

How often are thrust techniques used in practice

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Declaration

Hereby I declare that I have written the present master thesis on my own.

I have clearly marked as quotes all parts of the text that I have copied literally or rephrased from published or unpublished works of other authors.

All sources and references I have used in writing this thesis are listed in the bibliography. No thesis with the same content was submitted to any other examination board before.

Eisenstadt, November 17, 2008

Abstract

Research question: Are thrust techniques less often used the longer an osteopath is in practice? Are the reasons for that insecurity, the degree of success in the application and attitude towards this technique?

Methodology: Development of a quantitative questionnaire which was sent to all 211 Austrian osteopaths who graduated from the Vienna School of Osteopathy (Wiener Schule für Osteopathie, WSO, reference date: April 5, 2007).

The questions evaluated how often thrusts are used in the cervical spine (c-spine), thoracic spine (d-spine), lumbar spine (l-spine) and the extremities; whether and how alternative methods are applied in cases where a thrust would be appropriate; and what is the personal attitude of the therapist towards a thrust.

By means of the analysis of the general data (year of graduation, gender, age, duration of treatment) influences on the use of thrusts are determined.

Results: The return rate was 55.5% (117 returned questionnaires).

Experienced osteopaths thrust more rarely than their less experienced colleagues. Female osteopaths follow this trend to a greater extent than their male counterparts. How often thrust techniques are used does strongly depend on how much the therapist likes the technique and not so much on whether the therapist masters the technique successfully and feels confident in using it.

Preface

I would like to begin my master thesis with a personal observation:

I have noted that more and more osteopathic colleagues kept sending patients to me to treat them with thrusts because they themselves did no longer like to apply this technique.

According to their own explanations they felt insecure about this technique and thus their thrusts were also not so successful. For other techniques than the thrust, which are part of the osteopathic treatment, the patients then would go back to their original therapist. It seemed thus that there are therapists who are in favour of applying thrusts but for one reason or the other they seem to have unlearned or forgotten the technique or do not want to use it themselves. Also in discussions with osteopaths who have been in practice for quite a while I sometimes noted a complete rejection of the thrust techniques.

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To facilitate the readability of this paper gender-specific terms will not be used to differentiate between male and female. The masculine form will be used in cases where the members of both sexes are described.

1. Introduction

In several internet forums (focus.de, 2007, Beepworld.de, 2005) but also in other media (Rundfunk Berlin Brandenburg, 2002) the thrust techniques are represented as brutal techniques (cf. also Chapter 2.8.). According to focus.de (2007) the thrusts are regarded as dangerous. Both the patients (Beepworld.de, 2005) and also the therapists (Oexle's Gesundheitsfachschule, 2007) are divided into two camps: those who are in favour of the thrust techniques and those who are against them. Also Abehsera (2005) mentions two groups of osteopaths in his compendium on osteopathy (Leitfaden Osteopathie):

The “structural” and the “functional” osteopaths. While the “functional ones” use indirect techniques, which e.g. exaggerate a dysfunction, the “structural ones” use direct techniques, which “break through” a dysfunction through manipulation.

The public was drawn into the conflict. Patients who are used to manipulations feel betrayed by the mere “laying on of hands” by cranial therapists. On the other hand patients who are treated by therapists who only use their “hearing hands” feel strongly threatened through manipulations. (Abehsera, 2005, page 17).

The aim at the Vienna School of Osteopathy (Wiener Schule für Osteopathie, WSO) is to convey osteopathy in its whole range (wso.at, 2008). Here the thinking in camps is not appropriate because first the students have to gain an overview of the whole range of techniques that can be used in osteopathy. However, over the course of a therapist's life some feel more attracted by one or the other of the two camps, which have formed as a consequence of the conflict between Still and Littlejohn. *Littlejohn thought that function governs structure* (Abehsera, 2005, page 17). Thus Littlejohn can be regarded as the trailblazer of the functional camp. By exaggerating a dysfunction the therapists of the functional camp try to release a problem. The intellectual father of the structural camp is Still who maintained that *structure governs function* (Abehsera, 2005, page 17). The therapists who feel closer to the structural camp try to release dysfunctions by means of direct techniques. The thrust techniques belong to this category of techniques (Abehsera, 2005). It needs to be clarified whether a sort of “partisan thinking“ develops over the course of the work as a therapist, which entails that a whole group of techniques (in this case the thrust techniques) is being rejected. Therefore I asked the questions: “Are thrust techniques less

often used the longer an osteopath is in practice? What are the causes for this: dislike, insecurity and/or lack of success in the use of the technique?"

To evaluate these questions a quantitative questionnaire was developed and sent to all osteopaths living in Austria.

According to the Austrian Society of Osteopathy, OEGO, (2008) osteopathy is a holistic treatment method and also the WSO (2008) claims to convey osteopathy in its totality.

Therefore it is important to conserve the thrust techniques as fully integrated components of the range of osteopathic techniques.

To answer the question: "Are thrust techniques less often used the longer an osteopath is in practice?" it is first of all important to provide an introduction to the impulse techniques.

2. Introduction to the impulse techniques (HVLA)

HVLA means High Velocity Low Amplitude technique and will be used as abbreviation for the impulse techniques. Other synonyms for HVLA are HVT, manipulation and bone setting (Bayer, 2005) but also chiropractic and thrust. The impulse techniques belong to the most frequently used techniques (Greenman, 2005).

2.1. History of the impulse techniques

The treatment with thrust techniques is as old as the history of medical treatment. Prehistoric cave-paintings, which were found in the region of the old Mesopotamia, already depict such treatment techniques. It can be clearly recognized in these paintings that treatments of the support and locomotor system are carried out, which are similar to the manual therapeutic techniques that are used today (DGCO, 2007). Also 4000-year-old sculptures provide evidence of the use of manual therapeutic techniques in Thailand (Greenman, 2005).

The Greek scholar Hippocrates also described similar forms of treatment that were used at his time. For the first time a term is used which already gives an idea what this treatment is about: "bone setting" (DGCO, 2007). Other important figures in the history of medicine like Galen, Celsus and Oribasius also mention manipulation techniques in their works (Greenman, 2005).

Spinal pain due to a restricted mobility (a blockage) was seen as a misalignment of individual vertebral segments. Over centuries the releasing of such blockages was the job of layman

doctors who gathered the necessary knowledge through their own experiences (DGCO, 2007). At the time of widespread epidemics the doctors possibly developed an aversion to having a direct skin contact with the patients. Healing with the hands was then incumbent on the barber-surgeons and it seems that the manual medicine has decreased in importance in medicine due to the loss of the direct contact with the patients. (Greenman, 2005).

There are various treatment methods in the fields of conventional and complementary medicine which offer impulse techniques in their training. These include osteopathy and chiropractic, whose history I will briefly summarize. The reason for starting with the presentation of osteopathy is that my work is based on a survey among Austrian osteopaths.

Osteopathy:

The concept of osteopathy was founded by Dr. Andrew Taylor Still (1828-1917) in the USA in 1874. He found out that small changes in the bones, joints or muscles affect the whole organism. The term osteopathy consists of two Greek words: The bone (Greek: “osteon“) was the starting point for Dr. A.T. Still to detect the cause of pathologic conditions (“suffering“, Greek: “pathos“). In his concept of the “triune man” (the threefold differentiated entity of the human being), the entity of body, mind and soul, Still assumes that by Creation the organism is endowed with a perfect self-healing mechanism. The religious Dr. A. T. Still regarded the human being and the body as God’s perfect creation (OEGO, 2008).

According to the OEGO (2008) osteopathy is an independent, medically and scientifically founded, holistic treatment method. It is based on the assumption that an unimpeded, healthy functioning of the vital processes in the body depends on an unrestricted mobility of the structures in the body. Osteopathy is characterized by supporting the self-healing forces of the patient through individually selected manual osteopathic techniques which are consistent with the osteopathic principles. The holistic treatment concept of osteopathy comprises three columns, which are all integrated in an osteopathic treatment approach (OEGO, 2008):

Structural osteopathy

Structural osteopathy is concerned with treating dysfunctions of the whole locomotor system (e.g. spine, joints, muscles, tendons, ligaments).

Visceral osteopathy

In visceral osteopathy dysfunctions of the internal organs are treated.

Cranio-sacral osteopathy

Cranio-sacral osteopathy looks at treating dysfunctions on the level of the whole nervous system, the cerebrospinal fluid and the bony and membranous interconnections of the cranium and sacrum.

There are five important principles in osteopathy (OEGO, 2008):

- *Life is motion:*

Life is expressed through movement. Everything has to be mobile, i.e. each structure in the body needs to be able to move.

- *Structure and function:*

The body's structure and function have a reciprocal influence on each other.

- *The law of the artery:*

Every tissue in the body needs to be sufficiently supplied.

- *The entity of the body:*

The body works as a unit. All structures and tissues of the body are interconnected mechanically, via the nervous system and via the fluids in the body.

- *The body heals itself:*

The OEGO (2008) assumes that due to its self-healing forces our body has the ability to maintain health or to regain health in the case of disease.

The Austrian public knows the method of chirotherapy mainly as a method used by doctors (meduniqa.at, 2008). Therefore I also want to present chirotherapy.

Chirotherapy:

Chirotherapy is practiced by doctors, while chiropractic (also manual medicine or manual therapy) is used by alternative practitioners or non-medical personnel (meduniqa.at, 2008). It is a method that is related to osteopathy. Chirotherapy was founded by the American David Daniel Palmer (1845- 1913).

The first recorded chiropractic adjustment was performed on September 18, 1895, on a man, named Lillard, who had been deaf for 17 years. Palmer asked how he had become deaf.

Lillard replied that one day, when he had strained his back, he heard something "pop" in his back. For over 17 years Mr. Lillard complained of hearing problems. Palmer examined Lillard's back and found a spinal vertebra out of position. Reasoning this to be the cause of Lillard's deafness, Palmer pushed the vertebrae back into place. As he expected, Lillard's hearing improved. Palmer theorized that decreased nerve flow may be the cause of disease,

and that misplaced spinal vertebrae may cause pressure on the nerves. He reasoned, if the spinal column were correctly positioned, the body would be healthy (bay-mall.net, 2008). D.D.Palmer explained the supposedly new aspects of his treatment method with the following:

The basic principle and the principles of chiropractic which have been developed from it are not new. Still I claim to be the first person to adjust a subluxated vertebra using the spinous and transverse processes (Proc. spin. and trans.) as levers to bring the subluxated vertebra back into its normal position. On this foundation a science was created which was bound to revolutionize the theory and practice of medicine. (Re-translated from the German translation by: D.Oesch) (therapeutenfinder.com, 2008).

The name chiropractic contains the original method which was applied to carry out the technique: One of Dr.Palmer's patients, a minister, took the Greek words for "hand"(cheiros) and "done by"(pracktos) and put them together to spell chiropractic, meaning "done by the hand"(bay-mall.net, 2008). The therapist tries to restore the mobility of joints that are disturbed in their mobility (joint play) or that display a misalignment (subluxation). To achieve this, structure and form of the joint need to be intact. In 1935 Dr. med J.S.Riley published a book with the title "Das ist Chiropraktik!" (This is chiropractic!), where in part – made available by Mr. Zimmer – chiropractic is advertised as treatment for all sufferings in the world. (Riley, 1935).

In osteopathy disturbances are usually called somatic dysfunction. Since the respondents in my survey were exclusively osteopaths and since this term cannot be eliminated from the life of an osteopath, the next section will provide an explanation of the somatic dysfunction.

2.2. Somatic dysfunction

Within the osteopathic profession the traditional term *osteopathic lesion* was replaced by the term *somatic dysfunction* in 1973. The original definition of an osteopathic lesion was developed by Still. Then the thought of a possible dysfunction in the musculoskeletal system without the presence of a disease was revolutionary (Hartman, 1997). Disturbances of joints were regarded as the result of the changed position of a joint. Therefore techniques were developed to re-adjust these misalignments. With time and the increase in knowledge the

understanding of an osteopathic lesion changed. In 1959 Alan Stoddard defined this state as follows:

An osteopathic lesion of the spine is a state of restricted mobility of an intervertebral joint, which may or may not cause a change in the positions of adjacent vertebral segments. If it entails such a misalignment, this bad position always remains within the normal range of movement of the respective joint (Stoddard, quoted from Hartman 1997, page 13).

This definition is limited but it refers to the specific state which best responds to a manipulation. According to Hartman (1997) many practitioners who work osteopathically use this definition and other explanations as a basis for their way of working.

Hartman (1997) also claims that many therapists see a dysfunction as a fixed position. Some assume a restricted mobility in specific directions. Others recognize the problem that adjacent hypermobile areas compensate for less mobile segments. Usually, this hypermobile area is the most sensitive area among other symptomatic areas, which, however, is a very unreliable basis for a diagnosis.

Another, more extensive definition was provided by Rummey, quoted from Liem (2005, page 46):

A somatic dysfunction represents a reduced or changed function of parts of the body that belong together, i.e. skeletal, articular and myofascial structures and related parts of the lymphatic, vascular and nervous systems.

Visceral influences on a somatic dysfunction are mentioned but the classical definition of a somatic dysfunction in osteopathy does not include visceral dysfunctions. In Europe this is not in line with the current understanding and practice of osteopathy (Fossum, 2005a). Like all other types of tissue also visceral structures can have an altered or reduced function. Therefore they have to be included in the next, possibly more comprehensive definition (Fossum, 2005a).

The British School of Osteopathy differentiates between primary and secondary dysfunctions. The primary dysfunction can be caused by a traumatic event in a body part. The secondary dysfunction occurs in a different body part to the one affected by the primary lesion (Hartman, 1997).

The primary somatic dysfunction is the most significant and/or oldest somatic dysfunction in the body. Secondary somatic dysfunctions are a passive consequence, correction or compensation of a primary dysfunction (Fossum, 2005a).

2.3. Classification of osteopathic techniques

According to Hartman (1997) the osteopathic techniques are divided into the basic categories: soft tissue techniques, articulation techniques and impulse techniques. This categorization, however, could often not express the purpose of a technique in conversations among therapists. In the 1970s a team of teachers at the British School of Osteopathy (BSO) developed their own classification, which (with a few amendments) is still valid today. Other classification systems are also available, but I will only present that of the BSO as it is described in the book by Hartman (1997). The classification which is used today differentiates three groups of techniques, which partly overlap. The three groups are:

- Rhythmic techniques

- Impulse techniques

- Slow loading techniques

2.3.1. Rhythmic techniques

The rhythmic component is the basis of this kind of techniques and it is an adaptive and constantly modified repeated process. Every osteopathic technique has to be constantly modified and adapted to the reactions of the treated tissues. Depending on the applied technique the therapist can vary its speed, rhythm, direction, force, duration and number of repetitions (Hartman, 1997).

The aim of any manual therapy is to improve the function and thus increase the wellbeing, to reduce the pain and to release restrictions. The aim of an osteopathic treatment is to support the body's inherent homeostatic powers. Rhythmic techniques help to restore the mobility, circulation and lymphatic flow and reduce functional restrictions in the locomotor system (Hartman, 1997). Through the repetitive exertion of a force against a motoric barrier the range of motion in a hypomobile joint can be increased (Greenman, 2005). Greenman (2005) considers, in particular, the method of articulation, which is one of the rhythmic techniques, as a continuation of the examination of the process of movement.

Rhythmic techniques are often applied as preparation of impulse techniques like HVLA techniques but they are also very effective if used as individual therapy (Hartman, 1997). The method of articulation, which is also designated as mobilization without impulse, and the mobilization with impulse differ from each other in the aspect of the externally applied force. Both are techniques with direct action. Very often they are combined: the therapist starts with several repetitive movements without impulse and ends the treatment with an impulse (Greenman, 2005).

The rhythmic techniques are divided into eight categories (Hartman, 1997):

- Soft tissue massage

- Stretching

- Articulation

- Effleurage

- Inhibition

- Springing

- Traction

- Vibration

In the following I want to look at the impulse techniques in more detail since they are the focus of my paper.

2.3.2. Impulse techniques (HVLA)

Hartman (1997) describes the impulse techniques as follows: In the case of impulse techniques a force is applied with high velocity and low amplitude. The force is focused on a specific point, region or structure. If several movement components are combined, an artificial barrier can be created. According to Hartman (1997) this has the advantage that the impulse does not hit the anatomical barrier where the danger of injury would be greater. Nevertheless, too much lumbar rotation in the positioning can cause back pain. This leads to a reduced cooperation of the patient, an increased protective tension of the patient and an ineffective application of the technique (Gibbons, 2001). The inertia of the tissue provides the necessary resistance for a successful application of the technique. Hartman (1997) emphasizes that the therapist needs to have enough speed to deliver the impulse to the focused tissue without reaching the end of range position of the affected joint. A bad focus and insufficient speed cannot be compensated by using more force (Greenman, 2005). Too

much force or an excessive amplitude can be dangerous (Hartman, 1997). Greenman (2005) writes that the impulse tries to achieve a movement amplitude of 3mm in the affected joint. The impulse should be applied parallel or perpendicular to the affected joint surface or in the direction in which the blockage can be most easily released (Hartman, 1997). The thrust impulse should exactly hit the elastic barrier of the dysfunctional joint even if the anatomical barrier is altered due to a degenerative condition of the joint (Greenman, 2005).

According to Hartman (1997) the above mentioned explanation of the application of HVLA techniques best describes the difference between the osteopathic approach and an ordinary impulse technique. Ordinary manipulation techniques try to use an impulse to break through a barrier at the end of range of a movement arc (Hartman, 1997). The osteopathic approach tries to understand and control the components of the restriction which are used to help building up the necessary tension in the tissues. This is the art in applying the technique. In this approach the artificially built up tension is located just before the anatomical movement barrier (Hartman, 1997). It is also important to maintain the created barrier and relevant components while the impulse is delivered, otherwise the technique loses its effectiveness (Hartman, 1997). *The beginner often goes away from the barrier to have a longer "run up" for the manipulation* (Greenman, 2005 page113). According to Greenman (2005) the decisive factor in an impulse manipulation is the speed not the force; and the impulse should come from shifting the weight of the therapist's body and not from a mere activation of muscle force.

Impulse techniques are used both as direct techniques and exaggeration techniques. In the case of the more often applied direct technique and externally activated force is exerted on a restrictive barrier to improve the mobility of a joint. If the thrust is directed towards a normal physiologic barrier, i.e. in the free direction opposite the restriction, one talks about an exaggeration method (Greenman, 2005).

The current classification distinguishes between five impulse techniques (Hartman, 1997):

- Impulse with combined leverage
- Impulse with combined leverage and momentum
- Impulse with minimal leverage
- Impulse without leverage
- Impulse without leverage and with momentum

Impulse with combined leverage

In this variant the impulse is delivered in the vicinity or directly at the dysfunction with or without exaggeration of the leverage. According to Hartman (1997) the impulse can also be exerted via an extremity which serves as lever, even if the contact point is distant from the site of the lesion. Through pressure or fixation at the site of the lesion a static pivot point for the applied levers can be created. A combination of these two is also possible. (Hartman, 1997).

Impulse with combined leverage and momentum

Many therapists have difficulties to initiate the impulse with enough speed to facilitate a gapping of the joint surfaces from a static position (Hartman, 1997). Often the effect is a mere “shifting” instead of a “rapid thrust” (Greenman, 2005). According to Hartman (1997) the inertia of the tissues can be overcome more easily if the therapist does a rocking motion in the direction of the primary lever. The therapist has to make sure to build up the momentum only in one direction. The direction of the impulse usually is applied in a straight line even though there are no real straight lines in the body. Through the building up of momentum the impulse automatically takes on a slightly curved direction. This makes it easier to find out the best direction for the impulse. This type of technique is best suited for relatively small therapists working with bigger patients (Hartman, 1997).

Impulse with minimum leverage

For this technique a body part is positioned with the shortest possible levers and the impulse is delivered with high velocity. Other tissues are hardly affected by the exerted pressure. The application of this kind of technique is very difficult (Hartman, 1997).

A more common method of the impulse with minimum leverage is to use several components to reduce the amplitude of the individual movements as much as possible. The positioning of a lever can also follow the third law of Frayett, which stipulates that the movement of one vertebra in one direction reduces its movement in all other directions (Greenman, 2005). This kind of technique is clearly more comfortable for the patient because the barrier is built up closely to the middle position of the joint. Actually the technique is not a technique with only one minimum lever but it applies many levers that are combined and

thus can be used in a minimum quantity. Under certain indicated circumstances this technique can even be used to treat patients with disc problems because the vertebral disc is not exposed to too much torsion (Hartman, 1997). A study by Lisi (2005) also supports the use of HVLA techniques for patients with lumbar disc problems. Hartman (1997) uses the minimum leverage method to unload the facets and to facilitate a faster healing. However, impulse techniques which use only one general lever can even make the problem area worse, while minimum leverage techniques cause less strain for the surrounding tissues and are thus more comfortable for the patients. In addition, the danger of injuries or excessive tissue reactions is considerably reduced (Hartman, 1997).

Impulse without leverage

According to Hartman (1997) this technique is usually more often used by chiropractors but also some osteopaths find it useful in certain circumstances. In this case the force is applied directly to the bone to release a blocked facet or articular suture. Preparing pressure can replace a lever in this case. Greenman (2005) emphasizes that the building up of tension is the precondition for applying an impulse. Usually a very fast impulse is necessary so that the applied force is not dispersed in other tissues and loses its intensity (Hartman, 1997).

