

# Manual medicine of functional disorders in children

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## Abstract

Manual Therapy in Children (MTC) deals with the dysfunction of the (cervical) spine during a crucial period of neuro-motor development. Based on 25 years of clinical experience this biomechanic and neuro-developmental framework is presented and the effects of a malfunction of the cranio-cervical junction are shown. The concept of KISS (kinematic imbalances due to sub-occipital strain) is proposed as a diagnostic tool to bring together the diverse symptoms caused by it. These start in the first weeks of life with cry-babies and colic, later fixed posture—torticollis—and retardation of the motor development. In school children the symptoms become more diffuse and are summarized under the acronym KIDD (KISS-induced Dyspraxia & Dysgnosy). The basics for diagnostic and therapy are presented.

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## 1. Introduction: A new frontier

Manual therapy is a very old craft. Having been gradually accepted by the medical community for the treatment of ailments in adults, its role in the therapy of functional disorders in children is still underestimated outside a rather small group of therapists. Reports of manipulations of infants were scarce and mostly casuistical [1,2]. When we presented our results in 1983 [3] I was astonished at how few reactions we got. In private discussions with colleagues I heard about many experiences those active in the field had, and their reluctance to publish them. Recently some monographies got published by chiropractors [4,5] and osteopaths [6]. Our concept of looking at functional disorders in the development of small children was presented in several book chapters and a monograph [7-9].

## 2. The KISS Syndrome

It is intriguing to report individual cases which are astounding, but more convincing are groups of cases which can be classified and compared; during more than 25 years of working with small children we were able to develop this coherent concept which offers a simple and efficient approach to some old problems.

The term KISS refers to *Kinematic imbalances due to sub-occipital strain*. These can be regarded as one of the main reasons for asymmetry in posture and consequently asymmetry of the osseous structures of the cranium and the spine. In twenty years of treatment of small children and newborn babies for a variety of problems we saw more than 35,000 children under the age of two years. Based on these cases we realized that the sub-occipital region—between occiput and C<sub>3</sub> (the cranio-cervical area)—plays a very important role in the senso-motor development, exceeding the symptoms seen at that time and reaching far into adolescence and even adulthood. Cranial asymmetry, functional asymmetries and asymmetrical neurological patterns all contribute to this diagnosis.

The term KISS-syndrome is used to bring together a seemingly non-coherent group of symptoms and ailments found in newborn and small children, its dominant feature being the torticollis, often combined with an asymmetry of the head (Table 1).

**Table 1.** Spontaneous complaints reported by the parents<sup>1</sup>

<b>Complaints reported by the parents</b>	<b>N = 263 n (%)</b>
Torticollis	234 (89.3)
Reduced range of head movements	223 (84.7)
Cervical hypersensitivity	200 (76.0)
Cranial asymmetry	105 (40.1)
Opisthotonos	73 (27.9)
Restlessness	62 (23.7)
Forced sleeping posture	38 (14.5)
Unable to control head movements	25 (9.5)
Uses one arm much less	20 (7.6)

<sup>1</sup>All statistical material presented here is based on a catamnestic study of 263 babies treated between July 1994 and June 1995. Of the total of 554 babies seen in our consultation those where the ones we could still locate directly by a phone call or via the doctors and/or physiotherapists who sent them initially

Cranial Asymmetry and the phenomena observed in association with it are beginning to get more and more attention. Understanding the importance of a symmetric senso-motor development during the first year allows us to analyze some problems which appear much later in a new context. Seen from this perspective, cranial asymmetry of small children can be an early warning sign, indicating a dysbalance in senso-motor development which may eventually lead to both morphological and neuro-functional disorders [10].

One does not need to treat asymmetry in babies as such. However, the timely treatment to achieve a symmetrical posture and morphology goes a long way to prevent both current problems and later complications, laying a solid base for other forms

of physical or behavioral therapy. Having traced back a lot of schoolchildren's problems to initial asymmetries of posture [11], one can attribute much more importance to them than their unremarkable symptomatology initially suggests. Asymmetry in posture and cranial configuration are a symptom, a sign calling our attention to the underlying condition that might be triggering it. By focusing on this *prime mover* we can successfully treat functional and morphological asymmetry as well.

As is often seen in the history of medical knowledge, our frame of reference changed over time: in 1727 Nicolas Andry, who coined the word "Orthopedics", had already mentioned the treatment of the torticollis as one important field of this new discipline. In going back to the roots we understand that good posture in children was at the forefront of the orthopedic diagnostics and treatment: Ortho-Paedics – "rightening the young" has such an importance for Andry that he used this concept as the definition of the medical procedures he published in his book. This fundamental underpinning of the new discipline was lost in later centuries and Andry's eminently functional approach had to make way for the mechanistic paradigms which have dominated orthopedics in the last decades.

Asymmetry in newborn babies remained a well-known problem, alas one which was often considered as disappearing spontaneously if left alone long enough. For a long time it was linked to the malfunction of the sternocleidoid muscle: "The etiology of congenital muscular torticollis remains a mystery despite intensive investigation" is a commonly held view; like Davids *et al.* [12] most authors still put the blame on a birth trauma of the sternocleidomastoid muscle [13,14]. The symptom was thought to be the cause. At least in the early phases the shortened and thick sternocleidomastoid muscle is so prominent that it's a "natural" culprit. This paper argues that it is a co-victim of the underlying trauma to the articular structures of the cervical spine and as such it is not a good starting point for therapy or analysis. It is a far better used as an indicator of the improvement brought about by other therapeutic measures.

There is a controversy about how to react to a fixed or asymmetric posture in newborn babies. Some consider this a "physiological scoliosis" and think it wears off without treatment [15,16]. More recent papers stress the importance of asymmetries in perception and posture for the development of more severe consequences later on [17]. Buchmann remarked, "The existence of an asymmetrical range of tilt in the sub-occipital region of a child is no big deal. Only if additional signs accompany this, an immediate treatment might be necessary" [18]. Asymmetry is frequently found in testing newborns [19] and its clinical significance has to be carefully examined. Seifert published data of unselected groups of newborn babies where she found that more than 10% of all newborn show signs of asymmetry of the functioning of the upper cervical spine [20].

