Effects of Swiss Ball Exercise on Functional Activity and Pain in Shoulder Dislocation Patients

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Abstract. The purpose of this study cares to investigate effect of shoulder stabilization exercise at the pain control, function and range of motion of shoulder girdle after surgery of shoulder dislocation patients. They were assigned by random sampling to an experimental group to which stabilization exercise was applied and a control group to which ordinary physical treatment was applied. The results of comparison of the therapeutic effect in the experimental and control groups revealed significant differences in active abduction, simple shoulder test, and power component of the Constant–Murley Scale. The results suggest that shoulder stabilization exercise positively affects pain alleviation and functional recovery in shoulder dislocation patients.

Keywords: Shoulder dislocation, stabilization exercise, pain, function

1 Introduction

A shoulder joint that is a special joint supported by muscles and tendons in body has a wide range of motion but joint stability has disadvantage because humerus head’s 1/3 joint with glenoid fossa. A shoulder joint has disadvantage of injury, and dislocation occurs the most frequently in the body [1]. After shoulder surgery, it is important to improve limited range of motion and muscle power. In the early stage, it is generally used cold therapy to control pain, and heat therapy to release soft tissue and then, it is advisable to intensify muscles [2]. Shoulder stabilization exercise which is safety and don’t apply hard attack on the shoulder is good to early stage patients after surgery [3]. Therapist has used shoulder stabilization exercise to fix abnormal state of scapula position, movement and functional disorders, and also shoulder stabilization exercise may give stability to shoulder girdle [4,5].

¹ Young-Han Park, ² Youn-Bum Sung, ³ Jung-Ho Lee, Improvements of Functional Activity and Pain Relief Through Stabilization Exercise
Previous researches are about comparison of recurrence rate between surgical therapy and non-surgical therapy. There are few studies to assess function and range of motion and pain control of shoulder joint after surgery of shoulder dislocation patients. The purpose of this study cares to investigate effect of shoulder stabilization exercise at the pain control, function and range of motion of shoulder girdle after surgery of shoulder dislocation patients.

2 Material methods

The subjects were 30 patients who were operated on capsulorrhaphy surgery of shoulder dislocation patients. They were assigned by random sampling to an experimental group (n = 15) to which stabilization exercise was applied and a control group (n = 15) to which ordinary physical treatment was applied. The study subjects provided written informed consent prior to participation according to the ethical standards of the Declaration of Helsinki.

To evaluate the degree of pain prior to and after the treatment, a 100 mm visual analogue scale (VAS) was used. The patients were asked to mark the intensity of pain they felt when they watched the table. The Constant–Murley Scale (CMS), which is a well-known, standardized clinical evaluation method, was used to evaluate the functions of the shoulder joints. To determine the range of motion, a Dartfish program was used to measure the passive flexion, active flexion, passive flexion, and passive extension. In order to prevent damage due to external rotation, external rotation angle was not measured. The simple shoulder test (12 items) was used to determine the condition of the shoulder joints of the subjects.

The control group was received conventional physical therapy after heat therapy during 20 minutes, TENS during 10 minutes, laser therapy 10 minutes to control pain and enhance shoulder function. The experimental group was received conventional physical therapy such as heat therapy during 20 minutes, TENS during 10 minutes, laser therapy during 10 minutes, and then accomplished shoulder stabilization exercise. One set of all exercises was composed of 10 times such as 10 seconds maintain and 5 seconds break. Each exercise is composed of 3 sets and between each set, subject rested 3 minutes. Both groups were received physical therapy 3 times a week, for 6 weeks, for total 18 times.

In the data processing, descriptive statistics were used to detect general characteristics of the subjects. A paired t-test was employed to examine differences in pain alleviation and functional improvement of the experimental group and the control group before and after the treatment. The independent t-test was used for inter-group comparison. For the data analysis, Win-SPSS Version 20.0 was used, and a significance level was set at \( \alpha = 0.05 \).

3 Results

The results of comparison of the therapeutic effect in the experimental and control groups revealed significant differences in active abduction, SST, and power.
component of the CMS (Table 1). This means that the stabilization exercise more effective to improve ROM, function, muscle power than conventional therapy.