Impulse without lever and with momentum

This technique is similar to the aforementioned with the difference that the therapist gathers momentum by rocking in the direction of the final impulse. The impulse itself is applied at a convenient moment as a sudden exaggeration of the rocking in one direction (Hartman, 1997).

A special kind of HVLA technique is the **recoil**. An online literature research of Medline, Osteopathic Research Web etc. could not provide an explanation of the recoil technique thus I will mention a brief description and practical instruction that I found. It is a technique where the recoil of the tissues is used to correct a dysfunction (Liem, 2005). Similarly to all other HVLA techniques it is important to create a tissue tension before delivering the technique. The therapist exerts pressure on the relevant joint component in the direction that has to be mobilized (Greenman, 2005). An instruction for the practical application of this technique says: *to give a short impulse and to emphasize the pulling away of the hands* (Liem, 2005).

According to Ligner (1997) the recoil is a more gentle adjustment technique in comparison with the thrust.

The recoil is more dynamic, faster and more superficial than the thrust. Just like touching a hot stovetop. (Ligner, 1997).

Below several explanations of the HVLA technique by various authors will be presented:

A manipulation is a short and fast impulse delivered to a blocked joint with only little force. The precondition for a manipulation is an adequate positioning of the joint. Usually the locking of the adjacent joints is utilized to isolate the problematic joint. The result is that the joint is positioned in a way that the only possible movements are those into the blocked direction. The impulse is delivered against this restriction or perpendicular to it. A manipulation wants to provoke a translatory shift of the joint surfaces or a separation through traction. Before the manipulation enough tension has to be built up in the tissues. (Bayer, 2005, page 7).

Bayer (2005) describes that the HVLA techniques are applied with high velocity which the name implies and which often provokes negative headlines (cf. Chapter 2.8.). In addition, he clearly points out the low amplitude to avoid excessive straining of the tissues. The success of the technique resides in a good focus on the blocked joint. Also Hartman (1997) emphasizes the low amplitude and good focus as most important elements of HVLA techniques. Legitimately this definition attributes much importance to the right positioning of the joint before the manipulation. A wrong localization or positioning of the joint can entail damage of tissues as a consequence of the manipulation (Greenman, 2005). If the positioning of the targeted joint is correct, only little force is necessary to deliver the thrust (as described in the text). The use of more force cannot compensate for a bad localization (Greenman, 2005). An important factor is the build-up of tension before the impulse is delivered in the only direction of movement that is left. The therapeutic thrust can only be delivered once the tension in the joint has been built up (Greenman, 2005). In addition, it is pointed out that the manipulation acts upon the joint surfaces in a translatory direction or as traction.

The next definition is short and concise but comprises all essential aspects, which were already quoted from Bayer (2005), of what an HVLA technique has to be like.

However, some experience with HVLA techniques is necessary to understand what is hidden behind the individual terms.

Herzog defines the manipulative treatment of the spine as the force of an impact applied to a defined section of the vertebral column in a previously determined direction.

Decisive is the amount of loading before the impact, the maximum impact, the duration of the impact (less than 200 msec.) and a fast acceleration coupled with a low amplitude (due to initial high level of loading) (Herzog, 1993 quoted by Matthijs, 2003, page 60).

In his definition of a manipulation Herzog (1993) refers only to the spine but it is applicable also to other joints. The text does not explicitly mention an adequate positioning of the joint, but when reading the wording *previously determined direction* an experienced therapist realizes that the direction can only be determined previously if the joint is positioned in a certain way. This usually means that the adjacent joints are locked and that in the affected joint only the movement into the blocked direction is possible (Gibbons, 2001). Similarly the wording *defined section* means that the manipulation must only be delivered at an exactly localized (Greenman, 2005) site. Bayer (2005) talks about a joint, while Herzog (1993) does not limit the definition. He leaves it to the therapist whether he interprets the *defined section* as being one joint or several as it is often the case in manipulations involving traction. The advantage of the term *defined section* is that it leaves room for interpretation. One could understand it also as tissues instead of joint structures. It would be possible, for instance, to mobilize a tight scar with the aid of an HVLA technique as successfully demonstrated in a study (Lewit, 2004). Lewit (2004) deliberately talks about extending the application of manipulations. In general, it is considered that the impulse of the manipulation has to act on a joint. Herzog (1993) uses a neutral definition because a manipulation can have a reorganizing effect also on seemingly healthy or actually healthy joints. The main effect of a thrust is not only the mechanical release of a joint blockage to improve the mobility but also a resetting of a faulty reflex response (DGCO, 2007, cf. Chapter 2.5.). Herzog also refers to the build-up of tension calling it the *loading before the impact* and considering it to play a decisive role with regard to the success of the manipulation. The impulse should be delivered only after the building up of tension in the joint (Greenman, 2005). Due to the high tension only very little movement in the manipulation direction is present. Thus the amplitude of the manipulation

needs to be small to avoid irritations of the tissues (Hartman, 1997). In addition, the maximum force of the impulse is decisive for the success of a manipulation. In this case the term ‘maximum’ means the maximum force necessary to move the joint because if a therapist would use his actual maximum force he probably would provoke injuries. A better wording would probably be ‘maximum necessary impact’. In any case, it is preferable to use a minimum of force to avoid irritations of the tissue. An excessive force is potentially dangerous (Hartman, 1997). For all HVLA techniques a high acceleration of the impulse is an important factor for a successful application (Greenman, 2005). Herzog (1993) also thinks it is decisive to keep the duration of the impulse at less than 200msec.

Since the definition by Herzog (1993) is short and concise and comprises the most important aspects, I have integrated it in the questionnaire. This makes it clear that my paper is concerned with the “dangerous” impulse techniques. Thrust or impulse techniques are considered to be potentially more dangerous than non-impulse mobilization (Gibbons, 2001). Herzog’s (1993) definition makes it undoubtedly clear that the questions in my questionnaire refer to thrusts and not to recoil techniques. Nevertheless, I also chose to point out explicitly in the questionnaire that I mean thrusts and not recoil techniques.

2.3.3. Slow loading techniques

The BSO summarized various techniques in this group like muscle energy techniques, myofascial techniques, cranio-sacral techniques and many more.

The following four sub-groups were formed:

- With persisting leverage
- With persisting traction
- With persisting pressure
- With persisting articulation

The common denominator of these techniques is that a certain position, pressure or movement is maintained while waiting for a tissue response (Hartman, 1997). The aim is to improve the function and to achieve the best possible relaxation of the tissues through a slow reactive treatment.

In the case of all the techniques specific factors have to be adapted to the circumstances at hand. Things like how the treatment is carried out and the initial position are very important aspects but also the factors which are surely incompletely listed below may play a role (Hartman, 1997):

- Speed of the application
- Duration of the applied force
- Movement amplitude
- Direction of force
- Amount of applied force
- Starting point of the technique
- End point of the technique
- Compression
- Primary and secondary levers
- Respiration
- Tissue resistance
- Pressure at the point of contact
- Intuition

Chapter 2.3. presented the individual techniques and the working definition by Herzog (1993) on which the questionnaire is based. Many authors (Gibbons, 2001; Hartman, 1997) attribute lots of writing space to emphasize how important the localization and the building-up of the barrier are for the successful delivery of a thrust. I am also aware how important the building-up of the barrier is, thus the next chapter will look at this aspect in more detail.

2.4. The principles of building-up the barrier

In techniques where a force acts on a specific joint the therapist tries to combine various levers in a way that the force is focused and a barrier is built up. This helps to avoid that adjacent structures are affected by the applied force, i.e. they are protected in a way (Gibbons, 2001).

Such methods involving the focusing of forces have in the past been taught under the catch phrases “physiological lock” and “ligamentous lock” (Hartman, 1997). In practice both locking methods are used. The “physiological lock” aims for a build up of tension in the joint

structure. The “ligamentous lock” wants to achieve a tissue tension in the soft tissue structures. A cautious therapist will position the affected body part with a combination of several levers so that the only thing left to do is to slightly exaggerate one of the levers to have a specific effect at the targeted site (Hartman, 1997). The vertebral segment at which the therapist wishes to produce cavitation should never be locked (Gibbons, 2001).

This does not necessarily mean that a continuous increase of tension is necessary for building up the barrier to a point at which the thrust impulse is delivered. Actually, this can even be so uncomfortable for the patient that he increases his resistance so much that the joint is overlocked. If too much rotation is put into the lumbar spine during the positioning the patients may get back pain (Gibbons, 2001). Instead, the therapist should look for the appropriate point where the applied forces complement one another (Hartman, 1997). If the therapist can achieve this without going to the end of range of the movement the patients are more compliant according to Hartman (1997) because they feel more relaxed. For the positioning the therapist needs a good perception of the tension that builds up in the tissues. He approaches the point of maximum tension from slightly differing directions and can thus deliver the technique before the end of the movement amplitude without too much tension. This is much more uncomfortable for the patient. The art of the technique relies in perceiving the way of resistance and adding the final components to build up the tension for a successful application of the impulse only for a brief moment (Hartman, 1997).

In most of the manipulation techniques for the spine more than one lever have to be added (due to its movement physiology) to achieve the necessary stability for directing the input of force. How much of one or the other lever is put in can vary (Hartman, 1997).

Concentrating or focusing the forces to one point is a better expression to describe the build up of tension than the frequently used term “locking” (Hartman, 1997). In his book Greenman (2005) talks about localization. Through an exact localization the mobilization with an impulse is confined to act on the affected joint without involving the adjacent joints. A technique with impulse must only be used after sufficient localization otherwise it can entail tissue damage, fractures or discopathias (Greenman, 2005).

When focusing the forces with combined leverages only the primary lever (which is also used for the impulse) is applied more than the other levers in the positioning but none of them reaches the end of range position. A guideline could be that the most effective barrier is achieved if those vectors of movement are put in the positioning, that are most restricted in the affected segment. The bigger the available range of movement the more additional levers have to be used (Hartman, 1997).

The technique involves a continuous searching for the position which causes the least strain on the tissues. The essential aspect of an impulse technique is to focus all forces to one point in a way that is comfortable for the patient and also for the practitioner. If the position is not comfortable for the patient he will not comply and resist the technique which causes the technique to fail (Gibbons, 2001). In osteopathy there are no absolute rules. The individual treatment of the patient in osteopathy is possible through the endless variety of combining the different levers. In osteopathy the trying is desirable and it is also facilitated by the fact that absolute rules do not exist in osteopathic approaches (Hartman, 1997).

2.5. Effect of thrust techniques

Originally it was thought that a blockage in the skeleton of the trunc and the extremities represents a subluxation or even a luxation. In any case, the blocked segment was very much restricted in its mobility and usually caused quite strong pain directly at the site of the blockage or radiating into the periphery (DGCO, 2007).

New evidence obtained through radiomorphological and neuromorphological examinations shows that a blocked joint is not a subluxation or luxation.

Rather it is a disturbance in the control of the joint play due to a faulty reflex arch on the level of the spinal cord influenced by endogenous central nervous and exogenous traumatic influences (DGCO, 2007).

In the case of the subluxation one has to differentiate between dogma and clinical research to keep one's credibility (Keating, 2005). Other theories mention a change in the thixotropic properties of the synovial fluid, a pinching of the synovial villi in the joint or strain on the capsule, which can alter the mechanoreceptors. Each of the listed causes can result in a restriction of the normal mobility of a joint (Greenman, 2005).

If such a restriction occurs as a symptom one can talk about a decoding error. A blockage is a painful restriction of movement with pseudoradicular pain radiation. The decoding error concerns the sensitive afferences on the level of the nociceptors. Triggers can be external mechanical malfunctions in the locomotor system or negative stress. The ensuing symptoms are caused by this faulty reflex. The result is a change in the tone of the muscular, ligamentous and connective tissue structures. Often this can be palpated or recognized as segmental irritation points or trigger points (DGCO, 2007).

The analysis of the effects of an HVLA technique applied to the spine on the paraspinal muscle spindles showed an increased sensitivity of the perception of speed in comparison with the perception of length (Pickar, 2006). Many therapists think it is necessary to produce a noise (pop, clunk) to know that the technique was successful (Lewit, 1978; Beffa, 2004). Greenman (2005) mentions that the production of such a noise is must not be the aim of the therapy. Some funny anecdotes even report of cases where there were discussions of whether the sound of the manipulation of a sacroiliac joint was a “clunk” rather than a “pop” (Flynn, 2006). However, the noise is not required and does not give any indication about the effectiveness of the manipulation. According to Flynn (2003) both practitioner and patient are wrong to believe that nothing has happened if there is no noise (Flynn, 2003; 2006). No clear picture can be gained from various studies whether a manipulation is more successful with a pop or not (Flynn, 2003; 2006). Due to this noise, the well-known “pop” the thrust is often seen as a “forceful” technique. In contrast, the muscle energy techniques are generally regarded as softer treatment option (Ärzte Woche, 2005). In general, gentler and slower techniques are used for mobilization (Ocenasek, 2007) than for manipulation. The aim of a successful manipulation should be a *painfree and noiseless restoration of the maximum joint function* (Kimberly, quoted from Greenman, 2005, page 111). The joint surfaces are re-aligned in their anatomical correct position and the physiological activity of the receptors in the joint is restored. The shortened peri-articular tissues are stretched and the intra- and extravascular exchange of fluids is improved (Greenman, 2005). According to the DGCO (2007) manual therapy wants to influence the proprioceptors and the nociceptors in a way that the reflex activity of the nociceptors is altered and the decoding error is eliminated.

2.6. Manipulation noise

One theory talks about the formation of a cavity between the joint surfaces when the technique is applied (“cavitation phenomenon”), where carbon dioxide is formed and explodes. This gas mixes quite well with the synovial fluid, which entails an improvement in the joint mobility (Brodeur, 1995).

If a pop occurs also the cavitation phenomenon happens. It is a change in the joint which produces a density within the joint which corresponds to nitrogen (Greenman, 2005).

Another theory assumes that the stretched ligaments of the capsule snap back, which produces the sound (“snapping back”) (Brodeur, 1995).

Since there is hardly any gapping of the facet joints in the spine and thus no gas can be formed that would produce the “cavitation phenomenon“, it is discussed whether the movement of a fat body into and out of the joint could cause the pop (McFadden, 1990). However, there is no indication that the sound in a manipulated joint depends on the application of a specific technique (Beffa, 2004).

2.7. Effectiveness of thrust techniques

The success of HVLA techniques is often rated quite subjectively by the patient and by the therapist. Often the pop produced by the manipulation is enough to make all the people involved happy (Lewit, 1978; Beffa, 2004). The secret of success is to choose the right manipulation technique for the specific case. However, the practitioners need to have more evidence to be able to find the right technique for a specific pathology (Gatterman, 2001). Some available studies attribute a higher success rate to the HVLA techniques than to so-called placebo treatments (Rasmussen, 1979). Pikula (1999) proved that a manipulation of the cervical spine plus a placebo in the form of an ultrasound treatment improves the mobility of the cervical spine and reduces the pain. Other studies demonstrate that manipulation is more effective in comparison with other techniques (Erhard, 1994). A comparison of two groups of patients who were all manipulated in the region of the cervical spine showed very positive results. One group was treated with traditional HVLA techniques, the other with a special device (Activator II). In both groups a reduction of the pain, an improvement of the wellbeing and an increase of mobility could be observed (Wood, 2001). Regarding cervical problems the manipulation is one of the most frequently applied treatment methods (Gross, 2002). In his study Martinez-Segura (2006) describes that a single HVLA technique applied to the cervical spine was more successful to reduce pain and increase mobility than a more gentle treatment approach. The improved mobility following a cervical thrust is also confirmed by other studies (Nansel, 1990; Schalkwyk, 2000). Also Cassidy (1992) attests that in comparison with muscle energy techniques manipulations achieved a better result in the treatment of cervical spine problems. In any case, the pain was more effectively reduced by the HVLA techniques and the effect on the mobility was at least equal to that of the muscle energy techniques. Nilsson (1996), however, cannot recognize a passive improvement of the mobility in the cervical spine after a manipulation.

The most effective technique to treat lumbar spine pain is the manipulation (HVLA) with the patient in a side-lying position (Cooperstein, 2001). A comparison of physical therapy with

chiropractic treatments of patients with lumbar spine problems provided study results in favor of chiropractic treatment (Cambron, 2006). Regarding acute or chronic lumbar spine pain no indications are available that only speak in favor of HVLA techniques (Assendelft, 2003).

This conflicting evidence indicates that definitely more research is necessary in this field. One must not make the mistake to simply adopt the results concerning the application of certain techniques in individual sections of the spine or body one-to-one without evaluating the effectiveness in these regions in a separate study.

2.8. Pro and contra statements concerning HVLA

According to the website focus.de (2007) one hears about serious traumatic consequences after manipulations again and again - in particular of the cervical spine. Also painful side-effects of lumbar spine manipulations are described, which, however, are regarded as small risk in the treatment (Gibbons, 2001). A study evaluating the general side-effects of manipulations showed that 55 % of the patients reported side-effects (Senstad, 1997). In general these complaints disappear within 24 hours (Gibbons, 2001).

With the so-called “jerk” the wall of the vertebral artery may be injured (vertebral artery dissection). In his work Rubinstein (2006) tried to find out more about the background of injuries of the vessels in the region of the cervical spine. In any case, several factors have to act together to provoke a dissection. An inherited underlying disease like a pathology of the blood vessel is discussed to be the main factor. In particular in young persons a spontaneous dissection can happen. Older persons seem to even have a certain protection from a dissection, even though they have collected more negative influencing factors like arthrosclerosis in the course of their lives. Often the manipulation is just the trigger. Nevertheless, further studies will have to be carried out to evaluate the problem (Rubinstein, 2006). On the internet almost every website that is concerned with health-matters contains a negative presentation of manipulations. *Der riskante Ruck – Schlaganfall durch Chirotherapie? [The risky jerk– stroke through chirotherapy?]* (Rundfunk Berlin Brandenburg, 2002). In this context several examples are mentioned where patients suffered from serious complaints and diseases after the adjustment of the cervical spine. General tenor: Chirotherapy: Beware of adjustments!

Be advised to be cautious when it comes to chirotherapy: the adjustments may cause a partial rupture of the artery that supplies the head. An obliteration of an artery or the formation of a blood clot after

chirotherapeutic treatment might even cause a stroke. The German Society of Neurology counts chiropractice among the most ineffective therapies against migraine. (focus.de, 2007)

Oexle's Gesundheitsfachschule (2007) (Oexle's specialized health care school) uses the following PR slogan: *Einlenken statt einrenken (soft guiding instead of manipulative adjustment)* because they want to distance themselves from the use of manipulations. In addition, they point out that their new method *in no case causes a forced over-stretching of the ligaments or joints or produces negative pathological irritations*. They paint a very negative picture of manipulations even though to date there are no studies to back up this negative attitude (Rubinstein, 2006). *You always work with the body and never against it* (Oexle's Gesundheitsfachschule, 2007). Also this statement illustrates the lack of trust in the manipulation techniques.

In the case of lumbar spine manipulations the pressure on the intervertebral disc is increased (Lisi, 2006). So far no conclusions can be drawn from this knowledge as to in how far this increase of pressure has a beneficial or negative effect. A different study supports the view that an HVLA technique is quite beneficial for a patient with lumbar disc problems. The idea that HVLA techniques have to be regarded as unsafe techniques in the case of intervertebral disc problems cannot be confirmed by this study (Lisi, 2005).

Some users of online forums do not hide that they reject manipulations. Regarding the following question of an internet user: "Can I adjust lumbar segments myself? And how?" his final conclusion is: *I hope that I will get a prescription of something before someone wrenches at my spine!* (Beepworld.de, 2005). Someone else who had a bad experience with adjustment points out the following: *an orthopaedist should not do the following two things: 1. adjustments – whatever that may be????? [...]* (Wer – weiss – was, 2004). The word adjustment has such a negative connotation in this case that the *modern Chiropractic* writes about *aligning* and the application of a *gentle and generally pain free correction of joint blockages. A gentle and specific impulse is used to restore the mobility of a joint* (Chiropractic Zentrum Braunschweig, 2008). In this case the word chiropractor is still used to designate the profession (probably because it is generally well known), however, terms like "aligning" and "gentle" are used in the description of the technique in order to distance oneself from the traditional terms. The effect and the necessary impulse to achieve the effect (in this case "gentle impulse") are put on a par with those of traditional chiropractic. Since complications occurred again and again in the context of manipulations – the first one was documented and published in 1907 (Fossum, 2005b) – the European School of Osteopathy

(ESO) has implemented a large scale study in 2005 which is currently still underway. One aim of this study is to collect data to make life easier for the therapists because laws like the “Code of Practice” of the U.K. General Osteopathic Council (May 2005) put more and more responsibility on the shoulders of the therapists (Fossum, 2005b).

2.9. Fields of application of HVLA techniques

The use of HVLA techniques can only be considered within the framework of a comprehensive treatment plan, where also other techniques are applied. The precondition for the application is a thorough case history, the exclusion of contraindications and the informed consent of the patient. The list below, which was published by Gibbons und Tehan (2001), provides some specific indications for HVLA techniques:

Indication

- Hypomobility
- Motion restriction
- Joint fixation
- Acute joint locking
- Motion loss with somatic Dysfunction
- Somatic dysfunction
- Restore bony alignment
- Meniscoid entrapment
- Adhesions
- Displaced disc fragment
- Pain modulation
- Reflex relaxation of muscles
- Reprogramming of the central nervous system
- Release of endorphins

I would like to look at the contraindications in more detail since the impulse techniques have a higher risk potential (Gibbons, 2001) and my paper focuses on the HVLA techniques.

