

**Danube University Krems**

**THE OSTEOPATHIC APPROACH IN THE  
TREATMENT OF THE ASYMMETRIC INFANT**

**Presented by:** **Sabine Kollingbaum-Fabian**  
Rothweg 9  
A-8047 Graz-Ragnitz

**Profession:** Physiotherapist  
Dipl. Osteopath

**Supervisor:** **Eva Krasser**  
Physiotherapist, Dipl. Osteopath

Graz, Juli 2006

<b>1. PREFACE:</b> .....	<b>3</b>
1.1 TOPICS TO EVALUATE:.....	4
<b>2. BASICS FOR THE DIAGNOSE OF THE ASYMMETRIE:</b> .....	<b>4</b>
2.1 DEFINITION OF ASYMMETRIE:.....	4
2.2. REASONS FOR ASYMMETRIE:.....	5
2.2.1 CONGENITAL MALFORMATION:.....	5
2.2.2. ABNORMAL INTRAUTERINE PRESENTATION:.....	5
2.2.3. POSTNATAL ASYMMETRIES CAUSED BY POSITIONING:.....	6
2.3. EMBRYOLOGY:.....	6
2.4. BIRTH:.....	7
2.4.1. SKULL OF THE FETUS.....	7
2.4.2. PRESENTATIONS:.....	8
2.4.3. MATERNAL PELVIS:.....	8
2.4.4. STAGES OF DELIVERY:.....	8
2.5. DYSFUNCTIONS:.....	11
2.5.1. Dysfunction`s of the cranium:.....	11
2.5.2. Origin of Dysfunctions:.....	11
2.6. REFLEXES:.....	12
2.6.1. THE INFLUENCE OF REFLEXES ON POSTURE:.....	16
<b>3. PSYCHOMOTORIC DEVELOPMENT OF THE CHILD.....</b>	<b>17</b>
3.1. FIRST MONTH:.....	17
3.2. SECOND MONTH:.....	18
3.3. FOURTH MONTH:.....	18
3.4. SIXTH MONTH:.....	19
<b>4. CONCEPTS:.....</b>	<b>20</b>
4.1. THE CONCEPT OF BOBATH THERAPY AND THE TREATMENT:.....	20
4.2 THE CONCEPT OF VOJTATHERAPIE AND THE TREATMENT:.....	22
4.3. THE CONCEPT OF OSTEOPATHY AND THE TREATMENT:.....	26
<b>5. METHODS:.....</b>	<b>31</b>
5.1. GROUP TREATED WITH OSTEOPATHY:.....	31
5.2. CONTROL GROUP:.....	31
5.3. STRUCTURE OF THE STUDY.....	31
5.4. THE QUESTIONNAIRE:.....	32
5.5. THE QUESTIONNAIRE:.....	33
5.6. ANALYSIS - TREATED GROUP.....	34
5.7. ANALYSIS - CONTROL GROUP:.....	35
5.8. EXPLANATION OF THE PILLAR GRAPHS:.....	36
<b>6. STATISTICS:.....</b>	<b>37</b>
<b>7. RESULTS:.....</b>	<b>50</b>
7.1. DIAGNOSIS AND REFLEXES:.....	50
7.1.1. Reflexes:.....	50
7.2. POSITIVE RESULTS:.....	50
7.2.1. motor system: (question 15,17).....	50
7.2.2. psychic aspects: (questions 1,2,3,4,5,6,7,8,16,19,20,21,22,23,24,25).....	50
7.2.3. visceral system: (questions 8,9,11,12,13,14,18).....	51
<b>8. DISCUSSION:.....</b>	<b>51</b>
<b>9. SUMMARY:.....</b>	<b>52</b>
<b>10. BIBLIOGRAPHY:.....</b>	<b>53</b>
<b>11. LIST OF PICTURES:.....</b>	<b>54</b>
<b>12. APPENDIX:.....</b>	<b>55</b>

12.1.	DIAGNOSTIC SHEET: .....	55
12.2.	REFLEXES: .....	56
12.3.	CHILDREN TREATED WITH OSTEOPATHY: .....	57
	12.3.1. NAME: V. (female, d.o.b.: 2001/01) .....	57
	12.3.2. NAME: F. (male, d.o.b. 5/2001).....	58
	12.3.3. NAME:L. (female,d.o.b.10/2001).....	58
	12.3.4. NAME: R. (male, d.o.b. 9/2001).....	59
	12.3.5. NAME: T. (female, d.o.b. 5/2001).....	60
	12.3.6. NAME. N: (male, d.o.b. 10/2001) .....	61
	12.3.7. NAME: P. (male, d. o.b. 8/2001).....	61
	12.3.8. NAME: C. (male, d.o.b. 8/2001) .....	62
	12.3.9. NAME: A. (male, d.o.b. 2/2001).....	63
	12.3.10. NAME: P. (male, d.o.b. 11/2001).....	63
<b>13.</b>	<b>ABSTRACT:.....</b>	<b>65</b>

## **1. PREFACE:**

In the past only neurophysiologic techniques (especially Bobath and Vojtatherapie) that were used for treatment of the asymmetric infant in Austria.

In my office I started to treat asymmetric babies with osteopathy three years ago – with much success.

This attracted the interest of both, physicians and paediatricians. They wanted to know more about this treatment, after observing the excellent progress these little patients made and seeing the excitement of their mothers. Fellow therapists started to discuss this different approach in treatment. This was the start of meetings to introduce the basics and the philosophy of osteopathic treatment.

It was the wish to show up specifics and efficacy of osteopathic treatment of these cases which made me choose this topic for my thesis, especially since osteopathy is hardly known in the Austrian health care system.

I want to offer the interested specialists a chance to make a decision for a “different” kind of treatment of the asymmetric child.

A draft to gain comparable data with respect to examination, diagnosis and evaluation of the therapeutic work followed. The first step was to design of a patient health record for the evaluation of the motoric development and the reflexes of our paediatric patients.

A draft to gain comparable data as for examination, diagnosis and evaluation of the therapeutic work followed. The first step was the design of a patient health record for the evaluation of the motoric development and the reflexes of our paediatric patients.

I also designed a questionnaire for the parents to gain better insight into all important facets of the problem (psychological and physical development with specific emphasis on motor development)

The next step was the literature search, including an electronic search for prior studies on this topic.

There are several studies on manual therapeutic treatment, but there is only very little in depth work.

Still I did find an interesting article by Rosegger and Steinwender: "Das Schräglagensyndrom"- eine Kombination typischer angeborener Skelettdeformierungen bei Neugeborenen.

The research of Biedermann, Gladel and Lewitt on structural problems with scoliosis infants brought up interesting aspects for my own work.

With "Kiss- Kinder" by Biedermann we discover a manual therapeutic approach to the problem. The "straight" upper cervical point of view might be too much of a reduction on one area for therapists, who prefer a full spine approach. Of course there is no doubt that this area is of utmost importance, even if you prefer a full spine concept.

It was quite difficult to find literature about the influence of and on the autonomic nervous system. Only Hofacker and Buchmann (with his book "Asymmetrische frühkindliche Kopfgelenksbeweglichkeit) pointed out the influences of the spine.

My source for embryological aspects was the book of Drews and Langmann. The remarkable work of Fleming was very useful for the motor development of the infant.

The book "Die Wirbelsäule aus osteopathischer Sicht" and some parts of Fryman`s "The trauma of birth" were also very helpful.

## **1.1 TOPICS TO EVALUATE:**

I would like to clarify to what extent the baby's condition will change through osteopathic treatment.

The results after osteopathic treatment of the baby- are there any change:

- of neurophysiologic aspects ( evaluation of the patient's case history, re-evaluation of motor development and of the reflexes)
- subjective according to the observation of the mother ( review of the questionnaire)

## **2. BASICS FOR THE DIAGNOSE OF THE ASYMMETRIE:**

The following basics are essential for a diagnosis of asymmetries:

As a matter of principle, I wrote about the definition of asymmetry and its different occurrences before and after birth. Then about embryological fundamentals, afterwards the importance of dysfunctions, the delivery itself and its influencing factors that enable a birth free of complication. Furthermore, about reflexes and their influence on posture.

### **2.1 DEFINITION OF ASYMMETRIE:**

(cf. Hüter-Becker, 1998)

- 1) The cervical spine is at least in one plane asymmetric (most times in the frontal plane); the neck is flexed laterally, even in children older than three months.
- 2) The posterior shoulder girdle is asymmetrically stressed.
- 3) The field of vision is increased significantly on the side of convexity.
- 4) The infant grasps earlier with the hand on the side of convexity. (Face side)
- 5) In supine position the trunk does not touch the surface symmetrically; there is a lateralisation towards the side of concavity.
- 6) Cranio- ventral pull on the pelvis on the side of concavity. (occiput side)
- 7) The development of the hip joints depends on the static foundation (spine). With normal kicking activity on the side of convexity the hip joint will develop properly and with increasing differentiated motility.

The hip joint on the side of concavity (the side turned away from the face) frequently shows malposition and sometimes even luxation will be evoked.

Each "local" lesion cause increasing global deficient development towards asymmetry of the whole body. The main problem seems to originate from the trunk (to be exact, from the spine). All affected children show asymmetric development of position and motility of all affected joints with cranial and caudal spread. The deep medial autochthonous muscles of the spine are of special importance for the static and motoric development- they are responsible for the coordination of spinal movement. Especially the long and the short rotator muscles and the multifidus and the levator costae muscles are responsible for the coordination of the vertebral segments. If growth and function of these muscles is asymmetrical optimal function of the vertebral column will be impossible. Depending on the severity of imbalance of the autochthonous muscles, the asymmetrical trunk / spine will cause distal functional aberration in the course of static and motoric development. Hence the symmetrical static foundation of a spine permitting differentiated motion is of greatest importance for the motoric development of the extremities.

## **2.2. REASONS FOR ASYMMETRIE:**

(cf. Langmann, 1980)

### **2.2.1 CONGENITAL MALFORMATION:**

Congenital malformations are significant morphological defects, which are already present at birth.

The embryo is well protected against mechanical forces by the uterus, the membranes and the amniotic fluid. The placenta offers protection against potentially harmful substances. But there is still a variety of agents that may cause lesions (f.e. chromosomal aberrations, infections- especially rubella, malnutrition)

During the embryonic period (phase of intense differentiation) teratogenous substances can cause a multitude of malformations. The period of greatest vulnerability is between day 9 and 11 for the spine and between 11 and 14 for extremities.

With the segmental development of the sclerotomes and the transformation into the final vertebrae, it is possible that an asymmetrical fusion of two succeeding vertebrae may occur, or that a part of a vertebra is missing. Sometimes there is an aberrant number of vertebrae, with an additional or a missing segment. An extremely severe lesion occurs when there is a partially or a completely missing fusion of the vertebral arch causing spina bifida, with the possibility of malformation of the spinal cord.

#### **2.2.1.1. Congenital Malformations may have various causes:**

(cf. Langmann, 1980)

##### **a) Genetic defect:**

Approximately 2-3 % of all live births have one or more characteristic malformations- this number doubles until one year of age, due to the discovery of further defects, which were not yet detected at birth.

Genetically based defects of the spine can be seen in Down syndrome, and also in Klinefelter and Turner syndrome.

**b) Infectious causes:** rubella, cytomegalic inclusion disease, toxoplasmosis

**c) Radioactive agents:** malformation of the skull, spina bifida, Klippel Feil syndrome, malformation of extremities.

**d) Chemical agents:** f.e. drugs: amelia and meromelia

Coffeine, nicotine

Hormones

**e) Hypoxia (anoxaemia):** before, during or after the birth

### **2.2.2. ABNORMAL INTRAUTERINE PRESENTATION:**

(cf. Rosegger, 1992)

**The following defective positions are distinguished:**

- transverse presentation: the child's position is aslant the pelvis exit
- pelvic presentation: the child's fundament is positioned towards the pelvis exit
- facial presentation: the child's face enters the pelvis exit first
- inclined presentation: the child's position in the mother's pelvis is inclined

These abnormal presentations can appear after the 20th week of gestation, probably caused by a relative decrease in the volume of the amniotic fluid in comparison to the

volume of the fetal body. The restraint of movements forces the fetus to adjust to the reduced space.

Predisposing factors are compressive forces, caused by the higher tonus of the abdominal and uterine muscles of a primipara, mechanical hindrances caused by uterine malformations or by a myoma, or simply the relationship of the size of the baby and the mother (big baby- little mother)

The prevalence of abnormal presentation is 19% of the otherwise healthy and mature babies.

### **2.2.3. POSTNATAL ASYMMETRIES CAUSED BY POSITIONING:**

(cf. Rosegger, 1992)

Postnatal asymmetries caused by (defective) positions are seen in:

- reflux children – they show reflux of gastric fluid into the gullet;
- cerebral apraxia – children with neurological disorders;
- hip dysplasia – an insufficient development of the acetabulum;
- Consequences of inadequate position and bedding of patients after surgical operations.

### **2.3. EMBRYOLOGY:**

(cf. Drews, 1993)

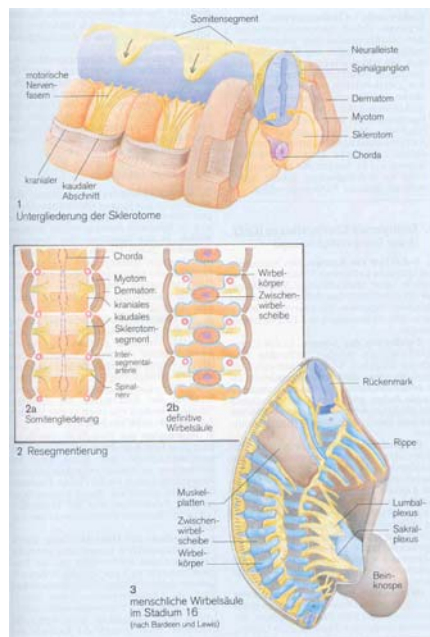
The notochord is the primitive embryological axial skeleton. It is a cylindrical cord of cells ventral of the neural tube, consisting of ballooning cells, which contain a gelatinous substance.

The pressure within this membranous, not extensible tube is caused by these ballooning cells. This causes a certain rigidity, which gives support to the embryonic trunk.

The paraxial mesoderm is segment ally organized into pairs of somites.

The somites subdivide into three kinds of mesoderm primordial: myotomes, sclerotomes and dermatomes. They are the precursors of osseous, muscular and epidermal tissues.

The sclerotomal cells surrounding the notochord develop into the vertebral segments.



Picture 2

The lateral and dorsal muscles of the trunk develop from the myotome. Dermis and subcutaneous tissues are formed from dermatome cells.

Mesenchymal cells arising from the sclerotome migrate ventromedially towards the notochord and the neural tube in week four and fuse with the cells of the contra lateral side.

At the level of each vertebral precursor the notochord is surrounded by prososseous tissue, the ring shaped arrangement around the neural tube already resembles the vertebral canal. The prososseous model of the vertebral body is formed by the fusion of the sclerotomes. As the sclerotome surrounds the notochord and neural tube, it splits into a cranial half and a caudal half, and the caudal half of each sclerotome fuses with the cranial half of the succeeding sclerotome. The resulting composite structures thus produce vertebrae that lie intersegmentally.

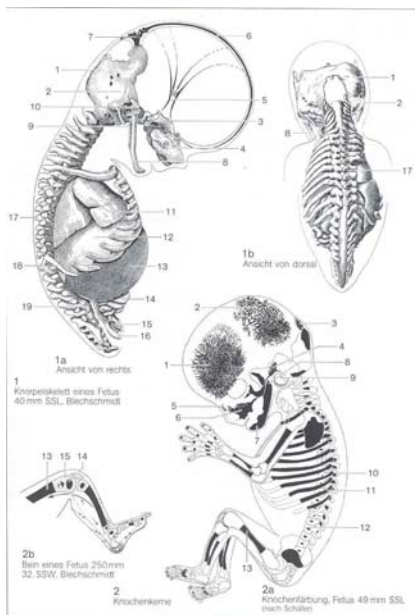
Cells from the cranial areas of the sclerotomes migrate into the space between two neighbouring vertebral bodies and become a part of the discus. The notochordal cells within the vertebral bodies disappear, whereas might be maintained within the discus. Here the notochord even grows; there is a mucoid conversion of the cells to build the nucleus pulposus, which eventually will be surrounded by the concentric layers of the annulus fibrosus. In the second month the sclerotoms convert into cartilaginous tissue.

The **primitive vertebra** consists of **two parts**:

- The ventral part, suggesting the vertebral body
- The dorsal part, suggesting the vertebral arch.

Ossification centers appear in the cartilaginous modle. The ossification of the vertebral arches is separated from the ossification of the vertebral bodies.

