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Surgical Therapy Of Ulnaris Nerve Entrapment In Cubital Tunnel Syndrome

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ABSTRACT
This case report describes the condition of ulnar nerve compression that occurs after closed reduction of elbow dislocation, which is a fairly rare complication but can cause upper limb dysfunction if not treated properly. In this case, it is emphasized the importance of making an accurate diagnosis through clinical and supporting examinations so that treatment can be given quickly and appropriately. A pinched ulnar nerve after dislocation can cause symptoms such as tingling, pain, and muscle weakness in the hand area innervated by the nerve. Therefore, this report not only highlights the process of identifying and diagnosing cubital tunnel syndrome, but also discusses the success of surgical intervention in the form of ulnar nerve release performed on the patient. In addition, more optimal results were also achieved through a planned postoperative immobilization and rehabilitation program, which helped accelerate the recovery of nerve function and reduce the risk of recurrence. Rehabilitation that includes range of motion exercises, muscle strengthening, and patient education are important factors in the overall healing process. Thus, this report provides a comprehensive overview of the importance of holistic treatment starting from diagnosis, operative measures, to rehabilitation in cases of cubital tunnel syndrome after elbow dislocation.

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INTRODUCTION

The elbow is a common location for *nerve entrapment syndrome.* The cause is multifactorial, but the anatomy and biomechanics of the elbow play a role in this process (Hidayah, D., 2019) . *Cubital tunnel syndrome (CuTS)* is the second most common compression neuropathy in the upper extremity. Previous literature suggests that soft tissues, such as the retinaculum, fibrous bands, and anconeus muscle, cause compression of the ulnar nerve, while other literature suggests that bony structures may cause tension on the ulnar nerve that runs just behind the medial epicondyle that forms the border of the cubital tunnel during elbow flexion (Nandar, 2019) .

Symptom neuropathy ulnar can appear consequence pressure on the roots nerves in the bones behind neck, compression of the plexus brachial plexus, thoracic outlet syndrome,

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or clamping at elbow, arm below, or wrist hand. Although Lots literature that discusses about syndrome tunnel cubital, the diagnosis still difficult Because patient often No realize existence clamping nerve ulnar until the symptoms Already severe and nervous experience damage. Patient generally come with deficit sensory and motor, which shows that the symptoms Already late, appropriate with poor prognosis good.Level deficit sensory and motor will influence choice treatment, which can range from treatment conservative until surgery. Deep understanding about anatomy and pathophysiology from case syndrome tunnel cubital on each patient is very important For ensure proper diagnosis and treatment (Ashabul Jannah Kholiliyah et al., 2024) .

Cubital tunnel syndrome is treated surgically using a variety of techniques with similar outcomes. Simple decompression in cases that are uncomplicated or have other conditions is less invasive and easier to perform surgically, with a lower risk of postoperative complications compared with other surgical techniques. Transposition surgery in cases of symptomatic ulnar nerve dislocation (e.g. partial or complete dislocation of the nerve during elbow flexion). This may be the primary option or may be performed if there are recurrent symptoms that require surgical revision. (Munir et al., 2021) .

The ulnar nerve is located in the elbow area which is susceptible to compression or pressure. When the elbow moves (for example when bending or straightening), the ulnar nerve can experience compression (pressure), pulling (trauma), or friction. All of these increase the risk of injury to the nerve. There are several ways or mechanisms that can cause disorders of the ulnar nerve, such as ischemia (lack of blood supply to the nerve) or mechanical compression (direct physical pressure on the nerve). Both of these conditions can damage nerve function. This study reports a case of ulnar nerve compression in a patient with a history of elbow dislocation and previous closed repositioning (Subadi et al., 2021) .

RESEARCH METHODS

This study uses a case report approach which aims to describe the management of cubital tunnel syndrome in a 43-year-old male patient with ulnar nerve compression. This approach was chosen because it can provide an in-depth clinical picture of the diagnostic process, operative actions, and postoperative recovery results. Data were obtained through physical examination, direct interviews with patients, and observations during the treatment and follow-up process.

