

Treatment of urinary incontinence

**(Stress incontinence of urine) at a
descensus of vagina and bladder**

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1. INTRODUCTION

In my surgery, I have often noticed a ptosis of uterus and bladder in the treatment of women. After inquiring, some patients admitted to be temporarily suffering from urinary incontinence, a fact which had not been stated previously in their medical history. After some osteopathic treatments, in which I also considered this problem, there was a thorough improvement to be noted; sometimes the incontinence vanished completely. Therefore, I became interested to investigate this practical experience systematically in a thesis.

I contacted Bernhard Ligner, D.O, concerning the therapeutically method, who furnished me with additional remarks regarding the complex osteopathic point of view and treatment. Furthermore, he encouraged me to carry out this study.

From the point of view of classical medicine, there is a large number of scientific researches and methods of treatment, which naturally were included in the present study. On the basis of osteopathy, however, I was unable to find further investigations, except the theoretical and practical fundamentals in "Visceral Manipulation" by Jean-Pierre Barral, D.O., and Pierre Mercier, D.O. Jean-Pierre Barral D.O., kindly, equipped me with additional specialist remarks.

To establish a connection between medicine and osteopathy, I contacted Dr. Bernhard Bartosch, a Viennese gynaecologist. As he frequently encounters the problem of urinary incontinence in his surgery, he was interested in enlarging the range of treatments for his patients, and in collaborating with me for this study.

In pre-studies I came across the state of health questionnaire "Münchner Modell-GZM" from 1995, which, however, then turned out not be useful for the purpose of investigating urinary incontinence. In the "Geburtshilfe und Frauenheilkunde" magazine No. 11, from November 1998 I encountered a study by the Universitätsfrauenklinik Freiburg, which contained a questionnaire more suitable for patients suffering from incontinence of urine. This is a "Quality of Life – questionnaire".

Still, the question of objectivising the loss of urine has not been solved. Since urinary incontinence is caused by gynaecological as well as urological factors, I contacted Univ.-Prof. Dr. Engelbert Hanzal, who recommended the PAD-Test for objectively assessing the grade of incontinence of urine. For the purpose of this study, however, the PAD Test was slightly modified. Furthermore, I drew up an information sheets for the participants.

After clarifying the theoretical fundamentals, a test plan was drawn up. Dr. Bartosch referred me to patients with urinary incontinence, at whom he had diagnosed a descensus of vagina and uterus and had excluded hormonal, inflammable or carcinogen causes.

The practical part of the present study was carried out in the period from October 2000 to March 2001.

MEDICAL FUNDAMENTALS

In order to understand urinary incontinence better, I would like to present an overview of the medical fundamentals in the following chapters. The overview will include anatomy and physiology of the urogenital tract, as well as pathologies and causes of urinary incontinence. I will briefly describe the different types of urine incontinence to establish a border to stress urine incontinence.

2. ANATOMICAL AND PHYSIOLOGICAL BASIS

This section deals with the definition and description of the anatomy of the urogenital tract. A special focus has been laid on the female anatomy. In order to explore the causes for incontinence of urine in greater depth, I examined many parts more closely. The following reference books served as a basis for my study:

1. Rauber/Kopsch¹: Anatomie des Menschen.
2. Benninghoff Alfred²: Anatomie Bd.2, and
3. Leonhard H³: Taschenatlas der Anatomie, Band 2, Innere Organe.
4. Staubesand J.⁴, Sobotta, Atlas der Anatomie des Menschen

2.1 Anatomy of the urogenital tract

2.1.1 Urinary bladder: vesica urinaria

In the adult, the urinary bladder lies in a subperitoneal position behind the symphysis in the true pelvis. In the female, the urinary bladder, the neck of the uterus and the vagina are connected by connective tissue. The organs stabilise each other mutually. The organs compound is separated from the rectum by a connective tissue like septum, which has a fixing effect. The orifices of the urogenital- and the intestinal tract, which stretch through the shared orifice of the pelvic floor and through the levator slit, are also separated by muscles.

