Hygiene of oral cavity of children with mandible and dental traumas during immobilizatione period

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Summary

The study was carried out in the State Hospital for children "Em. Cotaga", in the department of oro-maxillo-facial surgery for children on the basis of 2124 medical records conducted in the period from 1993 to 1997. All the data were selected by the following criteria: diagnoses, aetiology, gender, age, and nature of facial injuries.

The sex division demonstrated a male-to-female ratio of 2.5:1. The higher rate of maxillo-facial injuries (39 per cent) was determined in the age group from 3 to 7 years old. Overall injuries of maxillo-facial soft tissues occurred most frequently (in 86 per cent of cases), associated with defects in 1.1 per cent of cases, dental-alveolar injuries - in 5.3 per cent of cases, mandible fractures - in 4.4 per cent of cases, midfacial injuries - in 3 per cent of cases. Street accidents were the most frequent cause of traumas (35 per cent).

The state of oral cavity during the immobilization of mandible fracture and dental-alveolar traumas showed better periodontal tissues and mucosal membrane of the alveolar process which were not supplementary injured in the surveyed group (65 children), where modern **techniques (Edgewise system, monocortical plates) were used, as compared to the reference group (37 children) where classical techniques (Tigerstedt monomaxillar and bimaxillar splints) were used. Hygiene index in the reference group were: PMA 47 percent and OHI-S 1.7 at the end of the treatment, in comparison to the surveyed group where PMA was 14** per **cent and OHI-S 0.4 at the end of the treatment, after 25-30 days.**

Key words: mandible fracture, dental traumas, and immobilization.

Introduction

Oro-maxillo-facial regions are most frequently exposed to traumas in children. At present, maxillo-mandible fixation with the use of Tigestedt type splints is widely used for treat-ment of mandible and dental traumas for both adults and children

Splints adapted to dental neck and fixed by interdental wire, cause discomfort to children both, at the moment of application and during immobilization, which leads to alveolar, marginal periodontal and dental tissues as well as to alimentary contamina-tions, unsatisfactory care of oral cavity hy-giene. Scientific studies carried out on patients with maxillo-mandible traumas with the use of Tigerstedt type splints have demonstrated deterioration of the state of hygiene of oral cavity and the augmentation of caries affec-tion during immobilization and after the splints are removed

The morphofunctional particularities of studied region impede adaptation and fixation of fracture in children with the application of the above mentioned splints because temporary teeth can be insufficient in number, tooth root can be in the course of resorbtion or root formation, primary teeth can be conic in form or present feebly exposed necks, many of the dental crowns can be incompletely erupted. The elastic nature of children's facial bones, the relatively small form of the face and the existance of growing zones are additional factors that influence the management of the treatment

The improvement of medical care of children with traumas of oro-maxillo-facial region, the aspects of orthopedic-surgery treat-ment of traumas in children by application of monocortical miniplates and Edgewise techni-que remain an insufficiently explored sphere.

The aim of this study was to modify the management of mandible-maxillary traumas in children by the use of modern methods of immobilization, which correspond to morpho-functional particularities of a growing organism and allow maintaining a satisfactory state of hygiene of oral cavity with the minimal discomfort in the period of immobilization.

Materials and methods

The study was conducted in the department of oro-maxillo-facial surgery for children in the Republican Hospital for Children "Em. Cotaga", Republic of Moldova, from 1993 through 2000. The effectiveness of treatment in maxillo-facial traumas was determined on 102 patients with oro-maxillo-facial traumas (surveyed group - 65 children, reference group - 37 children) assisted in the regime of intensive care in the hospital. On the basis of 2124 medical records of children with maxillo-facial traumas assisted in the above mentioned department the incidence of traumas among children from 1993 through 1997 was deduced.