Nobody advocates a treatment schedule where all these initially asymmetrical babies have to be treated routinely, but these babies should be re-examined later on and treated if the functional deficit has not subsided spontaneously after 4–6 weeks. We would propose to take a large margin, especially as manual therapy is a low-risk procedure, quite uncomplicated and need not to be repeated more than once or twice.

Keessen *et al.* show that the accuracy of the proprioception of the upper limb is reduced in cases with idiopathic scoliosis and spinal asymmetry [17]. As we know that the proprioception of the arms depends heavily on a functioning SO-region [21], functional deficits in this region should be corrected as soon as possible.

**Table 2.** Improvement after single treatment for KISS-related problems. Answers of parents interviewed 6-18 months after treatment—216 (82%) responses of 263 interviews.

Time After Single Treatment	n (%)
0 – 24 hours after treatment	102 (47.2)
1 – 7 days later	34 (15.7)
8 – 14 days later	25 (11.6)
15 – 21 days later	33 (15.3)
22 – 28 days later	22 (10.2)
<b>Total</b>	<b>216 (100.0)</b>

While almost half of the cases reported an improvement soon after the manipulation, a smaller group needed some reaction time and the effects of the therapy appeared only 2-3 weeks later (no other treatment applied during the first three weeks after manipulation) (Table 2).

During 25 years of experience with children suffering from postural asymmetries we were able to show that the most efficient treatment of these cases is a one-time manipulation of the upper cervical spine. Almost all symptoms which lead to the presentation of the babies in our office subsided during three weeks after the manipulation.

### 3. The special situation during the first year

Newborn children are *very* different from adults or even older children, and much more so than the average observer might surmise. With a brain weight of approximately 400 g (0.88 lbs.) at birth, rapidly increasing to approximately 1000 g (2.21 lbs.) at the first birthday [22], the central nervous system of a newborn is small and light. Moreover, its most "human" parts – the prefrontal areas – are not myelinated yet and thus unable to function properly before the second birthday [23] and developing till the end of the teen years.

But even myelination does not automatically implicate complex capabilities, as several crude yet convincing tests indicate. The EEG of a newborn, if derived from the scalp of an adult would be considered "*sufficiently abnormal to indicate imminent demise*" [24] and the metabolic rate at that stage is very low [25]. After birth most of the activities of the newborn are governed by spinal and cerebellar reflexes. These primitive and unconditional reactions are gradually replaced by more complex patterns, parallel to the ripening of the pyramidal tracts and other structures of the suprapontine areas of the central nervous system [26-28].

The differentiation of the fine structures of the central nervous system depends on and is modified by the external stimuli on various levels. These influences commence long before birth and are well-documented on the nutritional [29] and acoustical [30] level. Already, well before birth, mothers report marked differences regarding the movement patterns of their babies and

they are able to trace these patterns to distinctive events, i.e. special food they ate or activities the mothers are performing at a given moment [30].

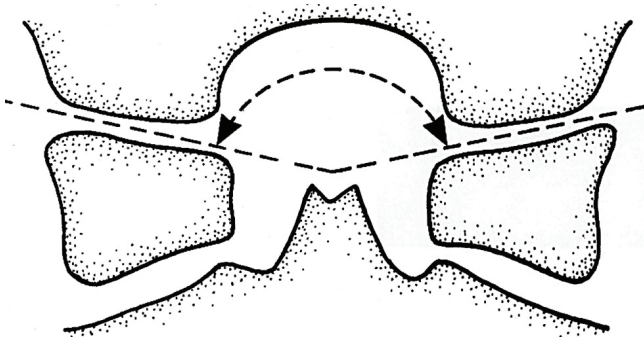
Interestingly enough there seems to be a correlation between babies which are “lazy” during pregnancy and those infants which display postural or behavioral problems during the first months [31]. These children show postural stereotypes with a fixed lateral bend of the spine, or a preference of hyperextension. In most cases these phenomena seem to be limited to a rather short period. It is thus not surprising that they were regarded as basically self-limiting and not in need of a specific therapy. Quite a few of the papers dealing with colic hint a “*difference in state regulation and control in infants with colic*” [32] and mention functional neurological disorders [33] in these children, whereas other factors, like nutrition or allergies, are mostly excluded [34]. On one hand we have to be aware that the infant’s development, and, first and foremost, its acquisition of neuro-motor competences are intimately connected to the optimal functioning of its interface with the external world. The performance of this system depends on a multitude of components, which are to a big part beyond our influence. A few of them are accessible to therapy – and one of these is the “spinal engine” [35]. At that stage of ontogeny the most important component of this engine is the upper cervical area.

**4. The biomechanics of the occipito-cervical junction in newborn**

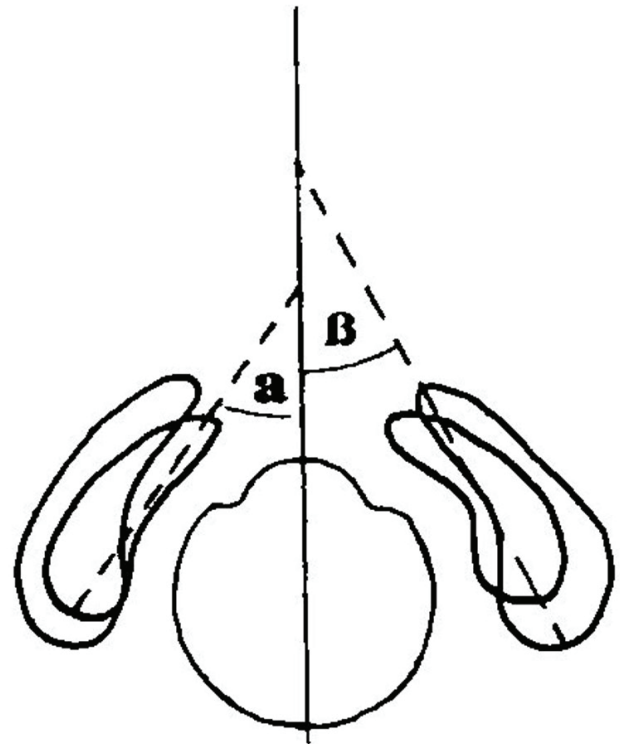
Functional MRIs and other modern research tools have significantly improved our understanding of the working conditions of the developing central nervous system in the last decade.

