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The Effects of Treatment of Korean Medicine for Superior Labrum Anterior to Posterior Lesions: A Retrospective Chart Review

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ABSTRACT

Background: This study aimed to investigate the clinical effectiveness of treatment of Korean medicine on superior labrum anterior to posterior (SLAP) lesions.
Methods: A total of 55 inpatients diagnosed with SLAP lesions by magnetic resonance imaging, were investigated from May 1st, 2014 to May 31st, 2019 at Haeundae Jaseng Hospital of Korean Medicine. The patients were sorted by gender, age, causing factor, illness duration, period of hospitalization, SLAP lesion type, complications, and treatments. Treatments included acupuncture, pharmacopuncture, Chuna therapy, herbal treatment, and physiotherapy. After treatment, the Numeric Rating Scale, Shoulder Pain and Disability Index, and European Quality of Life 5-Dimension questionnaire were used to evaluate treatment effect.
Results: There were more males than females in this study (1:0.83). Patients were more likely to be in their 50s (38.18%), have an unknown etiology (70.91%), and be in the subacute disease stage (41.82%). According to the SLAP lesion type, most of the inpatients had Type 2 lesions (69.09%). For inpatients diagnosed with SLAP lesions, the mean shoulder numeric rating scale score decreased from 5.55 ± 0.90, to 4.07 ± 1.18 ($p < 0.001$), the mean Shoulder Pain and Disability Index score decreased from 50.35 ± 18.36, to 39.90 ± 19.34 ($p < 0.001$), and the mean European quality of life 5-dimension index increased from 0.70 ± 0.16, to 0.75 ± 0.13 ($p < 0.01$) after treatment.
Conclusion: Treatment of Korean medicine effectively decreased pain and increased the quality of life of the patients with SLAP lesions in this study.

Introduction

A superior labrum anterior to posterior (SLAP) lesion stops above the midglenoid notch, and is classified into 4 types according to the tear pattern, and accompanying injuries [1]. Many reports have described the injury mechanisms of SLAP lesions however these lesions may be acute trauma or chronic repetitive damage (particularly repetitive overhead exercise) [2]. A SLAP lesion is most likely to cause inflammation of the surrounding area of the biceps anchor, resulting in crepitation, pain, and instability, but diagnosis is difficult to make due to the lack of specific symptoms, and the presence of other complicated diseases [3].

The treatment of a SLAP lesion varies by classification. For example Type 1, conservative treatment or arthroscopic debridement is performed, for Type 2 (the most common type), a SLAP lesion repair or biceps tenotomy/tenodesis is performed [4]. Despite many reports on arthroscopic surgery for single SLAP lesions, they were confined to young patients performing dynamic sporting activities; thus, it is unclear whether a SLAP lesion with other diseases causes pain [5].

Typically, SLAP lesions are characterized by rotator cuff tears in middle-aged and older patients, and acute SLAP lesions are

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rarely observed [6]. A repair is usually not performed for SLAP lesions in patients over 50 years of age since it is considered to be a degenerative change [7], so if there is a rotator cuff tear, a repair is futile [8]. Therefore, following diagnosis of a SLAP lesion by magnetic resonance imaging (MRI), conservative treatment should be considered according to the patient's age, and accompanying symptoms.

Although there have been several reports on the significant effects of conservative treatments of Korean medicine for SLAP lesions [9-13], case numbers are low, and that there are various treatments used including herbal treatment, pharmacopuncture, and motion style acupuncture treatment. In addition, there have been reports of treatment of Korean medicine for cervical and lumbar disc herniation [14,15] but few reports of SLAP lesions.

This study included 55 inpatients who were diagnosed with SLAP lesions on their shoulder using MRI, hospitalized with shoulder joint pain (as a chief complaint), and treated with Korean medicine at Haeundae Jaseng Hospital of Korean Medicine between May 1st, 2014 and May 31st, 2019. We aimed to determine whether treatment of Korean medicine had a significant beneficial effect on SLAP lesions.

Materials and Methods

Patients

The charts of patients with SLAP lesions who visited Haeundae Jaseng Hospital of Korean Medicine between May 1st, 2014 and May 31st, 2019 were reviewed retrospectively. Of the 149 patients who were diagnosed with SLAP lesions by MRI and received inpatient treatment, 60 who did not have shoulder pain as a chief complaint, 4 whose shoulder numeric rating scale (NRS) score was less than 4, 3 whose injuries were caused by traffic accidents, 25 who were admitted for less than 3 days, and 2 who did not complete the survey were excluded from this study. There were 55 patients enrolled in this study (Fig. 1).

Inclusion criteria

Patients hospitalized with shoulder pain as a chief complaint, and who underwent inpatient treatment after being diagnosed with a SLAP lesion during a physical examination and MRI, were included in this study.

