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Updates in Diagnosis and Management of Forearm Compartment Syndrome

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ABSTRACT

In children, compartment syndrome of the forearm often arises from supracondylar fractures, whereas in adults, distal radius fractures are the predominant cause. In 48% of instances, diagnosis was based exclusively on clinical assessment, while in the remaining 52% of cases, a combination of intracompartmental pressure measurement and clinical assessment was used. Several methods, including wick catheters, slit catheters, the Whitesides method, and the Stryker compartment pressure measurement device, were employed to measure intracompartmental pressure. The treatment approach of choice was fasciotomy, with a preference rate of 73%. Out of all the patients that needed wound management, postfasciotomy skin grafting was essential in 61% of them, while secondary closure was done in 39% of cases. The most prevalent consequence, observed in 21% of patients, was neurological impairment.

KEYWORDS: Compartment Syndrome, Forearm, Treatment

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INTRODUCTION

Accurately determining the exact occurrence of forearm compartment syndrome is challenging, but it is definitely linked to fractures of the forearm and the distal radius. Elliott and Johnstone documented that 23% of cases of forearm compartment syndromes resulted from soft tissue injuries that did not involve fractures, while 18% were attributed to fractures. Currently, there is a scarcity of evidence about the etiology, management, techniques for wound closure, functional prognosis, and comorbidities associated with forearm compartment syndrome [1-3].

DISCUSSION

Forearm compartment syndrome is often caused by fracture, which is one of the most common etiologies linked with this condition. Based on our analysis of papers, distal radius fractures were shown to be the most common cause of forearm compartment syndrome. These fractures accounted for 37.5% of all fractures related with compartment syndromes in the forearm and 14.3% of all causes overall. In a study of 164 instances of acute compartment syndrome including all limbs, McQueen et al reported comparable figures. Supracondylar fractures accounted for 8 out of the 12 pediatric cases, consistent with traditional statistics. However, it seems that supracondylar fractures may not be the most common. The etiology of forearm compartment syndrome in pediatric patients, as it was historically seen. In a study conducted by Grottkau et al, they examined 131 pediatric cases of compartment syndrome from the National Pediatric Trauma Registry. They found that 74% of the cases had fractures in the forearm of the upper extremity, whereas only 15% were caused by supracondylar fractures. Bae et al. (2018) conducted a study on 33 consecutive pediatric patients, in which they observed 36 cases of acute

compartment syndrome. They documented 18 instances of upper extremity injuries, out of which 10 were cases following fractures [4-6].

Bae et al. proposed that the decrease in supracondylar fracture-related compartment syndrome may be attributed to advances in fracture treatment, including the widespread adoption of percutaneous pin fixation and cast immobilization with the elbow flexed no more than 90°. Neuroleptic malignant syndrome is a seldom-discussed etiology of forearm compartment syndrome. Individuals below the age of 35 who experience high-energy traumas and polytrauma are more susceptible to developing forearm compartment syndrome. Furthermore, Hwang et al observed that patients who experienced a distal radius fracture together with an accompanying elbow injury had a 15% occurrence of compartment syndrome, which is significantly higher than the 0.25% probability of developing compartment syndrome following a distal radius fracture alone. Compartment syndrome is often diagnosed through a thorough clinical examination that relies on a high level of suspicion. However, further tests can be used to support the diagnosis. Removing any tight bandages is an essential step to enable a precise evaluation of the limb. Regarding the utilization of compartment pressures, there was a virtually equal distribution between the number of patients diagnosed through clinical examination and those diagnosed through the addition of intracompartmental pressures. While some authors may have deemed intracompartmental pressures as superfluous for diagnosis, it is widely recommended to utilize them in obtunded individuals, polytrauma cases, and patients with ambiguous clinical signs. Different skin incisions were employed for performing a volar compartment forearm fasciotomy. The standard volar incision starts 1 cm above and 2 cm to the side of the medial epicondyle. It then crosses diagonally over the front part of the elbow and the palm side of the movable wad. The cut follows a curved path towards the center, intersecting the middle and lower third of the forearm. The cut is extended in a direction towards the ulnar side of the palmaris longus tendon to prevent damage to the palmar cutaneous branch of the median nerve. The surgical cut intersects the fold of the wrist at a specific angle and continues into the middle of the palm to perform a simultaneous procedure for releasing the carpal tunnel. Additional, infrequently used surgical cuts include the volar ulnar incision, which originates on the radial side of the flexor carpi ulnaris and extends to the medial epicondyle of the humerus, as well as the zigzag incision. When there is a forearm compartment that includes both the volar and dorsal compartments, it is advisable to release the volar compartment first. Releasing the volar compartment frequently relieves pressure in the dorsal compartment [7, 8].

Hence, it is imperative to have a compartment pressure measuring apparatus on hand in order to facilitate the measurement of dorsal compartment pressure following volar fasciotomy. If there is no enhancement in pressure measurement, a dorsal fasciotomy is required [9].

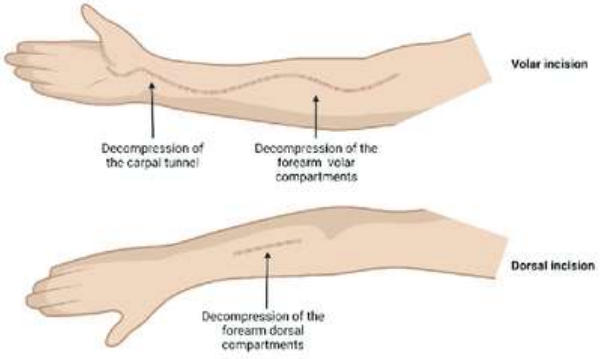

Figure 1. Incision for compartment syndrome

Figure 2. Fasciotomy

CONCLUSION

the incidence of forearm compartment syndrome was determined to be 42%, with neurological impairments being the most frequently observed consequence according to various research. Decompressing earlier will reduce the occurrence of these consequences.

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