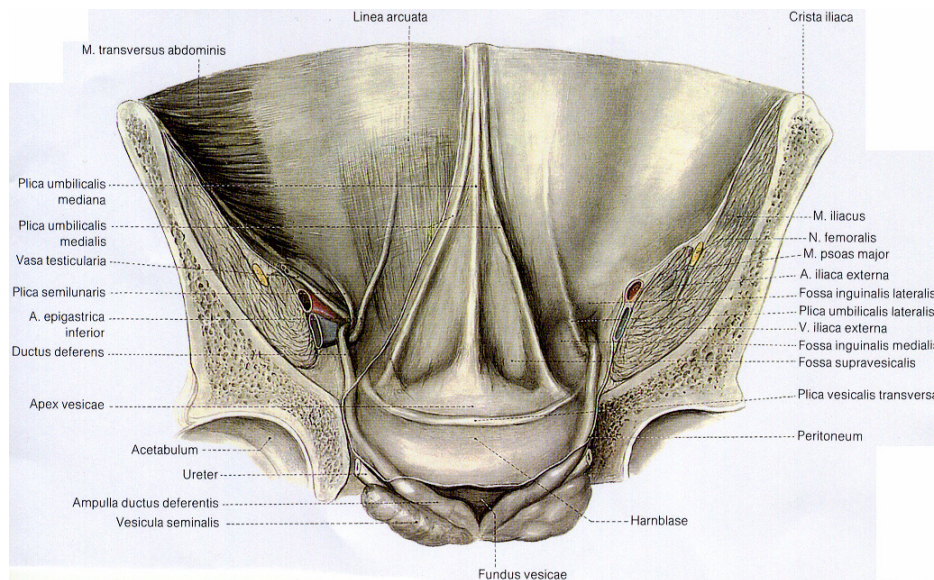
¹ Rauber/Kopsch, Hrsg. H. Leonhardt et al: Anatomie des Menschen, Lehrbuch und Atlas, Band II: Innere Organe: Thieme Verlag, 1987

² Benninghoff Alfred, Hrsg. Drenckahn D.: Anatomie Bd. 2, Urban und Schwarzenberg, 1994

³ Leonhart H.: Innere Organe, Taschenatlas der Anatomie Bd. 2. Hrsg: Platzer, Leonhardt, Kahle, G. Thieme Verlag, DTV 1991

⁴ Staubesand J., Sobotta, Atlas der Anatomie des Menschen, vol 2, Verl. Urban und Schwarzenberg, 1988

The urinary bladder assumes an oval form when moderately full. Two main parts are distinguished, viz. the in the front upwards directed body of the bladder and the downwards widened fundus. The filling of the bladder, and the size and position of the surrounding organs mainly influence the form of the expandable body of the bladder, not so much the fundus of the bladder, which is fixed by connective tissue.



III. 1: Position of the urinary bladder
 Rauber/Kopsch: Anatomie des Menschen, 1987

2.1.1.1. The body of the bladder

corpus vesicae, is directed towards the peritoneal cavity and is covered extensively by the peritoneum. It builds the roof of the urinary bladder and is directed upward and forward to the apex vesicae, which is attached flexibly to the anterior abdominal wall by the lig. umbilicale medianum, the biogenetical remainder of the urachus.

In osteopathy, great importance is attributed to the urachus, especially with respect to the urinary bladder and related treatments.

The middle umbilical ligament plays an important role in osteopathy, since it is directly connected to the liver, and hence exerts an influence onto the diaphragm.

The ligamentum umbilicale medianum is linked with both ligg. umbilicalia lateralia, the embryological residual of the umbilical arteries, to a triangular plate of connective tissue. This plate is covered by the peritoneum and can be shifted against the abdominal wall.

