



Clinical Case Report Competition

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Third Place Winner

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The effects of effleurage in reducing pregnancy induced edema and carpal tunnel syndrome

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Abstract

Objective

To evaluate the effectiveness of effleurage massage technique in reducing swelling at the wrist, resulting in a reduction in Carpal Tunnel Syndrome (CTS) symptoms in a pregnant woman.

Clinical Features

Twenty eight year old Primipara patient observed significant swelling of hands and wrists at around 26 weeks of pregnancy as well as right wrist pain diagnosed as CTS. Patient complained of numbness tingling and weakness involving her right wrist area and first two digits of her right hand. Other symptoms included being woken up at night due to pain into her right wrist and hand.

Research design and Methodology

Twenty minute treatments of the effleurage protocol were applied to the right wrist and arm every three to four days for five consecutive treatments. Patient walked 20 minutes per day on average for about 5 days a week to maintain cardiovascular and circulatory health. Contrast arm baths were administered post effleurage treatment to her forearms and hands, bilaterally. Measurements were taken before treatment, after treatment, and after contrast arm bath application.

Intervention and Outcome

Swelling and girth measurements decreased to the right wrist post effleurage treatment and she had a general decrease in pain using the visual analog pain scale measurement tool.

However, the contrast arm baths proved to increase the patient's pain level post application with consecutive treatments.

Conclusion

A temporary decrease in swelling can occur using the effleurage technique protocol designed for this study. The amount of swelling in the extremities, related to progression of pregnancy can be minimized using this treatment protocol. However a much larger sample size is needed to confirm these findings.

Keywords: Massage Therapy, Effleurage, Swelling, Edema, Circulation, Pregnancy, Carpal Tunnel Syndrome

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The Effect of Effleurage in Reducing Pregnancy

Induced Edema and Carpal Tunnel Syndrome

Introduction

Circulatory changes that occur during the course of pregnancy are needed to accommodate a growing fetus. The volume of blood circulation while pregnant can increase to at least 30-50% more than prior to pregnancy (Pillitteri, 2003). Sometimes this increased circulatory demand on the body can cause swelling in the extremities due to inadequate uptake of extra fluid via the lymphatic system. An increase in blood volume can cause increased pressure through the carpal tunnel and can result in Carpal Tunnel Syndrome (CTS) during pregnancy.

Hypothesis

As the causative factor for CTS for the patient in this case study was edema, the treatment focus was to increase the reuptake of excess interstitial fluid. The use of effleurage to test whether or not a decrease in edema could be achieved, created an interesting hypothesis that effleurage could obtain a similar decrease in edema as the traditionally accepted method of manual lymph drainage technique. Manual lymph drainage has been proven to reduce edema in limbs effectively, according to Duman (2009).

Common Medical Intervention

Common methods of treatment include: surgery involving division of flexor retinaculum, splinting to reduce friction and excessive irritation of structures passing through the tunnel, as well as steroid injections. Alternative and less common methods include ultrasound therapy, yoga, exercise therapy, oral anti-inflammatory drugs, and laser therapy (Black, 2001). The use of the effleurage protocol treatment in this case study is a much safer treatment for the patient than the other types of treatments available, assuming the cardiovascular and circulatory system is healthy and intact. Surgery has associated risks and the complete recovery rate is relatively low. Splinting can cause unnecessary musculoskeletal changes such as disuse atrophy causing muscle imbalances and a slower recovery. The use of medications to manage symptoms can cause undue stress to the liver and there is a risk for adverse reactions.

Etiology

CTS can occur as a result of pregnancy related changes for up to 62% of pregnant women (Ablove, 2009). The syndrome progresses with pregnancy and recovery is expected after birth; however, in some cases the exacerbation of the median nerve in the carpal tunnel may take longer for CTS to resolve. Sometimes CTS is idiopathic, but generally it is due to an increase in the size of the contents

that travel through the tunnel or a decrease in the size of the tunnel itself. This can create pressure on the median nerve and tendons that travel through this tunnel.

