http://dx.doi.org/10.35630/2199-885X/2020/10/31

STRUCTURE AND DYNAMICS OF ROTATORY SUBLUXATION OF THE CERVICAL SPINE IN CHILDREN

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ABSTRACT — Rotational subluxations of C1-C2 vertebrae in children is a common pathology causing acute torticollis syndrome and destabilizing the child and his family. The number of recurrent cases has increased, which requires the study and development of preventive measures. An analysis of the incidence dynamics was carried out in 2010-2018. Some clinical and radiological features of the process, seasonality, age, gender prevalence were also studied.

KEYWORDS — Rotational subluxation of C1-C2 vertebrae, dynamics, age features, seasonality.

Most common among cervical spine anomalies in children are rotational subluxations in the C1–C2 segment, which are usually accompanied by symptoms of severe pain and unilateral torticollis (A. Gubin, 2010, ClarkCh.R. 2005). In the last decade frequency of pathology has been steadily increasing (A . Kurkin, 2011; P. Gencpinara M. Erkan, 2015). This fact raises many questions and discussions, and, in our opinion, requires close examination. On the background of rapidly developing highly evidence-based medicine, a clinical-statistical analysis remains as a necessary basic tool, enabling to obtain a reliable analysis of the regional incidence and to develop preventive measures.

Objective

To identify the structure and dynamics of the incidence of cervical rotational subluxations in children in the Astrakhan region.

METHODS

The medical documentation of children who attended the traumatology department of the Regional Silishcheva Children's Clinical Hospital in period from 2010 to 2018 with symptoms of acute pain in the cervical spine and forced head position. The research materials were:

— results of a history and clinical examination of patients, including questionnaire data;
— call registers, stationary and outpatient cards;
— results of instrumental examination methods — radiography, computed tomography with 3-D reconstruction, magnetic resonance imaging.

At the same time, the parameters of growth, weight, age, seasonality of admission, and the frequency of calls were distinguished. The features of the x-ray picture in a certain group of patients were described. The data obtained were processed by statistical methods in order to identify patterns within the framework of a specific study.

The results of the study and their discussion: According to the data obtained in the trauma and orthopedic department of the Silishcheva Children's Regional Clinical Hospital for the period from 2010 to 2018. 4397 children with acute torticollis syndrome were admitted, which amounts t 17.8% of the total number of children with injuries during the same period. The number of children with the studied pathology increased annually (Fig. 1).

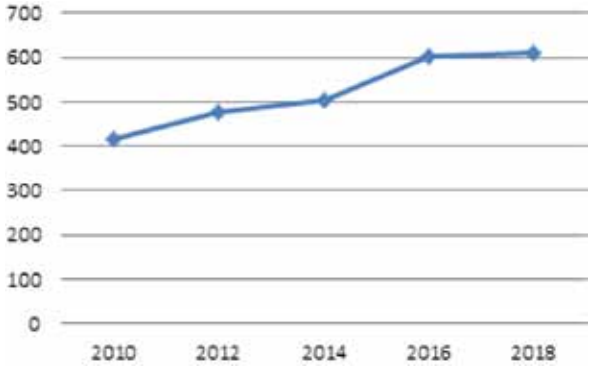

Fig.1. *The dynamics of treatment with symptoms of acute pain in the cervical spine and a forced head position during the period of 2010–2018*

In order to clarify the diagnosis, all children underwent radiation instrumental examination. Radiography in 2 projections was performed with 100% of applicants. Computer tomography in 3D-format was performed with 72% of children. A clinical diagnosis

was made after the examination. Analysis of patients by age and gender characteristics in 2017–2018 is given in (Fig. 2). The predominance of boys aged 11–15 years is established.

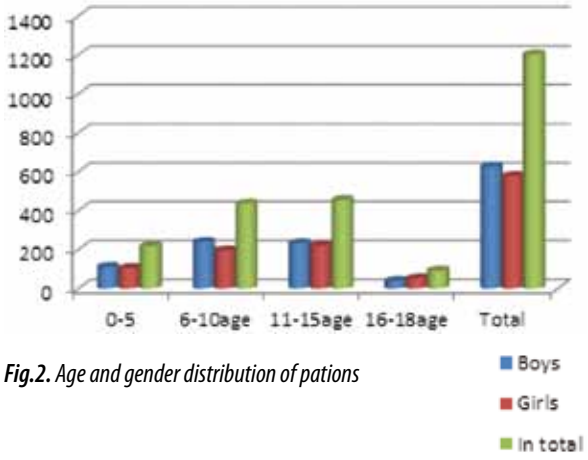

Fig.2. Age and gender distribution of pations

Acute and relapsing torticollis syndrome, according to the questionnaire, most often occurred at home (67%), at school (22%), places of sports (9%), and also on the street (2%) (Fig. 3)

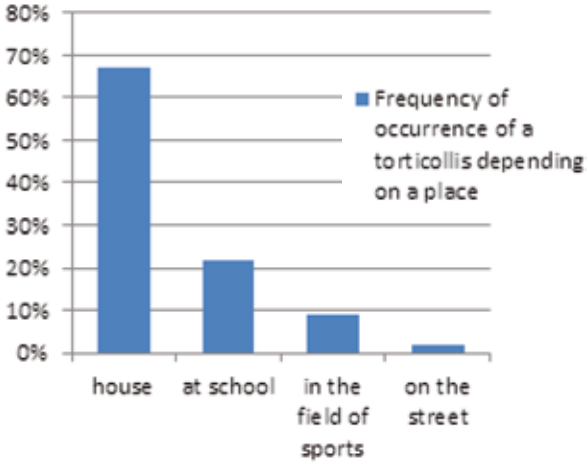

Fig. 3. Torticollis frequency depending on the place of occurrence

We believe that this is a confirmation of the non-traumatic nature of the pathology, because such condition most often occurred after sleep with relaxed skeleton muscles.

