Is there a relation between osteopathic kidney dysfunction and segmental dysfunction of the spinal segments D12 – L2 in patients suffering from renal hypertension?

- Pilot study -

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(Vienna School of Osteopathy)

Submitted by

Christoph Mauder

Freiburg, December 2007

Translated by Anna Walchshofer

Eidesstattliche Erklärung

Hiermit versichere ich, die vorgelegte Masterthese selbständig verfasst zu haben.

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Freiburg, den 2. Dezember 2007

Christoph Mauder

Thanks

For Simone

Without your support, I would not have been able to complete this course of studies.

Abstract deutsch

Studienziel: Überprüfung der These, dass es eine Relation zwischen osteopathischer Nierendysfunktion und segmentaler Dysfunktion in den Wirbelsäulensegmenten Th12-L2 bei Patienten mit renaler Hypertonie gibt.

Schlüsselwörter: Osteopathische Nierendysfunktion, renale Hypertonie, Wirbelsäulensegmente Th12 – L2

Studiendesign: Klinische beschreibende Forschung

Patienten: 34 Patienten: 27 männliche, 7 weibliche

Primärer Zielparameter:. Segmentale Dysfunktion in den Wirbelsäulensegmenten Th12 – L2

Sekundärer Zielparameter:. Osteopathische Dysfunktion einer oder beider Nieren.

Ergebnisse: Bei allen eingeschlossenen Patienten wurde eine osteopathische Dysfunktion einer oder beider Nieren gefunden. Dabei wiesen 68 % aller Patienten eine segmentale Dysfunktion in dem Wirbelsäulenabschnitt Th12 – L2 auf. Es konnte keine statistische Relevanz assoziiert werden.

Schlussfolgerung: Auch wenn das Ergebnis, wohl auf Grund der geringen Patientenanzahl, statistisch nicht relevant ist, so kann es doch als eindeutiger Trend interpretiert werden, dass bei Patienten mit renaler Hypertonie eine Relation besteht zwischen osteopathischer Dysfunktion einer oder beider Nieren und einer Dysfunktion im Wirbelsäulenabschnitt Th12 – L2.

Die Aussage muss jedoch dahingehend relativiert werden, als die Messmethode (manuelle Untersuchung) nicht reproduzierbar ist. Zukünftige Studien, idealerweise als so genannte „Multicenterstudie“ durchgeführt, könnten überprüfen, ob sich die gefundenen und vermuteten Relationen in einem größeren Patientenkollektiv und von einzelnen Untersuchern unabhängig statistisch signifikant bestätigen lassen und auch von der klinischen Diagnose „Renale Hypertonie“ unabhängig sind.

Abstract englisch (English Abstract)

Objective of the study: To test whether, in patients with renal hypertension, a relation between osteopathic dysfunctions of the kidneys and dysfunctions in the spinal segments D12 – L2 can be diagnosed.

Keywords: Osteopathic renal dysfunction, renal hypertension, spinal segments D12 – L2

Design: Fundamental research

Patients: 34 patients: 27 male, 7 female

Main outcome measure: Dysfunctions in the spinal segments D12 – L2. Secondary parameters were osteopathic dysfunctions of one or both kidneys.

Results: Osteopathic dysfunction of one or both kidneys diagnosed in all patients included in the study. 68% of these patients show a segmental dysfunction in spinal segments D12 – L2. No statistical relevance could be noted.

Conclusion: Even though the results is not statistically relevant on grounds of the small number of patients there is a definite trend among patients suffering from renal hypertension towards a relation between osteopathic dysfunction of one or both kidneys and a dysfunction in the spinal segments D12 – L2. However, this statement is put into perspective by the fact that the measuring method (manual analysis) is not repeatable. Future studies, ideally carried out as so-called multicenter studies, could show whether the relations found and assumed in this study can be confirmed in a bigger patient population, whether they can be found statistically significant by separate independent researchers, and whether they are independent from the clinical diagnosis of renal hypertension.

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1 Introduction

1.1 Preliminary Note

From 2004 to 2005 I conducted, together with a colleague of mine and in cooperation with the University Freiburg (Germany), a study with the following title: „*Haben osteopathische Techniken der Nieren und deren Umgebung einen Einfluss auf den Blutdruck bei Patienten mit renaler Hypertonie oder essentieller Hypertonie mit begleitender Nierenschädigung?*“ [1].

[‘Do osteopathic techniques of the kidneys and their surrounding have an influence on the blood pressure of patients with renal hypertension or essential hypertension with concomitant renal disease?’]

This study included 34 patients (7 female and 27 male) with clinically diagnosed (according to the guidelines of the ‘World Health Organisation’ (WHO)) renal hypertension or essential hypertension with concomitant renal disease.

It was remarkable that within the framework of the osteopathic examination in all patients osteopathic renal dysfunctions could be found (*concerning this see also Discussion:* 7.2.1 *and* 7.2.2.2*, p. 45 et seq.*). Furthermore very often a dysfunction of the biomechanics in the spinal segments Th12-L2 could be detected. This led to the consideration to further examine these observations and possible connections between these observations, respectively, by means of conducting a corresponding study. As the measurement method (manual examination) is not reproducible and only a rather small patient collective could be included in the study, results can only be rated as a trend and the study at hand should in the first place be classified as pilot study.

1.2 Hypertension in Germany

Little more than one half of German adults are affected by chronic arterial hypertension. However, one has to assume that the actual number of patients is much higher [2]. In most cases the cause for the hypertension is unknown (approx. 90%). In such cases one talks about ‘essential hypertension’ or ‘primary hypertension’.

In the other cases an organ disease can be made responsible for the development of hypertension. This form of hypertension is called secondary hypertension. Hereby renal diseases which can lead to renal hypertension play an important role, as chronic renal diseases globally increase [3].

The consequences of hypertension are fatal. With a systolic blood pressure of 159 mmHg the risk of a stroke rises by 40% compared to a blood pressure of 149 mmHg [4]. And the probability of cardiac insufficiency rises even by 50 % when blood pressure is constantly enhanced by only 5 mmHg.

The special connection between blood pressure and the speed of the decline of renal functions has been shown by epidemiological studies [5]. Thus effectively lowering blood pressure is of utmost importance, as otherwise there is the danger of a vicious circle with arterial hypertension and restricted renal function affecting each other [Fig. 1].

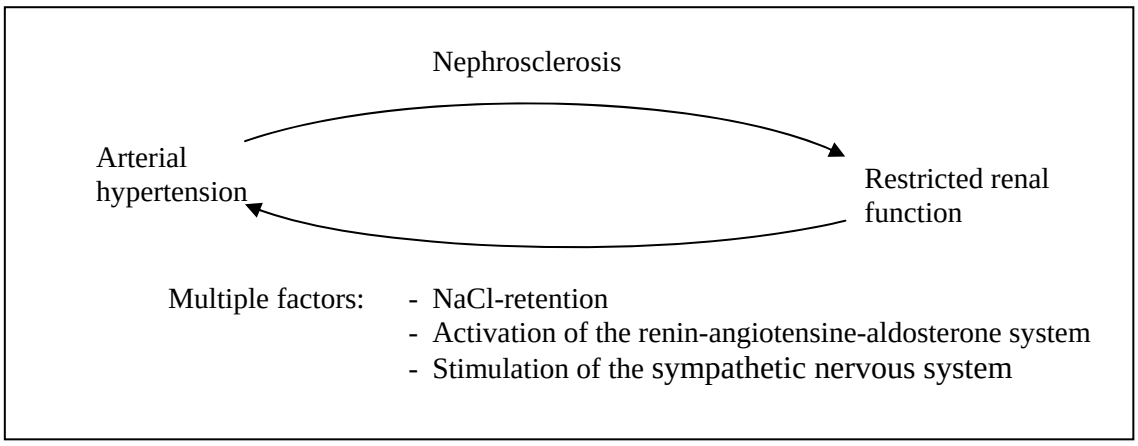

Fig. 1: Vicious circle – hypertension and renal insufficiency
From: BOKEMEYER D. Wichtiges Therapieziel bei Hypertonie ist der Nierenschutz. ***Offenbach: Ärzte Zeitung; 2003 Jun 16 (www.aerztezeitung.de)***

1.3 A short historic overview of arterial hypertension

The history of hypertension research actually started when Riva-Rocci developed in 1896 a possibility to exactly measure blood pressure by means of the pneumatic arm cuff [6].

At the beginning of the 20th century many works were published that dealt with arterial hypertension and its impact on different organs, such as kidneys, heart or brain (Janeway/Brunton, 1913) or that examined the effects of nephritis on the cardiovascular system (Widal, um 1920). Research increasingly concentrates on the newly discovered syndrome ‘arterial hypertension’ and its connection to the vegetative nervous system, especially to a raised tone of the sympathetic nerve. Consequently neurosurgical experiments on the sympathetic trunk and the splanchnic nerves follow (Peet, 1933) [7].

The meaning of renal perfusion for the blood pressure (Goldblatt, 1934) as well as for the renin-angiotensine-systems (Page, Houssay et al., around 1940) are two further important insights coming from the first half of the 20th century. This research is supported by surgical experiments. Thereby it can be shown that by means of resection of an atrophic kidney hypertension can be positively influenced (Butler, 1937) [7].

Thanks to arteriography, developed around 1955, there were new ways to show renal vascularisation. In 1962 the raised renin concentration in the blood in case of renovascular hypertension could be verified. At that time it was discovered that the cause of arterial hypertension is not a renal disease but a faulty adjustment of the blood pressure. Since then the focus of attention lay on the systems adjusting arterial blood pressure. From then on it was treated with the aid of pharmaceuticals influencing the following control systems:

- the haemodynamic system (cardiac output, capillary pressure, blood volume)
- the autonomic nervous system (sympathetic tone)
- the hormonal system (renin, aldosterone, catecholamines, cortisone) [7].

Today’s international standard is the classification of hypertension that of the WHO („World Health Organization“) [**Fehler! Verweisquelle konnte nicht gefunden werden.**].

Classification	systolic	diastolic
Ideal	<120	<80
Normal	<130	<85
raised-normal	130-139	85-89
mild hypertension (severity degree I)	140-159	90-99
Subgroup limit value hypertension	140-149	90-94
Medium hypertension (severity degree II)	160-179	100-109
Severe hypertension (severity degree III)	≥180	≥110
isolated systolic hypertension	≥140	<90
Subgroup syst. limit value hypertension	140-149	<90

Table 1: Blood pressure categories WHO

[8]

1.4 The historical development of osteopathic hypertension treatment

At the same time as orthodox medicine Osteopathy starts to deal with the clinical picture of arterial hypertension. In doing so it was initially attempted to influence blood pressure by means of the treatment of the spine. According to Blackman [9] and Downing [10], a manipulation of the second an third thoracic vertebra can lead to the reduction of blood pressure. They admit, however, that this as the only treatment is not sufficient and that the patient has to be treated within the framework of a holistic context.

Further research deepens these observations. Eggleston [11] distinguishes, regarding the osteopathic treatment and its influence on the blood pressure (as well as other parameters), between manipulative HVLA-techniques (HVLA = „High Velocity, Low Amplitude“) and the so called „soft-tissue-techniques“. Thereby he finds out that blood pressure is more strongly influenced by using HVLA-techniques than by using soft-tissue-techniques.

A publication by Northup [12] states that due to osteopathic manipulation treatment, blood pressure of 100 hypertension patient could be reduced significantly (systolic by

approx. 30 mmHg, diastolic by approx. 10 mmHg). However, the study does not give information as to when the blood pressure was measured, which relativises the statement.

Unfortunately similar deficiencies can be found in other studies, as for example in a work by Norris [13], which states that after osteopathic manipulation systolic as well as diastolic blood pressure could be lowered by approx. 5 mmHg in each case. However this statement has to be eyed critically, too, as only one measurement shortly after the treatment was made and thus there was no observation of the reaction of the blood pressure in the medium and long term.

In a more recent study by Johnston, Kelso et al. [14, 15] they described in a pilot- as well as long-term study segmental dysfunctions esp. in the coming along with hypertension. Earlier authors [12, 16, 17] found dysfunctions in this segment of the spine on the one hand but on the other hand also in the occipitocervical and thoracolumbar junction. For the study at hand especially one of Northup's [12] observations are of great importance, as he states that the involvement of kidneys can lead to a segmental loss of mobility, especially in the thoracolumbar junction.

2 Objectives

In my study I would like to examine the thesis, which states that there is a relation between osteopathic renal dysfunction and a segmental dysfunction in the spinal segments in patients suffering from renal hypertension.