In the initial stage, anamnesis is performed to explore the history of complaints experienced by the patient, such as pain in the elbow, tingling in the ring finger and little finger, and weakness of the hand muscles. Physical examination focuses on neurological tests, such as the Froment and Wartenberg tests, to assess the motor and sensory function of the ulnar nerve. In addition, supporting examinations such as electromyography (EMG) and imaging examinations (if available) are performed to confirm the location and degree of nerve compression (Cahyono et al., 2009) .

After cubital diagnosis tunnel syndrome is confirmed, the patient undergoes surgical procedures in the form of ulnar nerve release (*ulnar nerves release*) and repositioning the nerve to a safer position to avoid recompression. The procedure is performed under sterile

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conditions with appropriate anesthesia, then exposure of the ulnar nerve is performed, release of structures compressing the nerve, and repositioning of the nerve to a position anterior to the medial epicondyle. After surgery, patients undergo periodic observation and evaluation to assess the development of symptoms and nerve function. Evaluation is done through re-physical examination and repetition of the Froment and Wartenberg tests to ensure the success of the procedure.

RESULTS AND DISCUSSION

Report Results Case

A 43-year-old man was admitted to the hospital with complaints of cramps and pain in the elbow to the to palm left hand felt since 1 month ago. Other complaints such as weak (-), sick headache (-), fever (-), nausea (-), vomiting (-). History of trauma (+) 2 months ago Because fall from ladder with impact on the left elbow, patient brought to rs After 2 weeks post trauma and being treated in hospital with a diagnosis of left elbow dislocation and has done reposition closed left elbow joint.

On examination of vital signs, the patient was found to be in moderate pain, blood pressure 143/94 mmHG, pulse 72 times per minute (within normal limits 60-100 times per minute), temperature 36.6 ^{0} C (within normal limits 36.1-37.2 °C), oxygen saturation or SpO2 99% (within normal limits >95%), and breathing 20 times per minute (within normal limits >95%), and breathing 20 times per minute (within normal limits >95%). limit normal 16-20 time per minute). On inspection neurology consciousness or GCS 15 (E4M6V5) was obtained, which means the patient is in a state of compos mentis or full consciousness. On physical examination, the head, thorax and abdomen were found to be within normal limits.

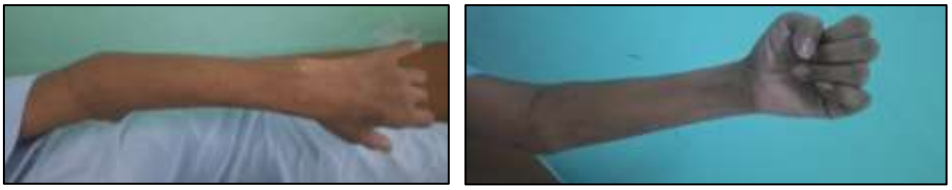

Figure 1 Clinical Photo of Patient

Examination of the local status of the left *elbow joint region* found hypothenar muscle atrophy (+), hypoesthesia of the 5th finger and half of the medial finger 4, tenderness in the elbow joint (+), Movement in the left superior extremity region is limited due to pain. NVD examination found hypoesthesia of the 5th finger and half of the medial finger 4, Range of Motion elbow joint around 10˚-120˚, A. Radialis & A. Ulnaris palpable, CRT <2 seconds. *Tinel test* at the elbow (+), *Froment test* (+), *Wartenberg test* (+). *Mc Gowan Score* grade 2.

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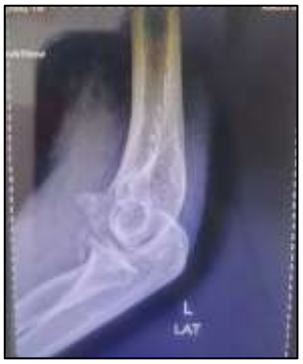

Figure 2 Plain X-ray of the left elbow joint in lateral position. New bone growth is seen in the posterior distal humerus and around the olecranon of the ulna.

In the supporting examination of the left elbow X-ray radiology lateral position, new bone growth was found in the posterior distal humerus area and around the olecranon ulna. This may indicate a pathological process. Based on these data, the patient was diagnosed with left ulnar nerve compression.

