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Research Article

SPSS Analysis of Pain Factors in Rotator Cuff Repair

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In this study, the matched case-control study was used. Nineteen cases of severe pain in the early postoperative period among 55 patients were set as the observation group, and 57 cases of simultaneous rotator cuff repair without severe pain were matched in a 1 : 3 ratio as the control group. Patients' general information, disease characteristics, anesthesia and analgesia scheme, and operation information were collected. Frequency statistics, Wilcoxon signed rank sum test, regulatory effect analysis, and Poisson regression analysis were performed on these data. Some findings are included in the analysis. (1) There was a markable difference of 0.01 between the preoperative 48 h maximum pain value and the postoperative 48 h maximum pain value in the observation group. (2) There was a markable difference of 0.01 between the size and shape of the wound tear and the maximum pain value at 48 h after operation in the observation group. (3) When the number of opioid use affected the maximum pain value at 48 h after operation, the regulatory variables (type, quantity, and number of days of postoperative analgesics) were at different levels, and the impact amplitude had markable differences. (4) Age has a markable negative impact on the postoperative hospital stay. (5) The operation duration has a markable positive relationship with the postoperative hospital stay. (6) The analgesic pump had a markable positive impact on the postoperative hospital stay. (7) The location of injury did not affect the postoperative hospital stay.

1. Introduction

Rotator cuff suture reduces the postoperative adhesion of the shoulder joint in wound treatment and can restore the shoulder joint function of patients to the maximum degree [1, 2]. Compared with the previous incision treatment, the rotator cuff suture has the advantages of less trauma [3], smaller incision, and more beautiful appearance after operation [4, 5].

SPSS is very useful in data analysis [6]. The pain problem before and after surgery has been widely discussed by scholars, and mathematical analysis is gradually used more frequently [7–9]. Many studies have discussed rotator cuff sutures with the method of mathematical analysis [10–12]. There are many other studies that have been conducted prospectively in patients with rotator cuff sutures [13, 14]. Derwin and Sahoo [15] studied factors such as the number of suture anchors used in rotator cuff repair and pain. Some researchers have described the magnitude of pain after rotator cuff suture [16]. Pain-related studies in rotator cuff sutures also include predictions of surgical outcomes and discussion of the size and shape of a patient's wound [17, 18].

The above observations indicate that the pain factors in patients undergoing rotator cuff repair deserve further analysis. In this work, we analyzed preoperative and postoperative pain in 55 patients to observe disease characteristics, anesthesia and analgesia regimens, operative information, and so on. SPSS software was used for frequency statistics, Wilcoxon signed rank sum test, adjustment effect analysis, and Poisson regression analysis. This work can further discuss the situation of pain factors in rotator cuff sutures.

2. Objective and Methods

The statistic analysis of the frequency for 55 patients is given in Table 1.

Table 1 provides the results of the frequency analysis for 55 patients. The original information is shown in Supplementary Materials. SPSS was used to analyze the results. As can be seen from the above table, on the distribution of the affected side in the observation group, most of the samples were "right shoulder," and the proportion was 76.92%. The proportion of "women" in the observation group was 53.85% and that of the male sample was 46.15%. The proportion of "right shoulder" in the control group was 64.29%. There was also left shoulder in 35.71% of samples. The highest proportion of females in the control group was 69.05%. 30.95% of the samples were male.

3. Results and Discussion

The paired sample Wilcoxon analysis results are given in Table 2.

It can be seen from Table 2 that the Wilcoxon signed rank-sum test is used to study the differences of experimental data. Among the two paired datasets, one actually presented a difference ($p < 0.05$). The specific analysis shows that there is a markable difference of 0.01 level between the presurgery and postsurgery 48 h maximum pain values in the observation group ($p < 0.01$), and the specific comparison difference shows that the presurgery median value (3.000) in the observation group is markablely lower than the median value of postsurgery 48 h maximum pain value (8.000). Therefore, the observation group data were true and valid. Next, the observation group data were analyzed.