At **the end of the second month** there are **two ossification centers** in the vertebral body. At the end of the third month there is one ossification center in the vertebral arch. Until **the end of the sixth year** there is still cartilage between the vertebral body and the arch. The vertebral precursor of the embryonic period is very similar to the vertebra of the fetal period. Morphological changes of each vertebra in a specific spinal segment are the result of functional demands in the course of the postnatal development- thus being acquired characteristics.



Picture 3

## 2.4. BIRTH:

One of the factors that could lead to complications during the birth process may be the relationship of the fetal skull to the maternal pelvis. Not only the size and the shape of the baby’s skull, as well as, the maternal pelvis, but also the position of the fetus in the birth canal are of prime importance.

### 2.4.1. SKULL OF THE FETUS

(cf. Sergueef, 1999)

The skull of the mature fetus is egg shaped, with the face being rather small in comparison with the vault.

It is of great importance for the delivery that the skull can move freely in every direction in relation to the spine.

Trunk of the fetus:

Since all diameters of the trunk are pliable, there is less danger of injury.



### **2.4.2. PRESENTATIONS:**

(cf. Wilson, 2001)

- 1) Vertex presentation: with the occiput being the point of direction  
95% of all cases: LOA or ROP (left occipitoanterior, right occipitoposterior)
- 2) Face presentation: point of direction is the chin.
- 3) Brow presentation: the forehead of the baby comes first.
- 4) Transverse presentation: always lead to caesarean section.
- 5) Breech presentation: presentation of the fetal buttocks or feet, with further subdivision depending on the position of the feet in relation to the body ( feet alongside the buttocks, legs extended against the trunk. feet lying against the face, prolaps of foot or knee into the vagina).

### **2.4.3. MATERNAL PELVIS:**

(cf. Wilson, 2001)

- 1) Gynoeceia pelvis: it is the most common (50%) and it is also the most adequate for delivery unless the mother is of small stature leading to brim restriction.
- 2) Anthropoid pelvis: (25%) head rotation is difficult for the fetus thus causing a prolonged birth process.
- 3) Platypelloid pelvis: (5%) makes it difficult for the head to rotate from the initial transvers lie to the occiput anterior position because of the flattened and anterior sacrum. Often there will be a deep transverse arrest, foetal distress and eventual caeserian section.
- 4) Android pelvis: (20%) That will get to invariable difficulties, because the head of the infant will get stuck across. This often leads to a prolonged or obstructed labour with extensive molding. The delivery very often leads to forceps termination or ventuse. As a diagnostic point the woman having an android pelvis usually has a vertical hirsute line on the abdomen.

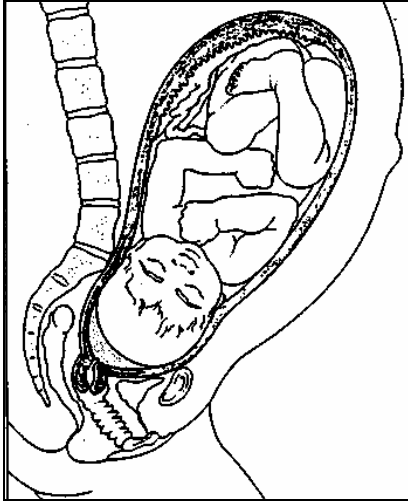
### **2.4.4. STAGES OF DELIVERY:**

(cf. Wilson, 2001)

#### **There are three stages:**

- 1) engagement
- 2) descent
- 3) expulsion

### 1.) Engagement:



Picture 4

The head of the baby engages in the transverse diameter of the pelvic brim. Molding of the skull by uterine contractions have already started during the last month prior to delivery, together with the flexion of the head there is a perfect adjustment to the narrow birth canal by reduction of the diameter of the presenting part.

60% anterior position of the occiput  
34% anterior position of the frontals  
6% in anterior posterior axis

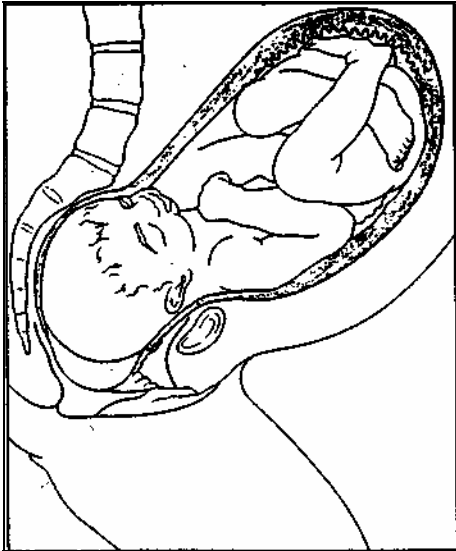
The flexion of the head may start as early as weeks 25- 26. Besides the reduction of the diameter of the leading part this also allows easier rotation. The axis for rotation is laid through the foramen magnum.

#### **Rotation is affected by:**

- The built of the maternal pelvis
- Muscles and ligaments of the pelvic cavity

## 2) Descent:

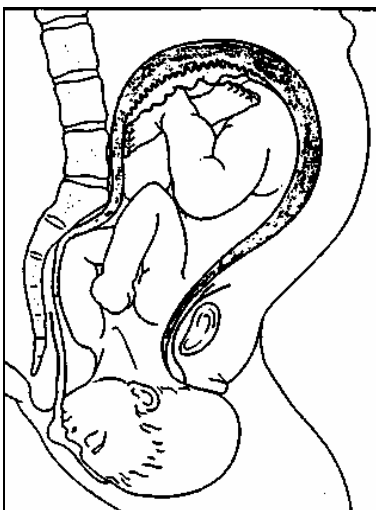
Since the further descent of the shoulders is impossible in the transverse diameter between the psoas muscles, a rotation of the back to the left or right- following the way of least resistance- is necessary. It is important to note that this rotation is only possible due to the great resistance of the maternal perineum.



Picture 5

## 3) Expulsion

At this point it becomes easier for both, mother and child, because Both, muscles and ligaments are pliable. Extension of the head takes place. After the birth of the head, the anterior and finally the posterior shoulders follow. With anterior rotation of the first shoulder the head is turned back 45 degrees again (restitution). If there are excessive rotational forces between head and shoulders, stress in the cervico thoracic junction can cause dysfunction in this area.



Picture 6

## **2.5. DYSFUNCTIONS:**

(cf. Sergueef, 1995)

Corporal or cranial Dysfunction may already occur during pregnancy and during accouchement.

Dysfunctions are disturbances of the physiological function within tissues and organs or between organs.

The origin of the dysfunction of somatic structures may not even be within this area but can be a disturbance within the visceral system. There is a direct influence of the musculo skeletal system by the visceral system and vice versa.

Changes of fascial tension can have influence on the viscera of chest and abdomen.

Restrictions are divided into:

- visceral articular restrictions
- visceral ligamentous restrictions

### **2.5.1. Dysfunction`s of the cranium:**

(cf. Sergueef, 1995)

1) PHYSIOLOGICAL DYSFUNCTION: reduced motion within the normal range of motion.

2) TRAUMATIC DYSFUNCTION: complete loss of mobility with all kinds of trauma. Dislocation of structures exceeding the normal physiological range of motion.

3) INTRAOSSEOUS DYSFUNCTION: loss of motion of the preosseous membranous modle before ossification.

4) PSEUDO DYSFUNCTION: changes of tension caused by disturbances with an origin apart from these structures.

### **2.5.2. Origin of Dysfunctions:**

(cf. Sergueef, 1995)

Dysfunctions can develop in the fetal period or during birth process.

#### **2.5.2.1. In the fetal period:**

In the fetal period you can lead back dysfunctions to the following points:

- a) Pathology of the uterus: intrauterine space is relatively too small, compromising the growth of the foetus.
- b) Malposition of the foetus in the maternal pelvis: favouring of asymmetries
- c) Gemini
- d) False labour
- e) Early engagement

#### **2.5.2.2. During the birth process:**

There are three stages:

- 1) Engagement: molding of the foetal skull to adjust to the birth canal. The transverse diameter is reduced by 2, 5- 2 cm.

- 2) Descent: with the descent through the birth canal also rotational movements have to take place, following the way of least resistance.
- 3) Expulsion: after delivery of the head, first the anterior, then the posterior shoulder and finally the body of the baby follow.

(cf. Sergueef, 1995)

Tractive and compressive forces acting on the head may alter equilibrium and balance of the reciprocal tension membranes of the skull or the cord and even of the fascial system. The whole body of the infant may be affected this way, creating disturbances in the area of the spine, the pelvis and the extremities.

Especially during expulsion the compressive forces on the occiput are very high, pressing the lateral masses towards the squama. These forces can be high enough to cause intraosseus dysfunctions. When there is asymmetric compression the insertions of the suboccipital fascia and muscles are affected. This can be an ethological factor for infantile scoliosis or for congenital torticollis. Sometimes the delivery of the shoulders causes a large amount of rotation and lateral flexion of the neck. This can build up tension or cause dysfunction of the cervical spine, the thoracic cervical junction or the upper thoracic spine.

Generally a certain degree of stress is necessary for delivery (release of catecholamines). Also, the skull of the fetus is built to resist the forces of delivery. But if the forces are greater than a certain limit, this may be reflected in the asymmetry of the tissues.

Corrective treatment always has to be exerted with the innate pulsating rhythm of the primary respiratory mechanism.

## **2.6. REFLEXES:**

(cf. Fleming, 1987)

From reflexes and reactions in the first year you can draw conclusions about the design of the brain and its development, because in the course of maturing of the brain primary behaviour patterns are curbed. The following reflexes are part of diagnostics.

**Palmar grasp reflex:** flexion or clenching of the hand on stimulation of the palm.



Picture 7

**Plantar grasp reflex:** flexion of the toes on stimulation of the sole, toes are spread when stimulus stops.



Picture 8



**Placing reaction:** When the infant is suspended by the axillae and lifted up slowly with the dorsum of one foot brushing along the border of a table, he or she will pull up the foot in a stepping motion.

Picture 9



**Stepping reflex:** The child is suspended by the axillae. When the sole of one foot is pressed down on the table the child flexes this leg and stretches the other one- this alternating motion appears like walking or stepping.

Picture 10



**Gallant reaction:** Para vertebral stroking of the trunk elicits lateral flexion of the trunk, with the concavity being on the side of the stimulus.

Picture 11

**Landau reaction:** The infant is held in a swaying position with the trunk being supported at the ventral side- this causes extension of first the neck, followed by the legs. When the neck is flexed (suddenly by the examiner) a flexion of the whole body follows.



Picture 12

**Moro reaction:** The infant is lying on the forearm of the examiner in supine position. With the other hand the examiner supports the head. When the head is momentarily allowed to fall backward (with immediate resupport by the examiner's hand), a series of actions will be elicited: The infant opens the mouth; the arms will be abducted and extended, the fingers fanned. Then it closes the mouth again and flexes the arms and brings them back to midline.



Picture 13

**Asymmetric tonic neck reflex:** When the examiner turns the infant's head to one side, the baby flexes the extremities at this side and extends them on the contra lateral side (fencer position).



Picture 14

**Symmetric tonic neck reflex:** When the examiner flexes the child's neck, the baby flexes the arms and extends the legs.

**Vojta lateral bend reaction:**

(cf. Vojta, 1984)

The infant is brought into vertical position, facing the examiner, the trunk is bilaterally supported by the examiner. The examiner tips the infant laterally in a sudden motion, supporting the trunk only with the lower hand, the upper hand only resting gently on the baby. There is a typical series of reactive movements depending on the age of the child.

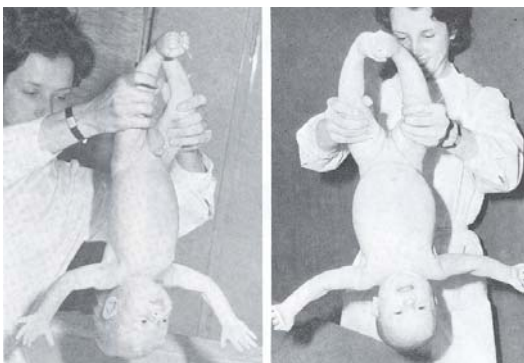


Picture 15

**Peiper- Isbert Kopfabhängeversuch:**

(cf. Vojta, 1984)

The infant is supine, the head kept in midline. The examiner pulls the infant up at its lower legs. The reaction can be divided into four phases and depends on the age of the child.



Picture 16



### **2.6.1. THE INFLUENCE OF REFLEXES ON POSTURE:**

(cf. Ansari, 1985)

#### **2.6.1.1. MOTOR ACTIVITY:**

Muscle activity may occur in terms of purposeful motion (motor move system) or of postural control (motor hold system)

The common effectors organ for posture and purposeful motion are the skeletal muscles.

Usually flexors are the muscles serving the motor move system, whereas extensors usually serve the motor hold system.

The main function of the muscles is contraction to create force.

There are two types of contraction: isometric and isotonic contraction.

Isometric contraction: The length of the muscle remains constant and the tension changes. The muscle is a postural muscle.

Isotonic contraction: The length changes and the tension remain constant.

Both kinds of contraction appear always simultaneously.

#### **Muscle contraction:**

It is elicited by alpha and gamma motor neurons.

#### **Alpha motor neurons:**

Small tonic alpha motor neurons: postural function

Great phasic alpha motor neurons: for muscles of the motor move system

#### **2.6.1.2. POSTURE:**

There is the spatial position of the whole body, and the position of individual parts of the body in relation to each other.

Our posture is controlled by impulses of high motor centres, causing voluntary motion, and by a number of reflexes.

#### **2.6.1.3. MOTION:**

Motion is made possible by voluntary muscle innervations. Much of our coordination of movement is congenital, but some has to be acquired by training. Most is controlled by sensory perception.

Purposeful motion is always combined with posture. It also requires involuntary motor activity and the constant change in posture. The posture is constantly adjusted to movement. Normal motor activity requires normal posture and in addition to this normal postural reflexes.

#### **2.6.1.4. REFLEXES:**

Monosynaptic reflexes: are the most important spinal reflexes for control of the muscle length and thus for stabilization of body posture.

Postural reflexes: they control the muscle tone, the position of individual parts of the body to each other and the position of the joints. They set the stage for motor patterns controlled and integrated by higher cerebral centres- for postural and balance reactions.

#### **2.6.1.5. BALANCE REACTIONS:**

These are voluntary visible movements or only subtle changes of the muscle tone to maintain body balance. They affect the position of individual parts of the body in relation to each other and the spatial position of the body.

The posture of our body is the result of the reaction of the nervous system to numerous, constantly changing stimuli. Positioning reflexes and balance reactions are the foundation for posture and hence for normal motor activity. Reflex control of motor activity is of great importance, but there is also the influence of efferent impulses from higher CNS centres and a voluntary control.

### **3. PSYCHOMOTORIC DEVELOPMENT OF THE CHILD**

(cf. Fleming, 1987)

#### **3.1. FIRST MONTH:**

**Supine:** Generally flexed. The head is turned laterally, the body follows en bloc to the side of the face. Arms are flexed, resting besides the body. Hands sometimes open, sometimes clenched to fists. The thorax is in midline, positional change depending on



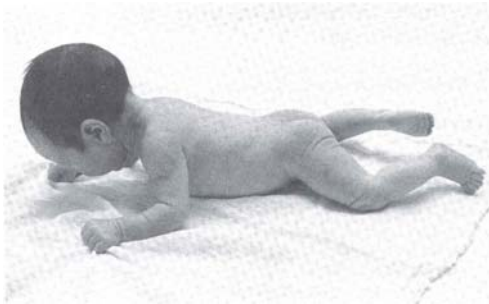
Picture 17

the head, because of the asymmetric tonic neck reflex.

The legs are externally rotated - sometimes only one leg, whereas the other leg may be abducted and internally rotated. Both legs may be abducted or held in asymmetric position.

The knees are flexed; the feet are in dorsal flexion. There exist a still frequent mass movement at this stage.

**Prone:** Lies in flexes attitude. The head is turned to the side and can be lifted up for a short time and turned to the other side. Crawl



like motions. You find motion and position of the trunk following the head. The arms are beneath the thorax or besides it. The baby has slightly flexed hip joints and knees.

Picture 18

**On pull to sitting position:** Arms stay flexed, head lag. In supported seated position anterior head tilted and bobbing.

**Language:** a few guttural sounds, cries before feeding, calms down immediately with feeding. Responds to a bell, becomes quiet and attentive.

**Social:** fixates the examiner sometimes; startled with loud noise. You find the first social smile in week 4- 6.

### 3.2. SECOND MONTH:

**Supine:** Alternately kicking of the legs- rarely symmetrically. The head is turned to the side, can be turned already to the other side. The arms are still in flexed position besides the body; the hands are already frequently open. Sometimes the arms are elevated. The baby has a symmetrical position of the body. The legs are externally rotated and sometimes already well abducted.