2.10. Contraindications and safety measures

According to Mayer-Fally (2008) osteopathy has to adopt a general approach regarding the definition of contraindications like it is practiced in conventional medicine and in the health care system; e.g. concerning vital threats and supposedly damaging techniques in the case of certain diseases. A practitioner should know about indications and contraindications to be able to work in a responsible way. The Latin term *indicare* literally means to signal. Under certain circumstances a compulsory reason for the application of a specific technique in the

case of a certain disease is indicated or signaled. A reason not to use a specific method represents a contraindication because otherwise harm might be caused to the patient or the practitioner or other useful procedures might be used with delay. It is up to the individual practitioner to observe the recommendations regarding contraindications (Mayer-Fally, 2008). *It is better to be wrongly overcautious than to have wrongly not been cautious enough* (Hartman, 1997, page 37)!

Every therapeutic procedure involves a possible improvement of the complaint but also the risk to make the problem worse. HVLA techniques differ from other manual therapeutic techniques because the practitioner delivers a rapid impulse. The therapist should be aware that such impulse techniques bear a greater potential to be dangerous than techniques without such an impulse (Gibbons, 2001). The patient does not have any control over the impulse techniques thus the protective reflexes do not work. In some HVLA techniques the joints are lined up at their anatomical movement barrier, where the ligaments and the joint capsule could be injured. Thus the contraindications for impulse techniques are more specific than for other techniques (Hartman, 1997). Manipulation techniques have more absolute and relative contraindications than other manual therapeutic procedures (Greenman, 2005). According to Hartman (1997) there are practitioners who believe that all manipulations can be safely delivered if the impulse technique is combined with a strong traction. In principle Hartman (1997) acknowledges the useful effect of various traction methods but he thinks it is not recommendable to regard them as a method to reduce the risk of a dangerous approach.

I will adopt the differentiation into absolute and relative contraindications because according to Hartman (1997) it provides useful guidelines and is not too complicated.

2.10.1. Absolute contraindications

According to Mayer-Fally (2008) an absolute contraindication for all osteopathic treatments is given in the case of unclear circumstances or vital threats. In his definition of the absolute contraindications Hartman (1997) refers to the tissue that potentially could be damaged and not to the pathological condition, which can easily be overlooked in the diagnosis. The most difficult area is the cervical spine. If the handholds are badly applied the nerves or vessels can be damaged. In particular if too much torsion is used the vertebrobasilar system of vessels is prone to injuries, which can entail serious damage (Hartman, 1997). Also Gibbons (2001) mentions that most of the published injuries after a manipulation concerned the cervical

spine. Rubinstein (2006) sees the reasons for a so-called dissection of the vertebral artery in a more differentiated way (cf. Chapter 2.8.). Gibbons (2001) warns of using too much rotation when positioning the lumbar spine, which can cause pain for the patient. In this context he rather points out the protective muscle tension and lacking compliance of the patient than a possible tissue damage. Greenman (2005) mentions that practitioners are divided in two camps regarding the manipulation of a joint when the patient has a disc problem. The proponents of a manipulation think the thrust is the technique of choice, while other practitioners see a contraindication for a thrust in such a case. Greenman (2005) himself explains that he has achieved good results with thrusts in cases of disc prolapses. A possible damage of the disc could not be confirmed by Lisi (2006) even though the pressure on the disc was measured in different starting positions of the lumbar spine and during lumbar spine manipulation. In this context it is important to mention that the patient who was treated was a volunteer without any symptoms. Thus further studies will have to be implemented to better understand manipulations in the lumbar spine region (Lisi, 2006).

Gibbons and Tehan (2000) list the following absolute contraindications for manipulations (cf. below). Manipulations that are not indicated can provoke a number of side-effects and complications (Liem, 2005):

- Every disease or condition that affects the structure of the bones:
 - tumors (e.g. metastases)
 - infections (e.g. tuberculosis)
 - metabolic conditions (e.g. osteomalacia)
 - congenital conditions (e.g. dysplasia)
 - iatrogenic conditions (e.g. after long cortisone therapy)
 - inflammatory conditions (e.g. advanced rheumatoid arthritis)
 - injuries (e.g. fractures)
- Neurological diseases or conditions:
 - spinal cord compression
 - Cauda equina syndrome
 - nerve root compression with progressive neurological deficit
- Vascular diseases or conditions:
 - aortic aneurism
 - bleeding into the joints (e.g. pronounced hemophilia)

Further, a manipulation should never be applied in cases of a lacking diagnosis, lacking consent by the patient, pain and resistance of the patient against the positioning for the manipulation (Gibbons und Tehan, 2000).

Most of the times it works out if a therapist follows the motto *first treatment, then diagnosis* but in the end an undiagnosed pathology or anatomical anomaly will prevail (Hartman, 1997). Hartman (1997) also mentions the lack of a reasonable working hypothesis as an absolute contraindication.

Mayer-Fally (2008) mentions the following absolute contraindications for manipulations in addition to the above mentioned:

- Vascular diseases or conditions
 - stenoses of the carotid or vertebral artery
- Osteosynthetically stabilized segments

Mayer-Fally (2008) also sees an absolute contraindication for an osteopathic treatment in the following cases:

- Internal medicine
 - hypertonic crisis,
 - untreated cardiac insufficiency 2-4
 - acute abdomen
 - untreated tachycard-bradycard disturbances of the heart rate
 - unclear acute dyspnoea
 - thoracic pain with vegetative symptoms
 - collapse tendency
 - sudden, unclear vomiting and/or diarrhea
- Vascular problems
 - Suspected acute venous or arterial vascular obliteration
- Neurological problems
 - acute, pronounced cephalgia (headaches)
 - acute stiffness in the neck with fever and possibly signs of meningism
 - new dizziness/vertigo of unclear origin
 - acute unclear pareses
 - conus-cauda-syndrom
 - sudden unclear visual disturbances
- Gynecological problems
 - threatened miscarriage
 - strong, unclear vaginal bleeding
- Psychiatric problems
 - untreated acute psychotic crises
 - incapacitated patients
 - acute risk of suicide

Under the above mentioned circumstances the medical care of the patient has to be guaranteed (Mayer-Fally, 2008).

Greenman (2005) points out hypermobility and instability of the joint as well as inflammatory diseases of the joints as absolute contraindications. The various contraindications are judged quite differently in the literature, therefore Greenman (2005) gives the advice to establish a thorough diagnosis and to act in a cautious and responsible way.

2.10.2. Relative contraindications

As long as the technique has the aim to restore mechanical dysfunctions and the work is carried out with the appropriate caution, contraindications may be regarded as relative (Hartman, 1997 page 41).

Some conditions listed under the relative contraindications may become absolute contraindications. This depends on the skills and experience of the practitioner who chooses the technique and decides how much force to use. In addition, the age, morphology and general condition of the patient have to be considered (Gibbons, 2000) and the treatment should be tailored to the current state of the patient's tissues. It is important to establish an individual treatment plan for each patient (Hartman, 1997).

The following list of relative contraindications for manipulations was established by Gibbons and Tehan (2000):

- side-effects and complications in previous treatments
- disc prolapse, disc protrusion
- arthritides
- pregnancy
- spondylosis, spondylolisthesis
- osteoporosis
- anti-coagulation
- advanced degenerative changes in the joints
- addiction to manipulation
- hypermobility or lax ligaments
- arthrosclerosis

Hartman (1997) also lists the following relative contraindications in addition to the above mentioned:

- medication
- dizziness
- mental problems
- intuition:

Intuition is composed of things that one has learned and experienced as well as unconscious aspects and it often is very reliable. In any case, it is absolutely indispensable to obtain a comprehensive knowledge about the pathology (Hartman, 1997).

None of the lists presented here is exhaustive.

A clear assessment of the cause and kind of the clinical picture is the precondition to formulate contraindications. A thorough diagnosis should provide the basis for a clear identification of the contraindications. The feedback from the tissues gives the attentive practitioner an even better guideline for the work. The osteopathic approach follows the principle that during the course of a treatment the therapist needs to constantly adapt the work to the requirements of the tissues. Science, skill of healing and ability to differentiate are applied in a dynamic way (Hartman, 1997).

However, the work of a therapist should not blindly rely on the absolute and relative contraindications. It has already been mentioned that the condition of the practitioner and the patient at the specific moment of treatment plays an important role in differentiating whether a contraindication is absolute or relative (Gibbons, 2001). There are also tendencies to forget the contraindications at all. According to Hartman (1997) there are specialists who are convinced that there is no case in which osteopathic therapy cannot have at least some benefit. They choose the appropriate and applicable technique for the case in question. In order to be able to decide which technique to apply all relevant factors have to be considered. The therapist has to choose the methods, which he is sure of not to be able to cause any harm. Even a tiny short-term improvement justifies the therapeutic efforts (Hartman, 1997).

3. Methodology

The design I have chosen for my master thesis is a quantitative analysis based on a questionnaire because I wanted to evaluate the question: “Are thrust techniques less often used the longer an osteopath is in practice?” The following chapters will present the structure of the questionnaire and the intention of the individual questions. The development of the questionnaire was based on Porst (1998).

Cover sheet

The cover sheet explains to the addressees why they have received the questionnaire, that their anonymity will be respected, that they do not have to spend any money only a little time and until when they are supposed to return the questionnaire. In addition, it contains the address and phone number of the author of the questionnaire and information about when the questionnaire was developed. The author’s gratitude is expressed at the end of the questionnaire. All these items are considered as important by Porst (2001) to increase the return rate of a survey by mail. In comparison with surveys by telephone or personal interviews surveys by mail in general have a rather low return rate, which can even be regarded as typical characteristic of such a survey (Porst, 2001).

Structure of the questionnaire

The questionnaire comprises five pages, including half a page of guidelines to help the participants to complete the questionnaire.

The question section starts with general questions concerning the personal data. It includes questions about the gender, age and original profession as well as the average time of a treatment session and since when the therapist has been working as an osteopath.

The following nine questions are structured in a way that the respondent always has to choose one answer. The questions were formulated on the basis of Porst’s (2000) recommendations. According to him a question has to be methodically and technically flawless because: *Bad questions collect bad data and no quantifying or analyzing method of the world can produce good results from bad data* (Porst, 2000, page 2).

Questions 1 and 2 are simple Yes / No questions.

Questions 3 to 6 are divided into four sub-questions, which are the same for all four questions but concern different body regions (cf. Chapter 4.). I have deliberately avoided the choice among an uneven number of answers with a middle category. The respondents were offered four possible answers thus everybody had to rate himself in at least one direction of the scale. If an uneven number of answers are offered there is the risk that the respondents choose the middle to avoid ‘outing’ themselves. (Porst, 1998).

Questions 7 to 9 offer the possibility to tick several possible answers. I did not consider any contraindications (cf. Chapter 2.10.) but left it to the respondents to choose the answers in their own discretion. The aim of the questionnaire is not to find out about the respondents’ knowledge of directives or rules but to establish whether a respondent avoids thrusts only for a certain group of persons. The groups of persons represent an arbitrary classification following my experience in practice. In the test run of the questionnaire almost every test respondent recommended little alterations of question 9. The question could be optimized with comments in brackets (cf. section Test of the questionnaire in this Chapter).

Question 10 is an open question and gives the respondents the possibility to add an explication or comment. Open questions offer the respondents the possibility to express themselves in their own words (Porst, 1998).

Guidelines to help with the completion of the questionnaire

Half a page is used to specifically point out that all questions in the questionnaire refer to the thrust technique and not the recoil. I have quoted the description of the technique by Herzog (1993), which is the clearest description of the thrust (cf. Chapter 2.3.2.).

Selection of target group

The questionnaire was sent to all graduates of the WSO who live in Austria. The list of addresses was made available by the WSO.

Graduates of the WSO who live abroad were excluded due to the complicated postal system. Under the legal provisions of data protection the WSO has the right to pass on addresses of their graduates to patients who are looking for a therapist or for internal surveys or communications. This does not hold for students who have not graduated yet. Therefore I automatically contacted only graduates with at least the status of ‘osteopath’ because I did not receive any other addresses. Other, higher graduation statuses are: Diplomierter

Osteopath (certified osteopath, D.O.) = those who have written a diploma thesis; or Master of Science in Osteopathy (MSc.) = those who have written a master thesis.

Thus all addressees have had at least a six-year training and experience in osteopathy, which is necessary to have at least some experience regarding the application of thrust techniques.

Test run of the questionnaire

The first draft of the questionnaire was tested with three osteopaths. To answer and analyze possible questions right away I was present in the room.

Since I adopted the clear structure of the questionnaire by Holzheu (2007), which is a proved and tested instrument, the structure of my questionnaire was not criticized. Most of the questions were formulated in a clear and simple way and it was possible to complete the questionnaire in the indicated time of 10 minutes.

What was criticized was the formulation of the general question: Since when have you been working as an osteopath?

Since the WSO has offered different degrees of osteopathic training in the last few years a comprehensive list of all the varying degrees would be too confusing. As it is irrelevant for my survey which degree the respondents obtained at the WSO, I have deliberately chosen an open formulation. For me it was important to find out from what moment onwards a practitioner felt as an osteopathic practitioner and has started to gain experience in particular with HVLA (further details cf. Selection of target group).

Sub-question c in every question set was slightly altered. The original question was e.g. 3c: “If you use a thrust in the cervical spine please mark your average rate of success.” In this case it was important to emphasize that the question concerns the execution of the technique and not whether the patients feel better afterwards. Thus it was necessary to add: ...rate of success **in the execution of the technique**.

In the case of question 9 the test respondents wanted a more extensive list of possible answers. The question was: “Which group of patients with the following underlying pathologies do you thrust?” It would go beyond the scope of the questionnaire to list every possible answer. I was particularly interested in 6 groups of patients because I am regularly confronted with them in my practice. When I asked the test persons they conceded that those are also the underlying pathologies that they encounter in their practice most often. Thus I did not have to change the wording of the question but only added some comments in brackets.

4. Content of the questionnaire

Questions to collect general personal data

Question about gender.

Since most of the persons who reject the HVLA techniques seemed to belong to the female camp of therapists, I think it is important to analyze whether gender-specific differences can be observed in the use of the thrusts.

Question about the age.

For completeness sake the practitioners were asked about their age. The data could be used for an age-specific analysis.

Since when have you been working as an osteopath? (cf. also Chapter 3.)

Due to the different degrees offered at the WSO in recent years I have formulated this question as an open question. Every practitioner could evaluate himself from which moment onwards he had the feeling to really work osteopathically. For me it was important that all my respondents were graduates.

The respondents had to indicate a year. Based on the indicated year and the year in which the questionnaire was distributed (2007) it can be easily calculated how long the individual therapists have been in osteopathic practice.

This is one of the most important aspects in my survey because I wanted to find out whether the frequency of the use of thrusts changes in the course of a therapist's career.

Question about the original profession

Three possible answers to this question are offered: doctor, physical therapist or other original profession, which the respondents were asked to indicate.

With these data it would be possible to analyze even more specifically whether there are differences in the thrust frequency. The data was collected for completeness sake but they were not used in the final analysis of this paper.

Question about the average duration of an osteopathic treatment (not first treatment).

Four possible answers are offered: less than 15 minutes, less than 30 minutes, less than 45 minutes, more than 45 minutes. It could be possible that some therapists tend to prefer certain techniques because of the limited treatment time. It could be assumed that the shorter the treatment time the more often HVLA's are used. Also these data were not used in the analysis for this master thesis.

Question 1: Would you let yourself be treated with a thrust?

This question wants to find out what is the therapists' general attitude towards the thrust techniques.

The two possible answers were either "Yes" or "No".

Question 2: In cases where a thrust would be appropriate, would you still try another technique first?

With this question I tried to assess the therapists' decision-making powers. The answers also indicate the therapist's readiness to apply a thrust. I was not interested which technique was preferred but if someone prefers another technique he wants to avoid the thrust or at least reduce its application to a minimum.

The possible answers were "Yes" or "No".

The following sets of questions (3 to 6) look at four different regions of the body. Each region has its particularities in the thrust work.

I have chosen to provide an even number of possible answers in the first three questions of each set to avoid that the respondents would choose the diplomatic middle (Porst, 1998). A tendency must be recognizable in either one or the other direction.

For the "c"- questions of each set I chose the well tried Austrian school marks system.

Everybody knows this rating system from school so there is no inhibition threshold. The familiarity with this system outweighs the disadvantage that there is an average, i.e. a diplomatic middle with the mark "3". This bears the risk that the respondents choose this middle way and don't need to show their colors. But there is also a positive aspect regarding the middle category because if the respondents are forced to choose one or the other direction by leaving out a middle they are deprived of the possibility to deliberately rate themselves as

being in the middle. This deliberate rating does not necessarily mean they do not want to declare themselves but it can be their true position in the middle of the scale (Porst, 1998).

Question 3: How often do you use thrusts in the cervical spine?

I wanted to pick out the region of the cervical spine because it is a very mobile and sensitive region. Greenman (2005) and Hartman (1997) emphasize the importance of the vertebral artery, which is particularly vulnerable in the region of the atlanto-occipital junction (Greenman, 2005). Nevertheless, the manipulation is one of the most frequently used techniques to treat complaints of the cervical spine (Gross, 2002). A faulty treatment in this region can have fatal consequences for the patient (Hartman, 1997). The question wants to evaluate a trend in the thrust frequency.

The possible answers were: “often”, “sometimes”, “rarely” or “never”.

Question 3a: Do you like to use a thrust in this area?

This question addressed the emotional level, the attitude of the therapists towards the thrust techniques. Emotions consist of many components and influence to a large extent the readiness to use a technique.

The possible answers were: “very much”, “voluntarily”, “not so much” or “not at all”.

Question 3b: How secure do you feel when using the thrust?

The question about the aspect of security/insecurity plays an important role in the decision of whether the technique is applied or not – just like the attitude towards the technique.

The possible answers were: “very secure”, “secure”, “not so secure” or “insecure”.

Question 3c: If you use a thrust in the cervical spine please mark your average rate of success in the execution of the technique.

The reasons for the success or failure of a thrust can be manifold. In any case such experiences contribute to the future use or avoidance of the technique.

The respondents could rate themselves with the familiar school marks system.

1 = very good success; 5 = no success

Question 4: How often do you use thrusts in the thoracic spine?

The region of the thoracic spine is characterized by a great stability. Very rarely serious pathologies occur after the application of a thrust.

The possible answers were: “often”, “sometimes”, “rarely” or “never”.

Question 4a: Do you like to use a thrust in this area?

(cf. Question 3a)

Question 4b: How secure do you feel when using the thrust?

(cf. Question 3b)

Question 4c: If you use a thrust in the thoracic spine please mark your average rate of success in the execution of the technique.

(cf. Question 3c)

Question 5: How often do you use thrusts in the lumbar spine?

Today lumbar spine complaints are the second most frequent reason why patients come to see a practitioner. Such problems affect 60% - 90% of the people at least once in their lives (Lewit, 1978). In these cases the lumbar roll technique is often used; a technique which is extensively taught at the WSO. In general, it is used to treat pain in the lumbar spine (Gibbons, 2001). Since Cooperstein (2001) says that the manipulation (HVLA) in the side-lying position is the most effective technique to treat lumbar pain, I explicitly ask how often the therapists manipulate the lumbar spine.

The possible answers were: “often”, “sometimes”, “rarely” or “never”.

Question 5a: Do you like to use a thrust in this area?

(cf. Question 3a)

Question 5b: How secure do you feel when using the thrust?

(cf. Question 3b)

Question 5c: If you use a thrust in the lumbar spine please mark your average rate of success in the execution of the technique.

(cf. Question 3c)

Question 6: How often do you use thrusts in the extremities?

Also thrusts in the extremities can have serious consequences if the technique is not well executed. However, their dimension is not so big in comparison with the spine. Thus the extremities are often used to learn and practice the thrust method. The students are not so afraid to do something wrong and they do not have so much respect. Therefore I wanted to include this body region in the questionnaire.

The possible answers were: “often”, “sometimes”, “rarely” or “never”.

Question 6a: Do you like to use a thrust in this area?

(cf. Question 3a)

Question 6b: How secure do you feel when using the thrust?

(cf. Question 3b)

Question 6c: If you use a thrust in the extremities please mark your average rate of success in the execution of the technique.

(cf. Question 3c)

Question 7: Which of the following groups of patients do you thrust?

Several answers possible:

The following possible answers were offered:

- not very athletic persons
- athletic persons (practice sports 1-2 times per week)
- very athletic persons (practice sports more than 2 times per week).

Since thrust techniques belong to the group of HVLA techniques (cf. Chapter 2.1), many therapists have a lot of respect of the possible reactions to the treatment due to the high velocity and fast impulse in the direction of the restriction (Greenman, 2005). 55 % of the patients report side-effects (Senstad, 1997), which usually disappear within 24 hours

(Gibbons, 2001). I was interested in this question because I wondered whether certain groups of patients are considered as not being able to cope well with a thrust.

Question 8: Which of the following groups of patients do you thrust?

Several answers possible:

The following possible answers were offered:

- Children before reaching their school age
- Children aged 6 to 12
- Adolescents between the age of 12 and majority (age of 18)
- Adults until the age of 70
- Adults aged 70 plus.

This question had the same intention as Question 7.

