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AGRICULTURE-RELATED SEVERE CRANIOFACIAL INJURIES IN RURAL CHILDREN AND ADOLESCENTS

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Abstract: The severe craniofacial injuries connected with agricultural work in rural children and adolescents were analysed. The analysis took into account the causes for injuries, their types and treatment. The studied group were hospitalized and constituted 18.6% of the patients of the specialized surgery department. The most severe injuries of the face and the bone structure occurred during operating or assisting in operating farming equipment, wood processing, as a result of the fall from a height, or were injuries inflicted by an animal. Causes of injuries sustained by rural children are analogous to factors causing injuries in adult agricultural workers. The practice of employing children to perform agricultural work should be prohibited because severe injuries of the facial skeleton and soft tissues may lead to disorders in children's physical and mental development.

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INTRODUCTION

The reality and the structure of the Polish rural areas is still largely based on tradition and family farming. Entire families are involved in work on a farm, including the elderly and children. It is still commonplace for children and adolescents, from their early years, to assist adults in farming. This is mainly the consequence of farm fragmentation, multigenerational and large families, the ageing of the rural population, the lack of people willing to take over, low profitability and poor standard of living. Another cause for accidents is said to be the passive presence of adults in the work area [12]. The socio-medical research has proved the number of children and adolescents engaged in agricultural work to be still substantial [3, 6, 10]. Children are frequently involved in work highly hazardous to life and health [1, 2, 7, 9, 17]. The negative consequence of including children and adolescents in agricultural work are the accidents amongst them which very often lead to serious and extensive injuries, and in some cases even to death [1, 2, 3, 4, 5, 7, 17]. The above findings are also confirmed by publications issued by the Agricultural Social Insurance Fund [9].

According to literature on the subject, the most common damage and injuries incurred by farming-related causes encompass mainly brain-cranial trauma and upper limbs damage, arms damage and fractures, finger amputations, feet damage, ankle joint and knee damage, as well as eye injuries [1, 2, 7, 12, 14]. However, the publications elaborating on the problem of face and cranium injuries in children and adolescents connected with the rural areas of the country are rarely to be found, despite the fact that the number traumatic cases amongst adolescents is constantly increasing [2, 6, 8, 9, 10, 11].

Aim of the study. The aim of this paper was analysis of the extensive craniofacial damage, face and facial skeleton in children and adolescents from the Sub-Carpathian region, while performing agricultural work, and assessment of the causes for the above-mentioned injuries.

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MATERIAL AND METHODS

The research was based on analysis of records of the Hospital Out-Patient Clinic and Maxillofacial Surgery Department of the Provincial Specialized Hospital in Rzeszów during the period 30 June 2003 – 1 January 2006. The analysis encompassed medical records of in-patients, as well as of the patients treated in the outpatient clinic, records made in the operating theatre log books, the doctor on duty reports and radiological documentation. Subject to evaluation were only the records of the patients with extensive bones injuries of the face which constitute an essential therapeutic problem. Cases of minor face injuries which involved superficial injuries of the face, teeth injuries, contusions and luxations, non-displaced fractures as well as isolated injuries were excluded from the analysis.

RESULTS AND DISCUSSION

The analyzed group comprised 15 adolescent patients with extensive craniofacial injuries aged between 9–15. The injuries were connected with performing work in the farmyard or assisting with agricultural work.

The group of patients with extensive maxillofacial injuries amounted to 18.6% of all the children and adolescents treated at the time concerned. Among the patients treated, 13 were male and 2 female.

The causes classified as farming injuries were industrial accidents connected with performing agricultural work by adolescent patients. From a practical point of view, it has to be emphasized that present-day accidents involving children in Poland occur only in rural areas where children take part in work in the fields, whereas children are not employed in any other spheres of life [2, 8, 11, 15, 17].

In 2 children the cause of the accident was involvement in work. In the first case – a 13-year-old boy was helping his father to operate a circular saw. While sawing through the wood, the boy was hit in his face with a piece of wood. In the second case – a 14-year-old boy was struck by a ricocheting piece of wood while chopping.