3 Foundations

[References: 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38]

3.1 Anatomy and physiology of the kidney

3.1.1 Topographic anatomy

The kidneys are situated in the retroperitoneum and to medial concavo-beanlike shaped. They are about 11-12 cm long, 7 cm wide and 4 cm thick, whereby the right kidney is usually smaller that the left one and, due to its position under the liver slightly more caudal than the left one: the right kidney extends from the 12^{th} thoracic vertebra to the 3^{rd} lumbar vertebra, the left kidney from the 11^{th} thoracic vertebra to the intervertebral disc of 2^{nd} and 3^{rd} lumbar vertebra. Thereby the lower edge of the left kidney ventrally projects to the height of the umbilicus; the right kidney is positioned about 1-2 cm lower.

At the cranial ends of the kidneys are the adrenal glands which are connected to the kidney by the lamina suprarenalis.

The kidneys are firstly surrounded by the capsula fibrosa. Furthermore the kidney and adrenal glands are enclosed by the capsula adiposa which proceeds to the hilus renalis. Adipose tissue fills the room between blood vessels and ureter.

The second enclosure shared by kidney and adrenal glands is the renal fascia, which substantially adds to the anchorage of these organs in their position. Cranially and laterally it proceeds to the transversal fascia, encloses both organs and their capsula adiposa and medially pulls to the front lumbar vertebrae. In the area of the kidney it splits into a ventral and a dorsal blade. In cranial direction both blades join above the adrenal glands and merge into the diaphragm. Im Bereich der Nieren teilt sie sich auf in ein ventrales und in ein dorsales Blatt. Caudally it loses itself in the fascia perirenalis and the fascia iliaca, medially it encloses the big abdominal vessels [Fig. 2].

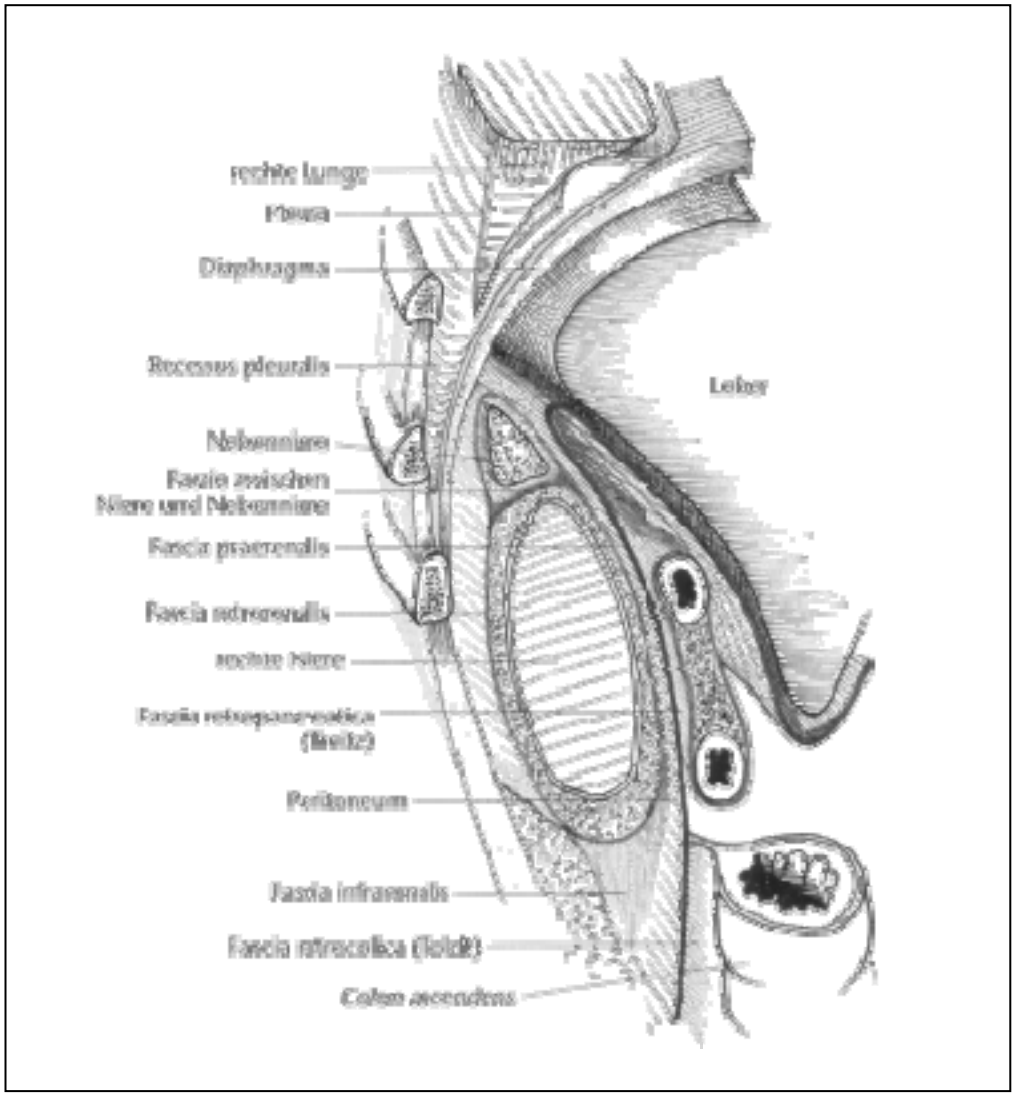

Fig. 2: The connection of thorax, abdomen and kidneys.

From: PAOLETTI S. Fascien, p. 84. *München: Urban und Fischer bei Elsevier; 2001*

[rechte Lunge = right lung; Pleura = pleura; Diaphragma = diaphragm; Recessus pleuralis = pleural recess; Nebenniere = adrenal gland; Faszie zwischen Niere und Nebenniere = fascia between kidney and adrenal gland; rechte Niere = right kidney; Peritoneum = peritoneum; Colon ascendes = ascending colon; Leber = liver]

The posterior blade merges in to the fascia of the m. psoas and the m. quadratus lumborum, the two anterior blades ventrally join each other. In the capsular fat run the n. subcostalis, the n. iliohypogastricus and the n. ilioinguinalis.

The dorsal side of the kidneys touches the m. quadratus lumborum, partially the origin aponeurosis of the m. transverses abdominis. The ventral side of the right kidney touches the liver cranially, the ascending colon and the duodenum. The ventral side of the left kidney touches the stomach, the spleen, the pancreatic cauda and the descending colon.

In the medial positioned hilum from ventral to dorsal can be found: renal veins, the renal artery and the ureter, which emerges from the renal pelvis (pyelon) and is the connection of kidney and urinary bladder.

3.1.2 Arterial supply

Normally only one single renal artery exists. However, in approx. 25% an additional concomitant renal artery occurs. The exit level of the renal arteries from the aorta varies according to the position of the kidney, but in most cases it is at the level of the 1st and 2nd lumbar vertebra. From the renal artery there are branches running to the capsula adiposa, to the adrenal gland, to the renal pelvis and to the ureter. The branches to the capsula adiposa anastomoses with neighbouring arteries.

3.1.3 Venous drainage

In the kidney hilum emerges the renal vein which finally merges into the inferior vena cava. The left renal vein is with its length of 5 -7 cm notably longer compared to the right side. It takes in the left suprarenal vein as well as the left testicular vein and is crossed by the mesentric artery [Fig. 3].

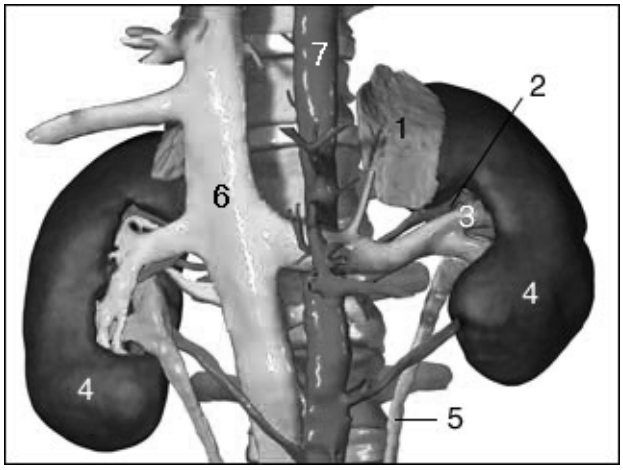

Fig. 3: Vascularisation of the kidneys

1 Adrenal gland
2 Renal artery
3 Renal vein
4 kidney
5 ureter
6 inferior vena cava
7 aorta

Source :URL:http://www.healthopedia.com

3.1.4 Lymphatic Drainage

The lymphatic drainage is carried out into the lumbar lymph nodes along the aorta as well as into the lymph nodes in front of the crura of the abdominal diaphragm.

3.1.5 Innervation

The autonomic innervation of the kidney is of special interest for this study, as it could be an explanation for the clinically observed relation of disorders of the thoracolumbal spine mobility in patients with renal hypertension which all showed an osteopathic renal dysfunction diagnosed by an osteopath.

3.1.5.1 Sympathetic innervation

The kidney is mainly innervated from the coeliac ganglion (mainly from the area D12-L2). It contains fascias from the greater, lesser and lowest splanchnic nerves as well as from the vagi nerves. Furthermore these fascias protract to the renal plexus, into which also the fascias of the mesentericum superior ganglion as well as of the sympathetic trunk merge. There are further connections to the aortic plexus of the abdominal aorta and the suprarenal plexus; partly also to the mesentericum inferius ganglion. Finally the nerves protract from the renal plexus to the kidney.

3.1.5.2 Parasympathetic innervation

The parasympathetic innervation is carried out by both vagus nerves, which protract through the celiac ganglion to the renal plexus. Furthermore parasmypathetic

innervation can be carried out by the nervi erigentes (of the 2nd - 4th sacral marrow) [Fig. 4].

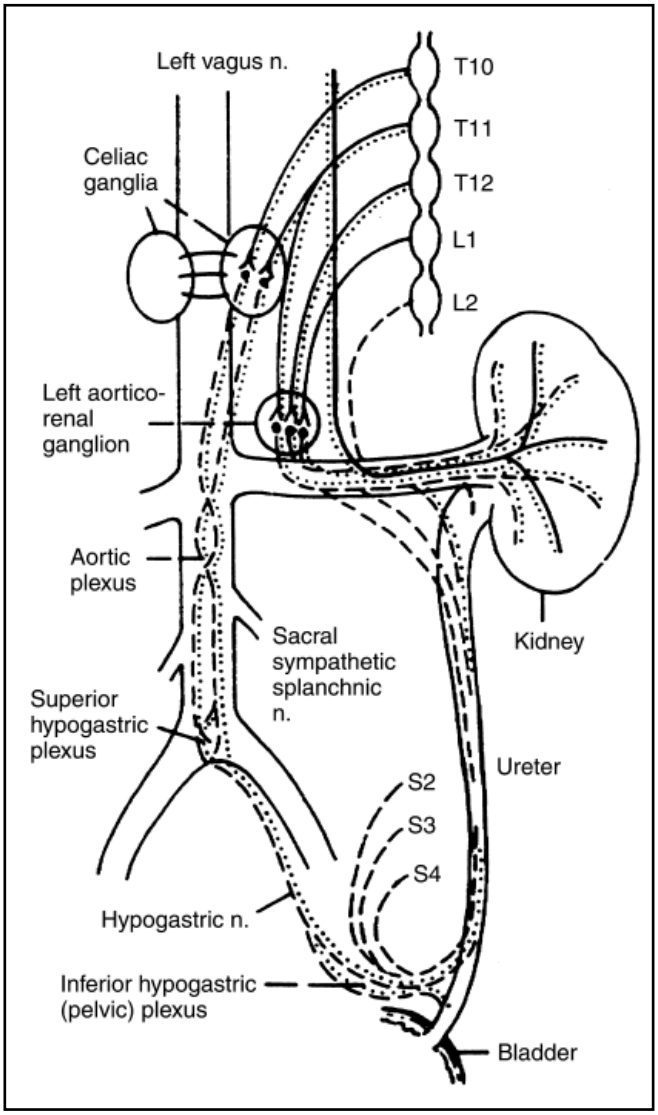

Fig. 4: Innervation of the kidney
[39]

3.1.6 Physiology of the kidney

Within one minute approx. 1 litre of blood flows through both of the kidneys, which means about every 4 – 5 minutes all of the blood circulating in the body passes through the two kidneys (i.e. 300 litre per day) and that again means that up to 1700 litres of blood flow through both kidneys within 24 hours. Within 24 hours the kidneys produce

about 170 litres of primary urine, which is reabsorbed to such a great extent that only 1 – 1.5 litres of urine remains that is excreted.

The most important functions of the kidneys are a) the regulation of the water and electrolyte supply, b) the excretion of metabolic waste products as well as foreign substances and water, c) the production of hormones, d) objective organ for metabolisation of hormones, e) the regulation of the acid-base balance, f) the reabsorption of for the body important substances in the primary urine.