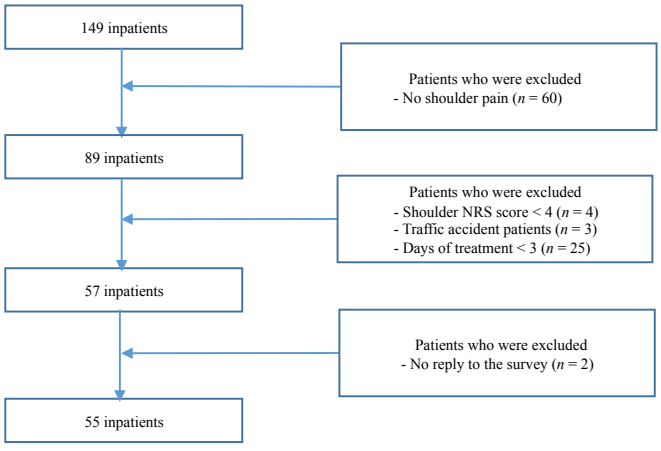

Fig. 1. Flow diagram of patients included in the study.

Exclusion criteria

Patients with serious conditions (malicious tumors, fractures, infections, paralysis) that may cause shoulder pain, chronic diseases (fibromyalgia, cardiovascular disease, diabetic neuropathy) that may interfere with the interpretation of a treatment effect, progressive neurological defects or symptoms, and conditions inappropriate for acupuncture (hemorrhagic disease, hemostasis) were excluded from this study. Patients who were taking immunosuppressive drugs or steroids, or who were pregnant were also excluded, along with those who did not complete the survey. In addition, to enhance the reliability of the survey data, patients with an NRS score of less than 4, whose shoulder pain was caused by a car accident, or who were discharged immediately after hospitalization were excluded.

Ethics statement

This retrospective study was approved by the Institutional Review Board of Jaseng Hospital and adhered to research ethics. To protect the patients' personal information, their medical records were accessed after approval from the Institutional Review Board of the Jaseng Hospital of Korean Medicine (no.: 2019-05-011).

General information

The demographic characteristics included patient gender and age. Causes of SLAP lesions were classified into reasons unknown, overwork/over exercise, and trauma/fall. Illness duration within 2 weeks, 2 weeks to 1 month, 1-6 months, and 6 months after onset indicated hyperacute, acute, subacute, and chronic stages, respectively. The period of hospitalization was defined by 1-week units. SLAP lesions were separated into 4 types as identified by tear patterns [16]. This was based on findings read by one radiologist. If the type of lesion was not specified, it was separately classified as "uncertain type." The presence or absence of shoulder complications were diagnosed with the SLAP lesion. Shoulder complications included rotator cuff tears and tendinitis, acromioclavicular joint arthrosis, adhesive capsulitis, subacromial and subdeltoid bursitis, biceps tendinitis, and shoulder impingement syndrome.

Treatments

Inpatient treatment consisted of acupuncture, pharmacopuncture, herbal treatment, Chuna therapy, traction, medicinal steaming therapy, manual therapy, extracorporeal shockwave therapy (ESWT), and interferential current therapy (ICT)/transcutaneous electrical nerve stimulation (TENS). Herbal treatment was reported as the number of weeks (due to difficulty presenting it as a combination of liquid and solid drugs), and the remaining treatments are shown as number of times. Acupuncture

The needles were 0.30 × 40 mm, made of stainless steel (The Eastern acupuncture equipment manufacturer, Boryung, Korea), standardized, and disposable. The acupuncture was administered at LI15, LI16, TE14, TE15, SI10, SI14, GB21, and Ashi points to a depth of 1.0-2.5 cm for 15 minutes twice a day with electroacupuncture (3 Hz).

Pharmacopuncture

Shinbaro pharmacopuncture (Jaseng Wonoe Tangjunwon, Namyangju, Korea) was injected at LI15, LI16, TE14, SI10, and Ashi points with the patient in the sitting position. Pharmacopuncture of up to 0.25 mL per session was administered twice daily using a

Table 1. The Composition of Herbal Medicines.

Herbal medicines	Herbal components
Chungpajunshin-Bang No 2. (decoction)	*Acanthopanacis Cortex* 5g, *Eucommiae Cortex* 5g, *Saposhnikovia Radix* 5g, *Achyranthes bidentata Bl.* 5g, *Cibotii Rhizoma* 5g, *Atractylodis Rhizoma Alba* 2.5g, *Amomi Fructus* 2.5g, *Geranii Herba* 2.5g, *Zingiberis Rhizoma* 1.25g, *Scolopendra morsitans L* 0.25g, *Glycyrrhizae Radix* 1.6g,
Chungshinbaro-Hwan (tablet)	*Poria(Hoelen)* 0.15g, *Ginseng Radix* 0.07g, *Achyranthes bidentata Bl.* 0.04g, *Asini Gelatinum* 0.02g, *Rehmanniae Radix* 0.62g, *Cervi Cornus Colla* 0.06g, *Mel* 0.31g, *Cibotii Rhizoma* 0.02g, *Eucommiae Cortex* 0.02g, *Saposhnikovia Radix* 0.01g, *Acanthopanacis Cortex* 0.01g, *Scolopendra Corpus* 0.01g, *Atractylodis Rhizoma Alba* 0.05g, *Atractylodis Rhizoma Alba* 0.02g.

disposable 29 gauge × 13 mm needle with a 1-mL syringe (Sungsim Medical, Bucheon, Korea) to a needle depth of 0.5-1.0 cm.

