. Using her abdominal strength the patient pulled herself as far into seated as she could; I then took her hand and assisted the rest of the way up. The patient, having family at home, was encouraged to add five repetitions of this exercise to her homecare, with the caution to go only as far as she could and to allow her family to assist her. I cautioned her not to practise the exercise while she was alone.

On the 8th treatment the patient performed the same active assisted sit-up, this time self assisting by catching her knees and pulling herself the rest of the way up. In this manner she was able to sit-up fully on her own.

On the 9th treatment the patient surprised me. During the assessment she sat up, with feet rooted, entirely on her own without need of assistance from therapist or from her own arms. During this treatment she was encouraged to begin the same active assisted exercise without rooting her feet.

On the 10th, and final, treatment the patient was again tired. She was unable to sit-up entirely on her own with her feet rooted and needed to catch her legs. This set-back was discouraging to the patient, so her final homecare addition was to make a list of all of the improvements she had made over the past 10 weeks and to keep that list in a visible place. Knowing that the change is happening and will continue to happen would give her the incentive to continue treatments and exercises until she met her final goal.

Results

After 10 visits the patient was reassessed. Her lumbar spine now had normal Range of Motion in all directions and was pain free. She had a full grade of 5/5 in both hip flexion and extension. A Thomas test showed 10 degrees of hip extension bilaterally. Trunk Extension and Oblique Endurance were also 5/5. Abdominal Flexion Endurance, which had been 0/5 with hands on the floor, was now 5/5 with hands by her ear. The scar, which had been 50cm long and 2cm wide, was now in 3 sections of 10 cm and only 1mm wide. The ring around her navel was also 1mm wide. The “bunny ears” were not visible and the scar was more pliable, though there were still parts of the scar with no cutaneous sensation. The patient now described her IBS symptoms as “virtually non-existent.” The plum-line posture showed she still had a wide stance but her hip angles had become less noticeable and her head and shoulders only slightly projected anteriorly.

Discussion

10 treatments with one patient is not enough to make a solid conclusion. In this case we had a woman determined to “get her body back” and willing to do the work it would take to make that happen. She had tried exercising herself but lacked the specific knowledge of how abdominal muscles function. Given that information, direction and encouragement she happily completed her homecare exercises and helped herself accomplish her goals.

Muscles that have been removed no longer function but the body is intelligent and can learn to compensate if trained to do so. I utilized facilitating techniques designed by Margaret Rood over 50 years ago, to stimulate the Internal and External Abdominal Oblique muscles to co-contract bilaterally and perform the function of the absent Rectus
Abdominis.
Core muscles also needed to be addressed as all normal function needed to be stabilized.

With the patient training herself in forward flexion only, it became important to compensate by opening through the Thorax. Full body posture was also important in order to leave the body in full balance.

In order to make a solid conclusion, more study will need to be done in this area. Thousands of women undergo (TRAM) Flap reconstruction every year, and these women could benefit by retraining their bodies to maintain full body function.

**Conclusion**

Prior to her first treatment the patient was unable to sit, from supine, unassisted for over seven years. After 10 weeks of Massage Therapy and Therapeutic Exercise, she was able to bring herself from supine to sitting without any outside assistance.
In her case Massage Therapy and Therapeutic Exercise were highly effective in bringing her body back to normal function by increasing abdominal flexion and muscle balance.
Resources


5. Davey, E. Myofascial Release 2 class notes, WCCMT Victoria, 2010


7. Scovill, N. Neurological Assessment class notes, WCCMT Victoria, 2010


9. Ruzzier, R. Hydrotherapy class notes, WCCMT Victoria 2009

10. Little, I. General Orthopedic Treatments class notes, WCCMT Victoria 2009
# Appendix A

## Progression of Abnormal Assessment Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Abdominal Flexion Endurance</th>
<th>Thomas Test</th>
<th>Hip Extension MMT</th>
<th>Scar Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 4, 2010</td>
<td>0/5 Hands at Side</td>
<td>0 degrees extension</td>
<td>L=3/5</td>
<td>Length=50cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R=4/5</td>
<td>Width=2cm</td>
</tr>
<tr>
<td>June 9, 2010</td>
<td>4/5 Arms crossed at chest, 2&quot; past Scapulae</td>
<td>0 degrees extension</td>
<td>Bi=5/5</td>
<td>Length=3x10cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Width=2mm</td>
</tr>
<tr>
<td>July 15, 2010</td>
<td>5/5 Hands at Ears, 3&quot; past Scapulae</td>
<td>10 degrees extension</td>
<td>Bi=5/5</td>
<td>Length=3x10cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Width=1mm</td>
</tr>
</tbody>
</table>
Appendix B

Photographs of Abdominal Scar During 10th Treatment
Appendix C

Diagram of TRAM Flap Surgery
From breastreconstruction.ca

Figure 1 - This schematic demonstrates a typical mastectomy scar.

Figure 2 - This schematic demonstrates how the TRAM flap is moved from the abdominal area to the mastectomy site.
**Figure 3** - This schematic demonstrates a left TRAM flap used in the reconstruction of a right mastectomy defect.

**Figure 4** - This schematic demonstrates an idealized final TRAM flap result.