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Reconstruction of Chronic Monteggia Fracture with Radial Head Excision: A Case Report

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A B S T R A C T

Introduction: Chronic Monteggia fracture is a rare and clinically challenging condition, characterized by a non-union fracture of the proximal ulna with dislocation of the radial head. This case report presents the case of a 42-year-old woman with a chronic Monteggia fracture diagnosed 21 years after the initial injury, highlighting the importance of a careful patient history and radiographic investigation. **Case presentation:** A 42-year-old woman presented with left elbow pain and a history of significant trauma 21 years previously. Physical examination revealed limited range of motion and radiographic examination revealed a nonfused fracture of the proximal ulna with dislocation of the radial head. The patient underwent open reduction and internal fixation (ORIF) reconstruction of the ulna and excision of the radial head. **Conclusion:** Successful surgical reconstruction of chronic Monteggia fractures results in significant improvements in the patient's function and quality of life. This case report emphasizes the importance of early diagnosis and timely surgical intervention to prevent long-term complications and achieve optimal functional outcomes.

1. Introduction

Monteggia fracture, an injury entity first identified by Italian surgeon Giovanni Battista Monteggia in 1814, is a complex combination of proximal ulna fractures accompanied by dislocation of the radial head. These injuries, which often result from high-energy trauma such as a fall on an outstretched arm or a direct impact on the forearm, present unique diagnostic and therapeutic challenges for the orthopedic practitioner. The complexity of a Monteggia fracture lies in the close anatomical relationship between the ulna and radius, the two long bones that make up the forearm. The ulna, the longer and more medial bone, articulates with the humerus at the elbow joint and with the radius at the proximal and distal radioulnar joints. The radius, the shorter, lateral bone, also articulates with the humerus at the elbow joint and with the carpal bones at the wrist. The structural and functional integrity of these two bones is critical for normal forearm movement, including flexion, extension, supination, and pronation. Monteggia fractures can be classified into several types based on the direction of dislocation of the radial head and the presence or absence of additional fracture fragments. The Bado classification, the most commonly used, divides Monteggia fractures into four types: Type I: Fracture of the proximal ulna with anterior dislocation of the head of the radius; Type II: Fracture of the proximal ulna with posterior dislocation of the head of the radius; Type III: Fracture of the proximal ulna with lateral dislocation of the head of the radius; Type IV: Fracture of the ulna and proximal radius with anterior dislocation of the radial head. The injury mechanism underlying a Monteggia

fracture usually involves a combination of axial, bending, and rotational forces on the forearm. Axial forces, produced by a fall on an outstretched hand or a direct impact on the forearm, cause a fracture of the proximal ulna. Bending forces, which occur when the forearm is forced into a valgus or varus position, cause dislocation of the radial head. Rotational forces, which occur when the forearm undergoes forced supination or pronation, can worsen dislocation of the radial head and cause ligament and other soft tissue injuries.[1,2]

Diagnosis of a Monteggia fracture can be challenging, especially in cases with unclear trauma history or nonspecific symptoms. Standard radiographic examination, including anteroposterior and lateral projections of the elbow, is often sufficient to identify ulna fractures and dislocations of the radial head. However, in some cases, additional examinations such as a CT scan or MRI may be needed to evaluate in more detail injuries to ligaments, cartilage and other soft tissues. Management of a Monteggia fracture depends on several factors, including the patient's age, activity level, degree of elbow instability, and the presence of complications such as neurovascular injury or compartment syndrome. In most cases, open reduction and internal fixation (ORIF) is the recommended treatment option to achieve adequate anatomical reduction and stability. Chronic Monteggia fracture, as described in this case report, is a rare but clinically challenging condition. This fracture is defined as a Monteggia fracture that does not unite or malunion more than three months after the initial injury. Diagnosis of chronic Monteggia fractures is often delayed for a variety of reasons, including unclear trauma history, nonspecific symptoms, and lack of clinical suspicion on initial examination. The consequences of an untreated chronic Monteggia fracture can be significant, including chronic pain, elbow instability, limited range of motion, and degenerative arthritis. Therefore, timely diagnosis and surgical intervention are essential to prevent long-term complications and achieve optimal functional outcomes.[3,4]

