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BIOMEHANICAL CLASSIFICATION OF CONTRACTURES OF ELBOW JOINT IN CHILDREN

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Аннотоация Болалар тирсак бугими жарохатдан кейинги контрактуралари болалар ортопедиясининг долзар муаммоларидан хисобланади. Олимлар томонидан бир нечта класификациялар ишлдаб чикилган булиб самарали фойдаланилиб келинади. Мазкур классификациялар патологик жараённинг биомеханикасини тулаконли очиб бераолмайди. Мултиспирал кимпьютер томографиянинг кириб келиши билан мазкур биомеханик классификацияни яратишга имкон топилди. Ушбу классификация операциядан олдин режалаштиришга кенг замин яратади.

Калит сузлар: Бола, классификация, тирсак, контрактура, бугим, биомеханика

Аннотация Посттравматические контрактуры локтевого сустава у детей являются одной из актуальных проблем детской ортопедии. Учеными разработано несколько классификаций, которые эффективно используются. Однако эти классификации не могут в полной мере раскрыть биомеханику патологического процесса. С появлением мультиспиральной компьютерной томографии стало возможным создание данной биомеханической классификации. Эта классификация обеспечивает широкую основу для предоперационного планирования.

Ключевые слова: Биомеханик, контрактура, локтевой, дети, сустав, классификация.

Abstract Post-traumatic contractures of the elbow joint in children are one of the urgent problems of pediatric orthopedics. Several classifications have been developed by scientists and are effectively used. These classifications cannot fully reveal the biomechanics of the pathological process. With the advent of multispiral computed tomography, it became possible to create this biomechanical classification. This classification provides a broad basis for preoperative planning.

Keywords: Biomechanic, contracture, elbow, classification, joint, child.

Introduction. The inveterate damages of an elbow joint is most serious mutilation of patients among all damages of a locomotorium of children's age, figuratively speaking to "the Big tragedy of a small joint»[1,4,12]. Inveterate damages of an elbow joint makes to 37% of all inveterate damages of a locomotors. Children's physical inability makes to 32 % of cases[2,3,11,14,16].

Restriction of movements is a leading symptom of inveterate damages of an elbow joint. The wrong adnation, nearthroses, inveterate dislocations and fracture-dislocations of bones of an elbow joint always are the reasons of the artrogenic contractures[5,7,9,12,17,20,31]. A biomechanical basis of a joint is the slipping complex consisting of jointed articulate cartilages [8,10,15,19,21,26].

Proceeding from quantity of articulate cartilages and the form of the last, proceeding from a biomechanical basis, as a matter of fact, there will be correct a separation of inveterate damages of an elbow joint concerning a slipping complex[6,13,18,20,32]. Into structure of a slipping complex

enters: The trochlea and head of a condyle of a humeral bone, olecranon of an elbow bone, head of a radial bone and articulate cartilages. The form and a locating of each element of a slipping complex have great value in fulfillment of high-grade movements in a joint [22,23,25,28,30,33,34].

Authors, made some classifications of inveterate damages of an elbow joint of children and adolescents. But in our opinion it is not given due attention by authors to biomechanical preconditions for the basic demands which are shown to joints is possibility fulfillment of movements.

Material and research methods. In Department of Children's trauma Research institute of Orthopedics and Traumatology, Ministry of Heath, Republic of The Uzbekistan from 1996 to 2009 was treated 356 patients with inveterate damages of an elbow joint. The structure of damages looks as follows: varus deformation of an elbow joint of 34 %, valgus deformation of 12 %, inveterate a of bones of an elbow joint of 54 %. Middle age of sick 10-12 years. Boys have made 74 %, girls of 26 %. The right-hand kind of damages prevails, making 79%, from these patients of the right-handed person have made 86 %. The average limitation period of damages has made from three months till 3 years. All patient spends roentgenography of an elbow joint both a multispiral computer tomography and standard clinic laboratory researches.

Results of their discussion Analyzing twenty years' experience of treatment of inveterate damages of Department of Children's trauma of Research institute of Orthopedics and Traumatology, Ministry of Heath, Republic of The Uzbekistan at the dawn of high-technological diagnostic equipment and new methods of operative treatment and after carrying out of the mathematical analysis of the received data, we have framed biomechanical classification of inveterate damages of bones of an elbow joint. In creation of the given classification the basic role played the multispiral computer tomography where the machine from many sections in a real-time-regimen creats the three-dimensional virtual image of elements of an elbow joint. In other researches, for example, there is no possibility of visualization the volume of elbow and coronal fossas and their deformation, it is not obviously possible to visualise articular cartilage, one of basic elements of a slipping complex. Proceeding from a slipping complex of an elbow joint, we have parted all arthrogenic contractures on four classes.

Class A. The limitations of movement at the expense of an obstacle out of a slipping complex.

A1. Deformation or deficiency of volume of an elbow or coronal fossa.