But another area where these big differences between adults and newborn are especially important is the development of the sub-occipital structures during the first year. These anatomical details can be examined via conventional radiographies which are taken routinely before any treatment of the cervical spine. Our huge archive of radiographs of newborn and small children made it possible to check some of the data provided by authors who obviously did not have access to these amounts of data [36]. The example presented here concerns the frontal and saggittal angle of the sub-occipital joints, i.e., the orientation of the condyle/atlas junction (Figs. 1 and 2).

**Figure 1.** Frontal angle of the condyles. This angle is almost horizontal after birth and decreases from 153 to 125 degrees during the first years of life.

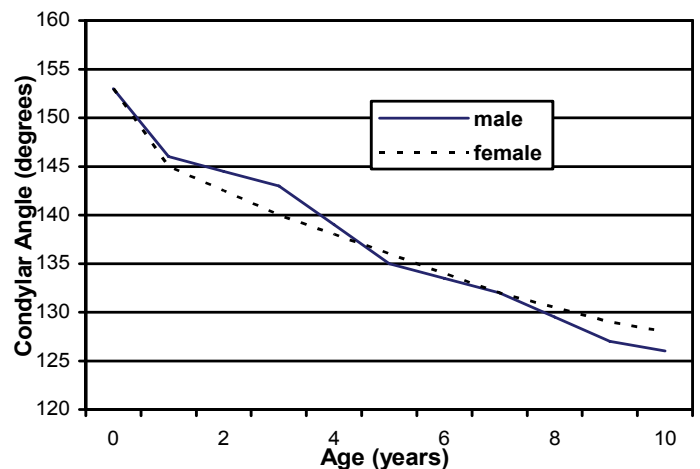


**Figure 2.** The development of the saggital angle is similar: (a) 35.5° in the adult and (b) 28° during the first year



We examined a sample of over a thousand plates and were able to show that the initially almost horizontal orientation of the frontal angle C<sub>0</sub>/C<sub>1</sub> decreases rapidly during the first year of life. At the age of eleven, the adult configuration is almost attained (Fig. 3).

**Figure 3.** Change in the Condylar Angle (N=1046)



As the saggittal angle shows a comparable trend from an initially shallow configuration to a steeper angle, restricting the movement of the structures involved. This crucial region is much less protected against excessive mobility during the first months and years.

Two other aspects of the infant's biomechanics confound this situation further: (1) the head occupies a much bigger percentage of the newborn's body and (2) the muscles maintaining active control of the connection between head and trunk are much weaker than later on.

So three aspects combine to render the sub-occipital region especially vulnerable during the first months:

1. Insufficient articular restriction of movements between condyles and atlas
2. Insufficient active (i.e., muscular) fixation between head and trunk and
3. Undeveloped neuro-motor control of these structures

These findings are complemented by our knowledge of the paramount importance of this area for the proprioceptive control of the entire body, and its influence on the sensory integration of the acoustic and optical system. If the newborn does not achieve control over the active positioning of its head, it cannot orient its eyes toward a source of interest and the acoustical focusing is at least more complicated, if not impossible at all. The sub-occipital region is thus set apart from other areas of proprioception, and even more so in small children.

##### 5. A short summary of the biomechanics of birth

“Head stabilization .... is a complex process involving the interaction of reflexes elicited by vestibular, visual and proprioceptive signals” [38]. Most of the afferent proprioceptive signals originate from the cranio-cervical junction. Any obstacle impeding these afferent signals will have many more extensive consequences in a developing nervous system, which depends more on appropriate stimuli to organize itself [39,40]. “Most of the cerebral development lies still in the future for the newborns” [41]; this development “begins at the head” [42]. Head stabilization and an adequate supply of sensory input from the cranio-cervical junction are essential for the ripening of the central nervous system.

These delicate structures undergo considerable stress during delivery, as the evolution of bipedal gait necessitated a radical restructuring of the human pelvis. The initially straight birth canal had to be bent to fit the new anatomical situation. Our ancestors in Central Africa had a pelvis construction much better adapted to upright gait [43]. The increased cranial circumference of the modern newborn makes the situation even worse. The birth canal is one of the most dangerous obstacles we ever have to traverse [44]. Wischnik *et al.* [45] showed in experimental studies the biomechanics of delivery (see also [46]).

During delivery the head is rotated about 90° and pressed against the trunk by the contractions of the uterine muscles. A majority of newborns suffer from micro traumata of brain stem tissues in the periventricular areas [47]. The injury of the intracranial and sub-cranial structures is thus the rule, not the exception [48,49]. The ability of most newborns to overcome and

repair these lesions shows the enormous capacity of the not yet fully developed brain to cope. Now that we understand that the complete of brain development – which lasts at least till the 5<sup>th</sup> year – depends on consistent sensory inputs, the importance of dysbalances for the efficient repair of cerebral lesions becomes evident. This area is beyond the scope of this paper, but it opens fascinating opportunities for the improvement of the therapy schedule for cerebral palsy and similar neuropediatric problems.

The trauma of the sub-occipital structures inhibits the functioning of the proprioceptive feedback-loops. The motor development, though pre-programmed, does not develop automatically. These systems are fault-tolerant and able to overcome considerable difficulties and restricted working conditions. But the price for this is a reduced capacity to absorb additional stress later on. Children who underwent that kind of trauma may show only minor symptoms in the first months of their lives, e.g., a temporary fixation of the head in one position and “recover” spontaneously. Later on – at the age of five or six – they suffer from headaches, postural problems or diffuse symptoms like sleeping disorders, being unable to concentrate, etc. Quite a large number of those children suffering from one of these “three-letter-word” syndromes like Minimal Cerebral Damage (MCD), Psycho-Organisches Syndrom (POS), Attention Deficit Disorder (ADD) and the like have as one of their problems a functional disorder of the upper cervical spine.

