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MINIMALLY INVASIVE, HIGH-TECH OPERATIONS FOR LONG TUBULAR BONE FRACTURES IN CHILDREN USING ELASTIC RODS

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Abstract:

Fractures of the long tubular bones in children are among the most severe skeletal injuries. The problem of treatment of fractures of the long bones is still topical at the present stage due to the high frequency of this type of injury, the severity of clinical manifestations, the duration of traditional staged therapy and considerable economic costs. The current views on the choice of optimal tactics of minimally invasive osteosynthesis in long bone fractures of the limb are described in this article. The authors of the article point out the advantages of TEN osteosynthesis in the treatment of fractures of the long bones in children.

Keywords: fractures of long bones in children, minimally invasive osteosynthesis, new technologies.

INTRODUCTION

Diaphyseal fractures of long bones are the most common among injuries in children [1]. Among the various types of musculoskeletal injuries in children, fractures of the long bones account for about 65% and often cause disability [6]. Fractures of the forearm, femur, tibia and shoulder predominate in the fracture pattern in children. Thus, fractures of the forearm range from 17.5-68.2%, fractures of the humerus, tibia and femur from 4 to 10% [2, 4, 5].

THE MAIN PART

In recent years there has been an increase in the number of supporters of surgical treatment of bone fractures in children. Early restoration of the anatomical integrity of injured bones allows for active patient care and effective treatment of other injured organs [1, 9, 11]. The expansion of surgical activity is associated not only with the growth of multiple and combined injuries in the structure of pediatric trauma, but is also dictated by the duration of the hospital period and rehabilitation in conditions of conservative treatment, increased requirements for quality of life, and economic costs [7, 9]. The treatment technique should be simple, minimally traumatic, and ensure anatomical fracture matching and stable retention throughout the consolidation period. Thus, the criteria "stable" and "unstable" fractures cannot serve as a basis for determining treatment tactics, but only mislead in assessing the nature of fractures and cause inconsistency in the choice of treatment method [3, 4].

Previously used methods of osteosynthesis with plates and pins are accompanied by the need to use massive fixators, which damage the growth areas, periosteum, medullary canal, and traumatize the surrounding soft tissues. A relatively high risk of peripheral nerve and vascular damage, wide access to the fracture site, traumatic nature of the surgery, significant blood loss, risk of non-union, intra- and postoperative complications require more minimally invasive methods of surgical treatment. The use of internal fixators is accompanied by a significant number of complications, leading to poor treatment outcomes in 15-46% of cases [8, 11, 13].

In the last decade, pediatric traumatology has undergone significant changes in the concept of surgical treatment of fractures due to the need to strike a balance between the stability of fixation and the biological features of bone tissue in children. New terminology has appeared: "minimally invasive", "minimally invasive", "biological", and "functional" types of closed osteosynthesis, reflecting conceptual changes in approaches to surgical fracture treatment, which occurred due to the abandonment of anatomic repositioning, rigid fixation, and interfragmentary compression in favor of flexible fixation that allows micromobility of bone fragments [1]. Each of these techniques has its own advantages and specific risks, the ratio of which must be correctly assessed.

Minimally invasive techniques are more gentle. For example, minimally invasive interventions use different implants, but their contact with the bone is minimal [3]. The bone is not drilled out and the fracture heals

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almost naturally. The implants are only used for primary fixation, after which a bone marrow is formed at the fracture site.

Minimally invasive osteosynthesis surgery allows minor tissue damage to the fracture area. For closed fractures, fixation with rods and plates is often prescribed through 2-3 surgical incisions. This support is usually sufficient to allow the bone tissue to recover later on.

In minimally invasive surgeries, osteosynthesis of bones occurs naturally. Patients receive the necessary medication to prevent infection and inflammation. However, the fixation of the bone fragments in the fracture zone is done without any surgical intervention at all. The development and introduction in modern medicine of new technologies and modern radiological apparatuses has allowed us to reconsider the concept of treatment choice in children and adolescents. New functionally stable methods of fracture treatment, more advanced operating theatres, and new electro-optical transducers (EOP) with narrow beams and low radiation doses are now widely used for imaging.

Minimally invasive, functionally stable fixation techniques are not only and not so much understood as cosmetic intraoperative accesses, but rather the absence of surgical access to the fracture zone and therefore no additional trauma to the soft tissue and periosteum. Modern techniques make it possible to achieve optimal repositioning and stabilization of the fracture in the absence of external immobilization or hardware, which allows for early restorative treatment. Such osteosynthesis promotes early activation of the patient, avoids prolonged forced positioning, significantly reduces the time of hospitalization, shortens the period of rehabilitation treatment, etc. [8, 9].

