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REVIEW / PRACA POGLĄDOWA

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THE EVALUATION OF THE RESULTS OF SURGICAL TREATMENT OF FOREARM SHAFT FRACTURES IN CHILDREN USING ELASTIC INTRAMEDULLARY STABILIZATION IN OUR WARD.

PORÓWNANIE WYNIKÓW LECZENIA ZŁAMAŃ NADKŁYKCIOWYCH KOŚCI RAMIENNEJ U DZIECI METODA ZAMKNIĘTEJ I OTWARTEJ REPOZYCJI ZE STABILIZACJĄ DRUTAMI „K”

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Summary

Children supracndylar fractures are among the most common fractures of the elbows. The variety of methods of treatment indicates that there is no unified and effective surgical treatment for all types of fractures. The aim of the study was clinical and radiological evaluation of the comparative results of treatment of supracondylar fractures of the humerus in children by closed reduction method for stabilizing wires “K” and open method for setting the stabilization crossed wires. We analyzed 289 cases of spracondylar fractures of the humerus in children age from 2 to 17 years old. The classification of a division of fractures of Gartland with Wilkins modification was used. The evaluation of results of treatment is based on the modified rating scales given by Faflik and Jasiński. The good outcome was achieved at 81% of patients, who were operated with the method of closed reduction, and 80% of cases after open reduction. The largest percentage of unsatisfactory results was obtained when more than 2 or incomplete repositions – usually open ones - were performed.

Streszczenie

Złamania nadkłykciowe u dzieci są jednymi z najczęściej spotykanych złamań w obrębie stawu łokciowego. Różnorodność stosowanych metod leczenia wskazuje, iż nie ma jednolitej i skutecznej techniki operacyjnej dla wszystkich typów złamań. Celem pracy była kliniczna i radiologiczna ocena porównawcza wyników leczenia złamań nadkłykciowych kości ramiennej u dzieci metodą repozycji zamkniętej ze stabilizacją drutami „K” oraz metoda otwartego nastawienia również ze stabilizacją „skrzyżną”drutami

Analizie poddano 289 przypadków złamań nadkłykciowych kości ramiennej u dzieci w wieku od 2 do 17 lat. Do klasyfikacji złamań zastosowano podział Gartlanda w modyfikacji Wilkinsa. Oceny wyników leczenia dokonano w oparciu o zmodyfikowaną skalę ocen podaną przez Faflika i Jasińskiego. Dobry wynik leczenia uzyskano u 81% chorych, operowanych metodą zamkniętej repozycji i 80% przypadków po repozycji otwartej . Największy odsetek wyników niezadowalających uzyskaliśmy u chorych u których wykonano więcej niż dwie repozycje lub niepełną repozycję, zwykle sposobem otwartym.

Powyższe analizy pozwoliły na wyciagnięcie następujących wniosków:

1. Objawy uszkodzenia nerwów kończyny górnej są częstym powikłaniem złamań nadkłykciowych kości ramiennej i ustępują po zastosowanym leczeniu
2. Transfikcja „skrzyżna” złamań nadkłykciowych kości ramiennej drutami „K” w sposób zadowalający stabilizuje odłamy w obu typach złamania (II i III wg Gartlanda)
3. Dobre wyniki daje anatomiczna, nie więcej niż dwukrotna zamknięta repozycja złamania, niezależnie od jego typu
4. Wyniki repozycji zamkniętej i otwartej ze stabilizacją drutami „K” są porównywalne

Key words: supracondylar fracture of the humerus bone, repositioning closed, repositioning open, stabilizing legs crossed wires “K”

Słowa kluczowe: złamanie nadkłyciowe kości ramiennej, repozycja zamknięta, repozycja otwarta, stabilizacja „skrzyżna” drutami Kirschera

APPLICATIONS:

1. Symptoms of upper extremity nerve damage are common complications of supracondylar fractures of the humerus and disappear after the treatment.
2. Transfixion legs crossed supracondylar fractures of the humerus wires K is stabilizing in both II and III Gartland scale
3. Good results are obtained in case of no more than twice closed reposition of fractures (regardless of type).
4. Results of closed reduction and stabilization of the open with legs crossed wires "K" are comparable.

Key words: supracondylar fracture of the humerus bone, repositioning closed, repositioning open, stabilizing legs crossed wires "K".

ADMISSION:

One of the most common injuries within the elbow in children are supracondylar fractures of the humerus. [1,2]. In most cases this type of fracture realignment has a greater degree of displacement of bone fragments. In the clinical classification we used three degree Gartland's scale, which is helpful during child's treatment.