Picture 19

**Prone:** There is still greater flexor muscle tone than extensor tone, but the infant can already extend the thoracic area. Hips are flexed. The head can be lifted up for a short period but still slightly bobbing. The baby has his upper torso resting on the forearms- still unstably. You find external rotation of the legs, alternately kicking.



Picture 20

**On pull to sitting position:** head can already follow quite well. In supported seated position still some anterior tipping of the head, tries to bring it back into more stable erect position - still some bobbing.

**Language:** vocalizes, laughs and coos

**Social:** responds to voices, smiles, observes faces.

### 3.3. FOURTH MONTH:

**Supine:** Stable symmetric posture predominates. The child can roll over on both sides and has the head in midline. Brings the hands in midline, watches them and plays with them, can grasp and hold toys. The legs are externally rotated and abducted - alternately kicking. Hips, knees and feet are flexed.



Picture 21

**Prone:** supported symmetrically on the forearms, can bring head outside of supported foundation. The baby can open hands well. You find further extension of trunk and hips. The legs are fully touching the surface, they are externally rotated and abducted.



Picture 22

**On pull to sitting position:** child helps with good head control. Legs are almost extended, only slight flexion of the knees. Head can be held stable and in midline.

**Language:** responsive smile, laughs out loud sometimes, faces partner when addressed. The baby has spontaneous cooing and squealing. Turns toward noise, is quiet and attentive.

**Social:** looks at the examiner, fixates. The baby watches faces carefully. It can be consoled when picked up, by body contact or by a voice.

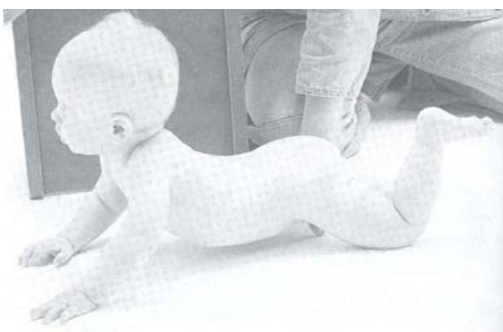
### **3.4. SIXTH MONTH:**

**Supine:** Can roll over into prone position. The baby can lift head. Can touch own feet.



Picture 23

**Prone:** Lateral movement of gravity centre is possible. Back is extended. The hips touch surface. The baby rolls around on the floor.



Picture 24

**Social:** talks even when alone. Says mama and papa yet not aimed. Shy with strangers. Takes pleasure in mirror. The baby turns to the origin of a noise.

## **4. CONCEPTS:**

The following concepts were used in the treatment of the infants. I want to present them, because they are very different in their basic approach. The concepts are: Bobaththerapy, Vojtathérapie and the osteopathy.

### **4.1. THE CONCEPT OF BOBATH THERAPY AND THE TREATMENT:**

(cf. Bobath, 1980)

Based on the ideas of Dr. Karel Bobath (neurologist and psychiatrist) and Dr.h.c. Berta Bobath ( physiotherapist) the concept was developed in London. Originally it was applied to adolescents and adults with acquired movement disorders (f.e. after stroke). In world war two Berta Bobath treated an adult with spastic hemi paresis after a stroke. She observed that the spasticity was reduced by specific handling of the patient, who could gain new experience of movement. This way she could influence the control of muscle tone.

They discovered that the periphery could influence the CNS by sensory input with postural changes. Soon this new concept was applied to children and infants with congenital movement disorders.

From the beginning, in the forties, they worked constantly on the further development of this holistic concept, based on the development of cerebral function and on neurophysiologic laws.

The outline of this concept allows the integration of further scientific and empirical findings.

Bobath regards normal development of the child as an approach to treatment; witch requires constant adjustment of congenital motor patterns to the environment. Intellectual curiosity, experimenting and repetition encourage the learning of flexible strategies of acting.

These factors may be affected in many ways with primary impaired development or with disorders acquired later.

The aim of treatment is to assist the child with motoric learning through experience of motion, to assist the child with self organization.

(cf. Seiler, 2002)

Requirement for therapy is a medical diagnosis. Further steps:

- 1) Listing of functional capability
- 2) Drafting the treatment plan

Aim:

- improvement of function
- to build up on the abilities of the patient ( with regard to the disabilities)

Clinical proceeding is done as follows:

- **findings:** essential requirement is the detailed knowledge of the normal development
- **analysis:** it is the basis of the treatment plan with regard to the personality of the patient
- **interpretation of the gathered data**
- **definition of the immediate and future goals**
- **development of a therapy plan**
- **putting the plan into action**
- **re-evaluation of the infant**

(cf. Seiler, 2002)

Bobaths neurological development basically depends on the modules of “normal” development. (Not in the sense of a linear inflexible chronology, but with regard to the development of abilities)

Motoric learning:

Motoric learning is encouraged by creating the foundation for exploration, experimentation and development of strategies.

Motoric learning happens with action. Tactile, proprioceptive and vestibular stimuli in the sense of touching and being touched, moving and being moved are part of the process as well as acoustic and optic stimuli and stimuli addressing smell and taste. The infant learns by adaptation of the congenital movement patterns, laid down genetically, in confrontation with:

- the social and physical environment
- biochemical premise

This is a strategy, which offers an economic solution for the individual patient in every specific situation and environment.

The child is learning by:

- Attention.
- Motivation.
- Selfintented activity- with themselves.
- With the environment.
- Repetition.

Therefore, economic strategies are developed- ability becomes skill, with automation of a function.

Only **activity** can **influence the development and maturation of the CNS.**

Bobaths holistic point of view consists of:

(cf. Seiler, 2002)

**a) Stage of sensomotoric development**

**b) Knowledge of normal and pathological development**

**c) Psychosocial environment**

**Ad c) The psychosocial environment:**

- 1) orientation on the child: needs of the child, actual state, everyday life, family

2) being aware of the interaction between child, parent and therapist  
Aim of the treatment plan is to create the basis for activation of a better postural foundation by rearrangement of the centre of gravity and support.

The therapist tries:

- Changing the posture:
  - shifting the body weight economically above the supportive surface
  - partial reduction by supportive measures
- Changing the position of parts of the body and of joints in relationship to each other and to the surface.
- Changing of the position of the whole body in relationship to the surface and changing its special position.
  - f.e.: **prone**: easier caudal shifting of the gravitational centre by supportive elevation of the shoulder girdle
  - **supine**: easier cranial shifting of the gravitational centre with support of the pelvis and with flexion of the legs.

(cf. Seiler, 2002)

**Therapeutically aim** is on one hand **regulation** on the other hand **activation**.

To encourage the child with becoming active the adjustment to the environment has to be in an active way on the other hand regulation needs to be encouraged too.

The manipulative correction at key positions leads to a change of the position of individual parts of the body and of joints in relationship to each other and to the surface as well as a change of their special position. This makes distinct muscle activity easier. Economical criterions have to be observed. The weight of the body has to be adjusted perpendicularly. Short levers! (Reduction of the supporting surface, use of diagonally rotatory elements, supporting measures for hands and feet).

By slight shifting of the weight of the body, the adjustment to the supporting surface can become easier and thus can help to control the tone.

Compensating pathological mechanisms can be reduced, and more economical support mechanisms can be activated.

**Aim of the therapy** is to help the child with **motoric learning** by postural and motion experience- **to help with self organization**.

Handling in everyday life means (does not mean that there should be therapy all day long) handling of: lifting up, carrying, transfer, feeding, bathing, dressing and undressing.

#### **4.2 THE CONCEPT OF VOJTATHERAPIE AND THE TREATMENT:**

(cf. Vojta, 1984)

Reflex locomotion was developed by the Paediatric Neurologist, **Prof. Dr. Vojta** at the beginning of the 1950's and since then has been systematically developed further. Today it has a wide application in the therapeutic field.

This therapy form was developed in an empirical manner. Prof. Dr. Vojta observed motor reactions occurring through out the entire body as a result of specific peripheral stimulation given with the patient placed in specific positions. He established that components of this provoked global dynamic muscle activity that can be found in all forms of human locomotion.

In 1954 Vojta discovered reflex locomotion, which is based on "global patterns". The term "global pattern's" refers to the motor responses that arise during the application of Reflex locomotion. Skeletal musculature through out the entire body is activated in a coordinated manner and the central nervous system is addressed at all its regulatory levels.

Besides the skeletal musculature, muscles involved in facial expression, eye movements, the swallowing process, bladder and bowel function, and breathing are also activated. This flow of authentic motor reactions is provoked by graded pressure applied on certain body parts which are called "zones", with the patient placed in specific positions (supine, side-lying, and prone) and are reproducible at any time. They are part of human movement processes such as grasping, rolling, creeping, crawling, and walking.

The therapeutic goals of Reflex locomotion are to facilitate the automatic regulation or control of the body's position, to facilitate the active maintenance of the support function of the extremities, and to stimulate coordinated muscle activity. These skills are disturbed to a greater or lesser extent in every central or peripheral lesion of the nervous systems or impairment of the movement apparatus. The pathological, substitute patterns of movement that then arise can be treated by Reflex locomotion.

Vojta's **conception of development** relies on his belief that newborn babies already have a rich faculty of a clearly defined and thus predictable stock of motion patterns at their command.

The neonate already has a clearly definable and predictable supply of movement patterns available to it. These are an expression of human phylogenetic development. Even at birth, these so-called "motor programmes" are made available by the CNS, however initially they are limited in their ability to provide purposeful goal directed movement. Therefore the neonate, for example, cannot sustain lifting its head, cannot support itself on its elbows in prone, cannot roll, cannot reach and grasp in a goal directed manner.

The full availability of innate movement patterns is apparent in the healthy infant, normally, within the first year of life, as a consequence of its continual ambition to reach progressive targets. As a result of its pursuits, it must constantly deal with the effect of gravity in continuously differentiated ways.

The extent, to which these movement patterns are acquired within a specific developmental timeframe, is determined by the maturity of the up righting process.

Various stages of this up righting process are: symmetrical elbow support, single elbow support, sitting, standing with support...

The respective stages of up righting are characterised by a precise relationship between the postural and movement components. In the evaluation of movement, the postural component is of the utmost importance. Unfortunately this is commonly neglected in movement assessments.

In **neurokinesiological diagnostics** according to Vojta, the postural and movement components are seen in their entirety (the so-called "global patterns") against the background of the attained level of up righting.

(cf. Vojta, 1984)

- The child's spontaneous movements are assessed initially only in supine and prone.



- Quantifiable evidence of a child's stage of up righting as well as the quality of the global movement patterns is gained through testing seven postural reactions. On this basis a correlation is made between the test results and the highest possible quality parameter - the "ideal pattern". Deviations from this are termed a "central co-ordination disturbance" of varying severity.
- The third essential diagnostic element taken into account is the dynamic interplay of the neonatal reflexes (also described as primitive reflexes).

(cf. Vojta, 1984)

Under normal developmental conditions these important reactions of the nervous system are only observable within a specific period of time, (the so-called validity periods) which is over the first few months of life (e.g. Moro reaction, rooting reflex, extensor reflexes, palmar and plantar grasp reflexes and Galant reflex )

With the assistance of an **assessment procedure** it is possible within a relatively short time, to acquire a clear and reproducible developmental rating of a child that successfully determines the current developmental age and the extent of the developmental disturbance.

Precise identification of the absence or limited availability of segmental partial movement patterns (according to Vojta: a blockade to a partial pattern), viewing both posture and movement is crucial for therapeutic intervention.

Therapeutic intervention is then focused by means of a targeted input of stimulation to the central nervous system to remove the "blockade" and gain access to the movement patterns that are considered normal or approximate normality.

Treatment effectiveness is dependent upon: early initiation of treatment, the extent of the impairment, the extent of the "blockade", the intensity of treatment, how effectively the exercises are being carried out. As a rule, parents are instructed and supervised in the treatment techniques for their child by a specially trained physiotherapist. The parents take on the major portion of the therapy which extends over a period of at least several weeks.

At the beginning of treatment goals are formulated on the basis of the above cited diagnostic process. They are also orientated around the clinical findings.

In the practical application, Reflex locomotion utilises two so-called coordination complexes:

[Reflex creeping](#)

[Reflex rolling](#)

(cf. Vojta, 1984)

Both complexes were initially used on patients with already fixated movement disorders (eg. spastic paresis) and the reactions were then observed. It was only later that the same was done with healthy newborns and young babies.

Through these therapeutic trials, Prof. Vojta saw that the reactions he evoked in those with an already fixated movement disorder, resembled that which was evoked in the healthy baby. This meant that it was possible to stimulate important patterns from early movement i.e. the "building blocks" comprising early normal movement up to and including walking, in patients with already fixated movement disorders.

Both Reflex creeping and Reflex rolling contain, like any other form of locomotion, three inseparable components:

- ❖ the automatic control
- ❖ regulation of body position
- ❖ postural reactivity

In babyhood, Reflex locomotion is utilised within the framework of early intervention and the best results are gained at this time. At this age the plasticity, that is the malleability of the central nervous system, is the greatest. At this stage a pathological motoricity with substitute movements has not been fixated. The opportunity to gain access to normal movement patterns is merely blocked.

By implementing Reflex locomotion, coordinated muscle activity and coordinated movement patterns are stimulated. This level of coordination is able to be seen in normal movement development, but is not available to a child with the threat of developing a cerebral paretic disorder. These muscle activities and movement patterns are presented to the central nervous system "ahead of time" within the therapeutic situation and are later made available as "building blocks" for the fulfilment of the developing motor repertoire.

It must be stressed that Reflex locomotion does not train or exercise functional movement, for example: reaching and grasping, rolling from supine to prone, it merely conveys to the central nervous system the necessary muscle co-ordination and individual segmental partial patterns. Along side the purely motor aspect of performing varying functional movements, a child's cognitive maturity and its motivation also play an important role.

(cf. Vojta, 1984)

In principal, the prescription for the implementation of Vojta Therapy comes from the attending doctor.

A Vojta trained Physiotherapist is responsible for the implementation of the Therapy. She/he chooses, on the basis of the patient's available clinical data, the appropriate starting position using a choice of activation zones. The developed "therapy programme" is regularly supervised and matched to the patient's movement development.

In the treatment of babies, children, and adolescents the parents are thoroughly instructed to carry out Reflex locomotion. Regardless of the age of the patient, regular appointments with the outpatient Physiotherapist should take place.

Optimally, the Therapy should be carried out **4 times a day**.

- ❖ Neonates less 4 weeks: 5-6 minutes
- ❖ Older neonates: 10 minute
- ❖ Little children: 15 minutes

The treatment should not last more than 20 minutes and is always matched to the actual state of health of the patient.

### **4.3. THE CONCEPT OF OSTEOPATHY AND THE TREATMENT:**

At the beginning I make the patient case history. She includes in my opinion following fields:

#### **CASE HISTORY:**

- **PREGNANCY:**

Medical history of the mother during pregnancy and course of the pregnancy (false labour, cerclage, quickening...)

- **BIRTH:**

Description of the course of birth (easy or difficult)

Was the birth full term or was it premature (influence on stage of ossification)

Presentation of the fetus.

First scream: intense, whiny (could be a hint about distribution of fluids)

The condition of the infant after birth (cyanosis, asymmetry of the head, oedema or bruises)

- **CONDITION OF THE CHILD AFTER BIRTH:**

Breathing, screaming, sucking, nutritional situation, sleeping, alertness

Special examinations

- **GROWTH AND DEVELOPMENT:**

Preference of certain positions (how long did the asymmetry of the head exist after birth)

Steps of development (rolling over, symmetrical supine position, grasping, upright sitting...)

- **MEDICATION AND TREATMENT:**

Did the child suffer frequently from certain diseases, was there hipdysplasia,...

#### **OBSERVATION:**

The observation starts (in my opinion) already before the examination, with observing the interaction between mother and child.

You never start with the examination of the head; even if this is the problem area- this could cause distress and fear.

I have a close look at:

- Color of the face
- Symmetry of the face
- Asymmetries of the spine and of the body ( face presentation at delivery often leads to hyperextension of the spine)
- Position of the legs and feet
- Movements of the child

During the examination and palpation I pay attention at:

- **lower extremities:** harmonious general appearance?
- **pelvis:** edema, gluteal folds
- **thorax:** breathing, motion of the diaphragm
- **spine:** physiological and pathological curves, grooves ( spina bifida?)
- **upper extremities:** movements of the shoulder girdle/ of the clavicle
- **head and neck:** sutures (overriding?), fontanel, haematoma of the SCM, oedema,...
- **eyes:** nystagmus, asymmetry of the pupils,...