2.1.1.2. The fundus of the bladder

fundus vesicae, is directed towards the pelvic floor. It has the shape of a funnel and narrows downwards to the neck of the bladder, cervix vesicae, which empties into the urethra. The two ureters empty into the posterior wall of the fundus. Behind the symphysis and above the pelvic floor, the fundus is connected to the neck of the bladder partly by connective tissue and muscles and partly by the intervention of the surrounding genitals. The connective tissue type connections of the fundus of the bladder are strengthening streams of the fascia pelvis, covering the pelvic intestines together with the visceral sheet.

In females, the lig. pubovesicale attaches the neck of the bladder to the symphysis. The wall of connective tissue between the urogenital organs and the rectum, in females the septum rectovaginale, also has a stabilising effect.

From the posterior wall of the symphysis, muscular junctions arise to the neck of the bladder as bundles of smooth muscles, m. pubovesicalis. From the longitudinal layer of the rectum, bundles of smooth muscles arise to the neck of the bladder as m. retrovesicalis and to the posterior wall of the urethra as m. rectourethralis. These muscles act as the involuntary opening and closing muscle of the urinary bladder. Therefore, they are important with regard to incontinence of urine.

2.1.1.3. The trigone of the bladder

trigonum vesicae, is marked at its superior corners by the two mouths of the ureters and at its below corner of the exit of the urethra. The transverse ureter groin connects the two ureter mouths. The plica interureterica constitutes the basis of the trigone of the bladder, behind which there is a transverse fossette, the fossa retro-ureterica, which is the lowest level when standing upright. The inferior thickened apex of the trigone arises from behind to the internal urethra orifice as the uvula vesica. A bulging ring narrows it down. The cranial part of the urethra, the venous network situated below the mucous membrane, builds a compressible padding for occlusion.

2.1.1.4. Fine structure of the urinary bladder

Like all hollow organs, the urinary bladder consists of dartos, the motor of evacuation and of mucous membrane with submucous connective tissue. The superior surface of the bladder body is connected with the peritoneum by subserous connective tissue. In order to understand the function of the bladder, it is important to describe the structure of the dartos and its innervation.

The urinary bladder consists of a strong coat of muscles which together form the m. detrusor vesicae, the detrusor muscle.

The muscles of the bladder wall, except those of the trigonum vesicae, are composed of three different layers made of reticular muscles: an external and an internal layer of muscles having a longitudinal arrangement and a middle layer arranged in a circular manner. The longitudinal layer converges toward the bladder orifice and merges into the urethra's muscles. The fibres of the internal longitudinal layer turn into the internal longitudinal muscles of the urethra, while the muscles of the external longitudinal layer turn into external circular ones at the urethra. The muscles running along the body of the bladder, which arise from the bladder neck and from the m. pubovesicalis, pass along the superior back wall to the apex of the bladder in sagittal direction. From there, small bundles of muscles pass up to the lig. umbilicale medianum and descend to the rectum and the anterior wall of the vagina.