In each kidney there are about one million of nephrones which are the smallest functional unit of the kidney. A nephrone consists of [Fig. 5]:

- *Afferent vessel* (vas afferens), circulating the blood into the renal corpuscle
- *Renal corpuscle* (corpus malpighi), consisting of a glomerulus and a Bowman's capsule
- *Tubules*, with their proximal tubule, Henle’s loop, and distal convoluted tubule, lying in the kidney cortex together with the renal corpuscles
- *Efferent vessel* (vas efferens), together with the afferent vessel making up the so-called capillary network.
- *Collecting tubule*, located in the renal medulla

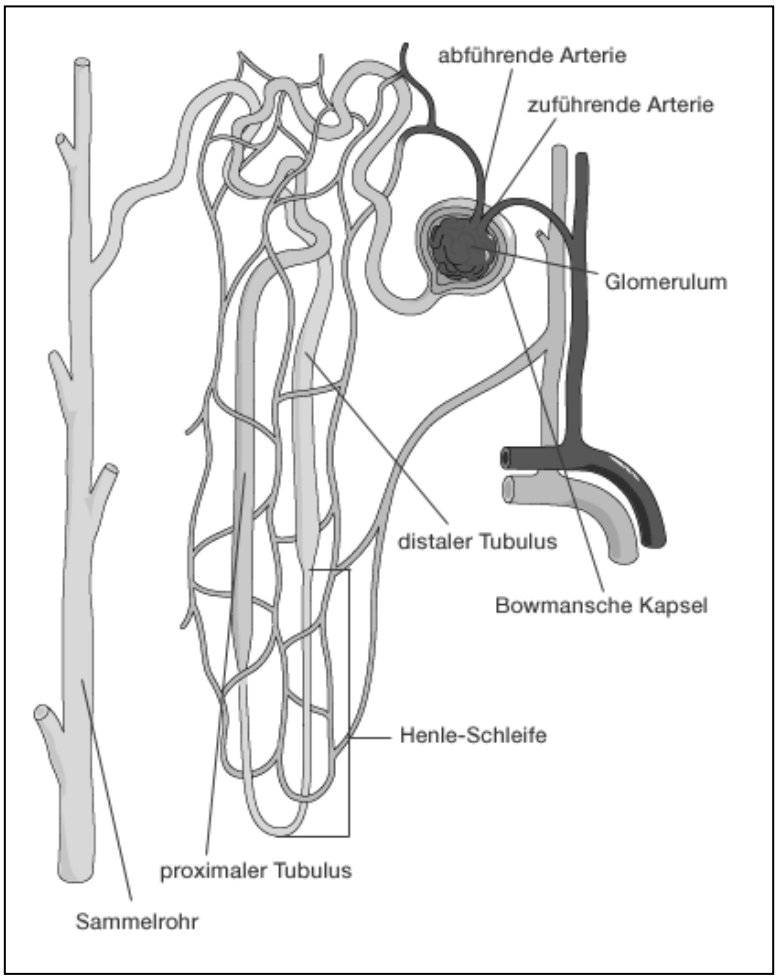

Fig. 5: Schematic anatomy of a nephron

Source: http://www.onmeda.de

[vas afferens = afferent vessel; glomerulus = glomerulus; Henle-Schleife = Henle's loop; Sammelrohr = collecting tubule]

In the 'juxtaglomerular apparatus' in the corpus malpighi, which consists of parts of the afferent and efferent vessels, the macula-densa cells of the ascending part of the Henle's loop as well as the extraglomerular mesangial cells, the renin is released. It is initiated by a) an increase of the sodium chloride concentration in the area of the macula densa, b) the stimulation of the baroreceptors in the afferent vessel (the higher the pressure the lower the release of renin), and c) activation of the sympathetic nervous system via beta receptors in the cells releasing renin.

The production of urine takes place by means of glomerular filtration, tubular reabsorption and the subsequent tubular secretion.

4 Background

There are two types of hypertension. One is called ‘primary’ (essential) hypertension (from which suffer approx. 90 % of patients) and the other one is called ‘secondary’ hypertension (approx. 10%), which is caused by an organ disease [**Fehler! Verweisquelle konnte nicht gefunden werden.**].

Primary (essential) hypertension	**90 – 95 %**
Secondary hypertension	**5 – 10 %**
- **renal parenchymatous hypertension**	**3.5 %**
- **renovascular hypertension**	**1 %**
- other (e. g. pheochromocytoma, hyperfunction of the adrenal cortex) (M. Cushing) etc.)	each with < 1 %

Table 2: Forms of secondary hypertension and their incidence

From: KUHLMANN U, WALB D, LUFT FC, Hrsg. Nephrologie: Pathophysiologie, Klinik, Nierenersatzverfahren. 4th. ed. *Stuttgart: Thieme; 2003*

A differentiation between primary and secondary hypertension is often difficult and only possible to a certain extent. This is especially true for renal hypertension. Every form of hypertension can lead to kidney damage in terms of a nephrosclerosis, which in turn intensifies the hypertension. Only with very few forms of hypertension is it possible to exclude a primary or secondary renal involvement. This is especially true for renal hypertension [40, 41; Fig. 6].

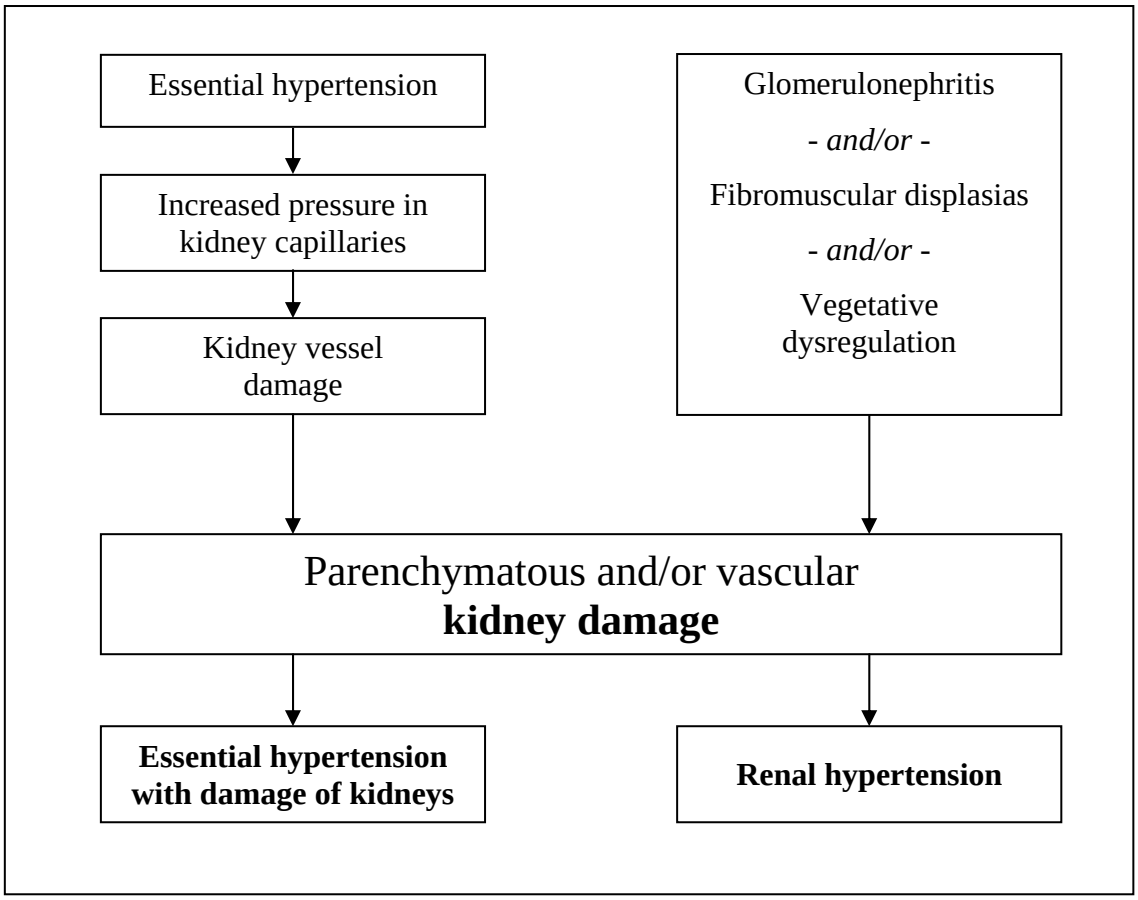

Fig. 6: Development of essential hypertension with damage of kidneys and renal hypertension [**Fehler! Textmarke nicht definiert.**]

4.1 Primary hypertension

So far no clear reason for the hypertone of 'primary/essential/idiopathic hypertension' has been found. However, one important role thereby plays the fact that blood pressure is subject to many different regulation systems which additionally influence each other. Examples are the peripheral as well as the central-adrenerge, renal, hormonal and vascular system.

4.2 Special form of secondary hypertension: renal hypertension

Renal hypertension classes among the different forms of secondary hypertension. Causes are vascular and parenchymatous renal diseases.

A reduced circulation of the kidney plays an important role in vascular diseases. Reasons are fibromuscular or arteriosclerotic changes in the vessels.

Parenchymatous changes, however, can be caused by glomerulonephritides, cystic kidneys, kidney tumors as well as by phlogistic system diseases with involvement of the kidneys, nephrosclerosis or interstitial diseases [42, 43]. Dysregulation in the autonomic nerve supply of the kidneys seems to play a role as well (*see* ***Fehler! Verweisquelle konnte nicht gefunden werden.****: Vegetative causes, p. 28*) [56, 59].

In the following the different causes for renal hypertension shall be presented.

4.2.1 Renoparenchymatous causes

Renoparenchymatous hypertension is most frequent of all forms of secondary hypertension (3.5 %). It is assumed that due to parenchymous change of the kidney a general drop of the peritubular hydrostatic pressure happens. This leads to sodium and water retention. And this in turn leads to an enlargement of the extracellular liquid space, increase in the volume of the freely circulating blood as well as to a bigger cardiac output [53]. In the long term the result is an increased peripheral vessel resistance. There are, however, different points of view how this mechanism exactly works: On the one hand it is assumed that the arterial wall becomes thicker because of structural changes [44, 45]. Other authors suspect that the cause is the reactivity of the nerve and muscle tissue in reaction to the sodium retention [46, 47] or that humoral substances may be the cause [48, 49]. It is assumed that in cases of chronic parenchymatous kidney diseases, autoregulation of the renal vessel system is restricted. As a result of the high systolic pressure on the glomerula the capillaries of the glomerulus can be damaged, which in turn can lead to high blood pressure again.

4.2.2 Renovascular causes

The cause for renovascular hypertension (approx. 1% of all hypertensions) is a renal artery stenosis [Fig. 7], which in turn is caused by arteriosclerotic plaques (approx. 75% of renovascular hypertensions) or by fibromuscular dysplasias, the cause of which is yet unknown [50]. Other significantly rarer causes of renal artery stenosis are aneurysms, compression due to cysts or renal artery angiomas.

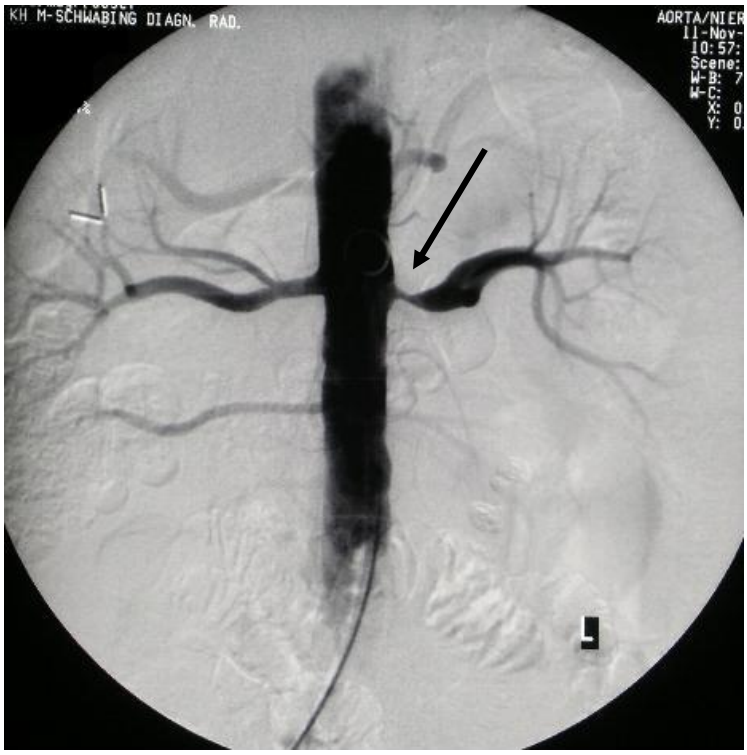

Fig. 7: Angiography of a kidney artery stenosis left (→ arrow)
Source: www.kms.mku.de

Reduced renal blood flow or low perfusion pressure is at the bottom of all forms of vascular kidney damage. This leads to an increased production of renin in the cells of the so called juxtaglomerular apparatus and secreted into the blood. This stimulates the angiotensineogen produced in the liver and is converted into angiotensine I. By means of the angiotensine converting enzyme (ACE) angiotensine I is converted into angiotensine II which has a vasoconstrictional effect on arterioles and thus causes an

increase of blood pressure due to an obstruction of peripheral blood vessels. Furthermore angiotensine II stimulates the secretion of the adrenocortical hormone aldosterone. This leads to sodium and water retention, resulting in volume increase and in consequence in a further rise of blood pressure [Fig. 8; 51, 52, 53, 54, 55].

