



# Clinical Case Report Competition

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Can massage therapy change the appearance of  
chronic surgical scar and improve its mobility?

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**Abstract**

After having a caesarean section approximately eight months prior, the subject complained of slight pain at the end range of left hip flexion and left hip internal rotation and presented with decreased fascial mobility of the left lower abdomen. The scar appeared significantly redder on the left side and it was hypothesized that myofascial techniques over the area would improve both fascial mobility over the left hip and the appearance of the scar itself. Six treatments were performed over a two month period and each treatment involved an initial assessment, application of heat over the lower abdomen, Swedish massage, myofascial techniques over and around the scar, clearing, ice application/stretch, and a final assessment. While the scar improved in appearance over the course of the treatments, the patients' subjective reports of the left hip pain during movement were not significantly changed.

*Keywords: massage, myofascial release, scarring, caesarean section, hip pain*

## Introduction and Hypothesis

Massage therapy is routinely recommended as treatment for scars and has been shown to improve range of motion and decrease contracture after surgery (Donnelly & Wilton, 2002), as well as improve scar quality and decrease pain and pruritis following burns (Roques, 2002). However, when it comes to scar massage there is some disagreement on the best time to initiate treatment, which techniques to use, and how long to treat (Shin & Bordeaux, 2012). This inconsistency in treatment makes it difficult to conclusively state the benefit of massage therapy on a scar given certain parameters. Can massage therapy change the appearance of a chronic scar and improve its mobility? The aim of this case study is to show the effect of specific myofascial techniques on a chronic post-caesarean scar over six treatments.

## Background

Caesarean sections, or C-sections, are procedures in which the birth mother's abdomen and uterus are cut open and the baby is delivered this way instead of vaginally. The surgeon commonly makes a transverse incision across the belly just above the pubic line (Medline Plus, 2012). The rate of this surgery is steadily on the rise, with an estimated 26% of babies in Canada born this way (National Post, 2013). This results in about a quarter of mothers out there with C-section scars, and for each mother who considers the scar a badge of honour, the growth of the "C-section tattoo" industry would seem to indicate there's another who wants to cover it up (Chanel, 2012). However, there is a lack of literature proving the efficacy of scar massage (Shin & Bordeaux, 2012) and, while some believe it is possible to change a well-established scar, the process is slow (Macdonald, 2004). The aesthetic implications of a scar should not be minimized as it can affect an individual's body image and self-esteem, but there can be other less immediately obvious effects of a scar as well.

The formation of scar tissue can cause layers of skin and connective tissue to stick together and what used to glide easily becomes bound up. Because the incision in a C-section has to cut through the entire abdominal wall, this adherence can extend to muscle fibers as well (MacDonald, 2004). Fascia serves as an attachment for muscles and, in the abdomen, the three lateral abdominal muscles all have fascial connections towards the midline, forming the rectus sheath surrounding the rectus abdominis muscle (Hertling & Kessler, 2006). These muscles are cut in a caesarean section, but just as problematic is the cutting of fascia in this area which attaches to ribs, the thoracolumbar fascia, and the pelvic girdle and is essential for postural integrity and visceral support (Hertling & Kessler, 2006). The easy slide and glide of fascia is crucial to proper, pain-free function, and an adhesion can create a pattern of tension in the body (Rattray, 2000).

## Scar Tissue

During wound healing fibroblasts lay down collagen fibers randomly over the wound (Tortora & Derrickson, 2012). These random fiber patterns create adhesions which can reduce range of motion and massage has been shown to release these fibrous bands, thus softening the scar (Ratray, 2000). The goal is to have as mobile a scar as possible in order to free up surrounding structures.

There is a lot of literature regarding the effects of mechanical stress on scar remodeling, particularly how collagen fibers can be deposited along lines of stress in response to mechanical load. It has been shown that skin cells have the ability to respond to their mechanical environment, with mechanical stress causing the remodelling of collagen and fibrin fibers (Aarabi, Longaker, & Gurtner, 2007). Fibroblasts line up parallel to lines of tension, causing the collagen to aggregate in bundles across the wound (Hertling & Kessler, 2006). During the early stage of wound healing, fibroblasts are stimulated by local growth factors to secrete extracellular matrix to fill the wound and, once the wound has been re-epithelialized, the scar is ready for strengthening in order to return to full function (Hertling & Kessler, 2006).

By the time the scar has reached the remodeling phase (about three weeks), its tensile strength begins to increase in two phases: the consolidation stage (day 21 to day 60) and the maturation stage (day 60 to day 360) (Hertling & Kessler, 2006). During this time, the scar strengthens from the increased amount of collagen at the site, the change from weak hydrogen bonds to stronger covalent bonds, and the lining up of collagen fibers along lines of stress (Hertling & Kessler, 2006). Therefore, once a scar is remodelling and maturing, mechanical stress is placed on it to realign restricted tissue (Brook, 2009).

