

Assessing the Effectiveness of Massage Therapy for Bilateral Cleft Lip Reconstruction Scars

Emilie McKay, RMT

Ottawa, ON, Canada

Background and Objective: Bilateral cleft lips occur when the bones that form the upper lip fail to fuse at birth. Surgical reconstruction creates scars, which may lead to the following impairments: adhesions, decreased oral range of motion, decreased strength of orbicularis oris muscle, and asymmetry of oral region leading to poor self-esteem. The purpose of this case study is to determine the effectiveness of massage therapy in its ability to improve these impairments.

Methods: A five-week treatment plan consisting of fascial release, kneading, and intraoral techniques. Subjective information was assessed on two scales: restriction of scar and clients attitudes and acceptance of scar. Objective information was cataloged through photographs, a palpatory chart, and a self-created “Pen Test”.

Results: Results included increase range of motion and strength, decrease restrictions (palpable and subjective), and increase of symmetry. Client’s perceived confidence of scar and its appearance increased.

Conclusions: The evidence suggests that massage therapy helped with the impairments associated with scars formed by bilateral cleft lip reconstruction.

KEY WORDS: cleft lip; scars; adhesions; massage therapy

INTRODUCTION

Bilateral Cleft Lip

A bilateral cleft lip is a congenital facial defect of the lip that occurs when the medial and lateral nasal prominences and maxillary prominence fail to fuse together on both sides of the nose.⁽¹⁾ Cleft lips occur in one in 1000 births.⁽²⁾ During the first year of life, a child may have up to five surgeries to repair the hole created by the fusion failure. The goal of these surgeries is to create a full upper lip that is symmetrical and functional. This may require reconstructing the nose region.^(3,4,5) Other surgeries, such as fixing the maxillary arch, may be needed and are done later in life to ensure proper growth of the face. Repairing

the maxillary arch may also require a revision of the lip repair.⁽³⁾ After all the surgeries are complete, the patient is left with orofacial scars that can be found in both the nasolabial sulci, lateral philtrum regions, and through the upper lip (see Figure 1(a)). Postsurgical treatments are typically used to correct dental anomalies, speech problems, and biomechanical issues.^(3,4,5,6) No research was found that addressed the scars specifically.

Scar Formation

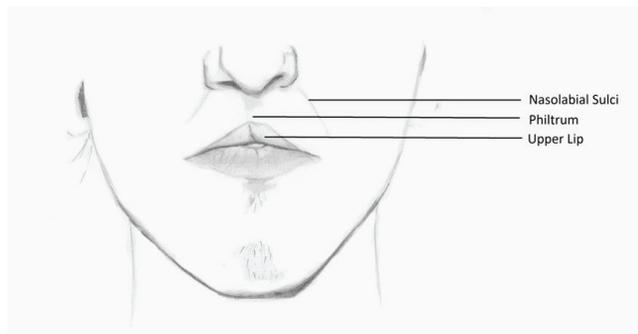
Scars are the result of tissue repair after the tissue barrier has been broken. Once this disturbance has occurred, an inflammatory and regeneration process follows which ends with collagen fibers proliferating to form scar tissue.⁽⁷⁾ The collagen is laid down in a sporadic fashion, which may lead to adherence to underlying structures and improper movement of tissue.⁽⁸⁾ The impairments associated with scars can be functional or aesthetic in nature.^(5,9) Commonly, when adhesions form, muscle weakness, decreased range of motion, and abnormal appearance of skin are seen.