Question 9: Which groups of patients with the following underlying pathologies do you thrust? Several answers possible:

The following possible answers were offered:

- Osteoporosis
- metabolic problems (e.g. Diabetes mellitus)
- Disturbed surface sensitivity
- Disturbed deep sensitivity
- patients with myocardial infarctions (acute state some time ago)
- patients with strokes (acute state some time ago)

The respondents could indicate whether they do or do not thrust a certain group of patients. Since there is a controversial discussion about the contraindications (cf. Chapter 2.10.), I did not have the intention to test the practitioners' background knowledge. I wanted them to refer to their daily practice because there is a tendency of specialists to actually drop the contraindications because the slightest improvement even for a short time justifies the therapist's efforts (Hartman, 1997). The above listed underlying pathologies were those I encountered mostly in my practice which was confirmed by the test respondents.

Question 10: Why do you thrust or why do you not thrust?

This is an open question where every respondent could explain his approach. Usually, the practitioners want to add a comment because they have the feeling that one or the other aspect was not enough considered. Everybody should have this possibility. Open questions

allow the respondents to use their own words (Porst, 1998). However, this question was not integrated in the analysis for the present thesis.

5. Analysis of the questions

The questionnaire was sent to 211 persons living in Austria on April 5, 2007.

The addressees were asked to send the return envelopes with the completed questionnaire by April 25, 2007 to my address. 104 envelopes were returned in time. 13 envelopes reached me with one week delay. 2 return envelopes arrived in July 2007 which was too late because the analysis was already on its way. Thus they were not integrated in the analysis. The same holds for an envelop which was returned end of August.

Thus a total of 117 questionnaires were returned, which corresponds to a return rate of 55.45 %. These 117 questionnaires were used for the statistical analysis.

Analysis of the personal data

The answers were entered into a specially developed database of Microsoft® Access 96 and checked one more time.

Grouping

In the classification of the data according to when the therapists started to work osteopathically, I tried to achieve a balance between the necessary large size of the groups to obtain significant results and a best possible differentiation. Less than three sub-groups would have meant a loss of information, more than that would have produced quite small groups which would have made it more difficult to interpret the results as to their significance.

Data classification

The osteopaths were divided into three groups on the basis of the 33% and 66% percentiles with regard to the beginning of their osteopathic practice (-1998/ 1999-2000/ >2000). This produced three groups of similar size which could be compared with each other:

Those who have started to work osteopathically before 1998 are those who are longest in practice and thus the most experienced osteopaths.

The group who started between 1999 and 2000 has an average experience with the osteopathic practice.

The osteopaths who started their osteopathic work after 2000 are the less experienced therapists because they have not been working with osteopathy very long.

Of course, it is possible that a therapist who only recently started to work osteopathically is more skilled and better qualified than a practitioner who has been in practice longer. The osteopaths in this survey were attributed to the three groups merely considering when they started to work osteopathically.

In addition, also the answers to the question why osteopaths use thrusts or not were classified in several steps with the aid of the database.

Data analysis

Before a more detailed analysis a mean comparison test was carried out with a univariant variance analysis (ANOVA, level of significance $\alpha=0.05$). To do so the nominal values had to be transformed in ordinal values. This was achieved through the following substitutions:

frequently	4
often	30
rarely	2
never	1

Further, the nominal values "yes" and "no" in the characterization of the patients, who are treated with thrusts, were replaced by the numerical codes "1" and "0".

In cases, where the use of thrusts was additionally qualified with a written comment ("yes*"), the answer was classified as "yes" because it can be assumed that also the other osteopaths make the decision of whether they apply a thrust or not dependent on the condition of the individual patient.

The linear correlations between the frequency of use, popularity, security in the execution of the technique and treatment success were calculated according to Spearman. Further, t-tests (double sided, $\alpha=0.05$) were used for the comparison of the treatment success in the different groups. In this context it has to be pointed out that the data of this question were collected using an (extended) school marks system and thus the lower values indicate better treatment results. In all other ordinal-scaled variables the opposite is the case.

The software SPSS[®] 12.0.0 was used for the analysis.

Since 13% of the respondents (which is not a negligible quantity for a statistician) subdivided the school marks system in in-between marks, the statistician analyzed the data in 0.25 steps. Some respondents indicated a mark of e.g. 2.25 or 2.75 instead of 2 or 3.

Representation of the results

Since the amount of data is quite large, graphical illustrations are only used for the general overview, while the comparisons between the various groups are presented only in tables. To facilitate a quick overview of the results the most important results are highlighted in colors. Since many nominal values have been collected, the absolute and relative frequencies of the dependent variables are grouped and summarized after the values of the independent variables. Modal values (which are the values that occur most frequently) are highlighted in dark blue. In addition, the 95% confidence intervals of the frequencies are indicated. Since the sub-groups are very small, they are actually of subordinate importance.

The values that have been transferred into an ordinal scale are presented with mean values and standard deviation, where the highest value is highlighted in dark blue.

In cases where ANOVA produced significant results ($p < 0.05$), those are also presented in a table (F and p-values) and marked in dark blue. Less significant differences are highlighted in light blue ($0.05 < p < 0.15$). The smaller the p-value, the smaller the probability of similarities in two groups.

6 Results

6.1. General overview

This chapter will present the overall results. On the one hand, the participating osteopaths shall be characterized, on the other hand, a general overview of the application of thrusts shall be provided.

6.1.1. The osteopaths

The return rate in this survey was 55.45 %: 117 of the 211 contacted osteopaths answered, among them 75 women (67%) and 37 men (33%). Five osteopaths did not indicate their gender.

The average age of the osteopaths was 40.9 years (SD: 5.6), with a median value of 40 and a modal value of 35 years (cf. Figure 1).

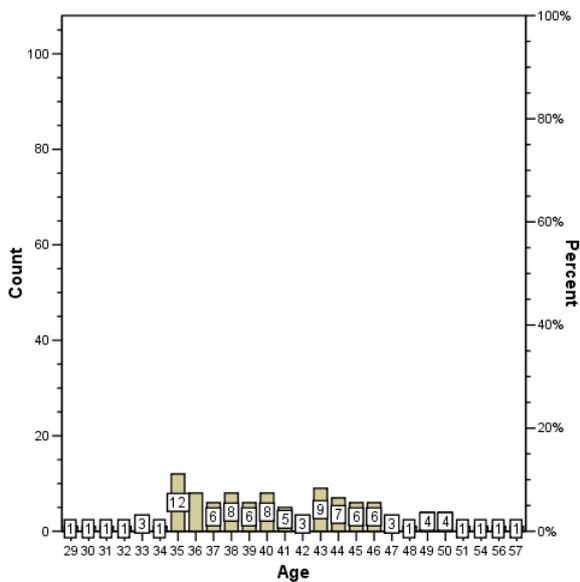


Figure 1: Age distribution of the participating osteopaths.

On average the therapists started to work osteopathically in 1999 (SD: 3.4), with the median and modal values each being 2000 (Distribution of the start of the osteopathic practice cf. Figure 2).

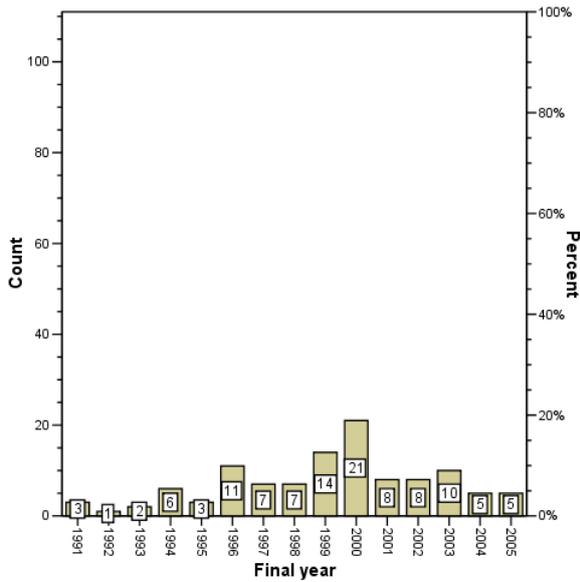


Figure 2: Start of the osteopathic practice.

Most of the participating osteopaths are physical therapists in their original profession: 94 physical therapists (83.9%), 16 doctors (14.3%), one medical-technical specialist and one masseur (0.9% each). Five therapists did not provide any information about their original profession.

Only one osteopath indicated a treatment duration of less than 15 minutes per patient (0.9%). The majority spends between 30 and 45 minutes ($n=73$, 65.2%), while 25 therapists (22.3%) spend more than 45 minutes and 13 therapists (11.6%) less than 30 minutes. The data of five osteopaths are missing (cf. Figure 3).

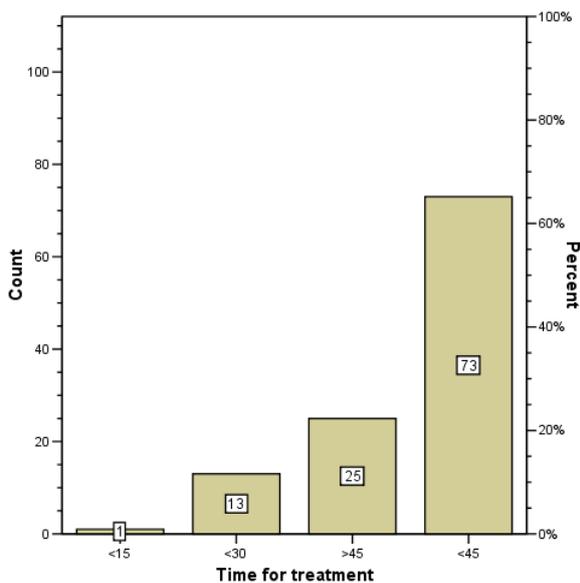


Figure 3: Time spent with the patients.

100 of the osteopaths (86.2%) would let themselves be treated with thrusts, while only 16 (13.8%) would not. (One missing answer).

80 osteopaths (69.6%) use another technique before the thrust, if it is similarly promising. 35 therapists (30.4%) indicate to use the thrust also in such a case. (Two missing answers).

6.1.2. The use of thrusts in the cervical spine

Frequency of the use of the technique

Most of the osteopaths use thrusts in the cervical spine rarely (n= 42 or 35.9%) or not at all (n=37, 31.6%). Only 10 therapists indicated that they would use cervical thrusts often (8.5%), while the remaining 28 practitioners use the thrusts sometimes (23.9%) (cf. Figure 4).

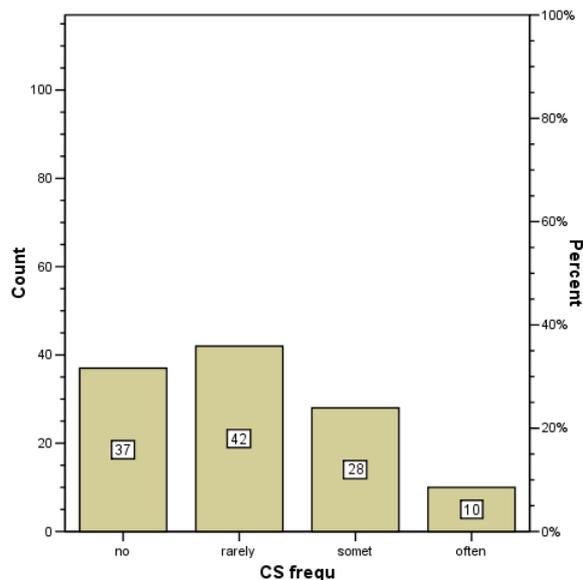


Figure 4: Frequency of cervical thrusts.

Popularity of the technique

31 osteopaths (27.2%) do not like to use cervical thrusts at all, while 42 (36.8%) do not so much like to use it. 37 therapists use it voluntarily (32.5%) and only four (3.5%) like it very much. (3 missing answers) (cf. Figure 5).

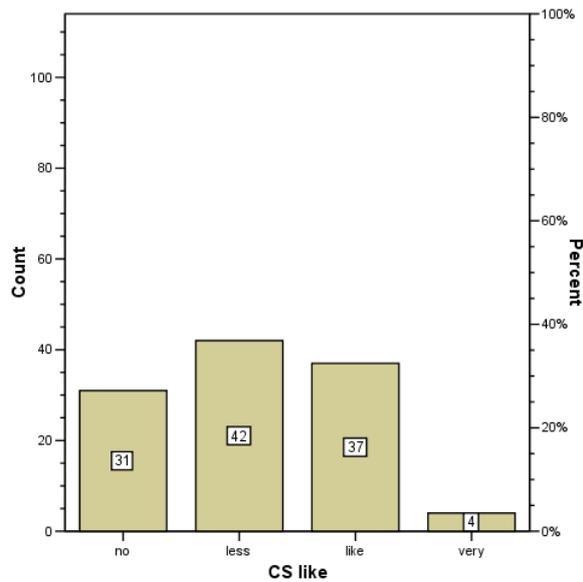


Figure 5: Popularity of cervical thrusts.

Security in the execution of the technique

Most osteopaths indicate to feel secure when using the cervical thrust techniques (n=54, 47.8%), another 18 feel very secure 18 (15.9%). 24 feel less secure (21.2%) and 17 of the respondents do not feel secure at all (15%). Four therapists did not answer the question (cf. Figure 6).

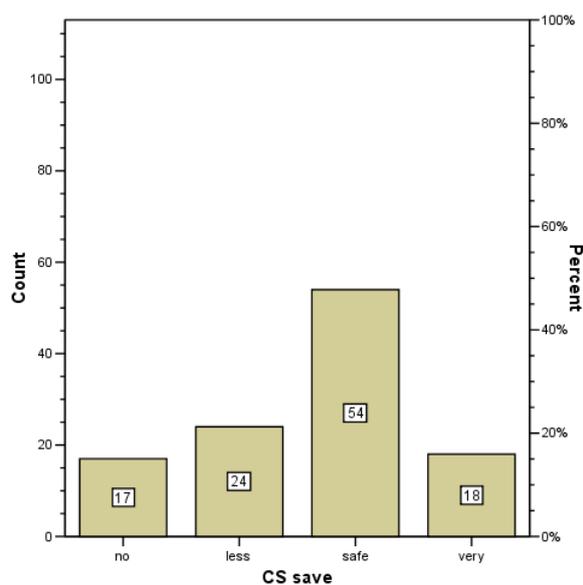


Figure 6: Security of cervical thrusts.

Average success

The mean value of the responses regarding the rate of success in the execution of cervical thrusts was 2.2 (SD: 0.86), which represents an average success.

6.1.3 The use of thrusts in the thoracic spine

Frequency of the use of the technique

In contrast to the cervical spine most osteopaths use thrusts in the thoracic spine often (n= 64 or 54.7%). 37 (31.6%) use the thoracic thrusts sometimes and 14 therapists indicated to use thrusts in this region rarely (12.0%). Only 2 indicated that they never use thoracic thrusts (1.7%) (cf. Figure 7).

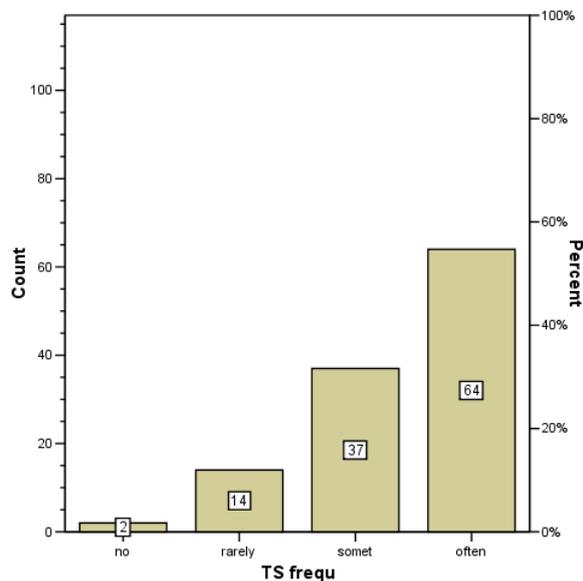


Figure 7: Frequency of thoracic thrusts.

Popularity of the technique

Also in the popularity of the technique differences to the cervical spine can be observed. 35 osteopaths (29.9%) like to use the technique in the thoracic spine very much, while 65 (55.6%) use it voluntarily. 14 therapists do not so much like it (12.0%) and only three (2.6%) do not like it at all (cf. Figure 8).

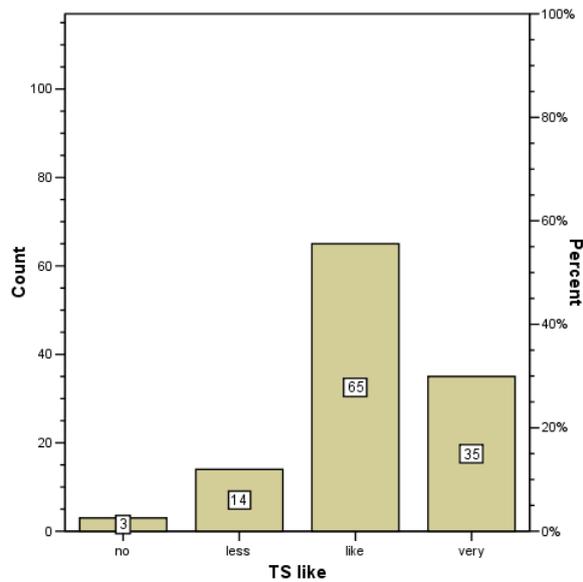


Figure 8: Popularity of thoracic thrusts.

Security in the execution of the technique

In this region the osteopaths' security in the execution of the thrusts is quite high. Not a single therapist indicated to feel insecure.

Most osteopaths indicated to feel secure in the execution of the thoracic thrusts (n=59, 51.3%), another 54 (47.0%) feel very secure and only two (1.7%) of the respondents feel not so secure. Two therapists did not answer this question (cf. Figure 9).

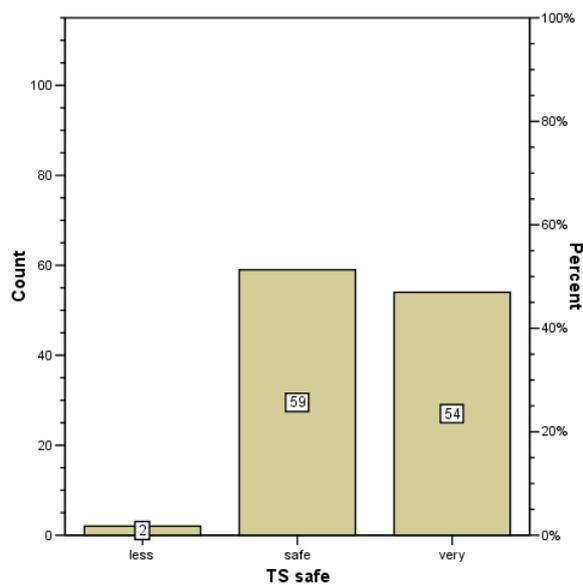


Figure 9: Security of thoracic thrusts.

Average success

The mean value of the answers regarding the rate of success of the thoracic thrusts was 1.9 (SD: 0.60), which represents a “good success” on average.

6.1.4. The use of thrusts in the lumbar spine

Frequency of the use of the technique

Most of the osteopaths (n= 51 or 43.6%) use the lumbar thrusts only sometimes. 10 of the osteopaths (8.5%) do not thrust at all. In this region thrusts are used often by 30 therapists (25.6%), while the remaining 26 (22.2%) use the technique rarely (cf. Figure 10).

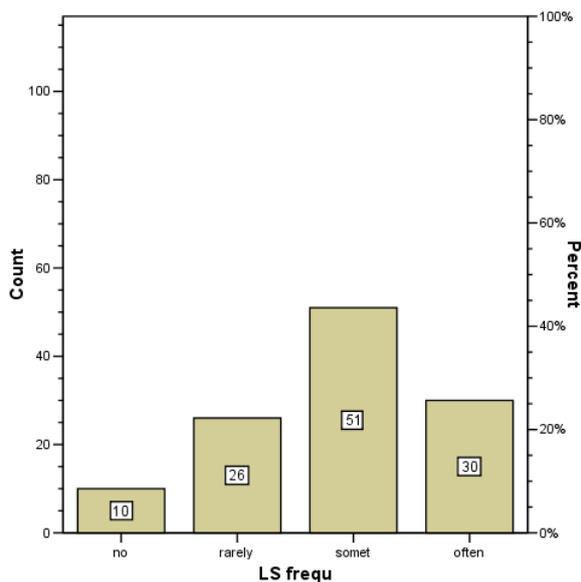


Figure 10: Frequency of lumbar thrusts.

Popularity of the technique

55 osteopaths (47.4%) voluntarily use the technique in the lumbar spine. 15 (12.9%) like it very much to thrust the lumbar spine. 36 practitioners do like lumbar thrusts "not so much " (31.0%) and ten (12.9%) do not like them at all (one missing answer) (cf. Figure 11).

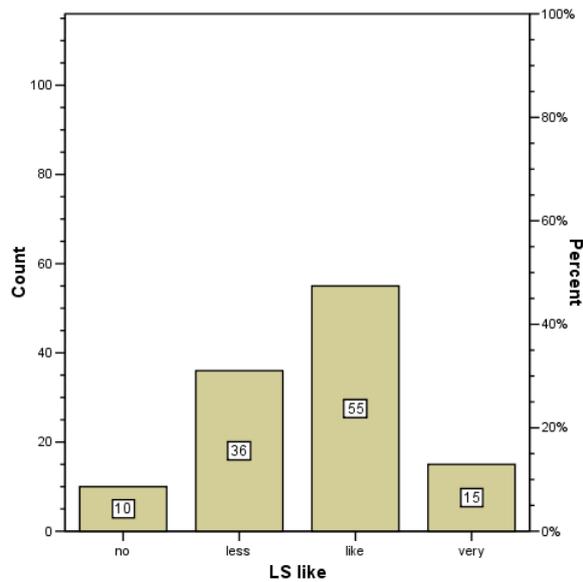


Figure 11: Popularity of lumbar thrusts.

