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SUPRACONDYLIC FRACTURES IN CHILDREN

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Key words: the humerus, supracondylar fracture, children, miniinvasive osteosynthesis, the brachial artery, injury.

The authors in their paper deal with treatment of supracondylic fractures of the humerus in children and they mention possibilities of treatment of these severe injuries and warn of possible complications that occurred in studied sample of 133 patients treated in the Traumatology Centre of University Hospital with Polyclinic in Ostrava.

The most severe traumatologic complication is the injury of the brachial artery, which they observed in 5.3% of their studied sample. In 3% they mentioned occurrence of reversible nerve injury. In treatment of instable supracondylic fractures of the humerus they recommend emergency miniinvasive osteosynthesis, which they performed in their hospital in 103 patients.

INTRODUCTION

Supracondylic fractures of the humerus are one of the most frequent injuries in children that occur in most cases after fall on extended elbow [1]. This is the third most frequent fracture in children with average age above 6 years and in 97% of cases these fractures are extension type. Almost in 50% of cases these fractures are dislocated where early or later complications may occur [2]. Early complications include arterial injuries in 1-2% and nerve injuries in 3-16% [3, 4].

Table 1.
Clinical set

Type of fracture	No. of cases
Gartland I	18
Gartland II	21
Gartland III	94

CLINICAL POPULATION

From 1996 to 2004 133 children with supracondylic fractures of the humerus were treated in the Traumatology Centre of University Hospital with Policlinic in Ostrava (tab. I).

94 children had dislocated fracture of Gartland type III with average age of 7.5 year (fig. 1). More than two thirds of these fractures occurred in males. In treatment of all cases of Gartland I we proceeded in conservative way. In fractures of Gartland type II and III we used reposition with percutaneous osteosynthesis by crosswise inserted Kirschner´s wires with shortening of their ends sub cutis (fig. 2).

We treated all fractures within 6 hours from the admission of a child. In 3 cases we observed traumatic reversible injury of the radial nerve. In 7 cases we diagnosed injury of arteries in the elbow region with pulsation disappearance on the radial artery of the injured extremity, which reappeared after fracture's reposition and transfixation. In one case during surgery revision we discovered

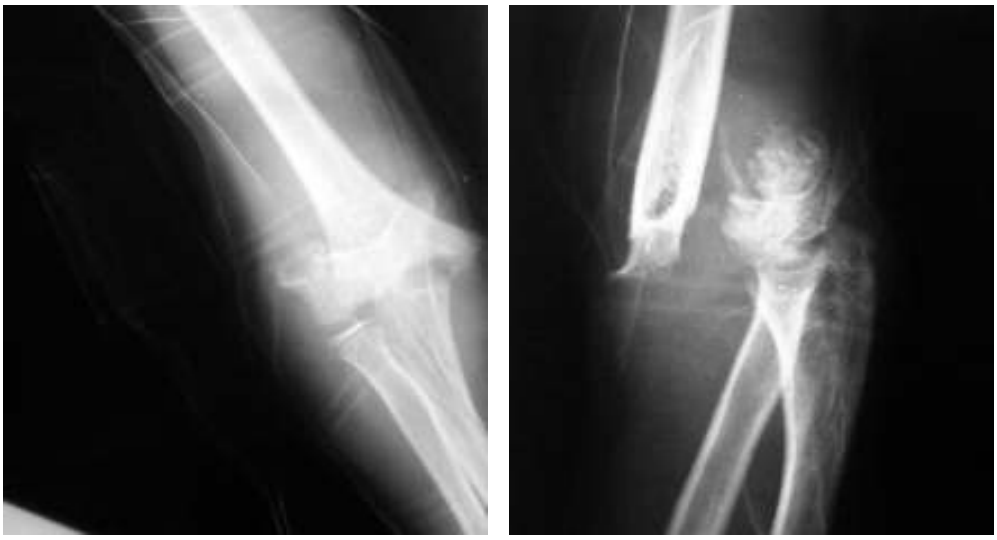

Fig. 1. Supracondylar fracture of the humerus – Gartland type III

elongation and spasmus of the brachial artery, where after reposition of fracture fragments pulsation was reestablished and in one case of compound fracture we observed discission of the brachial artery, which was treated by replacement of the injured section by venous graft.

We did not observe antebrachial compartment syndrome or Volkmann's contracture in any of the patients. When we take into consideration later complications, we observed limitation of movement in five children of our sample and one case of varus angle deformation of 20 degrees (fig. 3).

DISCUSSION

Supracondylic fractures of the humerus in children are frequent problem of traumatic surgery [1]. Development of high-energy injuries brings about increase in number of instable fractures with incidence of post-traumatic complications like vascular injury and neurological complications.