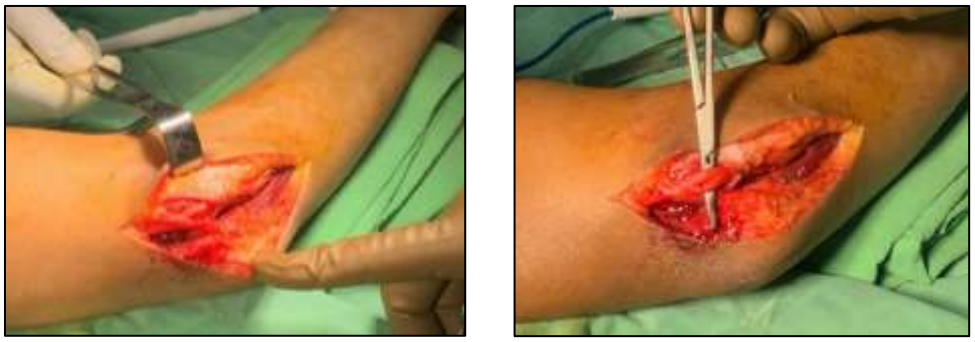

Figure 3 The operative procedure, namely releasing the pinched ulnar nerve.

The surgical procedure was performed with a medial approach, focusing on the medial epicondyle, with exploration of the cubital tunnel and release of the ulnar nerve entrapment. The patient showed good progress and the patient's clinical status returned to normal based on *the McGowan Score,* during postoperative hospitalization. After surgery, the patient underwent immobilization for 2 weeks followed by rehabilitation.

Discussion

The Ulnar Nerve is located in the elbow area passing through cubital passageway, the gap that forms between medial humeral epicondyle and olecranon. There are the following five areas which are: places potential happen ulnar nerve compression : arch *struthers,* medial intermuscular septum, cubital canal, Guyon's canal and flexor aponeurosis (Arifianto, 2021) .

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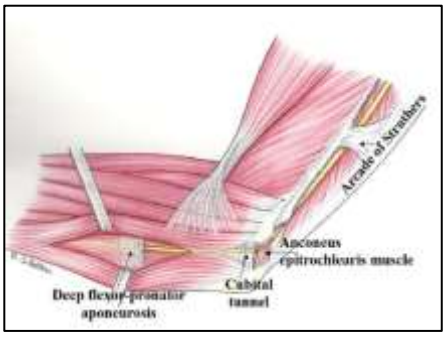

Figure 4 The ulnar nerve and potential sites of compression around the elbow.

The branches of the ulnar nerve are highly variable in number and extent. At the level of the medial epicondyle, there are usually 1-2 posterior articular branches, followed by 2-3 distal motor branches. [9-10]

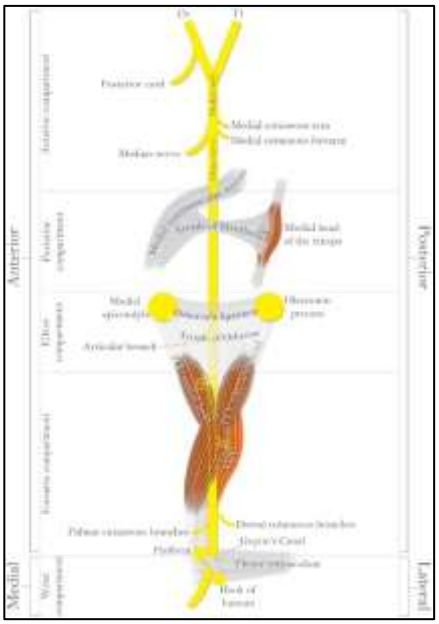

Figure 5 Branching pattern of the ulnar nerve at the elbow and wrist.

Reason *Cubital tunnel syndrome* itself can due to Because constriction from binder network, subluxation from the ulnar nerve in the medial area of *the* epycondyle, cubitus valgus, bony spurs, synovial hypertrophy, tumors, trauma in the elbow, wounds or Because pressure. Condition This often found in ordinary people get pressure on the area his elbow, like movement pulling, lifting, and throwing, and invasion bacteria (Afifah, 2019) .