## **EXAMINATION:**

The Examination consists on three parts:

### 1.) STRUCTURAL EXAMINATION:

(cf. Hüter-Becker, 1998)

#### **a) CERVICAL SPINE:**

examination of rotation, flexion- extension and lateral flexion. If there are asymmetries think of:

- 1) upper cervical blockage
- 2) torticollis myogenes
- 3) syndromes: f.e. Klippel- Feil syndrome

segmental examination of the cervical spine is usually not possible with young infants

#### **b) THORACIC SPINE:**

With the infant held in a "swaying" position you can evaluate the whole back in a caudal to cranial view. The head of the infant has to be kept in midline. The curve can be evaluated by observing the posterior rotation of the vertebrae at the apex of the scoliosis. The thorax appears narrower and hunched at the side of convexity and flattened and wider on the side of concavity.

#### **c) LUMBAR SPINE AND PELVIS:**

if you find a left- right difference with passive motion, think of:

- 1) locked SI- joint ( there is always a connection between the upper cervical and the pelvic area in asymmetric infants).
- 2) pathology of the hip joints
- 3) syndromes with structural influences

### 2.) VISCERAL EXAMINATION:

The visceral examination consists of mobility and motility tests to discover dysfunctions.

### 3.) CRANIAL EXAMINATION:

(cf. Sergueeff, 1995)

She depends of the results of the listening.

The **listening** offers the possibility to perceive the quality of the tissues and structures, to recognize increased or decreased motion and to normalize it.

After observation and palpation the therapist puts the baby on his lap or the mother keeps the child in her arms.

#### **In my opinion you have to check:**

- 1) Palpate to evaluate the quality of the movement of the membranes of the primary respiratory mechanism from the head to the legs.
- 2) Evaluate the fascial tension of the legs ( is there a wave like motion from the cranium to the legs?)
- 3) Examine the fibulae ( there is a link between femur, pelvis and the diaphragm). They are frequently pressed against the maternal promontorium und pulled caudally → this puts stress on the interosseous membrane. This stress may be carried up until the diaphragm.
- 4) Examine the ankles and the muscle tone.( with shock: babies will have tight fascias)
- 5) Check hip joints for symmetry of rotation.
- 6) Examine the iliac- their position, also in relation to the sacrum.
- 7) Examine the lower ribs for motion and quality.
- 8) Umbilicus: motion of the umbilicus and around the umbilicus. (Direction, tension)
- 9) Diaphragm: I check the quality between both sides.
- 10) Evaluation of the skull of the infant: the baby is already used to my hands. After prior examination of the body, I can continue now with the head (many babies don't like it at all to be touched at the head). The therapist has to adjust to the baby and follow with his hands all movements.
- 11) Cranium: evaluation of the sphenobasilar synchondrosis by examination of the cranial tension.

### THE CRANIOSACRAL DYNAMICS AND THEIR EFFECTS:

(cf. Sergueeff, 1995)

#### **Dura mater:**

The dura mater connects the bones of the skull and coordinates their movement. There is a firm attachment to the inner surface of the skull (except of the parietals).

There are intracranial reduplications:

**Falx cerebri:** connecting membrane between the anterior and posterior cranial fossa and the vertebral dural sack.

**Tentorium cerebelli:** Serves to balance the two parietals. The intracranial meninges continue with the dura of the spinal canal, with firm attachment to the foramen magnum and the bodies of C2 and C3 and at the level of the second sacral segment. The dural sheath of the spinal area forms a link between the skull and the sacrum and it also connects the three diaphragms (diaphragma sellae, diaphragma between thoracic and abdominal cavities, perineum). The respiratory motion of these three diaphragms is synchronized when they are balanced. This synchronicity is what the therapist tries to restore.

Not only is the dura of great importance for the development of the CNS and the cranial vault, but it is especially the close connection of this membrane to the cranial base that puts the dura into the centre of our attention. By the means of desmal ossification the cranial vault develops from a primitive membrane, covering the brain. The cranial base is laid down in cartilage (enchondral ossification).

The chondral model of the skull is not affected that much by the growth of the CNS, but it may be deformed during the birth process. A multiplicity of complications can show it there is no reconfiguration of these deformities of the base within the first postnatal weeks.

This reconfiguration is what we are doing with the craniosacral corrective technique.

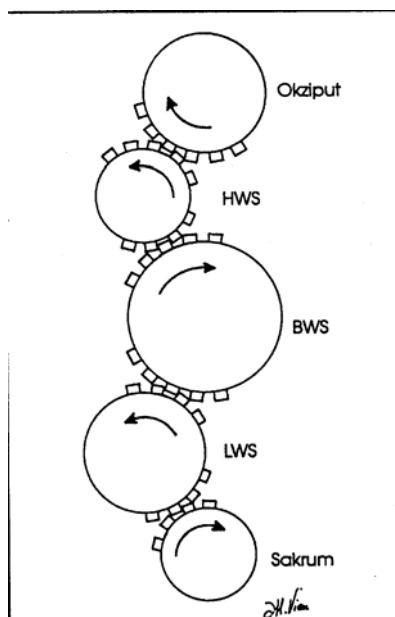
### SPINAL MOVEMENT AND THE PRIMARY RESPIRATORY MECHANISM

(cf. Richard, 1995)

The spine participates synchronously in the flexion- extension motion of the cranial bones.

#### **cranio- sacral flexion:**

- 1) the occiput is tilting posterior around a transverse axis, causing tension in the ventral part of the spinal dura.



Picture 25

- 2) flattening of the sagittal spinal curves: with flexion of the cervical and lumbar spine, and extension of the thoracic spine.
- 3) upward fluctuation of the cerebrospinal fluid.
- 4) (respiratory) flexion of the sacrum (bio mechanically this would be an extension motion), with a posterior and superior movement of the base and an anterior and superior movement of the apex.
- 5) the ilea are ventrally rotated.
- 6) upper and lower extremities are externally rotated.

### **cranio- sacral extension:**

In the **cranio- sacral extension phase** the movements will be just into the opposite direction, leading the structures back into neutral position.

### **4.3.4. TREATMENT:**

In my opinion there is no real treatment protocol but there is a number of things that need to be checked.

The treatment of the asymmetric infant is quite extensive.

A thorough knowledge of the normal development of the infant is as important as the love to treat babies in general, patience and last but not least the attitude towards the mother has to show empathy and respect.

I check for, if necessary correct, the following structures:

- 1.) sacro occipital release
- 2.) foramen magnum release
- 3.) bilateral release of the ilia
- 4.) diaphragm release
- 5.) tension around the umbilicus
- 6.) visceral technique: liver , stomach , abdomen
- 7.) fascial technique: a.) occipitovertebral technique  
b.) occipio-sternal technique  
c.) lumbrosacral technique
- 8.) structural: C0-C1-C2  
L4-L5-S1

Aim of the treatment is a balance of all structures.

The common goal of all three methods is to take stress off the nervous system.

Unlike the neurophysiologically oriented therapies (Bobath and Vojta) which are based on direct influence on the CNS, the osteopathic treatment is an indirect approach: influence on the CNS by correcting and optimizing the dural tension. This work on the dura gives free space to the CNS. But osteopathy puts also emphasis on intra and interosseous lesions and on visceral dysbalance.

All three concepts have in common to help the baby with his/ her development, with regard to the normal development of perception and motion.

At the begin I stated a definition of "asymmetry", the embryological development of the spine, the birth process, reflexes and the psycho motor development of the child. For all three therapeutical concepts these aspects were of equal importance.

## **5. METHODS:**

I chose a randomised study due to the fact that I had worked at the paediatric clinic in Graz as a graduate physiotherapist and hence had made a lot of experience in the field of treating children suffering from this kind of problem. Furthermore, I am still in regular contact with colleagues at the clinic who treat these children according to Bobath's or Vojta's therapies. So it was the obvious choice to compare these two approaches to treatment with each other.

Through the interest that my colleagues showed in my study my task was comparatively easy to carry out, because their job requires being trained in a way similar to my own education (anamnesis, reflexes,...). Thus, they could directly adopt my anamnesis sheets and the test results of reflexes.

Parents filled in the questionnaires immediately, so there were no delays in the evaluation. And as they of course were very keen to contribute to positive changes in their children's health conditions, they carried out this task very diligently.

### **5.1. GROUP TREATED WITH OSTEOPATHY:**

Ten mature born babies age 6-8 weeks, referred by paediatricians or directly by the paediatric university clinic Graz, treated with osteopathy.

There were no signs of cerebral movement disorders, any cerebral haemorrhage or seizures.

### **5.2. CONTROL GROUP:**

10 babies age 6-8 weeks treated with neurophysiologic techniques by physiotherapists of the university clinic Graz (Bobath and Vojta therapy)

### **5.3. STRUCTURE OF THE STUDY**

Treated children	Patients of the control group
Number:10	Number: 10
Mature born babies age 6-8 weeks	Mature born babies age 6-8 weeks
Treated wick osteopathy	Treated with neurophysical techniques (Bobath- and Vojtatherapie) by physiotherapists of the university clinic Graz
Questionnaire before the fist treatment	Questionnaire before the first treatment
Osteopathic treatments	Neurophysiologic treatments by colleagues from the clinic
Questionnaire after 3-4 weeks	Questionnaire after 3-4 weeks



#### **5.4. THE QUESTIONNAIRE:**

It consists of 26 questions from different areas. I took structural visceral and psychic factors into consideration. The background for this questionnaire was the years of experience with the treatment of these children, as well as study of research on this topic.(Biedermann,1996, Rosegger,1992, Lewitt,1964, Woods,1973, Sergueef,1995, Fleming,1987)

Possible answers, the parents could choose between: "never", "sometimes" or "always". The results of the osteopathic study group were compared with the results of the control group.

**5.5. THE QUESTIONNAIRE:**

This is the questionnaire. The following statistics will address the issue of several questions.

QUESTIONNAIRE:

NAME of the CHILD.

DATE:

		never	sometime s	always
	My child.....			
1	....is irritable and fuzzy			
2	....has a quick change from whining to intense screaming)			
3	....cannot console him/herself (by sucking his/her fingers or comforter)			
4	....is whiny, frequently led mood			
5	....needs constantly somebody for occupation			
6	....is frequent unconable screaming without reason			
7	....needs to be carried around			
8	...is very prone to catch infects			
9	....is easily distracted, short attention span			
10	....wakes up at least 3 times per night, cannot go to sleep again by itself.			
11	....needs help to go to sleep (rocking, carrying around...)			
12	....fights feeding			
13	....squirms, and kicks restlessly with feeding			
14	....retchis, vomits			
15	...can turn his/her head equally on both sides			
16	....fights cuddling, turns away, retracts or becomes stiff			
17	....preference of one side with positioning			
18	...fights certain positions- (supine, prone...)			
19	....cannot tolerate reduction of space of action,)			
20	....is fuzzing around			
21	....prefers to be undressed			
22	....screams with dressing and undressing			
23	....is unhappy, when face or hair is washed			
24	....would like to stand in upright position			
25	....frightens with strangers or a new situation			
26	....startled with loud noise (bell....)			

## 5.6. ANALYSIS - TREATED GROUP

Fragen		Behandelte Gruppe									
		Fragebogen 1: Vor der 1. Behandlung					Fragebogen 2: nach 3-4 Wochen				
		nie	manchmal	immer	nie	manchmal	immer	nie	manchmal	immer	
Mein Kind.....											
1	....ist leicht irritierbar und unruhig	4	2	4	8	2	0				
2	....steigert sich rasch vom Jammern zu intensiven Schreien	2	4	4	4	5	1				
3	....kann sich nicht selbst beruhigen (durch Saugen an Schnuller oder Fingern)	3	5	2	4	5	1				
4	....quengelt viel, ist oft schlecht gelaunt	4	3	3	5	4	1				
5	....braucht ständig jemand, der sich mit ihm beschäftigt	3	3	4	4	5	1				
6	....schreit oft unstillbar und ohne Grund	3	5	2	7	2	1				
7	....muss ständig herumgetragen werden	2	4	4	5	5	0				
8	....ist sehr anfällig gegenüber Infekten	5	5	0	8	2	0				
9	....lässt sich leicht ablenken, bleibt nur kurz bei der Sache	3	5	2	6	4	0				
10	....wacht mindestens 3mal in der Nacht auf und kann nicht von selbst wieder einschlafen.	2	5	3	5	4	1				
11	....braucht viel Hilfe beim Einschlafen (Schaukeln, Herumtragen...)	3	1	6	5	4	1				
12	....wehrt sich gegen das Stillen/ Essen	7	2	1	8	1	1				
13	....windet sich, strampelt unruhig bei den Mahlzeiten	5	3	2	6	3	1				
14	....würgt oder spuckt	2	3	5	4	5	1				
15	....kann den Kopf auf beide Seiten gleich weit drehen	4	6	0	0	1	9				
16	....wehrt sich gegen Schmusen, wendet sich ab, entzieht sich oder macht sich steif	6	4	0	8	1	1				
17	....hat eine einseitig bevorzugte Lage	1	2	7	3	5	2				
18	....wehrt sich gegen bestimmte Körperlagen, z. B. auf den Bauch oder auf dem Rücken zu liegen	1	3	6	5	3	2				
19	....kann keine Einschränkungen seines Bewegungsspielraums ertragen (z.B. Autositz, Hochstuhl,)	4	5	1	5	5	0				
20	....ist motorisch unruhig	3	5	2	6	2	2				
21	....fühlt sich ausgezogen am wohlsten	1	0	9	1	1	8				
22	....schreit regelmäßig beim An- und Ausziehen	5	5	0	5	5	0				
23	....ist unglücklich, wenn ihm Gesicht oder Haare gewaschen werden	4	4	2	6	2	2				
24	....will am liebsten in der Vertikale stehen, sich auf die Füße stellen	8	2	0	9	1	0				
25	....erscheint ängstlich oder fürchtam gegenüber neuen Menschen oder Situationen	4	2	4	5	5	0				
26	....erschrickt bei lauten Geräuschen oder schreit (Türglocke..)	3	4	3	5	5	0				

**5.7. ANALYSIS - CONTROL GROUP:**

<b>Kontrollgruppe</b>						
<b>Fragen</b>	<b>Fragebogen 1: Vor der 1. Behandlung</b>			<b>Fragebogen 2: nach 3-4 Wochen</b>		
	nie	manchmal	immer	nie	manchmal	immer
Mein Kind.....						
1 ....ist leicht irritierbar und unruhig	2	4	4	4	4	2
2 ....steigert sich rasch vom Jammern zu intensiven Schreien	3	3	4	2	4	4
3 ....kann sich nicht selbst beruhigen (durch Saugen an Schnuller oder Fingern)	6	3	1	5	5	0
4 ....quengelt viel, ist oft schlecht gelaunt	4	2	4	3	4	3
5 ....braucht ständig jemand, der sich mit ihm beschäftigt	2	3	5	1	6	3
6 ....schreit oft unstillbar und ohne Grund	4	5	1	4	5	1
7 ....muss ständig herumgetragen werden	3	2	5	3	4	3
8 ....ist sehr anfällig gegenüber Infekten	6	3	1	6	3	1
9 ....lässt sich leicht ablenken, bleibt nur kurz bei der Sache	2	5	3	4	5	1
10 ....wacht mindestens 3mal in der Nacht auf und kann nicht von selbst wieder einschlafen.	5	4	1	5	4	1
11 ....braucht viel Hilfe beim Einschlafen (Schaukeln, Herumtragen...)	4	2	4	4	3	3
12 ....wehrt sich gegen das Stillen/ Essen	8	2	0	8	2	0
13 ....windet sich, strampelt unruhig bei den Mahlzeiten	5	4	1	5	4	1
14 ....würgt oder spuckt	2	6	2	4	5	1
15 ....kann den Kopf auf beide Seiten gleich weit drehen	6	2	2	2	6	2
16 ....wehrt sich gegen Schmussen, wendet sich ab, entzieht sich oder macht sich steif	7	3	0	7	3	0
17 ....hat eine einseitig bevorzugte Lage	1	2	7	1	8	1
18 ....wehrt sich gegen bestimmte Körperlagen, z. B. auf den Bauch oder auf dem Rücken zu liegen	4	1	5	3	5	2
19 ....kann keine Einschränkungen seines Bewegungsspielraums ertragen (z.B. Autositz, Hochstuhl,)	3	4	3	4	5	1
20 ....ist motorisch unruhig	4	4	2	5	3	2
21 ....fühlt sich ausgezogen am wohlsten	1	1	8	1	2	7
22 ....schreit regelmäßig beim An- und Ausziehen	2	5	3	2	6	2
23 ....ist unglücklich, wenn ihm Gesicht oder Haare gewaschen werden	3	3	4	2	6	2
24 ....will am liebsten in der Vertikale stehen, sich auf die Füße stellen	8	1	1	8	0	2
25 ....erscheint ängstlich oder furchtsam gegenüber neuen Menschen oder Situationen	4	4	2	4	5	1
26 ....erschrickt bei lauten Geräuschen oder schreit (Türglocke..)	3	5	2	3	6	1

**5.8. EXPLANATION OF THE PILLAR GRAPHS:**

**x-axis:** temporal course: before the first treatment  
3-4 weeks later

**y-axis:** number of parents, who chose the answer

The colours show, witch answer the parents chosed:

Blue = never  
Red = sometimes  
Yellow = always

For every question the treated group was put opposite to the control group.  
To be able to compare both groups, values were given to the categories “never”,  
“sometimes” and “always”.

