Discussion of the Efficacy of External Fixator Application in Clinical Orthopedics

Chaofeng Shi
The First Affiliated Hospital of Zhengzhou University, Zhengzhou 450052, Henan, China
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Abstract: Objective: to investigate the application effect of external fixator in clinical orthopaedic treatment. Methods: the number of cases included in the study 218 cases, all in January 2021-January 2024, were consulted in the clinical orthopaedics department, grouping, grouped in a ratio of 1:1, the line of the random envelope lottery to divide the group, the study group (external fixator treatment), the control group (conventional gypsum immobilisation treatment), analyse the effect of treatment. Results: compared with the control group, the clinical indicators of the research group mainly cover the length of surgery, the difference in the comparison of the indicators is statistically significant, P<0.05; the length of hospitalisation and the length of fracture healing are shorter, the difference in the comparison of the indicators is statistically significant, P<0.05; the total effective rate of clinical treatment of the research group is higher, and the difference in the comparison of the indicators is statistically significant, P<0.05.Conclusion: in clinical orthopaedic treatment, the application of Conclusion: In clinical orthopaedic treatment, the application of external fixator has significant therapeutic effect, which is conducive to the optimisation of clinical indexes and the enhancement of total effective rate of treatment.
***Keywords*:** external fixator; clinical orthopaedics; treatment effect

1. Information and Methods

1.1 General information

The number of cases included in the study was 218 cases, all of whom were seen in the clinical orthopaedic department from January 2021 to January 2024, and all of whom were seen in the clinical orthopaedic department. In the grouping, the groups were grouped in a ratio of 1:1, and a random envelope was drawn to divide the groups into groups, the study group (treatment with an external fixator), and the control group (treatment with a conventional plaster cast fixation), and the male to female ratio of the study group was 55:54, and the age (years) was 18-75, with a mean value (55.63 ± 4.24). 4.24); in the control group, the male to female ratio was 56:53, age (years): 19-78, mean value (55.71±4.37). There was no significant difference in the general information data, p>0.05.

1.2 Methods

1.2.1 Control group

Adopt conventional plaster fixation treatment mode of intervention, after the patients are admitted to the hospital, it is necessary to assess the patients‘ condition in time, clarify the patients’ fracture position, determine the length and thickness of the required plaster according to the part of the injured limb, and at the same time, prepare cotton paper, bandage, and room-temperature water, for the fracture part, firstly, carry out manipulation of reset to ensure that the fracture end is well aligned, and after the reset, support the fracture broken end in order to keep the state of reset. Put the prepared plaster rolls into warm water and soak them completely, then take them out and squeeze out the excess water, spread them out and smoothen them on the wooden board or the floor, generally lay 12 to 16 layers of plaster, after that, place the plaster in the part centred on the fracture end, make sure the length of the plaster is more than the upper and lower joints, so as to fix it effectively, after fixing it in the plaster, it is necessary to shape the plaster to make it match with the shape of limb, and fix it by wrapping it with a bandage. Wrap the plaster with a bandage, pay attention to the bandage can not be too tight or too loose, so as not to compress the limb or lead to the loosening of the plaster, in the process of wrapping, the bandage should be avoided twisting. During the process of plaster fixation, the limb should be kept in a proper position and not be moved, and the blood flow of the end of the limb should be observed to make sure that there is no compression, and if the plaster is found to be too tight or loose, it should be adjusted in time. After plaster fixation, film examination is generally required to ensure that the fracture is satisfactorily repositioned and no heterotaxy occurs.

1.2.2 Study Group

Adopt external fixator to carry out treatment, choose appropriate external fixator according to the fracture part and type, apply multi-plane external fixator as much as possible, choose anaesthesia method according to the injury, patient's age and injury part, with the help of C-arm X-ray machine, firstly, correct the rotational and angular displacement deformity of the injured limb with appropriate stretching by manipulation, determine the site of pinning, avoid the important blood vessels and nerves, and usually, it is preferable to be 4-6cm away from the end of the fracture. Usually 4~6cm from the fracture end is suitable. The skin at the needle insertion site is cut 0.5~1.0cm into the deep fascia with a sharp knife, and a steel needle of the corresponding diameter is selected and drilled into the bone in the middle of the bone cross-section, perpendicular to the bone shaft or at an angle and at a low speed into the bone to the opposite side of the bone cortex to penetrate the bone. The displaced fracture end was manoeuvred again and the pin was fixed to the connecting rod. Under the fluoroscopic view of C-arm X-ray machine, the traction, rotation and compression functions of the external fixator are used to correct the deviation of the alignment of the fracture end and the residual axis, so that the fracture can be anatomically reset as far as possible, and the pin fixation clip is tightened to fix the fracture securely in the position of the restoration. Ethanol gauze was applied to the skin pinhole, and the outside was wrapped with sterile gauze and bandage. After the operation, change the dressing regularly, elevate the affected limb, apply antibiotics and other symptomatic treatment, start the joint movement above and below the piercing site as early as possible, and adjust the intensity of rehabilitation training according to the recovery situation until complete recovery.

1.3 Observation indexes and efficacy judgement

(1) Observation indexes. Record the clinical indexes of the two groups of patients, mainly covering the length of surgery, length of hospitalisation and length of fracture healing.

(2) Judgement of therapeutic effect. Evaluate the therapeutic effect of the two groups of patients, obvious effect: patients with good fracture site reduction, can move independently, pain, swelling and other symptoms all disappeared; effective: patients with better fracture site reduction, basically can move independently, pain, swelling and other symptoms greatly improved; ineffective: patients with abnormal fracture site reduction, unable to move independently, pain, swelling and other symptoms have not improved or even aggravated [3].