2. Case Presentation

A 42-year-old woman presented to the orthopedic clinic with a chief complaint of left elbow pain that had worsened over the past month. Pain is felt especially when doing activities that involve elbow movement, such as lifting objects or rotating the forearm. The patient also reported limited movement in the left elbow, especially when attempting to fully straighten or bend the elbow. The patient's medical history revealed that she had experienced a significant injury to the left elbow 21 years ago. At that time, the patient was 21 years old and had a single motorbike accident at moderate speed. The patient falls to the left with the left arm bent and the body supported. As a result of the accident, the patient experienced pain and swelling in the left elbow. However, the patient did not seek medical help from an orthopedic specialist. Instead, patients choose to seek traditional medicine. After some time, the pain and swelling in the left elbow decreased, but the patient felt that the movement of her left elbow was not as normal as before. Patients also often feel a "crack" sensation in the left elbow, especially when performing certain movements such as prostrating during prayer. Over the past 21 years, the patient has learned to live with limited mobility and discomfort in her left elbow. However, in the last month, the pain in the left elbow has gotten worse and interfered with the patient's daily activities. This encourages patients to seek medical help from an orthopedic specialist.

Physical examination revealed tenderness in the left elbow, especially in the olecranon area and radius head. There is mild swelling around the left elbow, but there are no signs of acute inflammation such as redness or increased temperature. The range of motion of the left elbow was significantly limited, especially in flexion, extension, supination, and pronation. The strength of the muscles around the left elbow is also reduced compared to the right elbow. Neurovascular examination showed normal results, there were no signs of nerve damage or impaired blood flow to the left forearm. A radiographic examination of the left elbow in two projections (anteroposterior and lateral)

revealed an interesting picture. There was an old fracture of the proximal third of the left ulna that had healed with malunion, characterized by varus angulation and hypertrophic callus formation. In addition, there was an anterior dislocation of the left radial head (Figure 1). Based on clinical and radiographic findings, the patient was diagnosed with Bado type II chronic Monteggia fracture. Chronic Monteggia fracture is a rare condition in which a fracture of the proximal ulna and dislocation of the head of the radius is not treated properly at the time of the initial injury, resulting in persistent anatomical and functional abnormalities.

After considering the patient's age, activity level, and degree of elbow instability, the team of doctors decided to perform ORIF reconstruction of the left ulna with plate and screw installation, as well as excision of the left radius head. The goal of this procedure is to restore bone stability and alignment, improve elbow range of motion, and reduce pain. The surgical procedure went smoothly without complications. After surgery, patients undergo an intensive rehabilitation program that includes muscle strengthening exercises, increasing range of motion, and functional exercises. Postoperative control radiographs showed that the plate and screws were well installed in the left ulna (Figure 2). Eight weeks after surgery, the patient showed significant improvement in left elbow function. Pain is drastically reduced, range of motion increases, and the patient can perform daily activities such as opening jars, writing, preparing food, carrying a briefcase, cleaning the back, and cutting fruit without difficulty (Figure 3). The patient's DASH assessment was 15.8, indicating that the patient experienced little difficulty in carrying out daily activities. The patient's MEPS score was 100, indicating excellent results in terms of pain, stability, range of motion, and elbow function. Even though the results of the operation were very satisfactory, the patient still complained of mild pain and weakness in the left hand when carrying heavy objects (>3 kg). This is likely caused by the muscle strength not yet recovering optimally and still being in the process of adapting to anatomical changes after surgery. The team of doctors advised the patient to continue the rehabilitation program and avoid activities involving heavy loads on the left hand for a while.

Figure 1. A 42-year-old woman fell from a motorbike and suffered an injury to the left elbow (chronic Monteggia fracture sinistra). (1) Radiograph before ORIF reconstruction. (2) Control radiograph after ORIF reconstruction. (3) Observation at the 8th week after surgery, the patient can open jars, write, prepare food, carry a briefcase, clean the back, and cut fruit.

3. Discussion

Chronic Monteggia fracture is a rare condition, but presents unique diagnostic and therapeutic challenges for the orthopedic practitioner. This condition is defined as a Monteggia fracture that does not heal or develops malunion more than three months after the initial injury. The uniqueness of chronic Monteggia fractures lies in the frequent delay in diagnosis, even decades after the initial trauma, as occurred in the case presented in this report. There are several factors that contribute to the delay in diagnosis of chronic Monteggia fractures. First, an unclear or incomplete trauma history is often a major obstacle. Patients may not clearly remember the traumatic event that led to the Monteggia fracture, especially if the injury occurred in childhood or adolescence. Additionally, patients may not seek immediate medical attention after injury for a variety of reasons, such as lack of awareness of the severity of the injury or limited access to healthcare. Second, the symptoms of chronic Monteggia fractures are often nonspecific and can mimic other musculoskeletal conditions, such as osteoarthritis, tendinitis, or bursitis. Pain, swelling, and limited movement of the elbow are common symptoms that can be found in various conditions, making it difficult to diagnose chronic Monteggia fractures based on clinical symptoms alone. Third, lack of clinical suspicion at initial examination can also lead to a delay in diagnosis. Chronic Monteggia fracture is a rare condition, so doctors may not always consider this diagnosis in patients with non-specific elbow complaints. In addition, standard radiographic examination may not always reveal the anatomical abnormalities typical of chronic Monteggia fractures, especially if malunion or significant bony deformity is present.[5-7]

