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NEUROVASCULAR COMPLICATIONS OF DISTAL HUMERUS FRACTURES IN CHILDREN

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ABSTRACT

Introduction: Distal humerus fractures represents a common pathology in paediatric traumatology that can result in neurovascular injuries, which can be serious and require prompt medical attention. Most common complications noted are Brachial Artery Injury and Median Nerve Injury.

Objective: To determine the total number and frequency of neurovascular complications in distal humerus fractures on a period of 6 years in County Emergency Hospital of Constanta.

Material and methods: A cohort study was conducted in patients under 16 years old from 2017 to 2022. Children with pathologic fractures were excluded from this study.

Results: We diagnosed 9 patients out of 165 with nerve injuries, out of which 6 (3.6%) had Median Nerve Injury and 2 (1.2%) had Ulnar Nerve Injury, mostly in children aged 10 or less. We identified 4 (2.4%) children with brachial artery injury.

Conclusions: It is important for healthcare providers to carefully assess and monitor patients with humerus supracondylar fractures to identify and manage any potential complications. Treatment may involve immobilisation, closed reduction or surgical interventions depending on the severity of the fracture and associated complications.

Keywords: supracondyla fractures, humerus, children, neurovasdcular complications

Introduction

Among fractures that appear in childhood, distal humerus fractures play an important role, through their frequency (1, 2), and through the implication these fractures can have, like local associated injuries, or long-term recovery. Distal humerus fractures in children can result in neurovascular injuries (3), which can be serious and require immediate medical attention. Among the most frequently encountered injuries are:

- Brachial Artery Injury: Regarding the anatomical position of the brachial artery, damage can easily occur during a fracture. Injury of this artery will result in decreased blood flow to the distal segment, leading to ischemia and necrosis.
- Median Nerve Injury: As the median nerve runs through the cubital fosa it can be easily injured in case of a distal humerus fracture. Most of the times the nerve is elongated but in literarute there are quoted more severe cases where the nerve can break. Median nerve pathology can result in specific distal sensitive and motor deficiency.
- Radial Nerve Injury: The radial nerve also has a descendent trajectory through the cubital region and can be injured when a distal humerus fracture occurs.
- Ulnar Nerve Injury: The ulnar nerve

runs along inside the elbow joint and can be injured resulting in hand and fingers paresthesia.

- Compartment Syndrome: In more severe cases when the fracture of the distal humerus is accompanied by other complications, compartment syndrome can occur. This can translate to high pressure within the muscle compartments that will result in nerve compression, decreased blood flow in the distal segment and tissue damage with permanent disability.
- Volkmann`s Ischemic Contracture: This complication is rare but clinically serious because if occurred, it creates prolonged ischemia and pressure on the muscles and nerves in the forearm. It can also result in permanent muscle and nerve damage and lead to a claw hand deformity.

The aim of this study was to determine the number and frequency of neurovascular complications in distal humerus fractures on a period of 6 years in County Emergency Hospital of Constanta.

Material and methods

A cohort study was conducted in patients admitted to the County Emergency Hospital of Constanta. In total there were 165 patients, under 16 years old from 2017 to 2022 with fractures of the distal humeral shaft. Children with pathologic fractures were excluded from this study. Data on patient demographics, fracture type, mechanism of injury and neurovascular complications were collected. The primary outcome of this study was the total number and frequency of neurovascular complications.

Results

As it is visible from Figure 1, from a total number of 165 cases with distal humerus fractures, we identified nerve injuries in 9 patients, of which 6 had Median Nerve Injury (4%) and 3 of them Ulnar Nerve Injury (2%). These values seem to be lower than data from other internationally published studies (4, 5), respecting the proportions with fewer patients having injuries of the ulnar nerve compared to the median nerve. There was no radial nerve injury observed in our study.

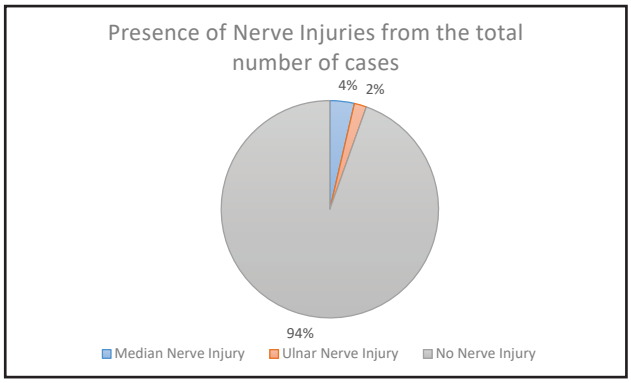


Figure 1 Presence of nerve injuries

From a total number of 9 patients under 16 y/o that associated nerve injuries, the majority is represented by children under 10 y/o (8 patients) (Figure 2).