Never = 0  
Sometimes = 1  
Always = 2

The sums were compared to each other (they are mentioned in the right columns of the statistic – first row.)

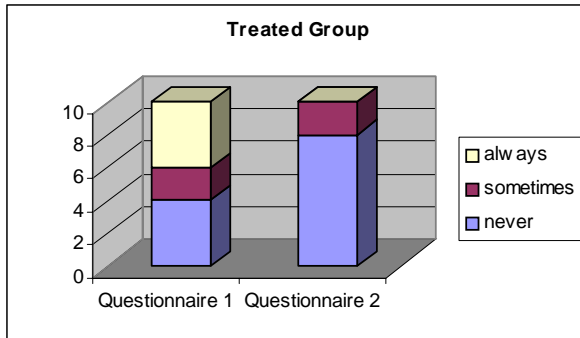
**For example:** Question 1:....easy irritated and fuzzy...

Never = 4 Babies / Sometimes = 2 Babies / Always = 4 Babies  
 $0 \times 4 = 0$                        $1 \times 2 = 2$                        $2 \times 4 = 8$   
 $0+2+8=10$

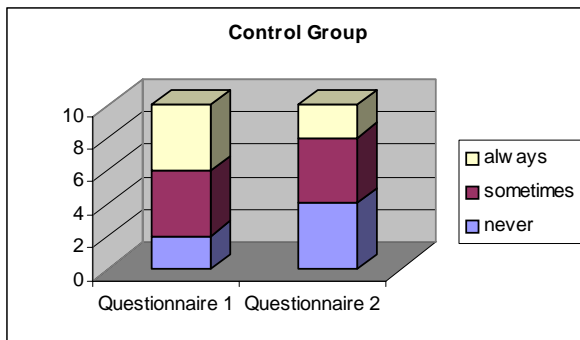
In the caption of statistics I have tried to highlight those aspects which are relevant to me, but maybe readers will take an interest in other factors. Bar charts should enable them to get their own picture.

## 6. STATISTICS:

### Question 1:

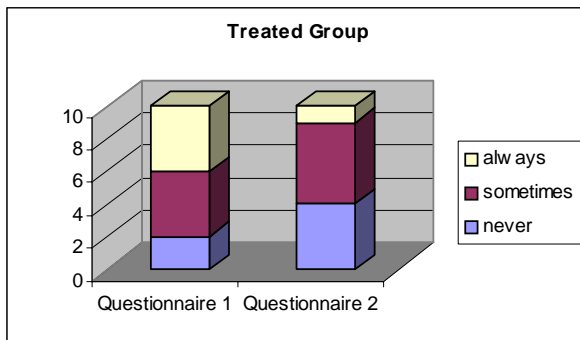


Treated group: 10 2  
Control group: 12 8

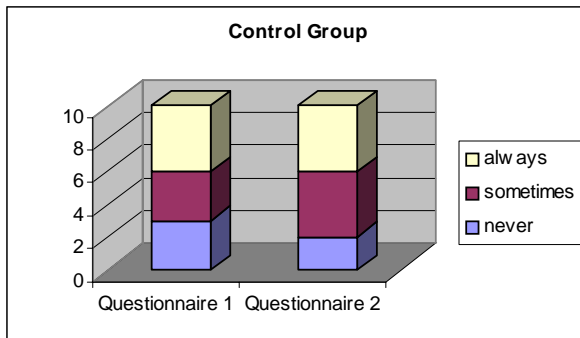


One result was that, compared to the control group, **constant** agitation disappeared with those children that I had treated.

### Question 2:

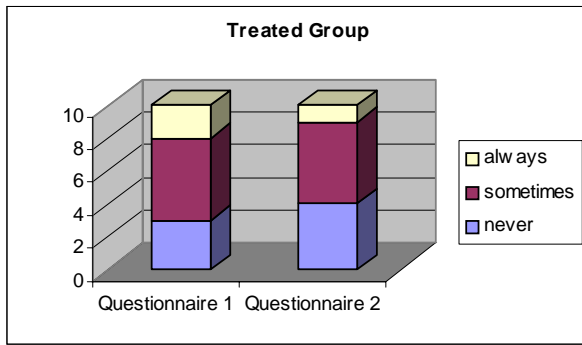


Treated group: 12 7  
Control group: 11 12

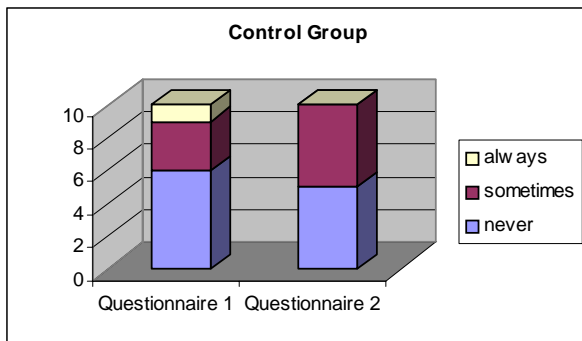


Children in the group that had been treated could be comforted by their parents noticeably more easily.

**Question 3:**

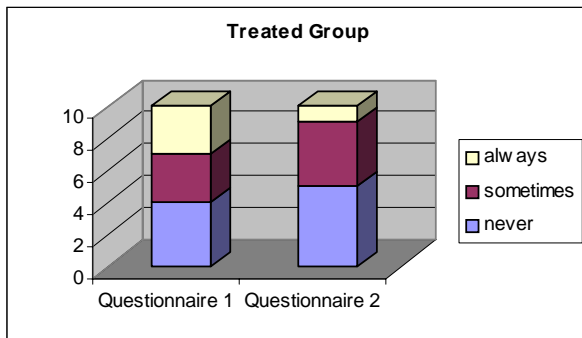


Treated group: 9 7  
Control group: 5 5

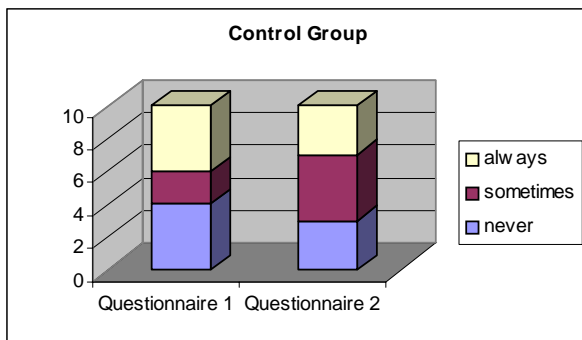


Children in the control group remained agitated in spite of treatment and could hardly calm down subsequently.

**Question 4:**

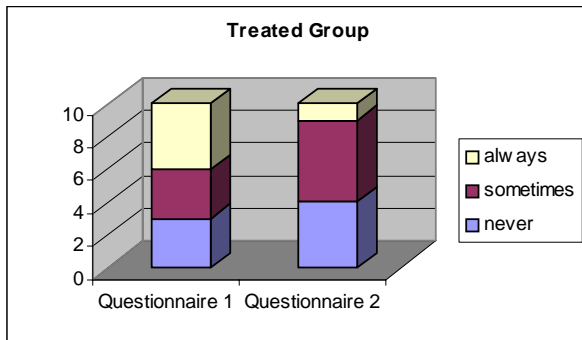


Treated group: 9 6  
Control group: 10 10

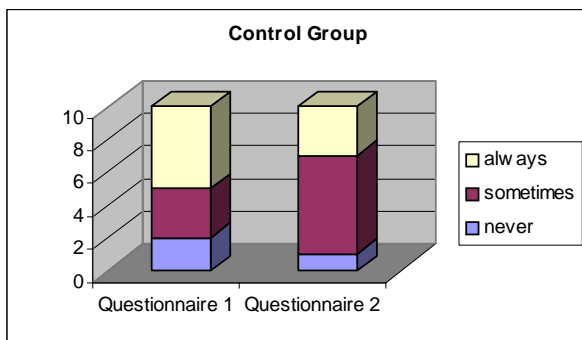


Compared with the control group, children's moods showed considerable improvement within the group treated.

**Question 5:**

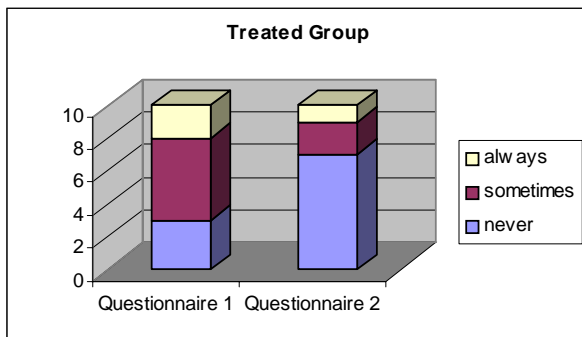


Treated group: 11 7  
Control group: 13 12

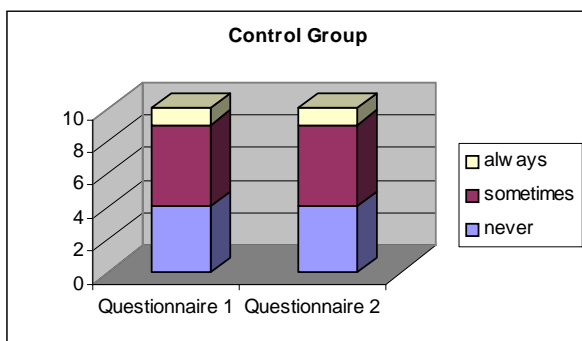


Enhancement could be observed in both groups, but within the group treated children clearly showed more competence to be engaged with themselves.

**Question 6:**



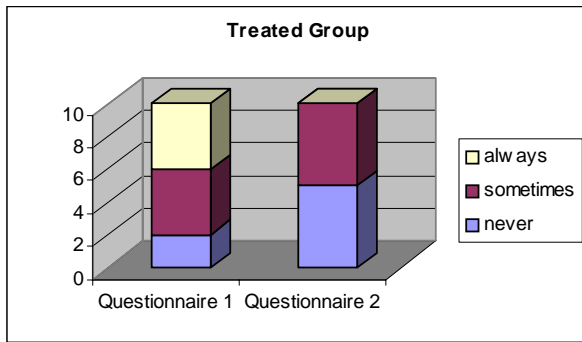
Treated group: 9 4  
Control group: 7 7



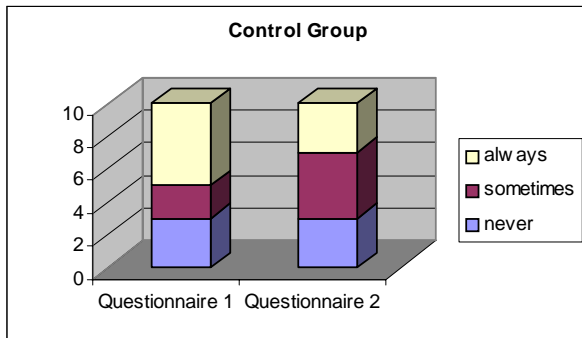
In this group, the percentage of cases of “insatiable crying without obvious reason” could be reduced remarkably.



**Question 7:**

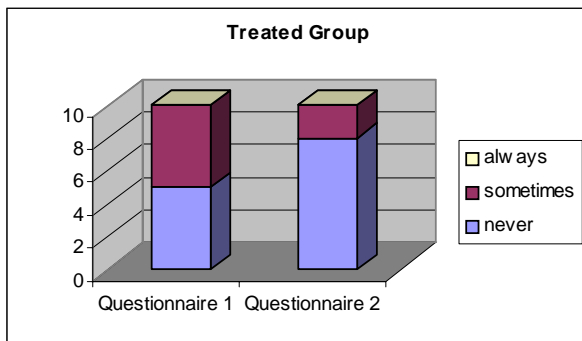


Treated group: 9 5  
Control group: 12 10

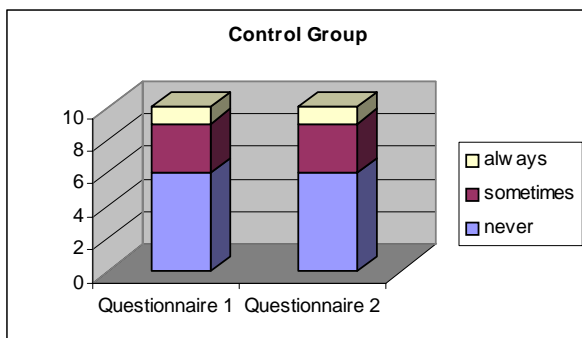


No child in this group had to be carried around permanently after treatment, which allows drawing conclusions saying that these children were more balanced.

**Question 8:**

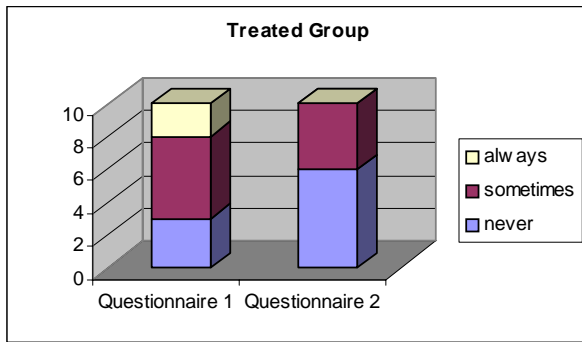


Treated group: 5 2  
Control group: 5 5

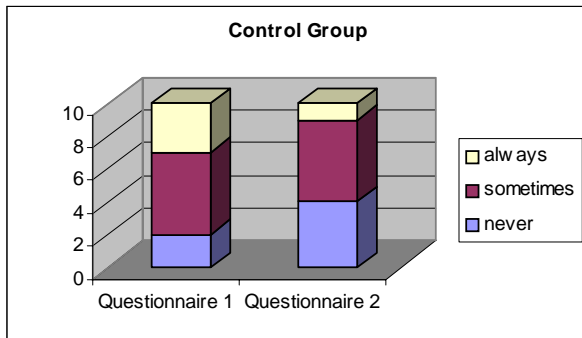


Obviously, the immune system of the children that had been treated was also influenced in a positive way, as susceptibility to infections decreased in this group.

**Question 9:**

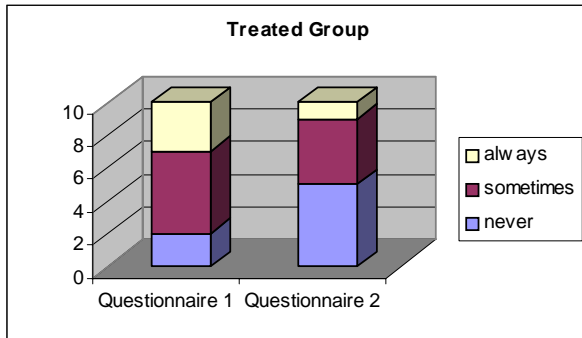


Treated group: 9 4  
Control group: 11 7

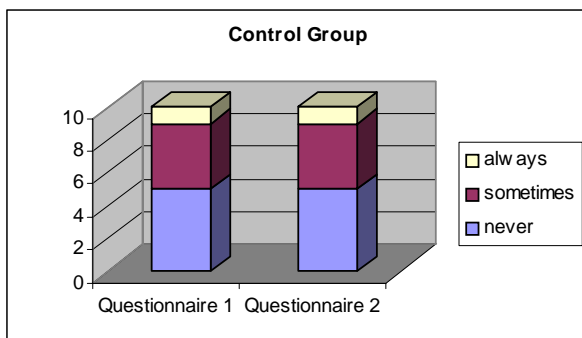


The power of concentration among children in the group that had been treated increased at a considerably higher rate than in the control group.