Security in the execution of the technique

Most osteopaths indicate that they feel secure when using the technique in the lumbar spine (n=53, 46.5%). 31 (27.2%) feel very secure. 29 respondents (25.4%) feel less secure and one therapist feels not at all secure (0.9%). Three therapists did not answer the question (cf. Figure 12).

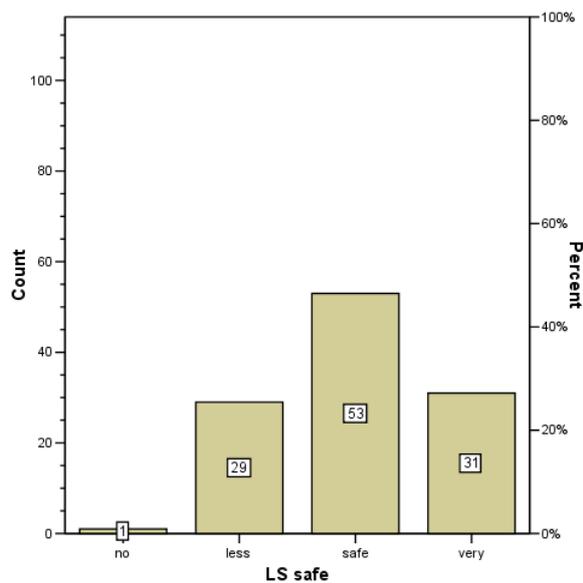


Figure 12: Security of lumbar thrusts.

Average success

The mean value of the responses regarding the rate of success when using thrusts in the region of the lumbar spine was 2.4 (SD: 0.85), which represents a “good success” on average.

6.1.5. The use of thrusts in the extremities

Frequency of the use of the technique

Most osteopaths use thrusts in the extremities only sometimes (n= 44 or 37.1%) or rarely (n=42, 36.2%). Only 16 (13.8%) therapists apply thrusts in the extremities often, while the remaining 15 (12.9%) never use thrusts in these regions. One respondent did not answer the question (cf. Figure 13).

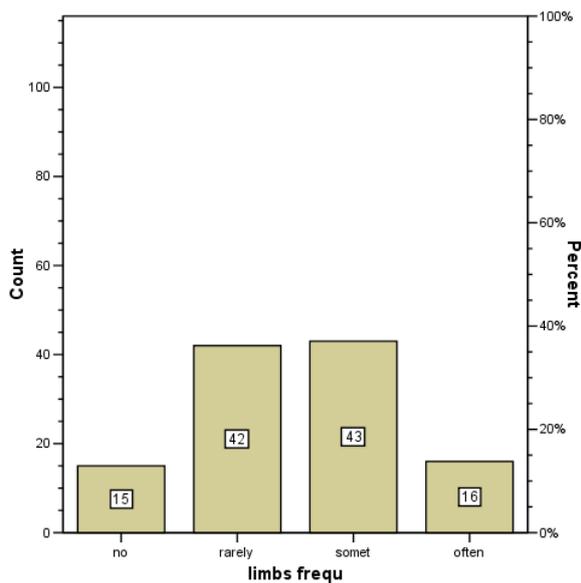


Figure 13: Frequency of thrusts in the extremities.

Popularity of the technique

15 osteopaths (9.6%) indicate that they do not like to use the thrusts in the extremities at all, while 25 (21.9%) like to use them "not so much". The majority of the therapists (n= 63, 55.3%) voluntarily use thrusts in the extremities and 11 (9.6%) like to use them very much (three missing answers) (cf. Figure 14).

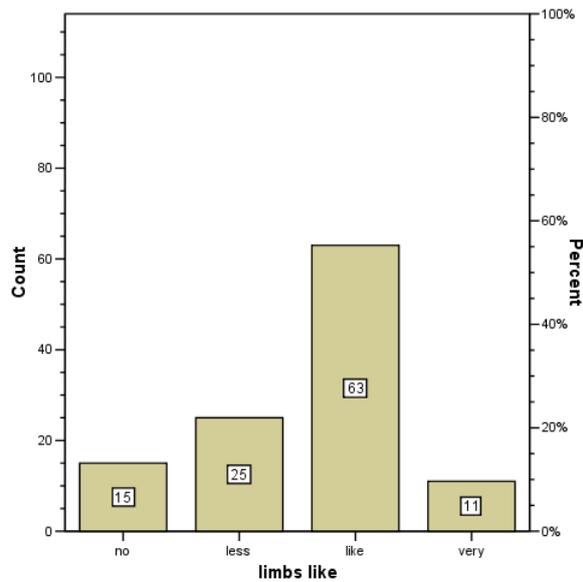


Figure 14: Popularity of thrusts in the extremities.

Security in the execution of the technique

Like for all other body regions most osteopaths indicate to feel secure when using the thrust techniques in the extremities (n=62, 56.4%). 29 (26.4%) feel very secure. 14 (12.7%) feel less secure and five (4.5%) feel not secure at all. In this case seven practitioners did not answer the question (cf. Figure 15).

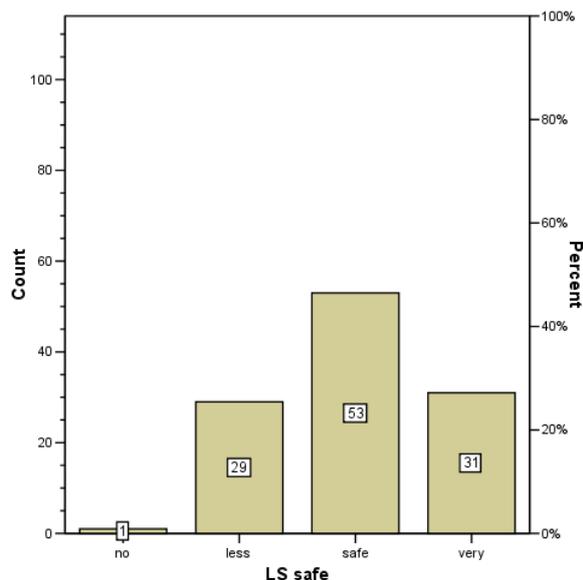


Figure 15: Security of thrusts in the extremities.

Average success

The mean value of the responses regarding the rate of success with thrusts in the extremities was 2.5 (SD: 0.87), which represents a “good to mediocre success” on average.

6.1.6. Preconditions for thrusting

6.1.6.1. Fitness of patients

Figure 15 summarizes in how far the state of fitness of the patients has an effect on the use of thrust techniques. The degree of fitness (i.e. how much sports the patients practice) has hardly any influence on the thrust behavior of the therapists. The majority of the osteopaths use thrusts for all the specified patient categories. However, the group of athletic (sportive) persons is thrust with the least reservations.

(cf. Figure 16).

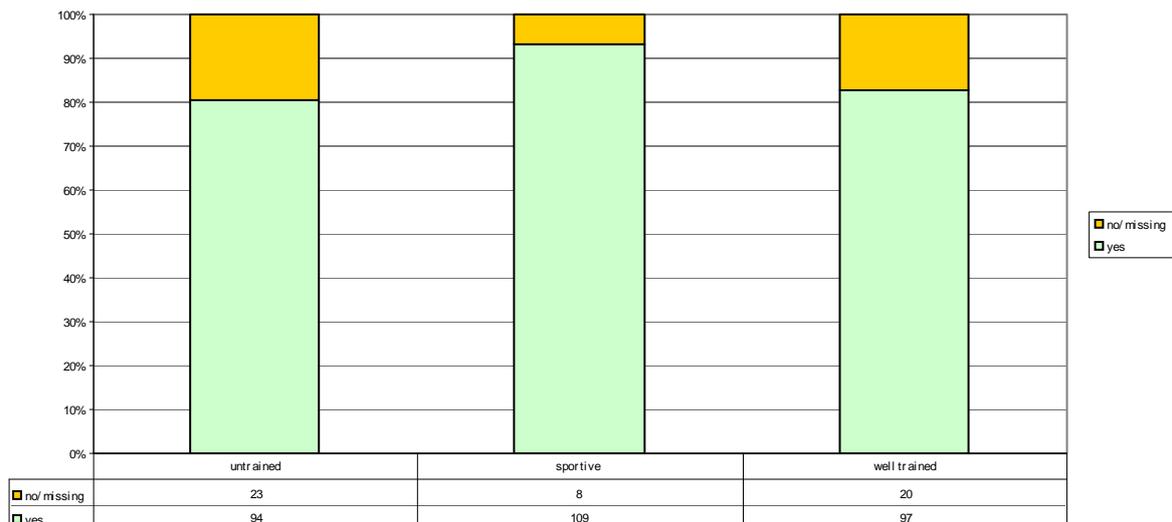


Figure 16: Thrusts, depending on the state of fitness of the patients.

6.1.6.2. Age of the patients

Figure 17 illustrates in what age groups thrusts are applied by the therapists. While the majority of the osteopaths use thrusts for adults between the ages of 18 and 70, there is a tendency that thrusts are less often applied in the other age groups.

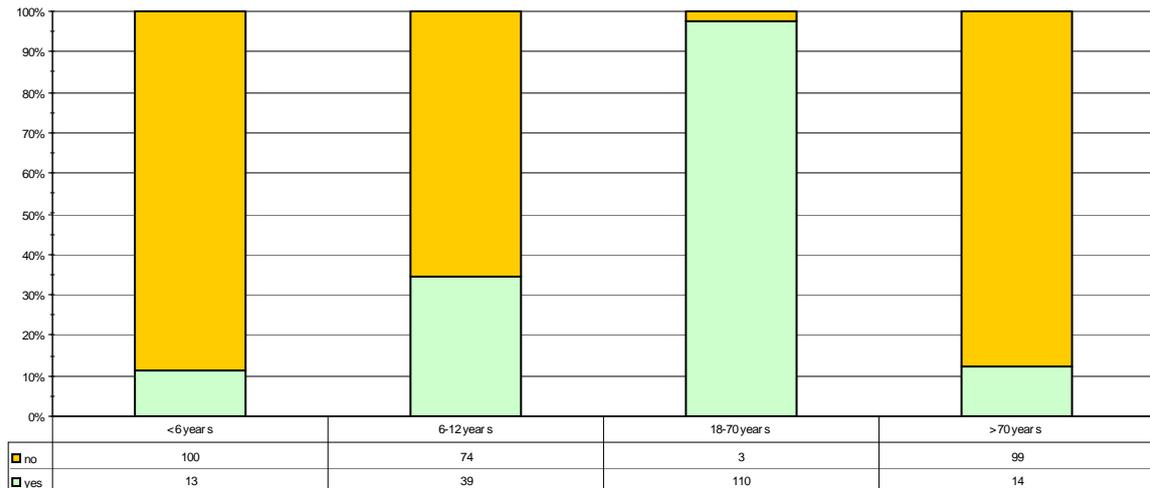


Figure 17: Thrusts, depending on the age of the patients.

6.1.6.3. Underlying diseases

Figure 18 summarizes in the case of which (selected) underlying diseases thrusts are applied even though this involves a higher risk of possibly causing a deterioration of the patient's state of health. Patients with osteoporosis are thrusts most rarely, while patients with disturbed surface sensibility are most frequently treated with thrusts.

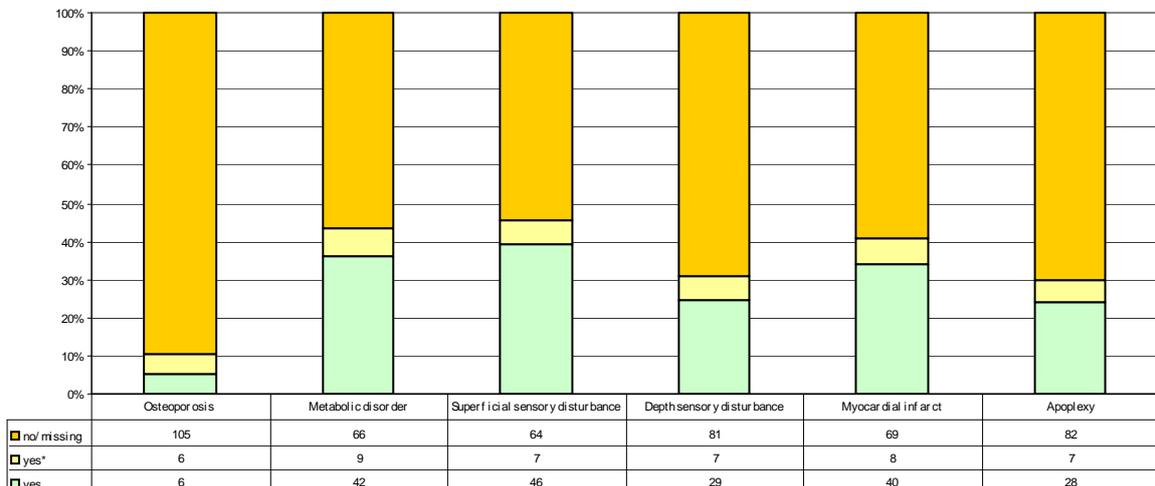


Figure 18: Thrusts, depending on the underlying disease of the patients.

y*: yes, with explicit comment of reservation on the questionnaire.

6.1.7. Reasons for using a thrust or not

Reasons that speak against using a thrust:

The answers to Question 10 contained absolute reasons against using a thrust (why the osteopath does or does not like to thrust) and relative reasons of why thrusts are not used in the case of **some patients**.

Basically, the answers can be summarized in seven main categories:

- Reasons which have to do with the **technique in general**
- Reasons concerning the **clients/patients**
- **Personal reasons**
- Reasons regarding **contraindications/differential diagnosis**
- Reasons linked with **insecurity**
- Reasons regarding **possible consequences**
- Principal reasons which have to do with **osteopathy** in general.

These categories can partly be further divided in sub-categories. Below the statements are briefly summarized:

- **Technique in general** (relative and absolute)

Other techniques are as effective, thrusts do not have a long-term effect and (in most cases) only secondary problems are treated.

The various answers were either classified as relative or absolute reasons.

- **Clients/patients**

Consideration of patient's wellbeing (relative)

Some patients do not give their consent, find other techniques more comfortable, feel insecure or unwell.

Patients/clients not suited (relative)

Some therapists indicated children, pregnant women or breastfeeding mothers in this context; or patients are too old.

- **Contraindications/differential diagnosis** (relative)

Some osteopaths indicated not to use thrusts in the presence of contraindications or certain differential diagnoses.

- **Personal reasons**

- **Preference of other methods** (relative and absolute)

Thrusts are too aggressive or invasive; some therapists do not like the thrust position and the closeness to the patient; alternative methods are more natural to them.

- **Own experience** (absolute)

Some osteopaths have made bad experiences with being thrust.

- **Internal resistance** (absolute)

Some therapists do not use thrusts because they do not like the method, they built up an internal resistance.

- **Intuition** (relative and absolute)

Some therapists intuitively do not use thrusts for certain patients but find it difficult to explain why. The individual answers in this category were either qualified as relative or absolute reasons.

- **Not indicated** (relative)

Some osteopaths pointed out in the case of what contraindications or following which personal considerations they do not apply a thrust.

- **Personal condition at the day** (relative)

Some therapists explained that it would depend on their condition at the particular day whether they would thrust or not.

- **Insecurity** (relative and absolute)

An absolute and - relatively – frequent reason not to thrust is insecurity regarding the diagnosis, technique or contraindications. Sometimes contraindications cannot be recognized clinically and the therapists are afraid to cause a negative reaction.

Some therapists, however, explain that they only feel insecure and do not thrust in certain situations. These statements were qualified as relative reasons.

- **Consequences**

- **Legal consequences** (absolute)

- The respondents did not want to face the legal question whether physical therapists are allowed to use thrusts.

- **Risk** (relative)

- The risk of thrusts in the cervical spine and to a lesser extent in the lumbar spine was often mentioned as a reason not to thrust.

- **Hypermobility** (relative)

- In particular, if a region has been repeatedly thrust there is the danger of hypermobility.

- **Osteopathic principally** (absolute)

Thrusts are a misguided development in osteopathy. They affect a structure with too much force; the therapists do not want to strain the joint; it confuses the system. Other techniques provide a better treatment of the true origin of the problem.

Type of answer (in descending order)	n	%
technique – other more/as effective	27	18.0%
personal – not indicated	16	10.7%
insecurity (diagnosis, general, technique, contraindications)	15	10.0%
contraindications, differential diagnosis	13	8.7%
patient - wellbeing	13	8.7%
personal – preference of other methods	13	8.7%
consequences - risk	8	5.3%
technique – not long-term	8	5.3%
osteopathic	7	4.7%
technique – only secondary problem treated	7	4.7%
patient - inappropriate (children, pregnant women, breast-feeding mothers, too old)	4	2.7%
personal – internal resistance	4	2.7%
consequences - hypermobility	3	2.0%
consequences - legal	3	2.0%
personal - intuition	3	2.0%
patient - discomfort	2	1.3%
personal – own experiences	2	1.3%
personal – personal condition at the day	2	1.3%

Reasons speaking in favor of thrusts:

In this case, the answers can be divided in four main categories:

- **Reasons why a thrust is delivered**
- **Conditions that have to be fulfilled to do a thrust**
- **Aims that the therapists want to achieve with the thrust**
- **Indications to use a thrust**

Also these categories can partly be further divided in several sub-categories. The statements are briefly summarized below:

- **Reasons why a thrust is delivered**

Rapidity

Most of the statements pointed out that it is a quick method. The therapist gets an immediate response from the tissues; Pain can be reduced quickly and the mobility improved.

Success

Many therapists have had good experiences with this method and can observe a sustainable treatment success.

General attitude

The method is regarded as helpful and sometimes necessary.

Psychological

Some patients need to see that “something happens“.

Osteopathic

Thrusts are part of the holistic approach.

- **Conditions that have to be fulfilled to do a thrust**

Respect of the tissues

The tissues have to be prepared and tissue reactions need to be considered.

Last resort

Some osteopaths only use the thrust if they have resolved all other problems and alternative methods did not achieve the desired results.

Condition of the patients

The right constitution, age and the consent of the patient are for many osteopaths the precondition to use a thrust.

Exclusion of contraindications and risks

Personal reasons

Trust in one's own skills (therapist's condition at the day) and other personally important tests and criteria.

Consideration of the general situation

Some osteopaths point out explicitly that they use thrusts only in cases where the general situation is appropriate.

Indication

Thrusts are only applied when indicated.

- **Aims that the therapists want to achieve with the thrust**

Stimulation in cases of stagnation

If the tissue needs stimulation; if the self-regulation shall be stimulated; or if the possibilities for a re-organization shall be created

Stimulation of the vegetative system

Some osteopaths see the thrust as a means to stimulate the vegetative nervous system.

Mobility / relaxation / analgesia

- **Indications to use a thrust**

General

Thrust are applied depending on the examination findings or if indicated.

Structural restrictions

It is pointed out explicitly that thrusts are only applied in the case of true structural blockages.

Beginning of a problem

There are different opinions regarding this aspect. The majority of the statements indicate that the therapists only use thrusts if the blockage occurred recently. However, other osteopaths explain that they use the thrust mainly to treat long-standing problems.

Personal indications

You use a thrust if you think it is necessary.

Clear blockages

Some osteopaths only use thrusts to treat distinct or hard blockages.

Description of the dysfunction

Some therapists indicate explicitly for which kind of dysfunctions they use a thrust.

In addition, two osteopaths explained that more and more often they did not need to thrust due to the preparatory work on the tissues.

Type of response (in descending order)	n	%
General comment	2	1.2
Condition – respect of tissues	17	10.6
Condition – last resort	14	8.7
Condition – patient’s condition	7	4.3
Condition – exclusion of contraindications /risks	5	3.1
Condition - personal	4	2.5
Condition – general situation	2	1.2
Condition - indication	1	0.6
Condition – follow-up treatment	1	0.6
Reason - rapidity	21	13.0
Reason - success	20	12.4
Reason – general attitude	6	3.7
Reason - psychological	4	2.5
Reason - osteopathic	2	1.2
Reason - personal	2	1.2
Indication - general	12	7.5
Indication – structural blockage	7	4.3
Indication – beginning of the problem	5	3.1
Indication - personal	5	3.1
Indication – clear blockage	4	2.5
Indication – description of dysfunction	2	1.2
Aim – stimulation in case of stagnation	10	6.2
Aim – stimulation of vegetative system	4	2.5
Aim - mobility/relaxation/analgesia	4	2.5

6.2. Influences on the application of thrusts

This chapter will look at in how far the application of thrusts is influenced by the fact when the therapist started to work osteopathically.

6.2.1. General issues

The majority of osteopaths would let themselves be treated with thrusts. No dependence on the year of graduation from their osteopathic training can be recognized (cf. Table 1).

