

PARENTAL NUTRITION EFFECTS OVER SPEECH DEVELOPEMENT

Ștefan Lucian Burlea*, Valeriu V. Lupu, Anamaria Burlea

Faculty of Dental Medicine

University of Medicine and Pharmacy "Grigore T. Popa" - Iasi, Romania

ABSTRACT

The programs of total parenteral nutrition (TPN) or continuous delivery enteral nutrition (CDEN) will have a positive effect on health and a negative effect on speech occurrence and future development. Identifying any disturbance in child's development requires immediately taking adequate amelioration and multifactor support actions. Working as a mixed team (physicians, speech therapists, psychologists and physical therapists), we developed a program which had as its main objectives: stating the effects of the parenteral/enteral nutrition program on future child development; preventing the occurrence of disturbances in child development through family counselling and early intervention; creating a system of services addressed to families with children fed intravenously/intestinally. The beneficiaries of this program were 40 children, born prematurely and tube fed, who often needed to be hospitalized in the gastroenterology or intensive care clinics of the "St. Mary" Children Emergency Hospital from Iasi.

Key words: parenteral nutrition, speech, early intervention, multifactor support

INTRODUCTION

The separation from the mother at birth causes a new kind of mother-child relationship, dependent and symbiotic, which has, however, a mediator: the alimentary function. The baby satisfies its need to be fed, but it will also feel the pleasure of sucking, being stroked by its mother, hearing her voice, feeling her smell, being carried. The baby will look for this wellness independently from its physical needs. The tactile contact during breastfeeding keeps a unique affective relationship between mother and child, the breastfeeding moment becoming for the newly-born the act through which it experiments countless sensations. The primary spot in which the tactile perception is initiated, a contact perception which is the basis for all future perceptions, is the buccal-pharyngeal cavity.

In several pathological instances, the newly-born premature babies undergo total

parenteral (intravenous) nutrition programs (TPN) or continuous delivery enteral nutrition (tube feeding) programs (CDEN), that will have a positive effect on their health and a negative effect on the later speech occurrence and development. The problem that will block immediately after birth, for several month, the manifestation of the sucking and deglutition reflexes, de-afferentation in various degrees, will have repercussions on the entire body, causing a delay in the manifestation of other reflexes or processes as mastication and phonation, ulterior from the ontogenetically point of view.

In normal conditions, during breastfeeding, the organs of the phono-articulator apparatus (the tongue, the lips, the soft palate, the cheeks) execute complex and complete gymnastics. These will lose their flexibility and motility needed for the future phonation if the baby is not subjected to natural alimentation. The long lasting horizontal

position imposed by the medical procedures, the nostrils occluded by the tubes, the lack of deglutition will affect breathing, making it superficial and rhythmless.

The absence of the pre-linguistic period which cannot be recreated and is very influential on the ulterior period, is caused by the lack of training of the effective speech organs as well as of affective moments implied by the oral alimentation and the contact between mother and child. The absence of the vocalic game and babbling will lead to the impossibility of transmitting messages to the mother. The pre-verbal communication is deteriorated and consequently, the child's relationships with the environment are seriously altered.

When the child's health requires long hospitalizations during the second year of life, the situation becomes even more serious. The physical suffering, the limited life environment, the affective deficiencies will cause severe delays in the occurrence and the later development of the speech. An early speech therapy must be initiated. Without this recovery action, the severe lag in speech development will be maintained through the entire future evolution.

A difference must be made between the newly-born with a normal foetal development of the phono-articulator apparatus and those who, even though they are born on time, have at birth a certain dysfunction more or less serious of the sucking and deglutition. The oral alimentation activity of the newly-born babies of the first kind, even though is interrupted during enteral nutrition, can be done later without too much complication. The deglutition moves and the sucking reflex are present starting with the 11th and respectively the 10th pregnancy week, whereas spontaneous sucking can be identified in the uterus close to the 15th week. The sucking-deglutition thus represents the fetus's first dynamic pattern, preparing the

chronologically following function: breathing. These functions support each other, sucking-deglutition during the prenatal period initiating the breathing function which is unstable and weak. On its turn, breathing which becomes regular when the baby is held vertically in its mother's arms, supports sucking and ensures its rhythm. The phono-articular production of the word will be strongly influenced by the quality of the sucking - deglutition - mastication - breathing activities.

