Effect of Standardized Pain Management Combined with Clinical Teaching on the Adverse Reactions and Nursing Efficacy in Patients with Rotator Cuff Injury after Surgery

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To study the effect of standardized pain management combined with clinical teaching on the adverse reactions and nursing efficacy in patients with rotator cuff injury after surgery. 104 patients with rotator cuff injury treated in our hospital (April 2019-April 2020) were chosen as study subjects and randomly split into experimental group (n=52) and control group (n=52). After all the patients received arthroscopic revision surgery, the experimental and control group received standardized pain management combined with clinical teaching and routine pain management postoperatively, respectively. After that, the effect of different pain management modes on the adverse reactions and nursing efficacy in patients with rotator cuff injury after surgery was analyzed by comparing various indexes between two groups. No obvious differences in sex ratio, average age, mean BMI, injury severity, injury cause, education level and residence were found between two groups ($P > 0.05$); no obvious differences in numeric rating scale (NRS) scores at T1 were found between the two groups ($P > 0.05$), and the NRS scores at T2 and T3 in experimental group were obviously lower compared with control group ($P < 0.001$); no obvious differences in the angle of shoulder abduction, anterior flexion and extension were found between the two groups before intervention ($P > 0.05$), and angle of shoulder abduction, anterior flexion and extension in experimental group at 3 and 6 months after surgery was obviously greater compared with control group ($P < 0.001$); no obvious differences in the constant shoulder scores were found between the two groups before the intervention ($P > 0.05$), and the constant shoulder scores in experimental group at 3 and 6 months after surgery were obviously higher compared with control group ($P < 0.001$); the nursing satisfaction in experimental group was obviously higher compared with control group ($P < 0.05$); the clinical effective rate in experimental group was obviously higher compared with control group ($P < 0.05$); the incidence of adverse reactions in experimental group after surgery was obviously lower compared with control group ($P < 0.05$). Standardized pain management combined with clinical teaching in treating rotator cuff injury of patients can significantly reduce shoulder pain severity and improve shoulder mobility, with significant efficacy and high safety, which is worthy of application and promotion.

Keywords: standardized pain management combined with clinical teaching; rotator cuff injury; postoperative adverse reactions;

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Rotator cuff injury, a common disease of shoulder joint dysfunction, often occurs during repeated sports requiring extreme abduction of shoulder joints, such as weight lifting, freestyle swimming, etc. [1-2], and in some cases, the failure of timely treatment may lead to shoulder joint dysfunction caused by secondary arthrogryposis in patients. Epidemiology has shown [3] that rotator cuff injury, with its prevalence rate increasing with age, mostly affects the elderly population and is mainly manifested by shoulder pain, snapping sounds, activity limitation, localized swelling, etc. At present, most patients suffering from shoulder pain are treated with surgeries; however, the complex musculature of shoulders brings the disadvantages of difficult operation, long operation duration and slow recovery after surgery, and thus majority of the patients is presented with shoulder joint pain, anxiety, depression as well as other adverse reactions, with poor clinical outcomes. Additionally, analgesics are used more often in clinical practise, but the lack of scientific measures for pain management has resulted in the ineffectiveness of the treatment. Routine pain management proves that for patients' pain after surgery is acceptable, anaesthetic intervention is generally applied only during surgery, and analgesic treatment will be not implemented after surgery until patients experience intolerable pain [4-6]. Standardized pain management combined with clinical teaching, an essential part of health care services centered on regular pain assessment, personalized analgesia, and clinical health education for patients, aims at greatly relieving patients' pain [7]. Based on this, the paper studied effect of standardized pain management combined with clinical teaching on adverse reactions and nursing efficacy, and the study results are reported as below.

MATERIALS AND METHODS

General Information

104 patients with rotator cuff injury treated in our hospital (April 2019-April 2020) were chosen as the study subjects and randomly split into experimental group (n=52) and control group (n=52).

Inclusion Criteria

① Patients' imaging examination results and clinical symptoms both met the diagnostic criteria for rotator cuff injury. ② Patients received arthroscopic revision surgery. ③ Patients had no rotator cuff dysfunction before injury. ④ This study got approval of Hospital Ethics Committee, and the patients and their family members knew purpose and process of this study and signed the informed consent.

Exclusion Criteria

① Patients had the history of shoulder surgery. ② Patients had poor compliance and refused to cooperate with others. ③ Patients had organic lesions and malignant tumors in heart, liver, brain, kidneys, etc. ④ Patients had confusion of consciousness or mental and cognitive disorders.

