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Therapeutic Effect of Single-row Technique and No-compression Sputum in the Treatment of Post Small and Medium Rotator Cuff Injury under Shoulder Arthroscopy

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Abstract: ***Objective.*** To investigate the clinical effect of single-row fixation and non-conjunction compression in the treatment of post small and medium rotator cuff injuries under arthroscopy. ***Methods.*** Forty-five patients admitted to our department from June 2018 to May 2019 were enrolled in the study. 32 patients in the single-row fixed-group and 13 patients in the non-conjunctival group were randomly assigned. The VAS, ASES, and UCLA scores of the two groups were compared before surgery, one month, three months, and six months after surgery[1]. ***Results.*** The VAS, ASES, and UCLA scores were significantly higher in those two groups other than the preoperative group. The scores of the two groups were gradually improved from one month, three months, and six months respectively after surgery. At one month, the scores of those two groups were statistically significant (P<0.05), but there was no significant difference between the two groups at three months and six months (P>0.05). ***Conclusion.*** Under arthroscopy, the single-row fixation technique and the non-conjunction compression method were used to treat post small and medium rotator cuff injuries. The effect is very significant. In particular, the no-knot sputum method has a significant improvement in restoring postoperative pain, joint activity and joint strength.

Keywords: Rotator cuff injury, Post classification, Shoulder arthroscopy, Single row method.

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1 Introduction

The rotator cuff injury is a common type of shoulder joint disease[2]. The rotator cuff tissue is a tendinous tissue attached to the large nodules of the humerus and the small nodules of the humerus. The proximal humerus is wrapped in a cuff, the tendon is mainly divided into the supraspinatus, the infraspinatus, the subscapularis and teres minor. The tendon of the muscle stabilizes the shoulder joint structure and drives the shoulder movement. According to statistics: 36% of the people have different degrees of rotator cuff injury, which is divided into 5% of the full thickness of the rotator cuff, 20% of the damage, and the proportion of full-layer damage and partial damage of people over 60 years old is 28% and 26%. The proportion of full-thickness and partial injury in patients between 40 and 60 years old was 4% and 24%, and the proportion of rotator cuff injuries under 40 years old was 4%[3]. According to the literature, patients with rotator cuff injury are mainly middle-aged and elderly people, which is a degenerative disease with age as the main factor. However, arthroscopic technique is mainly used among patients for the treatment of rotator cuff tears. In the past, traditional arthroscopy treatment of shoulder joints was mainly based on single-row fixation, double-row fixation, and treatment of small and medium-sized rotator cuff injuries. The stitching of the rotator cuff in the single row technique forms a contact point with the bone surface of the footprint area, but eventually the rotator cuff cannot fully cover the footprint area.

For this problem, the double-row technology can obviously reach the full coverage of the footprint area. The disadvantage is that the excessive use of the anchor nails in the footprint area will reduce the area of the bone healing area, and the formation of knots can easily cause discomfort in the rotator cuff area, leading to additional surgery fee[4]. In response to such kind of problems, our department circumvented the above shortcomings, using the knotless compression method to suture small and medium-sized injuries of the rotator cuff. Using the traditional single-row fixation method and the non-conjunction compression method under arthroscopy to treat patients with small and medium-sized lesions. In order to summarize the main points, the research on the clinical efficacy of the no-compression sputum method was carried out.

2 Research data and methods

2.1 General information

In this study, 45 patients with rotator cuff injury treated in our joint movement ward from June 2018 to May 2019 and were enrolled in this study, combined with MRI imaging findings. Inclusion criteria: (1) Patients with rotator cuff injury were diagnosed by MRI and other imaging findings and clinical diagnosis. (2) Through the arthroscopic examination of the damaged pathological tissue during the operation, and the probe was determined to be consistent with post medium and small rotator cuff injuries, the tears were less than or equal to 3 cm. Exclusion criteria: (1) The degree of tear is relatively large or partial, and the rotator cuff can not be sutured. (2) The results of arthroscopy before surgery by MRI and surgery are SLAP and Bankart[5]. (3) Frozen shoulder patients. Thirty two patients were enrolled in the early stage and the single-row fixed suture method was used in the single-row method group. Thirteen patients were enrolled in the later stage and the patients were treated with no knot method.