In this case, ulnar nerve compression occurs due to trauma in the elbow, namely a history of dislocation of the left elbow joint. Based on several literatures, it is confirmed that the incidence of ulnar nerve injury increases in cases of elbow dislocation. Galbraith and McCullough found 6 ulnar nerve injuries out of 187 cases of elbow dislocation. Linscheid and Wheeler noted 16 ulnar nerve injuries out of 110 elbow dislocations. Watson-Jones found 12 ulnar nerve lesions in 97 cases of elbow dislocation and documented 8 cases of medial epicondyle entrapment in the joint. Post-traumatic cubital tunnel syndrome occurs in 1% to

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10% after elbow dislocation and about 12% after distal humerus fracture (Fadlilah et al., 2021) .

Diagnosis of Clamping nerve ulnar enforced based on findings clinical and electromyography. [14] Common physical examination findings associated with CuTS include impaired sensation in the ulnar nerve distribution , muscle atrophy, the first dorsal interosseous muscle, as well as *the Wartenberg, Froment,* and *Jeanne* signs (Wulaningsih et al., 2022) .

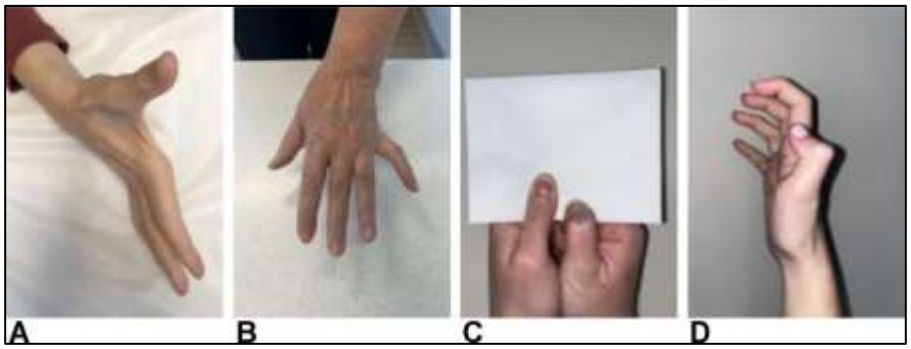

Figure 6. Physical examination findings and signs in a patient with CuTS. A. *Ulnar claw hand* with dorsalis primus interosseous muscle atrophy. B *Wartenberg's sign.* C *Froment's sign.* D *Jeanne's sign.* [9]

Provocative maneuvers that may be positive in patients with CuTS include *Tinel's sign testing* with percussion over the retrocondylar groove, as well as the elbow flexion and flexion-compression tests. [13]

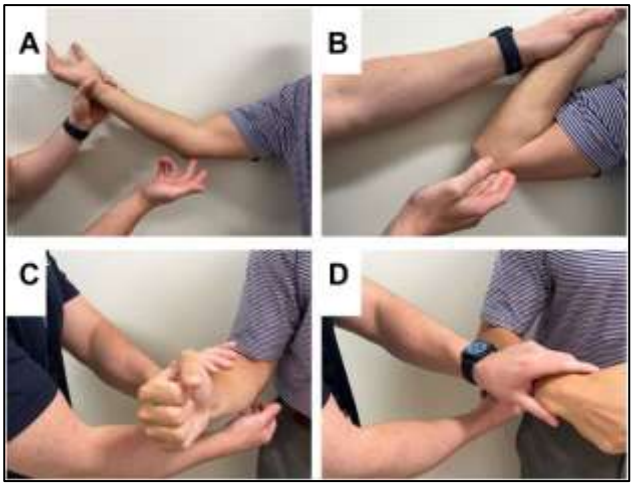

Figure 7. Maneuvers inspection physique useful provocative in the diagnosis of CuTS. A Test Tinel's sign. B Test compression flexion. C. *Scratch collapse test* before happen weakness muscle. D *Scratch collapse test* after happen weakness muscle.

Inspection imaging also contributes in establish a diagnosis and determine characteristics CuTS. Evaluation with ultrasonography (USG) can detect thickening nerves, which are characterized with:Loss pattern fascicular, Increased hypoechogenicity consequence perineural edema, and Increased cross-sectional diameter nerves, with normal

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reference as comparator (Length & Ulnaris, 2018) .