Herbal treatment

Chungpajunshin-Bang no. 2 decoction (120 mL/package) and Chungshinbaro-Hwan (tablet) were prescribed. Table 1 describes the composition of the herbal medicines. The inpatients took these medicines 3 times daily during the hospitalization (Table 1).

Chuna therapy

The patients were treated with Chuna therapy once daily, which included joint mobilization, joint distraction, and spine and joint manipulation for the shoulder joint.

Physiotherapy

The patients underwent traction and medicinal steaming therapy once daily that were classified into Korean medicine treatment, manual therapy, ESWT, and ICT/TENS depending on their condition.

Assessment methods

NRS

The NRS is used to measure a patient's subjective pain expressed from 0 to 10, where 0 is the absence of pain and 10 is the worst imaginable pain. The visual analog scale is a widely known pain assessment method, but it is relatively easier to measure with the NRS in that it does not require vision or motor functions. NRS scores were recorded at admission and discharge from hospital.

Shoulder pain and disability index

The shoulder pain and disability index (SPADI) is widely used as an evaluation tool for shoulder pain and has a total of 13 questions, consisting of 5 pain and 8 disability questions. The Korean version of SPADI has a confidence level of 0.991 between evaluations and re-evaluation, and its validity is sufficiently certified with a Cronbach Alpha score of 0.942 for internal correspondence [17]. Each item of SPADI for pain-free or the most comfortable state scores 0, and the most uncomfortable and painful state scores 100, with intervals of 10. The total score is averaged over pain and disability. SPADI measurements were made on admission and discharge from hospital.

European quality of life 5-dimension 5-level

The European quality of life 5-dimension (EQ-5D) is a general quality of life assessment tool that has 5 items: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression [18]. EQ-5D-5L shows 5 levels of the EQ-5D. It can be expressed as a single number which is set by each country's valuation, and is now widely used in many countries because of the ability to calculate quality-adjusted life years [19]. EQ-5D-5L measurements were made on admission and discharge from hospital.

Table 2. Distribution of Gender and Age.

		N	%
Gender	Male	30	54.55
	Female	25	45.45
Age (y)	30-39	3	5.45
	40-49	13	23.64
	50-59	21	38.18
	60-	18	32.73
Total		55	100

Data analysis method

Statistical analysis was conducted using SPSS 25.0 for Windows (SPSS Inc., Chicago, IL, USA). The data are presented as mean ± SD, and changes in NRS, SPADI, and EQ-5D index, before versus after treatment were examined for normality before the statistical analysis using a paired *t* test for parametric data and the Wilcoxon signed-rank test for nonparametric data. The correlation analysis of changes in NRS and treatment were conducted using the Spearman correlation coefficient.

Results

General information

Distribution of gender and age

The inpatients consisted of 30 males and 25 females (Table 2). The mean age was 54.49 ± 9.55 years (range, 33-71 years), with 3 patients in their 30s (5.45%), 13 in their 40s (23.64%), 21 in their 50s (38.18%), and 18 in their 60s (32.73%).

Distribution of causes

There were 39 cases (70.91%) with the cause unknown, 7 (12.73%) from overwork/over exercise, and 9 (16.36%) from a trauma/fall (Table 3).

Distribution of illness duration

Six cases (10.91%) developed illness acutely within 2 weeks, 10 between 2 weeks and 1 month, 23 (41.82%) between 1 and 6 months, and 16 (29.09%) before 6 months (Table 4).

Table 3. Distribution of Causes.

Causes	*N*	%
Reason unknown	39	70.91
Overwork / Over exercise	7	12.73
Trauma / Fall	9	16.36
Total	55	100

Table 4. Distribution of Illness Duration.

Stage	*N*	%
Hyperacute	6	10.91
Acute	10	18.18
Subacute	23	41.82
Chronic	16	29.09
Total	55	100

Table 5. Distribution of Hospitalization Period.

Days	*N*	%
1-7	12	21.82
8-14	14	25.45
15-21	6	10.91
22-28	7	12.73
29-35	8	14.55
36-42	2	3.64
43	6	10.91
Total	55	100

Table 6. Distribution of SLAP Type.

