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Internal fixation of proximal humerus fractures: A prospective study with an outcome analysis

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Abstract

Background and objectives: The third most common type of fracture in older people is a proximal humerus fracture. The process of fixing proximal humerus fractures is difficult and often leads to complications because of osteoporosis, especially in older patients. The goal of this study was to look at the results of internal stabilization of proximal humerus fractures over time.

Materials and Methods: The study was done at Tagore Medical College and Hospital in Chennai, Tamil Nadu, India, in the Department of Orthopaedics. There were 30 cases in this prospective study, which took place from April 2019 to March 2020. All of the people who took part in this study gave their informed consent, which meant they understood what the study was about and why they were taking part.

Results: To keep the femur head from dying of lack of blood flow, the surgeon must make sure that the bones are perfectly aligned and that the fixation is strong. The majority of current research says that anatomical reduction of the fracture and secure fixation are necessary for a good functional result after a shoulder fracture, no matter what method or implant is used. To get the best benefits, shoulder functional treatment should also start right away.

Conclusion: One of the reasons for this is definitely the learning curve that comes with using implants. Using a strict rehabilitation program will help people get better, and using a professional surgical method will reduce the risk of complications.

Keywords: Internal fixation, proximal humeral fractures, and prospective investigation

Introduction

Proximal fractures, which include all other types of fractures, are the most common type of humeral fracture. An increased risk of proximal humeral fractures is seen in older people who have osteoporosis. The third most common type of fracture in older people is a proximal humerus fracture^[1-3]. The process of fixing proximal humerus fractures is difficult and often leads to complications because of osteoporosis, especially in older patients. Most injuries happen when someone falls on a raised hand. This is most common in older women with osteoporosis. Proximal humerus fractures are common in young people who have been through high-energy injuries, like a car accident^[2-4].

80% of proximal humeral fractures that are not displaced or are only moderately displaced can be treated without surgery. After K-wire fixation and conservative care, the joint becomes stiff and has a smaller range of motion. There is still disagreement about the best way to treat fractures that are weak or have moved. Several methods have been written about, such as arthroplasty, intramedullary nailing, open reduction and internal fixation with proximal humeral plates, and minimally invasive or percutaneous treatments using pins or screws^[3-5]. The Proximal Humerus Internal Locking System plate was created to lower the high risk of complications that come with these fractures and to provide angular support, especially in bone that is osteoporotic. Non-locking plates, like T-plates and cloverleaf plates, have a high failure rate in osteopenic bones. They also have a 40% chance of conditions like subacromial impingement, screw loosening, and avascular necrosis^[4-6].

Several studies have shown that tension band wiring does not work to treat proximal humerus fractures. Following that, blade plates were created, which had a form that was more durable than regular plates. However, these plates failed very often because they were wider and didn't stay in place well in osteoporotic bones.

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Even though they have a shorter lever arm, load-sharing devices like intramedullary nails cause a lot of problems because the proximal screws aren't fixed well enough [5-7].

The main problem that was seen was the proximal screw pulling back or becoming loose. Most cases of two-part proximal humerus fractures had good results. The structure of the proximal humerus was taken into account when locking plates were made. These plates have a low shape and are biomechanically designed to fix proximal humerus fractures [6-8]. They provide locking screw fixation and angular support in osteoporotic bones that aren't as strong. Many locking screws and small holes in these plates allow cerclage wires or stitches to be attached to the rotator cuff. This plate has different locking screw choices that can be put in either convergently or divergently to make the pull-out strength stronger. Locking plates are now often used to treat proximal humerus fractures because they have a low chance of problems [7-9]. The point of this study was to look at the results of internal stabilization for proximal humeral fractures over time.

Materials and Methods

The present study was carried out in the Department of Orthopaedics, Tagore Medical College and Hospital, located in Chennai, Tamil Nadu, India. This prospective study was conducted with a sample size of 30 cases from April 2019 to March 2020. All patients involved in this trial provided informed consent, ensuring their comprehension of the study's nature and objectives, and voluntarily opted to participate.

Inclusion Criteria

- Patients who consent to research
- Individuals with mature bones

Exclusion Criteria

- Medically unfit for surgery
- Pathological fractures
- Un-displaced fractures

Results

Ten patients had 30 surgeries where locking compression plates were used, six surgeries used buttress plates, three surgeries used screws, and one surgery used K-wires. Out of the twenty people in the watched group, five had results that were out of the ordinary, five had results that were acceptable, nine had results that were moderate, and six had results that were poor.

