

Comparison of Clinical Efficacy of Surgical Approaches for Acetabular Fractures

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1. Abstract

1.1. Objective: To compare the different approaches and effects of pararectus approach, modified stoppa approach and ilioinguinal approach in the treatment of acetabular fractures.

1.2. Process: Through regression sorting, 44 patients with acetabular fractures who were hospitalized in our unit from September 2012 to September 2017 were summarized. Three surgical methods were used, and the operation time, intraoperative blood loss, postoperative complications, fracture reduction satisfaction and hip function were recorded in the three groups.

1.3. Results: There was little difference in the effect of fracture reduction, patient satisfaction, and the last follow-up survey of rehabilitation function among the three different approaches. The calculation shows that $P > 0.05$, the existing difference meets the statistical value. However, in terms of operation time and blood loss, the difference was significant, $P < 0.05$, and the difference was statistically significant.

2. Introduction

Acetabular fractures often occur in trauma caused by high energy and severe violence, such as traffic accidents and falls from heights [1, 2], and acetabular fractures account for 2% to 5% of pelvic fractures [3]. In some more severe cases, this fracture may cause vascular [4], nerves and other key human tissues are facing damage. For this disease, open reduction and internal fixation can repair the pelvic ring and significantly reduce the length of the patient's hospital stay. In addition, the possibility of subsequent arthritis can be controlled [5]. With the breakthrough of surgical

techniques and imaging methods, the use of surgical methods for treatment and treatment has become a new trend in the medical field. However, its uncertainty still exists, and there are still many issues that need to be clarified. Whether the operation can be successful or not depends on the selection of a more reasonable operation method according to the type of fracture and the location of the fracture fragments. The long-established ilioinguinal approach [6] has been widely used in the treatment of acetabular fractures, but it cannot treat quadrilateral fractures [7]. At the same time, due to the problems of vascular and nerve injury, infection and inguinal hernia, some scholars improved the Stoppa method [8] and applied it to pelvic and acetabular fractures, and achieved certain results. In the follow-up time, Keel and other scholars were the first to give a successful case of the "pararectus approach". From September 2012 to September 2017, our unit treated 44 patients with related fractures through three different surgical approaches. The results are reported as follows.

3. Materials and Methods

3.1. Cases and Groupings

Including 27 males and 17 females with the disease, a total of 44 patients. The age ranged from 24 to 57 years, with an average of (42 ± 5) years old; according to the Letournel - Judet classification of fractures [9-10]: 21 fractures were located in the anterior column, 11 were in the double column, and 6 were in the anterior column with the posterior semi-transverse. Another 6 corresponded to T-shaped fractures. A total of 24 people in the observation group, 11 people in the B control group, and 9 people in the C control group. There were no significant differences in gender, age

and fracture classification among the three groups ($P > 0.05$). The operation time, blood loss and other indicators were recorded to comprehensively evaluate the safety of the operation and the recovery of joint physiological function.

3.2. Methods

Pararectus approach: After the incision is determined, the skin, subcutaneous and other tissues are incised in sequence. Through the treatment of the anterior sheath, the rectus abdominis can be observed, and it enters the outer space along the lateral edge. The positions of the first window, the second window and the third window are then exposed, respectively. The area from the quadrilateral to the greater sciatic foramen can be observed in the second window portion. appearing

In the case of a tetrahedron fracture, by stripping until the tetrahe-

dron is exposed. The position of the quadrilateral is fixed by a certain reset method. After the combined reduction was performed, the plate fixation was recreated (see Figures 2-4). The other two approaches will not be elaborated here.

A corresponding drainage tube is left after operation to avoid inflammation, and at the same time, the occurrence of thrombus can be avoided by means of antithrombotic pressure belts. On the first day after the operation, according to the doctor's order to strengthen the exercise of the quadriceps, the hip joint can be slightly moved on the third day. 6 weeks after the operation, you can use crutches to move around. After 3 months, you can walk independently without aids. X-ray review was performed at 4, 12 weeks and 6, 12 months after operation. The operation time and bleeding during the operation were observed in the three groups, and the corresponding scores were given [11].