In the CIS and non-CIS countries, minimally invasive closed repositioning with intramedullary fixation with titanium flexible nails (TEN) is the standard of care for fractures of the long bones. This method (ESIN - elastic stable intramedullary nailing osteosynthesis) was developed and introduced in 1979 by Jean Paul Metaze and Jean Pevot (Clinic of Nancy, France). ESIN is a minimally traumatic and minimally invasive surgical technique designed to treat fractures in children. ESIN is a biological osteosynthesis technique for transverse, oblique and short spiral fractures of growing bone.

Elastic stable intramedullary osteosynthesis is performed using a standard set of instruments and implants, which are titanium elastic rods with a diameter of 1.5 to 4 mm and a length of up to 400 mm. The tip of the rod is club-shaped and flattened, which facilitates gripping the opposing fracture during repositioning and further insertion of the rod. Before insertion, the rods are adjusted in diameter and modelled according to the nature of the fracture and the diameter of the medullary canal. The main method for introducing the pins is the closed "ascending technique" for femur fractures and the "descending technique" for tibia fractures. For tibia and femur fractures, two rods are inserted each. Depending on the insertion technique, the insertion points of the rods are 1-2 cm away from the growth area and are positioned at the same level, outside the capsule of the adjacent joint. The operative time is usually 20 to 40 minutes. The operation is performed under the supervision of an EOP. When intramedullary osteosynthesis is performed in children under 3 years of age, mainly Ilizarov spokes are used as stabilising elements.

Such osteosynthesis promotes early activation of the patient, avoids prolonged forced positioning, significantly reduces the time spent in hospital, and shortens the period of rehabilitation treatment. Intramedullary osteosynthesis combines stability and elasticity of fixation of fragments, slightly damages the surrounding tissues, which contributes to the rapid restoration of bone trophism in the fracture zone. Early restoration of movement also promotes bone regeneration. The results of this study demonstrate the advantages of minimally invasive osteosynthesis for diaphyseal fractures in children. This method can be used early after injury, reduces hospitalization time, and reduces the number of unsatisfactory results.

CONCLUSION

Thus, analysis of the literature allows us to conclude that the introduction of minimally invasive osteosynthesis techniques in the treatment of fractures of long bones in children leads to improved treatment results.

REFERENCES:

1. Ankin L.N. Politravma. Moskva. 2004. S. 153-155.
2. Baimagambetov SH.A., Jakupova B.C., Ospanov M.G. i dr. Struktura travm verhnei konechnosti v usloviyah specializirovannogo travmatologicheskogo stacionara. Aktual'nye voprosy hirurgii verhnei konechnosti. Materialy nauch.-prakt. konf. s mejdunar. uchastiem. Kurgan 2009. S. 16-17.
3. Gaiko G.V., Ankin L.N., Polyachenko YU.V. i dr. Tradicionnyi i maloinvazivnyi osteosintez v travmatologii. 2000. S.73-76.

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4. Ignat'ev A.G. Osteosintez kostei predplech'ya fiksatorom so spicami (kliniko-eksperimental'noe issledovanie). Avtoref. dis....kand. med.nauk. Novosibirsk 2003. S. 22.
5. Kuz'min V.P.,Tarasov S.O. i dr. Monolateral'nyi maloinvazivnyi osteosintez diafizarnyh perelomov plecha u detei. 2012. №1(63). S. 94-97.
6. Lieber J., Schmittenbecher P. Developments in the treatment of pediatric long bone shaft. 2000.
7. Maiseyonok P.V., Pah A.B., Mironov A.N. Lechenie perelomov dlinnyh trubchatyh kostei u detei po tehnologii ESIN. Margo Anterior. 2009. C. 13-15.
8. Mukasheva SH.M. Sovremennyi podhod k lecheniyu perelomov dlinnyh trubchatyh kostei u detei i podrostkov. Karaganda. 2012. S. 44-47.
9. Musaev T.S., SHermuhamedov B.T., Mahkamov I.H., Hashimov F.E. Lechenie politravmy u detei s primeneniem apparatov vneshnei fiksacii. Vestn. vracha obsch. Prakt. 2001. S. 64-67.
10. Nikitin G.D., Minyunin N.K., Gryaznuhin E.G. Mnojestvennye i sochetannye perelomy kostei. L. Medicina 1990. S. 216.
11. Pisarev V.V., L'vov S.E., Oshurkov YU.A. i dr. Infekcionnye oslojneniya posleoperacionnoi rany pri metalloosteosinteze zakrytyh perelomov dlinnyh trubchatyh kostei. 2008. № 2 (48). S. 14-19.
12. Pojarisskii V.F. Politravmy oporno-dvigatel'noi sistemy i ih lechenie na etapah medicinskoi evakuacii. M. Medicina. 1989. S. 256.
13. Hodjaev P.P., Hodjanov I.YU., Kadirov R.S. Lechenie diafizarnyh perelomov kostei goleni u detei. Tashkent. 1994. S. 3-5.
14. Saidumarova M.T. (2023). Issues in the Study of Osteochondrosis. Eurasian Medical Research Periodical, 17, 33–38. URL: https://geniusjournals.org/index.php/emrp/article/view/3332