Effects of Moving cupping on the edematous hands of three patients with flaccid hemiplegia

Yong-Suk Kim, Hong-Min Lee

Department of Korean Association of Acupuncture & Moxibustion

Abstract

Objectives: This study evaluated the effect of Moving Cupping therapy for the edematous hands of three people with flaccid hemiplegia.

Method: The subjects were from 1 month to 4 month post-cerebrovascular accident with flaccid hemiplegia. Each subject’s routine therapy program was maintained throughout a single subject ABA withdrawal design. During the first week, baseline data were gathered, during the second week the intervention was provided (20 minutes of Moving Cupping therapy), then during the third week data were gathered with treatment withdrawn. Edema was measured with a hand volumeter and a measuring tape.

Results: The Moving Cupping had an effect in reducing edema in the hands of the three subjects.

Conclusions: The Moving Cupping therapy is a readily available tool that could enhance the treatment of edematous hands of persons with flaccid hemiplegia by offering a contribution to already established treatment protocols. Further research is needed, however, to establish guidelines for use.

Key Words: moving cupping therapy, lymph edema, single subject design.

Edema is the presence of large quantities of fluid in the intracellular spaces\(^1\). Edema is reported in about 16% of cases of hemiplegia after a cerebrovascular accident (CVA). Especially, hand edema is a problem frequently encountered by medical professionals involved in the rehabilitation of patients with paretic upper extremities\(^2,3\). About the most important factor in the cause of edema, Geurts et al. conclude that hand edema is not lymphedema and no specific treatment has yet proven its advantage for reducing hand edema\(^3\), but Exton-Smith and Crockett suggested that hand edema is the lymphedema induced from muscle weakness\(^4\). Lymphedema is caused by the accumulation of protein exuded from the serum to the tissue due to venous and lymphatic flow dysfunction\(^4\). If lymphedema is severe or lasting, it finally results in demyelination of the motor and sensory neuron or axon damage\(^5\).

Thus, to reduce hand edema due to muscle weakness, several methods have been used such as limb elevation, lymph massage, air compression, and active or passive motion\(^6,8,10\).

As one of the conservative therapies, Choi JE et al. reported that moving cupping therapy has effectiveness in reducing hand edema caused by CVA\(^9\). This study only compared the volume of the affected side with the volume of the unaffected side. We think that it is warranted to further study
the effects of moving cupping therapy using other study design and measurements, so we studied the effects of moving cupping therapy on the hand edema of three CVA patients using the single subject ABA withdrawal design and volumeter and measuring tape.

Method

Subjects
The three subjects selected for this study were all male and had hand edema with hemiplegia due to cerebral infarction. Their age was between 50 and 70. They had experienced a CVA from 1 to 4 months before the study and hand edema from 1 week to 1 month after the stroke. The subjects were taking physical and occupational therapy for two hours daily. No subjects had trauma or infection in the upper extremities that evidenced hand edema.

Procedures
A single subject ABA withdrawal design was used for this study. Edema was measured by the same person with volumeter and measuring tape. The hand volumeter measured the amount of water displaced by the total volume of the lower part of the styloid process of the ulna. According to Waylett-Rendall and Seibly, the volumeter was found to be accurate to within 1% of the total volume when successive measurements were performed. Intrarater reliability for the measurement protocol on normal hands was r=1.0. A circumferential measure (in millimeters) was taken of the wrist joint by measuring tape. The intrarater reliability for this measurement protocol was r=1.0. The moving cupping therapy used a plastic cup (diameter 30mm, Dae Gun Bu-Hang, Korea). A cup was connected with the vacuum pump (Sheboygan CO, USA) by a rubber tube so that the inner space of the cup [approached a] vacuum state. The negative pressure of the vacuum pump was set to 100-200mmHg so that moderate negative pressure was applied. Because excessive stimulation may make hurt skin, gel was applied to the patient’s skin which would help the movement of the cup. Proceeding with cupping therapy, we considered a sequence of lymph massage and direction of the Meridian. That is, we treated in sequence the unaffected side’s chest, shoulder, arm, hand and then the affected side’s chest, shoulder, arm, hand. However, the hand can’t receive the cupping therapy, so we instead applied passive movement for 30 seconds to the hand. Because subjects have difficulty changing position as a sequela of CVA, all subjects maintained a supine position for treatment.

We studied the subjects for 3 weeks. In the first week, we gathered baseline data for edematous hands. In the second week, we measured hand edema after applying moving cupping therapy for 20 minutes a day. In the third week, we measured hand edema without moving cupping therapy.

During the three weeks, we continued physical and occupational therapy. Also, we taught about limb elevation.

Data Analysis
The measurements were plotted on a graph for both visual and statistical analysis. Visual analysis was completed by observation of patterns that developed over the 3-week data collection period. Observations of upward, downward, or inconsistent patterns were noted.

The mean of the data gathered with the volumeter and measuring tape was also calculated for each of the 3 weeks. These means were used for evaluation of edema levels comparing with
visual analysis. In addition, a Pearson’s product-moment correlation coefficient (r) was calculated to establish the strength of the correlation between hand volumeter and measuring tape.