It can be seen from Table 3 that the Wilcoxon signed rank-sum test is used to study the differences of experimental data. The paired data of the two groups showed differences ($p < 0.05$). The specific analysis showed that there was a markable difference of 0.01 between the wound tear size and the maximum pain 48 h after surgery in the observation group ($p = 0.003 < 0.01$). By specific comparison, the median tear size (1.500) was markablely lower than the median maximum pain 48 h after surgery (8.000).

There was a markable difference at the 0.01 level between wound tear shape and wound retraction ($p = 0.009 < 0.01$), and the median tear shape (2.000) was markablely higher than the median retraction.

A total of 2 sets of paired data will all present differences.

As given in Table 4, some information of patients is missing the variables to be investigated in this analysis, so $n = 13$. The regulatory effects were divided into three models, with the independent variable (opioid use times) included in model 1. Model 2 included regulatory variables (type, quantity, and number of days of postoperative analgesics) on the basis of model 1, and model 3 included interactive terms (the product term of independent variables and regulatory variables) on the basis of model 2.

Model 1 was used for studying the effect of independent variable (opioid use times) on dependent variable (maximum pain 48 h after surgery) without considering the interference of regulatory variables (type, quantity, and number of days of postoperative analgesic). As given in the above table, the independent variable (number of opioid use) showed markable ($t = 0.696$, $p = 0.501 > 0.05$). This means that, regardless of the effects of regulatory variables (type, quantity, and number of days of postoperative analgesics), the number of opioid use did not have a markable impact on the maximum pain value at 48 h after surgery, which should still be investigated for further regulatory effects.

The adjustment effect can be viewed in two ways. The first way is to view the significance of F value change from model 2 to model 3. The second way is to check the significance of the interaction items in model 3. The regulation effect is analyzed in the second way this time.

As given in the above table, the interaction between the number of opioid use and the type, quantity, and number of days of postoperative analgesics was statistically markable ($t = -2.874$, $p = 0.018 < 0.05$). It meant that when the number of opioid use affected the maximum pain value at 48 h after operation, the magnitude of impact was markablely different when the regulatory variables (type, quantity, and number of days of postoperative analgesic drugs) were at different levels.

As given in Table 5, age, operation duration, analgesic pump, and injury site in the observation group were regarded as independent variables, while the postoperative hospital stay was regarded as dependent variable for Poisson regression analysis. Only 10 cases met the requirements when the data of age, operation time, analgesic pump, and injury site of the observation group were available. Therefore, only these ten cases were analyzed. The model pseudo-R formula (McFadden R formula) was 0.487, which meant that age, operation duration, analgesic pump, and injury site could explain 48.7% of the change in the postoperative hospital stay. It can be seen from the above table that the model formula was $\log(u) = 5.979 - 0.122^{*}$ age $+ 0.015^{*}$ operation duration $+ 1.513^{*}$ analgesic pump -0.045^{*} injury site (where U represents the expected mean).

The regression coefficient value of age was −0.122 and showed a markable value at 0.01 level ($Z = -5.394$, $p < 0.01$), which meant that age had a markable negative impact on the postoperative hospital stay. An OR of 0.885 meant a 0.885-fold change in postoperative hospital stay as age increased by one unit.

The regression coefficient value of the operation duration was 0.015, and the significance was shown at 0.05 level ($z = 2.260$, $p = 0.024 < 0.05$), indicating that the operation duration had a markable positive impact on the postoperative hospital stay. An OR of 1.015 indicated a 1.015-fold increase in postoperative hospital stay with a unit increase in procedure duration.

Table 1: Statistic analysis of the frequency for 55 patients.