Anatomy and Pathology

The anatomy involved with CTS is the flexor retinaculum. This structure makes up the roof of the tunnel and attaches to the pisiform and the hook of hamate bone on the ulnar side of the wrist and the scaphoid tubercle and trapezium on the radial side (Rattray, 2000). The median nerve, the tendons of the flexor digitorum superficialis, flexor digitorum profundus, as well as the flexor pollicis longus travel through the carpal tunnel. When fluid retention and edema occur compression of these structures causes symptoms such as numbness, tingling, and weakness to the thumb, index, middle, and radial half of the ring finger (Appleby, 2009). Motor loss can occur to flexor pollicis brevis, opponens pollicis, abductor pollicis brevis to the thumb, and the lumbricals to the index and long fingers (Appleby, 2009). Compression can also occur due to overuse of tendons, improper posture of hands, physical stressors and metabolic disorders such as thyroidism and diabetes (Burt, 2011). Because the flexor retinaculum is so strong there is no extra room for enlargement or swelling within the tunnel as this tissue has very little compliance to expansion. Padua (2010) mentioned in their study that fluid retention is the main cause for CTS during pregnancy.

Research Findings

A survey of the current research in the field of CTS treatment was performed. Surgery is a common treatment plan chosen by the medical profession to treat re-occurring CTS symptoms; however, according to a paper written by Field (2004) surgical intervention rarely changes the patients physical performance measures, such as grip strength, key, and three-jaw, when measured pre and post operation. The paper indicates the official success rate for the surgical intervention is 75% with a 9-19% recurrence rate (Field, 2004); however, the definition of success for the surgery is only a change in symptoms, not full recovery.

Due to the risks associated with surgery and limited success of surgical intervention (Appleby, 2009, p. 244) different methods for treating CTS have been explored. Ablove (2009) found the symptoms of CTS can be reduced by reducing the systemic edema. According to Moraska (2008) massage therapy may be a practical conservative intervention for CTS; however, they mention that additional research is required to verify massage therapy as an effective treatment.

Field (2004) found that massage techniques such as release of neurotransmitters and pain gate theory can decrease the symptoms of CTS. Huisstede (2010) concluded that massage therapy is an effective short term treatment for CTS symptoms. However, according to the current research

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available, no research has been performed into the effectiveness of effleurage regiments on the treatment of CTS.

The effect of pregnancy related changes to CTS has been written in various papers. Ablove (2009) found that 62% of women will have CTS symptoms during the course of their pregnancy. Padua (2010) found that fluid retention is a major cause of CTS during pregnancy. It was found that the methods adapted by doctors for diagnosing CTS caused by pregnancy vary widely; resulting in discrepancies in the percentage of women diagnosed with CTS. They also suggested further research should be performed in order to determine why some patients recover completely from CTS after giving birth and other patients do not.

Specific Data from Treatment

Patient History

Patient is a 28 year old primipara female who works in a high stress position as a yard planning supervisor for a ship docking company. She mainly sits at a desk and does a lot of computer work and typing and mentioned that this seemed to aggravate her CTS symptoms. She has had prior injuries in the past, such as whiplash due to pushing up fellow swimmers during synchronized swimming. She began receiving massage for the case study at 27 weeks of pregnancy, due to pain in her right wrist diagnosed as CTS four weeks prior. The patient's symptoms were numbness and tingling down to the first and second

fingers that seemed to have a gradual onset, and these symptoms appeared intermittently throughout the day.

Her underlying health conditions are Asthma, her last attack occurred 5-6 years ago; and heart burn, which she was diagnosed with prior to pregnancy. Generally her heart burn symptoms occur 1-2 times per day. Another issue that developed during her pregnancy is sciatica down her right leg. Two medications that this patient is taking are Pulmicort which she takes as a preventative measure for her asthma, and prenatal vitamins. Sleep quality for this patient is poor. Due to being pregnant and being uncomfortable when staying in one position for too long, she says she wakes up one to two times per night due to hand pain and when she feels the need to roll onto her back. Her sleep is intermittent as she only sleeps for two to three hours at a time at night. Activity level is mild for this patient; she does yoga once a week and walks almost every day for at least twenty minutes. Her pain level score pre-treatment was a three out of ten using the visual analog pain scale.