Table 1: Anatomically correct repositioning

Fragments	Patients	Score
2	10	33.33
3	12	40.00
4	8	26.67
Total	30	100.0

Except for the patients whose cases were worsened by screw pull-out and fixation failure, all twenty patients were united within about six weeks of their follow-up visit.

Table 2: Not moving bodily parts

Fragments	Patients	%
2	7	35
3	11	55
4	2	10
Total		

It could, however, cause the humeral head to fall all the way or partially, which would be out of place. The x-ray's picture of the disease doesn't always match up with how it feels, which can cause pain and problems with how things work. No matter how unlikely osteonecrosis is to happen, it needs to be treated with careful surgery that focuses on keeping blood flowing to each piece.

Table 3: Complications

Sr. No.	Complications	Patients
1.	Inability to secure or unscrew	14
2.	humeral head primary screw perforation	08
3.	Axillary nerve impairment	01
4.	Infection of wounds	06
5.	Non-union or postponed union	01
	Total	30

Discussion

To avoid avascular necrosis, the surgeon must make sure that the bones are perfectly aligned and that the attachment is strong, all while keeping as much blood flow as possible to the femoral head. The most recent study suggests that strong fixation and anatomical reduction of the fracture are necessary for a good functional outcome after a shoulder fracture, no matter what method or implant is used [7-9]. Also, shoulder functional treatment needs to start right away for the best benefits. Strong internal stabilization has been used more and more in surgeries for proximal humeral fractures over the past few years [8-10]. The standard plate osteosynthesis method didn't work as well as it could have for older people with osteoporosis.

Standard plate osteosynthesis has been shown to be effective in treating people with good bone quality in the past. Esser's study of a cloverleaf plate led to important results, with an ASES score of 84.6%. A prospective study from 2006 found that using cloverleaf plates was linked to an average Constant score of 72.4 points. In addition, it was shown that 59% of patients who got treatment had good or great outcomes [9-11].

Wachtl *et al.* used Prevot nails in their study and found that the average Constant-Murley score went up by 63 points during the follow-up time. In this study, a mean Constant-Murley score of 63.44 points means that the clinical result was good. A meta-analysis shows that the short-term results of external fixation and internal stabilization of proximal humerus fractures are about the same. Previous research has shown that there is a link between the original level of functioning and the long-term outcome, so the short follow-up period of our study shouldn't cause too many concerns [12-14].

The outcome seems to depend on a number of things, such as how bad the fracture is, how the bone is aligned anatomically, what caused the injury, how good the bone is, how long it has been since the injury and surgery, whether there are any other injuries going on at the same time, and how precisely the implant is placed and held in place [15-17]. A much better therapeutic outcome happened when an exact anatomical reduction was achieved and the plates were placed correctly. The Constant-Murley score went down a lot when an anatomical reconstruction failed or when a nonanatomical reconstruction was picked during surgery [18-20].

Subacromial contact can happen if the plate is not at the right height on the shaft. The Constant-Murley score goes down by a large amount because of this. Six of the people in the study had bad affects. Two patients developed humeral head osteonecrosis, two patients had ongoing shoulder pain, one patient had a dislocation that wouldn't go away after surgery, and another

patient had a screw come loose from the humeral head. Our research showed that 8% of people got infections, which is about the same as the 2.5% infection rate [21-23].

Recent research shows that the rate of necrosis for 3- and 4-part fractures can be anywhere from 0% to 50%, depending on the osteosynthesis method used. Our results about how often aseptic necrosis happens are in line with the lower end of the range that other studies have found. The high amount of primary stability may be one reason why avascular necrosis doesn't happen very often. It was found that using rigid internal fixation and correctly realigning the tuberosities led to a large improvement in functional outcomes. Our results show how important it is to carefully realign patient pieces to where they were originally positioned in the body [24-29].

Conclusion

Finding the right anatomical reduction seems to have more of an effect on getting a satisfactory final functional result than the specific implant used. This part stays the same no matter what kind of implants are chosen or how they are put in. Several things affect the choice of surgical method and implant type. These include the type of fracture, the quality of the bone, the patient's goals, and the surgeon's past experience with other treatments. One of the reasons for this is definitely the learning curve that comes with using implants. Using a strict rehabilitation program will help people get better, and using a professional surgical method will reduce the risk of complications.

Funding

None

Conflict of Interest

None

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