I- The first type – non – displaced fracture fragments

II- The second type – (A and B) – displaced fracture, but the rear context is maintained with a gapping fissure to the front

III- The third type – displaced fracture fragments without contact.

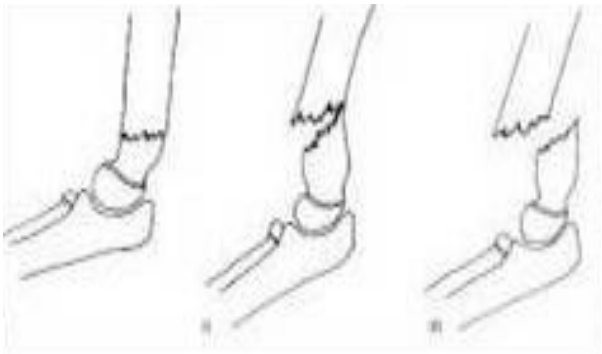

Figure 1. *Types of supracondylar fractures of the humerus in children, according to Gartland*

Rycina 1. *Typy złamań nadkłykciowych kości ramiennej u dzieci wg Gartlanda*

The way of conduct in most orthopedic centre is as follows [1,2]:

Type 1- plaster immobilization

Type II A - closed reduction and plaster immobilization for failure to stabilize closed reposition wires K and plaster immobilization

Type II B -closed or open reduction with "K" wires stabilization and plaster immobilization

Type III -closed or open reduction with "K" wires and plaster immobilization, or as an alternative, now is going to the history of functional treatment method for the help of the "ZENO" traction with plaster immobilization after setting fractures.

The variety of treatments and a large number of negative results, indicate that there is no unified and effective surgical technique of all types of fractures. Fractures are often accompanied by complications including transient damages nerves – the median radial and ulnar as well as of contracture Volkman. [1,2]

The aim of the study was clinical and radiological comparative evaluation of treatment results of supracondylar fractures of the humerus in children by closed reduction method for stabilizing wires "K" and the method of open reduction with stabilization "legs crossed" wires "K"

Material and Methods:

During the period from 1995 to 2010 in the Department of Orthopedics and Traumatology CM in Bydgoszcz 289 children were treated surgically (112 girls and 117 boys) in age from 2 – to 17 years old (~7.4 =-1.8) with a fractured humerus bone (supracondylar) type II (121 cases) and type III (168 cases), according to the Gartland. Closed reduction with stabilization wires "K" in 106 patients made curtains open reduction with "K" wires in 183 patients.

The duration of the observation was about from six months to 10 years (~4.5 years +-1.2)

The analysis of outcomes was based on modified rating scales given by Faflik and Jasiński assessing configurations in elbow range of motion and pain in the elbow [3].

Table I. The modified scale elbow function assessment according to Faflik and Jasiński

The configuration of elbow:
-proper 2
-Varus <5 degree 1
-Valgus>5 degree 0
Range of movements:
-good – bend >130 degree 2
- Extension > 10 degree
- Rotation of the forearm in the standard
- sufficient – bend 115 degree- 119 degree 1
- extension < 10 degree
- forearm rotation > 50 degree standards
-insufficient – range of movements smaller than previously
Pain:
-lack – 2
-mediocre – 1
-significant – 0

Flexor and extensor strength of elbow:
- < 5% weakening 2
- 6 - 15% weakening 1
- > 15 % weakening

In the above scale good result was the result between 8 – 12 points, satisfactorily result was the result between 4-7 points, and result was – below 3 points and less.

RESULTS:

Very good result we obtained by 233 patients (80.6 %), good by 51 (17.7 %), and bad results by 5 (1.7 %).

Result	Closed reposition and wires "K" and plaster immobilization	Open reposition and wires "K" and plaster immobilization
good	86(81%)	147(80,3%)
satisfactorily	20(19%)	31(17%)
bad	-	5(3%)

Table II. *Shortlist and compare two methods of repositioning*

Tabela 2. *Porównanie wyników obu metod repozycji*

	II type of fracture according to Gartland		
	good	satisfactorily	bad
closed repositioning + "K" wires + plaster (n=66)	55(83%)	11(17%)	-
open repositioning + "K" wires + plaster (n=55)	46(83%)	8(15%)	1(2%)**
Total	101(83,3%)	19(15,6%)	1(0,9%)