Methods

Arthroscopic revision surgery

Before surgery, the operation tolerance and cardiopulmonary function of the patients were comprehensively assessed. After anesthesia was performed and a sterile surgical drape was put on operating table, the rotator cuff injury in patients was observed by placing an arthroscope on their postero-lateral side. Subsequently, adhesions were removed by electrotome, and after lesions were found, acromioplasty was performed, proliferative bony spurs were excised and footprint area was abraded until bone grooves appeared. In the middle of patient's footprint area, the broken side of rotator cuff was sutured by using suture anchors by means of spectrum method, and the suture from the broken side to footprint area was conducted in the way of mattress suture. After that, the incision was sutured in full thickness after hemostasis was checked, and then routine anti-infective therapy was implemented after surgery [8-9].

Pain management

In the control group, the routine pain management was performed, and the specific steps were as follows. After surgery, an abduction package was used to immobilize patients' arms in the abduction of 45° and in the anterior axillary position for 3 to 5 weeks, with ice compress for continuous 24 hours daily [10]. Additionally, an intravenous patient-controlled analgesia pump was also adopted for the treatment for 48 hours after surgery, and meanwhile the patients should take 60 mg of loxoprofen sodium (State Food and Drug Administration approval number: H20030769; Manufacturer: Daiichi-Sankyo Pharmaceutical Co., Ltd.; Specification: 60mg*20 tablets) orally, twice a day, for 5 days.

In the experimental group, the standardized pain management combined with clinical teaching was adopted. ① Pain education. Medical staff should explain and introduce the knowledge related to rotator cuff injury for the patients and their family members, so as to make them fully understand the nosogenesis of shoulder pain and correct their wrong perception, and inform them of drug effect and specific usage. ② Pain assessment.

Patients' pain was assessed at regular time every day, and the medical staff should record patients' pain sites, severity and time in detail. ③ Implementation of analgesic treatment. The patients took 60 mg of loxoprofen sodiu orally at 2 days before surgery, twice a day, until 7 days after surgery. Besides, postoperatively, the patients were given periarticular injection with 150 mg of ropivacaine (State Food and Drug Administration approval number: H20113463; Manufacturer: Hebei Yipin Pharmaceutical Co., Ltd.; Specification: 10ml:75mg), 0.3 mg of epinephrine (State Food and Drug Administration approval number: H11020584 manufacturer: Beijing Yookon Pharmaceutical Co., Ltd.; Specification: 1ml:1mg), 10 mg of morphine (State Food and Drug Administration approval number: H21021995; Manufacturer: Northeast Pharmaceutical Group Shenyang first pharmaceutical Co., Ltd.; Specification: 0.5ml:5mg), 5 mg of dexamethasone (State Food and Drug Administration approval number: H44024469; Manufacturer: Guangdong Huanan Pharmaceutical Group Co., Ltd.; Specification: 0.75mg*100s) as well as normal saline solution. After surgery, the patients were treated with the intramuscular injection with 40 mg of parecoxib (State Food and Drug Administration approval number: J20130044; Manufacturer: Pfizer Pharmaceutical Co., Ltd.; Specification: 40mg/bottle, 1 bottle/box) twice a day, for consecutive 3 days;the intravenous patient-controlled analgesia pump was adopted for the treatment for 48 hours, with ice compress for continuous 24 hours daily. Moreover, all the patients in both groups underwent out-patient follow-up at 3 and 6 months after surgery.

Evaluation Indexes

The pain severity at different time points was evaluated by NRS [11]. Three time points, before treatment, 3 months after surgery, and 6 months after surgery, were set as T1, T2 and T3, respectively, and with the total score of 10 points, higher scores indicated severer pain in patients.

The angle of shoulder abduction, anterior flexion and extension of the patients before intervention, at 3 and 6 months after surgery were measured in the two groups.

The recovery of shoulder joint function in both groups was evaluated by the constant shoulder score [12], which consisted of 4 items, with the total score of 100 points, and higher scores indicated better shoulder joint function.

Clinical nursing satisfaction in the two groups was evaluated by the Clinical Nursing Satisfaction Questionnaire made by our department, with the total score of 100 points, in which the score of more than or equal to 85 represented the very satisfied, 65-84 points the satisfied and less than or equal to 64 the unsatisfied, total satisfaction = very satisfied % + satisfied %.