**Results**

Volumeter data and measuring tape data are shown in Figures 1 through 6. Visual analysis of the figures indicates that moving cupping therapy has some effect on the amount of edema in the affected hands. The pattern during the first week reveals an up and down situation or increasing edema. The pattern in the second week, with use of the moving cupping therapy, indicates a reduction in edema. The pattern in the third week indicates an increasing or decreasing edema.

The mean of the data for each week of the study are shown in Table 1. As with visual analysis, statistical analysis showed more decreasing hand edema in the second week than the first week.

The correlation of the two measurements was of strong significance (p<0.01) in two subjects, but
weak correlation with the third.

**Discussion**

A single subject ABA withdrawal design was used for this study. This design is commonly used in the field of physical therapy. Ottenbacher reported that the agreement between visual analysis and statistical significance was high and the sensitivity of visual inferences compared with statistical test results was 0.84, specificity was 0.88, and positive predictive value was 0.91.\(^{11,12}\)

The visual analysis of the data indicates that the use of moving cupping therapy may have had value in the treatment of edematous hands of the subjects with flaccid hemiplegia. Reduction of hand edema was evidenced during the treatment phase. The mean of the volume and wrist circumference was also reduced. Dirette et al. reported that the mean of reduction volume between first and second weeks was 29ml and 28ml\(^7\). In this study it was 27ml, 40ml and 62ml. In addition, the mean of reduction volume between the second and third weeks was 1.7ml, 69.3ml and 16.6ml. It remains to study whether the moving cupping therapy has a continuous effect on reduction of the edematous hand or not.

The treatment methods of lymphatic edema include lymphatic massage, compression therapy, limb elevation, and active or passive movement.\(^6,9\,13\). In this study, we tried moving cupping therapy for reducing hand edema. We noticed that the direction of the Meridian is similar to lymph vessel distribution, so we hypothesized returning abnormally increasing lymphatic fluid to normal lymph circulation by moving cupping therapy. The Meridian is defined as twelve pathways believed to connect the whole body in a system regulating body balance. Cupping therapy is a treatment method applied from ancient times both in the East and the West. The principle of cupping therapy is the purification of blood through the gas exchange between skin surface and skin tissue and improvement of blood circulation through capillary expansion. Generally, cupping therapy is applied to one or several acupoints, but with moving cupping therapy, cups are moved according to the direction of the Meridian.\(^{14}\)

The lymphatic system is composed of lymphatic fluid, lymphatic vessels and lymph nodes. Lymphatic fluid in peripheral tissue space is moved through lymphatic vessels in the same direction of the veins and gathered in lymph nodes of axilla and inguinal regions. The principle of lymph edema treatment is that accumulated lymphatic fluid in the edematous tissue is returned to normal lymph circulation.\(^{15}\) One of the common lymph edema treatments is lymphatic massage. Lymphatic massage is repeatedly giving mild low

<table>
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<th>Measure</th>
<th>Subject1</th>
<th>Subject2</th>
<th>Subject3</th>
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<tbody>
<tr>
<td><strong>Hand volumeter</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week1</td>
<td>366.7</td>
<td>461.7</td>
<td>430.0</td>
</tr>
<tr>
<td>Week2</td>
<td>340.0</td>
<td>420.0</td>
<td>368.3</td>
</tr>
<tr>
<td>Week3</td>
<td>338.3</td>
<td>351.7</td>
<td>351.7</td>
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<tr>
<td><strong>Measuring tape (wrist)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week1</td>
<td>175.7</td>
<td>184.8</td>
<td>196.7</td>
</tr>
<tr>
<td>Week2</td>
<td>176.3</td>
<td>179.6</td>
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</tr>
<tr>
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<td>174.2</td>
<td>177.7</td>
<td>187.2</td>
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positive pressure through the lymphatic vessel distribution. In contrast, the principle of moving cupping therapy is negative pressure using the vacuum. It is needed to study which among positive and negative pressure is more effective for the treatment of lymphatic edema.

The equipment used on the treatment was designed to give appropriate negative pressure by vacuum pump. We took special care to maintain 100-200mmHg mild low pressure. If strong negative pressure is applied on the region of lymphatic fluid accumulation, the lymphatic vessel is harmed and the period of rehabilitation is prolonged.

About the relationship of hand edema’s onset and edema treatment effect, Exton-Smith et al. suggested that treatment effect is weaker when hand edema is prolonged\(^1\), but Giudice suggested that there is a little or moderate positive relationship between amount of time after hand edema occurrence and treatment effect\(^6\). In this study, hand edema happened from 1 week to 1 month after CVA stroke in all subjects but we don’t know if amount of time after hand edema occurrence had an influence on treatment effect or not.

**Conclusions**

We studied the effect of moving cupping therapy on hand edema with a single subject design in three CVA patients. In the visual analysis, hand edema was reduced in all subjects. Through this study, we suggest that we can use moving cupping therapy as an additional treatment for hand edema of CVA patients. Research is needed to (a) further document the efficacy of the use of moving cupping therapy as a method of edema reduction; (b) collect data on the immediate, cumulative, and long-term effects of treatment; (c) use a larger sample size; (d) control the amount of time after hand edema occurrence; (e) investigate the effect of the moving cupping therapy on other lymphatic edema.

**References**

11. Bobrovitz CD, Ottenbacher KJ. Comparison of