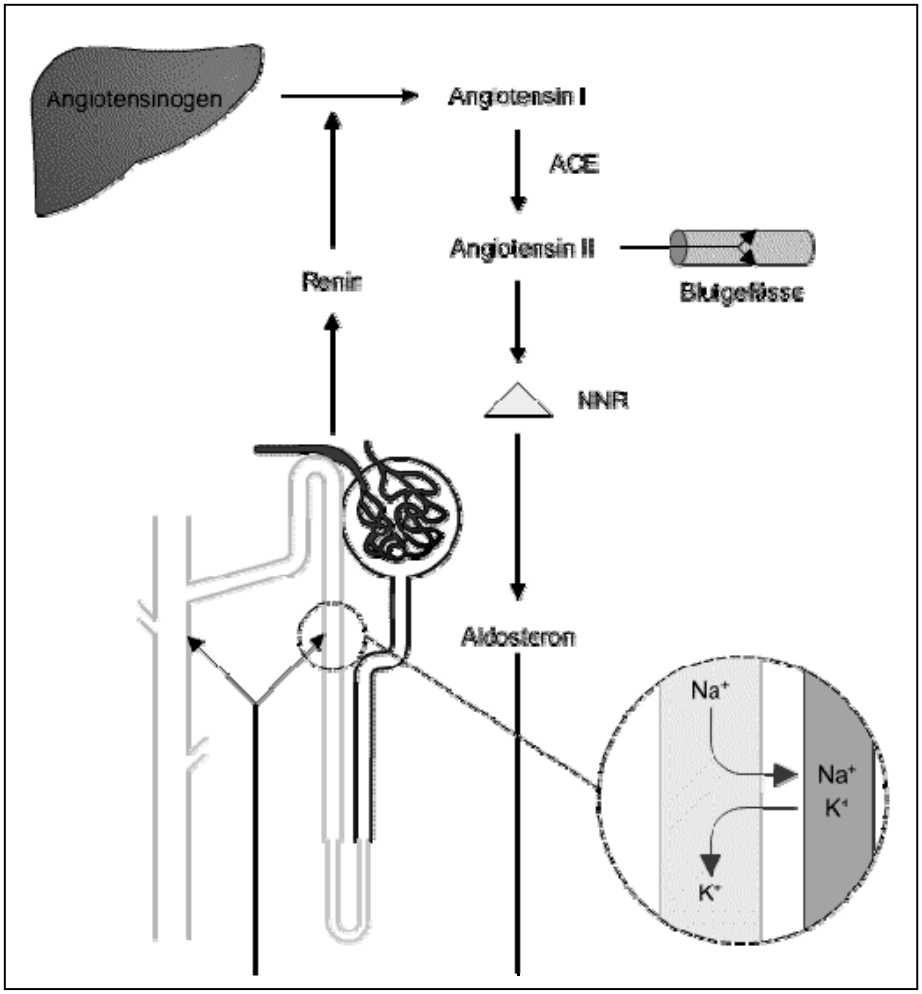

Fig. 8: The Renin-angiotensine-aldosterone system

Quelle: http://www.biorama.ch

[Blutgefässe = blood vessels]

4.2.3 Vegetative causes

Next to the renin-angiotestine-aldosterone-system, nowadays another mechanisms regarding chronic renal insufficiency approaches the focus of science: It is assumed, that sympathetic hypertension influences the development of chronic renal insufficiency [56]. Many studies could show a connection between renal insufficiency and increased

sympathetic activity and that patients thus have a propensity for high blood pressure [57, 58]. Furthermore it was observed that nerve impulses sent by diseased kidneys to the central nervous system lead to an increase of efferent sympathetic impulses. Possibly this is an explanation for arterial hypertension [59; Fig. 9].

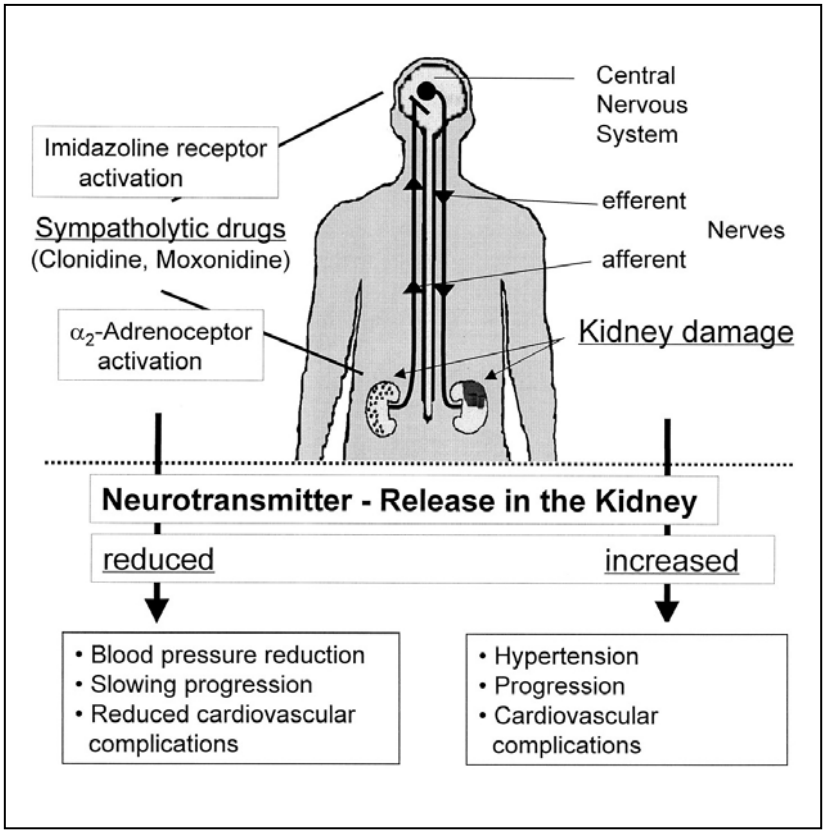

Fig. 9: Synopsis of pathophysiological events leading to sympathetic overactivity in chronic renal failure

[60]

5 Methods

5.1 Design of study

Descriptive research.

5.2 Patients

Number of patients: 34 (7 female, 27 male)

5.3 Therapists

The researches were carried out by two therapists each. Both therapists passed their pre-final exams successfully in November 2000 at the *Akademie für Osetopathie AFO e.V.* (Academy for Ostoeopathy AFO, registered association/Germany) [61]. They have been working for many years as self-employed osteopaths in their own medical offices.

5.4 Criterion for inclusion

- Diagnosis: Renal hypertension or essential hypertension with additional kidney damage (WHO 1999: systolic value: > 140 mmHg, diastolic value > 90 mmHG, creatinine >1,0 mg/dl)
- Age of patients 18 – 70 yearss
- Patients with normotensive blood pressure under medications with one or more blood pressure medicine.
- Patients with a constant blood pressure profile (including not normotensive) under medication for more than one year.

5.5 Criterion for exclusion

- Malignant diseases
- Aortic aneurysm
- Nephrectomy
- Kidney anomaly
- Familiar/hereditary cystic kidney disease
- Acquired/developed cystic kidney disease
- Untreated renal artery stenosis
- Pregnancy

The criterion for exclusion were established on one had for reasons of security, in order to counter possible doubts of the Ethic Commission of the University of Freiburg, that had until then no experience and no knowledge with osteopathic treatments, concerning the admission of the study. On the other hand, structural change within the kidneys was considered a criterion for exclusion, because according to our opinion hardly any influence could be expected from an osteopathic treatment.

5.6 Primary target variable

Segmental dysfunction in the spinal segements Th12 – L2.

5.7 Secondary target variable

Osteopathic dysfunction of one or both kidneys.

5.8 Methods of measurement

The manual osteopathic examination was carried out by a trained osteopaths in the rooms of the physiotherapy department of the Medical Clinic of the University of Freiburg and was documented according the examination sheet (*see 13.5: Osteopathischer Untersuchungsbogen*)

5.8.1 Osteopathic examination of the spine

The osteopathic examination of the spine was carried out as a movement test while seated; according to the model of Fryette [62], especially the component of movement flexion-extension, lateral rotation and rotation were examined [Fig. 10].

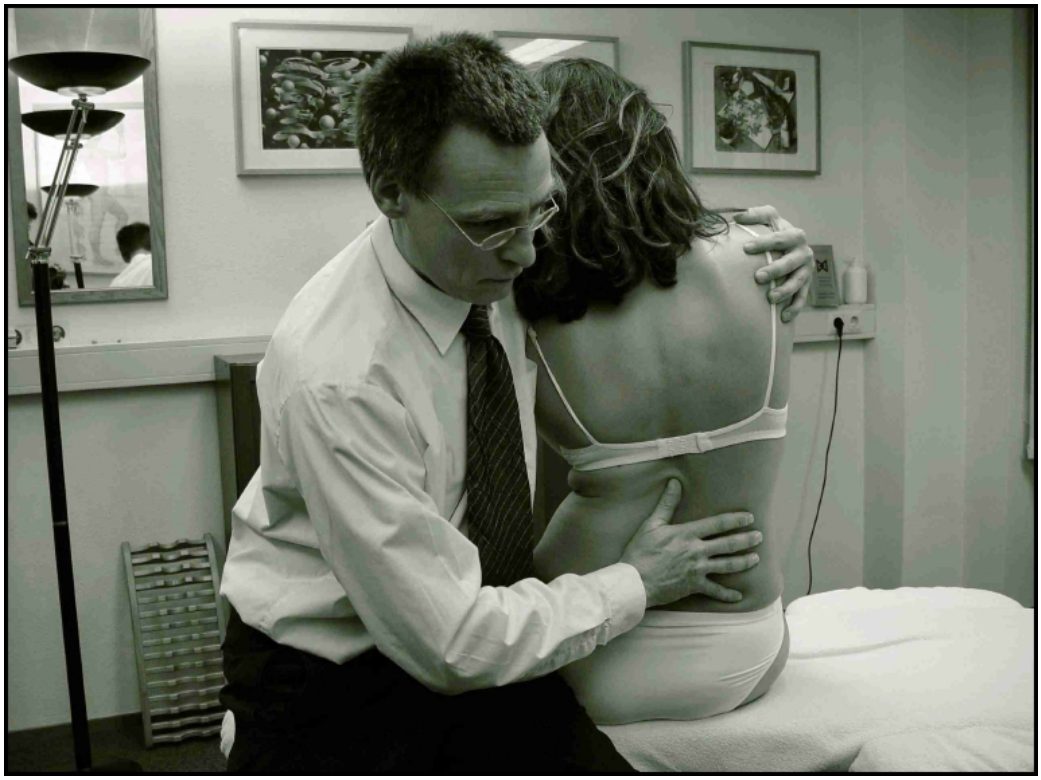

Fig. 10: Osteopathic examination of the spine.

Picture source: www.integraalmedischcentrum.nl

5.8.2 Osteopathic examination of the kidneys:

Examination in dorsal position, evaluation of the kidneys' mobility, especially in cranial-caudal and medial-lateral direction [Fig. 11].