### Table 1. Comparative analysis between the groups (Mean ± SD)

<table>
<thead>
<tr>
<th></th>
<th>Experimental group</th>
<th>Control group</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Flexion</td>
<td>9.33±4.95</td>
<td>8.00±3.16</td>
<td>0.879</td>
<td>0.387</td>
</tr>
<tr>
<td>Active Abduction</td>
<td>9.67±3.99</td>
<td>16.67±4.88</td>
<td>-4.299</td>
<td>0.000*</td>
</tr>
<tr>
<td>Passive Flexion</td>
<td>9.67±6.67</td>
<td>8.67±3.52</td>
<td>0.513</td>
<td>0.612</td>
</tr>
<tr>
<td>Passive Abduction</td>
<td>3.00±10.66</td>
<td>8.00±3.16</td>
<td>-1.742</td>
<td>0.092</td>
</tr>
<tr>
<td>Visual Analog Scale</td>
<td>-12.00±4.14</td>
<td>-10.67±4.58</td>
<td>-0.837</td>
<td>0.410</td>
</tr>
<tr>
<td>Simple Shoulder Test</td>
<td>-1.27±1.16</td>
<td>0.07±1.44</td>
<td>-2.793</td>
<td>0.009*</td>
</tr>
<tr>
<td>CMS Pain</td>
<td>2.33±0.58</td>
<td>1.33±0.51</td>
<td>0.887</td>
<td>0.382</td>
</tr>
<tr>
<td>ADL</td>
<td>2.80±0.48</td>
<td>1.60±0.29</td>
<td>1.375</td>
<td>0.180</td>
</tr>
<tr>
<td>ROM</td>
<td>4.67±1.19</td>
<td>2.40±0.88</td>
<td>1.913</td>
<td>0.066</td>
</tr>
<tr>
<td>Power</td>
<td>4.27±1.90</td>
<td>1.60±0.47</td>
<td>2.237</td>
<td>0.033*</td>
</tr>
<tr>
<td>Total</td>
<td>14.80±5.58</td>
<td>9.00±4.00</td>
<td>1.344</td>
<td>0.190</td>
</tr>
</tbody>
</table>

*p<0.05, CMS=Constant-Murley Scale, ADL=Activities of Daily Living, ROM=Range Of Motion

## 4 Discussion

This study investigated the effect of shoulder stabilization exercise on the shoulder dislocation patients undergone capsuleorrhaphy surgery about pain and functional recovery. Shoulder joint has a wide range of motion while dislocation the most frequently comes up in the body. 95% of first time dislocation patients were caused by trauma or falling [6]. If patients are not applied therapy in the early stage after dislocation, recurrence rate is high up to 95% and also shoulder pain or functional limit has a large influence on activities of daily living with causing lowering quality of life [1,7].

Bottoni(2002) investigated recurrence of shoulder dislocation patients [8]. This study reported that non-surgical treatment patent’s recurrence rate is 9 of 12 (75%), and arthroscopic surgery is 1 of 9 (11.1%). However, patients who were take surgery have some problems with activities of daily living because of limit of range of motion. Therefore, therapists should focus on increasing range of motion of shoulder with controlling pain and strengthening surrounding muscles to prevent re-dislocation of shoulder. Therefore, it is important to rehabilitation after surgery because recurrence rate is not zero.

De Oliveira(2008) reported that exercise of shoulder and arm using swiss ball enhance activity of trapezius [9]. Marshall(2005) showed that core stabilization exercise using swiss ball make considerable increase of activities of rectus abdominis. Also, it is reported that stabilization exercise is effective on pain control and functional recovery of patient during long term [10]. That is, the stabilization exercise
of the shoulders have a positive effect on the pain and function. Clinicians, the patients who received damaged of shoulder will need stabilization exercise.

In this study, the use of stabilization exercise to treat shoulder dislocation in capsulorrhaphy patients reduced their pain and had positive effects on their functional recovery. However, this study had some limitations, namely, a short study period and a small number of subjects. More efficient and systematic research to shed light on the role of stabilization exercise is needed.

References