**Question 10:**

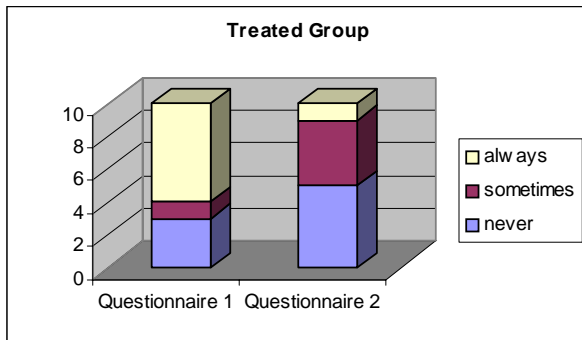


Treated group: 11 6  
Control group: 6 6

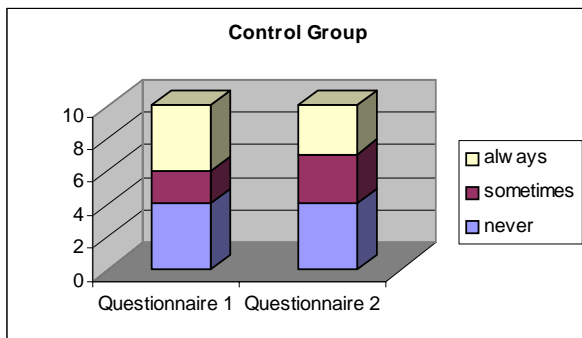


In contrast to the group that had been treated, no changes were noticed in the field of “waking up during the night and falling asleep again independently” in the control group.

**Question 11:**

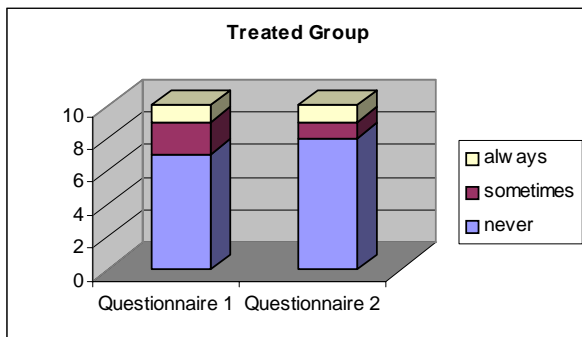


Treated group: 13 6  
Control group: 10 9

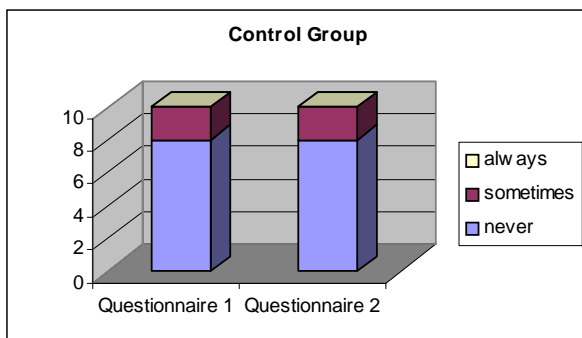


This group that I had treated needed considerably less assistance with falling asleep.

**Question 12:**

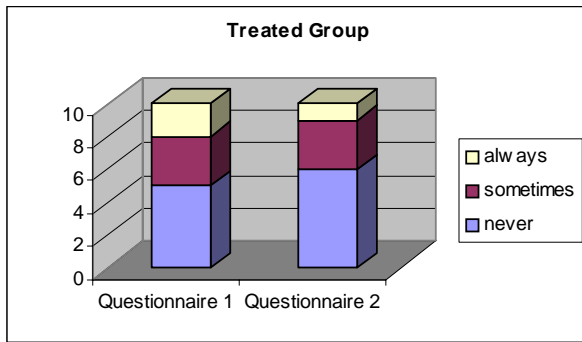


Treated group: 4 3  
Control group: 2 2

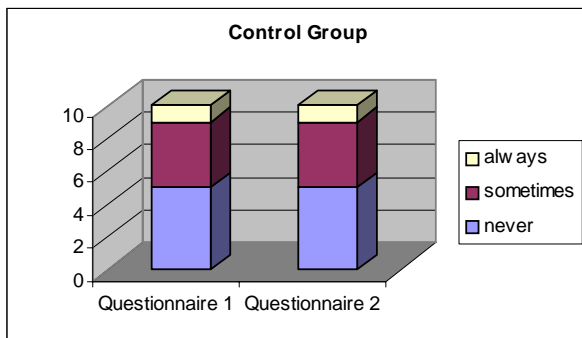


Resistance against breastfeeding or feeding changed only insignificantly in the group that had been treated; there were no changes at all in the control group.

**Question 13:**

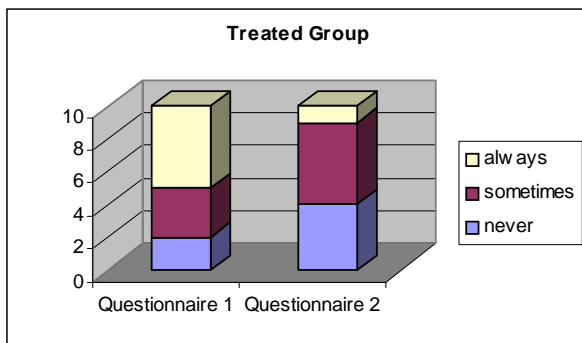


Treated group: 7 5  
Control group: 6 6

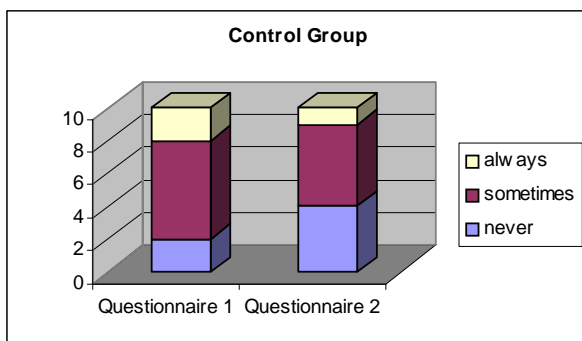


Unrest among children during meals slightly changed in the group that had been treated, this was not the case in the control group.

**Question 14:**

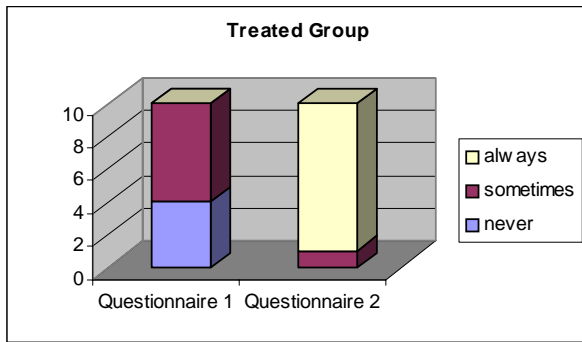


Treated group: 13 7  
Control group: 6 6

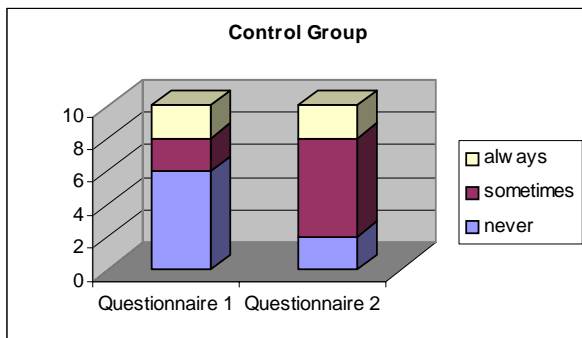


With retching and spewing, positive changes were much bigger than in the control group.

**Question 15:**

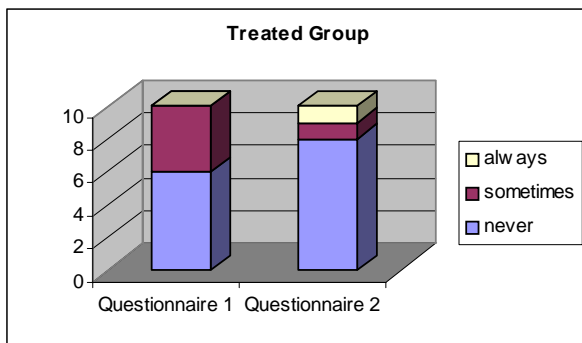


Treated group: 6 19  
Control group: 10 7

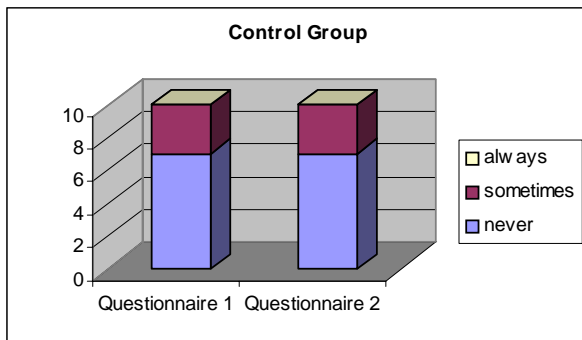


In the group treated, uniform twisting of the head in both directions improved noticeably faster and more extensively than in the control group.

**Question 16:**

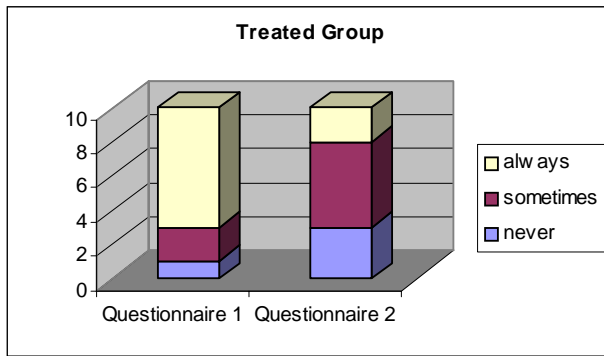


Treated group: 4 3  
Control group: 6 10

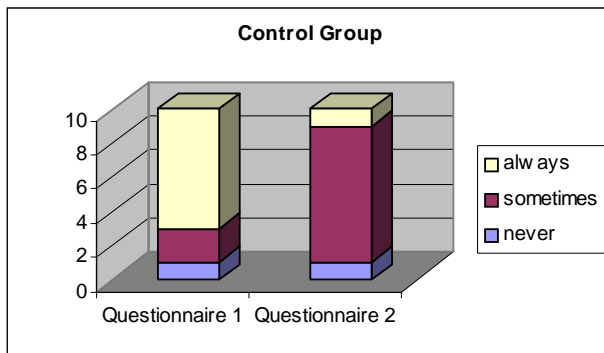


Fighting against cuddling was less found in the control group, there was a little positive change in both groups.

**Question 17:**

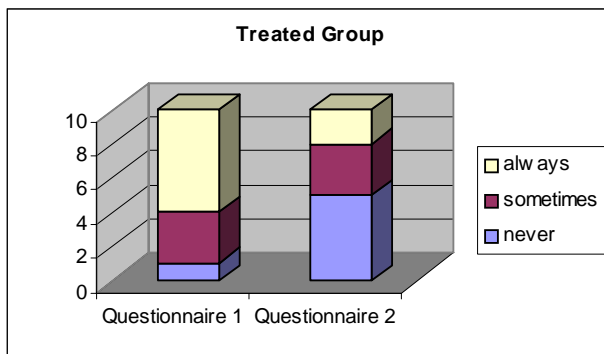


Treated group: 16 9  
Control group: 3 3

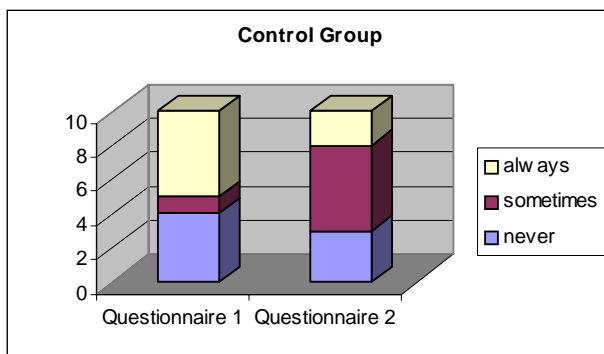


The preferred single-sided position could be influenced well in both groups; a certain number of children remained asymmetric in both groups.

**Question 18:**

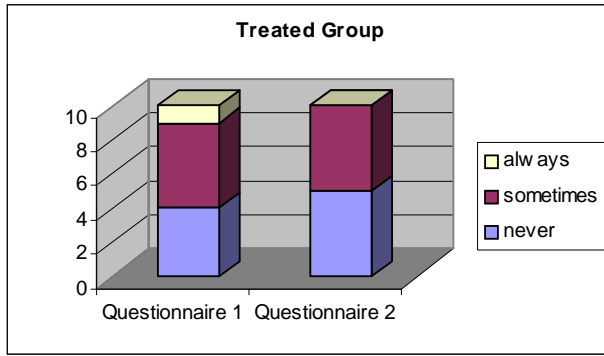


Treated group: 15 7  
Control group: 16 10

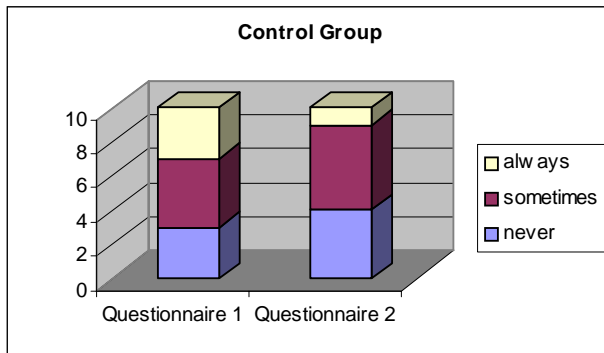


Resistance against certain positions was reduced in both groups; this effect was stronger among those being treated.

**Question 19:**

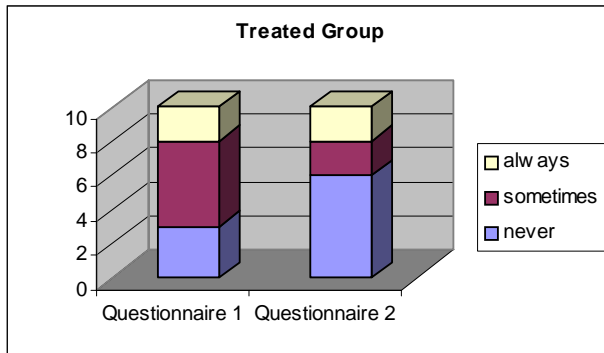


Treated group: 7 5  
Control group: 11 9

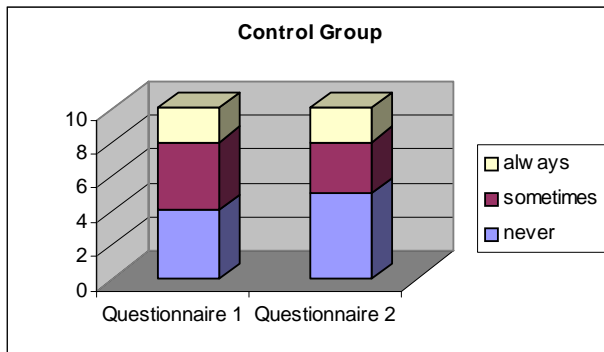


Problems about restrictions of area of activity were clearly reduced in both groups.

**Question 20:**

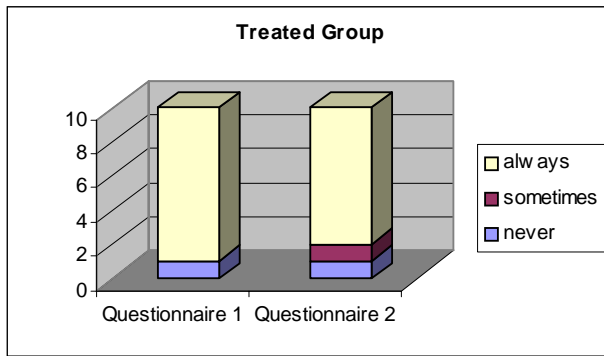


Treated group: 9 6  
Control group: 10 7

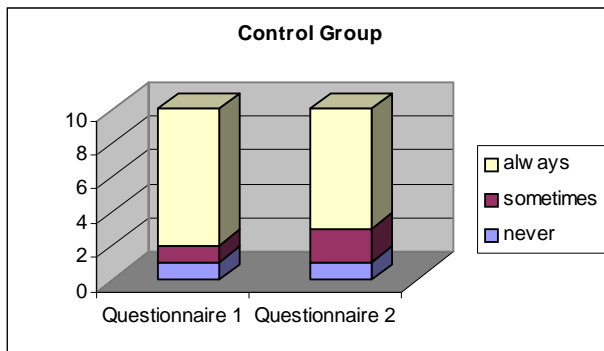


In general, kinetic unrest among children improved in both groups, but the percentage of children that are permanently agitated remained unchanged.

