

Original Article

Effects of sodium hyaluronate intraarticular injection with continuing rehabilitation nursing on knee function and quality of life in osteoarthritis patients

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Abstract: Objective: To evaluate the impact of sodium hyaluronate (SH) intraarticular injections plus continuing rehabilitation nursing on knee function and quality of life (QoL) in osteoarthritis (OA) patients. Methods: A total of 127 OA patients admitted between May 2021 and May 2023 were selected. The control group (60 cases) received SH intraarticular injections and routine care, while the observation group (67 cases) received SH intraarticular injections plus continuing rehabilitation nursing intervention. Comparative analyses were conducted on treatment efficacy, pain level (Visual Analog Scale (VAS)), negative emotions (Self-rating Anxiety/Depression Scale (SAS/SDS)), knee function (Lysholm Score and Lequesne Index), and QoL (World Health Organization Quality of Life Scale (WHOQOL-100)). Results: The observation group showed a significantly higher overall treatment efficiency and evident declines in VAS, SAS, and SDS scores compared to the control group (all $P < 0.05$). Additionally, the Lysholm and WHOQOL-100 scores were more significantly elevated than those in the control group (all $P < 0.05$). Conclusions: SH intraarticular injections plus continuing rehabilitation nursing can significantly improve knee function and QoL in OA patients.

Keywords: Sodium hyaluronate intraarticular injections, continuing rehabilitation nursing, osteoarthritis, knee function, quality of life

Introduction

Osteoarthritis (OA) is a prevalent chronic joint disorder in the elderly, especially in women. OA is characterized by joint pain and functional limitations, leading to impaired quality of life (QoL) [1, 2]. According to statistics, knee OA (KOA) is the most prevalent form, accounting for at least 80% of OA cases, affecting around 10% of the population over 60, and it is expected to affect 50% of the population in the future [3, 4]. The main pathologic features include progressive degeneration of articular cartilage and subchondral osteosclerosis, with risk factors such as aging, obesity, inflammation, and trauma [5, 6]. Although no curative treatment exists, current therapies focus on alleviating pain, improving functional abilities, and enhancing QoL [7, 8]. This study explored a novel ther-

apy designed to provide new directions for OA management.

Sodium hyaluronate (SH), also known as hyaluronic acid, is a crucial component of synovial fluid and the cartilage matrix, with effects including joint lubrication, anti-infection, and cartilage repair, making it widely used in OA treatment via intrathecal injections [9, 10]. The therapeutic mechanism of SH in OA is related to its down-regulation of reactive oxygen species (ROS) levels and protection of chondrocytes from oxidative stress-related damage [11, 12]. Previous studies have also shown that SH can complement minimally invasive arthroscopy in treating elderly KOA patients, promoting wound healing, inhibiting inflammation as well as improving joint function [13]. Continuing rehabilitation nursing is a nursing model that extends

nursing care beyond the hospital, providing post-discharge care services to ensure the continuity and coordination of nursing services. This approach supports sustained rehabilitation and maximizes therapeutic outcomes [14].

In this study, we combined SH intraarticular injections with continuing rehabilitation nursing for the treatment of OA, aiming to evaluate their combined effects on knee function and QoL and to verify the clinical advantages of this approach compared to SH intraarticular injections alone.

Materials and methods

General patient data

A total of 127 OA patients were selected for the study between May 2021 and May 2023. The control group comprised 60 OA cases (male-to-female ratio: 27:33, mean age: 54.50±11.06 years) who were treated with SH intraarticular injections plus routine care. The research group included 67 OA cases (male-to-female ratio: 31:36, mean age: 56.45±9.21 years) who were treated with SH intraarticular injections plus continuing rehabilitative nursing interventions. The general patient data between the two groups were clinically comparable (all $P>0.05$). This retrospective research was approved by the Ethics Committee of Qingdao Special Servicemen Recuperation Center of PLA Navy.

Patient selection criteria

Inclusion criteria: Patients who met the diagnostic criteria for OA [15]; Patients who received treatment for the first time; Patients with clinical symptoms such as joint pain, knee swelling, dysfunction, claudication, inability to walk, joint soreness, and fatigue; No cognitive or communication disorders; No serious organ diseases.