2.2 Surgical methods

The arthroscopic diagnosis of general anesthesia and rotator cuff injury usually adopts a semi-sitting position (beach chair position), and the rear approach is made by the entrance of the posterior lateral apex of the shoulder to the apex of 2~3cm between the infraorbital muscle and the small round muscle. The joint synovium was removed and the degree of damage to the joint capsule, the biceps femoris head and the rotator cuff was examined. The anterior cuff is used for the anterior cuff and the anterior approach. Bone tissue hemorrhage occurred at the site of the supraspinatus muscle at the large nodule of the humerus with a planer and a grinding drill. After the surface layer was freshened, the sacral tendon was clamped and damaged by a forceps. The single-row method first determines the number of anchors according to the size of the posterior, and then enters the exact position. The suture spacing is about 1cm. The knotless compression method is sutured at the junction of the iliac crest about 1-1.5 cm from the edge of the tear. Then pass the high-strength line through the inside of the tendon stump. At about 1 cm, the suture was passed through the muscle hole at the other end, the two tails were passed through the anchor tensioned and pressed, and the anchor was fixed. Outside of the broken end suture were tightened, determined the satisfaction of the footprint area by mirroring and open it at the exact position[6].

2.3 Postoperative rehabilitation and evaluation indicators

Comparison between the two groups of patients, they all exercised passively the day after surgery wearing an abduction foam brace to protect against re-injury[7]. Active exercise after 6 weeks, and exercise after 3 months according to their own situation. The shoulder joint can move normally after 6 months.

Evaluation indicators: (1) VAS score. (2) ASES score. (3) UCLA score.

2.4 Statistical methods

According to the SPSS21.0 software analysis, the normal distribution of the measurement data using the group t test method, the count data using the chi-square test method, the non-normal distribution data using the Wilcoxon rank sum test method, set $P<0.05$ there is a significant difference.

3 Results

3.1 Comparison of postoperative improvement compared with preoperative correction in patients with single row group

The preoperative VAS scores of the single-row group were compared with the VAS scores of the single-row group after one month of surgery. The difference of $P<0.05$ was statistically significant, indicating that the pain in the single-row group after one month of surgery was lower than that of before surgery (see Table 1).

The preoperative ASES scores of the single-row

group were compared with the ASES scores of the single-row group after one month of surgery. The difference of $P<0.05$ was statistically significant, indicating that the postoperative pain, stability and functional level of patients in the single-row group were lower than those before surgery (see Table 2).

The preoperative UCLA scores of the single-row group were compared with the ASES scores of the single-row group after one month of surgery. The difference of $P<0.05$ was statistically significant, indicating that the postoperative pain, function, activity, and satisfaction of the single-row group were higher. Which indicates their improvement before surgery(see Table 3).

At the same time, two reasons for patients with failed catheterization were analyzed. One is categorized as gastroptosis while another one is intubation into the lung.

3.2 Comparison of improvement among a month, three months and six months after surgery among single-row group

According to Table 1, patients in the single-row group were compared among a month, three months and six months after surgery. It was found that the VAS score of the group was higher with the patient's postoperative recovery time. The lower the difference, the $P<0.05$ difference was statistically significant.

According to Table 2, patients in the single-row group were compared among a month, three months and six months after surgery. It was found that the ASES score of the group was painful and stable with the recovery time of the patient. The improvement in functional level was also significant, and the difference of $P<0.05$ was statistically significant.

According to Table 3, patients in the single-row group were compared among a month, three months and six months after surgery. It was found that the UCLA score of the group was painful and functional with the recovery time of the patient. Activity strength and satisfaction were improved, and the difference was significant. $P<0.05$ was statistically significant.

3.3 Comparison of postoperative improvement compared with preoperative group

The VAS score before surgery in the no-claw group was significantly higher than that in the non-conjunctival group compared with the VAS score at 1 month. This indicates that patients in the no-residue group had significantly improved postoperative pain levels compared with preoperative (see Table 1).

The preoperative ASES scores in the no-claw group were significantly higher than those in the no-resident group at 1 month after surgery. The difference of $P<0.05$ was statistically significant. This indicates that the postoperative pain, stability and functional level of the patients without complication have improved compared with preoperative, and achieved good results (see Table 2).

The preoperative UCLA score was significantly higher than that of the non-conjunctival group at 1 month after surgery, $P<0.05$. This indicates that the postoperative pain, function, activity strength and satisfaction of the patients without the knot were significantly improved compared with preoperative (see Table 3).

3.4 Comparison of improvement in a month, three months and six months after surgery

According to Table 1, patients in the no-residue group were compared among a month, three months and six months after surgery. It was found that the VAS score of the group was higher with the patient's postoperative recovery time. The lower the difference, the $P<0.05$ difference was statistically significant.

According to Table 2, patients in the no-conjunctival group were compared among a month, three months and six months after surgery. It was found that the ASES score of the group was painful and stable with the recovery time of the patient. The improvement in functional level was also significant, and the difference of $P<0.05$ was statistically significant.

According to Table 3, patients with no-conjunctival group were compared among a month, three months and six months after surgery. It was found that the UCLA score of the group was painful and functional with the recovery time of the patient. Activity strength and satisfaction were improved, and the difference was significant. $P<0.05$ was statistically significant.