Evaluation of efficacy. ① Recovery referred to that the shoulder pain completely disappeared in patients after the intervention, with the muscle strength of grade V, and the shoulder range of motion returned to the normal standard. ② Markedly effective referred to that the shoulder pain basically disappeared, with the muscle strength of grades IV-V, and the shoulder range of motion showed significant improvement. ③ Effective referred to that the shoulder pain reduced, with the muscle strength of grade IV, and shoulder range of motion improved. ④ Ineffective referred to exacerbation of shoulder pain, muscle strength and shoulder range of motion. Total effective rate = recovery % + markedly effective % + effective %.

The incidence of adverse reactions was compared.

Statistical Methods

All the data were processed for statistical analysis by SPSS21.0 software, and GraphPad Prism 7 (GraphPad Software, San Diego, USA) was used to draw the pictures of the data. Measurement data were expressed by ($\bar{x}\pm s$) and tested by t-test. Enumeration data were expressed as [n (%)] and tested by X2 test. The differences had statistical significance when $P < 0.05$.

RESULTS

Comparison of Clinical Information

No obvious differences in sex ratio, average age, mean BMI, injury severity, injury cause, education level and residence were found between the two groups ($P > 0.05$), with comparability (Table 1).

Table 1 Comparison of clinical information

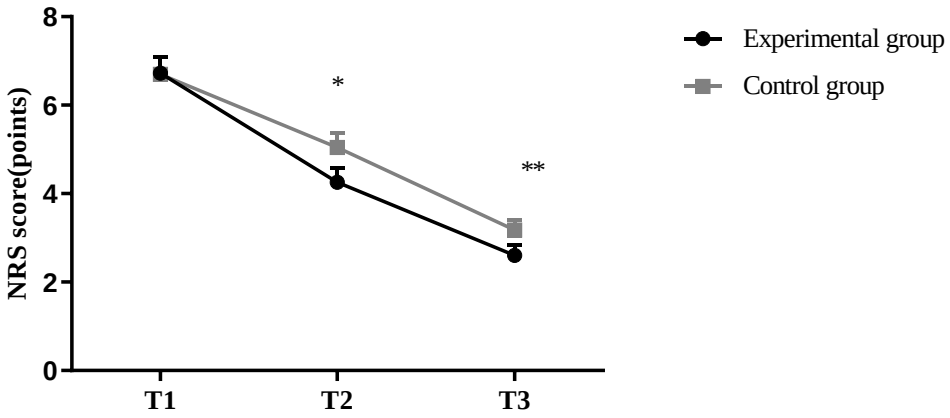
Types	Experimental group (n=52)	Control group (n=52)	χ^2/t	P
Gender			0.039	0.844
Male	28 (53.85%)	29 (55.77%)		
Female	24 (46.15%)	23 (44.23%)		
Average age (years old)	52.34±4.52	52.38±4.56	0.045	0.964
Mean BMI (kg/m^2)	21.32±2.35	21.35±2.38	0.065	0.949

Injury severity			0.166	0.684
Partial injury	32 (61.54%)	34 (65.38%)		
Small and medium-sized injury	20 (38.46%)	18 (34.62%)		
Injury cause				
Traffic injury	17 (32.69%)	19 (36.54%)	0.170	0.680
Pricking injury	12 (23.08%)	11 (21.15%)	0.056	0.813
Sports injury	23 (44.23%)	22 (42.31%)	0.039	0.843
Education level				
Undergraduate level	13 (25.00%)	12 (23.08%)	0.053	0.819
Secondary education	28 (53.85%)	30 (57.69%)	0.156	0.693
Primary education	11 (21.15%)	10 (19.23%)	0.060	0.807
Place of residence			0.158	0.691
Urban area	23 (44.23%)	21 (40.38%)		
Rural area	29 (55.77%)	31 (59.62%)		

Comparison of Nrs Scores at Different Time Points

No obvious differences in NRS scores at T1 were found between two groups (P > 0.05), and the NRS scores in experimental group at T2 and T3 were obviously lower compared with control group (P < 0.05), as shown in Figure 1.

Figure 1 Comparison of NRS scores at different time points (x̄±s)



Note: The abscissa represented T1, T2 and T3, while the ordinate represented NRS score, points.

The NRS scores at the T1, T2 and T3 in the experimental group were (6.46 ± 0.52) points, (4.03 ± 0.46) points and (2.43 ± 0.34) points, respectively.

The NRS scores at the T1, T2 and T3 in the control group were (6.43 ± 0.54) points, (4.82 ± 0.45) points and (3.02 ± 0.31) points, respectively.