In our practice we learned to look for symptoms of functional lesions of the upper cervical in the newborn-phase of schoolchildren who came to us with postural or behavioral problems. Their successful manual therapy suggested functional disorders of the cervical spine as the main problem of their disorders and we looked back into their developmental history to find the starting point of their ailments. As a rule we found signs of KISS-related problems in these cases, e.g. a fixed posture during the first months, sleeping problems, and many more. The incentive to define the KISS-Syndrome was purely practical: Having found an efficient and low-risk way of treating the asymmetries of small children we had to re-define some pathogenetic concepts. If the shortened sternocleidomastoid muscle lengthens spontaneously after a manipulation of the upper cervical spine it cannot be burdened with the responsibility of cause of a torticollis. The shortened muscle is only a symptom, albeit quite a prominent one.

Two typical developmental patterns need to be analyzed when examining babies with asymmetry problems:

- In the first group the cranial and postural asymmetry is clearly visible from day one. Immediately after delivery the posture of the head and neck as well as the configuration of the cranial bones are asymmetrical. The gynecologist or the midwife can show this to the parents.
- The baby appears symmetrical after birth. Beyond the “normal” distortions of the cranial structures nothing obvious is to be seen. The asymmetrical posture is observed only 4–8 weeks later and develops gradually, together with other “KISS-symptoms.”

There is no need to treat every newborn that shows signs of cranial asymmetry; quite frequently this asymmetry subsides spontaneously in the first 3–6 weeks. Overzealous therapy is, more often than not, unnecessarily irritating. Most of the initially asymmetrical babies are able to straighten themselves out by their own means if given enough time. Having said this, we must emphasize that these

initially asymmetric babies should be screened after 5 to 7 weeks and be treated at that moment if symptoms persist.

Head control is accomplished between the second and third month. Only then can one meaningfully examine the babies in order to check and treat for cranial and postural asymmetries. If such symptoms are found, the distinction between the two patterns outlined above helps to give insight into the probable cause of the asymmetry. At a later stage in the child's development, these two patterns which we have identified become less important as a tool for analyzing the cause of the asymmetries.

The treatment of cranial asymmetry is not achieved by pushing or pulling the skull into a more or less symmetrical form. Since the ancient Egyptians applied head bandages to their newborns to give them a "beautiful" head it is well known how malleable a structure the newborn's head is. It does not serve any useful purpose to "rectify" the cranial asymmetry itself. Once the functional deficits behind it are treated, the asymmetry diminishes gradually. Whatever asymmetry is still there afterwards interferes only inasmuch as it blocks normal functioning of sensory input and proprioception. To treat plagiocephaly with redression helmets [50,51] confuses the symptom with the cause, similar to the myotomy of the sternocleidomastoid muscle still advocated by many practitioners. But the effects of a functional asymmetry on the morphology of the skull or the muscle cannot simply be reversed by eradicating these secondary signs. Once that is agreed, the treatment schedules become much more efficient and simplified, too. Another more functional approach is to facilitate the delicate movements of the different osseous partners, i.e., cranio-sacral therapy as presented elsewhere in this publication.

## 6. The clinical picture of the KISS-Syndrome

It is next to impossible to identify the exact reason why an individual baby has KISS-related problems. Sometimes, we find massive asymmetries in babies with a completely empty birth anamnesis. In other cases, the children had everything going against them: oblique intrauterine positioning, a long and difficult birth using extraction aids in the last phase and marked cranial deformation immediately after birth. But six to ten weeks later some of these children are without any KISS-type symptoms and are straight as an arrow. It is therefore exceedingly difficult to define the origin and outcome in any one individual child. However, examining 100 (or more) a picture emerges.

The risk groups we found in our statistics [52,53] are:

- long labor
- extraction with vacuum etc,
- twins, or triplets
- prenatal positional anomalies

Any combination of these factors is possible. An obliquely positioned fetus has more difficulties in adapting to the contortions of the birth canal and long labor often results in the use of extraction aids, etc. The common denominator is the mechanical stress exerted on the most vulnerable structures, i.e. the cerebral tissues and the occipito-cervical area with its high density of sensory and transport structures.

The main items found in the newborns and small children (up to 24 months) referred to us for treatment are:

- Tilt posture of head and spine, torticollis
- Opisthotonos, often with a KISS-spot, i.e. an asymmetrical abrasion of the hair of the occipital part.
- Uniform sleeping posture; difficulties to find a convenient sleeping position
- Sleeping disorders; the baby often wakes up crying during the night
- Asymmetric motor patterns and posture of trunk and extremities: the arm at the concave side is less frequently used
- In cases with prominent retroflexion of the head the arms are often held in an fixed extroverted position: "chicken-wings"
- Extreme sensitivity of the neck to palpation, tearing its hair, especially on one side
- Cranial scoliosis or plagiocephaly, combined with a flattened occipital region
- Unilateral microsomy, i.e. swelling of one side of the facial soft tissues
- Blockages of the iliosacral joints, asymmetries of the gluteus muscles.
- Asymmetric development and range of movement of the hips, especially of the concave side
- "Three-Months-Colics," often combined with
- Cry babies, i.e., constant crying and visible discomfort without apparent infection, etc.
- Fever of unknown origin, loss of appetite and other symptoms

We have to be careful not to over-emphasize the importance of the torticollis and/or C-scoliosis in the discussion of the KISS-syndrome: It is like a self-fulfilling diagnosis to regard these signs to be the most important. Most children are referred to manual therapy primarily because this kind of asymmetrical posture is apparent. To put these two specific conditions on top of the list is a circular argument: As we have noted they are the most prominent features, but not necessarily the most important causal agents. We saw that other less specific symptoms often precede the asymmetry and certainly the morphological changes of the skull.

For many decades the treatment of these babies consisted of putting them into braces, gypsum casts while sleeping, or leather bandages to "redress" their asymmetrical spinal posture. A latecomer of this kind of mechanical treatment schedule is the "corrective helmet" [54], or the use of botulinum toxin to paralyze and thus lengthen the contracted muscles [55].