SLAP type	*N*	%
1	5	9.09
2	38	69.09
3	4	7.27
4	0	0
Uncertain type	8	14.55
Total	55	100

SLAP, superior labrum anterior to posterior.

Table 7. Distribution of Complications with SLAP Lesion.

Complications	*N*	%
Rotator cuff tear	18	32.73
Rotator cuff tendinitis	4	7.27
Acromioclavicular joint arthritis	21	38.19
Adhesive capsulitis	9	16.36
Subacromial and subdeltoid bursitis	9	16.36
Biceps tendinitis	8	14.55
Shoulder impingement syndrome	1	1.82

SLAP, superior labrum anterior to posterior.

Table 8. The Means and Standard Deviation of Treatments.

	Mean	SD
Herbal treatment (d)	19.65	15.73
Acupuncture	27.98	20.58
Pharmacopuncture	32.42	28.60
Chuna therapy	16.80	15.31
Traction	5.22	9.59
Medicinal steaming therapy	12.36	15.76
Manual therapy	11.71	9.00
ESWT	4.44	6.24
ICT/TENS	16.65	18.05

ESWT, extracorporeal shockwave therapy; ICT, interferential current therapy; TENS, transcutaneous electrical nerve stimulation.

Distribution of hospitalization period

Twelve patients (21.82%) stayed for less than 1 week of hospitalization, 14 (25.45%) for 1-2 weeks, 6 (10.91%) for 2-3 weeks, 7 (12.73%) for 3-4 weeks, 8 (14.55%) for 4-5 weeks, 2 (3.64%) for 5-6 weeks, and 6 (10.91%) for more than 6 weeks (Table 5). The mean hospitalization period was 20.04 ± 15.88 days (range, 3-56 days).

Distribution of SLAP lesion types

There were 5 cases (9.09%) of SLAP lesion Type 1, 38 (69.09%) of Type 2, 4 (7.27%) of Type 3, none of Type 4, and 8 (14.55%) were an unidentified type (Table 6).

Complications with SLAP lesions

Regarding complications of SLAP lesions discovered by MRI, 21 patients (38.19%) had a rotator cuff tear, 18 (32.73%) had rotator cuff tendinitis, 4 (7.27%) had biceps tendinitis, 29 (52.73%) had acromioclavicular joint arthrosis, 9 (16.36%) had adhesive capsulitis, 8 (14.55%) had subacromial and subdeltoid bursitis, and 1 (1.82%) had shoulder impingement syndrome (Table 7).

Treatment

Among the treatments provided (Table 8), herbal treatment is shown in number of weeks (Table 9), while the other treatments are shown as the number of times (Tables 10 and 11). Spearman correlation coefficient analysis of the number of treatments and changes in NRS scores revealed the following: Chuna therapy

Table 9. Distribution of Herbal Treatment Period.

Days	*N*	%
0	1	1.8
1-7	12	21.8
8-14	13	23.6
15-21	6	10.9
22-28	8	14.5
29-35	7	12.7
36-42	2	3.6
43	6	10.9
Total	55	100

Table 10. Distribution of Korean Medicine Treatments Times.

	Acupuncture		Pharmacopuncture		Chuna therapy	
	N	%	*N*	%	*N*	%
0	0	0	2	3.6	10	18.2
1-10	16	29.1	14	25.5	17	30.9
11-20	11	20.0	12	21.8	5	9.1
21-30	1	1.8	0	0	13	23.6
31-40	13	23.6	5	9.1	4	7.3
41-50	6	10.9	11	20.0	5	9.1
51-60	3	5.5	3	5.5	1	1.8
61	5	9.1	8	14.5	0	0
Total	55	100	55	100	55	100

Table 11. Distribution of Physiotherapy Times.

	Traction		Medicinal steaming therapy		Manual therapy		ESWT		ICT/TENS	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%
0	32	58.2	15	27.3	3	5.5	3	5.5	16	29.1
1 - 10	13	23.6	18	32.7	27	49.1	27	49.1	13	23.6
11 - 20	4	7.3	9	16.4	14	25.5	14	25.5	8	14.5
21 - 30	4	7.3	7	12.7	9	16.4	9	16.4	2	3.6
31 - 40	2	3.6	1	1.8	2	3.6	2	3.6	9	16.4
41 - 50	0	0	4	7.3	0	0	0	0	3	5.5
51 - 60	0	0	0	0	0	0	0	0	3	5.5
61	0	0	1	1.8	0	0	0	0	1	1.8
Total	55	100	55	100	55	100	55	100	55	100

ESWT, extracorporeal shockwave therapy; ICT, interferential current therapy; TENS, transcutaneous electrical nerve stimulation.

Table 12. Correlation Analysis Between Treatments and NRS Change.