Name	Option	Frequency	Percentage (%)
Affected side of the observation group ($n = 13$)	Right shoulder	10	76.92
	Left shoulder	3	23.08
Gender ($n = 13$)	Woman	7	53.85
	Man	6	46.15
Affected side of the control group ($n = 42$)	Right shoulder	27	64.29
	Left shoulder	15	35.71
Gender ($n = 42$)	Woman	29	69.05
	Man	13	30.95
Add up to			100.0

Table 2: Paired sample Wilcoxon analysis results.

Name	Paired (median)		Difference (pair 1-pair 2)	Statistical value, z	P
	Pair 1	Pair 2			
Maximum pain 48 h after preoperative pairing in the observation group	3.000	8.000	−5.000	3.208	≤0.001**
Patients in the control group were paired with the maximum pain value at 48 h after operation	3.000	3.000	0.000	0.493	0.622

** $P < 0.01$.

Table 3: Paired sample Wilcoxon analysis results.

Name	Paired (median)		Difference (pair 1-pair 2)	Statistical value, z	P
	Pair 1	Pair 2			
The size of wound tear in the observation group was paired with the maximum pain value at 48 h after operation	1.500	8.000	−6.500	2.944	0.003**
Does the tear shape pair retract	2.000	0.000	2.000	2.598	0.00**

** $P < 0.01$.

Table 4: Adjustment effect analysis results ($n = 13$).

	Model 1			Model 2			Model 3		
	Standard error	t	P	Standard error	t	P	Standard error	t	P
Constant	0.184	41.298	≤0.001**	0.191	39.78	≤0.001**	0.147	51.686	≤0.001**
Number of opioid uses	0.103	0.696	0.501	0.107	0.714	0.492	0.092	−0.488	0.637
Type, quantity, and number of days of postoperative analgesic				0.066	0.455	0.659	0.056	−0.665	0.523
Number of opioid use*, type, quantity, and number of days of postoperative analgesics							0.028	−2.874	0.018*
R^2	0.042			0.062			0.511		
Adjust r	−0.045			−0.126			0.347		
Variance ratio	F (1, 11) = 0.485, p = 0.501			F (2, 10) = 0.328, p = 0.728			F (3, 9) = 3.130, p = 0.080		
$\triangle R^2$	0.042			0.019			0.449		
$\triangle F$ value	F (1, 11) = 0.485, p = 0.501			F (1, 10) = 0.207, p = 0.659			F (1, 9) = 8.258, p = 0.018		

Dependent variable: maximum pain 48 h after surgery in the observation group. * $P < 0.05$. ** $P < 0.01$.

The regression coefficient value of the analgesic pump was 1.513, and the significance was shown at 0.01 level ($z = 3.212$, $p < 0.01$), which meant that the analgesic pump had a markable positive impact on the postoperative hospital stay. An odds ratio (OR value) of 4.540, which means a 4.540-fold change in postoperative hospital days, occurred when the analgesic pump was increased by one unit.

The regression coefficient value for the injury site was −0.045, but it was not markable ($z = -0.195$, $p = 0.845 > 0.05$), suggesting that the injury site did not affect the postoperative hospital stay.

According to the summary and analysis, it can be seen that the operation duration and analgesic pump have a markable positive impact on the postoperative hospital

Table 5: Summary of Poisson regression analysis results ($n = 10$).

Item	Coefficient of regression	Standard error	Z value	P value	OR value	OR value, 95% CI
Observation group age	−0.122	0.023	−5.394	≤0.001**	0.885	0.846–0.925
Duration of surgery	0.015	0.006	2.260	0.024	1.015	1.002–1.028
Analgesic pump	1.513	0.471	3.212	≤0.001**	4.540	1.804–11.428
Injury site	−0.045	0.232	−0.195	0.845	0.956	0.606–1.507
Intercept	5.979	1.668	3.584	≤0.001**	395.129	15.024–10391.750

Dependent variable: postoperative hospital stay in the observation group. McFadden R formula, 0.487.