Exclusion criteria: History of chronic conditions like heart disease, diabetes, and hypertension; Use of other drugs such as hormones within six months that could influence the treatment outcome; Comorbidities of acute illnesses, infectious diseases, malignant tumors; Pregnant or breastfeeding women; History of alcohol or drug abuse; Those who were concurrently participating in other clinical trials; and Inability to cooperate with the follow-up visits.

Intervention methods

The control group received SH intraarticular injections (Qiyi Biological Technology (Shanghai) Co., Ltd., QY1220-1). The patients were positioned supine with their knee joints bent. After routine disinfection, the injection was administered either through the inner or outer side beneath the patella, targeting the joint cavity. Two mL of SH was injected once a week for a total of 4 times. In addition to the SH injection, the control group was also given routine care, mainly including routine nursing measures such as routine dietary guidance, daily activity guidance, early functional training guidance, and precautions during hospitalization.

In addition to the above treatments, observation group was further given a continuity of rehabilitation nursing intervention. The specifics of the intervention were as follows:

(1) Pre-hospital interventions: During hospitalization, nursing staff conducted a comprehensive evaluation of each patient based on their basic data to develop a targeted and personalized continuing rehabilitation nursing plan. Nurses patiently answered the patient's questions, emphasizing the importance of the rehabilitation plan and ensuring active participation. Patients were informed about possible complications and adverse reactions, and they were advised to seek prompt medical attention if discomfort arose. Electronic patient records, including personal data and contact details, were created before discharge to ensure continuity of care.

(2) Psychological care: As OA patients often experience physical, mental and financial stress. Caregivers assessed patients' psychological state and provided timely psychological counseling to alleviate their negative emotions, encouraging active cooperation with the nursing practice.

(3) Functional exercise: Individualized rehabilitation exercise training is given to patients in a gradual manner according to the plan to enhance limb strength and promote muscle recovery.

(4) Life guidance: Patients were guided on how to maintain a well-ventilated home environment with appropriate humidity and temper-

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Table 1. Comparison of baseline data between the two groups

	Control group (n=60)	Observation group (n=67)	χ^2/t	P
Gender (male/female)	27/33	31/36	0.021	0.886
Age (year)	54.50±11.06	56.45±9.21	1.084	0.281
Weight (kg)	58.17±7.08	57.58±9.12	0.404	0.687
BMI (kg/m ²)	22.33±3.39	22.99±2.45	1.267	0.208
Lesion site (left/right)	31/29	37/30	0.161	0.688

Note: BMI, Body Mass Index.

ature. They were instructed on maintaining proper posture while sitting and sleeping and encouraged to maintain a structured daily routine. Meanwhile, Nutritional guidance was provided, with personalized diet plans recommending nutritious foods, fresh fruits, and vegetables while advising against spicy foods.

(5) Review and follow-up management: Patients were reminded to return to the hospital for dressing changes and suture removal as scheduled. Nursing staff maintained regular contact with patients through phone calls and WeChat visits. In addition, weekly telephone check-ins and monthly home visits were conducted to monitor recovery, address any issues, and provide recommendations.

Observation indicators

(1) Treatment efficacy: Cured: Complete resolution of knee pain, pressure, and dysfunction in activities. Markedly effective: Knee pain and pressure disappeared, and only mild limitations in activity remained. Improved: Decreased knee pain and pressure with mild limitations in activity. Ineffective: Persistent knee pain, pressure, and no improvement in activity dysfunction.

Overall effective rate = (Cured + Markedly effective + Improved)/Total of case number × 100%.

(2) Pain intensity: Before and after the intervention, pain intensity was rated using a Visual Analog Scale (VAS) [16], with scores ranging from 0 (no pain sensation) to 10 (the most intense pain).

(3) Negative emotions: Anxiety and depression were assessed using the Self-Rating Anxiety (SAS) and Depression Scale (SDS) before and after intervention [17]. Higher scores indicated greater levels of anxiety and depression.

(4) Knee function: Lysholm score and Lequesne index [18] were employed for knee function assessment before and after the intervention. The Lysholm score ranges from 0-100, with higher scores indicating better knee recovery. The Lequesne index ranges from 0-24, with higher scores suggesting worse knee joint recovery.

(5) Quality of life (QoL): Evaluation was performed. QoL was evaluated using the World Health Organization Quality of Life Scale (WHOQOL-100) [19] before and after intervention. The scale ranges from 0 to 100, with higher scores indicating better QoL.