	Acupuncture	Pharmaco-puncture	Chuna therapy	Traction	Medicinal steaming therapy	Manual therapy	ESWT	ICT/TENS
Correlation coefficient	0.487	0.488	0.497	0.153	0.420	0.436	0.105	0.450
p	< 0.001*	< 0.001*	< 0.001*	0.264	0.001†	< 0.001*	0.444	< 0.001*

ESWT, extracorporeal shockwave therapy; ICT, interferential current therapy; NRS, numeric rating scale; TENS, transcutaneous electrical nerve stimulation.
* Spearman correlation analysis; $p < 0.001$.
† $p < 0.01$.

(0.497), pharmacopuncture (0.488), acupuncture (0.487), ICT/TENS (0.450), manual therapy (0.436; $p < 0.001$), and medicinal steaming therapy (0.420; $p < 0.01$) (Table 12). The correlation coefficient of traction and ESWT was not significant.

Assessment

NRS

Changes in the entire patient population NRS scores before and after hospitalization, significantly decreased from 5.55 ± 0.90

Table 13. Comparison of Shoulder NRS Scores Before and After Treatment.

		N	NRS		*p*
			Before	After	
Gender	Male	30	5.37 ± 1.00	3.87 ± 1.20	< 0.001*
	Female	25	5.76 ± 0.72	4.32 ± 1.14	
Age (y)	< 50	16	5.44 ± 1.15	3.88 ± 1.31	< 0.001†
	≥ 50	39	5.59 ± 0.79	4.15 ± 1.14	
Period of disease	Most acute stage	6	5.67 ± 0.82	4.17 ± 0.98	0.041‡
	Acute stage	10	5.20 ± 0.63	3.70 ± 0.95	0.007§
	Subacute stage	23	5.57 ± 1.12	4.09 ± 1.38	< 0.001*
	Chronic stage	16	5.69 ± 0.70	4.25 ± 1.13	0.002§
Complicated with rotator cuff tear	Yes	21	5.57 ± 0.93	3.81 ± 1.44	< 0.001†
	No	34	5.53 ± 0.90	4.24 ± 0.99	
Total		100	5.55 ± 0.90	4.07 ± 1.18	

Data are presented as mean ± SD.
NRS, numeric rating scale.
* Wilcoxon signed-rank test; $p < 0.001$.
† Paired t-test; $p < 0.001$.
‡ Wilcoxon signed-rank test; $p < 0.05$.
§ Wilcoxon signed-rank test; $p < 0.01$.

Table 14. Comparison of Pain Score of SPADI Before and After Treatment.

		N	Pain score of SPADI		*p*
			Before	After	
Gender	Male	30	49.20 ± 19.86	36.40 ± 21.23	< 0.001*
	Female	25	57.92 ± 15.23	48.96 ± 15.43	0.013†
Age (y)	< 50	16	51.00 ± 23.48	38.50 ± 22.89	0.016†
	≥ 50	39	54.05 ± 15.94	43.59 ± 18.34	< 0.001*
Period of disease	Most acute stage	6	66.00 ± 19.64	51.33 ± 16.38	0.115
	Acute stage	10	50.00 ± 16.41	30.20 ± 16.31	0.008‡
	Subacute stage	23	59.22 ± 15.44	45.48 ± 19.79	< 0.001*
	Chronic stage	16	41.63 ± 17.08	41.25 ± 20.62	0.929
Complicated with rotator cuff tear	Yes	21	52.95 ± 18.27	38.19 ± 16.16	< 0.001*
	No	34	53.29 ± 18.55	44.53 ± 21.45	0.005§
Total		55	53.16 ± 18.28	42.11 ± 19.69	< 0.001*

Data are presented as mean ± SD.
SPADI, shoulder pain and disability index.
* Paired t-test; $p < 0.001$.
† Paired t-test; $p < 0.05$.
‡ Wilcoxon signed-rank test; $p < 0.01$.
§ Paired t-test; $p < 0.01$.

to 4.07 ± 1.18 ($p < 0.001$; Table 13). This value was significantly reduced in each group despite classification by gender or age > 50 years versus age < 50 years ($p < 0.001$). It was confirmed that the mean NRS score decreased significantly in each group even when patients illness duration was considered ($p < 0.05$), and accompanying rotator cuff tear ($p < 0.001$).

SPADI

The SPADI assessment covered pain, disability, and total scores. Changes in the SPADI pain score before, versus after hospitalization, significantly decreased from 53.16 ± 18.28 to 42.11 ± 19.69 in the entire patient population ($p < 0.001$; Table 14), even when patients were classified by gender or age > 50 years versus age < 50 years ($p < 0.05$). We confirmed that it decreased significantly in each

Table 15. Comparison of Disability Score of SPADI Before and After Treatment.