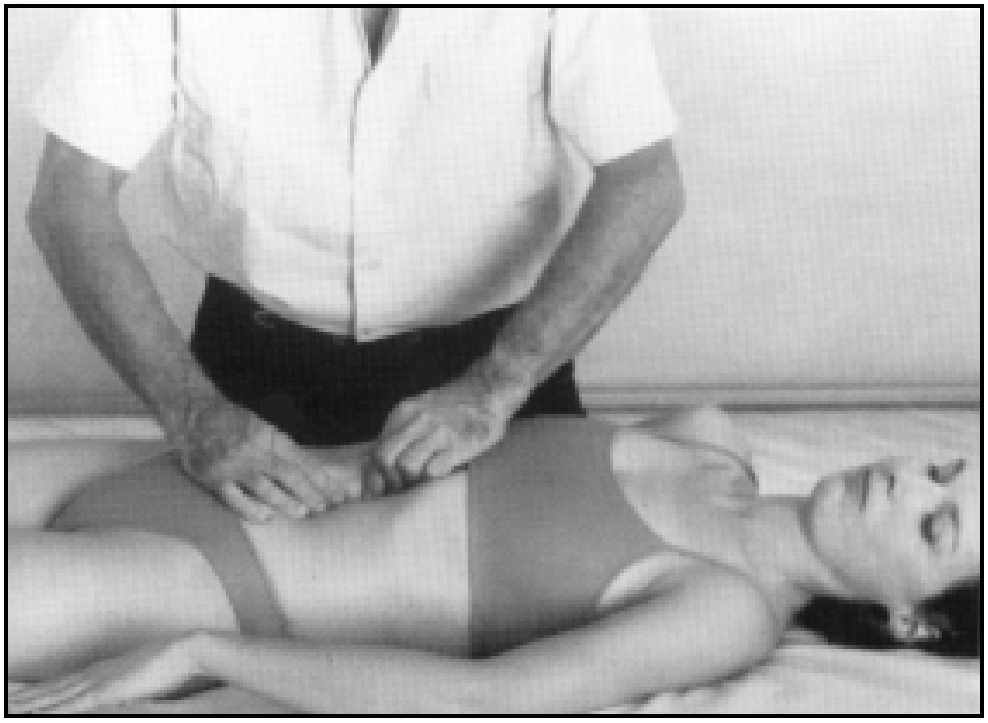

Fig. 11: Osteopathic examination of the right kidney

From: BARRAL JP, MERCIER P. Lehrbuch der viszeralen Osteopathie, 2. ed., p. 181
München: Urban und Fischer bei Elsevier; 2005

5.9 Process of study

Evaluation of the examination sheet in a series of studies which were carried out within the scope of a scientific study with the subject "Osteopathic treatment of patients with renal hypertension" [**Fehler! Textmarke nicht definiert.**].

5.10 Statistical evaluation

The statistical evaluation was carried out using SPSS for Windows, Version 14.0 (SPSS Inc., U.S.A). The continued variables were presented as means, while the standard deviation was chosen as the spread.

The distribution of sexes was checked for its balance using an individual Chi-Square-Test.

The categorized data was evaluated using the Chi-Square-Test, respectively the exact test according to Fisher.

All carried out tests underwent a two-sided significance test; in every case a p-value < 0,05 was assumed as stastically significant for a statistical tests.

The graphic presentations were generated with SPSS as well. For illustration of the categorized data simple and grouped bar-charts were drawn up. The distribution of age was illustrated by a histogram.

6 Results

6.1 Descriptive statistics

The study included 34 patients between the age of 23 and 79 years with a mean of 59 years [Table 3 and Fig. 12].

N	Gültig	34
	Fehlend	0
Mittelwert		59,09
Median		62,00
Standardabweichung		13,903
Minimum		23
Maximum		79
Perzentile	25	52,75
	50	62,00
	75	70,25

Table 3: Age of included patients

[gültig = valid, fehlend = missing, Mittelwert = average, Median = median, Standardabweichung = standard deviation, Minimum = minimum, Maximum = maximum, Perzentile = percentiles]

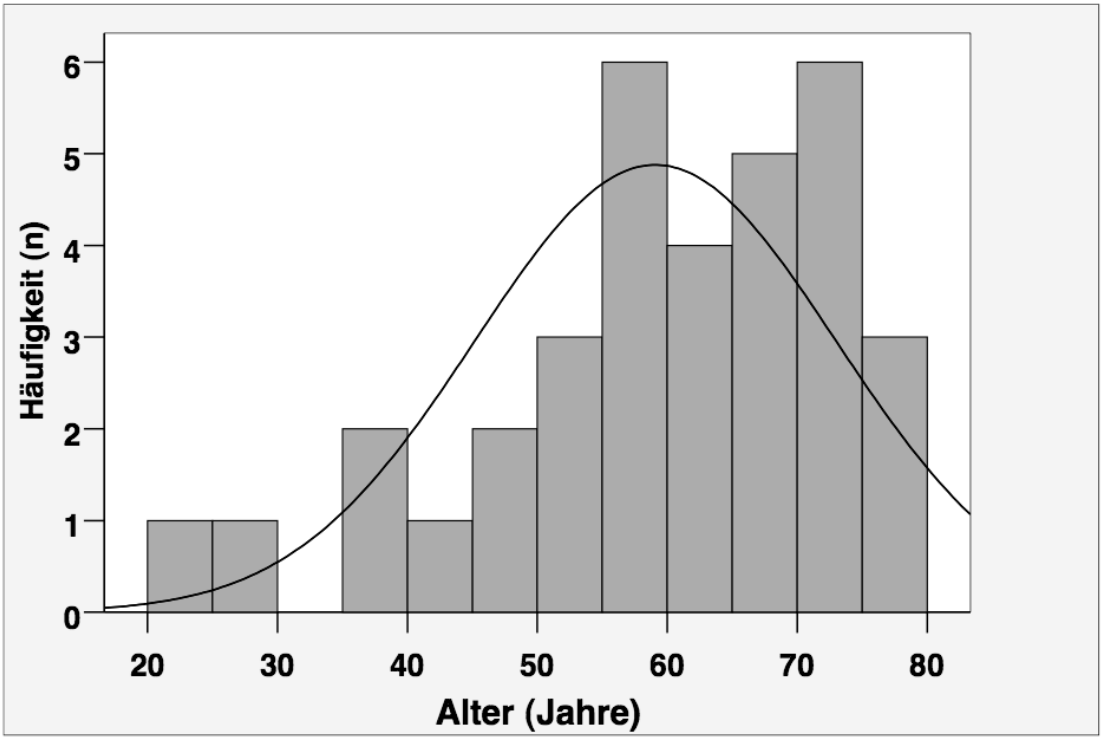

Fig. 12: Distribution of age

[vertical: frequency (n), horizontal: age (years)]

A total of 27 of the included patients were men, seven women. Collectively, there were significantly more men than women (p=0,001) [Table 4 and Table 5].

	Häufigkeit	Prozent
männlich	27	79,4
weiblich	7	20,6
Gesamt	34	100,0

Table 4: Distribution of sexes

[männlich = male, weiblich = female, Gesamt = total, Häufigkeit = frequency, Prozent = percentage]

	Geschlecht
Asymptotische Signifikanz	,001

Table 5: Significance of distribution of sexes

[Asymptotische Signifikanz = asymptotic significance, Geschlecht = sex]

6.2 Results of the main target variable (spinal segments Th12-L2)

Among 34 included patients, 23 persons (i.e. 67%) had an osteopathic dysfunction in the spinal section of Th12 – L2. These were distributed as follows: 20 patients had a restricted mobility of Th12, twelve patients had a restricted mobility of L1 and ten patients had a restricted mobility of L2 (in every case, one or more spinal segments can be affected) [Table 6 – 8, Fig. 13].

	Häufigkeit	Prozent
nein	14	41,2
ja	20	58,8
Gesamt	34	100,0

Table 6: Mobility restriction Th12

[nein = no, ja = yes, Gesamt = total, Häufigkeit = frequency, Prozent = percentage]

	Häufigkeit	Prozent
nein	22	64,7
ja	12	35,3
Gesamt	34	100,0

Table 7: Mobility restriction L1

[nein = no, ja = yes, Gesamt = total, Häufigkeit = frequency, Prozent = percentage]

	Häufigkeit	Prozent
nein	24	70,6
ja	10	29,4
Gesamt	34	100,0

Table 8: Mobility restriction L2

[nein = no, ja = yes, Gesamt = total, Häufigkeit = frequency, Prozent = percentage]

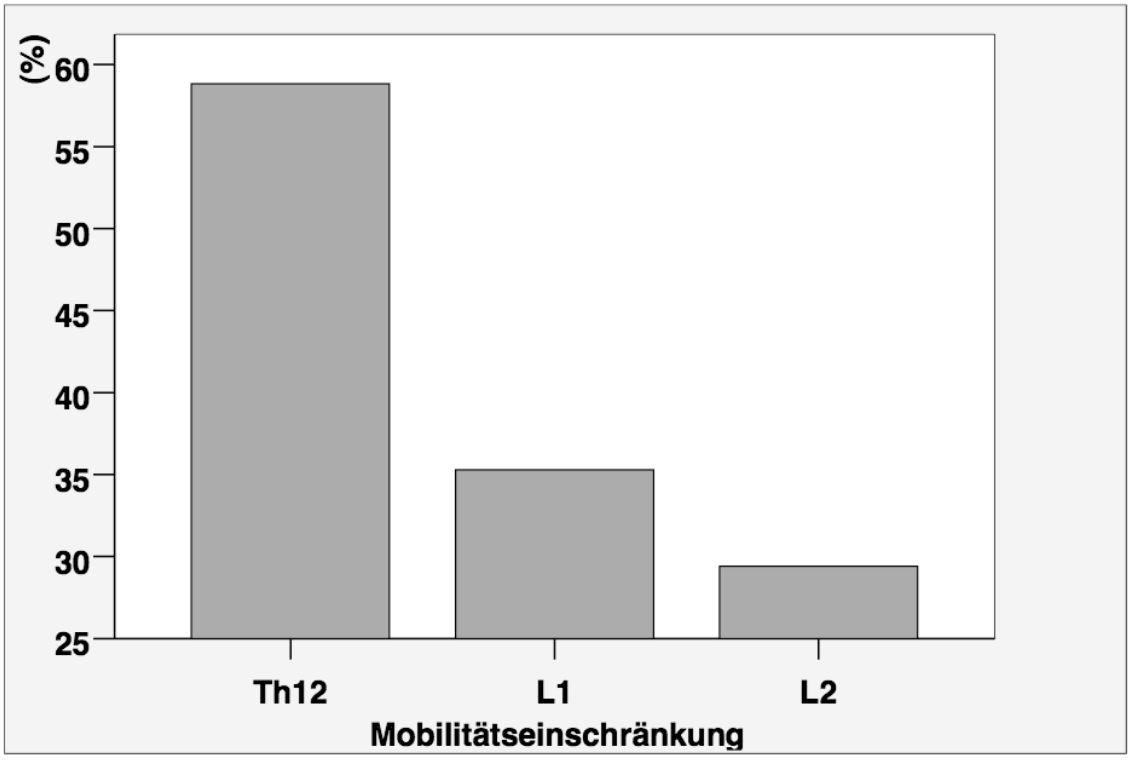

Fig. 13: Mobility restriction Th12 – L2

[Horizontal: Mobilitätseinschränkung = mobility restriction]

6.3 Results of the secondary target variable (kidneys)

Among all the included patients, an osteopathic dysfunction of one or both kidneys was diagnosed. Seven patients had a dysfunction of the right kidney, 13 of the left kidney and 14 patients were diagnosed with a two-sided osteopathic dysfunction of the kidneys [Table 9 and Fig. 14].

	Häufigkeit	Prozent
rechts	7	20,6
links	13	38,2
beidseits	14	41,2
Gesamt	34	100,0

Table 9: Mobility restriction of the kidneys

[rechts = right, links = left, beidseits = bilateral, Gesamt = total, Häufigkeit = frequency, Prozent = percentage]

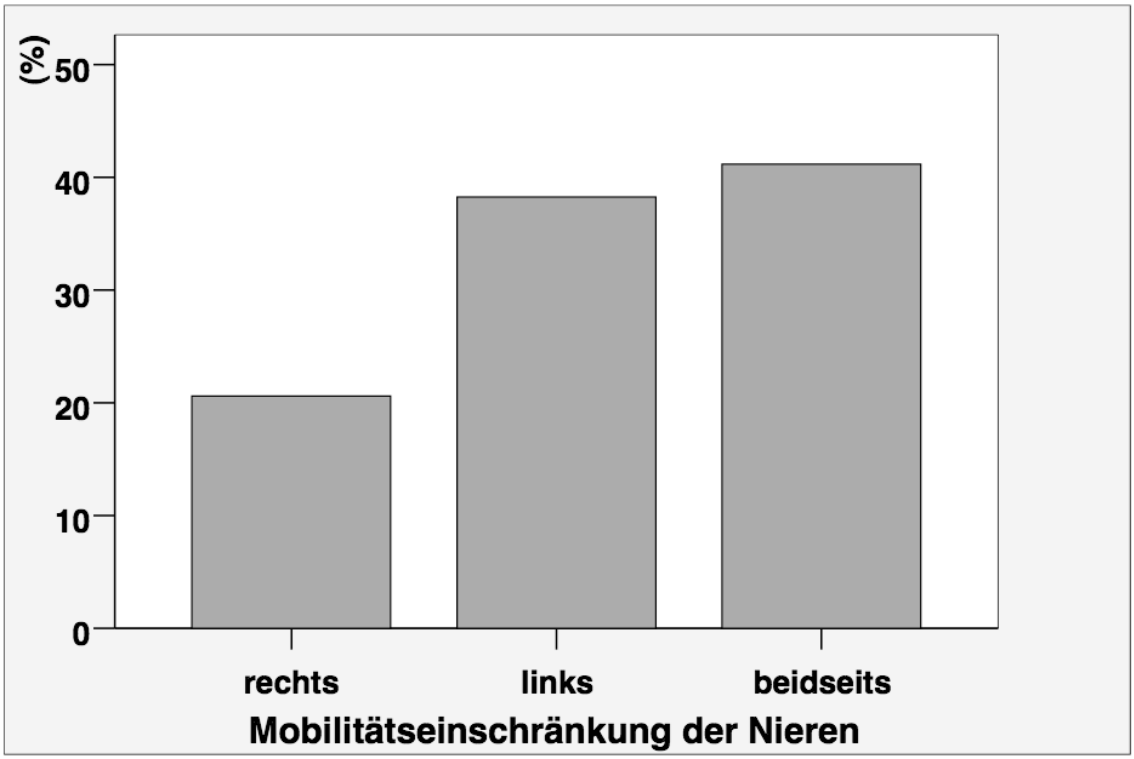

Fig. 14: Mobility restriction of the kidneys

[rechts = right, links = left, beidseits = bilateral]

6.4 Relation of primary to secondary target variable

In the following paragraphs, the relation between the spinal section Th12 – L2 (primary target variable) and the osteopathic kidney dysfunction (secondary target variable) will be presented. Later on, these relations will be assigned to the individual spinal segments.