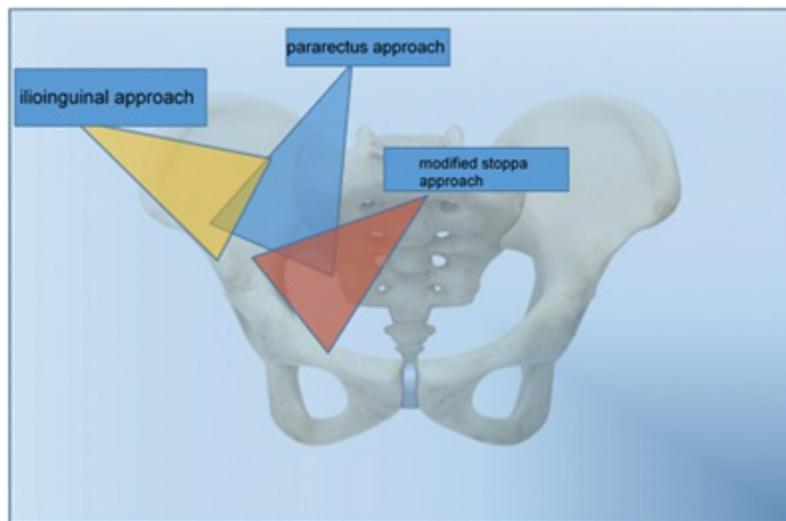


Figure 1: Viewing range of different surgical approaches



Figure 2: Preoperative imaging of a 59-year-old male with acetabular fracture from a car accident (A3)



Figure 3: Postoperative imaging of a 59-year-old male with acetabular fracture (A3) from a car accident



Figure 4: Preoperative localization of the incision surface Postoperative incision condition

3.3. Evaluation and Criteria

Three sets of data were analyzed. Follow-up was performed at 1, 3, 6 months and 1 year after operation. The fracture reduction effect and hip joint function were evaluated by pelvic X-ray films and three-dimensional reconstruction. For the judgment of the quality of reduction through Matta imaging [12], a corresponding evaluation is given. The functional evaluation was completed using the improved Merle d' Aubigne and Postel scoring platform [13].

3.4. Statistical processing

Statistical analysis was performed using SPSS19.0 software. Relevant data information was described in the form of mean \pm standard deviation ($\pm s$), and a one-way variance study was completed. At the same time, the chi-square test was used to compare the categorical data, and the difference was statistically significant when $P < 0.05$.

4. Results

All patients were followed up for 12 to 15.5 months, with an average of 13 months. The operation time of groups A, B and C were (147.5 \pm 3.9) min, (153.3 \pm 1.8) min and (172.5 \pm 4.3) min, respectively. The hip function scores at the last follow-up were (18.3 \pm 2.7), (17.9 \pm 1.6), and (16.9 \pm 1.6) points. There were significant differences in the operation time among the three groups, which met statistical value ($P < 0.05$), and were relatively close in the comparison of corresponding physiological functions, $P > 0.05$, and the difference did not meet statistical significance. However, the intraoperative blood loss in groups A, B and C were (689 \pm 46), (755 \pm 32), and (847 \pm 35) mL, respectively, and the difference was statistically significant ($P < 0.05$). Group A had no obvious compli-

cations, such as abdominal wall hernia and damage to important blood vessels and nerves, only one case of incision infection. In group B, there was 1 case of incisional fat liquefaction; 1 case of lateral femoral cutaneous nerve palsy. Group C had wound infection in 1 patient, nerve palsy in 1 patient, and heterotopic ossification in 1 patient, corresponding to Brook I grade [14]. In the comparative analysis of the probability of complications, $P < 0.05$, which also met the statistical value. Therefore, the three groups in terms of satisfaction with surgery, comparative analysis of follow-up status, etc., $P > 0.05$, the difference does not meet the statistical value. However, in terms of operation time and blood loss, $P < 0.05$, the difference was statistically significant.

the three groups of surgical efficacy indicators ($x \pm s$)

5. Discussion

Usually the quality of the surgical effect is positively correlated with the quality of fracture reduction, and the correct selection of surgical methods can improve the efficiency of intraoperative reduction and the success rate of surgery [15, 16]. For fractures located anterior to the acetabulum, the ilio-inguinal approach is traditionally the most commonly used surgical approach for treating anterior acetabular fractures [17] (See Figure 1), the hip structure can be fully exposed during the operation, the abductor muscles are not stripped, and the sciatic nerve is less damaged and the postoperative recovery is fast, but this approach requires dissection and separation of the lateral femoral cutaneous nerve, iliopsoas muscle, and femoral nerve. As well as important tissues such as the external iliac artery and vein [18]. However, the operation of this method is complicated and cumbersome, and it is difficult to