A delay in diagnosis of chronic Monteggia fractures can have a serious impact on the patient's prognosis. Over time, anatomical abnormalities caused by untreated Monteggia fractures can lead to degenerative changes in the elbow joint, such as osteoarthritis, which is characterized by cartilage damage, osteophyte formation, and joint inflammation. This can cause chronic pain, stiffness, and limited mobility in the elbow, which significantly interferes with the patient's daily activities and quality of life. Additionally, elbow instability caused by chronic Monteggia fractures can lead to recurrent subluxation or dislocation of the radius head, which can worsen joint damage and cause more intense pain. In severe cases, untreated chronic Monteggia fractures can cause damage to the nerves or blood vessels around the elbow, which can result in serious neurological or vascular complications. This case report highlights the importance of a careful patient history and comprehensive radiographic investigation in the diagnosis of chronic Monteggia fracture. A detailed history of trauma, even if it occurred decades previously, can provide valuable clues regarding the possibility of a chronic Monteggia fracture. Therefore, doctors must take the time to thoroughly explore the patient's medical history, including history of trauma, previous treatment history, and current symptoms. Standard radiographic examination, including anteroposterior and lateral projections of the elbow, is an important initial step in the evaluation of patients with suspected chronic Monteggia fractures. However, in cases with an unclear history of trauma or questionable radiographic findings, additional examinations such as a CT scan or MRI may be necessary to evaluate in more detail the anatomical abnormalities and assess the extent of joint damage. In the case presented in this report, the diagnosis of chronic Monteggia fracture was made 21 years after the initial injury. This suggests that chronic Monteggia fracture may be a missed diagnosis, even in patients with a history of significant trauma. Therefore, physicians should always be alert to the possibility of chronic Monteggia fractures in patients with non-specific elbow complaints, especially if there is a history of trauma in the past.[8-11]

Management of chronic Monteggia fractures is a challenge in the field of orthopedics, because it involves the anatomical and functional complexity of the elbow joint. Therapeutic decisions must consider individual patient factors, injury characteristics, and

expected functional goals. In this case, we will discuss in depth the approach taken in treating a case of chronic Monteggia fracture in a 42 year old woman, with a focus on ORIF reconstruction of the ulna and excision of the head of the radius. The patient's age plays an important role in determining treatment options. In young, active patients, the main goal is to restore optimal elbow function to support daily activities and sports. In older patients, considerations may be more focused on reducing pain and improving basic function. The patient's activity level prior to injury is an important factor in determining post-treatment functional goals. Athletes or individuals with physically demanding jobs may require more aggressive recovery to return to previous levels of activity. The degree of instability of the elbow joint due to chronic Monteggia fracture varies greatly. Instability can be assessed through physical examination, radiographic stress tests, and imaging such as CT scans. The higher the degree of instability, the greater the likelihood that surgical intervention will be required to restore joint stability. Complications such as degenerative arthritis, nerve damage, or vascular disorders can affect treatment options and long-term prognosis. Arthrosis of the elbow joint is often the main problem in chronic Monteggia fractures, especially if there is unreduced dislocation of the radial head. Malunion of proximal ulna fractures causes angulation deformity that can compromise elbow function. ORIF reconstruction allows the correction of this deformity and restoration of normal bone alignment. The placement of plates and screws provides the stability necessary for optimal bone healing. This is especially important in chronic Monteggia fractures, where callus formation may be inadequate. By restoring bone alignment and stability, ORIF reconstruction can improve the elbow range of motion that was previously limited due to deformity and pain.[12-15]