		N	Disability score of SPADI		*p*
			Before	After	
Gender	Male	30	43.29 ± 22.13	31.00 ± 19.12	< 0.001*
	Female	25	54.95 ± 13.90	47.55 ± 17.75	0.066
Age (y)	< 50	16	44.84 ± 25.38	33.83 ± 22.00	0.044†
	≥ 50	39	50.13 ± 16.79	40.45 ± 19.29	0.002‡
Period of disease	Most acute stage	6	66.04 ± 19.05	50.00 ± 21.05	0.116
	Acute stage	10	41.75 ± 20.40	23.88 ± 17.58	0.011§
	Subacute stage	23	54.13 ± 13.83	45.43 ± 17.91	0.025†
	Chronic stage	16	38.36 ± 20.41	33.44 ± 18.96	0.307
Complicated with rotator cuff tear	Yes	21	52.95 ± 18.27	38.19 ± 16.16	< 0.001*
	No	34	53.29 ± 18.55	44.53 ± 21.45	0.043†
Total		55	48.59 ± 19.57	38.52 ± 20.14	< 0.001*

Data are presented as mean ± SD.
SPADI, shoulder pain and disability index.
* Paired t-test; $p < 0.001$.
† Paired t-test; $p < 0.05$.
‡ Paired t-test; $p < 0.01$.
§ Wilcoxon signed-rank test $p < 0.05$.

Table 16. Comparison of Total Score of SPADI Before and After Treatment.

		N	Total score of SPADI		*p*
			Before	After	
Gender	Male	30	45.57 ± 20.56	33.08 ± 19.16	< 0.001*
	Female	25	56.09 ± 13.60	48.09 ± 16.43	0.035†
Age (y)	< 50	16	47.21 ± 24.07	35.62 ± 21.81	0.024†
	≥ 50	39	51.64 ± 15.64	41.66 ± 18.24	< 0.001*
Period of disease	Most acute stage	6	66.03 ± 19.12	50.52 ± 18.77	0.116
	Acute stage	10	44.92 ± 18.38	26.31 ± 16.35	0.008‡
	Subacute stage	23	56.09 ± 12.99	45.45 ± 18.11	0.003§
	Chronic stage	16	39.63 ± 18.72	36.44 ± 18.96	0.472
Complicated with rotator cuff tear	Yes	21	51.87 ± 18.39	36.96 ± 16.56	< 0.001*
	No	34	49.42 ± 18.56	41.72 ± 20.90	0.015†
Total		100	50.35 ± 18.36	39.90 ± 19.34	< 0.001*

Data are presented as mean ± SD.
SPADI, shoulder pain and disability index.
* Paired t-test; $p < 0.001$.
† Paired t-test; $p < 0.05$.
‡ Wilcoxon signed-rank test; $p < 0.01$.
§ Paired t-test; $p < 0.01$.

group even when the patients were analyzed as per accompanying rotator cuff tear ($p < 0.01$). However, when the patients were classified according to illness duration, it decreased significantly in the 2 weeks to 1 month, and 1 month to 6 months groups ($p < 0.01$).

Changes in the SPADI disability score before, versus after hospitalization, significantly decreased from 48.59 ± 19.57 to 38.52 ± 20.14 in the entire patient population ($p < 0.001$; Table 15). The difference was significant even when the patients were classified by age > 50 years versus age < 50 years ($p < 0.05$), or only males ($p < 0.001$). We confirmed that it had significantly decreased in each group even when the patients were analyzed according to accompanying rotator cuff tear ($p < 0.05$). However, when the patients were classified as per illness duration, it decreased significantly in the 2 weeks to 1 month, and 1 month to 6 months

Table 17. Comparison of EQ-5D-5L Index Before and After Treatment.

		N	EQ-5D-5L index		p
			Before	After	
Gender	Male	30	0.75 ± 0.15	0.79 ± 0.13	0.171
	Female	25	0.63 ± 0.16	0.71 ± 0.13	0.002*
Age (y)	< 50	16	0.79 ± 0.13	0.81 ± 0.13	0.441
	≥ 50	39	0.66 ± 0.16	0.73 ± 0.13	0.002†
Period of disease	Most acute stage	6	0.63 ± 0.12	0.74 ± 0.19	0.173
	Acute stage	10	0.80 ± 0.15	0.85 ± 0.10	0.176
	Subacute stage	23	0.68 ± 0.17	0.73 ± 0.13	0.116
	Chronic stage	16	0.68 ± 0.17	0.72 ± 0.12	0.071
Complicated with rotator cuff tear	Yes	21	0.73 ± 0.10	0.77 ± 0.09	0.039‡
	No	34	0.68 ± 0.19	0.74 ± 0.15	0.016§
Total		100	0.70 ± 0.16	0.75 ± 0.13	0.003†

Data are presented as mean ± SD.
EQ-5D-5L, European quality of life 5-dimension.
* Wilcoxon signed-rank test; $p < 0.01$
† Paired t-test; $p < 0.01$
‡ Wilcoxon signed-rank test; $p < 0.05$.
§ Paired t-test; $p < 0.05$.

groups ($p < 0.05$).