**Question 21:**

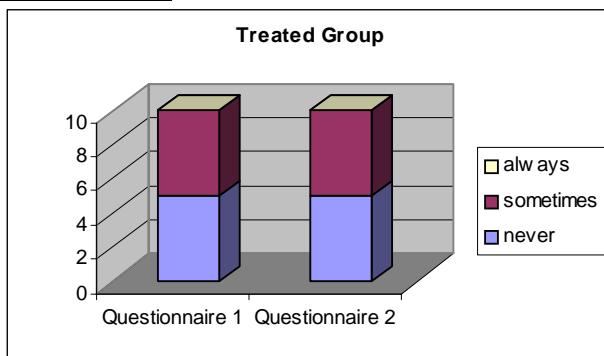


Treated group: 18 17  
Control group: 8 7

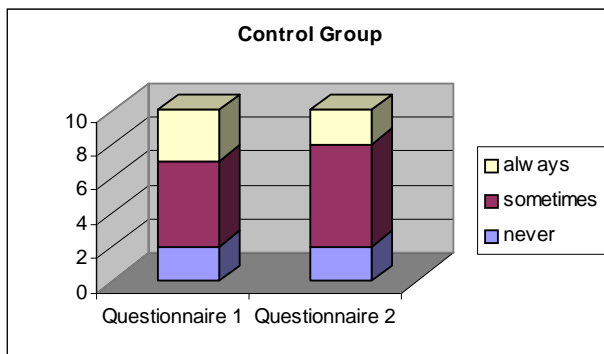


As the bigger part of the children had already felt most comfortable when they were undressed, no considerable changes were observed after treatment.

**Question 22:**



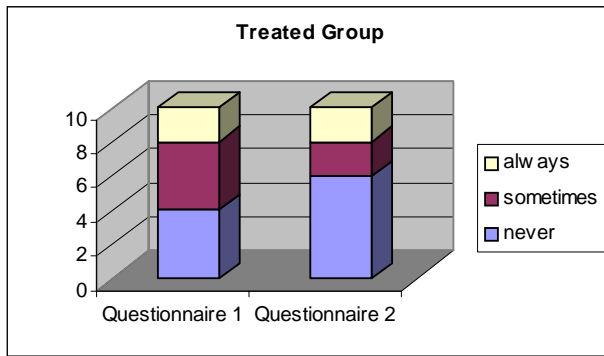
Treated group: 5 5  
Control group: 17 16



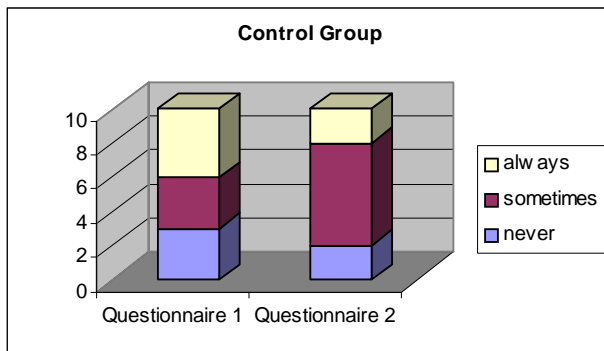
Screaming while they were dressed and undressed had been a minor problem in the group treated before we started; improvement was also noticed in the control group.



**Question 23:**

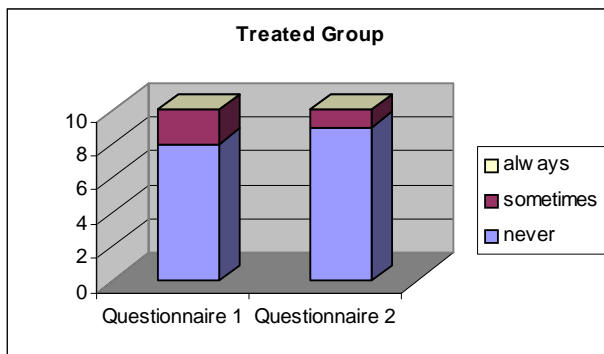


Treated group: 8 6  
Control group: 11 10

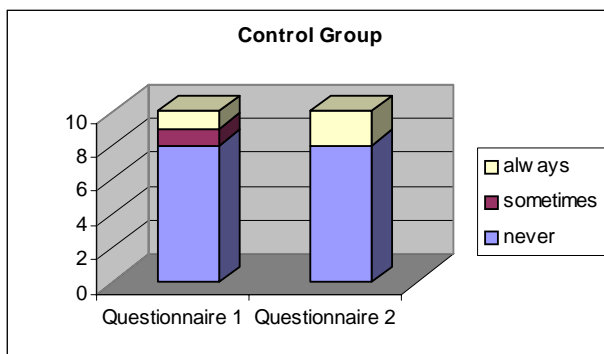


In the act of washing hair and faces, children in both groups became happier. With most children in the group treated this led to no conflict at all anymore.

**Question 24:**

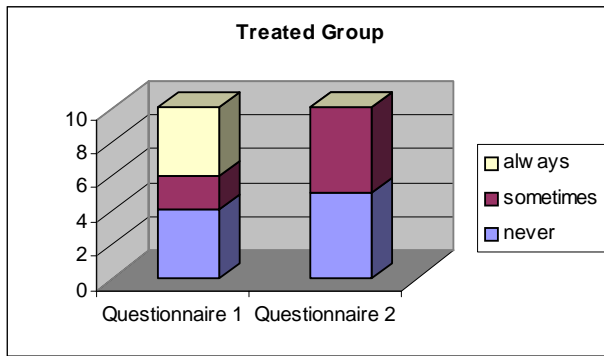


Treated group: 2 1  
Control group: 3 4

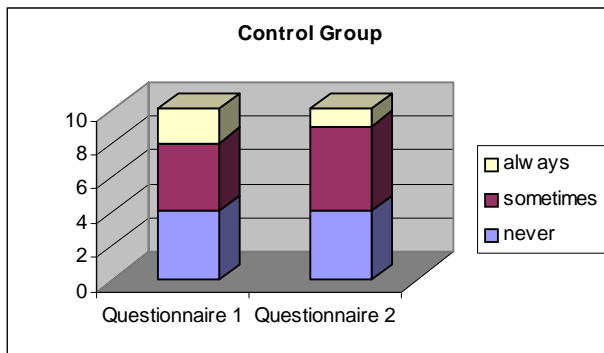


In the control group the children’s need to “prefer being in the vertical position” is more clearly developed than in the group that has been treated. There, children do not yet try that.

**Question 25:**

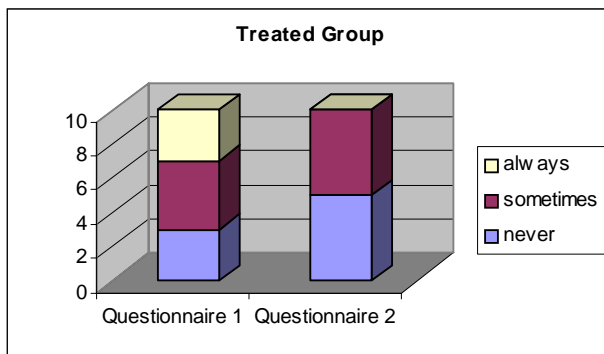


Treated group: 10 5  
Control group: 8 7

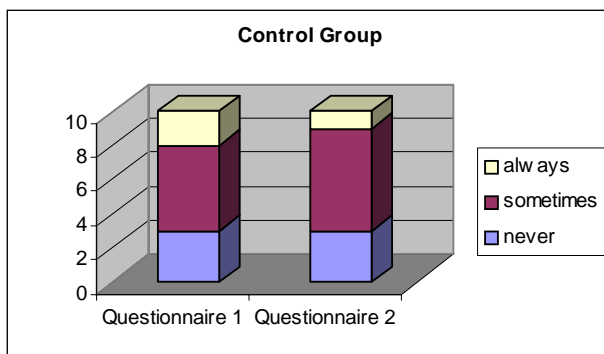


Compared to the control group, fear of people or unfamiliar situations was noticeably more reduced in the group treated.

**Question 26:**



Treated group: 10 5  
Control group: 9 8



In both groups affright as a reaction to loud noises showed improvement. This could be observed to a larger extent in the group treated.

## **7. RESULTS:**

My study was a small study with 10 babies in the osteopathic study group and 10 babies in the control group. I wanted to point out the importance of osteopathic treatment of the asymmetric infant, which has not been fully recognized yet with the treatment of this syndrome.

It would be desirable to continue these beginnings with a greater study.

A detailed description of the children that I have treated can be found in the appendix. These approaches would deserve being continued in a secondary, extended study.

### **7.1. DIAGNOSIS AND REFLEXES:**

With the evaluation of the first two diagnostic forms we could find the same results for both groups with reference to the change of the reflexes, on grounds of the asymmetry.

#### **7.1.1. Reflexes:**

1.) Especially with the palmar and plantar grasp reflex and the Galant reaction there was significant longer persistence of the reflexes on the side turned away from the face than on the side of the face.

2.) Landau reaction:

The apex of the curve is most times at the level of TH 9. On the side of convexity the thorax is narrower and hunched.

3.) Peiper-Isbert R.:

The asymmetry can be easily observed with this reaction - even by the parents.

4.) Vojta-Seitkippreaktion:

On one hand there is a clear bilateral difference of the extremities, on the other hand the postural difference is easily palpable- partially even visible, because of the difference of muscle tension. The trunk is more floppy on the side of concavity than on the side of convexity.

### **7.2. POSITIVE RESULTS::**

There were clear changes in both groups.

I want to divide them into 3 groups:

**As to the motor system**

**As to psychic aspects**

**As to the visceral system**

#### **7.2.1. motor system: (question 15,17)**

There is better movement of the head as well as a better control of the trunk, with better symmetry in both groups. The positive results are clearer in the osteopathic study group.

#### **7.2.2. psychic aspects: (questions 1,2,3,4,5,6,7,8,16,19,20,21,22,23,24,25)**

Many problems in this fields were not addressed with the control group even when they can be of great importance for the parents.

There is a significant improvement of all symptoms in the osteopathic study group, in contrary to the control group.

This is also the reason why the parents feel better, there is a regular rhythm with every day life possible and it prevents the building up of a vicious circle.

### **7.2.3. visceral system: (questions 8,9,11,12,13,14,18)**

This is one of the great fields of osteopathy, where we deal with all structures intensely. The general condition of the baby can improve remarkably-partially they are even free of symptoms.

Summing up it may be said that there was the slightest difference by the use of the different treatments on the motoric system, but marked differences on the physic aspects and visceral system because of the osteopathic treatment.

Because of lesions in the development of the skull I could find in the

**Anterior base:** lesions for vision, strabismus, olfactory disturbances and sensory disorders in the face.

**Middle base:** disorders of facial muscles, of hearing impairment and disturbances of balance.

**Posterior base:** influence of the whole body by the Vagusnerv (digestive system, sleep, swallowing, sucking...).

## **8. DISCUSSION:**

I want to say a few words about the most interesting and helpful literature for my study.

In his book "KISS. -Kinder- Ursachen, (Spät-) Folgen und manualtherapeutische Behandlung frühkindlicher Asymmetrie ...." Biedermann gives account of his experience in treating asymmetric babies and infants. Biedermann has been working with manual therapy since the seventies. With his book he sums up his experience with the treatment of asymmetric babies and children.

The abbreviation KISS stands for kopfgelenkinduzierte Symmetrie Störung (upper cervical induced symmetry disorder). It is interesting that he also writes about KISS-children, where this disorder was not recognized and remained without treatment. He describes the subsequent effects and problems, typical for this syndrome as well as associated problems, such as sleeping disturbances, tummy ache,...

There is the description of an interesting phenomenon observed by 2 ergo therapists (p.91) who found out, that with some of the children the transmission of the vibration of a tuning fork was disturbed on their spines.

The weakness of this study, as to my opinion, is the reduction of this problem to the upper cervical area and the manipulation of the atlantooccipital area as the only treatment.

The article of Rosegger and Steinwender about "Das Schräglagensyndrom"- eine Kombination typischer angeborener Skelettdeformierungen beim Neugeborenen.- describes a paediatric and paedologic work, a complex of symptoms of benign, congenital deformities, caused by an oblige intrauterine lie that can be found with 0,6% of all mature born babies. The study is again reduced on structural problems.

The two authors Buchmann and Bülow made in their book "Asymmetrische frühkindliche Kopfgelenksbeweglichkeit" the first longitudinal studies about specific asymmetries of the motor move and motor hold system. There is a lot of statistic material, again reduced on the motoric system.

Pachler and Straßburg describe in their book about the restless infant very interesting, that the main interest of the infant in the first three months is to gain a state of inner homeostasis - every disturbance is externally reflected by signals to the environment.

The book relates to the somato emotional plane and is based on principles of behavioural science.

Summing up, it may be said that there exists quite some literature on this topic, but it was always a concentration on individual aspects whereas the interrelation was missing. The same holds for the literature on Bobath and Vojta therapy: Here the emphasis was laid on the muscular skeletal aspect only, without regarding the remaining aspects of the problem.

It may well be much more the additional related problems that are the main challenge in everyday life for the parents and their children, than the asymmetry itself.

## **9. SUMMARY:**

"The treatment of the asymmetric infant" was only a small study. The insight I could gain with this relatively small number of patients may initiate further, more extensive studies on this topic.

Nevertheless it became obvious, that this therapy could be a valuable addition to the other therapeutically techniques.

The common goal of all three methods is it, to take stress off the nervous system. Unlike the neurophysiologic ally oriented therapies (Bobath and Vojta) which are based on direct influence on the CNS, the osteopathic treatment is an indirect approach: influence on the CNS by correcting and optimizing the dural tension. This work on the dura gives free space to the CNS. But osteopathy puts also emphasis on intra and interosseous lesions and on visceral dysbalance.

All three concepts have in common to help the baby with his/ her development, with regard to the normal development of perception and motion.

Vojta therapy offers a good and well structured therapy plan. But the required intense interaction between the mother and her baby by the therapy, which is exerted by the parents at home, can be extremely stressful on the mother child relationship.

With Bobath therapy the parents learn a specific way of handling their baby in every day life tasks. I think this is of great importance for the parents, because it gives them the feeling to participate actively with the healing process of their child.

Diagnosis by a paediatrician with subsequent referral for physiotherapy concomitant with osteopathic therapy at a stage as early as possible would be the ideal for me.

