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Original Article

Effect of hip replacement surgery on clinical efficacy, VAS score and Harris hip score in patients with femoral head necrosis

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Abstract: Aim: To study the effect of hip replacement surgery on the clinical treatment efficacy, VAS score and Harris hip score of patients with necrosis of the femoral head (NFH). A total of 86 patients with NFH who were treated in our hospital from January 2016 to January 2019 were selected as the research subjects, and were divided into the control group (n = 43, conventional artificial hip replacement) and the observation group (n = 43, modified version of artificial hip replacement) according to a random number table method. The treatment efficacy, pain, hip function, motor function and adverse reactions of the two groups were compared. Results: The effective rate of the observation group was 93.02%, which was higher than 79.07% of the control group (P<0.05). There was no difference in VAS scores of the two groups before treatment (P>0.05); after treatment, VAS scores were reduced, and the observation group was lower than the control group (P<0.05). There was no difference in Harris hip scores between the two groups before treatment; after treatment, the Harris hip joint scores were elevated, and the observation group was higher than the control group (P<0.05). There was no difference in Fugl-Meyer motor function scores between the two groups before treatment (P>0.05); after treatment, Fugl-Meyer motor function scores increased, and the observation group was higher than the control group (P<0.05). The incidence of adverse reactions in the observation group was 6.98%, which was lower than 16.28% in the control group, and the difference was not statistically significant (P>0.05). Conclusion: Modified artificial hip replacement is effective in treating NFH. It can relieve pain, improve hip joint function and motor function, and has high safety and is therefore worthy of promotion.

Keywords: Hip replacement, femoral head necrosis, clinical efficacy, VAS score, Harris hip score

Introduction

As a common disease in orthopedics, necrosis of the femoral head (NFH) often occurs in middle-aged and elderly people. The early symptoms of the disease are non-specific, and most are discovered in late stages [1], and those in advanced stages have damage to various parts of the hip joint, resulting in the loss of joint function. The disability rate caused by this disease is also very high, which seriously affects the patient's living standards [2]. The pathogenesis of NFH is complicated, and it is speculated to be related to long-term use of hormones, external damage, alcohol abuse and other factors [3, 4]. It can trigger ischemia of the femoral head, resulting in poor blood supply and ischemic necrosis of the femoral head over time [5]. For patients with collapsed or deformed NFH, artificial hip replacement is often performed. At present, artificial hip replacement surgery has been recognized clinically, but scholars hold different views on the results of performing artificial hip replacement [6-8]. One study pointed out that considerable variation was seen in the revision rate after hip replacement surgery between hospital sectors in Australia. The variation was largely due to differences in prosthesis selection [9]. It has also been proven that hip replacement surgery can led to substantial improvements in joint-specific scores and overall quality of life [10]. This study was performed in patients with NFH who were treated with modified artificial hip replacement surgery to provide a reference for NFH treatment.

Materials and methods

Materials

The NFH patients who were treated in Shengli Hospital, Dongying City, Shandong Province from January 2016 to January 2019 were selected as the research subjects. Inclusion criteria: (1) patients meeting the clinical diagnostic criteria for NFH [11]; (2) confirmed by MRI or X-ray; (3) voluntarily signing of the informed consent. Exclusion criteria: (1) patients complicated with severe coagulation dysfunction; (2) complicated with severe cardiac and renal dysfunction; (3) complicated with motor dysfunction before the onset; (4) with surgical contraindications to this study; (5) patients with malignant tumors; (6) with a history of hip surgery with in the past 3 months. A total of 86 patients were finally included. According to a random number table method, they were divided into a control group (n = 43) and an observation group (n = 43).

Methods

Control group: Conventional artificial hip replacement was adopted. Routine disinfection, general anesthesia, and a lateral decubitus position was implemented; the skin was peeled back layer by layer to expose the patient's acetabular rim and femoral head to repair the acetabulum. According to the NFH volume, the corresponding size prosthesis was implanted, and then the wound surface was cleaned, the drainage tube was injected, the incision was sutured, and finally antibiotic anti-infection treatment after the operation were given.