* indicated an obvious difference in NRS scores at T2 between two groups (t = 8.853, P = 0.000).

** indicated an obvious difference in NRS scores at T3 between two groups (t = 9.247, P = 0.000).

Comparison of the Shoulder Range of Motion at Different Time Points

No significant differences in angle of shoulder abduction, anterior flexion and extension were found between two groups before the intervention (P > 0.05), and angle of shoulder abduction, anterior flexion and extension in the experimental group at 3 and 6 months after surgery was obviously greater compared with control group (P < 0.05), as detailed in **Table 2**.

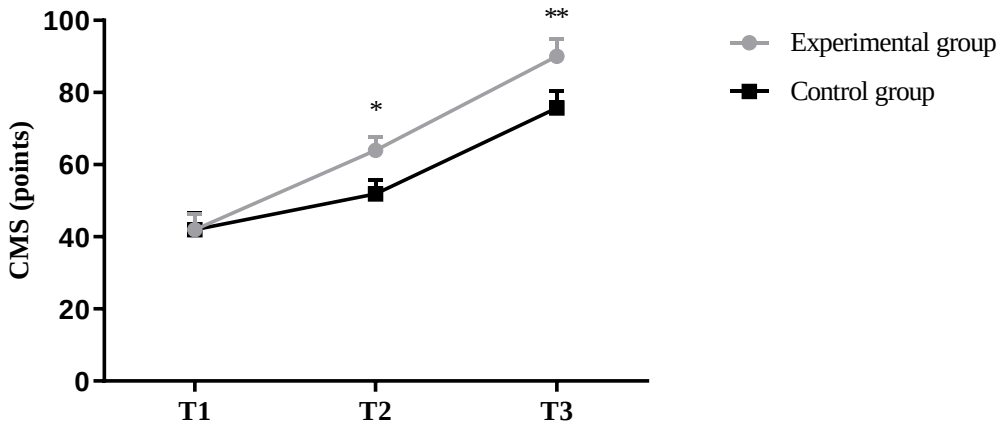
Table 2 Comparison of shoulder range of motion at different time points (x̄±s)

Group	n	Shoulder abduction			Shoulder anterior flexion			Shoulder extension		
		Before intervention	3 months after surgery	6 months after surgery	Before intervention	3 months after surgery	6 months after surgery	Before intervention	3 months after surgery	6 months after surgery
Experimental group	52	37.32±4.35	67.21±6.38	127.32±9.25	40.23±7.29	77.62±6.43	142.41±11.25	11.32±1.89	18.35±2.18	32.75±3.12
Control group	52	37.36±4.38	56.81±6.34	104.52±8.36	40.27±7.26	65.31±6.57	114.25±10.35	11.25±1.85	15.21±2.11	26.42±3.17
t		0.047	8.338	13.187	0.028	9.656	13.284	0.191	7.463	10.263
P		0.963	0.000	0.000	0.978	0.000	0.000	0.849	0.000	0.000

Comparison of Constant Shoulder Score at Different Time Points

No obvious differences in the constant shoulder scores were found between two groups before the intervention (P > 0.05), and constant shoulder scores in experimental group at 3 and 6 months after surgery were obviously higher compared with control group (P < 0.05), as shown in Figure 2.

Figure 2 Comparison of constant shoulder score at different time points (x̄±s)



Note: The abscissa represented T1, T2 and T3, while the ordinate represented constant shoulder score, points.

The constant shoulder scores at T1, T2, and T3 in the experimental group were (38.75 ± 6.34) points, (61.32 ± 5.34) points and (86.74 ± 6.57) points, respectively.

The constant shoulder scores at T1, T2, and T3 in the control group were (38.78 ± 6.38) points, (49.17 ± 5.46) points and (72.35 ± 6.69) points, respectively.

* indicated an obvious difference in constant shoulder scores at T2 between two groups (t = 11.472, P = 0.000).

** indicated an obvious difference in constant shoulder scores at T3 between two groups (t = 11.067, P = 0.000).

Comparison of Nursing Satisfaction

The nursing satisfaction in experimental group was obviously higher compared with control group (P < 0.05), as shown in **Table 3.**

Table 3 Comparison of nursing satisfaction [n (%)]

Group	n	Very satisfied	Satisfied	Unsatisfied	Total satisfaction
Experimental group	52	25 (48.08)	25 (48.08)	2 (3.85)	96.15% (50/52)
Control group	52	20 (38.46)	22 (42.31)	10 (19.23)	80.77% (42/52)
X^2					6.029
P					0.014

Comparison of Clinical Efficacy

The overall effective rate in experimental group was obviously higher compared with control group ($P < 0.05$), as shown in Table 4.