## **10. BIBLIOGRAPHY:**

- Ansari,C.: Der Einfluß von Reflexen auf die Körperhaltung  
(Krankengymnastikzeitschrift 12/1985, 855-864, Pflaumverlag )
- Biedermann H.: Kisskinder (Stuttgart: Enke, 1996)
- Bobath,B.: Die Hemiplegie Erwachsener, (Stuttgart: Thieme,1980)
- Buchmann J., B. Bülow: Asym. frühkindliche Kopfgelenksbeweglichkeit  
(Heidelberg/Berlin, Springer-Verlag, 1995)
- Drews, U.: Taschenatlas der Embryologie (Stuttgart: Thieme, 1993)
- Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen(Stuttgart:  
Thieme, 1987)
- Frymann, V.: Relation of disturbances of cranialsacral mechanism to  
symptomatology of the newborn study of 1,250, J.A.O.A. 65 (1966) 1059-1075
- Gladel: Überlegungen zur Spontanbildung der sogenannten Säuglingsskoliosen Z  
Orthop. 115 S633 (1999)
- Hofacker, N.v., M. Papousek (1999): Rätsel der Säuglingskoliken Monatsschrift  
Kinderheilkunde 147 S244-253
- Hüter-Becker, Schewe-Heipautz: Physiotherapie, Band 12: Pädiatrie (Stuttgart:  
Thieme, 1998)
- Langmann, J.: Medizinische Embryologie (Stuttgart: Thieme, 1980)
- Lewitt, K., V. Janda (1964): Die Entwicklung der Gefügestörungen der WS im  
Kindesalter und die Grundlagen einer Prävention vertebraer Beschwerden  
(Stuttgart, Hippokrates 34 S 308-316)
- Pachler, M.J. H.- M. Straßburg: Der unruhige Säugling (Hansisches Verlagskontor  
Lübeck, Scheffler Heinz, 1990))
- Richard, J.-P.: WS aus der Sicht der Osteopathie (Koetzting, Wührverlag, 1995)
- Rosegger H., Das Schräglagesyndrom- eine Kombination typischer angeborener  
Skelettdeformierungen beim Neugeborenen (Pädiatrie und Pädologie 27/1992 125-  
127)
- Seiler, A.: Das Bobathkonzept (Fachzeitschrift Physiotherapie, ÖPV, Ausgabe 1-02)
- Sergueef, N.: Die craniosacrale Osteopathie bei Kindern(Koetzting,  
Wührverlag,1995)
- Sutherland,W.G.: Contributions of Thought (Portland, Rudra Press, 1998)
- Vojta, V.: Die zerebrale Bewegungsstörung im Säuglingsalter (Stuttgart,  
Enkeverlag, 1984)
- Wilson, M.: Skriptum Kinderosteopathieausbildung, (9.1.2001, unveröffentlicht)
- Woods RH 1973: Structurell normalisation in infants and children with particular  
reference to disturbances of the central nervous system.( J AM Osteopath.  
Assoc.72:903-908)

## **11. LIST OF PICTURES:**

**Pict.1:** Cover picture

**Pict.2:** Drews, U.: Taschenatlas der Embryologie (Stuttgart: Thieme, 1993, Resegmentierung, Seite 179)

**Pict.3:** Drews, U.: Taschenatlas der Embryologie (Stuttgart: Thieme, 1993 Knochenkerne, Seite 111)

**Pict.4:** Wilson, M.: (Skriptum Kinderosteopathie, 2001: „The birth process“ 1)

**Pict.5:** Wilson, M.: (Skriptum Kinderosteopathie, 2001: „The birth process“ 2)

**Pict.6:** Wilson, M.: (Skriptum Kinderosteopathie, 2001: „The birth process“ 3)

**Pict.7:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 Handgreifreflex Seite24)

**Pict.8:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 Fußgreifreflex Seite25)

**Pict.9:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 Placing-Reaktion, Seite19)

**Pict.10:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 Schreitreflex, Seite17)

**Pict.11:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 Galantreaktion, Seite20)

**Pict.12:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 Landaureaktion, Seite28)

**Pict.13:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 Mororeaktion, Seite27)

**Pict.14:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 ATNR, Seite20)

**Pict.15:** Vojta, V.: Die zerebrale Bewegungsstörung im Säuglingsalter (Stuttgart, Enkeverlag, 1984 Vojta-Seitkipp Reaktion, Seite27)

**Pict.16:** Vojta, V.: Die zerebrale Bewegungsstörung im Säuglingsalter (Stuttgart, Enkeverlag, 1984 Peiper-Isbert Reaktion, Seite31)

**Pict.17:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 1.LM RI: Seite109)

**Pict.18:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 1.LM BI: Seite110)

**Pict.19:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 2.LM RI : Seite122)

**Pict.20:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 2.LM BI: Seite123)

**Pict.21:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 4.LM RI: Seite153)

**Pict.22:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 4.LM BI: Seite154)

**Pict.23:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 6.LM RI: Seite181)

**Pict.24:** Fleming, I.: Normale Entwicklung des Säuglings und ihre Abweichungen, (Stuttgart: Thieme 1987 6.LM BI: Seite182)

**Pict.25:** Richard, J.-P: WS aus d. Sicht der Osteopathie. (Koetzting, Wührverlag, 1995 kraniosakrale Flexion, Seite 80)

**12. APPENDIX:**

**12.1. DIAGNOSTIC SHEET:**

DIAGNOSTIC:

Name of the child:

date:

Date of birth:

Development:

SUPINE POSITION:

1. date:	Date of control::

PRONE POSITION:

1. date:	Date of control:



**12.2. REFLEXES:**

REFLEXES:	1.date		Date of control	
	left	right	left	right
HANDGRASPREFLEX				
FOOTGRASPREFLEX				
GALANTREACTION				
ATNR				
STNR				
	positive	negative	positive	negative
PLACING-REACTION				
STEP-REACTION				
LANDAU-REACTION				
MORO-REACTION				
	left	right	left	right
VOJTA-SEITKIPP-REACTION				
PEIPER- ISBERT-REACTION				

### **12.3. CHILDREN TREATED WITH OSTEOPATHY:**

#### **12.3.1. NAME: V. (female, d.o.b.: 2001/01)**

##### **PREGNANCY:**

24 year old woman. First pregnancy – constant sickness during the whole course of pregnancy, no medication, 4 or 5 times diagnostic ultrasound- no abnormalities.

##### **BIRTH:**

Vertex presentation, breaking of the waters four hours before birth of the baby, short uterine inertia during bearing down pains because of failure of head rotation.

After birth: V. is exhausted and does not want to suck.

##### **DEVELOPMENT:**

Can drink only from the bottle, frequent deglutition, still takes long time for drinking, Constant infections of the right eye.

##### **OBSERVATION:**

Supine: left convex scoliosis with head rotation to the left, difficulty with rotation to the other side.

Prone: does not like prone position.

Pronounced occipital flattening on the left.

Wide left convex scoliosis.

Reflexes: Galant: strong positive on the left side.

Peiper- Isbert: asymmetric left convex position of the trunk.

##### **OSTEOPATHIC CATEGORIES:**

Important factors derived from history + etiology: diagnostic factors:

Uterine inertia during bearing down labours interosseous lesions of the occiput

Problems with sucking

C0-C1 compaction on the left

Recurrent eye infections (left side)

dysfunction of the left temporal

Fronto- maxillary compression

##### **TREATMENT:**

Direct technique between frontal bone and maxilla

Modelling of the maxilla

C0-C1 release

Occipital interosseous technique

Balancing of occiput and temporals

##### **DEVELOPMENT:**

Improvement with drinking after treatment of the occiput and the left Temporal.

After decompression around the left eye the inflammation subsided – there was no further flare up.

At the age of 6 months the baby could turn from supine into prone position on both sides.

She could be dismissed from therapy in Nov. 2002.

**12.3.2. NAME: F. (male, d.o.b. 5/2001)**

**PREGNANCY:**

30 years old prima Para; She had no abnormalities during pregnancy; no medication; 5 time's diagnostic ultrasound.

**BIRTH:**

11 days before term; ten hours of labour; Kristeller's manoeuvre during bearing down labour because the head of the baby did not descent; difficult development of the shoulder during expulsion; clear amniotic fluid; Apgar 8/9/10; first breast feeding immediately after birth no problems with sucking; the mother could not recall if the baby did cry after birth; mother was in good condition after delivery.

**DEVELOPEMENT:**

Difficulty to get to sleep alone; Choking and vomiting after feeding; motoric restlessness, sensitive to noises.

**OBSERVATION:**

Supine: head rotated to the right- rotation to the left almost impossible)

Right convexity of the thoracic spine.

Prone: dislikes prone position.

Occipital flattening on the right side.

Reflexes: Galant: stronger on the left side.

**OSTEOPATHIC CATEGORIES:**

Important factors derived from history + etiology:	diagnostic factors:
Kristeller's manoeuvre	reduced thoracic motility
Difficult development of the shoulder	dysfunction around foramen mag.
Stop of the descendance of the head	occipital compression

**TREATMENT:**

Occipital interosseous work

Release of tension around foramen magnum

Working of the thoracic diaphragm

**DEVELOPEMENT:** last treatment at the end of Oct. 2001; quiet friendly infant; can turn from prone into supine position and back on both sides; rarely vomiting after feeding.

**12.3.3. NAME:L. (female,d.o.b.10/2001)**

**PREGNANCY:**

Third pregnancy – no complications (miscarriage with 2nd pregnancy in week 10/11) no medication. 4 times diagnostic ultrasound during the last four weeks of pregnancy- the baby did not have enough space in the uterus.

**BIRTH:**

Six days after term; Oxitocic drugs because of bradytocia; reduced heart beat of the baby under labour, Vertex presentation, Apgar 9/10/10, discoloured amniotic fluid, perineal laceration.

L. was cold and exhausted after birth but she was able to suck

**DEVELOPMENT:**

Breast feeding for one week then bottle feeding, prone to infectious diseases, dislikes prone position, sensitive to noises.

**OBSERVATION:**

Supine: spontaneous head rotation to the left  
Left convex dorsal scoliosis  
Prone: does not like prone position  
Again spontaneous head rotation to the left  
Reflexes: plantar grasp reflex and Galant reflex more pronounced on the right side

**OSTEOPATHIC CATEGORIES:**

Important factors derived from history + etiology      diagnostic factors:  
Discoloured amniotic fluid                                      weak long tide  
Medication because of uterine inertia  
Stress of the baby under labour  
Prone to infectious diseases

**TREATMENT:**

Occipito- sacral release  
Treatment of the left tibia  
Ignition through coccyges

**DEVELOPMENT:** discharge from therapy in March 2002

V. could gain stability in prone position with symmetrical support on both forearms, rolling over on both sides possible.

**12.3.4. NAME: R. (male, d.o.b. 9/2001)****PREGNANCY:**

Fourth pregnancy (two times miscarriage: week 6/ week 9), medication: Uterogestan 1/week from week 9 on drugs against headaches in mid pregnancy.  
7 or 8 times diagnostic ultrasound.

**BIRTH:**

Medically induced labour in week 40 (Premmen) increasing labour pains over a period of 3 hours, vertex presentation, Apgar 9/10/10, clear amniotic fluid, perineal laceration. R. cried after birth – he was restless and whiny.

**DEVELOPMENT:**

Sleeping at daytime – restless at night, belly ache – frequently hyper extending; very restless and nervous – fights feeding.

**OBSERVATION:**

Supine: spontaneous head rotation to the left – but can also turn head to the right  
Left convexity of the trunk  
Prone: restless in this position- constantly turning the head  
Reflexes: Peiper – Isbert: asymmetrical  
Galant pronounced on the right side  
Skin: eczema of the skin all over the body (all allergies tested negative)

**OSTEOPATHIC CATEGORIES:**

Important factors derived from history +etiology      diagnostic factors:  
Stress under labour                                      reduced motility of the liver  
Medically induced labour                              cranial position of the stomach

Tension of the diaphragms not balanced

**TREATMENT:**

Mobilization of liver and stomach  
Release of all three diaphragms  
Occipito- sacral release

**DEVELOPEMENT:**

April 2002: friendly content baby boy, likes to roll over the floor,  
Skin: only two small spots of the eczema left.  
Mother wants to observe the baby and recheck if necessary.

**12.3.5. NAME: T. (female, d.o.b. 5/2001)**

**PREGNANCY:**

second pregnancy, c- section one week before term because of breaking of the waters with discolored,amniotic fluid- no prior complications during pregnancy,5 times  
diagnostic ultrasound: no abnormalities detected.

**BIRTH:**

C-section at the begin of week 40  
T. was very quiet after birth- only whiny but no real first cry

**DEVELOPMENT:**

No problems with sleeping and drinking but frequent vomiting after feeding,  
Is very frightened.

**OBSERVATION:**

Supine: turns head spontaneously to the left but can turn head to the other side too.  
Wide left convex scoliosis.  
Prone: does not like prone position at all.  
Reflexes: Galant: pronounced on the left side.

**OSTEOPATHIC CATEGORIES:**

Important factors derived from history +etiology:     diagnostic factors:  
C-section   compression around manubrium st.  
Discoloured amniotic fluid   shock of the fascias  
1st cry?

**TREATMENT:**

C0/1 release  
Interosseous work on sternum  
Synchronization of occiput and sacrum  
Treatment of left fibula

**DEVELOPMENT:**

March 2002: dismissed from treatment, the asymmetry had resolved.  
Fascial system still very sensitive to external influences.

**12.3.6. NAME. N: (male, d.o.b. 10/2001)**

**PREGNANCY:**

24 year old woman, second pregnancy, excessive morning sickness in first trimester, early maternity leave, normal lab data, 5 times diagnostic ultrasound.

**BIRTH:**

in week 40, quick change from irregular to very strong labour pain, quick expulsion of the head, strong pull on the head by the midwife for development of the shoulder. First cry a few seconds after birth.

**DEVELOPMENT:**

Very nervous and irritable, restless during feeding- much vomiting, eccentric midline, Frequent strong Moro reaction.

**OBSERVATION:**

Supine: rotates head spontaneously to the right

Hyperextendig, convexity of the thoracic spine to the right

Prone: dislikes prone position

Reflexes: Galant: clearly pronounced on the right side

Vojta reaction strong asymmetry

**OSTEOPATHIC CATEGORIES:**

Important factors derived from history + etiology: diagnostic factors:

Excessive morning sickness

eccentric midline

Reflux

blockage of C2/3/5

Excessive pulling on head during

Expulsion strong tension of the diaphragm on the right

C0/1 occlusion on the left side

**TREATMENT:**

C0/1 release

Occipito- sacral release

C2/3/5

Balancing of right diaphragm

Working the umbilical fascia

**DEVELOPEMENT:**

Much more relaxed in the mornings already after the first treatment, hyperextending is reduced, still often squirming after feeding, continuing work on umbilical fascia, checking and correcting midline.

April 2002: sleeps through nights, no more belly ache. Parents want to recheck if necessary.

**12.3.7. NAME: P. (male, d. o.b. 8/2001)**

**PREGNANCY:**

27 year old woman, second pregnancy- no complications no diseases, 5 times diagnostic ultrasound.

**BIRTH:**

In week 40; vertex presentation; short labour and bearing down labour, umbilical cord was twisted around neck, Apgar 9/10/10,

First cry immediately after birth.

Mother and child were well.

**OBSERVATION:**

Supine: head rotated to the right but can be turned to the other side as well- but there is a fixated convexity of the trunk to the right.

Prone: Moro reaction is easily elicited even with every day handling.

**OSTEOPATHIC CATEGORIES:**

Important factors derived from history + etiology: diagnostic factors:

Umbilical cord twisted around neck

torque of the umbilical fascia

Belly ache

interosseous lesion of the sacrum

**TREATMENT:**

Reduction of tension around umbilicus

Interosseous work on sacrum

**DEVELOPMENT:**

Already after the first treatment remarkable improvement of the abdominal problems with increasing relaxation of the baby reduction of the asymmetry.

Dismissed from treatment in March 2002.

**12.3.8. NAME: C. (male, d.o.b. 8/2001)**

**PREGNANCY:**

38 year old woman, first pregnancy; no complications; no medication, 4 times diagnostic ultrasound.

**BIRTH:**

Week 40, c-section because the head of the baby did not descend, Apgar 9/10/10, the baby cried after birth and could be nursed on the breast one hour later.

**DEVELOPMENT:**

Still breast feeding, frequently vomiting after feeding.

Restless during feeding.

**OBSERVATION:**

Supine: head rotated to the right, but can be turned to the other side too.

Tendency towards left convex scoliosis.

Prone: does not like prone position – never in prone position.

Again left convex scoliosis which is fixated.

**OSTEOPATHIC CATEGORIES:**

Important factors derived from history + etiology: diagnostic factors:

Head did not descend increased tension of left diaphragm

Reflux symptoms

and of right lower abdominal

Quadrant

**TREATMENT:**

Balancing diaphragm

Stabilization of midline

Balancing occiput and sacrum

**DEVELOPMENT:**

No more vomiting after meals, mother does not want to continue care- further check ups with paediatrician.





Quiet baby boy – needs to be rocked to get to sleep, bottle fed – vomits a part of the milk after feeding.

**OBSERVATION:**

Supine: spontaneous head rotation to the left/ left convexity of the trunk.

Cranial displacement of the pelvic axis on the right side.

Prone: does not like prone position.

Left occipital flattening.

Support on forearms not yet possible.

Reflexes: palmar grasp reflex stronger on the left side.

**OSTEOPATHIC CATEGORIES:**

Important factors derived from history + etiology: diagnostic factors:  
not enough space in utero      tension and cranialisation of the diaphragm

**TREATMENT:**

C0/1 release

balancing of the trunk through scapulae

balancing of diaphragm and cranial base

**DEVELOPMENT:**

April 2002: correction of the asymmetry

still under care because of recurring reflux.

### **13. ABSTRACT:**

Neurophysiologic techniques are still the state of the art treatment for asymmetric infants in Austria.

Three years ago I started to treat this patient group with osteopathy- which proved to be successful.

The aim of my thesis was to show the benefits of using osteopathic treatment on asymmetric babies in comparison with the use of neurophysical techniques.

At the begin I stated a definition of "asymmetry", the embryological development of the spine, the birth process, reflexes and the psycho motor development of the child. For all three therapeutical concepts these aspects were of equal importance.

A comprehensive introduction of the three concepts followed.

The patients of the osteopathic study group were referrals by paediatricians. The patients of the control group were treated by physiotherapists from university clinics. Diagnostic criteria was equal for both groups, a questionnaire for the patients was then developed.

Although it was only a small study, nevertheless we arrived at some interesting conclusions:

The results for reflexes and their diagnosis were the same for both groups.

There were visible changes in both groups after treatment.

Improvement of the motor system was witnessed in both groups.

With the visceral and the psychic systems very positive changes were found in the group of patients treated by osteopathy, whereas the control group showed less improvement.

To sum up, it may be said that each of the three therapeutical concepts is valuable. Thus the ideal therapy for the asymmetric infant would be a therapy based on the neurophysiologic techniques, concomitant with osteopathic treatment.