Thrust_yourself		-1998		99-00		>2000	
n	n	6		4		6	
	y	33		31		30	
%	n	15,4		11,4		16,7	
	y	84,6		88,6		83,3	
95% CI		l	u	l	u	l	u
	n	7,2%	29,7%	4,5%	26,0%	7,9%	31,9%
	y	70,3%	92,8%	74,0%	95,5%	68,1%	92,1%
Mean values:		0,85		0,89		0,83	
Standard dev.:		0,37		0,32		0,38	
ANOVA		F= 0,241		p= 0,625			
		F= 0,022				p= 0,882	
				F= 0,393		p= 0,533	

Table 1: Overview of osteopaths who would let themselves be treated with thrusts (grouping according to year of graduation).

The osteopaths who have already been working longer in practice prefer to first try out other techniques in cases where a thrust would be appropriate. They differ significantly from those osteopaths who finished their osteopathic training after the year 2000 (cf. Table 2).

Other technique		-1998		99-00		>2000	
n	n	8		12		15	
	y	31		23		21	
%	n	20,5		34,3		41,7	
	y	79,5		65,7		58,3	
95% CI		l	u	l	u	l	u
	n	10,8%	35,5%	20,8%	50,8%	27,1%	57,8%
	y	64,5%	89,2%	49,2%	79,2%	42,2%	72,9%
Mean values:		0,79		0,66		0,58	
Standard dev.:		0,41		0,48		0,50	
ANOVA		F= 1,769		p= 0,188			
		F= 4,047				p= 0,048	
				F= 0,401		p= 0,529	

Table 2: Overview of osteopaths who prefer other techniques in cases where a thrust would be appropriate (grouping according to year of graduation).

6.2.2. The use of thrusts in the cervical spine

Frequency

It can be observed that how often thrusts are used does not depend on when the osteopathic training was completed (cf. Table 3). Cervical thrusts are most often used by osteopaths with the graduation years 1999 and 2000. This group differs most obviously (but not significantly) from the group "-1998".

CS frequ		-1998		99-00		>2000	
n	no	16		9		9	
	rarely	11		12		17	
	somet	10		9		8	
	often	3		5		2	
%	no	40,0		25,7		25,0	
	rarely	27,5		34,3		47,2	
	somet	25,0		25,7		22,2	
	often	7,5		14,3		5,6	
95% CI		l	u	l	u	l	u
	no	26,3%	55,4%	14,2%	42,1%	13,8%	41,1%
	rarely	16,1%	42,8%	20,8%	50,8%	32,0%	63,0%
	somet	14,2%	40,2%	14,2%	42,1%	11,7%	38,1%
often	2,6%	19,9%	6,3%	29,4%	1,5%	18,1%	
Mean values:		2,00		2,29		2,08	
Standard dev.:		0,99		1,02		0,84	
ANOVA		no significant results					

Table 3: Frequency of cervical thrusts.

Popularity

Also regarding the popularity of thrusts in the cervical spine no significant differences can be observed between the groups. However, there is a tendency that osteopaths who completed their training after 2000 do not like to use cervical thrusts as much as those who finished their training in the years 1999 and 2000 (cf. Table 4).

CS like		-1998		99-00		>2000	
n	no	12		8		9	
	less	11		9		19	
	like	13		15		8	
	very	2		2		0	
%	no	31,6		23,5		25,0	
	less	28,9		26,5		52,8	
	like	34,2		44,1		22,2	
	very	5,3		5,9		0,0	
95% CI		l	u	l	u	l	u
	no	19,1%	47,5%	12,4%	40,0%	13,8%	41,1%
	less	17,0%	44,8%	14,6%	43,1%	37,0%	68,0%
	like	21,2%	50,1%	28,9%	60,5%	11,7%	38,1%
	very	1,5%	17,3%	1,6%	19,1%	0,0%	9,6%
Mean values:		2,13		2,32		1,97	
Standard dev.:		0,93		0,91		0,70	
ANOVA				F= 3,304		p= 0,07	
		F= 0,774		p= 0,38			
		F= 0,685				p= 0,41	

Table 4: Popularity of cervical thrusts.

Security

A similar picture to that of the thrust frequency can be observed regarding the security in the execution of the thrusts. Osteopaths who completed their training in 1999 or 2000 feel most secure when using cervical thrusts. The most obvious differences can be seen in the comparison with the osteopaths who finished their training later (i.e. after 2000). Other differences between the groups are not significant (cf. Table 5).

CS save		-1998		99-00		>2000	
n	less	5		5		6	
	no	4		6		13	
	safe	23		14		14	
	very	4		10		3	
%	less	13,9		14,3		16,7	
	no	11,1		17,1		36,1	
	safe	63,9		40,0		38,9	
	very	11,1		28,6		8,3	
95% CI		l	u	l	u	l	u
	less	6,1%	28,7%	6,3%	29,4%	7,9%	31,9%
	no	4,4%	25,3%	8,1%	32,7%	22,5%	52,4%
	safe	47,6%	77,5%	25,6%	56,4%	24,8%	55,1%
	very	4,4%	25,3%	16,3%	45,1%	2,9%	21,8%
Mean values:		2,72		2,82		2,39	
Standard dev.:		0,85		1,01		0,87	
ANOVA				F= 3,847		p= 0,05	
		F= 2,704				p=0,11	
		F=0,230		p= 0,63			

Table 5: Security in the execution of cervical thrusts.

Success

Osteopaths who completed their training before 1998 rate their thrust success best and show a significant difference in comparison with the other osteopaths with less experience (cf. Table 6).

	Final year_c	N	Mean	Std. Deviation	Std. Error Mean	t/Sig.	t/Sig.	t/Sig.
CS success	-1998	26	1,83	0,586	0,115	-2,304	-3,891	
	99-00	28	2,21	0,644	0,122	0,025		-2,035
	>2000	29	2,66	0,965	0,179		<0,001	0,047

Table 6: Successful application of cervical thrusts.

6.2.3. The use of thrusts in the thoracic spine

Frequency

Thrusts in the region of the thoracic spine are most frequently applied by osteopaths who completed their training after the year 2000. A significant difference to the osteopaths who started to work osteopathically before 1998 can be observed in Table 7. They are the group who least often uses thoracic thrusts.

TS frequ		-1998		99-00		>2000	
n	no	2		0		0	
	rarely	7		5		1	
	somet	13		10		12	
	often	18		20		23	
%	no	5,0		0,0		0,0	
	rarely	17,5		14,3		2,8	
	somet	32,5		28,6		33,3	
	often	45,0		57,1		63,9	
95% CI		l	u	l	u	l	u
	no	1,4%	16,5%	0,0%	9,9%	0,0%	9,6%
	rarely	8,7%	32,0%	6,3%	29,4%	0,5%	14,2%
	somet	20,1%	48,0%	16,3%	45,1%	20,2%	49,7%
	often	30,7%	60,2%	40,9%	72,0%	47,6%	77,5%
Mean values:		3,18		3,43		3,61	
Standard dev.:		0,90		0,74		0,55	
ANOVA		F=6,300				p= 0,01	
		F= 1,740		p= 0,191			
				F= 1,401		p= 0,241	

Table 7: Frequency of thoracic thrusts.

Popularity

Similarly to the frequency also the popularity of thoracic thrusts is highest among osteopaths who finished their training after 2000. However, the differences between the groups in this category are all not significant (cf. Table 8).

TS like		-1998		99-00		>2000	
n	no	2		1		0	
	less	6		2		4	
	like	21		22		19	
	very	11		10		13	
%	no	5,0		2,9		0,0	
	less	15,0		5,7		11,1	
	like	52,5		62,9		52,8	
	very	27,5		28,6		36,1	
95% CI		l	u	l	u	l	u
	no	1,4%	16,5%	0,5%	14,5%	0,0%	9,6%
	less	7,1%	29,1%	1,6%	18,6%	4,4%	25,3%
	like	37,5%	67,1%	46,3%	76,8%	37,0%	68,0%
	very	16,1%	42,8%	16,3%	45,1%	22,5%	52,4%
Mean values:		3,03		3,17		3,25	
Standard dev.:		0,80		0,66		0,65	
ANOVA		no significant results					

Table 8: Popularity of thoracic thrusts.

Security

The therapists who started their osteopathic work in the years 1999 and 2000 indicate the greatest security regarding the execution of thoracic thrusts. In comparison with the less experienced osteopaths the difference is significant. In addition, a tendency can be observed that with a smaller probability they also feel more secure than the more experienced osteopaths (-1998) (cf. Table 9).

TS safe		-1998		99-00		>2000	
n	no	0		0		0	
	less	1		0		1	
	safe	21		14		22	
	very	16		21		13	
%	no	0,0		0,0		0,0	
	less	2,6		0,0		2,8	
	safe	55,3		40,0		61,1	
	very	42,1		60,0		36,1	
95% CI		l	u	l	u	l	u
	no	0,0%	9,2%	0,0%	9,9%	0,0%	9,6%
	less	0,5%	13,5%	0,0%	9,9%	0,5%	14,2%
	safe	39,7%	69,9%	25,6%	56,4%	44,9%	75,2%
very	27,9%	57,8%	43,6%	74,4%	22,5%	52,4%	
Mean values:		3,39		3,60		3,33	
Standard dev.:		0,55		0,50		0,53	
ANOVA				F= 4,732		p= 0,03	
		F= 2,798		p= 0,10			
		F= 0,238				p= 0,63	

Table 9: Security in the execution of thoracic thrusts.

Success

Also the success of thoracic thrusts was rated best by the therapists who started to work osteopathically in 1999 and 2000. Nevertheless, the various groups do not differ significantly in the evaluation of the success in the application of thrusts (cf. Table10).

	Final year_c	N	Mean	Std. Deviation	Std. Error Mean	t/Sig.	t/Sig.	t/Sig.
TS success	<1998	36	1,98	0,754	0,126	0,615	0,516	
	99-00	34	1,88	0,537	0,092	0,541		-0,170
	>2000	36	1,90	0,468	0,078		0,608	0,866

Table 10: Successful application of thoracic thrusts.

6.2.4. The use of thrusts in the lumbar spine

Frequency

Thrusts in the lumbar spine region are most frequently used by therapists who started to work osteopathically in 1999 and 2000, while those who started their osteopathic practice before 1998 apply the thrusts most rarely. The difference in frequency is not significant but it could indicate a tendency that more experienced osteopaths use thrusts less often in the lumbar spine (cf. Table 11).

LS frequ		-1998		99-00		>2000	
n	no	7		0		2	
	rarely	9		11		6	
	somet	15		12		21	
	often	9		12		7	
%	no	17,5		0,0		5,6	
	rarely	22,5		31,4		16,7	
	somet	37,5		34,3		58,3	
	often	22,5		34,3		19,4	
95% CI		l	u	l	u	l	u
	no	8,7%	32,0%	0,0%	9,9%	1,5%	18,1%
	rarely	12,3%	37,5%	18,6%	48,0%	7,9%	31,9%
	somet	24,2%	53,0%	20,8%	50,8%	42,2%	72,9%
	often	12,3%	37,5%	20,8%	50,8%	9,8%	35,0%
Mean values:		2,65		3,03		2,92	
Standard dev.:		1,03		0,82		0,77	
ANOVA		F= 3,048		p= 0,09			
				F= 0,351		p= 0,56	
		F= 1,612				p= 0,21	

Table 11: Frequency of lumbar thrusts.

Popularity

Thrusts in the lumbar spine region are most popular among osteopaths who started their osteopathic practice in the years 1999 and 2000. This group differs significantly from the osteopaths who graduated after 2000, who on average are those who like to use the lumbar thrusts the least. Other differences between the groups are not significant (cf. Table 12).

LS like		-1998		99-00		>2000	
n	no	6		1		2	
	less	9		8		17	
	like	18		21		14	
	very	6		5		3	
%	no	15,4		2,9		5,6	
	less	23,1		22,9		47,2	
	like	46,2		60,0		38,9	
	very	15,4		14,3		8,3	
95% CI		l	u	l	u	l	u
	no	7,2%	29,7%	0,5%	14,5%	1,5%	18,1%
	less	12,6%	38,3%	12,1%	39,0%	32,0%	63,0%
	like	31,6%	61,4%	43,6%	74,4%	24,8%	55,1%
	very	7,2%	29,7%	6,3%	29,4%	2,9%	21,8%
Mean values:		2,62		2,86		2,50	
Standard dev.:		0,94		0,69		0,74	
ANOVA				F= 4,426		p= 0,04	
		F= 1,568		p= 0,215			
		F= 0,348				p= 0,557	

Table 12: Popularity of lumbar thrusts.

Security

Osteopaths who started to work in 1999 and 2000 are those who feel by far most secure when it comes to the execution of lumbar thrusts. They differ significantly from the osteopaths who have less experience in osteopathic practice. The self-assessment of the latter also lies clearly below that of the therapists who started to work osteopathically before 1998 (cf. Table13).

LS safe		-1998		99-00		>2000	
n	no	0		0		1	
	less	8		6		14	
	safe	18		17		14	
	very	11		12		7	
%	no	0,0		0,0		2,8	
	less	21,6		17,1		38,9	
	safe	48,6		48,6		38,9	
	very	29,7		34,3		19,4	
95% CI		l	u	l	u	l	u
	no	0,0%	9,4%	0,0%	9,9%	0,5%	14,2%
	less	11,4%	37,2%	8,1%	32,7%	24,8%	55,1%
	safe	33,4%	64,1%	33,0%	64,4%	24,8%	55,1%
	very	17,5%	45,8%	20,8%	50,8%	9,8%	35,0%
Mean values:		3,08		3,17		2,75	
Standard dev.:		0,72		0,71		0,81	
ANOVA				F= 5,475		p= 0,02	
		F= 3,421				p= 0,07	
		F= 0,288		p= 0,593			

Table 13: Security in the execution of lumbar thrusts.

Success

Similarly to the evaluation of security also the success in the execution of lumbar thrusts is rated highest by the osteopaths who have been working since 1999 or 2000. However, no significant differences can be observed for this variable (cf. Table 14).

	Final year_c	N	Mean	Std. Deviation	Std. Error Mean	t/Sig.	t/Sig.	t/Sig.
LS success	<1998	33	2,37	0,940	0,164	0,343	-0,921	
	99-00	34	2,30	0,712	0,122	0,733		-1,399
	>2000	35	2,58	0,917	0,155		0,361	0,166

Table 14: Successful application of lumbar thrusts.

6.2.5. The use of thrusts in the extremities

Frequency

Thrusts in the extremities are most frequently used by osteopaths who graduated after 2000. This group differs significantly from the osteopaths who completed their training before 1998. Otherwise the differences between the groups are quite small (cf. Table 15).

limbs frequ		-1998		99-00		>2000	
n	no	8		4		2	
	rarely	19		13		9	
	somet	7		14		18	
	often	6		4		6	
%	no	20,0		11,4		5,7	
	rarely	47,5		37,1		25,7	
	somet	17,5		40,0		51,4	
	often	15,0		11,4		17,1	
95% CI		l	u	l	u	l	u
	no	10,5%	34,8%	4,5%	26,0%	1,6%	18,6%
	rarely	32,9%	62,5%	23,2%	53,7%	14,2%	42,1%
	somet	8,7%	32,0%	25,6%	56,4%	35,6%	67,0%
	often	7,1%	29,1%	4,5%	26,0%	8,1%	32,7%
Mean values:		2,28		2,51		2,80	
Standard dev.:		0,96		0,85		0,80	
ANOVA		F= 6,523				p= 0,01	
				F= 2,096		p= 0,15	
		F= 1,285		p= 0,26			

Table 15: Frequency of thrusts in the extremities.

Popularity

Also regarding the popularity of thrusts in the extremities the osteopaths who started their work after 2000 indicated to like them most. Again they differ significantly from the osteopaths who started to work osteopathically before 1998 (cf. Table 16).

limbs like		-1998		99-00		>2000	
n	no	6		6		2	
	less	14		6		5	
	like	15		19		24	
	very	3		4		4	
%	no	15,8		17,1		5,7	
	less	36,8		17,1		14,3	
	like	39,5		54,3		68,6	
	very	7,9		11,4		11,4	
95% CI		l	u	l	u	l	u
	no	7,4%	30,4%	8,1%	32,7%	1,6%	18,6%
	less	23,4%	52,7%	8,1%	32,7%	6,3%	29,4%
	like	25,6%	55,3%	38,2%	69,5%	52,0%	81,4%
	very	2,7%	20,8%	4,5%	26,0%	4,5%	26,0%
Mean values:		2,39		2,60		2,86	
Standard dev.:		0,86		0,91		0,69	
ANOVA		F= 6,378				p= 0,01	
				F= 1,761		p= 0,189	
		F= 0,982		p= 0,325			

Table 16: Popularity of thrusts in the extremities.

Security

The osteopaths who completed their osteopathic training in 1999 or 2000 feel most secure when it comes to thrusts in the extremities, with (not significant) differences recognizable in comparison with the osteopaths who completed their training earlier or later (cf. Table 17).

limbs safe		-1998		99-00		>2000	
n	no	3		1		1	
	less	7		2		5	
	safe	16		18		23	
	very	10		12		6	
%	no	8,3		3,0		2,9	
	less	19,4		6,1		14,3	
	safe	44,4		54,5		65,7	
	very	27,8		36,4		17,1	
95% CI		l	u	l	u	l	u
	no	2,9%	21,8%	0,5%	15,3%	0,5%	14,5%
	less	9,8%	35,0%	1,7%	19,6%	6,3%	29,4%
	safe	29,5%	60,4%	38,0%	70,2%	49,2%	79,2%
	very	15,8%	44,0%	22,2%	53,4%	8,1%	32,7%
Mean values:		2,92		3,24		2,97	
Standard dev.:		0,91		0,71		0,66	
ANOVA		F= 2,732		p= 0,10			
				F= 2,653		p=0,11	
		F= 0,084				p= 0,773	

Table 17: Security in the execution of thrusts in the extremities

Success

Table 18 illustrates that the rating of the success of thrusts in the extremities does not depend on the start of the osteopathic practice.

	Final year_c	N	Mean	Std. Deviation	Std. Error Mean	t/Sig.	t/Sig.	t/Sig.
limbs success	<1998	33	2,63	0,827	0,144	0,720	0,742	
	99-00	33	2,46	1,042	0,181	0,474		-0,104
	>2000	34	2,49	0,756	0,130		0,461	0,917

Table 18: Successful application of thrusts in the extremities.

6.2.6. Preconditions for thrusts

According to ANOVA significant correlations with the start of the osteopathic practice can only be observed regarding the application of thrusts for the treatment of patients between the ages of 6 and 12 (cf. Table 19).

This group of patients is thrust most often by osteopaths who qualified before 1998, while the other therapists use the thrusts much less frequently. In comparison with the osteopaths who started their practice in 1999 or 2000 the difference is significant. In comparison with the osteopaths who qualified later at least a tendency can be observed.

6-12y		<1998		99-00		>2000	
n	n	19		26		25	
	y	18		9		10	
%	n	51,4		74,3		71,4	
	y	48,6		25,7		28,6	
95% CI		l	u	l	u	l	u
	n	35,9%	66,6%	57,9%	85,8%	54,9%	83,7%
	y	33,4%	64,1%	14,2%	42,1%	16,3%	45,1%
Mean values:		0,49		0,26		0,29	
Standard dev.:		0,51		0,44		0,46	
ANOVA		F= 4,157		p= 0,045			
		F= 3,097				p= 0,083	
				F= 0,070		p= 0,792	

Table 19: Frequency of thrusts depending on the patient's age.

Regarding the other age groups and also the fitness and underlying diseases of the patients no significant differences can be recognized.

6.3. Correlation between the frequency of the application of thrusts and the security, popularity and treatment success

6.3.1. Thrusts in the cervical spine

Table 20 summarizes the correlation coefficients (Spearman's Rho), which illustrate possible linear correlations between the different variables.

		CS_like_o	CS_save_o	CS success
CS_frequ_o	Correlation Coefficient	0,830	0,612	-0,355
	Sig. (2-tailed)	<0,001	<0,001	0,001
	N	114	113	87
CS_like_o	Correlation Coefficient		0,677	-0,448
	Sig. (2-tailed)		<0,001	<0,001
	N		112	87
CS_save_o	Correlation Coefficient			-0,618
	Sig. (2-tailed)			<0,001
	N			87

Table 20: Correlation coefficients of the cervical spine.

Significant linear correlations can be observed between all individual variables. The most distinct correlations are the following:

Frequency and security in the execution of the thrusts correlate most strongly with the popularity of thrusts among the individual osteopaths.

The success correlates most strongly with the security in the execution of the thrusts.

6.3.2. Thrusts in the thoracic spine

Table 21 summarizes the correlation coefficients (Spearman's Rho), which illustrate possible linear correlations between the different variables regarding the thoracic spine.

Also here significant linear correlations can be observed between all compared variables. The most distinct correlation is that of the frequency of the use of thrusts with the popularity of the technique among the individual osteopaths. Like in the cervical spine the security in the execution of the thrusts in the thoracic spine correlates most strongly with the success in the execution of the thrusts.

		TS_like_o	TS_save_o	TS success
TS_frequ_o	Correlation Coefficient	0,605	0,419	-0,278
	Sig. (2-tailed)	<0,001	<0,001	0,003
	N	117	115	112
TS_like_o	Correlation Coefficient		0,482	-0,427
	Sig. (2-tailed)		<0,001	<0,001
	N		115	112
TS_save_o	Correlation Coefficient			-0,487
	Sig. (2-tailed)			<0,001
	N			112

Table 21: Correlation coefficient (Spearman's Rho) of the comparison of various variables in the thoracic spine.