deal with high position and quadrilateral acetabular fractures, so it is often not considered [19-21]. Cole et al [22] used the improved Stoppa approach for treatment, which was successful in the mid-1990s. Cole et al. [23] first applied this surgical approach to the treatment of pelvic fractures and other cases, and proposed that its incision could be used in cases of various forms of acetabular fractures such as transverse and T-shaped anterior columns. Hirvensalo et al [24] believed that this approach has less trauma, convenient exposure, and satisfactory surgical results. However, in dealing with complicated problems such as sacroiliac joint dislocation, the iliac fossa approach should be supplemented. Severe fractures and obese patients are difficult to operate [25], and this approach is contraindicated in patients with a history of bladder surgery or bladder injury. In 2012, Keel et al. [26] The first to use the pararectus approach in the treatment of acetabular fractures with success. In 2014, Farouk et al. [27] successfully repeated this approach and achieved good results. The advanced nature of the transrectus abdominis surgical approach is reflected in the following: clear surgical anatomy, short exposure time, relatively simple operation, longitudinal exposure, avoiding excessive stretching of blood vessels, nerves, etc.; the surgical incision can be appropriately extended to meet the severity of fractures. Displacement and obesity surgery are required; and the reduction method at this time and subsequent fixation of the true pelvic ring and other positions are more convenient ; (see Figure 1) This approach is convenient for antegrade insertion of lag screws or placement of iliac ischial plates Column fractures are fixed with direct vision operation with high accuracy; under direct vision, the iliac vessels, femoral nerve, obturator vessels, lower abdominal wall vessels and “corona of death” vessels are exposed to reduce the incidence of vascular injury; secondly, the incision is small , high aesthetics; fast postoperative recovery, no need to cut muscle tissue; combined with K-L approach can more efficiently deal with the situation of posterior wall fractures [28]. However, it also has the disadvantage that it is not suitable for bilateral acetabular fractures or pelvic fractures of bilateral components of the anterior ring (Stoppa method is appropriate) [29].

it can be concluded that the three surgical approaches have no significant difference in fracture reduction effect and postoperative hip function. The score was obviously lower than that of the other two groups, and the difference was statistically significant. For this phenomenon, because the approach is close to the acetabular fracture, it is more convenient in the process of dissection and reduction, can better protect the soft tissue, reduce the operation time, and control the amount of bleeding. Through the clinical practice of this article, we have realized that the three groups of approaches have different exposed surgical fields of view. The pararectus abdominis approach has a more open field of vision, and can clearly observe specific iliac fossa, iliac crest, etc. Structural state. However, it is difficult to visualize the iliac

fossa and iliac crest with the modified Stoppa method. Therefore, for the anterior column fractures in the iliac wing and other parts, if the modified Stoppa approach is used, the blood loss is often increased due to the difficulty of tissue dissection. Correspondingly, the ilioinguinal approach is also relatively close, so the bleeding during the surgical operation is more serious. Therefore, the pararectus approach should be considered as much as possible for the treatment of high anterior column cases [30]. In addition, the modified Stoppa method is easily blocked by the rectus abdominis when exposing the anterior wall of the acetabulum because the incision is far away from the fracture end. When the fracture end is exposed, certain nerve palsy often occurs. One case of femoral nerve palsy occurred in this modified Stoppa group. Therefore, the anterior acetabular fracture is generally treated with the acetabular approach to reduce the risk of complications [31]. However, in the iliac-inguinal scheme, multiple positions such as the inguinal canal are required to be dissected during the exposure process, and there are problems such as limited operative field and inability to reduce and fix fractures under direct vision. The literature reports that the complication rate of inguinal approach is 10%-47%, which are more common in incision infection, lateral femoral cutaneous nerve and femoral nerve injury, femoral artery and vein injury, and deep vein thrombosis.

For complex pelvic fractures, some hospitals currently use 3D printing technology to present the fracture situation in the form of a solid model, and at the same time realize preoperative simulation surgery to formulate the best surgical plan. In this way, during the operation, it is more convenient to anatomically reduce the fracture, reasonably set the position and length of the plate, shorten the operation time, and control the blood loss during the operation [32-37]. If combined with the pararectus approach, At this time, the operation time can be shortened, the injury can be reduced, and the bleeding problem can be controlled, which is of great value for optimizing the prognosis. In the future, complex cases of acetabular surgery will receive new treatment ideas [38-40].

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