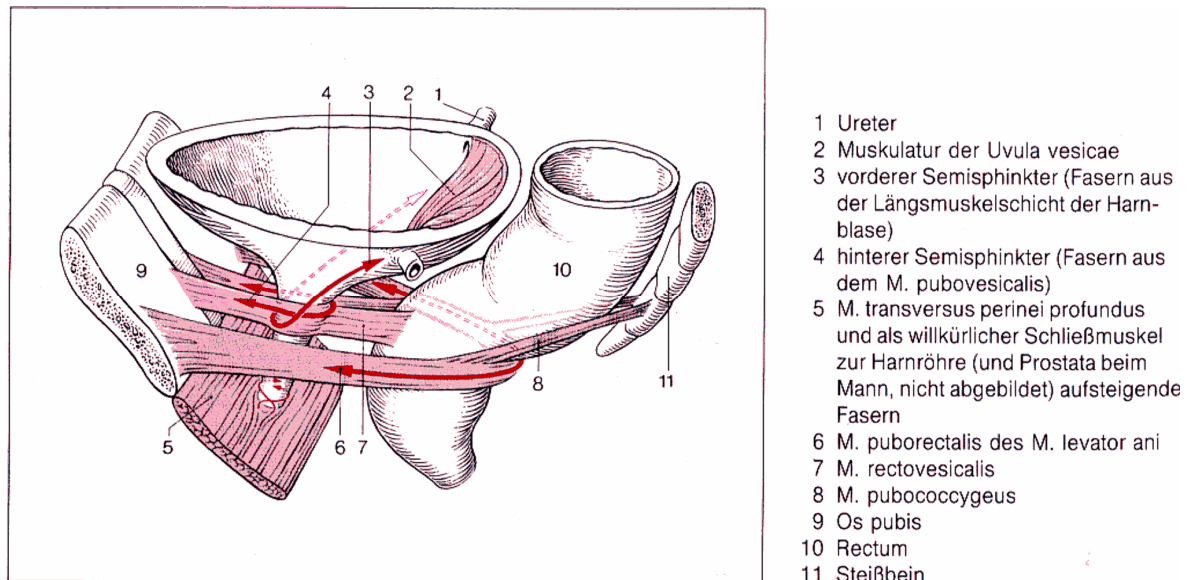
When the bladder fills with urine, the tonusless muscles expand at the beginning. When the bladder is empty, the tonus increases, which causes the bladder to assume a spherical shape. The abdominal squeezing assists in emptying the bladder. In the area of the trigone, the muscles of the bladder wall are arranged in a special manner as the opening and closing device of the ureter mouths and the internal urethra orifice.

2.1.1.5. Muscles of the internal urethra orifice

The muscles of the ureter orifices are composed of two pairs of loops: each consisting of a pair of opening- and closing loops.

Opening loops: The opening loops encircle the ureter orifice fundiformly. When the bladder fills and stretches beyond a certain point, this sling can lift the ureter mouth up and open it.

Closing loops: two other loops encircle the ureter mouth superio-laterally and empty into the trigone of the bladder in the direction of the internal urethra orifice. The loops of muscles draw the ureter mouth medially downward and thus close it. The muscles of the internal urethra orifice, which control the involuntary opening and closing, are composed of multiply ansiformed muscles.



III. 2: Involuntary and voluntary opening- and closing loops of the urinary bladder and the urethra
Rauber/Kopsch: Anatomie des Menschen, 1987

Closing:

The anterior circumference of the internal urethra mouth is encircled by loops of muscles, which stem from the longitudinal muscles of the urinary bladder. These pull the anterior wall of the urethra upward and backward. Together with especially circular muscles they act as the involuntary sphincter muscle of the bladder orifice. The small bundles of muscles of the m. pubovesicalis, which encircle the posterior circumference of the urethra's mouth, assist in opening the bladder. Together with veins of the mucous membrane, the muscles situated at the uvula also contribute to the opening.