6.4.1 Comparison of the mobility restriction of the kidneys with and without restricted mobility of Th12 – L2

Of 34 patients, 23 (i.e. 67,7%) were diagnosed with a mobility restriction of the spinal section Th12 – L2. One or more spinal segments could be affected. Correlating this to the osteopathic dysfunction of the kidneys, the following distribution shows: Four patients (17,4%) had an osteopathic dysfunction of the right kidney, eight patients (34,%) an osteopathic dysfunction of the left kidney and with eleven patients (47,8%), both kidneys were affected.

Among 34 patients, eleven (32,4%) had no mobility restriction in the spinal section Th12 – L2. Among them, three patients (27,3%) had a dysfunctional mobility of the right, five patients (45,5%) of the left kidney; three patients (27,3%) were diagnosed with a two-sided dysfunctional mobility of the kidneys [Fig. 15].

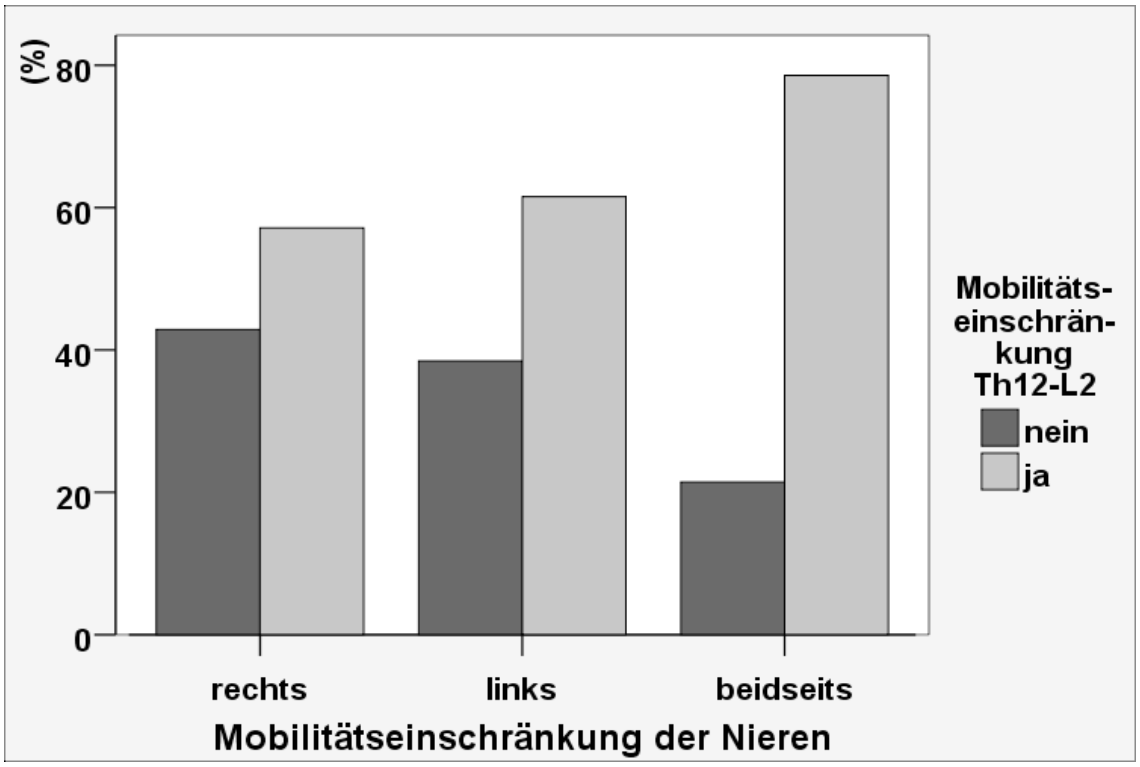

Fig. 15: Relation of the mobility restriction of the kidneys to the mobility restriction Th12 – L2.

[vertical: Mobilitätseinschränkung Th12-L2 = mobility restriction Th12-L2, nein = no, ja = yes
horizontal: rechts = right, links = left, beidseits = bilateral, Mobilitätseinschränkung der Nieren = mobility restriction of the kidneys]

The relation between the mobility restrictions in the spinal section Th12 – L2 and the mobility restriction of the kidneys is statistically not significant (p=0,51).

6.4.1.1 Comparison of the mobility restriction of the kidneys with or without mobility restriction Th12

Of 34 patients, 20 (58,8%) were diagnosed with a mobility restriction of Th12. Relating to the mobility restriction of the kidneys, this breaks down as follows: Three patients (15%) had an osteopathic dysfunction of the right, eight patients (40%) of the left kidney and nine patients (45%) of both kidneys.

14 of 34 patients (41,2%) had no mobility restriction of Th12. Among them, four patients (28,6%) had an osteopathic dysfunction of the right, and five (35,7%) had one respectively on the left and on both kidneys [Fig. 16].

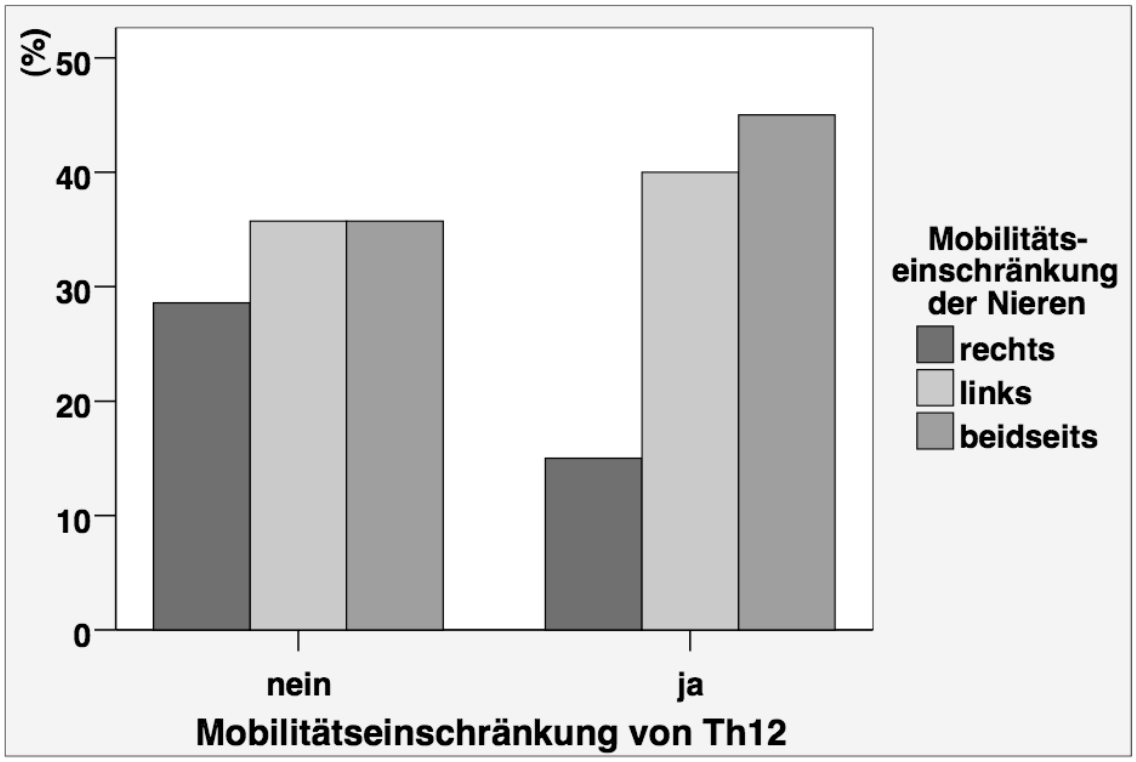

Fig. 16: Mobility restriction of the kidneys with and without mobility restrcition of Th12

[vertical: Mobilitätseinschränkung der Nieren = mobility restriction of the kidneys,
rechts = right, links = left, beidseits = bilateral
horizontal: nein = no, ja = yes, Mobilitätseinschränkung von Th12 = mobility restriction of Th12]

There is no significant association between the mobility restriction of Th12 and the restricted mobility of the kidneys (p=0,62).

6.4.1.2 Comparison of the mobility restriction of the kidneys with and without restricted mobility of L1

Twelve among 34 patients (35,5%) were diagnosed with a mobility restriction of L1. Once again, relating to the kidneys' mobility restriction, this is distributed as follows: Two patients (16,7%) had an osteopathic dysfunction of the left, and respectively five patients (41,7%) had one of the left and both kidneys.

With 22 of 34 patients (64,7%), no mobility restrictions of L1 could be discovered. Five patients (22,7%) had an osteopathic dysfunction of the right, eight patients (36,4%) of the left and nine patients (40,9%) of both kidneys [Fig. 17].

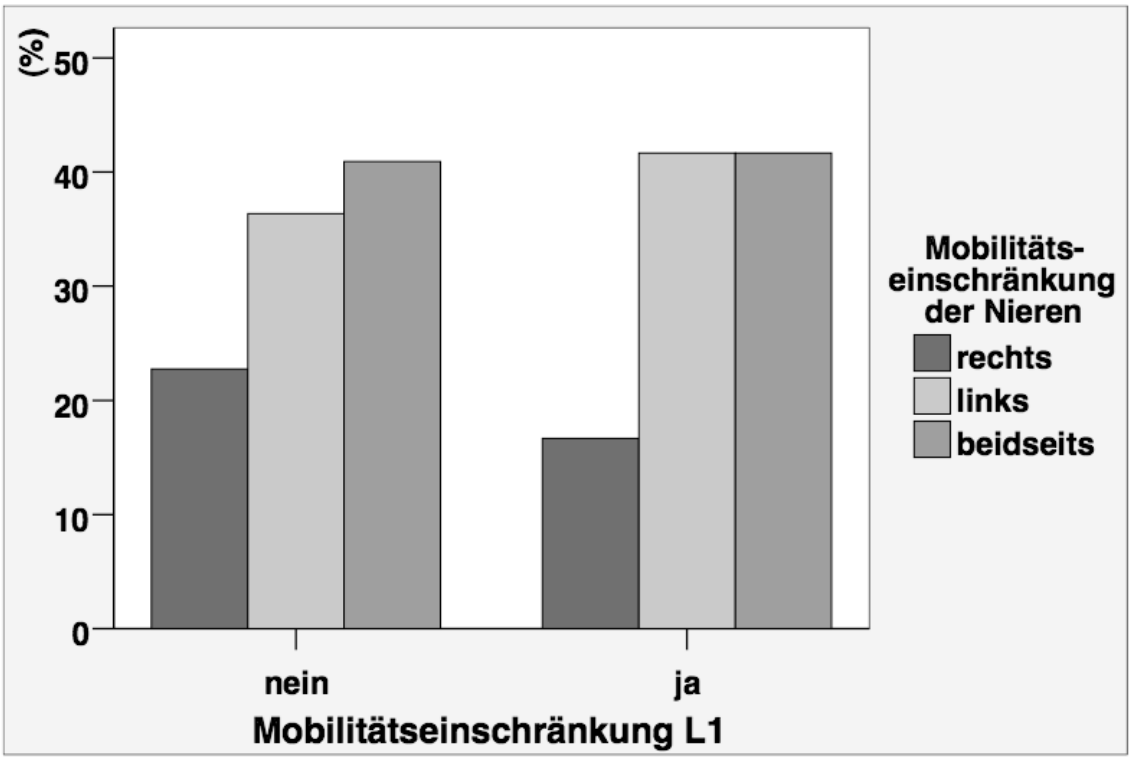

Fig. 17: Mobility restriction of the kidneys with and without mobility restriction of L1

[vertical: Mobilitätseinschränkung der Nieren = mobility restriction of the kidneys,
rechts = right, links = left, beidseits = bilateral
horizontal: nein = no, ja = yes, Mobilitätseinschränkung L1 = mobility restriction L1]

There is no significant association between the mobility restriction of L1 and the mobility restriction of the kidneys (p=0,91).