Observations

During assessment, significant swelling was noted in her hands especially in the right wrist and hand area. The veins in the dorsum of her hands seemed quite enlarged, especially in her right hand.

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Palpation

The tone around her right wrist and hand was boggy, temperature was warm, texture was smooth, and the area was tender to touch. Both palms had full sensation. Her left hand and wrist area was not tender to touch and was only slightly boggy.

Movement

Her left wrist had pain free active and passive range of motion and scored a five for resisted range of motion in all ranges; however, left wrist flexion and extension were slightly decreased. Her right wrist had slightly decreased flexion and extension in active and passive range of motion and scored a five for resisted range of motion with pain. Radial deviation and ulnar deviation were pain free and she achieved full range of motion.

Neurological

This patient complained of mild numbness and moderate tingling through the right wrist and first two fingers. Her grip strength was also slightly weak in her right hand. Manual muscle tests were completed on supinator and pronator teres pre-treatment to determine the point of impingement. A Manual muscle test was also performed on flexor pollicis brevis in order to determine whether or not there was any median motor nerve damage. These tests scored a five (strong), consistently for all three muscles.

Referred Pain

There were no signs of referred pain in this patient with this condition.

Special Tests

Phalens test, reverse phalens test, tinnels sign, and carpal compression test were all positive prior to the treatments. Prior to treatment capillary refill took less than a second to refill on both hands.

Treatment Goals

The primary goal was to decrease the swelling to the patient's right wrist. The secondary goal was to decrease numbness, tingling, and weakness into the 1st and 2nd finger and the ulnar eminence of her right hand. The third goal was to decrease pain to her right wrist.

Treatment Given

In order to accomplish the treatment goals above the treatment plan was focussed on decreasing edema, which in return would decrease the painful symptoms of CTS to the patients' right wrist and hand. This was done with a specific effleurage protocol created by the therapist. The patient was treated in semi-fowlers and the depth of the treatment strokes were applied with moderate pressure, to tissue resistance. Strokes were directed towards the lymphatic pathway of drainage in a slow, rhythmical, repetitive sequence.

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Holly oil was used to facilitate the strokes. Measurements were taken of both epicondyles as well as in line with the distal radius and ulna (wrist) bilaterally, pre effleurage treatment and post mild contrast arm bath application. With a measurement of the right wrist and epicondyle post effleurage treatment and pre contrast arm bath. The effleurage treatment protocol was as follows:

1. 12 long palmar effleurage strokes from the carpal bones to the shoulder girdle, from distal to proximal.
2. Followed by 6 segmental palmar effleurage strokes increasing in length from carpal bones to the shoulder girdle from distal to proximal. This step was repeated three times from distal to proximal.
3. The two above steps were repeated methodically for 20 minutes and then finished with 12 long strokes.

Remedial Exercise

Mild cardiovascular conditioning exercises were recommended to this patient as it was important to maintain the health of her cardiovascular system to enable her body to cope with the extra volume of blood accompanying her pregnancy.

Hydrotherapy

A mild contrast arm bath was applied post treatment after measurements of the right wrist and epicondyle were documented. The contrast arm bath was set

at 34 degrees and 18 degrees and three cycles were completed always beginning with warm for 3 minutes and then moving to the cooler bath for 30 seconds and always finishing with the cooler bath.

Application of Research to the Treatments

Due to a gap in research on the effect of effleurage on edema, an opportunity arose to conduct this study. The assessment plan considered what Appleby (2009) used in his study to document information; therefore the CTS questionnaire was the document of choice for recording information in this study. Flexor pollicis brevis is a muscle that can decrease in function due to motor nerve damage of the median nerve (Appleby, 2009). With this information it was decided to conduct a manual muscle test on this particular muscle to assess for nerve damage or loss of function. Since the visual analog scale seemed to be the choice of pain scale used by Field (2004) and other researchers, this scale was incorporated into documenting the pain levels of the subject.

