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Effect of physiotherapy rehabilitation on Volkmann ischemic contracture- A case study

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Abstract

This single subject case study was conducted to study the effectiveness of physiotherapy and rehabilitation in Volkmann ischemic contracture patient. Subject was 65 years old male with inability to move the left elbow and hand since 30 years associated with difficulty in performing activities of daily living. Subject was given active physiotherapy and splinting for 7 days. Data was analysed based on the change in the pain intensity and range of motion from day 1 to day 7 where pain was reduced by 3-4 points on visual analogue scale and improvement in range of motion was seen at elbow joint by 105 degree flexion, wrist plantar flexion 80 degree and MCP 80 degree. Thus we can conclude that seven day physiotherapy and rehabilitation showed improvement in ROM and pain in Volkmann ischemic contracture.

Keywords: Volkmann ischemic contracture, physiotherapy, rehabilitation.

Introduction

The limbs contain muscles in compartments enclosed by bones, fascia and interosseous membrane. A rise in pressure within these compartments due to any reason results in compartment syndrome. Compartment syndrome usually occurs after an injury as a result of swelling and bleeding. The excessively high pressure in this syndrome interferes with the flow of blood supplying the affected tissues. This may lead to an emergency, which may require surgery to prevent the chances of permanent tissue injury [1].

After an injury, blood or interstitial fluid may accumulate in the compartment. The fascia in the compartment is tough and cannot expand easily as a result the normal pressure in the compartment rises, which prevents adequate flow of blood to the tissue in the compartment. This may lead to severe tissue damage along with loss of function of body part and even death [1].

About three-quarters of the time, acute compartment syndrome is caused by a broken leg or arm. Acute compartment syndrome can even take place after trauma without bone fractures which include: Crush injuries, Burns, bandaging that is overtight, prolonged compression of a limb during a period of unconsciousness, surgery or damage blood vessels of an arm or leg, A blood clot in a blood vessel in an arm or leg, extremely vigorous exercise especially eccentric movements.

Another type of compartment syndrome, called chronic compartment syndrome, develops over days or weeks. Also called exertional compartment syndrome, it may be caused by regular, vigorous exercise. The lower leg, buttock, or thigh is usually involved.

A complication of compartment syndrome is Volkmann's ischaemic contracture. It is due to infarction produced by the arterial spasm of the main artery to an extremity. This produces ischaemia of the muscle bellies which results in necrosis and is later replaced by fibrous tissue causing contractures [2].

Impending Volkmann's ischaemia is detected by 6 P's – pain, pallor, paraesthesia, paralysis, pulselessness, positive passive stretch test [3].

Medical management for Volkmann's ischaemic contracture in acute cases is the removal of all tight encircling bandages. In case of no improvement a surgical fasciotomy is done [2].

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Surgical management involves Max Pages muscle sliding operation, neurolysis, tendon transfers in moderate cases and seddons carpectomy, arthrodesis and amputation [2].

Case

We present a case of a 65 year old male, farmer by occupation who came with complains of inability to move the left elbow and hand since 30 years associated with difficulty in performing activities of daily living.

There was a history of injury where the patient had a fall on the same side 30 years back while working in the field. He went to a local doctor and was diagnosed with supracondylar fracture of the humerus and a cast was applied. After removal of the cast which was after a month he experienced pain and swelling. He ignored it and continued doing his activities of daily living with the other unaffected extremity.

He then noticed his affected extremity was getting thinner and weak. He still did not consult any doctor and his family helped him perform his day to day chores.

The patient reported on visual analogue pain scale a rating of 7.4. On observation we observed that the patient had flexion at the elbow and wrist along with flexion at the 2nd, 3rd, 4th and 5th proximal interphalangeal joints.

On examination there was pain at the wrist joint, paraesthesia and a positive passive stretch test for the wrist flexors. On special test Volkmann's sign was positive (the test consists of extending the wrist which exaggerates the deformities and on flexion deformities appear less permanent).

Elbow flexion was 115^o and extension could not be assessed. Also wrist plantar flexion was 90^o.

Metacarpophalangeal flexion was 85^o at all affected joints.



Splinting was done for the patient. When the fingers were straight splints were applied to them and were used to extend the metacarpophalangeal range. A splint was then applied reaching from the finger-tips to the wrist-joint, and full extension of the hand was secured. This splint was then used as a lever slowly to dorsiflex the wrist, and later a splint was applied from the finger-tips to the elbow, in order to maintain and gradually to increase dorsiflexion [4].

The patient underwent physiotherapy treatment for 7 days in the form of Ultrasound on flexor compartment of the left forearm (0.8 w/cm² for 6 min).

Hot moist pack on the left forearm for 15 minutes.

Active exercises for the unaffected joints.

Light massage on the flexor compartment of the left forearm for 10 minutes.

After the 7 days of treatment the patient was reassessed for his pain and the ROM of the wrist using the visual analogue scale and the goniometer.

Result

The patient reported a reduction of pain by 3.4 points on the visual analogue scale and an improvement in the range of motion at elbow by 105^o flexion, wrist plantar flexion 80^o and MCP 80^o.

Discussion

Physiotherapy in the form of thermotherapy, massage and ultrasound along with splinting of the elbow, wrist and the metacarpophalangeal joints helped in alleviation of pain in the patient. Thus the case depicted the emphasis of the role of the physiotherapist in assessing the pain and alignment in a complex joint such as the wrist and the elbow joint and understanding the role performed by every component in the stability and pain reduction in the tissues of the flexor compartment in the left forearm. A study done by Robert Jones on Volkmanns Ischemic Contracture suggested that heat therapy, light massage and splinting can be used in reducing pain and improving function. Another study done by Henry Meyerding and Frank Krusen showed the importance of physiotherapy in the improvement of Volkmanns isachemic contracture using heat, and massage however they used deep friction massage and this study used lighter massage techniques [5].

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