It can be mentioned several predictors for the ulterior speech development: the child's age at the beginning of the enteral nutrition, whether the baby could or could not benefit from oral alimentation and the time it benefited from it. A long period of parenteral nutrition can complicate in various degrees the recommencement of the oral feeding, and hence it can block the speech evolution. Definitely, the disturbances in natural or artificial nutrition represent one of the etiological factors observed during the medical history of the child suffering from logopathy. A large number of babies premature or not, hospitalized for long periods of time in the neonatology clinic or paediatric intensive care develop phono-articular disorders without neurological background during hospitalization or after it

Until not so far ago, the TPN techniques needed early and often long hospitalization in rigorously septic conditions which excluded body contact. Oral feeding was totally eliminated and the child was discharged after a long time based on certain medical standards. Nowadays, these methods evolved. The parenteral nutrition done in hospital is now the parents' responsibility after special training, undergone within the clinic with its specialists and with the support of the HOLT Foundation. Becoming aware of the beneficial effects of the family involvement, the physicians, at first worried about the

evolution of the children that were about to be fed this way at home, have become more optimistic. If TPN can be now externalized depending on the case, CDEN remains an exclusively medical method, requiring special equipment, septic environment and specific very precise manoeuvres, things that can be found only in a medical institution. In this situation, the role of the specialists (physician, speech therapist and psychologist) will be one of family counselling especially for the mothers who are able to breastfeed but are not allowed to do so; of supervising the child's psycho-somatic evolution; monitoring the occurrence and development of the baby's speech and intervening through early therapy.

MATERIAL AND METHODS

Working as a mixed team (physicians, speech therapists, psychologists and physical therapists) at Helicomed Medical Clinic in Iasi, we developed a program which had the following objectives:

1. Stating the effects of the parenteral/enteral nutrition program on future child development;
2. Preventing the occurrence of disturbances in child development through family counselling and early intervention;
3. Investigating 40 cases of families with children fed parenterally;
4. Creating a system of services addressed to families with children fed intravenously/intestinally;
5. Promoting a good understanding of the characteristics and specific needs of the children who undergo par/enteral nutrition programs amongst professionals, decision factors and parents for early intervention and support;
6. Elaborating a "Training course for respite care volunteers".
7. Training 15 volunteers in 3 course sessions.

The beneficiaries of this program were 40

children aged 36 to 42 months, born prematurely and tube fed, who often needed to be hospitalized in the gastroenterology or intensive care clinics of the „St. Mary” Children Emergency Hospital from Iasi. Due to the high biological risk, their nursing varied from 2 to 5 months. The newly-born babies weighed between 800 and 1800 grams, the pregnancy age being between 26 and 32 weeks.

When evaluating these children we focused on several targets: the etiological context (organic or physiological); the CDEN effects on mastication and deglutition; the consequences of the clinical nutrition on speech; diagnosing the speech disorder; assessing the communication possibilities of the child suffering from logopathy and making the prognosis. To ensure the accuracy of the logaedics anamnesis, the mothers were trained and then given a questionnaire which asked for information regarding:

- Pre-verbal elements up to 6 months and between 6 and 12 months;
- Verbal elements between 12 and 24 months;
- Verbal elements between 24 and 36 months;
- Verbal elements between 36 and 42 months;
- The child's general motility, orthostatic posture, grip strength;
- The motility of the phono-articulator apparatus;
- The child's ability to understand the adult's message;
- The child's abilities to integrate into an infant school class (if there was an attempt to integrate and if this succeeded).

RESULTS AND DISCUSSIONS

The answers to the questionnaire revealed:

- *about 6 months old* – only 3 subjects – girls who weighed more at birth and who had shorter periods of enteral nutrition,

- emitted certain sounds, lacking articulator clarity that could be identified as the vowels „a” and „e”;
- *about 12 months old* -11 subjects (7 girls and 4 boys) uttered vocalic sounds „a”, „e”, „i”; for the rest of the subjects, the only way of communication was whining or crying.
 - *from 18 to 24 months old* – all subjects uttered vocalic sounds, but only 9 of them (7 girls and 2 boys) produced non-intentional sounds which foreshadowed the utterance of the double-syllable words; the general motility, the orthostatic posture and the grip strength are delayed in the all cases, with variable lagging;
 - *from 24 to 36 months* uttered 2 syllable words: *ma-ma; ta-ta; pa-pa; ba-ba*; but only 29 subjects (19 girls, 10 boys) synthesize the syllables into words. All children displayed linguistic competences, but no linguistic performance, this remaining limited; communication being done through few single word phrases, mainly in a gestural-emotional way (cry, grin, laughter);
 - *from 36 to 42 months*, the linguistic performance is low in all the cases, with a deviation from the normal level of 12 to 20 months;
 - 10 mothers attempted to integrate their children into the little class of the infant school, hoping that being in touch with other children in a stimulating playing environment, their child’s speech will evolve. The children were withdrawn due to the rejection reaction of the group and of the teacher who set forth the disturbance of the entire class’s schedule caused by the presence of that child.