6.4.1.3 Comparison of the mobility restriction of the kidneys with and without the mobility restriction of L2

Among 34 patients, ten (29,4%) had a mobility restriction of L2. In relation to the kidneys' mobility restriction, the following distribution shows: Two patients (20%) were diagnosed with an osteopathic dysfunction of the right, three patients (30%) of the left and five patients (50%) of both kidneys.

24 of 34 patients (70,6%) had no mobility restriction of L2. Five patients 820,8%) had an osteopathic dysfunction of the right, ten patients (41,7%) of the left and nine patients (37,5%) of both kidneys [Fig. 18].

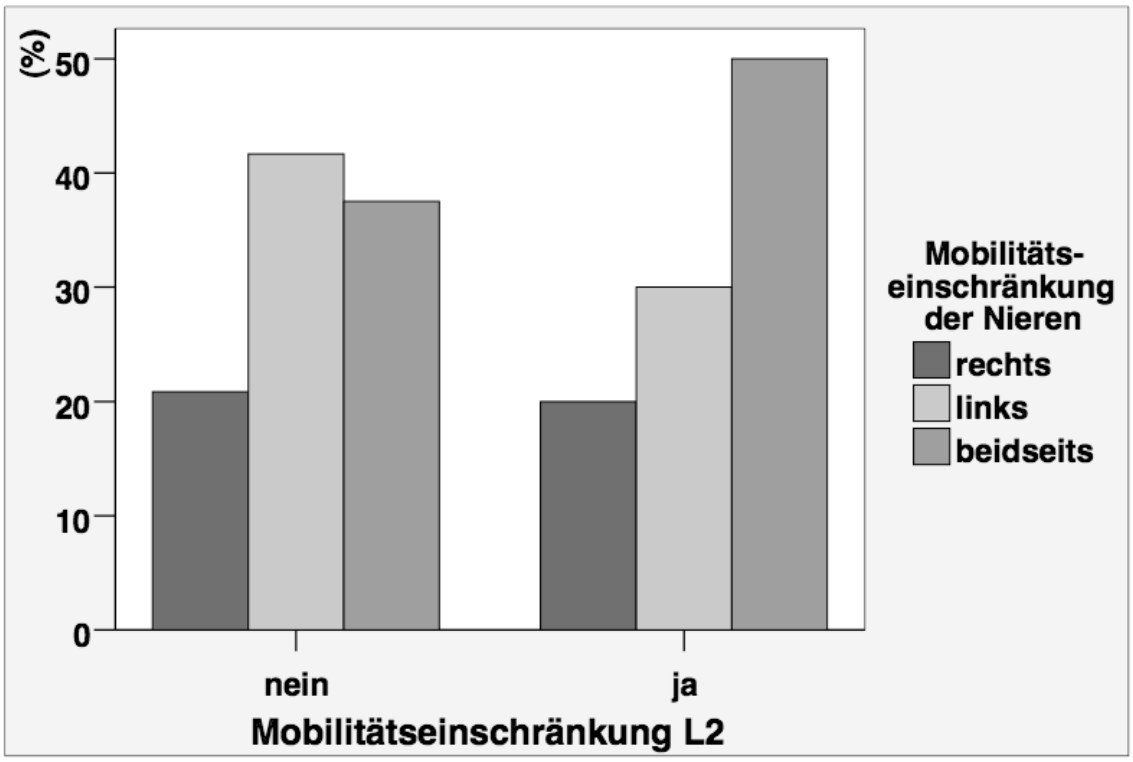

Fig. 18: Mobility restriction of the kidneys with and without mobility restriction of L2

[vertical: Mobilitätseinschränkung der Nieren = mobility restriction of the kidneys, rechts = right, links = left, beidseits = bilateral

horizontal: nein = no, ja = yes, Mobilitätseinschränkung L2 = mobility restriction L2]

No significant association between the mobility restriction of L2 and the mobility restriction of the kidneys (p=0,77) could be detected.

7 Discussion

7.1 Literature research

With the technical possibilities I know and the thorough research in the data basis (*see 9: internet directions*) I had at my disposal, there were no hints that a comparable study with this special question was carried out to the day. There were only a few publications which described an accumulation of osteopathic dysfunctions in certain spinal section with hypertension patients.

But the validity of these studies was not clearly retraceable. It could be assumed that some of these studies, partly dating back far more than 50 years, do not comply with today's standard of clinical studies. This might very well qualify the conclusions/statements of these studies.

7.2 Methods

7.2.1 Measurement methods of target variables

In principle, the measurement method „manual examination" poses the threat of non-repeatability – in the field of manual examination of the spine this problem is confirmed by studies [63, 64]. It has to be assumed, that this is also valid for the manual osteopathic examination of the kidneys [65].

Against this background, the result of this study has to be seen as a trend and the thesis itself has to be classified as a pilot-study.

7.2.2 Osteopathic examination

7.2.2.1 Osteopathic examination of the spine

The key-note of the osteopathic study was to design it as uniformly as possible. It should be retraceable for outsiders as well (above all i.e. for the Ethic Commission of the University of Freiburg).

But the principles of the spinal biomechanics according to Fryette [62] have to be observed critically: In the osteopathic world there is a lively discussion about the meaning of these principles [66, 67, 68]. However, with regard to the unification of the study, it was decided to follow these principles during the osteopathic examination of the spine.

7.2.2.2 Osteopathic examination of the kidneys

In the frame of the original clinical study [1] the main focus was put on the kidneys and the structures and regions in relation with them (*see 13.5. osteopathic examination sheet*). This refers not only to the organs and structures in direct topographic proximity, but also to segmental and mechanic relations.

The experiences of Barral and Mercier [69] were confirmed in daily practic work: Nephrectomy was diagnosed as the most frequent osteopathic dysfunction of the kidneys and, subsequently, the mobility restriction in cranial and/or medial direction. Thus it was decided to only include these two dysfunctions into the scheme of diagnosis. They were documented by every examiner in order to make the present statistical evaluation possible.

However, it has to be questioned whether each patient with a medically diagnosed kidney damage has an actual osteopathic dysfunction of one or both kidneys. This could be the subject of an osteopathic study, too.

7.3 Results

As previously explained, the present results can only be seen as a trend. But this trend seems unambiguous: The results confirm the thesis, that with patients with renal

hypertension, there is a relation between an osteopathic dysfunction of the spinal segments Th12 – L2 (primary target variable) and the osteopathic kidney dysfunction (secondary target variable), because a very high percentage (about 68%) was diagnosed with a dysfunction of the according spinal segments.

However, the result shows no statistical significance – a possible reason being the relatively small number of included patients.

A likely explanation for the observed relation could be the sympathic innervation of the kidneys from the Plexus renalis (above all Th12 – L2). A segmental dysfunction of the segment Th12 could be observed especially frequently (59%), as opposed to L1 (35%) or L2 (29%). The reason could be that the kidneys are always innerved by the splanchnic imus nerve, which emanates from the ganglion of Th12.

The possibility of an according spinal dysfunction rises clearly with the existence of a two-sided osteopathic dysfunction of the kidneys [Fig. 15]. This supports the thesis that the presumed relation actually exists.

Additionally to the previously mentioned presumption, the sympathic innervation could be responsible for the observed segmental dysfunctions, mechanical relations could play a role, e.g. via the m. psoas and quadratus lumborum. They have their origins or onset in the area Th12 or the twelfth rib to L4 and have a direct mechanic relation to the kidney. Unfortunately, an according assessment is not possible on the basis of the present data, but could be of good interest for the osteopathic world.

The following parameters would have to be at hand:

a) Evaluation of a larger community of patients.

b) Results independent from individual researchers (e.g. in the context of a so-called „multi-center-study“)

c) Assessment of the question, whether the results are independent from the diagnosis „renal hypertension“, and whether they are valid for patients without kidney damage.

8 Final statement and prospect

In the present clinical-descriptive study it was examined, whether patients with renal hypertension show a relation between osteopathic dysfunctions of the spinal section Th12 – L2 and osteopathic dysfunctions of one or both kidneys, using evaluated medical reports from a study from 2005.

The study did not achieve any statistically significant results. Even though caution has to be advised for the assessment of the results of manual examination, because they are endangered of being unrepeatable, the results show a clear trend, which supports the assumption of an existing relation.

The sympathic innervation of the kidneys is a likely explanation for this relation. Mechanic relations could play a role, too. Examining this could be the subject of a new study.

As a continuation of the presents thesis, another, future (multi-center-) study could test, whether the observed and assumed relations could be statistically significantly confirmed with a larger patient community and whether they are independent from the clinical diagnosis “renal hypertension” and individual researchers.

9 List of websites

http://info.multimedica.de

http://www.aerztezeitung.de

http://www.cochrane.de

http://www.dimdi.de

http://www.dzkf.de

http://www.healthopedia.com

http://www.kup.at/

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http://www.medical-tribune.ch

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http://www.merck.com

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http://www.nature.com/ki/index.html

http://www.osteopathic-research.com

http://www.osteopathie-akademie.de

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http://www.paritaet.org/hochdruckliga

http://www.prometheus.uni-tuebingen.de

http://www.pubmed.com

http://www.pubmedcentral.nih.gov/

http://www.uptodate.com

http://www.vascularweb.org

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13 Anhang

13.1 Kreuztabelle: Mobilitätseinschränkung der Nieren mit und ohne Mobilitätseinschränkung von Th12

			Mobilitätseinschränkung der Nieren			
			rechts	links	beidseits	Gesamt
Mobilitäts-einschränkung Th12	nein	Anzahl	4	5	5	14
		% von Mobilitäts-einschränkung Th12	28,6%	35,7%	35,7%	100,0%
		% von Mobilitäts-einschränkung Nieren	57,1%	38,5%	35,7%	41,2%
	ja	Anzahl	3	8	9	20
		% von Mobilitäts-einschränkung Th12	15,0%	40,0%	45,0%	100,0%
		% von Mobilitäts-einschränkung Nieren	42,9%	61,5%	64,3%	58,8%
Gesamt		Anzahl	7	13	14	34
		% von Mobilitätseinschränkung_Th12	20,6%	38,2%	41,2%	100,0%
		% von Mobilitäts-einschränkung Nieren	100,0%	100,0%	100,0%	100,0%

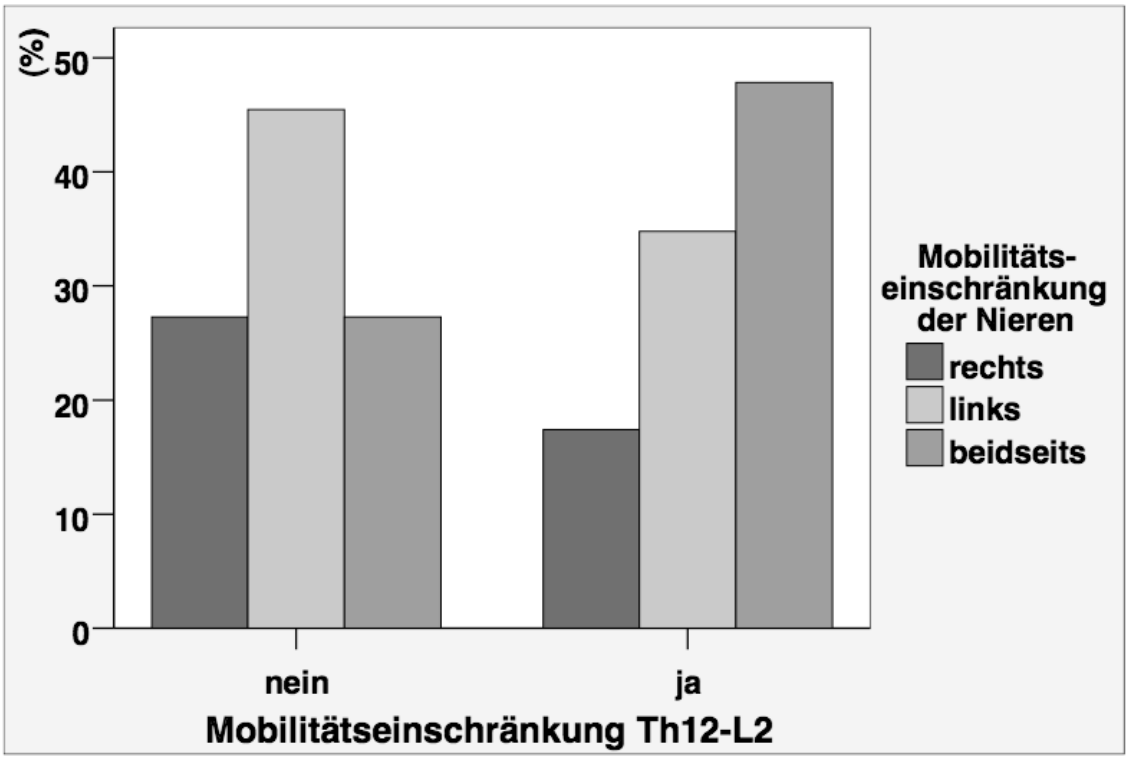
13.2 Kreuztabelle: Mobilitätseinschränkung der Nieren mit und ohne Mobilitätseinschränkung von L1