Massage may have another way of improving scar tissue. A study was done which placed fibroblasts under cyclic stretching for a period of time and the result was suppression of connective tissue growth factor (CTGF) (Kanazawa et al, 2009). CTGF stimulates fibroblasts to produce extracellular matrix, the material that fills a wound during early wound healing. Therefore, by suppressing CTGF through massage and delaying healing, we can possibly prevent fibrosis and contractures and encourage skin softening and pliability (Kanazawa et al, 2009). This could help explain why we see improved tissue mobility in areas that were moved and stretched throughout the healing process, particularly post-surgery.

## Patient History

The patient is a 29-year old woman who had a caesarean section in June 2012 with no relevant history of injury prior to the study. The caesarean scar is transverse and there were no complications with healing. Following the surgery she was prescribed anti-inflammatories for one week and used a “natural cream” (the patient couldn’t remember the name) for one month. The patient is not a smoker, is not on any medications

and reported no low back or pelvic pain since the surgery. She has normal bladder/bowel function and reported that there have been no changes to her activities of daily living. The only discomfort she reported was pain in her mid-back that disturbs her sleep occasionally, which she has experienced since she started breastfeeding. She commented that her doctor reported being pleased that the incision healed so well and so quickly, and she has no lingering pain or effects from it that she can recall.

### **Patient Anatomy and Range of Motion**

The scar is approximately 14 cm long and fairly straight across, just above the pubic line. On initial assessment the right half of the scar was barely visible, but the left side had some red patchy areas (Appendix B). On palpation, the area around the scar felt lumpy and the patient reported slight tenderness. Tissue mobility over the scar was excellent on the right side, but on testing the left side with fingertip shearing parallel and perpendicular to the scar, the patient reported a “prickly, burning” sensation and skin mobility was decreased.

The patient presented with a slight lumbar hypolordosis and anteriorly rounded shoulders. Her left shoulder was inferiorly positioned compared to her right shoulder and both knees were slightly hyperextended. Range of motion testing of the lumbar spine revealed a fascial pull in the lower abdomen with lumbar extension that the patient described as a “stretch” sensation in that area. Testing of the right hip revealed no pain or dysfunction. Passive range of motion testing of the left hip produced a slight pain that the patient referred to as “pinching” above the left anterior superior iliac spine at the extreme end range of hip flexion. She reported the same kind of pain in the same area at the end range of internal rotation of the left hip. All other movements of the left hip were pain-free and without dysfunction. It should be noted that the patient’s hips were hypermobile. Muscle testing revealed weak hip flexion bilaterally and was graded 4 on the right, 3+ on the left. All joint testing was documented on “star chart” assessment forms.

### **Special Tests / Documentation**

The squish test and lateral gapping of the sacro-iliac joint were performed to assess for pelvic outflare. Both tests were negative. A straight leg raise test was performed to assess for sacroiliac torsion problems and was negative.

Photographs of the scar (Appendix B) were taken at the initial and final treatment sessions. Range of motion testing of the hip was completed before and after each treatment and the patient’s subjective pain reports are summarized in Appendix A.

## Treatment: Protocol, Techniques and Goals

A treatment protocol was followed every treatment, and each treatment was 60 minutes long and included 15 minutes for initial assessment and re-assessment following treatment. The only exception was the first visit, which included an extra hour for patient history and interview. There were a total of six treatments and the first treatment was on February 12, 2013 and continued once a week except when the patient had to cancel due to illness. The final treatment was on April 1, 2013.

Before each treatment, patient history was taken and range of motion testing for the hip was performed actively and passively. Resisted range of motion was also performed, and special tests or specific muscle testing as needed.

The goal of treatment was to apply a stretch over and around the scar into any areas of restriction with the intention of softening this area and making it more pliable. Another goal was to increase circulation to the area and remove metabolic wastes, improving the scar's appearance on the left side where it was reddened.

The treatment would begin with an application of deep moist heat to the lower abdomen for ten minutes to increase circulation while another area of the body was worked on, often the feet or the neck. After ten minutes the heat was removed and general Swedish massage techniques to the abdomen were used to decrease muscle tonicity in the area, including light stroking and effleurage.