Impairments

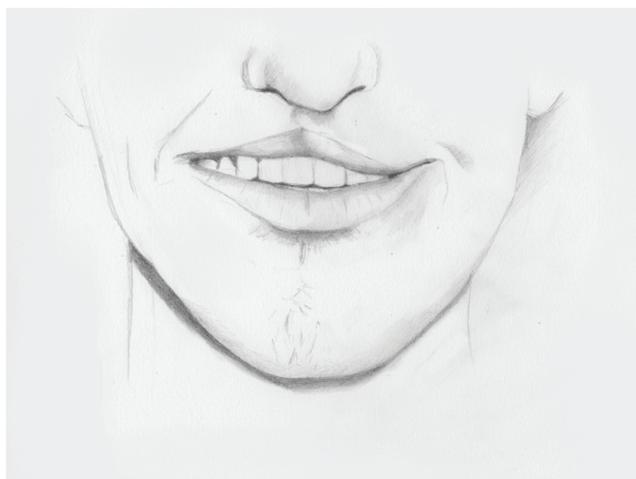
Adhesions

Adhesions are restrictions of connective tissue that form due to replacement of normal tissue. The normal glide of connective tissue is compromised.⁽¹⁰⁾ To address adhesions and help return normal glide, the massage therapy techniques fascial release (or myofascial release) and frictioning can be used, as they are suspected to break down the dense collagen fibers that were formed by tissue repair.⁽¹⁰⁾ Fascial release uses a sustained tension to elongate deep fascia and possibly promote tear. Frictions are a direct and sheering force applied to the adhesions with the intent to break them down and regain normal function.^(8,10,11) The scars of a cleft lip reconstruction surgery will also be palpable on the inside of the mouth. This means these techniques will be used during intraoral massage—a type of massage where the therapist wears gloves to massage structures located in the oral cavity—to alleviate adhesions formed on the inside of the mouth.

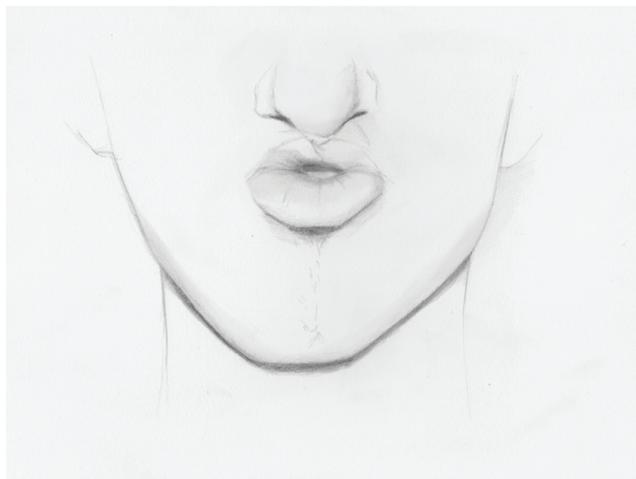
Studies show that soft-tissue manipulation, such as petrissage and specific compressions over the scarred area, releases the scar adhesions and helps regain lost length in tissue, scar tissue or muscle tissue.⁽⁸⁾ With this increase in tissue length, range of motion will increase, as well.



(a)



(b)



(c)

FIGURE 1. (a) Anatomy of upper lip. (b) Smiling. (c) Puckering.

Muscle weakness

Muscle weakness is a common result when scars develop into muscles because the integrity of the muscle's ability to function properly becomes impaired.⁽¹⁰⁾ Cleft lip scars run longitudinally over the orbicularis oris muscle. This muscle has two layers—the superficial layer helps with retracting the upper lip or smiling (Figure 1(b)) and the deep layer primarily functions as a constrictor, the action needed for puckering the lips together (Figure 1(c)).^(4,5) Since cleft lip scars lie over this muscle and when adhesions form into muscles weakness develops, the strength of these two actions can be compromised. After the adhesions in the muscles are addressed, resisted range of motion is a remedial exercise that can be used as a strengthening technique to promote muscle growth.⁽¹⁰⁾ Increasing strength and endurance can lead to improved range of motion.