Changes in the SPADI total score before, versus after hospitalization, significantly decreased from 50.35 ± 18.36 to 39.90 ± 19.34 in the entire patient population ($p < 0.001$; Table 16). This was significantly reduced in each group even when the patients were classified by gender or age > 50 years versus age < 50 years ($p < 0.05$). We also confirmed that it significantly decreased in each group after analysis of patients according to accompanying rotator cuff tear ($p < 0.05$). However, when the patients were classified based on illness duration, it decreased significantly in the 2 weeks to 1 month, and 1 month to 6 months groups ($p < 0.01$).

EQ-5D-5L

Changes in the EQ-5D-5L index before, versus after hospitalization, significantly increased from 0.70 ± 0.16 to 0.75 ± 0.13 in the entire patient population ($p < 0.01$; Table 17). This was significantly increased in female patients aged over 50 years ($p < 0.01$). It was confirmed that it had significantly increased in each group even when the patients were analyzed according to accompanying rotator cuff tear ($p < 0.05$). However, when the patients were classified based on illness duration, an increase was seen in all groups, but no changes were significant.

Discussion

The glenoid labrum is a hard fibrous structure consisting of hyaline cartilage that covers the glenoid fossa to fibrous labral tissue through the fibrous cartilage system [2]. It provides joint stability and disperses the load, increasing joint width and depth [20,21]. The superior labrum is loose, unlike the anterior, posterior, and inferior parts, which are firmly attached to the glenoid, and it serves as an origin of the biceps anchor. Basically, when compressive damage occurs in the arm during shoulder abduction and flexion, the glenoid labrum tends to be pulled from the glenoid fossa by traction of the biceps anchor, and a mechanism of SLAP lesions occur which is commonplace in athletes [3,22]. In addition to this application of single force, it can occur in many cases where a ball is thrown, through repetitive abduction and external rotation of the shoulder, causing a SLAP lesion by creating torsional force at the base of the biceps tendon, the so-called peel back mechanism [23]. Divided into traction and torsional forces, the former would be generally caused by normal trauma, which appears as anterior lesions, while the latter, the peel back mechanism, mainly appears as posterior lesions [24].

Snyder et al [16] classified SLAP lesions into 4 types: Type 1, tear and fibrillation of the labral margin despite the biceps labral complex being firmly attached to the glenoid fossa, Type 2, complete separation from the glenoid, making the biceps labral complex unstable (most commonly observed), Type 3, bucket handle tear in which some of the damaged labrum is moved into the articular space but the complex stability is maintained, and Type 4, a very unstable state of the complex as the bucket handle tear extends to the biceps anchor. A SLAP lesion is further subdivided by technological advances in diagnostic tests, with 93% sensitivity for detection by MRI and 96% sensitivity for magnetic resonance angiography [25]. Arthroscopy, most widely known for diagnosing SLAP lesions, shows that the superior labrum is peeled off from the glenoid when the arm is in abduction and external rotation, the peel back mechanism [26]. In the event of joint instability, the so-called drive through sign is performed by smoothly pushing the arthroscope into the axillary recess [23].

Treatments for SLAP lesions are divided into conservative and surgical treatments. For conservative treatment, physiotherapy and nonsteroidal anti-inflammatory drugs are intended to be used when there is no major inconvenience in daily life [27], for the purpose of restoring articular capsule flexibility and rotator cuff muscle strength [2]. Surgical treatment is considered if conservative treatment fails or the patient's pain is so severe that it influences daily life. Type 1 SLAP lesions are treated with arthroscopic debridement, Type 2 with repair or biceps tenotomy/

tenodesis, Type 3 with resection (repair as required), and Type 4 with repair if less than 50% of the biceps tendon is affected (otherwise, biceps tenotomy/tenodesis is required) [4].

Treatment uncertainty regarding SLAP lesions observed in non-athletes after middle age has increased recently because it is perceived as degenerative due to age and use [24]. Also, for patients whose degenerative changes of the superior labrum result in more movement than those of healthy individuals, repair does not have a good effect on pain reduction or quality of life [5]. Since previous studies mainly targeted athletes with heavy arm use, opinions differ on whether to apply surgical treatment to SLAP lesions in non-athletes [28]. SLAP lesions are difficult to define in Korean medicine but can be classified into "gyunbitong" and "nugyunpung." They have causes that are neither internal nor external as per the "Theory of 3 Causes" [12].

The subjects in this study were 55 patients (30 men, 25 women; ratio 1:0.83) diagnosed with SLAP lesions on their shoulder using MRI, and treated with Korean medicine. In terms of age and cause, 21 (38.18%) were in their 50s and 39 had unknown reasons (70.91%). Regarding illness duration, the largest group was 1 month to 6 months [23 patients (41.82%)] versus only 6 (10.91%) in the within 2 weeks group. This finding indicates that patients with SLAP lesions at this Korean medicine hospital were not young athletic people, but normal people with degenerative changes induced by chronic use.