Tinnels and phalens tests were used by Field (2004, 2011) and Appleby (2009); to maintain consistency with other research these tests were used to assess for CTS symptoms in this study. Rattray (2000) discusses how lymphatic flow can be increased by unidirectional effleurage, and since the goal of the case study was to decrease edema and promote lymphatic uptake this concept contributed to the development of the effleurage protocol used in this study.

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Pressure depth was decided upon after reviewing Fields research (2004, 2011) where she discusses using moderate pressure to reduce pain. Since one of the goals was to reduce pain through reduction of edema, and effleurage can be performed at varying degrees of pressure, Fields research (2011) was used to help develop the effleurage protocol intensity. The duration of the treatment for this study was considered after consulting Rattray's paper (2000) where it is mentioned that 30 minute treatments for the treatment of CTS is recommended when using several different techniques. Since only effleurage technique was being used in this study it was decided that 20 minutes would be a reasonable amount of treatment time to devote for determining the validity of this technique. Hydrotherapy of mild contrast arm baths for swelling was considered upon reading Rattray's (2000) recommendation for this type of treatment during the sub-acute stage.

Rattray (2000) also discussed the importance of cardiovascular exercise during pregnancy, which included walking as a safe alternative, so this was given to the patient in this study as remedial exercise during the period of this study. This seemed to be an obvious homecare recommendation as the patient was already performing this level of exercise and the maintenance of cardiovascular health can affect the prevalence of edema in some cases.

Management Plan

Active problems.

- Swelling to right wrist.
- Numbness, tingling, and weakness to right wrist and thenar eminence and first 2 digits.
- Pain to right wrist area due to CTS.
- Waking up at night with right wrist pain.

Domain of involvement. The domains of involvement were pain, stress, a functional issue, and a slightly decreased range of motion in flexion and extension of the wrist, as well as systemic edema due to pregnancy.

Conditional factors. Conditional factors included Physical work environment and the state of pregnancy.

Home instructions. Home care instructions were to walk briskly at least twenty minutes per day within a comfortable level; for example, still being able to easily carry on a conversation while walking.

Treatment modality. The treatment modality was Swedish massage regionally to the right arm using effleurage protocol designed for this study as well as a mild contrast arm bath given bilaterally post effleurage treatment.

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Treatment frequency. Treatments were given every Tuesday and Friday evenings for five consecutive treatments.

Treatment goals.

- Decrease Swelling to right wrist.
- Decrease numbness, tingling, and weakness to right wrist.
- Decrease pain to right wrist.
- Decrease waking at night from right wrist pain.

Outcome markers.

- A decrease in girth measurement.
- A decline in numbness tingling and weakness on the CTS questionnaire overtime.
- Through patient feedback as a decreasing number on the visual analog pain scale when assessed post treatment.
- Through patient feedback as documented on the CTS questionnaire.

Treatment Results and Prognosis

According to the treatment results, the effleurage protocol applied did decrease edema over the short term. However it is difficult to predict whether or not there was a significant decrease or prevention in returning edema as the patient felt that her systemic edema was becoming worse over the progression of

her pregnancy. The results represent this trend in figure 1 as her pain level after treatment compared to pre-treatment results decreased on average by two scale values; however overtime the patients' pre-treatment pain level slowly increased.