Observation group: A modified version of artificial hip replacement was adopted. Routine disinfection, general anesthesia, and a lateral recumbent position was performed; along the posterior approach, a 6-9 cm incision was made along the gluteus maximus muscle fibers on the posterior side of the large groin crest to expose the affected muscle groups and the external rotation muscle groups were cut; after cutting the exposed joint capsule, the acetabulum and femoral head could be completely exposed, the femoral neck was cut with a bone, the cut femoral head was removed, and the corresponding size of the prosthesis was implanted, then the wound surface was cleaned, the drainage tube was injected and the incision was sutured after operation; antibiotics were given for anti-infective treatment after the operation.

Outcome measures

(1) Curative effect. Patients were followed up for 6 months after operation, and the efficacy was evaluated according to Harris's total score [12]. ① Cured: total score ≥90 points; ② Markedly effective: 80~ <90 points; ③ Effective: 70~ <80 points; ④ Ineffective: <70 points. Total effective rate = (effective + markedly effective + cured)/number of cases × 100%. (2) The degree of pain. After 6 months of follow-up, the evaluation was based on the visual analogue scale (VAS) [13]. ① Severe: 7~10 points; ② Moderate: 4~6 points; ③ Mild: 1~3 points; ④ Painless: 0 points. The score is proportional to the severity of the pain. (3) Hip joint function. The Harris hip score [14] was used for evaluation, with a total score of 100 points, the higher the score, the more satisfactory the hip function. (4) Motor function. The evaluation is based on the simplified Fugl-Meyer motor function score [15] method. ① Severe dysfunction: <50 points; ② Marked dysfunction: 50~ <85 points; ③ Moderate dysfunction: 85~ <95 points; ④ Mild dysfunction: 95~100 points. The score is inversely proportional to the degree of motor dysfunction. (5) Adverse reactions, including swelling, pain, infection, etc.

Statistical analysis

SPSS 20.0 statistical software was used to process the data, and the measurement data conforming to a normal distribution were expressed by ($x \pm sd$), and the t test was performed for the analysis; the numeration data was represented by n (%), the rank sum test was carried out for the orderly data, and the chi-squared test was performed for the other data; variance analysis was used for repeated measurement data analysis. $P<0.05$ was considered statistically significant.

Results

Comparison of general data between the two groups

There were 23 males and 20 females in the control group; aged 48.63±6.87 years; types of NFH: steroid-induced 13 cases, trauma-induced 17 cases, alcohol-induced 8 cases, others 5 cases; sites: unilateral 29 cases, bilateral 14 cases. There were 25 males and 18 fe-

Table 1. Comparison of general data between the two groups

Groups	n	Male/female	Age (year)	Causes of disease				Sites	
				steroid-induced	Trauma-induced	alcohol-induced	Others	Unilateral	Bilateral
Observation group	43	25/18	49.35±6.35	14	16	9	4	30	13
Control group	43	23/20	48.63±6.87	13	17	8	5	29	14
X^2/t		0.189	0.505		0.186			0.054	
P		0.664	0.615		0.829			0.816	

Table 2. Comparison of efficacy between the two groups (n, %)

Groups	N	Ineffective	Effective	Markedly effective	Cured
Control group	43	9 (20.93)	7 (16.28)	15 (34.88)	12 (27.91)
Observation group	43	3 (6.98)	7 (16.28)	13 (30.23)	20 (46.51)
Z			-2.013		
P			0.044		

Table 3. Comparison of VAS score between the two groups (x ± sd, point)

Groups	N	Before treatment	After treatment	t	P
Control group	43	8.14±1.76	4.15±1.21	12.253	<0.001
Observation group	43	8.02±1.65	2.89±0.53	19.412	<0.001
t		0.326	6.255		
P		0.745	<0.001		

Table 4. Comparison of Harris score between the two groups (x ± sd, point)

Groups	N	Before treatment	After treatment	t	P
Control group	43	55.83±11.34	83.32±14.63	9.739	<0.001
Observation group	43	56.35±11.66	92.35±7.22	17.212	<0.001
t		0.230	3.629		
P		0.834	<0.001		

males in the observation group; aged 49.35± 6.35 years; types of NFH: steroid-induced 13 cases, trauma-induced 17 cases, alcohol-induced 8 cases, others 5 cases; sites: unilateral 30 cases, bilateral 13 cases. There was no statistically significant difference in the general data between the two groups of patients (P>0.05, **Table 1**).