Treatments of Korean medicine implemented in this study consisted of acupuncture, pharmacopuncture, Chuna therapy, herbal treatment, and physiotherapy. The Spearman correlation coefficient between number of treatments and NRS change was the highest for Chuna therapy (0.497), pharmacopuncture (0.488), and acupuncture (0.487; $p < 0.001$). It is speculated that Korean medicine treatment including acupuncture, pharmacopuncture, and Chuna therapy played a major role in treatment of Korean medicine for SLAP lesions.

Type 2 SLAP lesions were most common [38 patients (69.09%)], consistent with another finding [1]. Regarding complications, the largest group was acromioclavicular joint arthrosis [29 cases (52.73%)], followed by rotator cuff tear [21 cases (38.19%)] and rotator cuff tendinitis [18 cases (32.73%)]. Considering that patients in their 50s or older with an illness duration exceeding 1 month accounted for the majority of the cohort, most of the patients had shoulder condition/diseases caused by deterioration rather than injury.

Regarding the analysis of treatment results, the number-based method of expressing the condition before versus after treatment is objective thus, the NRS and SPADI were used before and after treatment to assess the degree of pain, while the EQ-5D-5L was used to analyze the degree of quality of life improvement. The coherence between SLAP lesions and rotator cuff tears is reportedly very high at 41% [1], and it is hypothesized that Type 2 posterior lesion, which formed the majority of SLAP lesions, can cause posterosuperior instability that results in damage to the posterior rotator cuff tear [29], and several studies have aimed to manage SLAP lesions in middle-aged or older people and those with rotator cuff tears [8,30].

The shoulder NRS score significantly decreased after treatment across the entire patient population ($p < 0.001$), even when the patient groups were classified by gender and age ($p < 0.001$), illness duration ($p < 0.05$), and accompanying rotator cuff tear ($p < 0.001$; Table 13). This indicates that treatment of Korean medicine is equally effective across the entire patient group, not just in a specific patient group.

SPADI assessed pain, disability, and total score changes before versus after treatment and indicated a highly significant decrease across the entire patient population ($p < 0.001$). Although SPADI score did not decrease significantly in the female group, most of the classifications showed a significant decrease ($p < 0.05$) however, when classified by illness duration, a significant decrease was only observed in the 2 weeks to 1 month and 1 month to 6 months groups ($p < 0.05$; Tables 14-16).

This treatment is generally effective for patients with SLAP lesions to reduce their pain and recovery from functional disorders, not for patients who have had symptoms for less than 2 weeks or more than 6 months. For a group of hyperacute stage patients (within 2 weeks), more patients than were in this study group may give a different result. In addition, many patients with chronic diseases over 6 months are likely to suffer from pain and dysfunction due to various causes in addition to SLAP lesions. Thus, unless it is extremely chronic, treatment of Korean medicine of SLAP lesions could effectively reduce shoulder joint pain and lead to the recovery of functional disorders.

The mean change in EQ-5D-5L index before versus after treatment displayed a significant increase across the entire patient population ($p < 0.01$). Regarding gender and age, significant increases were seen only in females, and in those over 50 years of age ($p < 0.01$), and in each group according to the presence or absence of rotator cuff tears ($p < 0.05$). However, upon classification according to illness duration, mean increases were seen in all groups, but none were significant (Table 17). Although the significance of each group was not confirmed due to small patient numbers overall, a significant increase can be seen as having a positive effect on the physical and mental quality of life, as well as a simple reduction of pain in all patients.

This study is meaningful in that it objectively demonstrates the effectiveness of Korean medicine treatment in a group of 55 patients and was unlike previous studies which were only case reports. In addition, the items of each group were divided in detail to allow comparison of the effects before, versus after treatment, according to patient group attributes. By diversifying the criteria for assessing the degree of improvement with treatment, it was possible to confirm that for SLAP lesions, the effects of treatment appeared as changes in pain on specific motions, improved shoulder joint dysfunction, and increased quality of life, not just pain relief.

However, due to the limitations of this study, it was not possible to design additional experiments such as controlled tests. Since this study targeted inpatients only, the results cannot be generalized to a wider population of patients with SLAP lesions. An additional limitation was that the surveys were conducted only on admission and discharge , and there was no follow-up after discharge. In addition, because it is difficult to assume that a SLAP lesion is the only cause of a patient's shoulder pain, detailed studies of simple SLAP lesions in patients with other currently excluded shoulder diseases, are needed. We believe that further research is required to compensate for these limitations.

Conclusion

Treatment of Korean medicine can be an effective and conservative approach to managing patients with SLAP lesions since it reduces pain, heals functional disorders, and improves quality of life.

Conflicts of Interest

The authors have no conflicts of interest to declare.

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