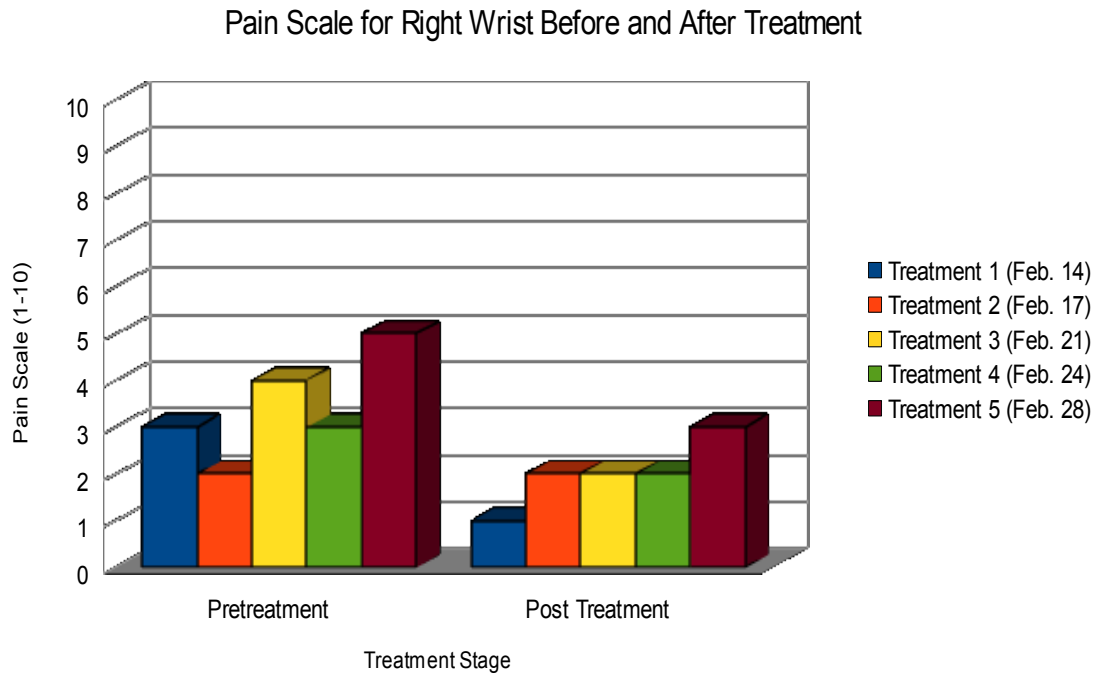


Figure 1: Pain scale for right wrist before and after treatment

The patient also suffered with higher pain levels towards the end of the treatment period. This trend can be seen in figure 2.