Facial appearance

Scars tend to lead to a variance in normal appearance of the skin due to the physical appearance of the scar or the adhesions pulling on the skin. Cleft lip scars can cause an asymmetry of the lip and nose due to the correction process, which may be perceived as unappealing by clients and lead to a decreased acceptance of facial appearance.^(5,9) Any pitting or restrictions seen as a result of adhesions under the skin, the techniques previously stated (fascial release and frictions) can address these.^(8,10,11) Effleurage, a light gliding technique, can be used to improve circulation and lymph flow to and from an area to aid in the elimination of inflammation caused by fascial release and frictions.^(8,10)

Previous Research

Previous studies on trigger finger, tight patellar retinaculum, and Dupuytren's contractures show the use of massage and fascial release help to decrease adhesions and scar tissue.⁽¹²⁾ Once these adhesions are released, function of the surrounding tissue has been restored. A study on cleft lip scarring and the use of massage therapy to alleviate scar impairments could not be found.

Hypothesis

By applying the research previously seen, it is hypothesized that massage therapy can potentially address the impairments associated with scar tissue,^(8,11,12) specifically the scars associated with cleft lips. Relieving the muscle of its restriction by means of fascial release, frictions, and soft-tissue manipulation, in combination with increasing resisted range of motion through smiling and puckering, it is likely that muscle strength, range of motion, and pliability of tissue will increase. Once all impairments are addressed, improved facial appearance is anticipated due to the normalization of affected facial regions. It is also hypothesized that effleurage will help with facial appearance due to the increase in blood flow,

nourishing the skin and surrounding tissues. Lastly, it is hypothesized that improving the scar will improve the acceptance of facial appearance. This case report follows a five-week massage therapy treatment plan and evaluates its effectiveness for the improvement of bilateral cleft lip reconstruction scars impairments.

METHODS

Participant

One client was observed during this case report process. He provided his informed consent for the research and treatment, the documenting of his case, as well as the release of his photos. The client, a 19-year-old male, was born with a bilateral cleft lip and palate. During the first year of his life, the client’s parents report that he had difficulties with feeding, like most cleft lip babies. He underwent three surgeries to repair the opening between his nasal cavity and oral cavity. These surgeries left him with significant scars. At the first meeting, the client described a sense of restriction under the scars when talking, eating, and forming facial expressions. He also described muscle weakness and early fatigue of the musculature in mouth and nose region while smiling and talking, as well as a decrease in the natural symmetry of the upper lip. The client noted a decrease in self-confidence due to his scar. This was the first intervention the client tried in order to improve the scar related impairments. It also represented his first massage experience. The patient consented to inclusion of the photos and the video presented in this case report.

Treatment Plan

Subjective assessment

To track how the client felt about his scars, as well as how the restrictions were perceived by him, two subjective scales were created. Each scale was scored out of 10 points (see Tables 1 and 2). Initially, the client rated his restriction as a 10 and his acceptance towards the appearance as a 2. The weekly scales were designed to monitor change in subjective findings.

Objective assessment

Photographs (see Figures 2(a) to 2(c)) were taken in Week 1 prior to treatment in order to obtain a visual look

TABLE 1. Restriction Scale

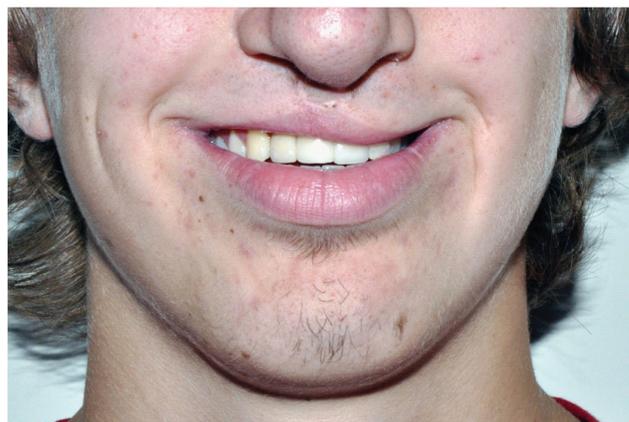
0	No sensation of restriction
1-3	Less restricted
4-6	Moderately restricted
7-9	Highly restricted
10	Most Restriction

TABLE 2. Appearance Scale

0	Indifference
1-3	Slight acceptance
4-6	Moderate acceptance
7-9	More acceptance
10	Complete acceptance



(a)



(b)



(c)

FIGURE 2. (a)-(c) Pretreatment scar photographs.

of the scars and the available range in certain movements. They also show the asymmetry that the client was self-conscious about. The photographs were repeated after the treatment series and changes examined.