Statistical analysis

The collected data were statistically analyzed using SPSS 23.0. Measurement data were presented in the form of ($\bar{x} \pm s$); independent samples t-tests were used to analyze the differences between groups, while paired t-tests were used to assess the differences before and after treatment within the same group. Counting data were expressed as rates (percentages) and compared using chi-squared tests between groups. A P value of less than 0.05 was considered as a statistical difference.

Results

Baseline data in both groups

Baseline data, such as gender, age, weight, body mass index (BMI), and lesion site were compared between the two groups, and no significant differences were observed (all $P > 0.05$, **Table 1**).

Overall treatment efficacy of SH intraarticular injections plus continuing rehabilitation nursing in OA patients

The total effective rate of treatment in the control group was 81.67%, remarkably lower than

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Table 2. Comparison of overall treatment efficacy between the two groups

Indexes	Control group (n=60)	Observation group (n=67)	χ^2/t	P
Cured	22 (36.67)	36 (53.73)		
Markedly effective	15 (25.00)	19 (28.36)		
Improved	12 (20.00)	8 (11.94)		
Ineffective	11 (18.33)	4 (5.97)		
Total efficiency	49 (81.67)	63 (94.03)	4.645	0.031

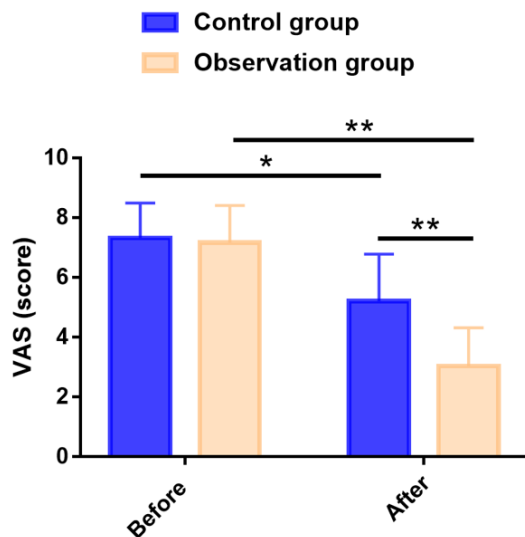


Figure 1. Effect of sodium hyaluronate intraarticular injections with continuing rehabilitative nursing on pain relief in OA patients. Note: * $P < 0.05$, ** $P < 0.01$. OA, osteoarthritis; VAS, visual analog scale. "Before" indicates before the intervention, and "After" indicates after the intervention.

the 94.03% in the observation group ($P < 0.05$, Table 2).

Effect of SH intraarticular injections plus continuing rehabilitation nursing on pain level in patients with OA

No remarkable difference was observed in pre-interventional VAS scores between the two groups ($P > 0.05$). After intervention, both groups experienced a significant reduction in VAS scores after the intervention ($P < 0.05$), with the observation group showing a more substantial decrease ($P < 0.05$), as shown in Figure 1.

Effect of SH intraarticular injections plus continuing rehabilitation nursing on negative emotions in OA patients

The two groups showed little differences in SAS and SDS scores before intervention (all

$P > 0.05$). After intervention, both groups experienced significant reductions in SAS and SDS scores (all $P < 0.05$), with the observation group showing even lower scores than the control group (all $P < 0.05$), as shown in Figure 2.

Impact of SH intraarticular injections plus continuing rehabilitation nursing on knee function in OA patients

Knee function was assessed using the Lysholm score and Lequesne index. Before intervention, no remarkable differences were found between the two groups (all $P > 0.05$). After intervention, the Lysholm increased while the Lequesne index decreased significantly in both groups (all $P < 0.05$). Moreover, the observation group demonstrated a higher Lysholm score and a lower Lequesne index compared to the control group (all $P < 0.05$), as shown in Figure 3.

Effect of SH intraarticular injections plus continuing rehabilitation nursing on the QoL of OA patients

The WHOQOL-100 scale was used to assess the quality of life of patients. Before intervention, there were no significant differences in WHOQOL-100 scores between the two groups ($P > 0.05$). After the intervention, both groups exhibited significant improvements in their WHOQOL-100 scores ($P < 0.05$), with the observation group showing a more pronounced increase ($P < 0.05$), as shown in Figure 4.