Vascular complications include fortunately mostly contusions or spasms of the brachial artery, less frequent are injuries of its adventitia or intima with subsequent thromboses or possibly arterial discission or its rupture [5]. The period of time from injury to clinical symptoms of ischemia of extremity may differ in these injuries from immediate symptoms of ischemia to its gradual progression from 12 to 14 hours, mostly caused by compression by hematoma or possibly by developing thrombosis (1-2%) [6, 7]. Therefore thorough clinical monitoring of perfusion of the injured extremity in the first days after injury is a fundamental prerequisite of a prompt diagnosis of vascular complications [8].

Neurological complications in these cases occur more frequently in 6-16%, but in most cases these fractures are of reversible nature and are usually caused by contusion or overstress of nerve trunk (neuropraxis or axonotmesis) and their function is redeveloped within several weeks or months of active conservative treatment [2].

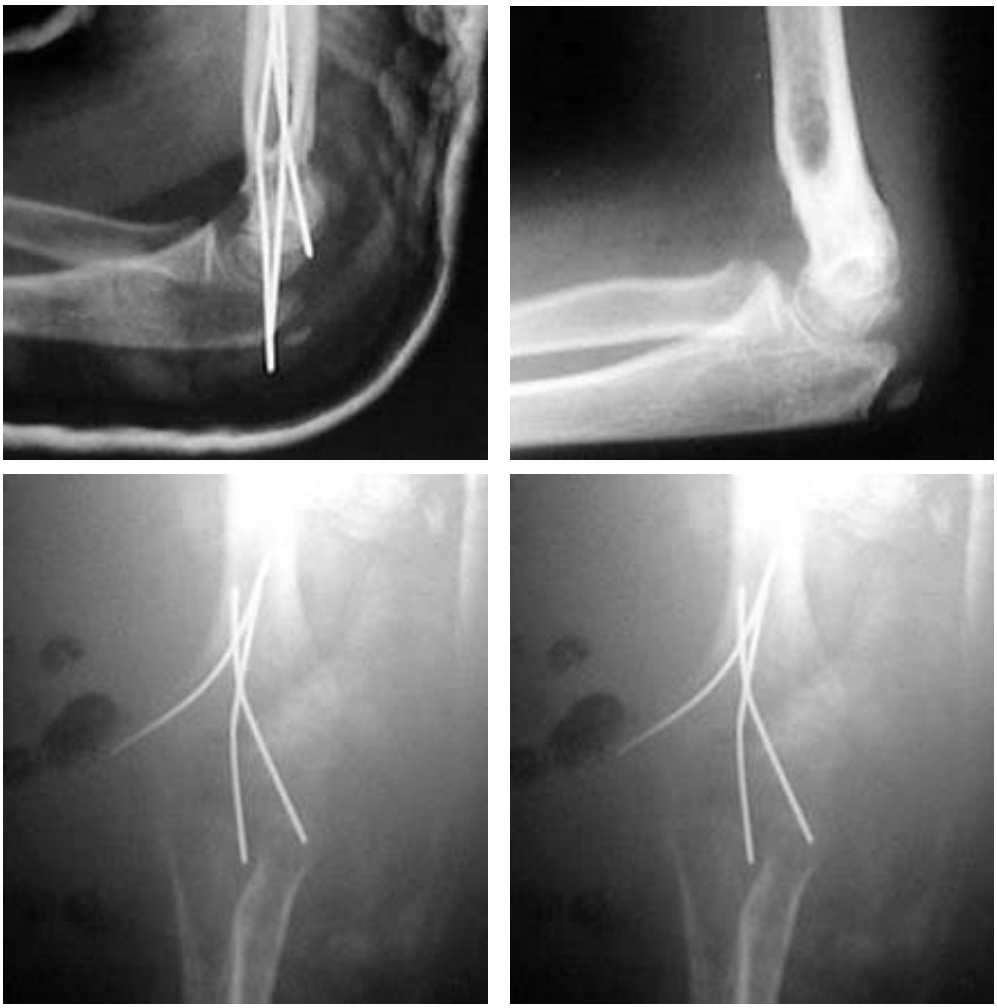

Fig. 2. Osteosynthesis with Kirschner wires

CONCLUSIONS

1. Dislocated and instable supracondylic fractures of the humerus in children still remain extremely severe problem of traumatic surgery and require very responsible approach by a traumatic surgeon.
2. Authors in their paper recommend treatment of these fractures in specialized hospitals of traumatic surgery with emergency reposition and percutaneous stabilization of crosswise Kirschner´s wires.
3. Concurrently they warn of the danger of early vascular complications that in case of a late diagnosis may result in ischemic damage of the injured extremity.