Therapist palpation was used to determine location, size, depth, and direction of the restriction and was recorded prior to every treatment to gauge how the tissue was responding to massage therapy. Initially, adhesions were found in the upper right lip, both nasolabial sulci, and between the superior vermilion border and nose. Also through palpation, muscle tension was found in the lower lip and cheeks.

A test was designed to challenge the strength of the orbicularis oris and other contributing muscles, simply named the “Pen Test”. The client was asked to hold a pen in between his nose and upper lip for as long as he could. By doing this action, the orbicularis oris muscle would engage. The purpose of the test is to calculate the rate at which the muscle fatigued. This is shown by how long the client could hold the pen. The pen provides a standard and replicable resistance against the orbicularis oris muscle contraction. This test has not been used by other professions; it has been constructed using the idea of the resisted range of motion, a commonly used assessment in massage therapy and physiotherapy.

A video was taken to document his first and last attempt of the pen test. At each weekly session, the client preformed the test prior to treatment and the length of time the client was able to hold the pen up was to be documented. The client couldn’t hold the pen during his first attempt. The video of the first and last attempt can be found here: <http://youtu.be/4uTr5mNQSQ>.

Massage therapy plan of care

The client’s impairments were treated in five weekly treatments lasting approximately 75 minutes. Every week the client received a massage while lying supine with a pillow under his head and a pillow under his knees. (Plan of Care, Table 3)

RESULTS

Subjective Results

After the five treatments were completed, the client reported that he “felt more comfortable” with his scar. When asked to elaborate, the client said he had “more room in the area” and found it “less noticeable”. Subjective levels were documented as 8/10 or “more acceptance” on the appearance scale and 2/10 or “less restriction” on the restriction scale. The client reported that friends and family noticed the improvements. He claimed it “felt much looser and more even”. The client also expressed that he had more self-confidence, as demonstrated in his comfort and new acceptance of the scar. Overall, he was happy with the results. Charts 1 and 2 show

values obtained weekly for the restriction scale and appearance scale.

Objective Results

Initial palpatory data showed adhesions in the right upper lip, between the superior vermilion border and nose, and bilaterally in the nasolabial sulci. There was also noted tension in the lower lip and cheek muscles. Through palpatory assessment, the adhesions palpated in Week 1 had decreased in depth and size by Week 5. Muscle tension in the lower lip and cheek muscles decreased, as well.

The photos in Figures 3(a) to (c) show the improvement of range, appearance and symmetry of the mouth from pre-treatment photos (Figures 2(a) to (c)). Figure 3(a) shows the decrease in visibility of the right scar that goes through the upper lip. The second photo (Figure 3(b)) shows an increase in the available smiling range. This is noted by the full view of the upper teeth and right upper gum line. It also shows minor improvement in symmetry. The pucker photo (Figure 3(c)) shows no remarkable change.