Analysis of the medical records suggests that in 3 children the injury was connected with a fall. In the first case, the child fell from a tall tree while picking walnuts. In the second case, the child fell from a ladder while storing straw, in the third case, the child fell from a roof while repairing one of the buildings in the farmyard.

In most cases the injuries were connected with operating farming equipment without surveillance; own research shows that this was the case for 7 children. A massive maxillofacial injury due to working with farm equipment concerned, among others, a 12-year-old boy who was crushed by an overturned tractor which he had been driving by himself while ploughing. In 3 children the injury was caused by them tripping and subsequently falling face down onto operating farming equipment: a binder and a potato and beetroot excavator. In 3 boys, the injuries were sustained while linking a tractor with a trailer full of potatoes.

Table 1. Causes for extensive facial cranium injuries.

Type – cause of injury	Number
Wood processing	2
Fall from a height	3
Operating or assisting in operating farming equipment	7
Injury inflicted by an animal	3
Total	15

Table 2. Type of facial skeleton and soft tissue injuries.

Type of injury	Number
Midface bone structure, mandibular fractures, soft tissues and face injuries	9
Midface bone structures injuries, soft tissues and face injuries, wounds	4
Mandibular fracture, soft tissues and face injuries	2

Three patients were knocked out by animals. In the first case, while loading the animal for transportation, in the second case the patient was bitten by a horse, in the third – kicked by a cow while milking it (Tab. 1).

The literature reports that injuries inflicted by large animals, such as horses and cows, require hospitalization. It is also said that animal related injuries are an important risk factor for the whole rural population [13, 14].

From the data obtained from the medical documentation, in all the analysed cases resulting from activities related to agricultural work, maxillofacial injuries were multiple and multiorgan in character. They concerned facial soft tissues as well as fractures of the facial bones. Causes of injuries sustained by rural children are analogous to factors causing injuries in adult agricultural workers [13, 14].

In accordance with the data presented in Table 2 the majority of the patients were diagnosed for concomitant midface fractures, including mandibular fractures and superficial injuries, as well as face tissue wounds. The patients were divided into three groups according to their treatment needs; soft tissues damage, facial bone injuries, fractures and other injuries. These were the most acute cases of face injuries treated. In 5 patients the damages were accompanied by concussion, and additionally in 3 of them, dysfunction of the eyeballs mobility and post-traumatic double vision, the so-called post-traumatic diplopia, were identified.

In the remaining 4 patients, the injuries concerned midface fractures and damage to the soft tissues of the face, whereas in 2 patients only comminuted mandibular fracture together with wounds and injuries of the mandibular and facial area.

Table 3 presents comprehensive information on the clinical symptoms of maxillofacial injuries diagnosed in the patients. The number of injuries and symptoms is larger

Table 3. Detailed information concerning soft tissues and bone structures injuries.

Detailed list of damaged facial cranium structures	Number
Soft tissue injuries	
Face contusions	3
Multifocal facial skin abrasions	8
Lacerated and slicing wounds of face	7
Penetrating wounds:	
to the orbit	2
to the maxillary sinus	2
to the buccal cavity	3
to the nasal cavity	1
Foreign body present in wound (wood splinters)	2
Bone structure fractures	
zygomatic-maxillary-orbital fractures	5
zygomatic-maxillary fractures	4
comminuted maxillary fractures	4
comminuted mandibular shaft fractures	5
comminuted mandibular shaft and candylar process of the mandible fractures	2
mandibular shaft fractures with dislocation of fracture fragments	2
fractures of the candylar process of the mandible	2
Other injuries and after-effects	
Concussion	5
Post-traumatic double vision	3
Second teeth injuries and fractures	11

than the number of children treated, because most of the patients had several face injuries at the same time.

Within the group of the most serious injuries of the midface, in 5 patients a zygomatic-maxillary-orbital fracture was diagnosed, which in 3 of them was complicated by double vision. The fracture required detailed radiological diagnosis: images of maxillary sinuses taken in Waters position, CT scans of the facial bone, as well as 3D-CT imaging. Post-traumatic double vision further demanded ophthalmic diagnosis: visual acuity examination and visual field test. In the remaining 4 patients, zygomatic-maxillary fractures with considerable zygomatic bone displacement requiring repositioning due to its maxillary dislocation and occlusal dysfunction were diagnosed.