For treatment of mandible fractures and dental lesions, several techniques were tested. Thus for immobilization of fractured fragments in mandible traumas and dental injuries, in the surveyed group, modern methods of immobilization after surgery or non-surgery reduction, were applied (Edgewise system, monocortical miniplate), while in the reference group classical methods of immobilization were applied (monomaxillar or bimaxillar wiring splints).

Clinical methods of hygiene evaluation applied to the surveyed and reference groups were determined for the pre-operation period, after 7-day postoperatively, and for 30-days postoperatively (after the removal of the immobilization systems) by the following parameters: - hygiene index OHI-S (Greene-Vermilion, 1960, 1964); - PMA index (Maslle r, Sower, 1949, Parma 1960); - Schiller-Pisarev probe and the clinical examination gingivae - hyperemia of interdental papillae, of marginal gingivae, adherent gingivae and blushness of interdental papillae, of marginal gingivae, presence of inflammation or edema. (TlaxoMOB, 1982). Statistical evaluation of the results was made with the use of variational method of statistical analysis.

Results

Carefully explored nature and frequency of different kinds of oro-maxillo-facial injuries of children, considered data of traumatism noted in 2124 medical registers revealed the prevalence of traumas of soft tissues (88 per cent) in relation to mandible fractures (4 per cent), dental traumas of primary dentition (3 per cent), dental traumas of permanent teeth (3 per cent), midfacial fracture (2 per cent). The highest rate of traumatism is exposed at 3 to 7 years old (39 per cent), then - from 7 to 11 years old (27 per cent), then 1 to 3 years old (18 per cent), at the age from 11 to 16 years old the rate of traumas consists in 14 per cent The incidence of injuries of soft tissues was maximal at the age from 3 to 7 years old, while mandible fractures and dental injuries are most common at 7-12 years old. The most frequent causes of traumas are falls, in most cases falls in the street (38 per cent) via falls inside (28 per cent). The cause of traumas by traffic accidents was comparatively low (3.4 per cent). Dog bite injuries occur in 9.6 per cent of children. Oro-maxillo-facial injuries suffered during participation in sports were registered in 3.2 per cent Interrelation of the number of boys and girls in each kind of traumas indicated the prevalence of boys in proportion of 2.5:1. Mandible fractures represented 61 per cent of total amount of facial bones.

9 of 65 children in the studied group had mandible fractures located at the level of condyle. Immobilization of such fractures was performed by acrylic monoblocks and extra oral temporo-mandible fixation. 27 children with mandible fractures needed open reduction and osseo-synthesis by monocortical miniplate, supplementary fixation by acrylic monoblocks and extra oral temporo-mandible fixation. 11 children needed close reduction and immo-bilization by Edgewise brackets. In our present study, maxilla fractures of Le-For type were not defined among children. Maxilla fractures were presented only by partial injuries including dental traumas. In our study dental traumas with partial maxilla fractures were revealed for 17 children. After dental reduction or replantation, the fixation was made with the help of Edgewise system. 37 children with mandible fractures and dental traumas represented the reference group, where monomaxillary or bimaxillary wiring splints were used. The hygienic state of oral cavity was defined in both groups.

The study concentrated on proper results of clinical and investigational observation, we estimated the comparative efficiency of modem surgery techniques of immobilization (Edgewise system and monocortical miniplate) with those of classical techniques practiced in treatment of oro-maxillo-facial traumas. The surveyed group consisted of 44 boys and 21 girls. The reference group consisted of 21 boys and 16 girls. 15 children in the surveyed group had primary dentition, 28 - mixed dentition, 22 - permanent dentition. In reference group 2 children had primary denti-ion, 22 - mixed dentition and 13 permanent dentition.

The clinical observation of oral mucosa, estimated in patients with dental and mandible fractures before application of immobilization system, did not reveal suggestive differences in both groups ($p<0.05$). In all patient groups were detected mucose ecchymosis, edemas in the area of mandible fracture or dental injuries and normal aspects of non-fractures segments. Thus, in 39 (60 per cent) patients in the surveyed group and 25 (68 per cent) in the reference group pale pink color of gingival mucosa was observed. 5 children (8 per cent) of the studied group had interdental papillary hyperemia; 14 children (22 per cent) and 3 children (8 per cent) in the reference group had hyperemia of marginal mucosa.