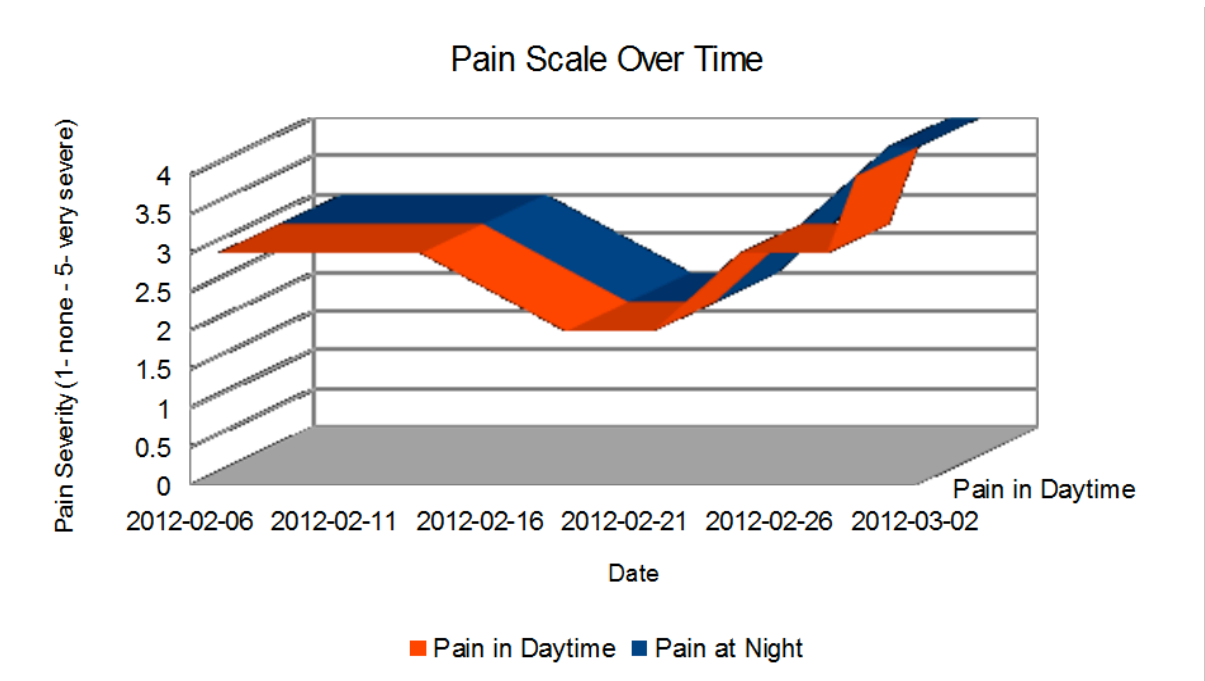


Figure 2: Pain symptoms over the treatment period

These trends lead the author to believe that the patient's systemic edema was the cause for the increasing levels of pain. It is also interesting to notice that the increase in pain is associated with the longer period between treatments associated with the weekend, where the patient was actively working around the house.

The right wrist girth measurements decreased by half a centimetre after the first two treatments, did not change during the next two treatments, and decreased by one centimetre during the last treatment. The results can be seen in figure 3.

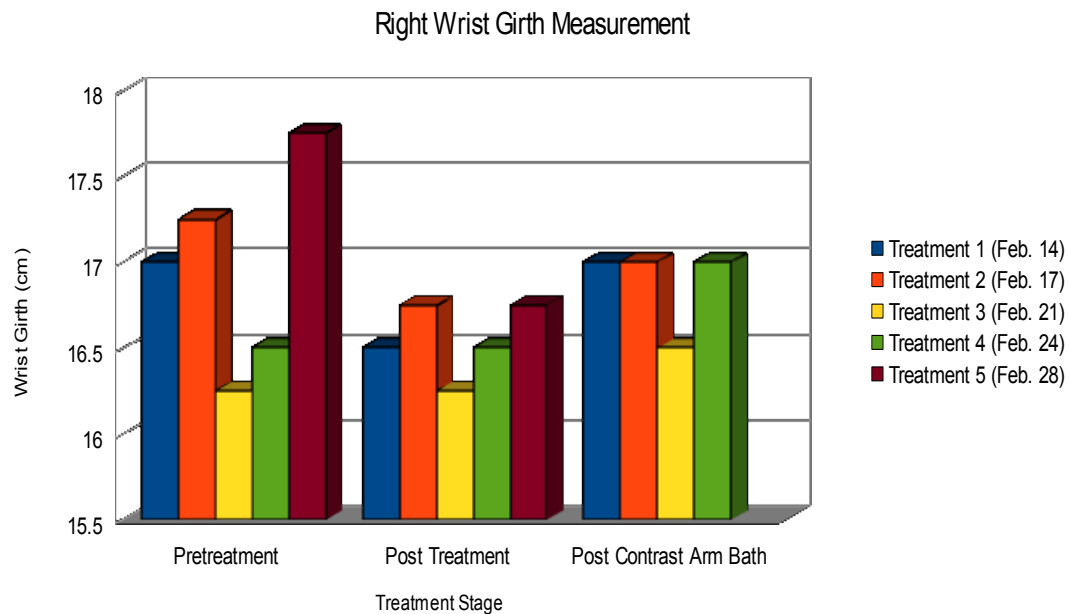


Figure 3: Right wrist girth measurement over the treatment period

The results from treatments three and four could have been affected by many variables such as: the patients high stress level, decreasing amount of sleep with the progression of her pregnancy, increasing systemic edema, and work related functional stressors. It is interesting to note that the hydrotherapy of a post treatment contract arm bath seems to increase the wrist girth measurement. Post contrast arm bath treatments consistently increased the patients' right wrist by a quarter to half a centimetre. It is the belief of the author that the increased edema caused by the contrast arm baths, were exacerbating the patients' CTS due to the increase in fluid within the carpal tunnel measured after each contrast arm bath. Symptoms of numbness, tingling, and weakness initially decreased with the

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effleurage protocol but then the symptoms started to increase in correlation with her progressively increasing edema over time, as seen in figure 4.