The information from the anamnesis together with the results of the assessment undergone according to the previously stated protocol, allowed us a fine and minute analysis of the speech components:

establishing the global lag of the speech, stating those affected speech components and the degree of disorder on which a certain component does not manifest alone but causes disorders in others.

The examination of the children continued with observations on the phono-articulator apparatus, breathing and deglutition. There were observed:

- The position of the tongue at rest, during deglutition and during articulation of certain phonemes, its mobility on the transversal and longitudinal plane.
- The support points of the tongue when pronouncing certain phonemes;
- The integrity and the tonicity of the lips;
- The tonicity of the buccinator muscle;
- The integrity, the shape and the amplitude of the arch of the hard palate;
- The integrity, the shape, the size and the mobility of the soft palate;
- The type of breathing, the existence of bad habits;
- Significant changes in deglutition.

The initial evaluations revealed the need for these children to immediately enter a speech therapy program. The efficiency of an intervention initiated as early as possible, advisable during pre-school, is given by the existence of better conditions for starting and stimulating the compensatory mechanisms due to the higher plasticity of the central nervous system than that during later growth stages; by the fact that there is enough time to develop these compensatory mechanisms; the possibility of preventing the setting in of secondary disorders derived from the primary disorder and of the false-compensatory manifestations and the possibility of avoiding failures in the school learning activity with all their inherent consequences.

The recovery therapy programs these children were part of, were focused on:

1. Speech therapy for:
 - Building up a strong buccal air flow-out,

- needed for word utterance;
 - Springing, consolidating and automating the faulty sounds;
 - Recovering the delay in speech development: enriching the active vocabulary through introduction of usual terms;
 - Building up and developing the phonological processing abilities, on three large levels: the phonological coding within the short term memory; the phonological representation within the long term memory; the access to the phonological structure of the word;
 - Building up the communicative skills, exteriorized in noticeable behaviour, like the abilities of: carefully listening a message for proper reception; easily decoding the meanings of the ordinary messages addressed to them; expressing thoughts in clear and correct oral statements; asking questions and giving correct answers to meaningful questions; making personal accounts of experienced events; setting relationships with other children and with adults without fear and hesitation; sustaining an exchanges of lines and remarks in a dialogue; informing from different sources, other than the person who directly delivers information;
 - Constant transposing the things acquired during the therapy sessions into daily life and family and social environment.
2. Psycho-motrical therapy for developing the general mobility coordination,

organizing perceptive-motrical behaviour and structures.

3. Cognitive therapy for stimulating psychological processes;
4. Socialization and building up the personal and social autonomy for ameliorating the interrelation dysfunctions; practicing and consolidating daily life habitual actions; developing self-control and emotional expressiveness.

CONCLUSIONS

There are several conclusions to be drawn:

1. The lack of oral nutrition causes the underdevelopment of the phono-articulator apparatus;
2. The invasive medical techniques blocks or seriously damages speech functions, the most affected being those of communication and play; the cognitive-linguistic acquisitions stagnate in the first two years of the linguistic period, with variables of time and degree;
3. Mothers counseling is absolutely necessary to help them understand the role they have in their child's future evolution;
4. The identification of any disturbance in child's development requires immediate adequate amelioration and multifactor support actions;
5. The speech therapeutical intervention, through its corrective role, will prevent school failure and provide even training, education and integration chances.

REFERENCES

1. Burlea M., *Pediatrie pentru studenții Facultății de Medicină Stomatologică*, Ed. Apollonia Iași, 1999.
2. Le Normand MT., *Modèles psycholinguistiques du développements du langage*. In C. Chevrie-Muller&J. Narbona (Eds.) *Le langage de l'enfant, aspects normause et pathologiques*. Paris, Masson, 1996
3. Mercier A., *L'épreuve de la nutrition artificielle*, R. Enfance&PSY, nr. 8 06., 1999