The most common answer to the question about the mechanism of the tinnitus syndrome occurrence was *during a quick turn of the head* after a night's sleep. In second place in frequency are sports. It should be noted that children indicated such sports as wrestling, athletics, rhythmic gymnastics, and dance sports. It was also revealed that the duration of sports in the above-mentioned species does not significantly affect the incidence rate. The results of a study of the seasonal occurrence of rotational subluxations of C1–C2 vertebrae, which we studied in 2017–2018, showed the following (Fig. 4):

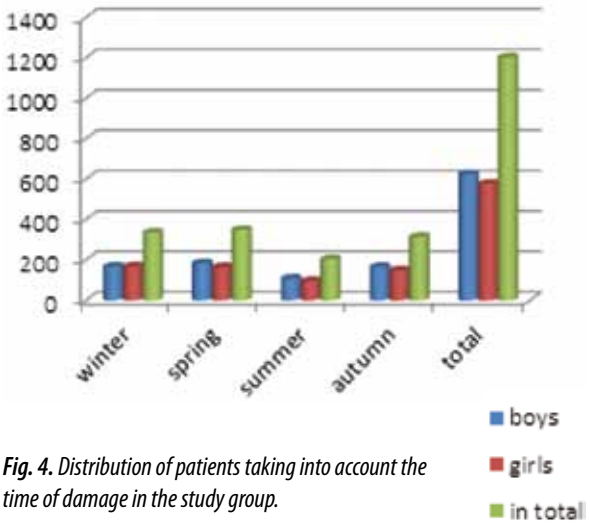

Fig. 4. Distribution of patients taking into account the time of damage in the study group.

Reduction in the incidence in the summer, which can be explained by a decrease in the static load in children was reliably established.

To study the features of the skeleton, somatometric studies were carried out, which showed a slight excess of the height-to-weight ratio when compared with standard centile tables, as well as a decrease in the average chest volume, which indicates the predominance of asthenic physique among children with rotational subluxations of C1–C2 vertebrae.

We suggest the presence of a relationship between asthenic physique and insufficient development of the ligamentous apparatus (systemic dysplasia of the connective tissue, syndrome of hypermobility joints) and the occurrence of rotational subluxations of C1–C2 vertebrae.

To this date, the results of radiation methods of examination have been studied in 144 children who applied in 2018–2019, while certain dysplastic symptoms were revealed in 68 patients (47%). In all children an adjustment of cervical lordosis was observed. Asymmetry of the joint spaces was detected in 30 (20.8%) children. Hypoplasia and underdevelopment of the posterior arch of the C1 vertebra was observed in 25 (17.4%) children. A CT scan of the sagittal plane al-

lowed us to detect an increase in the distance between the C1 and C2 vertebrae along the anterior contour in 15 (10.4%) children, as well as the deformation and underdevelopment of the contours of the transverse canal of the vertebral artery C1 of the vertebra. Delayed development of the ossification center at the odontoid apex C2 and underdevelopment of the side walls of the vertebra foramen in the transverse processes C1 of the vertebra is observed in almost half of the children. In most cases (n = 46), combinations of two or more components were revealed.

CONCLUSIONS

An analysis of the dynamics of the incidence of rotational subluxations in the cervical spine in children of Astrakhan region indicates a progressive increase over the past ten years with an annual average increase of 4.3%. The study of incidence of rotational subluxations of C1–C2 vertebrae in children in Astrakhan region has revealed that 11–15 years old boys had a higher prevalence in the spring-autumn period.

Somatometric indicators for children with rotational subluxations of C1–C2 vertebrae indicate the predominance of asthenic body type.

The results of radiographic examination confirm the presence of dysplasia of the cervical spine in children with rotational subluxations of C1–C2 vertebrae.

REFERENCES

1. **Clark Ch.R.** The cervical spine / Ch.R. Clark. — 4Ul ed. — Philadelphia :Lippincot and Wilkins, 2005. — 1250 p.
2. **P. Gencpinara M. Erkan.** Non-traumatic atlanto-axial rotatory subluxation: A rare cause of neck stiffness // Turkish Journal of Emergency Medicine. Volume 15, Issue 3, September 2015, P. 145–146
3. **Kurkin A.M .; Nazhmudinova O.M .; Goncharova L.A.** Dysplastic processes in the cervical spine with relapses of torticollis in children. // Collection of works of the All-Russian Scientific and Practical Conference "Vertebrology – Problems, Searches, Solutions" dedicated to the 75th anniversary of Professor S.T. Vetrel and the conference of young scientists edited by Professor A. Ochkurenko. Moscow, December 8-9, 2016 P.126–128
4. **Gubin A.V.** Acute torticollis in children: A manual for doctors. SPb. – 2010, 70 P.