Fascial techniques were performed as described in Fiona Rattray's book, *Clinical Massage Therapy: Understanding, Assessing and Treating over 70 Conditions*. She describes the general method as follows:

- 1) The appropriate level of fascia is reached by applying pressure to the tissue. The amount of pressure varies with the depth of the fascia;
- 2) A stretch is placed on the fascia to be treated, which takes the elastic slack out of the tissue;
- 3) The tissue is engaged by holding this stretch;
- 4) The stretch is held for a period of time sufficient to break some of the bonds between the individual fibres of the connective tissue. A burning sensation is perceived by the client. Several minutes may be required to achieve successful tissue release;
- 5) Successful release is indicated by hyperemia, a palpable release of heat, decrease of pain or other symptoms and a softening of lengthening of the tissue. (Rattray, 2010)

Fascial techniques used in the treatment were performed in the following order:

- **Cross-hands shearing:** one hand was placed near the insertion of rectus abdominis (left side) and would load in a superior direction. The other hand was placed on the muscle belly of rectus femoris (left side) and would load in an inferior direction. After this area had released, one hand was placed in the middle of the abdomen and sheared medially-superiorly, while the other hand was placed above the left anterior superior iliac spine and sheared laterally-

inferiorly. All cross-hands shearing was focused over the left lower abdomen since this was the area with the most palpable fascial adhesion.

- **Skin rolling:** the skin of the abdomen, over the scar, was loosely grasped between both thumbs and index fingers as the palms rested on the abdomen. The thumbs were slowly pushed across the abdomen, rolling tissue between the thumbs and index fingers as the fingers “walked” across the abdomen. This was slowly performed over the scar approximately three times in a direction parallel to the scar.
- **Fascial torquing:** the tissue area of the scar was picked up between thumbs and fingertips so it was separated from underlying tissue, then twisted until a barrier was engaged and held.
- **C-bowing:** the tissue area of the scar was picked up as above and mobilized into a “C” shape with the hands, then held.
- **Fingertip shearing:** the index and middle fingers of the bottom hand would stabilize the tissue inferior to the scar while the index and middle fingers of the top hand would engage the tissue just superior to the scar. Then the top hand would spread away from the bottom hand in a short stroke so the scar tissue would be mobilized superiorly. This was repeated along the entire length of the scar. The entire scar was also mobilized with fingertip shearing, stabilizing on the right side and mobilizing laterally on the left side into the restriction.

All of the above techniques would be loaded three-dimensionally and slack was taken up when a tissue release was felt and the patient stopped feeling a prickly, burning sensation.

Following the fascial techniques, the abdomen was cleared with light stroking in a clockwise direction. Cold hydrotherapy (ice wrapped in a towel) was then placed over the scar for ten minutes. At the same time, a pillow was placed under the patient’s hips to place the tissue fibers in a slight stretch in an effort to promote proper fascial alignment. After each treatment, the scar tissue was reassessed for mobility.

The patient was instructed to perform an iliopsoas stretch two to three times each day to encourage fascial mobility in her lower abdomen. She was also advised not to apply any topical creams to the scar during the treatment period.

## Treatment Results

Although there were changes in the patient’s reports of left hip pain after each session, there was no significant change overall from the beginning to the end of the study. By the end of the study she still reported a “slight pinching” sensation during left hip flexion and with internal rotation of the left hip. These were felt at the very end ranges of passive range of motion.



The scar's appearance did change. By the end of the study, the left side of the scar almost matched the right in translucency and lacked most of the red patches that were there in the beginning. The patient confirmed that she had not been applying any topical creams but, encouraged by the change in the scar's appearance towards the end of the study, had been performing fingertip shearing of the area herself between visits.

## **Discussion**

In this study, the use of myofascial techniques over the scar area to increase pain-free movement of the hip was unsuccessful. The pain, or "pinching", was removed by the end of some treatment sessions, but this result would not last over the following week. The fact that myofascial treatment improved the sensation suggests that there is a fascial component but whether this is related to her scar is unclear. It was unfortunate that the treatments could not have been more frequent than once a week due to the client's schedule, as better results may have been achieved. The fact that the patient did not do her home care as prescribed may also have negatively impacted the study.

The use of myofascial techniques to improve overall scar appearance was successful, with redness and irritation significantly diminished. This rapid change over so few treatments suggests the great benefit that can be attained from myofascial treatment for post-surgical scars.

The results indicate that massage and myofascial techniques are an effective treatment for scar therapy, particularly improving the appearance of a scar. More research needs to be done in this area, however. More evidence-based studies, with a larger group of participants over an extended period of time, are recommended.