*limited repositioning **more than 2 repositions (closed), limited repositioning

Table III. *Results of surgical treatment of supracondylar fractures of the humerus in type II according to Gartland, depending on the method of repositioning*

Tabela 3. *Wyniki leczenia operacyjnego złamań nadkłykciowych kości ramiennej typu II wg Gortlanda w zależności od metody repozycji*

	III type of fracture according to Gartland		
	good	satisfactorily	bad
closed repositioning + "K" wires (n=40)	31(77,5%)	9(12,5%)	-
open repositioning + "K" wires (n=128)	101(79%)	23(18%)	4**(3%)
Total	132(78,5%)	32(19,5%)	4(2%)

* limited repositioning** more than 2 repositions (closed), limited repositioning

Table IV. *Results of surgical treatment of supracondylar fractures of the humerus in type III according to Gartland, depending on the method of repositioning.*

Tabela 4. *Wyniki leczenia operacyjnego złamań nadkłykciowych kości ramiennej typu III wg Gortlanda w zależności od metody repozycji*

Neurological deficits were found in the preoperative study in 96 cases, where 43 concerned the radial nerve, 31 median and 17 ulnar.

CASES:

Case I: 9 year - old boy with a fractured of supracondylar type 2 treated with closed reduction method (according to Gartland) and stabilization with "K" wires and plaster immobilization, with a good clinical and radiological effect after 4 months:

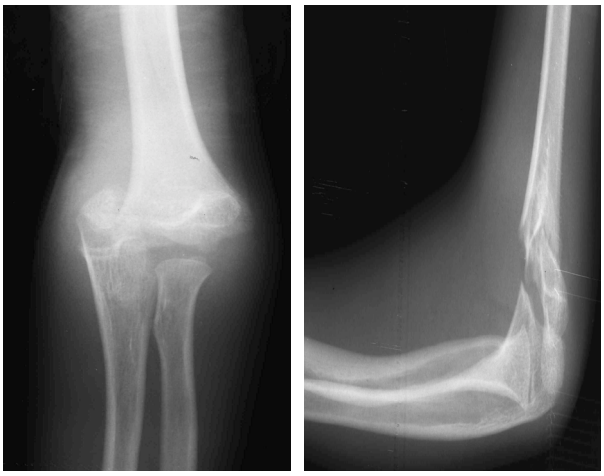

Figure 2 a and b. *Output radiographs of supracondylar fractures in type II according to Gartland (boy; 9 years old).*

Rycina 2 a i b. *Radiogramy wyjściowe złamania nadkłykciowego kości ramiennej typu II wg Gartlanda (M; l.9)*

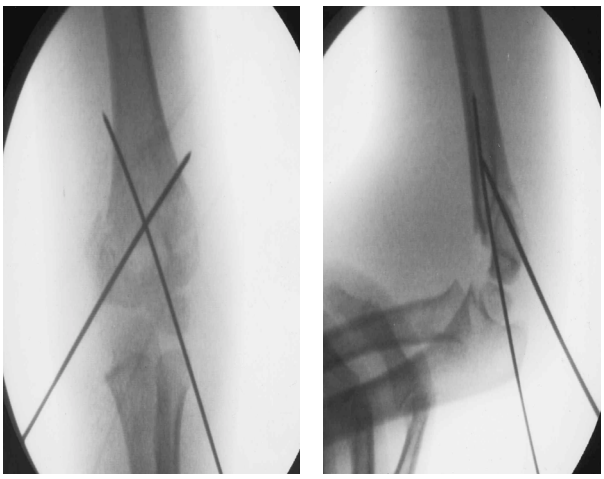

Figure 3a and b. Intraoperative radiographs – closed repositioning of supracondylar fractures and with "K" wires stabilization.

Rycina 3 a i b. Radiogramy śródoperacyjne -repozycja zamknięta złamania nadkłykciowego ze stabilizacją drutami „K"

Figure 4 a and b. *Control radiographs 4 months after injury.*

Rycina 4 a i b. *Radiogramy kontrolne 4 miesiące po urazie*

CASE 2:

8 year old boy with a fractured of supracondylar (type III) according to Gartland, who was surgically treated with open repositioning method (after 2 attempts closed repositioning) and stabilization "K" wires.