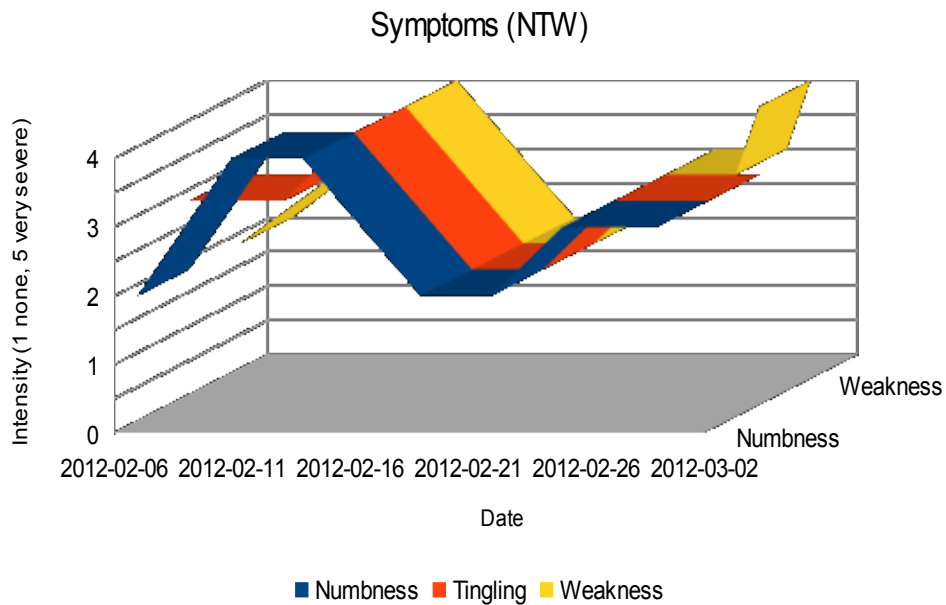


Figure 4: Carpal tunnel symptoms over the treatment period

The patient complained of increasing pain following the contrast arm baths applied after treatments three and four and requested that she not participate in the last contrast arm bath post treatment five due to the pain she experienced following the post contrast arm baths.

Summary and Conclusions

After five consecutive effleurage protocol treatments were applied over a three week period, it was correlated that the use of effleurage does decrease

edema over the short term and therefore reduces the pain in patients with CTS exacerbated by pregnancy induced systemic edema. Further studies of how effleurage affects edema on non-pregnant subjects suffering from CTS would be interesting to explore. In order to eliminate other possible factors contributing to the interpretation of the study's results stemming from the use of only a single subject; it would be beneficial to conduct a similar study with a much larger sample size. A comparison study would also be advised to compare the efficiency of the effleurage protocol versus manual lymph drainage, a technique well established in its use in decreasing symptoms of edema.

The concept of vascular training and clearing of excess fluid out of the arms with the use of contrast arm baths used in this study was perhaps not the most beneficial hydrotherapy since the results displayed a consistent increase in girth measurement and pain post hydrotherapy treatment. Also the vascular clearing that was expected to occur actually brought more blood into the area and therefore increased the diameter of the wrist in general overall. The mild contrast arm bath post treatment should be replaced in the future by a mild cold hydrotherapy such as a chilled arm bath. It may be interesting to conduct a study without any hydrotherapy to compare whether or not the effleurage protocol has a compounding affect in decreasing edema when combined with hydrotherapy. The use of the effleurage protocol shown to reduce edema in this study provides an interesting glimpse at how massage can be used as a safe alternative method to

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treat CTS.

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