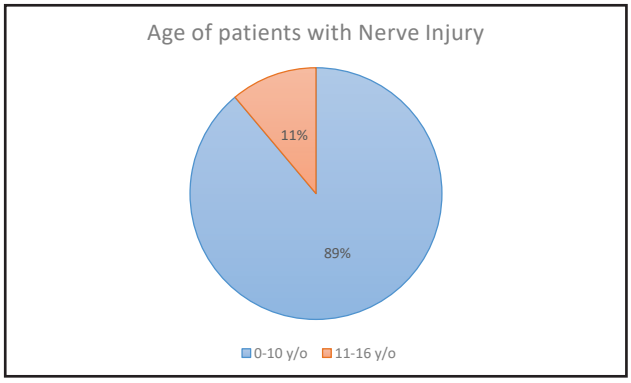


Figure 2 Age of patients with nerve injuries

When analyzing the vascular injuries, we encountered 4 cases of patients with brachial artery injury, representing 2.4% of the cases, all of them being observed in patients younger than 10 years old.

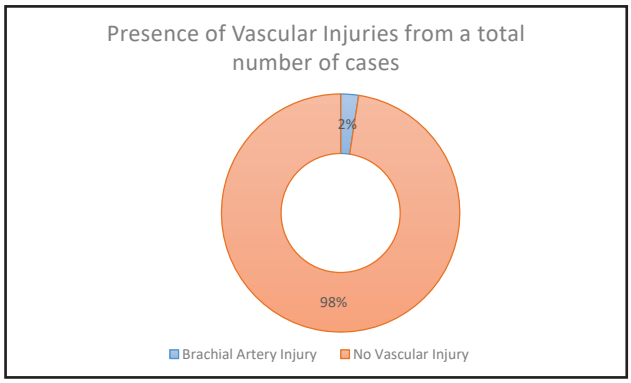


Figure 3 Presence of vascular injuries

A regularity can be seen in the results of the study. Every year, as it can be seen there are approximately 1 to 2 cases of distal humerus fractures that associate neurovascularly injuries.

Also, we observed a higher incidence of nerve injury comparing to vascular injuries in our patients.

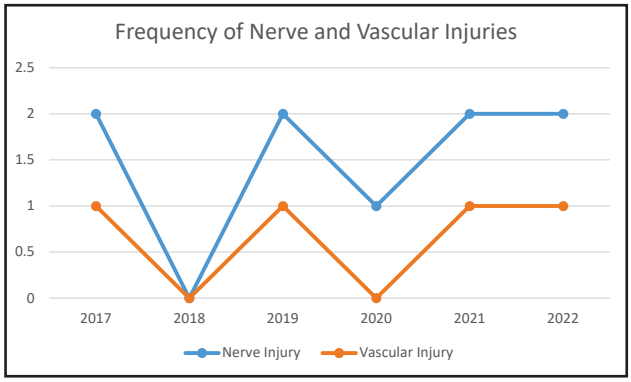


Figure 4 Frequency of nerve and vascular injuries by year

Discussions

Nerve and vascular injuries in children with distal humeral fractures represent a serious complication of the fractures. These are generally the results of the trauma, but cases of iatrogenic incidents are presented in the literature, or following the formation of the callus (6).

Performing a detailed neurovascular examination is critical in the management of distal humerus fractures in children. This examination should be done multiple times; initially upon presentation in the emergency department, and repeated after reducing the fracture to ensure that there is no neurovascular damage near the fracture site.

During the examination, the doctor should assess the patient`s sensory and motor functions of the arm and forearm, as well as the presence of distal pulse and sensitivity. Any sign of neurovascular compromise should be addressed accordingly. Some studies suggest that, fallowing orthopedic reduction blood flow recovers (7), thus a watchful waiting could be considered as a treatment option, while an earlier dated systematic review questioned the result of this approach in cases of absence of the pulse (8).

If there is a suspicion on neurovascular injury, treatment may involve surgical intervention, depending on the severity of the injury and associated complications.

Regular follow-up should be schedules to monitor the patient`s progress and closely observe that there are no long-term complications, and if needed, surgical revision (9).

Conclusions

In conclusion, neurovascular complications are relatively uncommon in distal humerus fractures in children under 16 y/o but when occurred it needs immediate management.

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