6.3.3. Thrusts in the lumbar spine

Table 22 summarizes the correlation coefficients, which illustrate possible linear correlations between the different variables in the lumbar spine.

		LS_like_o	LS_safe_o	LS success
LS_frequ_o	Correlation Coefficient	0,618	0,530	-0,441
	Sig. (2-tailed)	<0,001	<0,001	<0,001
	N	116	114	107
LS_like_o	Correlation Coefficient		0,595	-0,646
	Sig. (2-tailed)		<0,001	<0,001
	N		114	107
LS_safe_o	Correlation Coefficient			-0,625
	Sig. (2-tailed)			<0,001
	N			107

Table 22: Correlation coefficients (Spearman's Rho) of comparisons of various variables in the lumbar spine.

While in the previous regions the frequency correlated most strongly with the popularity of the technique and the evaluation of the security with the success, the success correlates most strongly with the popularity in the lumbar spine. In both the thrusts in the cervical and in the thoracic spine the correlation was most evident between the success and the security in the execution of the technique.

6.3.4. Thrusts in the extremities

Table 23 summarizes the correlation coefficients, which illustrate possible linear correlations between the different variables.

		limbs_like_o	limbs_safe_o	limbs success
limbs_frequ_o	Correlation Coefficient	0,668	0,416	-0,485
	Sig. (2-tailed)	<0,001	<0,001	<0,001
	N	114	110	105
limbs_like_o	Correlation Coefficient		0,598	-0,567
	Sig. (2-tailed)		<0,001	<0,001
	N		110	105
limbs_safe_o	Correlation Coefficient			-0,534
	Sig. (2-tailed)			<0,001
	N			104

Table 23: Correlation coefficients (Spearman's Rho) of the comparison of various variables in the extremities.

Also regarding the extremities all compared variables show significant linear correlations.

The following correlations can be recognized most distinctively:

frequency – popularity security– popularity success-popularity

6.4. Gender-specific characteristics in the application of thrusts

Since the analysis of the dependent variables showed highly significant differences between male and female osteopaths in almost all cases, they were analyzed with mean comparison tests and ANOVA for each sex individually. This made significant influences visible in particular in the case of the female therapists. Below the results are summarized in two separate groups (male and female therapists). (Results with low significance are not represented).

6.4.1 Influences on the use of thrusts by female osteopaths

6.4.1.1. General issues

In cases where a thrust would be appropriate the female osteopaths who started their osteopathic practice before 1998 use other techniques significantly more often (cf. Table 24). With decreasing experience the share of female osteopaths who use the thrust without trying another technique first increases.

OT	<1998	99-00	>2000
Mean	0,89	0,83	0,67
N	27	18	30
Std. Deviation	0,320	0,383	0,479
ANOVA	F= 0,277	p=0,601	
	F= 4,135		p= 0,047
		F= 1,568	p= 0,217

Table 24: Frequency of the use of other techniques in cases where a thrust would be appropriate. (Female osteopaths classified according to the start of their osteopathic practice).

6.4.1.2. Frequency of the use of thrusts

Thrusts in the cervical spine

How often thrusts are used in the cervical spine by female osteopaths is largely independent from the analyzed parameters.

Thrusts in the thoracic spine

The frequency of the use of thrusts in the thoracic spine is highly significantly dependent on the start of the therapist's osteopathic practice (cf. Table 25). Women who have been working as osteopaths longer use the technique more rarely than those who are not so long in practice.

TS_frequ	<1998	99-00	>2000
Mean	2,96	3,22	3,53
N	27	18	30
Std. Deviation	0,940	0,808	0,571
ANOVA	F= 0,916	p=0,344	
	F= 7,841		p= 0,007
		F= 2,434	p= 0,126

Table 25: Frequency of the use of thrusts in the thoracic spine. (Female osteopaths classified according to the start of their osteopathic practice).

Thrusts in the lumbar spine

How often women use thrusts in the lumbar spine depends significantly on the start of their osteopathic practice (cf. Table 26). Women who have been working as osteopaths longer use the technique more rarely than those who are not so long in practice.

LS_frequ	<1998	99-00	>2000
Mean	2,37	2,83	2,87
N	27	18	30
Std. Deviation	0,967	0,786	0,819
ANOVA	F= 2,861	p=0,098	
	F= 4,399		p= 0,041
		F= 0,019	p= 0,89

Table 26: Frequency of the use of thrusts in the lumbar spine. (Female osteopaths classified according to the start of their osteopathic practice).

Thrusts in the extremities

The frequency of thrusts in the extremities depends highly significantly on the start of the women's osteopathic practice. Women who have been working as osteopaths longer use the technique more rarely than those who are not so long in practice. (cf. Table 27).

limbs_frequ	<1998	99-00	>2000
Mean	2,04	2,39	2,76
N	27	18	29
Std. Deviation	0,898	0,916	0,786
ANOVA	F= 1,631	p=0,208	
	F= 10,272		p= 0,002
		F= 2,163	p= 0,148

Table 27: Frequency of the use of thrusts in the extremities. (Female osteopaths classified according to the start of their osteopathic practice).

6.4.1.3. Popularity of thrusts

It could be observed that the popularity of thrusts correlates most strongly with the frequency of use. Insofar, the following results provide an interesting background for further discussion.

Thrusts in the cervical spine

Like the frequency also the popularity of thrusts in the cervical spine is largely independent from the evaluated parameters.

Thrusts in the thoracic spine

The popularity of thrusts in the thoracic spine depends significantly on the start of the women's work as an osteopath (cf. Table 28). Women who have been working longer as osteopaths do not like to use the technique so much as women who have been in practice not so long.

TS_like	<1998	99-00	>2000
Mean	2,78	3,06	3,27
N	27	18	30
Std. Deviation	0,801	0,539	0,691
ANOVA	F= 1,658	p=0,205	
	F= 6,118		p= 0,016
		F= 1,226	p= 0,274

Table 28: Popularity of the use of thrusts in the thoracic spine. (Female osteopaths classified according to the start of their osteopathic practice).

Thrusts in the lumbar spine

The popularity of thrusts in the lumbar spine among female therapists shows a tendency to be dependent on the start of the osteopathic practice. Women who have been working longer as

osteopaths do not like to use the technique so much as women who have been in practice not so long (cf. Table 29).

LS_like	<1998	99-00	>2000
Mean	2,35	2,72	2,47
N	26	18	30
Std. Deviation	0,892	0,575	0,776
ANOVA	F= 2,478	p=0,123	
	F= 0,292		p= 0,591
		F= 1,464	p= 0,232

Table 29: Popularity of the use of thrusts in the lumbar spine. (Female osteopaths classified according to the start of their osteopathic practice).

Thrusts in the extremities

The popularity of thrusts in the extremities among female osteopaths depends highly significantly on the start of the osteopathic practice (cf. Table 30). Women who have been working longer as osteopaths do not like to use the technique so much as women who have been in practice not so long.

limbs_like	<1998	99-00	>2000
Mean	2,08	2,44	2,83
N	25	18	29
Std. Deviation	0,759	0,984	0,711
ANOVA	F= 1,882	p=0,178	
	F= 13,946		p< 0,001
		F= 2,399	p= 0,128

Table 30: Popularity of the use of thrusts in the extremities. (Female osteopaths classified according to the start of their osteopathic practice).

6.4.1.4. Security in the execution of thrusts

Also the aspect security showed distinct correlations with the variables frequency, popularity and in particular success. Therefore this chapter will evaluate the influences on these parameters.

Thrusts in the cervical spine

Like the frequency and popularity also the security in the execution of thrusts in the cervical spine is largely independent from the evaluated parameters when it comes to female therapists. Neither tendencies nor significant influences could be detected.

Thrusts in the thoracic spine

The results show the tendency that the professional experience could have an influence (cf. Table 31). The women who felt most secure were those who have been in practice for the longest time. The shorter the therapists were working as osteopaths the more insecure they felt.

TS_save	<1998	99-00	>2000
Mean	2,61	2,28	2,20
N	23	18	30
Std. Deviation	0,941	1,018	0,805
ANOVA	F= 1,163	p=0,288	
	F= 2,897		p= 0,095
		F= 0,086	p= 0,771

Table 31: Security in the execution of thrusts in the thoracic spine. (Female osteopaths classified according to their age).

Thrusts in the lumbar spine and extremities

Regarding the lumbar spine and the extremities no correlations between the security and other variables could be detected (neither significant nor tendencies).

6.4.1.5. Success of thrusts

Thrusts in the cervical spine

The success of thrusts in the cervical spine is rated significantly better by those female osteopaths who started their osteopathic practice before 1998, than by the female osteopaths with less professional experience (cf. Table 32).

CS success	<1998	99-00	>2000
Variable	CS success	CS success	CS success
Mean	1,79	2,45	2,83
N	14	11	23
Std. Deviation	0,678	0,688	0,984
ANOVA	F= 5,918	p=0,023	
	F= 12,082		p= 0,001
		F= 1,263	p= 0,269

Table 32: Success in the execution of thrusts in the cervical spine. (Female osteopaths classified according to the start of their osteopathic practice).

Thrusts in the thoracic spine

While a significant influence could be observed in the cervical spine this was not the case in the thoracic spine.

Thrusts in the lumbar spine

Regarding the thrusts in the lumbar spine by female osteopaths no correlations between success and the other variables could be detected (neither significant nor a tendency).

Thrusts in the extremities

The treatment success of thrusts in the extremities is rated most poorly by the female osteopaths who started their osteopathic work before 1998 (cf. Table 33). This group shows a tendency to differ in this respect from the other groups.

limbs success	-1998	99-00	>2000
Mean	2,89	2,48	2,45
N	20	16	28
Std. Deviation	0,714	1,120	0,800
ANOVA	F= 1,724	p=0,198	
	F= 3,87		p= 0,055
		F= 0,017	p= 0,897

Table 33: Success in the execution of thrusts in the extremities. (Female osteopaths classified according to the start of their osteopathic practice).

6.4.1.6. Preconditions for thrusts

Thrusts to patients of different age groups

Children between the age of six and twelve are thrust most frequently by experienced female osteopaths (start of osteopathic work before 1998) (cf. Table 34). The shorter the professional experience the less frequently the thrusts are used for this age group.

6-12	<1998	99-00	>2000
Mean	0,50	0,22	0,21
N	24	18	29
Std. Deviation	0,511	0,428	0,412
ANOVA	F= 3,484	p=0,069	
	F= 5,348		p= 0,025
		F= 0,015	p= 0,903

Table 34: Frequency of thrusts for patients aged between six and twelve years. (Female osteopaths classified according to the start of their osteopathic practice).

In contrast, the professional experience does not have an influence on the frequency of the use of thrusts for the oldest group of patients (older than 70 years) (neither significant nor a tendency).

Also in the other age groups no significant differences or a tendency of difference can be observed.

Thrusts to treat patients with underlying diseases

Differences regarding the use of thrusts to treat patients with the specified underlying diseases can only be observed in the cases of osteoporosis and disturbed deep sensitivity. However, these differences represent only tendencies and are not significant with regard to the 5% confidence level.

Patients with disturbed deep sensitivity are mainly treated with thrusts by female osteopaths with medium experience (start of the osteopathic practice in the years 1999 and 2000, cf. Table 35), while those who started their osteopathic work before 1998 or after 2000 do not differ much in the frequency of their thrust application.

depth_sens_dist	<1998	99-00	>2000
Mean	0,25	0,54	0,26
N	16	13	19
Std. Deviation	0,447	0,519	0,452
ANOVA	F= 2,586	p=0,119	
	F= 0,007		p= 0,932
		F= 2,538	p= 0,122

Table 35: Frequency of the use of thrusts to treat patients with disturbed deep sensibility. (Female osteopaths classified according to the start of their osteopathic practice).

6.4.2. Influences on the use of thrusts among male osteopaths

6.4.2.1. General issues

A tendency can be observed that it depends on several factors whether male osteopaths use other techniques first even though a thrust would be appropriate. Basically, the tendency can be recognized that the practitioners who have been in practice longer rather try alternative methods than the other therapists (cf. Table 36).

OT	<1998	99-00	>2000
Mean	0,58	0,47	0,17
N	12	17	6
Std. Deviation	0,515	0,514	0,408
ANOVA	F= 0,338	p= 0,566	
	F= 2,963		p= 0,104
		F= 1,697	p= 0,207

Table 36: Frequency of the use of alternative techniques even though a thrust would be appropriate. (Male osteopaths classified according to the start of their osteopathic practice).

6.4.2.2. Frequency of the use of thrusts

Thrusts in the cervical spine

The cervical spine is the only region of the body where correlations between the frequency of thrusts and the other variables could be detected among the male osteopaths. A tendency is recognizable in the decrease of the frequency of thrusts in the cervical spine with the increase of experience of the therapists (cf. Table 37).

CS_frequ	<1998	99-00	>2000
Mean	2,46	2,82	3,17
N	13	17	6
Std. Deviation	0,967	0,883	0,753
ANOVA	F= 1,14	p= 0,295	
	F= 2,467		p= 0,135
		F= 0,717	p= 0,407

Table 37: Frequency of the use of thrusts in the cervical spine. (Male osteopaths classified according to the start of their osteopathic practice).

Thrusts in other body structures

Regarding the other body structures no correlations between the frequency and the experience of the therapists could be observed among the male osteopaths (neither significant nor a tendency).

6.4.2.3. Popularity of thrusts

Thrusts in the cervical spine

No correlation could be detected between the popularity of thrusts in the cervical spine and the osteopathic experience of the practitioners.

Thrusts in the thoracic spine

Thrusts in the thoracic spine show the tendency to be more popular among male osteopaths with more experience than among their less experienced colleagues (cf. Table 38).

TS_like	<1998	99-00	>2000
Mean	3,54	3,29	3,17
N	13	17	6
Std. Deviation	0,519	0,772	0,408
ANOVA	F= 0,965	p= 0,334	
	F= 2,374		p= 0,142
		F= 0,146	p= 0,706

Table 38: Popularity of the use of thrusts in the thoracic spine. (Male osteopaths classified according to the start of their osteopathic practice).

Thrusts in the lumbar spine and the extremities

No correlations between the popularity of thrusts and the other variables could be observed with regard to these body structures (neither significant nor a tendency).

6.4.2.4. Security in the execution of thrusts

Thrusts in the cervical spine

The male osteopaths who have been working longest in their osteopathic practice feel most insecure regarding the thrusts in the cervical spine (cf. Table 39). In comparison with the osteopaths who started their work in 1999 and 2000 the difference is significant.

CS_save	<1998	99-00	>2000
Mean	2,92	3,41	3,33
N	13	17	6
Std. Deviation	0,641	0,618	0,516
ANOVA	F= 4,462	p= 0,044	
	F= 1,877		p= 0,188
		F= 0,077	p= 0,784

Table 39: Security in the execution of the thrusts in the cervical spine. (Male osteopaths classified according to the start of their osteopathic practice).

Thrusts in the thoracic spine

Also in the thoracic spine the male osteopaths who started their osteopathic practice in 1999 and 2000 rate their security in the execution of the thrust best. The therapists who started their work later feel most insecure (cf. Table 40).

TS_save	<1998	99-00	>2000
Mean	3,54	3,71	3,33
N	13	17	6
Std. Deviation	0,519	0,470	0,516
ANOVA	F= 0,855	p= 0,363	
	F= 0,643		p= 0,434
		F= 2,658	p= 0,118

Table 40: Security in the execution of thrusts in the thoracic spine. (Male osteopaths classified according to the start of their osteopathic practice).

Thrusts in the lumbar spine

Regarding the lumbar spine no tendency of a correlation between the security in the execution of thrusts and the start of the osteopathic practice can be observed.

Thrusts in the extremities

Again it is the group of osteopaths who started their work in 1999 and 2000 who feel most secure in the execution of the thrusts in the extremities (cf. Table 41). The differences to the less experienced therapists are not significant, however, a tendency can be observed.

limbs_safe	<1998	99-00	>2000
Mean	3,23	3,41	2,83
N	13	17	6
Std. Deviation	0,725	0,618	0,753
ANOVA	F= 0,544	p= 0,467	
	F= 1,206		p= 0,287
		F= 3,481	p= 0,076

Table 41: Security in the execution of the thrusts in the extremities. (Male osteopaths classified according to the start of their osteopathic practice).

6.4.2.5. Success of thrusts

Thrusts in the cervical and thoracic spine

Regarding the cervical and thoracic spine no correlations between the treatment success and the other variables could be observed among the male therapists.

Thrusts in the lumbar spine

There is a recognizable tendency that the most experienced male osteopaths (those who started their osteopathic practice before 1998) are most successful in the application of the technique in comparison with the other two groups (cf. Table 42).

LS success	<1998	99-00	>2000
Mean	1,90	2,29	2,46
N	12	17	6
Std. Deviation	0,734	0,830	0,510
ANOVA	F= 1,776	p= 0,194	
	F= 2,799		p= 0,114
		F= 0,204	p= 0,656

Table 42: Success in the application of thrusts in the lumbar spine. (Male osteopaths classified according to the start of their osteopathic practice).

Thrusts in the extremities

Regarding the extremities no correlations between the success and the other variables could be detected (neither significant nor a tendency).

6.4.2.6. Preconditions for thrusts

Thrusts to treat patients of different age groups

Regarding children between the ages of six and twelve, adolescents between 12 and 18 and patients older than 70 years tendencies of differences between the three groups of male osteopaths can be observed.

All patients in these age groups are thrusts most frequently by practitioners who started their osteopathic work after 2000 (cf. Table 43, Table 44 and Table 45). Regarding the other age groups no correlations between the frequency of thrusts and other variables could be detected among the male osteopaths (neither significant nor a tendency).

6-12	<1998	99-00	>2000
Mean	0,46	0,29	0,67
N	13	17	6
Std. Deviation	0,519	0,470	0,516
ANOVA	F= 0,855	p= 0,363	
	F= 0,643		p= 0,434
		F= 2,658	p= 0,118

Table 43: Frequency of the use of thrusts to treat children between the ages of six and twelve. (Male osteopaths classified according to the start of their osteopathic work).

12-18	<1998	99-00	>2000
Mean	0,92	0,65	1,00
N	13	17	6
Std. Deviation	0,277	0,493	0,000
ANOVA	F= 3,27	p= 0,081	
	F= 0,447		p= 0,513
		F= 2,988	p= 0,099

Table 44: Frequency of the use of thrusts to treat adolescents between the ages of 12 and 18. (Male osteopaths classified according to the start of their osteopathic work).

>70	<1998	99-00	>2000
Mean	0,15	0,24	0,67
N	13	17	6
Std. Deviation	0,376	0,437	0,516
ANOVA	F= 0,288	p= 0,596	
	F= 6,066		p= 0,025
		F= 3,946	p= 0,06

Table 45: Frequency of the use of thrusts to treat adults older than 70 years. (Male osteopaths classified according to the start of their osteopathic work).

Thrusts to treat patients with certain underlying diseases

Despite osteoporosis patients are thrust most frequently by male osteopaths with the longest professional experience (cf. Table 46). However, also the therapists who started their osteopathic practice after 2000 use more thrusts to treat these patients. Thus the most distinct differences can be observed between the groups "-1998" and "99-00". The same holds for patients with metabolic diseases (cf. Table 47) and patients with myocardial infarctions (cf. Table 48). Also patients with strokes are treated most rarely with thrusts by the group of male therapists who started their osteopathic practice in 1999 or 2000. In these cases the osteopaths with the least professional experience use thrusts most frequently (cf. Table 49).

osteoporosis	<1998	99-00	>2000
Mean	0,36	0,08	0,25
N	11	13	4
Std. Deviation	0,505	0,277	0,500
ANOVA	F= 3,107	p= 0,092	
	F= 0,149		p= 0,705
		F= 0,822	p= 0,379

Table 46: Frequency of the use of thrusts to treat patients with osteoporosis. (Male osteopaths classified according to the start of their osteopathic practice).

metabol_disord	<1998	99-00	>2000
Mean	0,91	0,62	0,80
N	11	13	5
Std. Deviation	0,302	0,506	0,447
ANOVA	F= 2,837	p= 0,106	
	F= 0,335		p= 0,572
		F= 0,508	p= 0,486

Table 47: Frequency of the use of thrusts to treat patients with metabolic diseases. (Male osteopaths classified according to the start of their osteopathic practice).

myocard_inf	<1998	99-00	>2000
Mean	0,91	0,62	0,80
N	11	13	5
Std. Deviation	0,302	0,506	0,447
ANOVA	F= 2,837	p= 0,106	
	F= 0,335		p= 0,572
		F= 0,508	p= 0,486

Table 48: Frequency of the use of thrusts to treat patients with myocardiac infarction (Male osteopaths classified according to the start of their osteopathic practice).

apoplex	<1998	99-00	>2000
Mean	0,73	0,38	0,80
N	11	13	5
Std. Deviation	0,467	0,506	0,447
ANOVA	F= 2,927	p= 0,101	
	F= 0,085		p= 0,774
		F= 2,571	p= 0,128

Table 49: Frequency of the use of thrusts to treat patients after strokes. (Male osteopaths classified according to the start of their osteopathic practice).

Regarding all other specified underlying diseases no correlations between the use of thrusts and the other variables could be detected among the male osteopaths, neither significant nor a tendency.