A2. A hypertrophy of a head of a radial bone.

A3. A hypertrophy of a head of a condyle of a humeral bone.

A4. Heterotopic ossification.

Class B. The limitations of movements owing to infringement bone-cartilaginous structures between slipping complexes.

B1. Infringement of an internal epicondyle of a humeral bone.

Class C. The limitations of movements owing to deficiency of "a slipping complex".

C1. Absence of an articulate cartilage.

Local.

Subtotal.

Total.

Class D. Restrictions of movements owing to absence of osteal elements of "a slipping complex" D1. Avascular necrosis of the trochlea of a humeral bone.

Class A. The frequent cause of restriction of movement is deformation of an elbow and/or coronal fossa. The given deformations are observed at incorrectly conjoined transcondylar fractures of a humeral bone in position of rotation of a distal fragment. The given deformations interfere with sliding of an elbow and coronal process caused from inconformity of the form of these elements. Volume deficiencies of fossas are observed at incomplete a resorption of an osteal callositas, in this case there is a volume conflict between processes of bones of a forearm and fossas of a humeral bone. Volume conflicts can be as from fossas when are observed their volume deficiency and from

processes of bones of a forearm when on processes fine osteal fragments grow together. In the latter case the augmentation of the sizes of processes is observed. Deformation of the trochlea of a humeral bone meets at a wrong adnation of the last and at partial avascular necrosis. In both cases deformation of the trochlea of a humeral bone will lead to decentration an elbow and coronal process in relation to the fossas with the same name and thus movement is limited. Germ cartilage damages of a distal medial part of a humeral bone leads to backlog of growth of the trochlea of a humeral bone. The parity of the trochlea and a head of a condyle of a humeral bone is broken. Backlog in growth of a distal medial part will naturally lead to a dysplasia of both fossas of a humeral bone, and processes of an elbow bone develop and as consequence there is a volume conflict. Heterotopic ossificates – are frequent satellites of inveterate damages of an elbow joint. Their occurrence in a projection of fossas of a humeral bone or processes of bones of a forearm too leads to volume disharmonies of elements of an elbow joint. The hypertrophy of a head of a radial bone is observed as complication at inveterate dislocations of a head of a radial bone, on visible having lost a leg in a shoulder-radial a joint last uncontrolledly starts to grow. Here it is pertinent, probably, an evolutionary principle–development of all organs and systems are immediately correlated by functions carried out by them. The hypertrophied head of a radial bone during extreme positions of a flexion and an extension rests against a head of a condyle of a humeral bone and by that limits movements. At a hypertrophy of a head of a condyle of a humeral bone as the similar picture of pathobiomecanics is observed. But often the hypertrophy happens "false", is frequent to a condyle head fine osteal fragments grow and feign a hypertrophy.

Class B. In many cases, an abruption of an internal epicondyle of a humeral bone is accompanied by infringement of the last between an olecranon and the trochlea of a humeral bone, sharply limiting movements. If the operative measure in due time is not spent, the restrained epicondyle is intimately accustomed joins with articulate surfaces. During mobilisation of damage of articulate surfaces inevitably, and movement pore are not so possible. It, in turn, leads to local or subtotal defects of a slipping complex of an elbow joint.

ClassC. Usually, the inveterate fracture-dislocations for more than three months standing, are accompanied by deficiency of a slipping surface of a slipping complex of local or subtotal character. Experimental researches confirms, what even in the absence of pressure from the outside on articulate surfaces of an articulate cartilage destructive changes pass presence of a local necrosis when the necrosis of an articulate cartilage has subtotal character, in a subchondral osteal plate.Total damage of a slipping complex is observed at infringement of osteoarticular elements in an articulate cleft of an olecranon or the trochlea of a humeral bone.

Class D. Avascular necrosis of the trochlea of a humeral bone is observed, when the dislocation is accompanied fracture of the trochlea of a humeral bone and usually an adnation on what or to the reasons does not come or occurs in a slowed-up way . At avascular necrosises of the trochlea of a humeral bone the parity of articulate elements of a distal condyle of a humeral bone is broken. It raspingly breaks a bodily machinery of an elbow joint and is frequent for restoration demands intraarticulate corrective an osteotomy. The volume conflict, owing to absence elbow and coronal fossa's is thus observed. In far come cases secondary deformation of an olecranon as a flatten form articulate surface is observed. Deformation such gives additional instability in a shoulder-elbow a joint. Thus, the framed arthrogenic contractures classification of inveterate damages of an elbow joint on the basis of a slipping complex is biomechanically proved and objectively estimates all pathological process.

Conclusions.

1. Offered classification completely reflects pathobiomechanics of elbow joint at inveterate damages.
2. In a basis of afthrogenic contractures lays basically volume conflicts and softly woven soldering.
3. The framed classification helps to define volume of forthcoming operation precisely.
4. Classification renders the big excessive help to practical traumatologists and orthopedists.

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