			Mobilitätseinschränkung der Nieren			
			rechts	links	beidseits	Gesamt
Mobilitäts-einschränkung L1	nein	Anzahl	5	8	9	22
		% von Mobilitäts-einschränkung L1	22,7%	36,4%	40,9%	100,0%
		% von Mobilitäts-einschränkung Nieren	71,4%	61,5%	64,3%	64,7%
	ja	Anzahl	2	5	5	12
		% von Mobilitäts-einschränkung L1	16,7%	41,7%	41,7%	100,0%
		% von Mobilitäts-einschränkung Nieren	28,6%	38,5%	35,7%	35,3%
Gesamt		Anzahl	7	13	14	34
		% von Mobilitäts-einschränkung L1	20,6%	38,2%	41,2%	100,0%
		% von Mobilitäts-einschränkung Nieren	100,0%	100,0%	100,0%	100,0%

13.3 Kreuztabelle: Mobilitätseinschränkung der Nieren mit und ohne Mobilitätseinschränkung von L2

			Mobilitätseinschränkung der Nieren			
			rechts	links	beidseits	Gesamt
Mobilitäts-einschränkung L2	nein	Anzahl	5	10	9	24
		% von Mobilitäts-einschränkung L2	20,8%	41,7%	37,5%	100,0%
		% von Mobilitäts-einschränkung Nieren	71,4%	76,9%	64,3%	70,6%
	ja	Anzahl	2	3	5	10
		% von Mobilitäts-einschränkung L2	20,0%	30,0%	50,0%	100,0%
		% von Mobilitäts-einschränkung Nieren	28,6%	23,1%	35,7%	29,4%
Gesamt		Anzahl	7	13	14	34
		% von Mobilitäts-einschränkung L2	20,6%	38,2%	41,2%	100,0%
		% von Mobilitäts-einschränkung Nieren	100,0%	100,0%	100,0%	100,0%

13.4 Mobilitätseinschränkung der Nieren mit und ohne Mobilitätseinschränkung von Th12-L2



13.5 Osteopathischer Befundbogen

Hypertoniestudie UKL Freiburg
Abt. Nephrologie Dr. med. M. Cybulla
Frank Gögel
Christoph Mauder

Behandler: **O cm** **O fg**
O bb **O s**

Untersuchungs-Datum: _____

Pat.-Nr.: _____

	rechts	**links**
Mobilitätseinschränkung Niere (nach cranial / medial)		

Seitneigungseinschränkung LWS		
Mobilitätseinschränkung Diaphragma		
Tonuserhöhung M. psoas		
Mobilitätseinschränkung der Innenrotation des Hüftgelenkes		

Assoziierte Organfixationen rechts	
Mobilitätseinschränkung Leber	
Duodenum pars desc.	
Colon asc.	

	Assoziierte Organfixationen links
	Mobilitätseinschränkung Magen
	Colon desc.

Mobilitätseinschränkung Th6–L2	Th6
	Th7
	Th8
	Th9
	Th10
	Th11
	Th12
	L1
	L2

Bindegewebsveränderungen Th6– L2	Th6
	Th7
	Th8
	Th9
	Th10
	Th11
	Th12
	L1
	L2

13 Appendix [Translation: Anhang]

13.1 Cross-classified table: Mobility restriction of the kidneys with and without mobility restriction of Th12

			Mobilitätseinschränkung der Nieren			
			rechts	links	beidseits	Gesamt
Mobilitäts-einschränkung Th12	nein	Anzahl	4	5	5	14
		% von Mobilitäts-einschränkung Th12	28,6%	35,7%	35,7%	100,0%
		% von Mobilitäts-einschränkung Nieren	57,1%	38,5%	35,7%	41,2%
	ja	Anzahl	3	8	9	20
		% von Mobilitäts-einschränkung Th12	15,0%	40,0%	45,0%	100,0%
		% von Mobilitäts-einschränkung Nieren	42,9%	61,5%	64,3%	58,8%
Gesamt		Anzahl	7	13	14	34
		% von Mobilitätseinschränkung_Th12	20,6%	38,2%	41,2%	100,0%
		% von Mobilitäts-einschränkung Nieren	100,0%	100,0%	100,0%	100,0%

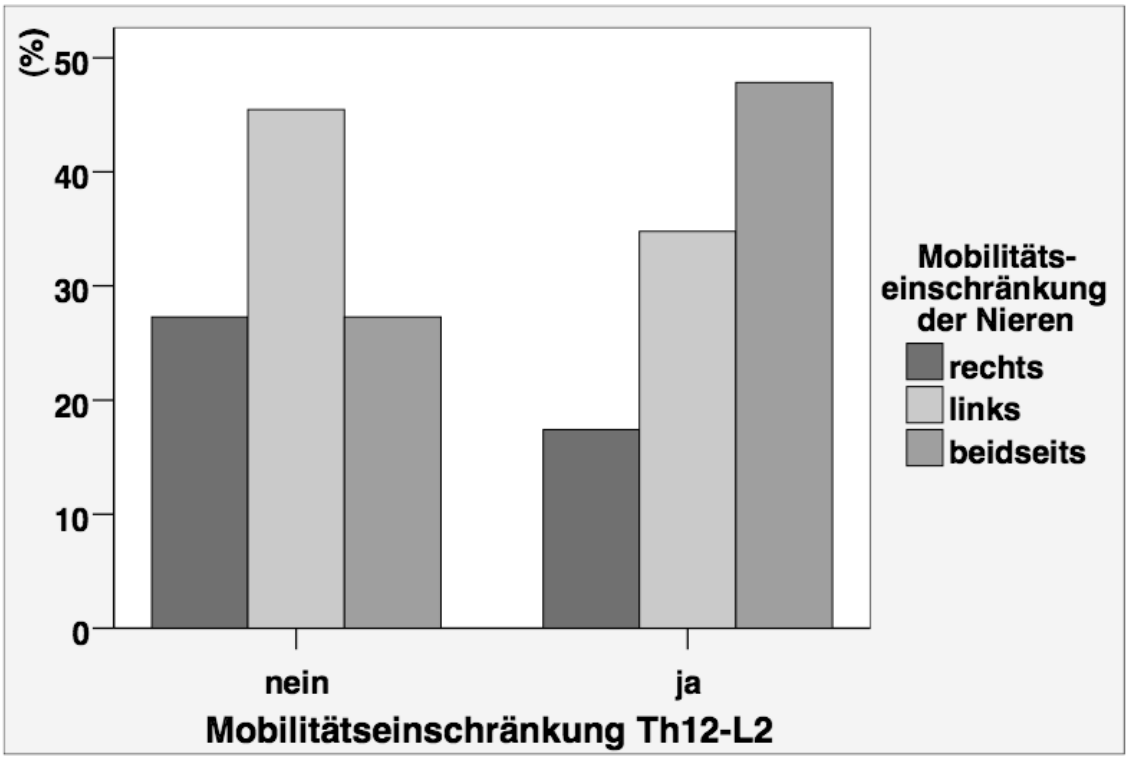
13.2 Cross-classified table: Mobility restriction of the kidneys with and without mobility restriction of L1

			Mobilitätseinschränkung der Nieren			
			rechts	links	beidseits	Gesamt
Mobilitäts-einschränkung L1	nein	Anzahl	5	8	9	22
		% von Mobilitäts-einschränkung L1	22,7%	36,4%	40,9%	100,0%
		% von Mobilitäts-einschränkung Nieren	71,4%	61,5%	64,3%	64,7%
	ja	Anzahl	2	5	5	12
		% von Mobilitäts-einschränkung L1	16,7%	41,7%	41,7%	100,0%
		% von Mobilitäts-einschränkung Nieren	28,6%	38,5%	35,7%	35,3%
Gesamt		Anzahl	7	13	14	34
		% von Mobilitäts-einschränkung L1	20,6%	38,2%	41,2%	100,0%
		% von Mobilitäts-einschränkung Nieren	100,0%	100,0%	100,0%	100,0%

13.3 Cross-classified table: Mobility restriction of the kidneys with and without mobility restriction of L2

			Mobilitätseinschränkung der Nieren			
			rechts	links	beidseits	Gesamt
Mobilitäts-einschränkung L2	nein	Anzahl	5	10	9	24
		% von Mobilitäts-einschränkung L2	20,8%	41,7%	37,5%	100,0%
		% von Mobilitäts-einschränkung Nieren	71,4%	76,9%	64,3%	70,6%
	ja	Anzahl	2	3	5	10
		% von Mobilitäts-einschränkung L2	20,0%	30,0%	50,0%	100,0%
		% von Mobilitäts-einschränkung Nieren	28,6%	23,1%	35,7%	29,4%
Gesamt		Anzahl	7	13	14	34
		% von Mobilitäts-einschränkung L2	20,6%	38,2%	41,2%	100,0%
		% von Mobilitäts-einschränkung Nieren	100,0%	100,0%	100,0%	100,0%

13.4 Mobility restriction of the kidneys with and without mobility restriction of Th12-L2



13.5Osteopathic examination sheet

Hypertoniestudie UKL Freiburg
Abt. Nephrologie Dr. med. M. Cybulla
Frank Gögel
Christoph Mauder

Behandler: **O cm** **O fg**
O bb **O s**

Untersuchungs-Datum: _____

Pat.-Nr.: _____

	rechts	**links**
Mobilitätseinschränkung Niere (nach cranial / medial)		

Seitneigungseinschränkung LWS		
Mobilitätseinschränkung Diaphragma		
Tonuserhöhung M. psoas		
Mobilitätseinschränkung der Innenrotation des Hüftgelenkes		

Assoziierte Organfixationen rechts	
Mobilitätseinschränkung Leber	
Duodenum pars desc.	
Colon asc.	

	Assoziierte Organfixationen links
	Mobilitätseinschränkung Magen
	Colon desc.

Mobilitätseinschränkung Th6–L2	Th6
	Th7
	Th8
	Th9
	Th10
	Th11
	Th12
	L1
	L2

Bindegewebsveränderungen Th6– L2	Th6
	Th7
	Th8
	Th9
	Th10
	Th11
	Th12
	L1
	L2

13.1 – 13.3: Cross-classified table: Mobility restriction of the kidneys with and without mobility restriction of Th12/L1/L2

			Mobility restriction of the kidneys			
			right	left	two-sided	Total
Mobility restriction Th12/L1/L2	no	Number				
		% of mobility restriction Th12/L1/L2				
		% of mobility restriction of the kidneys				
	yes	Number				
		% of mobility restriction Th12/L1/L2				
		% of mobility restriction of the kidneys				
Total		% of mobility restriction Th12/L1/L2				
		% of mobility restriction of the kidneys				

13.4. Mobility restriction of the kidneys with and without mobility restriction of Th12-L2

[Horizontal: Mobility restriction of Th12 – L2
Vertical rechts: Mobility restriction of the kidneys
Right – Left – Two-Sided]

Osteopathic examination sheet auf der nächsten Seite:

13.5. Osteopathic examination Sheet

Hypertension Study UKL Freiburg fg
Dep. Nephrology s
M. Cybulla, MD
Frank Gögel
Christoph Mauder

Examiner: cm bb

Date of examination:

Patient Number:

	right	**left**	
Mobility restriction of the kidney (cranial/ medial direction)			
Lateral inclination restriction lumbar spine Diaphragm mobility restriction			
Hypertonia of the musculus psoas			
Mobility restriction of the internal rotation of the hip joint			
Associated organ fixation right			Associated organ fixation
Mobility restriction liver			Mobility restriction stomach
- Duodendum pars desc. - Colon asc.			- Colon desc.

	Th6
	Th7
	Th8
	Th9
Mobility restriction Th6-L2	Th10
	Th11
	Th12
	L1
	L2

	Th6
	Th7
	Th8
	Th9
Connective tissue alteration Th6-L2	Th10
	Th11
	Th12
	L1
	L2