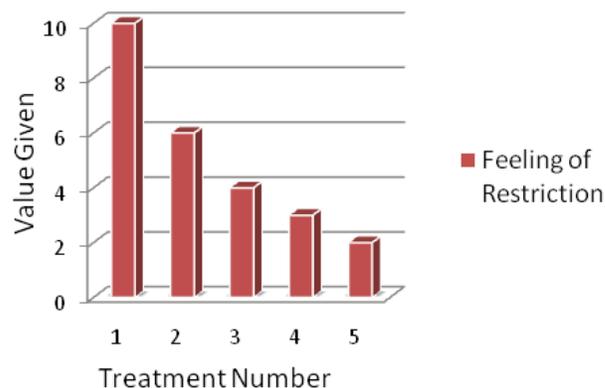


CHART 1. Restriction Scale

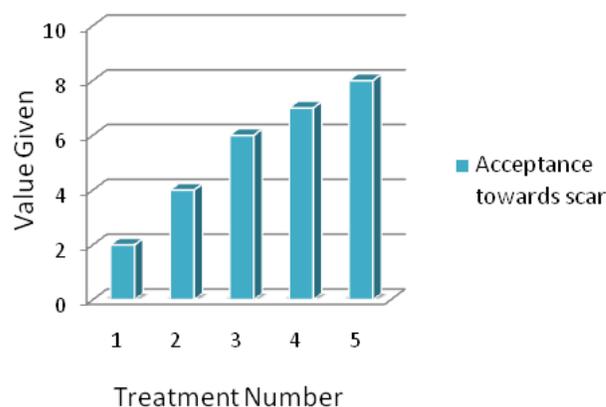


CHART 2. Appearance Scale

TABLE 3. Plan of Care

Week	Treatment		
	Technique	Area	Intent
1	Effleurage <i>A light gliding technique in direction of venous flow^a</i>	Full face - 1° oral/nasal region	Improve circulation decrease hypertonicity
	Fascial release (externally) <i>A firm, gliding sustained tension on taut fascia^a</i>	Oral/nasal scar adhesions	Breaking down and realigning scar tissue
2	Superficial reflexive techniques <i>Light sustained or moving techniques^a</i>	Shoulders and neck	Promote relaxation
	Effleurage <i>A light gliding technique in direction of venous flow^a</i>	Full face - 1° oral/nasal region	Improve circulation decrease hypertonicity
3	Fascial release (externally) <i>A firm, gliding sustained tension on taut fascia^a</i>	Oral/nasal scar adhesions	Breaking down realigning and increasing length in scar tissue
	Frictions <i>A deep, specific, non-gliding and vigorous sheering force^a</i>	Oral/nasal scar adhesions	Breaking down and realigning scar tissue
	Superficial reflexive techniques <i>Light sustained or moving techniques^a</i>	Shoulders and neck	Promote relaxation
	Effleurage <i>A light gliding technique in direction of venous flow^a</i>	Full face - 1° oral/nasal region	Improve circulation decrease hypertonicity
4	Fascial release (externally and intraorally) <i>A firm, gliding sustained tension on taut fascia^a</i>	Oral/nasal scar adhesions Intraoral scar adhesions	Breaking down realigning and increasing length in scar tissue
	Frictions <i>A deep, specific, nongliding and vigorous sheering force^a</i>	Oral/nasal scar adhesions	Breaking down and realigning scar tissue
	Resisted range of motion <i>Counterbalance pressure applied to a contracting muscle</i>	Oral region – primarily orbicularis oris	Increase strength and endurance with smiling and puckering
	Superficial reflexive techniques <i>Light sustained or moving techniques^a</i>	Shoulders and neck	Promote relaxation
	Effleurage <i>A light gliding technique in direction of venous flow^a</i>	Full face - 1° oral/nasal region	Improve circulation decrease hypertonicity
5	Fascial release (externally and intraorally) <i>A firm, gliding sustained tension on taut fascia^a</i>	Oral/nasal scar adhesions Intra-oral scar adhesions	Breaking down realigning and increasing length in scar tissue
	Frictions <i>A deep, specific, nongliding and vigorous sheering force^a</i>	Oral/nasal scar adhesions	Breaking down and realigning scar tissue
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	Superficial reflexive techniques <i>Light sustained or moving techniques^a</i>	Shoulders and neck	Promote relaxation
	Effleurage <i>A light gliding technique in direction of venous flow^a</i>	Full face - 1° oral/nasal region	Improve circulation decrease hypertonicity

^aGoats GC (1994).