The outcome of the treatment of babies coming with all symptoms mentioned above shows that whereas postural or cranial asymmetry may be the most visible problem—and the problem most easily connected to a malfunction of the upper cervical spine—the other ailments are as effectively treated by manipulation. One example are the "cry-babies": Once we can exclude the "usual suspects", i.e., respiratory or gastrointestinal infections—manipulation of the o/c-region is singularly effective.

### 6.1 Form follows function

Immediately after being born, babies regularly show signs of the forces exerted on the cranial structures. As a rule the resulting configuration of the head allows practitioners to analyze the delivery mode, i.e., how the head was positioned while passing the birth

canal. Frequently, an asymmetric cranial configuration is combined with the remnants of a hematoma.

These morphological signs of the birth trauma disappear during the first weeks. At this stage we can distinguish between those cranial asymmetries caused by the deformation of the osseous structures of the skull during passage through the birth canal and the asymmetries induced by an asymmetrical posture. In our view, the second group is by far more numerous.

Apart from the very few cases of primary unilateral microsomy (we see less than 1‰ in the babies treated) a cranial asymmetry starts as a postural asymmetry. The functional deficit, if left alone long enough, leads to the morphological change. Two types are discernible:

- **Primary Asymmetry:** Facial and cranial scoliosis in the sagittal and frontal plane. The primary asymmetry can be seen immediately after delivery and is easily distinguishable from cranial misalignment as it includes a scoliotic posture of the cervical spine or the whole body. Needless to say, it is impossible to draw a sharp line between it and secondary asymmetry. The newborn babies who display this kind of fixed and asymmetrical posture tend to have been in an oblique position during the last weeks of pregnancy, or at least, did not move a lot during this time.
- **Secondary Asymmetry:** Unilateral flattening of the occiput due to forced retroflexion. The secondary asymmetry is gradually developing after birth and is therefore only remarked after some time, usually 6–8 weeks after birth.

The primary asymmetry is the smaller group of the two. In our case histories, the percentage varies between 20%–30%. A much bigger group of newborns are straight at birth and nothing special can be seen. Only after six to ten weeks do these babies develop a more and more asymmetrical posture. In the beginning, the parents may try to counteract this posture preference by putting toys or other stimuli on the less-used side. In some cases, this simple maneuver does the trick. In others, the babies will not react when their preferred toy is put at the “wrong” side, or they will try to reach it and cry out in frustration when they cannot reach it. In these babies, an internal obstacle keeps them from using the “wrong” side.

Interestingly enough, the more subtle signs of KISS syndrome often precede the asymmetry in the clinical development of the asymmetry itself. Before a tilted head or a C-scoliosis is seen, the babies cause concern because they cry incessantly, are restless and irritable, and do not want to get into bed. The mothers of these children spend hours carrying them around and singing them to sleep. “I have to make sure she is fast asleep on my arms before I can try to put her to bed” is a remark frequently made. This chain of events makes it probable that the starting point of the whole problem is a painful neck. As newborn babies cannot react specifically to an irritant, they display the well-known signs of dysphoria. A three-month-old baby who cries may not necessarily do so because of neck pain—there are many other reasons for it—but this is at least *one* sound reason we should take into consideration.

The origin of the baby’s discomfort is not necessarily obvious for the onlooking parent or pediatrician. One of the less pleasant ways to “explain away the problem” is to put the blame on over-attentive mothers. Nobody doubts that over-attention can provoke such reactions in a three- or four-year-old, but, in the first months of their life, the little ones simply don’t have the means to analyze this maternal

attitude, let alone the capacity to react to it. As is often the case in the analysis of the first months, we mistakenly extrapolate from what we presume to be correct in older children or adults into this early developmental stage, forgetting that a symptom displayed at age nine and the same symptom displayed at age ½ do not necessarily have the same cause.

## 7. A window of opportunity

The acquisition of any skill requires a learning period and a pre-disposition to be acquired. The optimal point in time for a specific ability is embedded in the phylogenetically fixed development pattern. Language acquisition is the example we are frequently and painfully confronted with: whereas our children absorb another language without any effort, we grown-ups labor and toil and will never achieve the same level of effortless mastering our children grow into before puberty.

All our capacities, be they concerned with movement or perception build on physiological and mental abilities learned beforehand. The earlier a basic skill’s learning phase is situated in the “normal” chain of events, the more its faulty acquisition will interfere with cognitive or motor developments later on.

Head control is situated very early on in this chain of events, which is one reason why the long-term consequences of its malfunctioning are so far-reaching. This is also the primary reason why we should check and treat even minor signs of asymmetry of the posture or form of the head: they may not look very impressive at that stage, but they can cause a derailment of the kinesiologic development and thus necessitate a much more extensive treatment in later years. Kinematic imbalances lead to behavioral and morphological asymmetries. “Symmetric individuals appear to have quantifiable and evolutionary significant advantages over their asymmetric counterparts” [19]. We found signs of asymmetry and KISS in the newborn-period of 72% of the school children we saw (and treated successfully) for headaches, postural and behavioral problems. The seeds of problems, which surfaced at age 8 or 10, could be traced back to KISS-symptoms before verticalization, i.e., during the first year. This is the main reason why a vigilant attitude towards minor signs of functional asymmetry in this first stage of neuro-motor development is necessary.

Even successfully treated babies continue to carry the imprint of their initial asymmetry with them. In times of exhaustion or after periods of rapid growth, they will display the former asymmetrical posture again, at least temporarily. In most cases, these symptoms subside spontaneously and no treatment is necessary. Only when the asymmetry persists for more than a few days should one intervene therapeutically.

## 8. Treatment

Manual Therapy is *qua definitionem* a craft and therefore dependent on the skills and attitude of the individual therapist. The etymological root of the German word “Be-handlung” (treatment) indicates how basic a principle this is, as does the narrower term “mani-pulation”, its Latinized form. Where does manual therapy end, where does massage, osteopathy, chiropractics start? We know how the “normal” diagnostic examination of a patient already alters the clinical situation; you cannot draw a sharp line between test and

therapy, much less so limit whatever positive effect is exerted on one's patient for the exclusive use by one professional group. We can only give some guidelines in teaching the treatment of functional vertebrogonic disorders, nothing more.