The patients were predominantly operated on using an intra-oral access with the application of Champy miniplate to stabilize the fracture. In some cases, an intermaxillary traction was also employed. In 5 patients, the comminuted mandibular fractures were damage to the lower segment of facial bone structures which required surgical repositioning and stabilizing by means of miniplate osteosynthesis, whereas in 4 patients conservative--pharmacological treatment was prescribed. Within the group, in 4 patients the injuries were accompanied by teeth and maxillary or mandibular alveolar process fractures demanding surgical intervention. Facial wounds were extensive in character and penetrating to the buccal cavity, the maxillary sinus and the orbit. In 2 patients the wounds were complicated by the presence of a foreign body (wood splinters).

The midfacial fractures diagnosed in 4 children consisted in comminuted maxillary fractures complicated by injuries and wounds of the soft tissues of the face. The injuries necessitated immediate maxillofacial hard and soft tissue surgical treatment.

Mandible and submental region fractures diagnosed in 2 patients aged 9 and 13 were multiple. In the case of the 9-year-old boy, it was a segmental mandibular fracture located in the region of the right angle and the left canine tooth. Additionally, he was diagnosed with a left mandibular candylar process fracture. In the 13-year-old girl the fracture concerned the mandibular body in the region of lower incisors and the right condylar process of the mandible. In both of the above cases, the fractures were accompanied by a cut wound in the chin region moving up to the lower lip and buccal vestibule. In both cases the traumatic wounds were used as the access route for surgical treatment and osteosynthesis.

In all the cases the initial emergency treatment consisted in providing for the facial injuries as well as the bone structure damage and fractures. The zygomatic-maxillary-orbital fractures and the zygomatic-maxillary fractures involved the application of miniplate osteosynthesis, whereas in 3 cases, in which a post-traumatic diplopia had occurred, the treatment consisted in the release of the peribulbar tissues from the fracture cleft of the ocular fundus, and the subsequent application of autogenic graft surgery. The comminuted mandibular fracture with the dislocation of bone fragments was fixed by means of miniplate osteosynthesis. In the majority of the patients treated, fixation and an intermaxillary traction were used apart from the surgical treatment in order to obtain normal occlusion. The author's own observations, concerning the fact that in the case of extensive facial bones fractures in patients of developmental age, the treatment needs to be supplemented by conservative-orthopedic therapy in order to obtain normal occlusion, are in accordance with other author's reports [1, 3, 4, 5, 6, 7, 8, 15, 16, 17].

Children from rural areas are involved in work-related accidents the majority of which could be avoided. It has been proved that 23.7% of accidents involving children from rural areas were connected with the use of farming equipment and tools, whereas approximately 31% of them were the consequence of tripping, slipping or a fall caused by the uneven surface of outbuildings [2, 6, 10]. The authors' clinical experience, as well as literature data, suggest that children in rural areas work without surveillance [8, 16, 17]. The work is too hard not only from the physical point of view but also in terms of physiology and psychology. The old age of the rural population, parents' not being able

to live off the land and therefore taking on paid work in the city results in the lack of manpower [10, 15, 16]. The shortage of labour is partly compensated for by employing children in farming. In this way, children are exposed to various hazards. Entrusting children with this kind of chores is highly irresponsible of parents and ought to be subject to severe criticism. Performing agricultural work affects children's physical and mental development. It has been proved that schoolchildren who have been doing frequent physical work or assisting in agricultural work, are often of slight build and more likely to develop a chronic disease or fall ill [6]. Putting at risk the health of the children involved in work on a family-owned farm is not a typically Polish problem, but concerns also countries whose economy, as result of socio-political transformation, is still under reconstruction. Numerous authors seek to popularize the educational and preventive aspects of the issue [2, 3, 5, 8, 17].

CONCLUSIONS

Causes of injuries sustained by rural children are analogous to factors causing injuries in adult agricultural workers. The practice of employing children and adolescents to perform agricultural work should be prohibited because severe injuries of the facial skeleton and soft tissues may lead to disorders in children's physical and mental development.

Awareness of the risks resulting from employing children in farm work ought to be one of the major elements of health education in rural population.

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