Radius head excision is performed due to an irreparable dislocation, namely a dislocation that cannot be repaired with closed manipulation. Untreated dislocation of the radial head can cause chronic pain, elbow instability, and joint cartilage damage, which can ultimately progress to degenerative arthritis. Irreparable dislocation of the radial head can cause significant pain due to abnormal friction between the bones. Radius head excision removes this source of pain. By removing the dislocated radial head, excision can increase the range of motion of the elbow, especially in pronation and supination movements. Radius head excision can prevent or slow the progression of degenerative arthritis of the elbow joint by removing the source of friction and irritation. In this case, the patient is 42 years old, so age considerations are important in decision making. Although the patient was relatively young, the long history of injury and the presence of malunion indicated that ORIF reconstruction was necessary to correct the deformity and restore elbow function. Excision of the radial head was chosen because of the irreparable dislocation and the potential for degenerative arthritis if left untreated. After surgery, patients undergo an intensive rehabilitation program that includes muscle strengthening exercises, increasing range of motion, and functional exercises. The results achieved were very satisfactory, with significant improvements in pain, range of motion, and ability to perform daily activities. High DASH and MEPS scores indicate that the patient's quality of life is significantly improved after surgery.[14-16]

Open reduction and internal fixation (ORIF) reconstruction of chronic Monteggia fractures is a complex surgical procedure and demands significant skill and experience from the orthopedic surgeon. This procedure aims to treat the complex deformity that occurs due to a non-united fracture of the proximal ulna and prolonged dislocation of the radial head. The primary goals of ORIF reconstruction are to restore stability to the elbow joint, improve range of motion, reduce pain, and improve overall arm function. Chronic Monteggia fractures present a number of unique challenges that differentiate them from acute fractures. First, long-standing bone deformity is often accompanied by adaptive changes in the soft tissue around the elbow joint, including joint capsule

contracture, muscle fibrosis, and scar tissue formation. These changes can make reduction of fractures and dislocations more difficult, as well as limit the potential for restoration of range of motion after surgery. Second, chronic Monteggia fractures are often accompanied by damage to the articular cartilage in the elbow joint. This damage can take the form of erosion, fissures, or even partial loss of cartilage. Articular cartilage damage can cause pain, stiffness, and joint instability, and increase the risk of developing osteoarthritis later in life. Third, chronic Monteggia fractures can involve injury to the medial and lateral collateral ligaments of the elbow joint. These ligaments play an important role in maintaining the stability of the elbow joint during flexion, extension, supination and pronation movements. Ligament injuries can cause joint instability, which can impair arm function and increase the risk of re-injury. ORIF reconstruction of chronic Monteggia fractures begins with an appropriate surgical approach. The posterior approach is the most commonly used approach, as it provides good access to the proximal ulna and head of the radius. After opening the soft tissue, the surgeon will perform an osteotomy of the ulna to correct the angulation and rotation deformity. The ulna fracture fragment is then reduced and fixed with plates and screws. Radius head dislocation can be reduced directly or with the help of a joystick technique. If the radius head is significantly damaged or cannot be reduced stably, then excision of the radius head may be considered. After reduction of the fracture and dislocation, the stability of the elbow joint is thoroughly evaluated. If there is ligament instability, ligament reconstruction can be performed using a tendon graft or other appropriate technique. After the reconstruction procedure is complete, the surgical wound is closed layer by layer. The patient will then undergo an intensive rehabilitation program to restore muscle strength, range of motion, and overall arm function. The results of ORIF reconstruction in chronic Monteggia fractures vary depending on several factors, including patient age, activity level, degree of deformity, articular cartilage damage, and the presence of complications. In general, patients can experience significant improvements in pain, range of motion, and arm function after surgery. Clinical studies show that ORIF reconstruction of chronic Monteggia fractures can result in significant improvements in DASH and MEPS scores. The DASH score is an assessment tool used to measure the level of disability in the arms, shoulders and hands. The MEPS score is an assessment tool used to measure functional outcomes in the elbow joint. In this reported case, a 42-year-old woman with a chronic Monteggia type II Bado fracture underwent ORIF reconstruction of the ulna and excision of the head of the radius. Eight weeks after surgery, the patient showed significant improvement in elbow function. Pain is drastically reduced, range of motion is increased, and patients can perform daily activities without difficulty. The patient's DASH score was 15.8, indicating that the patient experienced little difficulty in carrying out daily activities. The patient's MEPS score was 100, indicating excellent results in terms of pain, stability, range of motion, and elbow function. Even though the results of the operation were very satisfactory, the patient still complained of mild pain and weakness in the left hand when carrying heavy objects (>3 kg). This is likely caused by the muscle strength not yet recovering optimally and still being in the process of adapting to anatomical changes after surgery. The team of doctors advised the patient to continue the rehabilitation program and avoid activities involving heavy loads on the left hand for a while. ORIF reconstruction of chronic Monteggia fractures is a complex procedure and demands significant skill and experience from the orthopedic surgeon. However, with careful planning, proper surgical technique, and intensive postoperative rehabilitation, satisfactory results can be achieved. This case report shows that ORIF reconstruction can provide significant improvements in pain, range of motion, and arm function in patients with chronic Monteggia fractures.[17-19]