Table 4 Comparison of clinical efficacy [n (%)]

Group	n	Recovery	Markedly effective	Effective	Ineffective	Total effective rate
Experimental group	52	11 (21.15)	16 (30.77)	22 (42.31)	3 (5.77)	94.23% (49/52)
Control group	52	4 (7.69)	15 (28.85)	23 (44.23)	10 (19.23)	80.77% (42/52)
X^2						4.308
P						0.038

Comparison of Incidence of Adverse Reactions

The overall incidence of adverse reactions in experimental group was obviously lower compared with control group ($P < 0.05$), as shown in Table 5.

Table 5 Comparison of incidence of adverse reactions [n (%)]

Group	n	**Laceration of rotator cuff again**	Reactive joint effusion	Neurovascular injury	Total incidence
Experimental group	52	1 (1.92)	1 (1.92)	1 (1.92)	5.77% (3/52)
Control group	52	3 (5.77)	3 (5.77)	4 (7.69)	19.23% (10/52)
X^2					4.308
P					0.038

DISCUSSION

Due to the special anatomical structure of shoulder joints, with weak joint capsules and loose surrounding tissues, rotator cuff injury can easily occur under excessive load or external force [13-14]. Arthroscopic revision surgery improves the shoulder function of the patients suffering from rotator cuff injury, but the disadvantages, such as long postoperative rehabilitation time and great shoulder pain are not conducive to patients' postoperative recovery. Additionally, this surgery is more demanding for the postoperative rehabilitation, and early activity of rotator cuff will exacerbate pain, adversely affecting the rehabilitation training effect to a certain extent; therefore, the implementation of efficient pain management can beneficially reduce postoperative shoulder pain and promote the rehabilitation of shoulder function [15]. At present, most patients are treated with clinical analgesia by using anaesthetic drugs postoperatively, but some patients have adverse reactions such as insomnia and respiratory depression under the effect of drugs, and their risks of suffering from infection, nerve injury and so on will also increase, posing a great threat to patients' physical health [16-17]. Relevant studies have confirmed that pain is a physiological and

psychological reaction of the body to the damage and repair of tissues, and for the patients with rotator cuff injury, the pains are mainly caused by disease and surgery, and the failure of timely treatment of the pains will negatively affect recovery and reduce the life quality [18-20].

The standardized pain management combined with clinical teaching is a patient-centered and personalized intervention method by comprehensively evaluating the pain conditions of patients, which is beneficial for promoting postoperative recovery. In this method, health care workers help the patients to establish the correct perception of their disease and pain through health education, so as to eliminate the adverse effect of pain on patients' physical health and psychology and increase the enthusiasm and initiative of self-healing [21-22]. In this study, standardized pain management combined with clinical teaching was carried out postoperatively in patients with rotator cuff injury, which greatly relieved their postoperative shoulder pain by using mixed analgesic modalities such as preoperative oral administration of loxoprofen sodium and intraoperative intra-articular injection with anesthetic drugs. Our results showed that the NRS scores in both groups gradually decreased with time after surgery, and NRS scores in experimental group at T2 and T3 were obviously lower compared with control group ($P < 0.001$), presuming that arthroscopic revision surgery can facilitate recovery of shoulder function and greatly relieve pain in patients. However, the routine pain management has not fully grasped the information of patients' pain duration, severity and so on, and thus the situation of one size fits all in the process of using analgesic drugs results in the poor analgesic effect. Lopiz et al [23] have pointed out in their study that after standardized pain management combined with clinical teaching in patients undergoing thoracic surgery, the VAS scores of patients at the 1d, 3d and 5d after surgery are (8.05 ± 1.13) points, (6.14 ± 1.12) points and (4.02 ± 1.16) points, respectively, which are all significantly lower than those of (8.62 ± 1.21) points, (7.21 ± 1.24) points and (5.23 ± 1.18) points in the routine management group, demonstrating that pain management can greatly relieve patients' pain and promote the recovery of shoulder function.[24]

In conclusion, standardized pain management combined with clinical teaching for patients with rotator cuff injury can significantly relieve postoperative pain, promote the recovery of shoulder function and improve range of motion of shoulder joints, with significant efficacy and high safety, worthy of application and promotion.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, author- ship, and/or publication of this article.

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