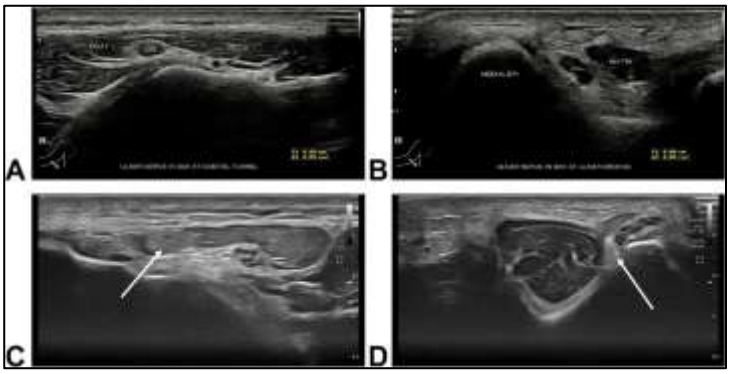

Figure 8. Ultrasonography to diagnose *cubital tunnel syndrome (CuTS).* A The ulnar nerve (UN) is located between the 2 flexor carpi ulnaris (FCU) muscles. B The ulnar nerve around the elbow in the ulnar groove between the medial epicondyle (MEDIAL EPI) of the humerus and the medial head of the triceps (MH-TRI). C. The ulnar nerve (arrow) in a patient with CuTS in the flexor carpi ulnaris. D. The ulnar nerve (arrow) in a patient with CuTS in the FCU and perched on the medial epicondyle. The morphology of the nerve is abnormally hypoechoic and has lost its normal fascicular echo pattern. [9]

Initial management for patients with non-atrophic ulnar neuropathy should include non-surgical measures such as anti-inflammatory medications, external nerve pads, and night splints with the elbow in 45 degrees of flexion, or the wrist in a neutral position depending on the etiology of the compression. In addition, occupational therapy providing education on proper positioning of the extremity may help relieve symptoms.

In patients This Operative action was taken liberation nerve ulnar pinched, pinched nerve ulnaris at the elbow, both in patients with or without complications, done with handle the cause, freeing trapped nerves, as well as do anterior transposition submuscular or subcutaneous.

In literature, the debate about which of second procedure the one that is more Good has Lots discussed. Transposition subcutaneous found own morbidity more low compared to transposition submuscular. However, transposition submuscular recommended For cases where transposition subcutaneous previously fail.

Surgical treatment for *cubital tunnel syndrome* with various technique surgery still will produce same results. Surgical outcomes remain stable in the long term, with treatment outcomes more than 20 years old showing that most patients experience similar outcomes to those seen 1 year after surgery, with only a small number of patients experiencing deterioration. Reoperation occurred in only 15.4 % of patients, indicating that the initial procedure was largely effective. Based on these findings, surgery remains an effective option for ulnar nerve entrapment.

In this patient underwent immobilization for 2 weeks followed by rehabilitation. Rehabilitation postoperative cubital *tunnel syndrome* plays a role role important in recovery function nerve ulnaris. Immobilization start at the elbow can help protect nerves, reduce risk of hematoma, and prevent formation network scars, but duration immobilization must

restricted so as not to hinder recovery. Proper joint exercises and physiotherapy can reduce pain, numbness, and adhesion network postoperatively, although exercise excessive can cause injury repeat on nerves ulnaris. Therefore that, selecting the right rehabilitation strategy, including monitoring strict to practice and use modality stimulation nerves, very important For minimize complications as well as speed up recovery nerve function. [20]

CONCLUSION

This case report describes the condition of ulnar nerve compression that occurs after closed reduction of elbow dislocation, which is a fairly rare complication but can cause upper limb dysfunction if not treated properly. In this case, it is emphasized the importance of making an accurate diagnosis through clinical and supporting examinations so that treatment can be given quickly and appropriately. Ulnar nerve compression after dislocation can cause symptoms such as tingling, pain, and muscle weakness in the hand area innervated by the nerve. Therefore, this report not only highlights the process of identifying and diagnosing cubital conditions tunnel syndrome, but also discusses the success of surgical intervention in the form of *ulnar nerves release* performed on the patient. In addition, more optimal results are also achieved through a planned postoperative immobilization and rehabilitation program, which helps accelerate the recovery of nerve function and reduces the risk of recurrence. Rehabilitation that includes range of motion exercises, muscle strengthening, and patient education are important factors in the overall healing process. Thus, this report provides a comprehensive overview of the importance of holistic treatment starting from diagnosis, operative action, to rehabilitation in cases of cubital tunnel post-elbow dislocation syndrome.

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