3.5 Two groups of patients were compared after a month of surgery

As we could see from Table 1, the VAS score of the single-row group after a month of surgery was statistically significant compared with the no-claw group, indicating that the pain levels of the two groups were significantly different after a month of surgery.

As we could see from Table 2, the ASES score of the single-row group after a month of surgery was statistically significant compared with the no-residue

group, indicating that the pain, stability, and function of the two groups after a month of surgery. The level difference was significant.

As we could see from Table 3, the UCLA score of the single-row group after a month of surgery was statistically significant compared with the no-residue group, indicating that the pain, function, and activity of the two groups after a month of surgery. The difference between strength and patient satisfaction was significant.

3.6 Comparison of three months and six months after operation in both groups

As we could see from Table 1, the VAS score of the single-row group was not statistically significant compared with the no-residue group, indicating that there were no significant difference in pain between the two groups at three and six months after surgery.

As we could see from Table 2, the single-row ASES score was not statistically significant compared with the no-claw group, indicating that the pain of the two groups were stable at three and six months, and there was no significant difference from the functional level.

As we could see from Table 3, the single-row ASES score was not statistically significant compared with the no-residue group, indicating that the pain, function, activity, and satisfaction of the two groups of patients at 3 and 6 months after surgery. There is no significant difference in the level of the degree.

Table 1. Preoperative and postoperative VAS Scores

Grouping	Before surgery	A month after surgery	Three months after surgery	Six months after surgery
Single row method	6.46±0.91	3.51±0.83	2.61±0.42	1.78±0.40
No knot method	6.58±0.71	2.86±0.20	2.44±0.56	1.80±0.17
P value	＞0.05	＜0.05	＞0.05	＞0.05

Table 2. ASES score before and after surgery

Grouping	Before surgery	A month after surgery	Three months after surgery	Six months after surgery
Single row method	44.41±2.52	66.53±2.27	81.32±2.51	88.89±2.90
No knot method	44.66±2.31	74.09±2.09	81.57±3.54	88.43±2.86
P value	＞0.05	＜0.05	＞0.05	＞0.05

Table 3. Preoperative and postoperative UCLA Scores

Grouping	Before surgery	A month after surgery	Three months after surgery	Six months after surgery
Single row method	8.74±1.67	15.47±2.16	25.16±2.38	32.60±2.56
No knot method	8.43±1.43	19.41±1.63	25.18±2.20	32.16±1.81
P value	＞0.05	＜0.05	＞0.05	＞0.05

4 Discussion

The results showed that: (1) The VAS, ASES, and UCLA scores of the two groups were significantly improved compared with those before surgery; (2) According to the follow-up data, the scores of the two groups were also improved after the recovery time. The improvement was followed, in which the difference was significant at 1 month after operation, $P<0.05$ was statistically significant; (3) there was no significant difference in the scores at 3 months and 6 months after operation ($P>0.05$).). In summary, the two procedures described in the article can get better therapeutic effects. As the recovery time progresses, the patient's pain relief gets improved, and the patient's activity and strength will gradually increase.

Patients in the no-residue group had better scores than the single-row group after a month of surgery. The reason is that the single-row method needs to form a knot at the upper iliac crest of the humerus, because the knot is too large, causing friction on the joint surface, causing discomfort. In addition, the anchor point needs to be inserted into the anchor, and the healing surface of the tibia is reduced. At the same time, the single-row rotator cuff tear is in contact with the surface of the footprint area, and the rotator cuff and bone attachment point is only 70% fixed. The rotator cuff tendon cannot cover the foot print area, thus affecting the anatomical healing degree and preventing the joint. The liquid invades the healing area of the tibia in no knot method.

Patients in the no-residue group had better scores than the single-row group at 1 month after surgery. The

reason is that the single-row method needs to form a knot at the upper iliac crest of the humerus, because the knot is too large, causing friction on the joint surface, causing discomfort. In addition, the anchor point needs to be inserted into the anchor, and the healing surface of the tibia is reduced. At the same time, the single-row rotator cuff tear is in contact with the surface of the footprint area, and the rotator cuff and bone attachment point is only 70% fixed. The rotator cuff tendon cannot cover the foot print area, thus affecting the anatomical healing degree and preventing the joint. The liquid invades the healing area of the tibia. However, the knotless method uses the tail line to pressurize the rotator cuff, so it is considered to be an ideal method compared with the single row method, which can reduce the gap in the healing zone and avoid the penetration of the joint fluid. In this way, the scores in the early stage of rehabilitation are better than those in the single row. Mainly because of the traditional single-row suturing and tying technique difficulties, and the unskillful technique of shoulder arthroscopy, which increases the time and difficulty of surgery. On the contrary, the surgery without knots is simple and easy to operate, which reduces the cost of medical treatment and the patient's satisfaction is naturally improved.

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