Discussion

As a prevalent chronic joint disorder in the elderly, osteoarthritis (OA) primarily manifests with progressive degeneration of articular cartilage and subchondral osteosclerosis. Factors like aging, obesity, inflammation, and trauma [5, 6] are linked to OA. Current therapies focus on alleviating pain, improving functional abilities, and enhancing patients' quality of life [7, 8]. This study included a total of 127 OA patients, with the control group receiving SH

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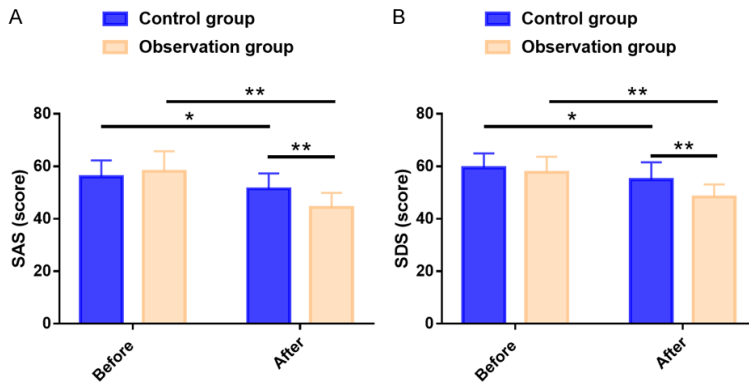


Figure 2. Effect of sodium hyaluronate intraarticular injections with continuing rehabilitation nursing on negative emotions in OA patients. A. Comparison of SAS scores between the two groups before and after the intervention. B. Comparison of SDS scores between the two groups before and after the intervention. Note: * $P<0.05$, ** $P<0.01$. OA, osteoarthritis; SAS, self-rating anxiety scale; SDS, self-rating depression scale. “Before” indicates before the intervention, and “After” indicates after the intervention.

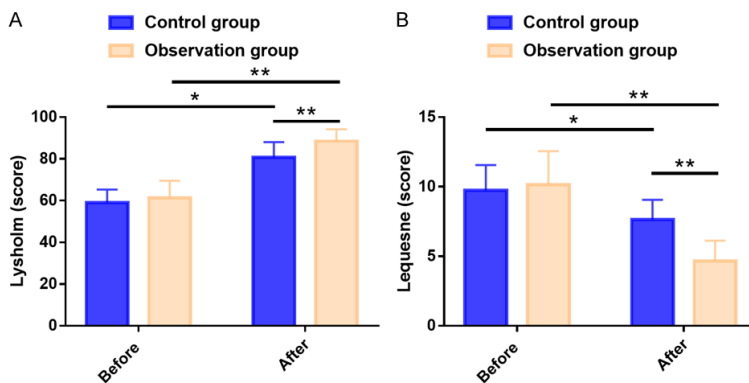


Figure 3. Effect of sodium hyaluronate intraarticular injections with continuing rehabilitation nursing on knee function in OA patients. A. Comparison of Lysholm scores between the two groups before and after the intervention. B. Comparison of Lequesne scores between the two groups before and after the intervention. Note: * $P<0.05$, ** $P<0.01$. OA, osteoarthritis. “Before” indicates before the intervention, and “After” indicates after the intervention.

intraarticular injections plus routine care and the observation group receiving SH intraarticular injections plus continuing rehabilitation nursing intervention. We comparatively analyzed the effects of the two interventions on patients’ knee function and QoL from various aspects, with the expectation of providing more high-quality intervention options for OA treatment.

In our findings, the total treatment effectiveness rate in the observation group was 94.03%, significantly higher than the control group

(81.67%), indicating that combining SH intraarticular injections and continuing rehabilitative nursing interventions in OA patients maximizes therapeutic efficacy. The comprehensive care provided to the observation group, including pre-hospital interventions, psychological support, functional exercises, life guidance, and follow-up management, not only enhanced patient motivation and cooperation, but also ensured the sustainability and effectiveness of post-hospital rehabilitation. This holistic approach also increased patient awareness of self-health management, further improving outcomes [20, 21].

Additionally, we observed a significant decrease in VAS scores in the observation group after intervention, compared to both the pre-interventional values and the control group, suggesting that the combined modality contributed to significant pain relief in OA patients. Consistently, Sun Z et al. [22] found that continuing rehabilitation nursing intervention enhanced the effects of warm needle therapy and meloxicam in reducing knee pain and swelling in OA patients.