However, there are some essentials that help to maximize efficiency and minimize the amount of time necessary. By reading Andry's book written in the beginning of the 18<sup>th</sup> century, you'll find a lot of those manual techniques, which one reads about in contemporary publications as the newest trick in town. Naegeli's book [56], written 100 years ago, lists some of our "modern" techniques within another context, but with comparable indications. This list can be expanded almost indefinitely. This is *one* reason why no "how-to" is given here. The technique an individual therapist uses depends as much on his or her individual abilities as on the material framework one has to function in. It is quite useless to tell somebody who has to work in a slum to use an X-ray picture of the cervical spine. So I want to limit the "dos and don'ts" to one warning: **Do not treat too often!**

Simple as this may sound, it is an extremely difficult advice to follow. All parties concerned want success as soon as possible, and rightly so. But it is the task of the professional to know when to expect a result of a treatment. Once we know that this may take more than two weeks we should convey this information to the parents. Overzealous therapy is one of the main reasons for unsatisfactory results. In the first years, we regularly told the parents to resume other therapies immediately after manipulation "to make the best use of the liberation of movement provided by the manipulation". We were quite astonished to see that in some cases where this was not possible (the mother was sick, the physiotherapist on holidays etc.) the results were *better* than normal. This led us to experiment with a therapy pause of 2-3 weeks after manipulation and we found reproducibly better results following that rule.

But having said that, one is still pushed to show how the treatment works; just to dispel the notion that there is such a thing as a "magic touch" let's describe the procedure:

If you want to treat a small child, take your time to win the confidence of the parents first. Remember that an anxious mother transmits her fear onto her child. The excitement and nervousness this puts into one's little patient cannot be easily overcome! One always has to consider that an almost axiomatic assumption says: "a very effective therapy has to have very impressive side-effects." I can look back on more than 35,000 newborns treated. Most of them (approximately 80%) were treated to the satisfaction of their parents and physicians with one manipulation without a single serious complication. But those who start to work in this field have to make do with less experience and still be able to transmit confidence to the parents.

Why not stick with the "classic" methods of physiotherapy and gradual treatment? The answers include:

- Sub-occipital Strain is the critical factor. Without its removal, the symptoms can be dealt with by physiotherapy, but the re-appearance of symptoms caused by sub-occipital strain can later necessitate manipulation at or after entering school.
- Removal of sub-occipital strain is the fastest and most effective way to treat the symptoms of KISS; one session is sufficient in most cases (81% once, another 16% twice).

- Manipulation of the occipito-cervical region leads to the disappearance of problems not reported by the parents, because they did not see any connection with the vertebral spine. Later on and especially when we made retrospective inquiries, we have heard time and again "that Lars (or Laura) sleeps (or eats) much better since the treatment", is "another child altogether," etc.
- This therapy requires no cooperation from the babies or their parents; whereas, most forms of physiotherapy have to rely on the compliance of the parents.

We do not treat the cranial asymmetry itself. It is considered a symptom of an underlying problem. Treating the upper cervical spine and optimizing its functioning re-establishes the full range of motion to the head and neck and thus induces a re-symmetrization of the morphologically altered cranial structures. While the functional improvement is detectable after 2–3 weeks, the diminution of the cranial asymmetry takes many months. It is important to attract the attention of the parents to the functional level of the problem. Otherwise, they become impatient and tend to want over-treatment.

The procedure used is basically an impulse manipulation as follows:

The baby lies on the examination table in front of the therapist. After the kinesiological and neurological examination, the child is put on its back and we check the segments of the cervical spine. These findings are compared with the X-ray analysis. It is important to be patient; agitated children are particularly difficult to examine. Careful friction massage of the short muscles of the neck helps manual palpation. Contrary to the situation in adults there is no "limit of the range" for a manipulative thrust. One has to be very delicate and it helps to realize that we cannot improve the outcome by using more force. We measured the forces used in the treatment of babies and adults [57]. For treating babies, this force should be 15-20% of the force used in adults.

In most cases, the direction of the manipulation is determined by the radiological findings (85%). In the other cases the orientation of the torticollis, the palpation of segmental dysfunction or the local pain reaction helps to find the best approach. The manipulation itself consists of a short thrust of the proximal phalanx of the medial edge of the second finger. It is mostly lateral. In some cases, the rotational component can be taken into account. When the retroflexion is the main component of the fixed posture, the manipulation can be applied via the proc.transversarius of C<sub>1</sub> in a sagittal direction.

We believe that the selection of the specific technique without functional analysis of the radiography of the cervical spine lessens the effectiveness of this treatment. As it is not that easy to get good x-ray-pictures, some colleagues tend to dismiss the necessity to consult the radiological findings. Apart from the improved treatment technique, a correct radiological analysis reveals morphological problems in 6–8% of the cases [58]. Standard x-rays – during the first 18 months an a.p.-plate of the cervical spine including the SO-region suffices – have to be of optimal quality and no manipulation in the SO-region should be done without them.

The technique itself needs subtlety and long years of experience in the manual treatment of the upper cervical spine of adults and schoolchildren. In the hands of the experienced, the risk is minimal and we have not yet encountered any serious complications. The forces used during the manipulation were tested with a calibrated pressure-gauge. They should not exceed the force used to push a bell-button energetically. Most children cry for a moment, but stop as soon as they are in their mother's arms. In 13 cases (of >35,000 infants), the children vomited after the treatment. However, this had no negative effect on the outcome, and there were at least as many babies vomiting already during the test routine determining their neurological status.

## 9. Results

The main aim of any therapy should be to result in the best possible outcome with the least time and expense needed. The method proposed here fulfills these demands rather nicely, alas with one drawback: we have to have a little patience.