**Appendix A – Treatment Notes**

## ➤ February 12, 2013

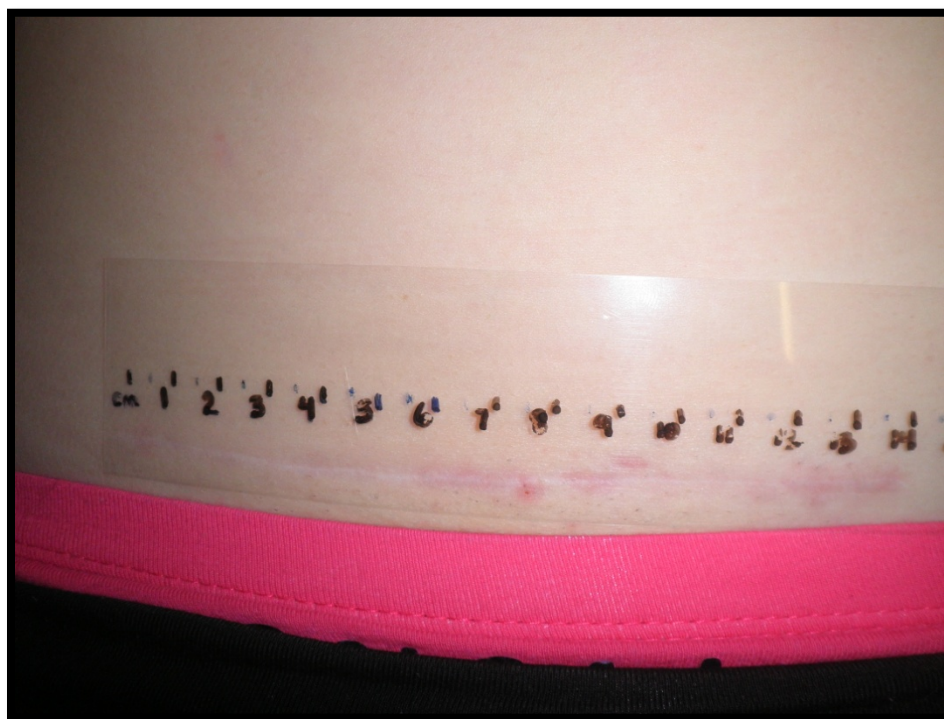
- Pre-treatment: Treatment protocol and techniques were reviewed with the patient.
- Assessment of the scar was performed, including taking a full patient history and photographs/measurement of the scar.
- Lumbar spine and hip range of motion was assessed actively and passively using the star chart.
- The patient felt a “pinching” pain just above the left ASIS at the end range of left hip flexion and internal rotation.
- With combined lumbar spine extension and hip extension, the patient reported feeling a “pulling” sensation just inferior to the scar.
- Fascial assessment of the scar in small fingertip shearing movements revealed increased resistance superiorly compared with inferiorly, and the lateral third of the scar on the left side showed restriction when sheared laterally.
- The scar was photographed and measured.
- Fascial mobility of the scar was assessed and it felt restricted on the left side more than the right, especially in a superior direction.
- Post-treatment: the patient was shown the iliopsoas stretches she was prescribed and reported feeling “less of a stretch” in her lower abdomen during lumbar spine extension and hip extension.
- Left hip flexion flexion and internal rotation was re-assessed and the patient reported feeling decreased pain at end range of hip flexion.

## ➤ February 18, 2013

- Pre-treatment: the patient’s hip ROM was re-assessed and she reported the same “pinching” sensation over her left ASIS. She admitted to not doing the prescribed stretches the past week and needed to be re-shown how to do them. The patient was reminded of the importance of doing her stretches a minimum of twice a day, every day between treatments.
- Post-treatment: on hip re-assessment, the pain during hip flexion and internal rotation had “almost disappeared”.

- February 25, 2013
  - Pre-treatment: the patient reported the same “pinching” sensation with left hip flexion and internal rotation. She admitted to only doing her stretches “a couple times” during the past week.
  - Post-treatment: on hip re-assessment, the patient reported the pain in the left hip had “almost disappeared”.
  
- March 4, 2013
  - Pre-treatment: During hip ROM assessment, the patient reported there was no change in the “pinching” sensation over her left hip. She confessed to not doing the stretches as prescribed.
  - Post-treatment: On hip re-assessment, the patient reported the pain in the left hip had decreased but the pain in left hip internal rotation had stayed the same.
  
- March 11, 2013
  - Pre-treatment: The patient reported that she has been doing her stretches more regularly and that the left hip is feeling “better”. Hip ROM showed a decrease in the “pinching” pain felt above the left ASIS during left hip flexion and internal rotation.
  - Post-treatment: On hip re-assessment, the patient reported the pain in the left hip had decreased but the pain in left hip internal rotation had stayed the same.
  
- April 1, 2013
  - Pre-treatment: The patient reported that she hasn’t been doing her stretches regularly since the last visit. On hip ROM re-assessment, the patient reported a “slight pulling” at the end range of passive left hip flexion. During passive left hip internal rotation, the patient reported “It feels like it wants to go further but can’t”.
  - Post-treatment: On hip re-assessment, the patient reported the pain in the left hip had disappeared but that the left hip still felt “restricted” during internal rotation. The scar’s appearance was significantly improved on the right side, with less red patches. The patient reported that she had started to do some fingertip shearing around the scar at home because she could see the improvement.

Appendix B – Photographs



*Figure 1 – caesarean scar before initiating treatment*



*Figure 2 – caesarean scar after six myofascial treatments*

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