Comparison of the efficacy between the two groups

The effective rate of treatment in the observation group was 93.02%, which was significantly higher than 79.07% of the control group (P<0.05, **Table 2**).

Comparison of VAS scores between the two groups

Before treatment, there was no significant difference in the VAS scores between the two groups (P>0.05); after treatment, the VAS scores of both groups were reduced, and the observation group was significantly lower than the control group (P<0.05, **Table 3**).

Comparison of hip function between two groups

Before treatment, there was no significant difference in the Harris hip score between the two groups (P>0.05); after treatment, Harris hip score of both groups were increased, and the observation group was significantly higher than the control group (P<0.05, **Table 4**).

Comparison of Fugl-Meyer motor function score between the two groups

Before treatment, there was no significant difference in Fugl-Meyer motor function score before treatment between the two groups of patients (P>0.05); after treatment, Fugl-Meyer motor function score of both groups were increased, and the observation group was significantly higher than the control group (P< 0.05, **Table 5**).

Comparison of adverse reactions between the two groups

As shown in **Table 6**, the incidence of adverse reactions in the observation group was 6.98%, which was lower than 16.28% in the control group (P>0.05).

Table 5. Comparison of Fugl-Meyer motor function between the two groups (x ± sd, point)

Groups	N	Before treatment	After treatment	t	P
Control group	43	53.28±11.87	79.52±12.47	9.994	<0.001
Observation group	43	53.96±10.74	90.36±8.41	17.501	<0.001
t		0.278	4.726		
P		0.781	<0.001		

Table 6. Comparison of adverse reactions between the two groups

Groups	n	swelling	Pain	infection
Control group	43	2 (4.65)	3 (7.00)	2 (4.65)
Observation group	43	1 (2.32)	1 (2.32)	1 (2.32)
X^2			1.811	
P			0.178	

Discussion

NFH is caused by poor blood circulation induced by osteoporosis, fracture and other factors [16]. Its clinical manifestations often include limited mobility, joint pain, etc. Patients usually have restricted upper limb and lower limb movement [17]. People's bones and body can become worse with age, so when exposed to external stimuli, NFH easily occurs [18]. Conventional drug treatment is not satisfactory with shortcomings such as longer treatment course, lower compliance, and poor prognosis [19]. Therefore, the prognosis of surgical treatment is of crucial significance.

Artificial hip replacement is an ideal treatment for NFH, with fewer contraindications. Most patients have higher tolerance, and it is more suitable for those with poor efficacy following conservative treatment and elderly patients [20]. Artificial hip replacement can improve the stability of the hip joint of the patient, reduce the dislocation of the surgical site of the patient, and restore the blood supply [21, 22]. In this study, the conventional artificial hip replacement surgery was modified and results our showed that the effective rate of the observation group was higher; the VAS scores in the observation group were lower; the Harris hip score and Fugl-Meyer motor function score were increased, and the observation group was better without aggravating adverse reactions, indicating that the modified artificial hip replacement for the treatment of NFH can effectively improve the efficacy, reduce the pain, enhance the hip joint function and motor function, and has a higher safety. Similar results were found in a previous study [23]. The following factors can be attributed to the remarkable effect of improved hip replacement procedure: (1) it can retain the femoral neck, maintain the proximal femur anatomy to the maximum, help provide protection for the prosthesis, and can help to preserve the normal hip joint biomechanical conduction, and can reduce bone loss; (2) it can remove the long stem of femur inserted into the medullary cavity without destroying the medullary cavity, and avoids the pressure generated by the traditional stalked joint prosthesis on the bone and cavity; (3) it can make the operation field more clear with direct vision, it avoids nerve damage due to poor surgical fields and excessive traction of soft tissue that often occurs in traditional way. However, there may be some bias in the results of the study due to the small sample size, which needs further exploration by enlarging the sample size. Moreover, the results should be interpreted cautiously because of methodological limitations and publication bias.

To conclude, the modified artificial hip replacement for the treatment of NFH can improve treatment effectiveness, relieve pain, and boost hip joint function and motor function.

Disclosure of conflict of interest

None.

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