Of the 263 cases (152 male, 109 female) randomly drawn from the 554 babies treated between June, 1994 and June, 1995, some of the data is compiled here. 213 Babies were treated only once, 41 twice. Only 3% were treated more often (4, three times, and 2 each, four or five times). To get a feeling for the kind of result one can expect from a well-applied manual therapy, first, we examined an evaluation by the pediatricians and/or physiotherapists who sent the children:

In our sample of 263 children, we were able to reach 195 for evaluation. Their replies:

Very content with the effect of the treatment	40.5%	79
Content with the effect of the treatment	31.3%	61
Moderately content with treatment	2.6%	5
Not content with treatment	2.6%	5
Cannot comment	23.1%	45

The evaluation of the parents was as follows:

Very content with the effect of the treatment	62.7%	165
Content with the effect of the treatment	24.7%	65
Moderately content with treatment	9.1%	24
Not content with treatment	3.0%	8
Cannot comment	0.0%	0

These results can be related to the different main symptoms:

Symptom	(very) good result after				Im- proved	No change	Total
	1 day	1st week	2 <sup>nd</sup> week	3rd week			
Torticollis	78	28	33	19	40	25	223
Ophistotonos	10	6	5	7	12	5	45
Restless/ Crying	26	5	6	2	6	7	52
Fixed sleeping position	16	3	3	6	4	1	33

Some details are worth mentioning:

It does take some time for the treatment to have an effect, regardless of the symptom treated. In most cases, no further

therapy was necessary – or, if so, vastly more effective. Less than half of the children treated received additional physiotherapy after the cervical manipulation.

Functional changes precede the morphological improvement and here soft-tissue asymmetries (for example the cheeks in a unilateral microsomy) disappear much faster than osseous asymmetries.

The flattened back of the head improves faster than the asymmetrical forehead. The former takes 3–5 months to be almost symmetrical; whereas, the latter might take almost a year. When the babies are older than 9 months at the first treatment, one has to warn the parents that a – functionally irrelevant – rest of asymmetry may persist.

These results are only obtainable in babies treated before, or at least at, their verticalization. After the first anniversary, the effectiveness of the functional therapy decreases rapidly.

In some very rare cases, one is tempted to use the term “Malign asymmetry” to classify those babies where a correctly applied treatment does not lead to the expected outcome regardless of the fact that no complicating details appear. If the expected improvement does not materialize, check for the following:

1. Was there a trauma immediately before or after the manipulation?
2. Did you treat too often and/or with insufficient time between the manipulations?
3. Did the mother continue the physiotherapy immediately after the manipulation? [Something frequently seen if the mother is a professional, i.e., (in most cases) a physiotherapist.]
4. Did you overlook a complicating neurological problem?
5. Did you overlook a morphological problem in the cervical or upper thoracic spine?

It is quite surprising how often one of these reasons emerge. To help distinguish between an adverse effect of the treatment and other factors, it's important to be very precise about the timing. Sometimes the parents come and tell us: “After the treatment she got a lot worse” – precise questioning reveals that the initial reaction was unspectacular or positive and only after “some gymnastics the other day” – “being roughed up by his elder brother” – “stumbling over the bike of her sister,” etc., things got worse.

In most cases, the symptoms stop spontaneously if we leave enough time and nobody interferes prematurely. Even the best-intentioned additional treatment is too much and usually less is more. If the symptoms resume or have an increased intensity, do think of a malignancy, even if the initial treatment improved the situation for days or weeks. At least after the second relapse, it is of paramount importance to ask for a neuropediatric examination including MRI or comparable procedures [58-62].

## 10. KIDD: KISS-induced Dyspraxia & Dysgnosy

Since the eighties, the awareness of the long-ranging consequences of pre-birth conditioning has risen considerably. British cardiologists were the first to note that children born in poor families with a high incidence of malnutrition suffer from a higher rate of heart failure decades later [63]. Similar results came from epidemiological studies in the Netherlands and in Finland [64]. It seems probable that our organism is assigned an “operating mode” early in life according to the environmental

conditions prevalent during pregnancy and the first months after birth.

Learning about these results, made it easier for us to come forward with the observations we made about schoolchildren and young adults. In many cases (72%), where we had to treat patients for headaches, postural problems or co-ordination malfunctions, we were able to establish KISS-related problems in the first year of life [65]. In order to find this connection, one should enquire about the typical problems with which the parents of these children are confronted. Another valuable source of information is the photo collections of the first year. Very often one finds the baby again and again in the same posture. When asked about other signs that we associate with a dysfunction of the occipito-cervical junction, we often got affirmative answers, e.g., mentions of colic, feeding problems or incessant crying. Due to the “fuzziness” of these symptoms, it is difficult to put this in a tight diagnostic frame.

Forthcoming research aims at establishing the effectiveness of MTC in treating school-related problems. A sample of schoolchildren in Hagen (Germany) were examined and treated. This group of children (between 6 and 10 years of age) came from a school specialized in pupils with learning difficulties. These children were evaluated by their teachers. In addition an initial interview was conducted to document each case history.. Two X-rays of the cervical spine were obtained and, at a second session, the documentation was reviewed, the X-ray pictures analyzed, and a manipulation of the cervical spine performed. Four and eight weeks later the parents and teachers were asked to evaluate the development of the children.

The pupils taking part in the pilot phase were assembled in two groups. Group I was those children where the case history contained items indicating an underlying KISS-Syndrome, group II was the other half. Those children where a significant amount of KISS-related problems were found in their case history profited most from MTC. Where there were no marked tendencies for functional vertebro-genic problems, the treatment applied did not have much of an effect.

These findings mirror our previous experiences: If it is possible to establish a case history typical of KISS-children in a pupil with learning difficulties, it is worthwhile to examine and treat such a child with MTC. To prove the influence of functional vertebro-genic disorders on a given sensori-motor problem, it is often most effective to simply perform a test treatment and evaluate the results, as Lewit and Janda remarked more than thirty years ago [66]. In order not to be overwhelmed by desperate parents, a pre-screening by a pediatrician who is able to filter out the most promising cases is helpful. We use a similar approach in an ongoing study about MTC as a treatment for headache in school-children [67].