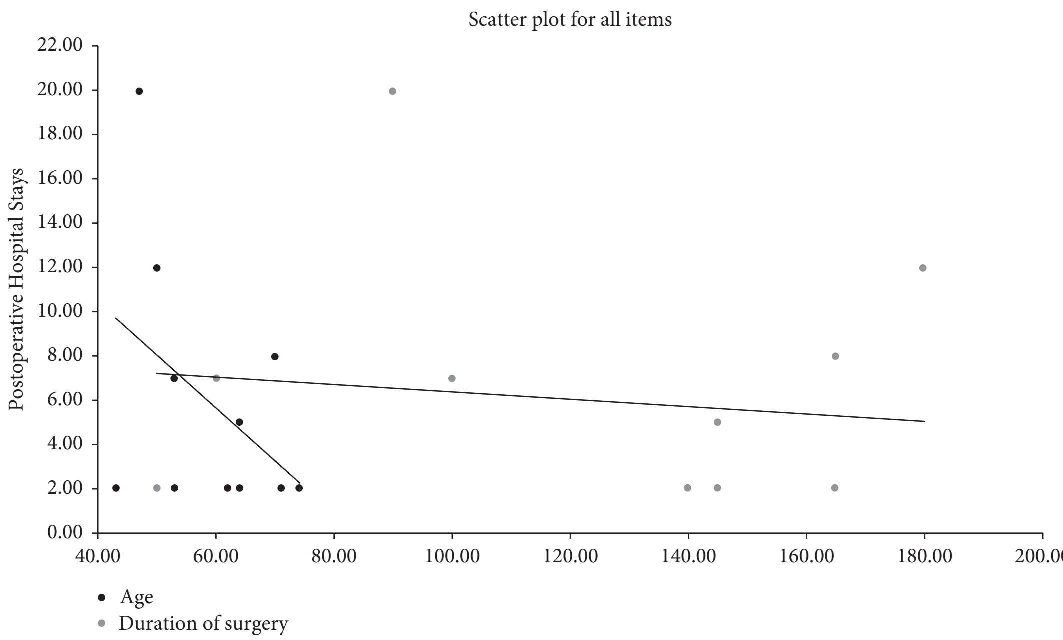

Figure 1: Scatter plot for 3 items.

stay, and age has a markable negative impact on the postoperative hospital stay. However, the injury site did not affect the postoperative hospital stay. The scatter plot of age, operation duration (analgesia pump was not good for making trend chart, so it was excluded), and postoperative hospital days in the observation group is shown in Figure 1.

4. Conclusions

Data analysis was performed on 55 patients. In the matched case-control study, 19 cases with severe pain in the early postoperative period were set as the observation group, and 57 cases without severe pain who underwent rotator cuff repair at the same time were matched according to the ratio of 1 : 3 as the control group. The general data, disease characteristics, anesthesia and analgesia scheme, and operation information of the patients were collected. The data were subjected to frequency statistics, Wilcoxon signed rank-sum test, adjustment effect analysis, and Poisson regression analysis. Some findings were included in the analysis. (1) There was a markable difference of 0.01 between the preoperative 48 h maximum pain value and the postoperative 48 h maximum pain value in the observation group. (2) There was a markable difference of 0.01 between the size and shape of the wound tear and the maximum pain value at 48 h after operation in the observation group. (3) When the number of opioid use affected the maximum pain value at 48 h after operation, the regulatory variables (type, quantity, and number of days of postoperative analgesics) were at different levels, and the impact amplitude had markable differences. (4) Age has a markable negative impact on the postoperative hospital stay. (5) The operation duration has a markable positive relationship with the postoperative hospital stay. (6) The analgesic pump had a markable positive impact on the postoperative hospital stay. (7) The location of injury did not affect the postoperative hospital stay.

Data Availability

The data used to support the findings of this study are included within the article and the Supplementary Materials.

Ethical Approval

Ethical approval for this work was obtained from the Ethical Review Committee of Hunan Provincial People's Hospital (the First Affiliated Hospital of Hunan Normal University).

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

Raw data for the analysis. (*Supplementary Materials*)

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