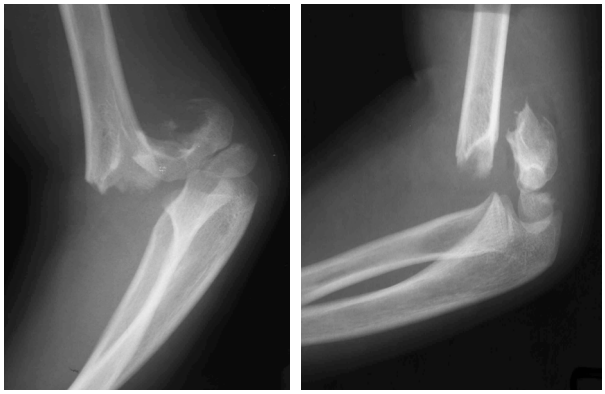

Figure 5 a and b. *Output radiographs of supracondylar fractures in type III according to Gortland (boy; 8years old)*

Rycina 5 a i b. *Radiogramy wyjściowe złamania nadkłykciowego kości ramiennej typu III wg Gartlanda (M; l.8)*

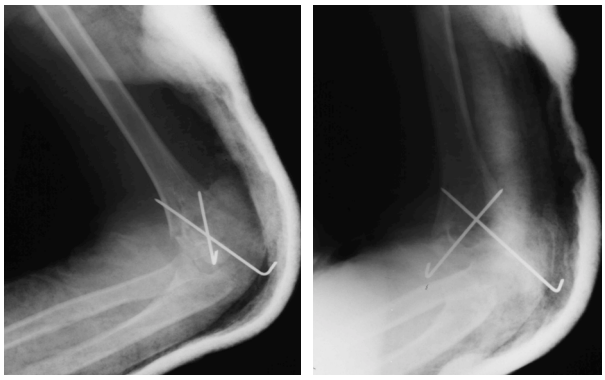

Figure 6 a and b. *Postoperative radiographs after open repositioning of supracondylar with the stabilization with "K" wires.*

Rycina 6 a i b. *Radiogramy pooperacyjne po repozycji otwartej złamania nadkłykciowego ze stabilizacja drutami „K"*

Figure 7 a and b. *Control radiographs after 7 months after injury*

Rycina 7 a i b. *Radiogramy kontrolne 7 miesięcy po urazie*

Figure 8 a, b, c, d. *Clinical effect after 7 months after open repositioning of supracondylar with the stabilization "K" wires (7 months after injury).*

Rycina 8 a,b,c,d. *Efekt kliniczny 7 miesięcy po repozycji otwartej złamania nadkłykciowego ze stabilizacja drutami „K"-7 miesięcy po urazie*

DISCUSSION:

The variety of methods of treatment indicates that there is no unified and effective surgical treatment for all types of fractures. The method of treatment is dependent on the type of damage [1,2,4,5,6,7,8], vascular damage and neurological disorders. Closed setting followed by immobilization in a cost gave very good results in type IIA (in our work). Other authors (Mc.Loughin [9] and O'Hara [4]) are of the same opinion. Angle bend of 90 degrees reduces the risk of vascular disorders. O'Hara and other authors [6,9] think that the use of traction therapy prolongs and gives operator percentage of distortion elbow deformity. Prevailing surgical results seem to be supported by the argument. On the other hand, Hadlow [10] recommends immobilization of all type IIA , IIB fractures by plaster cast, in spite of 31% children previously treated that way requiring surgery in the future. In our and other authors' [1,4,7,8] opinion in III type of breaks with total fragments of fractured bone dislocation by the method of freely choose is a method of closed reposition and in case of impossibility, open reduction and fixation with „K" wire stabilization and by plaster cast immobilization at bended elbow up to 90° [2,5,11,12,13,14,15]. Angle bends 90° reduces the risk of vascular disorders. O'Hara and others [9,15] assumed that applying traction extends treatment's duration and gives higher percentage of varus deformity, what makes the best method

to be chosen as a closed one. In case of failure of an open reposition and fixation with „K" wire stabilization method and in case of unsuccessfully result an open reposition, and then the next plaster cast immobilization. Mostly good results of surgery treatment for both closed and open methods seem to confirm the above described thesis.

RESULTS:

1. Symptoms of upper extremity nerve damage are common complications of supracondylar fractures of the humerus and disappear after the treatment.
2. Transfixion legs crossed supracondylar fractures of the humerus wires K is stabilizing in both II and III Gartland scale
3. Good results are obtained in case of no more than twice closed reposition of fractures (regardless of type).
4. Results of closed reduction and stabilization of the open with legs crossed wires "K" are comparable.

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