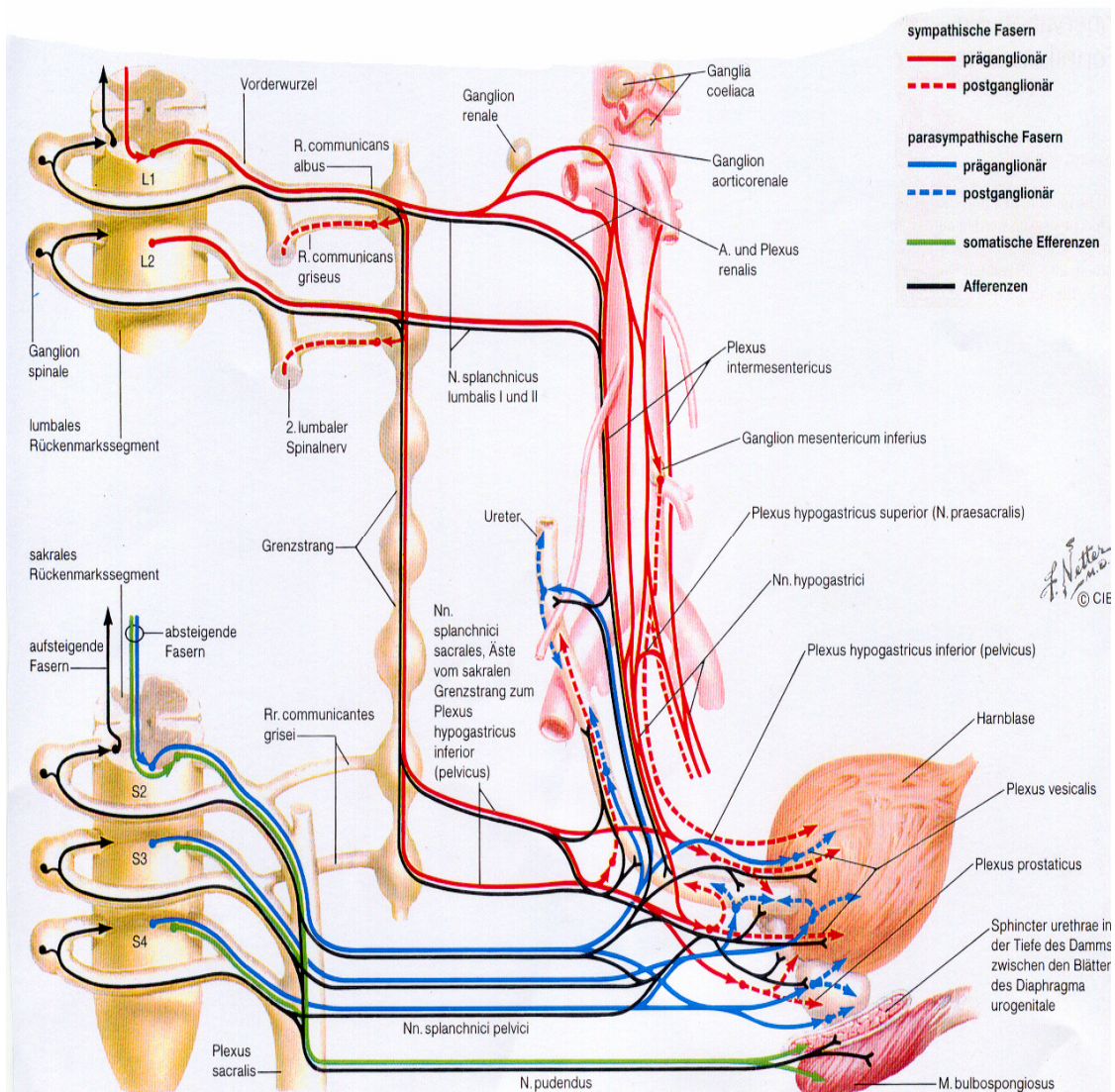
Opening:

The involuntary opening of the internal urethra's mouth is caused by the bundles of muscles descending from the closing loops at the mouth of the ureter to the sphincter vesicae. During contraction, a groove emerges at the fundus of the bladder, which contributes to the opening of the bladder outlet. The muscles found in the uvula are able to pull it back. Additionally, the small bundles of the m. pubovesicalis, which insert into the anterior wall of the urethra, as well as the small bundles of m. rectovesicalis which empty into its back-wall, make a contribution to the opening of the bladder exit. The voluntary sphincter muscle, the "rhabdosphincter", inserts directly into the urethra. It consists of striped muscle fibres which separate from the m. transversus perinei profundus and ascend the urethra in helical loops as the m. sphincter urethrae. The m. levator ani may also assist in closing the urethra.

The urinary bladder empties into the urethra. In comparison to the male urethra, the female one is considerably shorter and broader. It commences immediately above the urogenital diaphragm and empties below the diaphragm into the vestibule of the vagina.

2.1.1.6. Innervation of the urinary bladder

The urinary bladder is innervated by visceromotor (sympathetic and parasympathetic) and viscerosensory nerves. The latter start out as free nerve endings from the wall and respond to stretching. They convey the urge to pass water and thus the afferent signal of micturition. The parasympathetic fibres innervate the m. detrusor and instigate its contraction during urinating.