Regarding the psychological impact, the SAS and SDS scores for anxiety and depression were significantly lower in the observation group after intervention, compared to both the pre-intervention and the control group, suggesting that the combined approach contributed to a significant reduction in negative emotions in OA patients. The psychological care included in the intervention addressed changes in patient emotions both before and after hospitalization, providing timely and effective counseling. This support helped patients build confidence in overcoming their illness and contributed to their overall psychological well-being [23, 24].

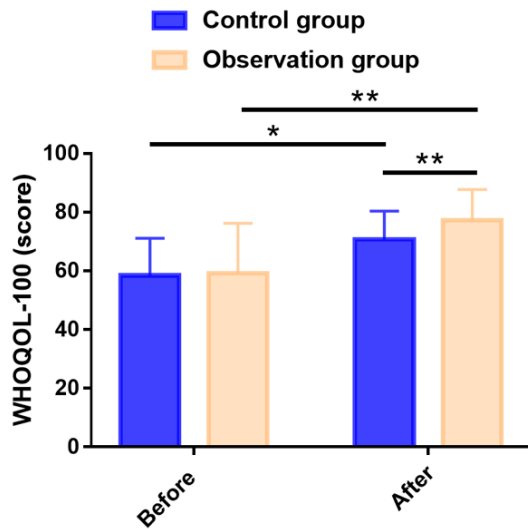


Figure 4. Effect of sodium hyaluronate intraarticular injections with continuing rehabilitation nursing on quality of life in OA patients. Note: * $P < 0.05$, ** $P < 0.01$. OA, osteoarthritis; WHOQOL-100, World Health Organization Quality of Life Scale. “Before” indicates before the intervention, and “After” indicates after the intervention.

Liu J et al. [25] claimed that continuing rehabilitation nursing intervention for patients undergoing urolithiasis surgery for double J-tube retention also achieved a remarkable alleviation in anxiety and depression, enhancing patients’ QoL and nursing satisfaction, similar to our observations.

Additionally, the observation group also showed better improvement in the Lysholm score and Lequesne index, suggesting that SH intraarticular injections plus continuing rehabilitative nursing intervention were more effective in restoring knee function in OA patients. This may be due to the individualized, progressive functional exercises provided as part of the nursing intervention, which were tailored to each patient’s specific condition and encouraged a more efficient recovery [26, 27]. Li Z et al. [28] similarly found that continuing rehabilitative nursing significantly improved knee joint function, limb mobility, and neurological outcomes in KOA patients, while increasing their awareness of the disease and reducing complications, aligning with our results.

Finally, the quality-of-life assessment revealed a more obvious increase in WHOQOL-100 scores in the observation group after interven-

tion compared to the control group, suggesting that the combined intervention was more beneficial for improving QoL than SH intraarticular injections alone. This may be attributed to pain reduction, negative emotion relief, and knee joint function improvement, all of which contributed to a smoother recovery process and better overall quality of life for OA patients [29]. The life guidance component of the rehabilitation nursing intervention also helped patients establish healthier habits in their home environment and diet, promoting active recovery and supporting long-term well-being.

This study is innovative as it confirms the outstanding clinical advantages of SH intraarticular injections with continuing rehabilitation nursing for OA patients, addressing various aspects such as curative effects, pain management, emotional well-being, knee joint function, and quality of life. This combination therapy not only markedly improves knee joint function and QoL but also has a positive impact on enhancing treatment efficacy, reducing pain, and alleviating negative emotions in OA patients.

This study still has several limitations: First, it was a single-center study, which may introduce information collection biases. Second, the lack of a long-term follow-up analysis limits our understanding of the long-term effects of SH intraarticular injections combined with continuing rehabilitation nursing on OA patients. Third, the study did not assess the factors influencing the intervention’s efficiency. Future research will focus on addressing these limitations to gain a deeper understanding of the long-term effects and intervention efficiency of SH intraarticular injections plus continuing rehabilitation nursing for OA patients.

In conclusion, SH intraarticular injections combined with continuing rehabilitation nursing offer significant clinical advantages for the treatment of OA patients. Compared with the intervention of SH intraarticular injections plus routine care, this approach maximizes the therapeutic efficacy, significantly relieves pain and negative emotions, promotes knee joint function recovery, and improves quality of life, making it worthy of clinical promotion.

Disclosure of conflict of interest

None.

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