The change of value of those state of gingival mucosa had different data in 7 days after application of immobilization systems. Among the patients, who benefited from the immobilization with the use of Edgewise system or monocoitical miniplate, gingival mucosa remained intact, while in the line of injuries primary regeneration emerged. In 72 per cent of cases pale pink color of gingival mucosa was kept and only in 10 per cent of cases slight hyperemia of interdental papillae emerged, in other 9 per cent of cases marginal hyperemia of mucosa. In the reference group, where Tigerstedt splints with interdental wire were used, the injuries of marginal mucosa, supplement traumatic elements and inflammation were determined. Thus, pale pink color of gingival mucosae was determined only in 10 per cent of cases; similarly hyperemia of interdental papillae was revealed in 51 per cent of cases. Hyperemia of marginal mucosae - 38 per cent of cases ($p<0.001$).

In 30 days after the removal of supporting system secondary affection of gingival mucosae by wire splints grew to 49 per cent cases of marginal hyperemia, 27 per cent cases of hyperemia of adherent mucosae and only 19 per cent cases of interdental papillar hyperemia. Similarly hypertrophy of interdental papillae in same cases was manifested on half of dental crowns. By comparison, in the surveyed group gingival inucosa remained pale pink in 97 per cent of cases, in 2 per cent interdental papillar hyperemia was observed, and only in 2 per cent cases we observed marginal hyperemia. ($p<0.001$).

Thus, the value of hygienic score determined in the surveyed and reference groups before treatment, proves no statistical difference. PMA in the surveyed group was 18%; in the reference group 17%. Schiller-Pisarev probe is negative in 88 per cent of cases in surveyed group and 95 per cent in the reference group ($p>0.05$). For the whole number of mandible and dental traumas examined on patients before surgery, no statistical difference of the value of OHI-S index was revealed 0.9 in the surveyed group and 1.0 in the reference group ($p>0.05$); *(Table 1).*

Table 1. Hygiene index Ohi-S, PMA and Shiller-Pisarev probe in the patients with immobilization of mandible fracture and dental injuries with the use of different techniques.

Groups	PMA			OHI-S			Schiller-Pisarev		
	I	II	III	I	II	III	I	II	III
Surveyed n=65	18%±1.86	9.9%±0.8	14%±2.5	0.9±0.05	0.6±0.07	0.4±0.03	88% 12%	97% 3%	97% 3%
Reference n=37	17%±2.63	26±1.94	47%±1.5	1.0±0.1	0.8±0.1	1.7±0.07	95% 5.4%	84% 16%	16% 84%
P	>0.05	<0.001	<0.001	>0.05	>0.05	<0.001	X^2=1.27, p>0.05	X^2=70.17 p<0.001	X^2=70.17 p<0.001

Note: I - before applied of immobilization system; II - 7 days after application of immobilization system; III - immediately after removal of immobilization system; PMA - index of determination of papillar, marginal and alveolar inflammation; OHI-S - Oral Hygiene indexes - Sibpified.

At the same time, after 7 days of immobilization on the content analysis, the value of PMA was significantly different in the surveyed group, 9.9 per cent, while in the reference group, 26 per cent ($p<0.001$). Schiller-Pisarev probe in the surveyed group was negative in 97 per cent as compared to the reference group, where the probe was positive in 16 per cent and negative in 84 per cent of cases. High values of PMA index in the reference group revealed the emergence of processes of inflammation of mucosae under the effect of Tigestedt splints.