Once confronted with an individual case, it is almost always better to treat one too much than to let a possible improvement slip away. It is fair to say that there is no risk involved if one limits the treatment to a single manipulation. As we were able to show in an analysis of fatal complications after manual therapy, almost all these cases occurred at the second or third intervention and/or using rotational manipulation [68]. In children there are no adverse effects recorded after manual therapy and our workgroup, European Workgroup for Manual Medicine

(EWMM) has an overview over more than 35.000 children treated during the last 15 years [69].

The different manifestations of functional vertebro-genic disorders in children and adolescents necessitate to distinguish between two main forms:

During the first year, the most important direct sign of functional problems of the occipito-cervical junction is asymmetry and fixed posture. The closer the child gets towards verticalisation the less pronounced these signs become. The additional information furnished by the third dimension obviously helps the child to compensate for the faulty proprioceptive patterns of C<sub>0</sub>/C<sub>2</sub>. Similar to the three-month-old who stops crying spontaneously, the problem of asymmetry seems to disappear if only we have the patience to wait long enough. In the second and third year, children enter a phase where they show little, or no, signs of any functional or motor disorder.

Later on—when the children are between four- and six-years-old—other symptoms appear: These children are reported as being “clumsy” or “slow”, and parents tell that they have difficulties to learn to bike or to rollerskate. “We were so astonished that she still cannot ride a bike as she was walking at 8 months already” is a remark we often hear. This is the situation where you have to enquire further: how was the delivery, how were the first months? The relevant questions are compiled in Figure 4. Those items marked with an “x” contribute to a “KISS-score” which we use to improve the accuracy of the prognosis. Once this sequence of events is established it becomes easier not to get lost in the multitude of signs and symptoms associated with it.

These questions—translated into a non-medical language—form the base of our interviews with the parents. If used judiciously, this list helps to avoid being over-eager when examining potential cases. As already mentioned, it does little harm to treat one child too much – but, on the other hand, it’s not helpful to claim to be able to treat all and anyone with the same method. Once we have found the typical pattern of KISS in the case history, we have to ascertain that the problems that brought the children to our consultation are consistent with the “KISS-pattern”.

## 11. Individual and interpersonal reproducibility

As mentioned already, we are dealing here with a form of therapy which depends to a large extent on the degree of competence the individual therapist has at his/her disposal. Therefore comparisons between different practitioners are difficult. If one therapist is able to treat a given problem, it is not necessarily true that all those having a diploma in manual therapy or chiropractics are able to do the same just by following the given recipe. This basic problem of any inter-personal comparison is shared by most medical and paramedical activities. Just think about psychotherapy or surgery, but also something as non-dramatic as massage or just a hairdo – all these services rendered to others may be absolutely individually reproducible but are not necessarily of the same quality when administered by another person.

As basic as this may seem, this fundamental dilemma is rarely addressed in scientific publications. Everybody feels much more at ease with the assumption that you just have to follow enough lessons and gather sufficient diplomas to be as good as anybody else. It

is certainly not good marketing for our concept of KISS-therapy to address this problem, but, when dealing with a topic as sensitive as the manual therapy in small children, the issue cannot be avoided.

#### Figure 4. Questionnaire for children

##### Birth

- mother's age
- first / second / third ... delivery
- duration of delivery ( < 1h ; 1-3 h ; 3-6 h ; > 6 h )
  - birth weight
  - birth length
  - oblique presentation
  - twin
  - forceps – vacuum
  - caesarean (why?)

##### The first months:

- bad sleeper during first months – 6 to 12 months – later
- did/does the child often wake up at night
- crying at night – how often
- fixed sleeping pattern
- problems with breast-feeding on one side
- signs of colic
- orofacial hypotonus
- hypersensitivity of the neck region

##### Motor development: started to

- Crawl
- sit
- pull itself up & stand
- walk

##### General health

- broncho- pulmonary infections
- headaches
- neurological disorders
- mouth is often open

##### Sensori- motor development slower than expected

- posture and movement
- language
- concentration
- social integration

##### Asymmetry

- visible immediately after birth
- only later (when?)
- obstetrician / midwife saw it
- parents observed A. first
- localisation
  - arm
  - trunk
  - head
- baby looks only to one side
- moves only one arm/leg
- face is smaller on one side
- back of the head flat on one side
- has a bald spot on the back of the head

These questions – translated into a non-medical language – form the base of our interviews with the parents. If used judiciously, this list helps to avoid being overeager when examining potential cases. As already mentioned, it does little harm to treat one child too much – but, on the other hand, it's not helpful to claim to be able to treat all and anyone with the same method. Once we have found the typical pattern of KISS in the case history, we have to ascertain that the problems that brought the children to our consultation are consistent with the “KISS-pattern.”

## 12. Epilogue

Having arrived here you might want to ask yourself (and me): well, sounds more or less convincing, but how can you be sure that this is it? There are so many other propositions and this one does sound too simple to be true. One could refer to the usage of the acronym KISS in business education, where management consultants use the acronym KISS to say “Keep It Simple, Stupid!”, but the final proof is the success of the treatment schedule based on the ideas outlined here. In almost 80% of the cases, one treatment only is sufficient. We do have to keep in mind that a lot of other problems mimic the same symptomatology, but if you keep the whole picture in focus you should be able to avoid these pitfalls.

If and when there is reason to believe that a given clinical situation is primarily caused by a functional problem of the upper cervical spine, the therapy proposed here is simple, effective and diagnostically undemanding. Whenever it does not succeed, nothing is lost besides two or three weeks' time. When it succeeds, mother and child are spared a lot of time- and energy- consuming treatments, and things are indeed kept simple.

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**Figure 5.** A KISS-II baby. The forced retroflexion makes it impossible for the child to cuddle with the mother. How much emotional stress results from that?



**Figure 6.** A KISS-I baby. The “classic” case of a fixed lateroflexion. These babies are often referred to as torticollis neonatorum. To put the cervical malfunctioning in the first place gives us a fast and effective approach to the problem and, in most cases, one treatment suffices.