7 Analysis of results

Among the osteopaths who have been longer in practice (group “-1998”) (cf. also Chapter 5 Data classification) 79.5 % try to use other techniques in cases where a thrust would be appropriate. A significant difference can be observed in comparison with the osteopaths who have been in practice shorter (“>2000”), where 58.3 % prefer to use another technique (cf. Table 2). The result is even more obvious if only the female osteopaths and their application of thrusts are considered. In cases where a thrust would be appropriate the more experienced female osteopaths (“-1998”) try other techniques before significantly more often than those belonging to the group “>2000” (cf. Table 24 below). The p-value in this case is ~0.05. The smaller the p-value the smaller the probability of correlations of two comparable groups (cf. p-value, Chapter 5.).

OT	<1998	99-00	>2000
Mean	0,89	0,83	0,67
N	27	18	30
Std. Deviation	0,320	0,383	0,479
ANOVA	F= 0,277	p=0,601	
	F= 4,135		p= 0,047
		F= 1,568	p= 0,217

Table 24: Frequency of the use of other techniques in cases where a thrust would be appropriate. (Female osteopaths classified according to the start of their osteopathic practice).

The trend among the male osteopaths goes in the same direction, however, no significant difference can be observed because the p-value for the comparison of the groups “-1998” and “>2000” is only ~0.10 (cf. Table 36).

Regarding the various body regions it can be recognized that the cervical spine in general is very rarely (35.9 %) to not at all (31.6 %) treated with thrusts (cf. Figure 4 below).

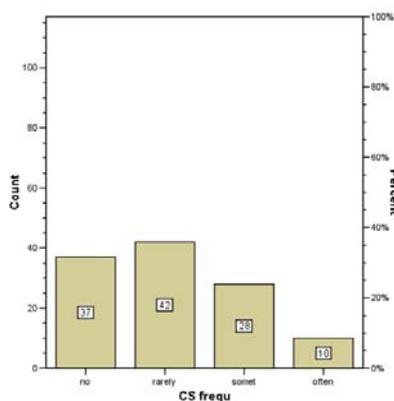


Figure 4: Frequency of cervical thrusts.

Those who use cervical thrusts least often are the osteopaths who started their osteopathic practice before “1998“, where 40 % do not use these thrusts at all. However, no significant difference can be detected in comparison with the other groups of therapists (cf. Table 3). Looking at the male and female therapists separately, no significant differences can be detected among the female therapists. However, among the male therapists a tendency can be observed that the more experienced practitioners (“-1998“) use cervical thrusts less often than the “>2000” group of therapists, even though this difference is not significant. The p-value is ~0.14 (cf. Table 37).

Regarding the thoracic spine it can be observed that osteopaths who have been in practice longer (“-1998”) use thrusts more rarely than the others, which represents a significant difference (cf. Table 7 below).

TS frequ		-1998		99-00		>2000	
n	no	2		0		0	
	rarely	7		5		1	
	somet	13		10		12	
	often	18		20		23	
%	no	5,0		0,0		0,0	
	rarely	17,5		14,3		2,8	
	somet	32,5		28,6		33,3	
	often	45,0		57,1		63,9	
95% CI		l	u	l	u	l	u
	no	1,4%	16,5%	0,0%	9,9%	0,0%	9,6%
	rarely	8,7%	32,0%	6,3%	29,4%	0,5%	14,2%
	somet	20,1%	48,0%	16,3%	45,1%	20,2%	49,7%
often	30,7%	60,2%	40,9%	72,0%	47,6%	77,5%	
Mean values:		3,18		3,43		3,61	
Standard dev.:		0,90		0,74		0,55	
ANOVA		F=6,300				p= 0,01	
		F= 1,740		p= 0,191			
				F= 1,401		p= 0,241	

Table 7: Frequency of thoracic thrusts.

In this group 5 % of the therapists indicate that they do not thrust the thoracic spine at all. In the two other groups 0 % of the osteopaths do not use thrusts at all. The p-value of the comparison between the “-1998” and “>2000” groups is 0.01. In general, however, the thoracic thrusts are used quite frequently by 54.7 % of the therapists (Figure 7). Female osteopaths of the group“-1998” use the thoracic thrusts highly significantly more rarely than their female colleagues in the group “>2000” (cf. Table 25 below).

TS_frequ	<1998	99-00	>2000
Mean	2,96	3,22	3,53
N	27	18	30
Std. Deviation	0,940	0,808	0,571
ANOVA	F= 0,916	p=0,344	
	F= 7,841		p= 0,007
		F= 2,434	p= 0,126

Table 25: Frequency of the use of thoracic thrusts. (Female osteopaths classified according to the start of their osteopathic practice).

The p-value in the case of the female therapists is ~ 0.01 . Regarding their male counterparts no difference could be observed.

In the region of the lumbar spine thrusts are used quite frequently (cf. Figure 10). 25.6 % of the therapists use lumbar thrusts frequently and 43.6 % at least sometimes. A tendency but no significant difference can be observed that more experienced osteopaths (“-1998“) use lumbar thrusts less often than the group “99-00” (cf. Table 11). The p-value in this case is 0.09. Like in the case of the thoracic spine a significant difference could also be detected in the lumbar spine: female osteopaths who have been in practice longer avoid thrusts in the region of the lumbar spine (cf. Table 26 below).

LS_frequ	<1998	99-00	>2000
Mean	2,37	2,83	2,87
N	27	18	30
Std. Deviation	0,967	0,786	0,819
ANOVA	F= 2,861	p=0,098	
	F= 4,399		p= 0,041
		F= 0,019	p= 0,89

Table 26: Frequency of the use of lumbar thrusts. (Female osteopaths classified according to the start of their osteopathic practice).

In comparison with the group “>2000” the group “-1998” displayed a significant p-value of ~ 0.04 , while the p-value in comparison with the group “99-00” is ~ 0.10 , which illustrates at least a tendency. Among the male therapists no differences could be detected.

The thrusts in the extremities are significantly more often used by the group “>2000” in comparison with the group “-1998”. The p-value is 0.01 (cf. Table 15 below).

limbs frequ		-1998	99-00	>2000			
n	no	8	4	2			
	rarely	19	13	9			
	somet	7	14	18			
	often	6	4	6			
%	no	20,0	11,4	5,7			
	rarely	47,5	37,1	25,7			
	somet	17,5	40,0	51,4			
	often	15,0	11,4	17,1			
95% CI		l	u	l	u	l	u
	no	10,5%	34,8%	4,5%	26,0%	1,6%	18,6%
	rarely	32,9%	62,5%	23,2%	53,7%	14,2%	42,1%
	somet	8,7%	32,0%	25,6%	56,4%	35,6%	67,0%
often	7,1%	29,1%	4,5%	26,0%	8,1%	32,7%	
Mean values:		2,28	2,51	2,80			
Standard dev.:		0,96	0,85	0,80			
ANOVA		F= 6,523		p= 0,01			
			F= 2,096	p= 0,15			
		F= 1,285	p= 0,26				

Table 15: Frequency of the use of thrusts in the extremities.

A separate analysis of the male and female osteopaths showed a highly significant difference between the more experienced female osteopaths (“-1998”) and the “>2000” group. The female osteopaths who are longer in practice use the thrusts in the extremities more rarely than their less experienced colleagues. The p-value is 0.002 (cf. Table 27 below).

limbs_frequ	<1998	99-00	>2000
Mean	2,04	2,39	2,76
N	27	18	29
Std. Deviation	0,898	0,916	0,786
ANOVA	F= 1,631	p=0,208	
	F= 10,272		p= 0,002
		F= 2,163	p= 0,148

Table 27: Frequency of the use of thrusts in the extremities. (Female osteopaths classified according to the start of their osteopathic practice).

A tendency can also be observed in the comparison of the groups “99-00” and “>2000”: the more experienced group uses thrusts less often. However, the difference is not significant. The p-value is ~0.15. Regarding the male osteopaths no important differences are recognizable.

It can be said that over the course of an osteopathic career the more experienced osteopaths use thrusts less often than their less experienced counterparts. This difference can mainly be attributed to the group of female osteopaths.

The frequency of the use of cervical and thoracic thrusts depends strongly on how much the therapist likes the technique. The correlation coefficient in the case of the cervical spine is 0.83 (cf. Table 20), while it is 0.65 for the thoracic spine (cf. Table 21). Whether a therapist feels secure in the execution of the thrust or has success with the technique is not so much linked with the frequency of use. However, success comes with the security in the execution of the technique. In this case the correlation coefficient is \sim -0.62 for the cervical and \sim -0.49 for the thoracic spine.

Regarding the lumbar spine (cf. Table 22) the frequency of use correlates with the popularity. The correlation coefficient is \sim 0.62. In this region also the success correlates with the popularity with a correlation coefficient of \sim -0.65 and not with the security like in the other regions.

Thrusts in the extremities are used often by osteopaths who like the techniques. The correlation coefficient is \sim 0.67. The same holds for the variable success with a correlation coefficient of \sim -0.57, and the variable security with a correlation coefficient of \sim 0.60 with both variables depending on the popularity of the technique (cf. Table 23).

Thus it can be said that if the therapists like a technique they use it more often. The frequency of use does not so much depend on how secure the osteopaths feel or how much success they have with the application.

8. Summary of the results and discussion

The following section will summarize and interpret the most important results of this survey. The research question was: Are thrust techniques less often used the longer an osteopath is in practice? Are the causes for this dislike, insecurity and/or lack of success in the use of the technique?

In discussions with more experienced osteopaths I made the observation that more and more often the therapists completely rejected the thrust technique. It seems that the patients and also the practitioners are divided into two camps, those who are in favor of thrust work and those who are against it. According to Abehsera (2005) the therapists who criticize the thrusts are the so-called “functional practitioners”, while the proponents of impulse techniques are the “structural practitioners”.

The method of choice to evaluate the research question was the development of a quantitative questionnaire which was sent to all 211 Osteopaths who are living in Austria and have graduated from the WSO (Wiener Schule für Osteopathie, reference date: April 5, 2007). The return rate was 55.5%.

On the basis of general data (year of graduation, gender, age, treatment time) the influences on the use of thrusts are evaluated.

According to the 33% and 66% percentiles the osteopaths were divided into three groups according to the start of their osteopathic practice (“-1998”/ “1999-2000”/ “>2000”). This produced three groups of similar size which could be compared with each other. The practitioners who started their osteopathic practice until 1998 (-1998) are those who have been working osteopathically for the longest time and are thus the most experienced osteopaths. The group 1999-2000 has average experience with the osteopathic practice. The osteopaths who started to work osteopathically after 2000 (>2000) represent the most inexperienced group because they have not been in practice so long.

The question about the completion of the osteopathic training was difficult because of the different degrees and training periods. I have decided to let the osteopaths decide themselves from which moment on (i.e. which degree) they felt as being osteopaths. Nevertheless, I only contacted graduates from the WSO who are on the list of therapists, which means that all of them had passed at least the final clinical exam and had obtained the status “osteopath”. For the analysis of my research question this was enough because I could assume that with this status they all were sufficiently familiar with the impulse techniques.

Since reactions of the body after the application of a thrust can have serious consequences in some body regions and since specific thrust techniques are used for certain regions, the questions looked at different regions of the body: cervical spine, thoracic spine, lumbar spine and extremities. The questions concerned the frequency, popularity, security in the execution of the technique, the success with the thrust, the use of alternative methods even in cases where a thrust would be appropriate and the personal attitude of the practitioners towards the thrusts.

The result was: 86.2% of the osteopaths would let themselves be treated with thrusts (cf. Chapter 6.1.1.). This speaks in favor of a very good acceptance of this technique among the osteopathic family. 79.5% of the more experienced osteopaths (“-1998“) try another technique first even though it is clear that a thrust would be the appropriate method. In this context, a significant difference with the group “>2000” could be observed, where only 58.3% would delay the use of a thrust. This question showed clearly that more experienced practitioners rather hesitate to use a thrust. The detailed analysis of the female osteopaths produced an even more significant picture, while the male osteopaths did not show any significant trend towards delaying the use of a thrust.

In the case of the cervical spine it was very evident that many practitioners avoid using a thrust. In this region the technique is used very rarely (35.9%) to not at all (31.6%). This goes along the lines of the Chapter Contraindications (2.10.), where the cervical spine region is presented as the most difficult area when it comes to thrusts because of the risk of injury to the vessels (Hartman, 1997). Also Gibbons (2001) mentions that most of the published injuries after a manipulation concern the region of the cervical spine. However, no significant difference can be recognized that more experienced osteopaths (“-1998“), no matter whether male or female, use thrusts in this region less often than the other groups of therapists.

In the thoracic spine more than half of the practitioners, i.e. 54.7% use a thrust often, while 31.6% use it sometimes. There is not too much fear of causing side-effects in this region. Nevertheless, a significant result could be observed: Osteopaths who have been in practice longer (“-1998“) use thrusts in this region more rarely. This holds in particular for the female osteopaths among the group “-1998” in comparison with their counterparts in the group “>2000”. The more experienced female osteopaths use the thrust highly significantly less often than the less experienced therapists. The female practitioners who do not apply thrusts in this area have in general a very reserved attitude towards the technique.

The result of the lumbar spine is similar to that of the thoracic spine. Thrusts are used relatively frequently: 25.6 % of the therapists use the lumbar thrusts often and 43.6 % at least

sometimes. This result corresponds with a statement by Gibbons (2001) who said that the lumbar spine rotation technique is in generally used to treat lumbar pain. Also Cooperstein (2001) says that the manipulation (HVLA) in side-lying is the most effective technique to treat pain in the region of the lumbar spine. More experienced osteopaths (“-1998“) tend to use the thrusts less often. In particular the comparison of the female osteopaths in the groups “-1998” and “>2000” showed a significant difference, while the comparison between the groups“-1998” and “99-00” revealed at least a tendency. Regarding the totality of the osteopaths a tendency can be observed but not a significant difference that less experienced osteopaths are more open to use the thrusts.

In the case of the extremities the tendency could be confirmed. More experienced osteopaths (“-1998“) use the thrusts less often than the practitioners of the group“>2000“. The difference is even more obvious among the female osteopaths, where a comparison of the groups “-1998” and “>2000” revealed a highly significant difference. A comparison of the female osteopaths in the groups“99-00“ and “>2000“ showed at least a tendency that the more experienced therapists use the thrusts less often but did not provide a significant result. Thus it can be said that over the course of an osteopathic career it can be observed that more experienced osteopaths use thrusts more rarely than less experienced practitioners. This difference is mainly attributable to the female osteopaths.

The more the practitioners like a technique the more often it is used. This holds for all regions of the body. The success with the thrust correlates with the security in the execution of the technique – at least regarding the cervical and thoracic manipulations. In the case of thrusts in the lumbar spine and extremities the success of the technique correlates with its popularity, while the feeling of security in the execution of thrusts in the extremities correlates with the popularity of the techniques.

9. Critical reflection

The return rate was 55.45%, which according to (2001) represents a return rate above average for a survey by mail. Usually, the return rates of such surveys rarely exceed 20% (Porst, 2001). This can mainly be explained by the fact that the osteopaths want to actively support their colleagues in completing their master thesis. Probably they were or are themselves dependent on the cooperation of their colleagues when writing their thesis. In addition, I respected a number of recommendations published by Porst (2001) to obtain a higher postal return rate. One important factor was the explicit information about the anonymity and that the addressees could send the completed questionnaire back with an enclosed envelop free of charge. Thus the respondents only had to spend some time to complete the questionnaire and to go to the next mailbox.

In the case of the general questions at the beginning of the questionnaire five osteopaths did not indicate their gender, original profession or treatment time. Several respondents also left out the answers to the questions about age and start of the osteopathic practice. Therefore it would be necessary to create a more attractive general part so that nobody can overlook this “introduction”.

Due to the different durations of osteopathic training at the WSO in recent years it was difficult to establish a uniform criterion regarding graduation. Since there will be alterations and innovations concerning the osteopathic training also in the future, it will be necessary to clearly define which group of osteopaths should be addressed and how they will be classified. More experienced osteopaths delay the use of impulse techniques. A follow-up study could evaluate what are the exact reasons for this hesitation. It could be that the osteopaths have a larger range of techniques at their disposal. In a follow-up study it would thus be good to additionally ask whether a more experienced osteopath has a more extensive repertoire of techniques and wants to use it, or whether the osteopath has already had bad experiences with the thrust.

Regarding the question about the average success in the application of the technique I have chosen to use the school marks system. Since I have linked the individual marks with hyphens (cf. Questionnaire in the annex) some respondents added intermediate marks, which made the analysis of the questionnaire much harder (cf. Chapter 5.). It would be better to write down the individual marks in an isolated way and to point out explicitly that only whole numbers can be given as marks.

In a follow-up survey the patient population of the individual osteopaths should also be considered. Many practitioners treat only children or persons with serious neurological conditions, where a thrust is only rarely the treatment method of choice or is even contraindicated (cf. Chapter 2.10.). The questions in this survey could not clarify whether a therapist in general has a positive attitude towards thrusts but cannot use them in practice. A possibility would have been to tell the respondents to skip the sets of questions 3 to 6 if they do not treat an adequate patient population in their practice. This might have been the reason why up to three osteopaths did not provide answers to these sets of questions. In the case of the question about the security in the execution of the thrust in the extremities even seven answers were missing.

Less experienced practitioners use thrusts more often in the individual body regions. In this context it is necessary to clarify whether they are still practicing or trying the techniques and have not found their way yet. Also in the future the impulse techniques have to be taught in a comprehensive way. The knowledge about the techniques, their effect and contraindications needs to be conveyed because the therapists have to take on more and more responsibility (Fossum, 2005b). In the holistic sense of osteopathy it would be desirable to preserve the whole range of treatment techniques just like the WSO tries to convey a complete picture of osteopathy (WSO, 2008).

The more popular a technique is the more often it is used. This holds for all the different body regions. It would be interesting to carry out a study about what makes a technique popular and why it is not security or a successful application that determines the frequency of use.

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April 2007

Dear colleagues,

I want to write my master thesis at the Donauuniversität Krems this year and would like to ask you for your cooperation.

The enclosed questionnaire can be completed easily within ten minutes. You will also find a response envelop to send back the questionnaire. All fees will be covered by me.

The data of the returned questionnaires will be treated confidentially and not be passed on to third parties.

Since I did not number the questionnaires before sending them I cannot retrace who filled in which questionnaire, which guarantees your anonymity.

I am looking forward to numerous responses and would like to wish you a lot of sunshine



in springtime.

Best regards

Thomas Pingitzer

The questionnaire starts on the backside of this letter and includes a total of five pages.

Please send the questionnaire back until April 25, 2007

T: 0676 / 5241310 e-mail: physio.t.pingitzer@gmx.at

Questionnaire

You are male female Age: ____

Since when have you been working as an osteopath?

Y E A R

e.g.:

Original profession doctor
 physical therapist
 other (please indicate): _____

Average duration of an osteopathic treatment session (not first treatment)

- less than 15 minutes
- less than 30 minutes
- less than 45 minutes
- more than 45 minutes

1) Would you let yourself be treated with a thrust?

- Yes No

2) In cases where a thrust would be appropriate, would you still try another technique first?

- Yes No



3) How often do you use thrusts in the **cervical spine**?

- often sometimes rarely never

3a) Do you like to use a thrust in this area?

- very much voluntarily not so much not at all

3b) How secure do you feel when using the thrust?

- very secure secure not so secure insecure

3c) If you use a thrust in the cervical spine, please mark your average rate of success in the execution of the technique.
(1 = very good success; 5 = no success)

1—————2—————3—————4—————5



4) How often do you use thrusts in the **thoracic spine**?

- often sometimes rarely never

4a) Do you like to use a thrust in this area?

- very much voluntarily not so much not at all

4b) How secure do you feel when using the thrust?

- very secure secure not so secure insecure

4c) If you use a thrust in the thoracic spine, please mark your average rate of success in the execution of the technique.
(1 = very good success; 5 = no success)

1—————2—————3—————4—————5



5) How often do you use thrusts in the **lumbar spine**?

- often sometimes rarely never

5a) Do you like to use a thrust in this area?

- very much voluntarily not so much not at all

5b) How secure do you feel when using the thrust?

- very secure secure not so secure insecure

- 5c) If you use a thrust in the lumbar spine, please mark your average rate of success in the execution of the technique.
(1 = very good success; 5 = no success)

1—————2—————3—————4—————5



- 6) How often do you use thrusts in the **extremities**?

often sometimes rarely never

- 6a) Do you like to use a thrust in this area?

very much voluntarily not so much not at all

- 6b) How secure do you feel when using the thrust?

very secure secure not so secure insecure

- 6c) If you use a thrust in the extremities, please mark your average rate of success in the execution of the technique.
(1 = very good success; 5 = no success)

1—————2—————3—————4—————5



- 7) Which of the following groups of patients do you thrust?
Several answers possible:

not very athletic
 athletic persons (who practice sports 1-2 times per week)
 very athletic persons (who practice sports more than 2 times per week)

- 8) Which of the following groups of patients do you thrust?
Several answers possible:

children before reaching their school age
 children aged 6 to 12

- Adolescents between the age of 12 and majority (age of 18)
- Adults up to the age of 70
- Adults aged 70 plus

9) Which groups of patients with the following underlying pathologies do you thrust?
Several answers possible:

- osteoporosis
- metabolic problems (e.g.: Diabetes mellitus)
- disturbed surface sensibility
- disturbed deep sensibility
- patients with myocardiac infarctions (acute state some time ago)
- patients with stroke (acute state some time ago)

10) Why do you thrust or why do you not thrust?

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Thank you for your valuable time and contribution to this project!