The statistical differences of the PMA and OHI-S values were estimated in 30 days of immobilization. In the surveyed group the value of OHI-S reached 0.04 but in the reference group 1.7 ($p<0.001$). The medium value of PMA index estimated in the surveyed group was 14 per cent, in reference group 47 per cent. Schiller-Pisarev probe was negative in 97 per cent of cases in patients from the surveyed group, as compared to the reference group, where positive value of marked probes was up to 84 percent of cases ($p<0.001$).

In conclusion, during the treatment performed with the use of modern methods of immobilization, the integrity of gingival mucosae was preserved, hence the sufficient level of the condition of oral hygiene was achieved, but in contrast with the reference group which was found aggressive to gingival mucosae and dental tissues, favorable for inflammation of periodontal tissues.

Discussions

Between 381 and 465 cases (approximately 24% per year) of oral-maxillo-facial traumas of children were registered annually between 1993 and 1997 in the Department of oro-maxillo-facial Pediatric surgery of the Republican Clinical Hospital for children "Em. Cotaga", Chisinau. By comparison with similar studies (Rowe and Killey, 1968; Chima Oji, 1998) our study shows higher rate of frequency of injuries in the above-mentioned region. It was probably conditioned by the fact that the similar studies were carried out for age 3 to 60 years old. In our clinic only children of age 1 to 16 were assisted.

The prevalence of traumas of soft tissues (89 per cent) over mandible dental traumas and traumas of facial bones was assessed in the present study. The collected data correspond to most of those performed in other studies in this area (Kholsa, 1971; Brokaw, 1996; Ugbokoetal. 1998).

We determined the highest frequency of injuries at 3 to 7 years old. However, dental, mandible and facial fractures are relatively more frequent at 7 to 12 years, while soft tissues are more frequently exposed to traumatism at 3 to 7 years. Thus, we can state that fractures of facial bones are the most rare cases at the age before 5 years, which is also proved by other researches (Rowe, 1968; Taller, 1992; Anderson, 1995).

The prevalence of boys over girls is evident and makes the proportion 2.5:1, which coincides with the same aspect of most studies (Guven, 1992; Anderson, 1995; Ugboko, 1998).

In our study we defined falls (inside and outside) as the principal cause of traumatic lesions in the children. Guven, 1992; Tanaca, 1993; Shinya, 1993; Anderson, 1995 reached the same conclusion in their surveys. We ascertained the direct proportion of falls inside and outside of age rate. At the age before 3 traumas received at home prevail (44 per cent) by comparison with those received outside (20 per cent). Vice versa, at 3 to 7 years, traumas received outside predominate (44 per cent vs. 18 per cent) and continue to grow at the age 7 to 12. Thus, we can state that injuries received outside are in direct proportion to the age of children.

The evaluation of the frequency of traumas in the studied area makes us state the reduced frequency of midfacial traumas, which corresponds to data in literature (Guven, 1992; Thaller, 1992; Tanaka, 1993). Mandible fractures prevail in relation to fractures of bones of the studied area, which confirms similar results of other studies (Spring, 1996; Acton C.N. et al., 1996; Ugboko V.I. 1998).

The treatment of traumas of facial bones by the application of modern methods (miniplate, direct bounded brackets) as well as classical ones (wiring splints by Tigerstedt type, Frigof method) stated a satisfactory provision of oral cavity hygiene in the surveyed group in the whole period of immobilization, confirming hygiene indexes. Though there is very little reference on hygiene of oral cavity in the literature we studied, data of our study

correspond to most of them (Абдо, 1987; Рединова, 1998; Utley, 1998)

Conclusion

The present study displays 40 per cent frequency of oro-maxillary traumas annually in the whole number of recipients. The prevalence of traumas of soft tissues is distinctive. The major causes of traumas in children are falls. The fixation of mandible fractures and dental traumas by means of Edgewise system and miniplate of stabilization permits to maintain sufficient fixation of fractured fragments and dislocations of teeth for the whole period of immobilization, and provides good condition for oral cavity hygiene.

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