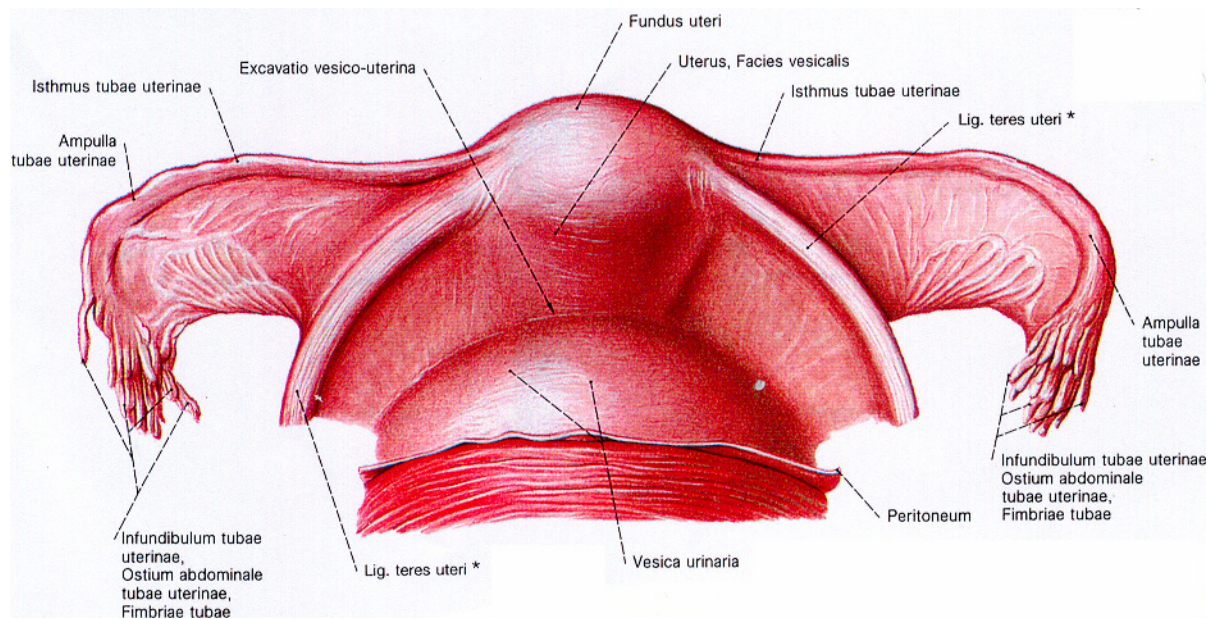


III. 3: Innervation of the kidneys, ureters and the urinary bladder

Günter Krämer, Nervensystem I, p. 87, 1987

2.2. Female genitals

A distinction is made with regard to the evolution of the female sexual organs: We distinguish the internal genitals, viz. ovary, fallopian tubes, uterus and vagina from the external genitalia, viz. the vaginal orifice with the labia majora and minora, the clitoris, the vestibule of the vagina and the vestibular gland. The internal female genitals are situated in the true pelvis.