1.4 Statistical methods

The experimental data were statistically analysed by SPSS 26.0 software, and the measurement data were expressed as '%' and statistically processed using the '$\chi 2$' test. Count data (in line with the normal distribution) with '$x \pm s$' for analysis of variance, using the 't' test for statistical processing. $p < 0.05$ for statistical analysis of differences between groups

2. Results

2.1 Clinical indicators

Compared with the control group, the length of surgery, hospitalisation and fracture healing were shorter in the study group, with a significant difference of $P<0.05$, as shown in Table 1 below:

Table 1: Comparative Analysis of the Clinical Index (x ± s)

Group	n	The Length Of The Operation(Min)	Length Of Hospitalization(d)	The Length Of Fracture Healing(d)
The Research Group	109	21.22±3.36	11.19±2.57	26.25±4.35
Control Group	109	41.78±5.25	23.87±3.69	40.66±5.06
t		34.437	29.440	22.546
p	-	0.000	0.000	0.000

2.2 Treatment Effect

Compared with the control group, the total effective rate of treatment in the study group was higher, with a significant difference of $P<0.05$, and the data are shown in Table 2 below:

Table 2: Comparison Analysis Of Treatment Effects [n (%)]

Group	n	Excellence	Effective	Of No Avail	Total Effective Rate
The Research Group	109	92（84.40%）	16（14.68%）	1（0.92%）	108（99.08%）
Control Group	109	65（59.63%）	33（30.28%）	11（10.09%）	98（89.91%）
x^2	-	-	-	-	8.819
p	-	-	-	-	0.003

3. Discussion

Currently, external fixators are widely used in orthopaedic treatment and have become an important means of treatment for orthopaedic diseases. External fixators can achieve effective fixation of the fracture site, which is its most basic and important function, and by means of fixation pins and fixation screws, external fixators can fix the fracture fragments together and prevent them from being displaced and dislocated, and this stability can help to promote healing of the fracture and reduce the occurrence of complications The external fixator can also provide appropriate traction to correct the misalignment of the fracture site, and by adjusting the length and angle of the connecting rods and connectors, appropriate traction can be applied to restore the fracture fragments to their correct position [4]. External fixator has the advantages that traditional treatment means do not have, its surgical method is simple to operate and easy to master, it does not need very extensive incision wound, so the trauma area is small, and only need routine anaesthesia, in addition, the external fixator can correct the rotational displacement and other situations occurring at the end of the fracture, to achieve a full range of adjustments of the fracture, and it can be adjusted during the rehabilitation process, in order to achieve the correction of the axial deviation,. This surgical method meets the guidelines and requirements related to elastic fixation, which provides better fixation compared to traditional methods and minimises stress masking, ensuring that the fracture end of the bone can feel continuous stress stimulation [5]. External fixators are excellent in dealing with specific types of fractures, for example, in comminuted fractures, they can achieve maximum reduction and fixation. For open fractures, an external fixator constrains the degrees of freedom at each segment of the fracture during fixation and provides sufficient strength to prevent fracture displacement. At the same time, it can also be used for exchange observation during soft tissue repair, preventing problems such as fracture dislocation during exchange. It can be seen that external fixators have significant application effects and roles in clinical orthopaedic treatment, especially in dealing with complex and specific types of fractures showing unique advantages [6].

The study shows that compared with the control group, the length of surgery (21.22±3.36) min, length of hospital stay (11.19±2.57) d and length of fracture healing (26.25±4.35) d of the study group are shorter, and the total effective rate of the study group's treatment is 99.08% higher, with a significant difference of $P<0.05$, which can be seen that the external fixator is conducive to reducing the length of surgery, optimising clinical indicators, and improving the efficiency of the treatment. It can be seen that the external fixator treatment of clinical orthopaedic diseases is conducive to reducing the length of surgery, optimising clinical indicators and improving the efficiency of patient rehabilitation. The reason is that external fixator treatment of fractures is relatively safe, its operation process is simple, the traumatic area is small, and usually only requires routine anaesthesia. This minimally invasive feature helps to reduce further damage to the patient's body and reduces the risk of postoperative infection. The external fixator can achieve all-round fixation of the fracture, which not only can correct the rotational displacement of the fracture end, but also can be adjusted during the rehabilitation process to ensure that the fracture breaks are healed in the correct position [7]. In addition, the external fixator meets the relevant guidelines and requirements of elastic fixation, and its fixation is better than that of the traditional way, which can minimise the masking of stress, so that the fracture end can feel the continuous stress stimulation, thus promoting the healing of the fracture. External fixators can be used to treat many types of fractures, including open fractures, pelvic fractures, and multiple injury fractures. For open fractures, external fixators can effectively immobilise the fracture site while protecting the soft tissues, preventing displacement and infection. For pelvic fractures, external fixator can initially repair the fracture site, reduce bleeding and create favourable conditions for subsequent treatment. For multiple injury fracture, external fixator can be preferentially applied to the treatment of serious injury parts due to its easy operation and stable fixation, thus ensuring the life safety of patients. The external fixator allows patients to move to a certain extent during the treatment process, which helps promote blood circulation and metabolism of the fracture site. This treatment can promote fracture healing and soft tissue repair, thus shortening the recovery period of patients [8]. At the same time, the external fixator also facilitates the observation and adjustment of dressing changes during the recovery process, ensuring that patients receive timely and effective treatment.

In conclusion, the application of fixdevices in clinical orthopedic treatment is worth popularizing.

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Author Bio

Shi Chaofeng (1998.05-), Male, Han nationality, Henan Zhoukou, Master, The First Affiliated Hospital of Zhengzhou University. Research Direction: Orthopaedics.