Postoperatively, the patient showed very encouraging progress in terms of recovery of function

of her left elbow. These improvements are evident in a variety of aspects, from a significant reduction in pain levels to a substantial increase in range of motion, allowing patients to return to their daily activities with a much greater level of comfort. One of the most striking changes that patients experience after surgery is a significant reduction in pain in the left elbow. Before surgery, the patient reported constant, bothersome pain, especially during activities involving elbow movement. This pain not only limits the patient's ability to carry out daily activities but also reduces his overall quality of life. After surgery, patients report a dramatic reduction in pain. In the first few weeks after surgery, patients still feel mild pain when doing certain movements, but this pain can be managed well with pain relievers prescribed by the doctor. As time goes by, the pain decreases until it finally disappears completely. At the eight-week post-operative examination, the patient reported feeling no pain at all in the left elbow, even when performing activities that previously triggered pain. This significant reduction in pain can be attributed to several factors. First, ORIF reconstruction successfully restores bone stability and alignment, thereby reducing irritation and inflammation in the soft tissue around the elbow. Second, the excision of the radial head eliminates the source of pain originating from dislocation and the potential for degenerative arthritis. Third, an intensive post-operative rehabilitation program helps reduce pain by increasing muscle strength, flexibility, and blood circulation around the elbow.[16-18]

In addition to the reduction in pain, the patient also experienced a substantial increase in range of motion in the left elbow after surgery. Before surgery, the patient's left elbow range of motion was very limited, especially in flexion, extension, supination, and pronation. This limitation makes it difficult for patients to carry out simple daily activities, such as eating, bathing, dressing, and combing their hair. After surgery, the patient gradually regained the range of motion in her left elbow. Initially, the patient still felt stiffness and limited movement, but with the help of intensive physical therapy, the patient was able to increase the range of motion of her left elbow significantly. Eight weeks after surgery, the patient has achieved a nearly normal range of motion of the left elbow, allowing the patient to perform daily activities with more freedom and comfort. This increase in the range of motion can be attributed to several factors. First, ORIF reconstruction successfully eliminates the mechanical resistance caused by the ulna fracture and dislocation of the radial head. Second, excision of the radial head allows freer movement between the ulna and radius. Third, a postoperative rehabilitation program that includes stretching and muscle strengthening exercises helps increase flexibility and strength of the muscles around the elbow, thereby increasing the range of motion.[17,19]

Significant improvement in left elbow function after surgery allows patients to return to daily activities with a much better level of comfort. Before surgery, patients have difficulty carrying out simple activities such as opening bottles, writing, preparing food, carrying bags, and cleaning themselves. After surgery, patients can do all these activities without difficulty and without feeling pain. The patient reported that she could perform daily activities more quickly, efficiently, and independently. She also feels more confident and satisfied with her ability to carry out daily activities. This shows that ORIF reconstruction not only improves the patient's physical function but also improves the patient's overall quality of life. To objectively evaluate treatment outcomes, patients underwent DASH and MEPS assessments eight weeks after surgery. DASH is a questionnaire used to measure the level of disability and difficulties experienced by patients in carrying out daily activities due to problems with the arms, shoulders, and hands. MEPS is a scoring system used to evaluate treatment outcomes in patients with elbow problems, taking into account factors such as pain, stability, range of motion, and function. The patient's DASH assessment result was 15.8, which indicated that the patient experienced little difficulty in carrying out daily activities. This score was much lower than the

patient's preoperative DASH score, indicating that ORIF reconstruction succeeded in significantly reducing the patient's disability level. The patient's MEPS assessment result was 100, indicating excellent results in terms of pain, stability, range of motion, and elbow function. These scores indicate that ORIF reconstruction successfully restored the patient's elbow function to nearly normal levels. Overall, the results of the DASH and MEPS assessments showed that ORIF reconstruction was successful in significantly improving the patient's quality of life. Patients experience significant pain reduction, a substantial increase in range of motion, and the ability to comfortably return to daily activities.[19,20]

4. Conclusion

Chronic Monteggia fracture is a rare but clinically challenging condition. Early diagnosis and timely surgical intervention are essential to prevent long-term complications and achieve optimal functional outcomes. ORIF reconstruction of the ulna and excision of the radial head is an effective treatment option for chronic Monteggia fractures. This case report highlights the importance of careful patient history, comprehensive radiographic investigation, and adequate surgical experience in the management of chronic Monteggia fractures.

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