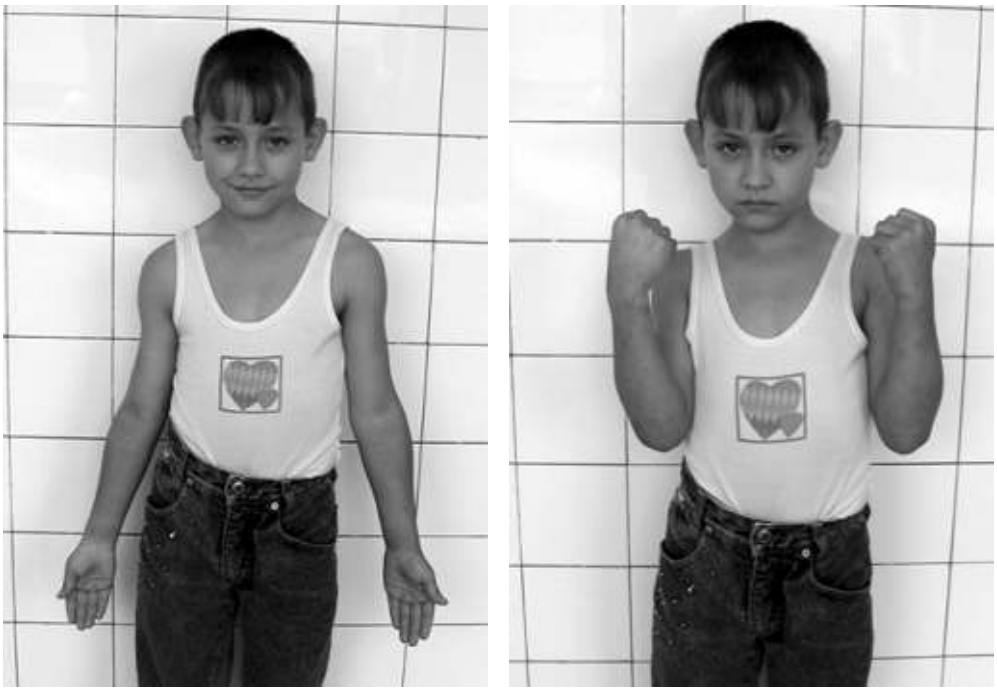

Fig. 3. Status post osteosynthesis

REFERENCES

1. *Osemlak J., Osemlak P.*: Clinical epidemiology of severe, complex elbow injuries in children. Rocznik Dziecięcej Chirurgii Urazowej, 2004, 8 (XXXII), 22.
2. *Havránek P.*: Dětské zlomeniny. Princo, Praha 1991.
3. Gál P.: Miniinvazivní osteosyntéza zlomenin horní končetiny u dětí. Kusák, Brno 2001.
4. *Kitka M.*: Kryté osteosyntézy humeru. Royal Unicorn s. r. o., Košice 2000.
5. *Pleva L., Prusenovský P., Kopáček I., Chmelová J.*: Otevřené zlomeniny u dětských polytraumat. Úraz. chir., 2003, 11 (4), 9.
6. *Pleva, L., Mazlík J., Prusenovský P.*: Končetinový kompartment syndrom. Úraz. chir., 2003, 11 (4),16.
7. *Pleva, L., Mazlík J., Prusenovský P.*: Limb compartment syndrome in children. Rocznik Dziecięcej Chirurgii Urazowej, 2003, 7 (XXXI), 41.
8. *Bajor G., Starzak P., Bijata W., Bohosiewicz J.*: Condylar fractures of the humerus in children - satisfactory results of surgical treatment with different techniques of osteosynthesis. Rocznik Dzieciecej Chirurgii Urazowej, 2004, 8 (XXXII), 63.

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NADKŁYKCIOWE ZŁAMANIA KOŚCI RAMIENNEJ U DZIECI

Słowa kluczowe: kość ramienna, złamanie nadkłykciowe, dzieci, małoinwazyjna osteosynteza, tętnica ramienna, uraz.

W pracy autorzy przedstawiają leczenie dzieci ze złamaniami nadkłykciowymi kości ramiennej, wymieniają możliwości leczenia tych ciężkich uszkodzeń i ostrzegają przed możliwymi powikłaniami, które wystąpiły w badanym materiale obejmującym 133 chorych leczonych w Centrum Traumatologii Szpitala Klinicznego w Ostravie.

Najcięższym urazowym powikłaniem jest uszkodzenie tętnicy ramiennej, które stwierdzono u 5,3% chorych oraz uszkodzenie nerwów - u 3% pacjentów. W leczeniu niestabilnych złamań nadkłykciowych kości ramiennej autorzy polecają doraźną małoinwazyjną osteosyntezę, którą wykonali u 103 pacjentów.

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