Table 4 shows the length of time each pen test yielded during weekly assessments. On the last evaluation, the client held the pen for 15 seconds until he was asked to stop. This shows an increase in strength of the orbicularis oris muscle.

DISCUSSION

Charts 1 and 2 show there is an initial improvement and then gradual plateau of the subjective scales. This may indicate that there was not much more massage

TABLE 4. Pen Test Results

<i>Week</i>	<i>Time (Seconds)</i>
1	0
2	3
3	4
4	8
5	15+

therapy could do for the client. These charts also show that there is a correlation between sensation of restriction and feelings towards the appearance of the scar. As the restrictions decrease, the client's acceptance of the scar increased.

As for the objective results, Figures 3(a) and 3(b) showed significant change from the initial photos. Figure 3(c) does not show as much, if any, change. This could be due to the direction of adhesions initially restricting the puckering movement, or the lack of adequate adhesion breakdown. Since the strength of the puckering action shown in Figure 3(c) did increase, it is more plausible that the direction of the initial adhesions were not affecting the range of puckering, but only the strength.

Also, a change that was observed in the figures, but not evaluated, was the amount of edema above the top lip. This was because no edema was noticed at the beginning of the case study. Once the photos were reviewed, they illustrated a decrease in this fluid accumulation. This may be due to adhesions causing impaired lymph flow of the face (Figure 2(a)). Massage has been shown to decrease this edema buildup with the use of manual lymph drainage.^(4,9) Manual lymph drainage is similar to effleurage, which was one of the techniques used during treatment. Further studies should be done to determine the prevalence of fluid accumulation in cleft lips, and if manual lymph drainage is beneficial in decreasing the accumulation once adhesions have been broken down.

A facet that should be better evaluated is the client's self-esteem and how it relates to his scar. Some research indicates that there could be a correlation between scars and self-esteem.⁽⁹⁾ The client did note that along with his own increased acceptance of the scar, he had "more confidence" and a general sense of increase self-esteem. If further studies are done, there should be an examination of how the self-esteem is affected for the client.

Although all results were positive, the measures used lack a certain level of sophistication and reliability. In future case studies, subjective measures should be done with standardized scales and tests. Objectively, range of motion should be documented in a quantitative manner in order to see improvements



(a)



(b)



(c)

FIGURE 3. Posttreatment photos (a)-(c).

throughout each week. Also, if there is a quantitative way to monitor change in scar tissue, it should be used. If in future studies, fluid were to be present, an objective assessment should follow. Pre- and post-photos should be taken with the same setting. The accuracy of the self-created "Pen Test" should also be examined. A resisted range of motion test to test the strength of smiling should be found or created.

Based on the evidence obtained by this report, massage therapy could be looked at as an intervention used to aide with the recovery of cleft lip surgeries. In addition to the points above, further case studies should also examine the results of massage therapy on younger cleft lip scar clients, to see if manipulation of immature scar tissue will yield results quicker. A follow-up should occur to see if the effects of treatment are sustainable. It should also be examined to see if there is a decrease in the child's odds of developing of poor self-esteem.

CONCLUSION

After five treatments, this case study suggests that massage therapy is beneficial towards the improvement of impairments associated with bilateral cleft lip and palate reconstruction scars. By using various forms of soft-tissue techniques, fascial release, intra-oral techniques, and home care, each of the client's impairments associated with this bilateral cleft lip were addressed. The oral range of motion of smiling improved, the strength in muscles associated puckering improved, adhesions formed by the scars decreased, and the client experienced a new acceptance and improved feelings towards his scars. Overall, the client was quoted saying he was "extremely happy" with the results of the case study.

CONFLICT OF INTEREST NOTIFICATION

The author declares there are no conflicts of interest.

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Corresponding author: Emilie McKay, RMT,
2-590 MacLaren Street, Ottawa, ON K1R 5K9, Canada
E-mail: emckay@bodypoets.com