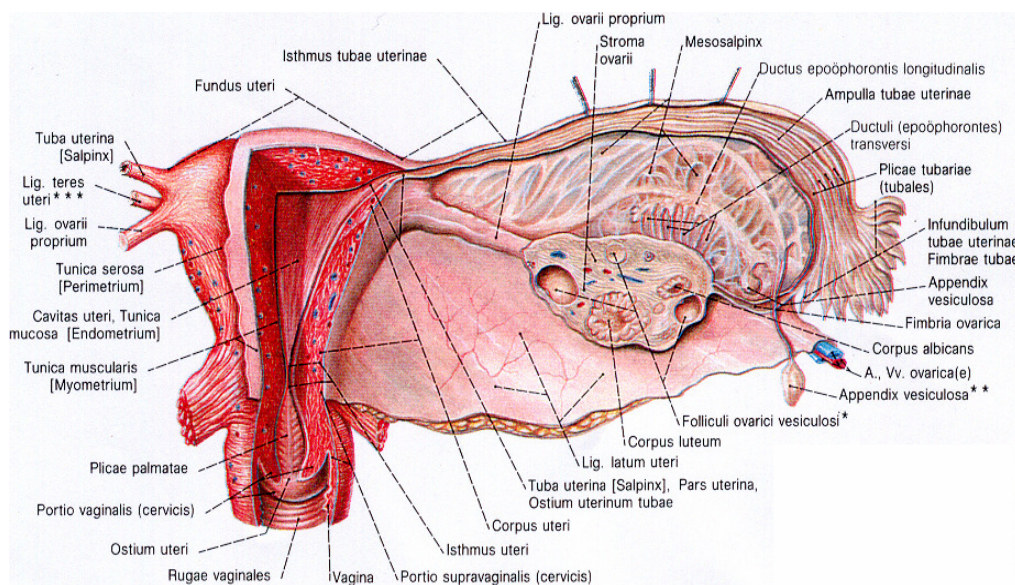
III. 4: Internal female genitals
 J. Staubesand, Sobotta (ed): 1988

2.2.1. Ovary, ovarium

The ovary of the sexually mature woman has the shape of a plum. The ovary lies intraperitoneally, in a lacuna between the a. iliaca interna and externa. Through the mesovarium it is loosely connected to the posterior wall of the lig. latum. On both poles, the ovary is additionally flexibly attached to the mesovarium. The suspensory ligament of the ovary (lig. suspensorium ovarii) is attached to the tubal extremity (extremitas tubaria), which descends from the side of the pelvic wall. From the extremitas uterina, the lig. ovarii proprium is directed toward the womb. In the erect posture the ovary, which is hung up between the two ligaments, rests onto the lig. latum. The ovary is laterally above and on the front surrounded by the uterine tubes. It is vascularized by the a. and v. ovarica and by anastomosi from the v. and a. uterina.

2.2.2. Uterine tube, tuba uterina

The uterine tube lies intraperitoneally. It is attached to the mesosalpinx, the superior portion of the lig. latum. The tube is about 9 -16 cm in length and is described as consisting of the ampulla tubae uterinae, the intermediate dilated portion, and of the isthmus tubae uterinae, the medial constricted third. And finally, the pars uterina, the portion running through the wall of the uterus, which empties into the uterine lumen with the 1mm broad ostium uterinum tubae. The abdominal end of the tube extends to a 1 – 2 cm long funnel, the infundibulum tubae uterinae, in whose base the orifice of the ostium abdominale tubae can be found. From the brim of the funnel fringe like appendices, called fimbriae tubae, surround the ovary. It is their task to lead a discharged ovum into the uterine tube.



III. 5: Frontal-section through the tube

J. Staubesand, Sobotta (ed), 1988

2.2.3. Womb, uterus

The uterus is situated in the subperitoneal cavity between the bladder and the rectum. It is pyriform in shape and is approximately 7 cm long. The uterus is divided into a neck (cervix) and a body.

2.2.3.1. The body of the uterus

Corpus uteri is directed anterior-superiorly. The anterior surface, *facies vesicalis*, is distinguished from the posterior, *facies intestinalis*. The *tubae uterinae* laterally pierce the corpus in the zone of the tubal angle. The superior part, *fundus uteri*, towers above the corpus at the level of the tubal angle, where it can be seen as a fornix. The constriction of the uterus, known as the *isthmus uteri*, forms a waisted transition between the body and the neck of the uterus.

2.2.3.2. The neck of the uterus

Cervix uteri is the portion below the *isthmus*. The neck of a non pregnant woman takes up approximately the lower third of the total length, and it is directed downward and backward in the fundus of the vagina. The upper portion, anchored by connective tissue, is termed *portio supravaginalis*. The *portio vaginalis*, the lower portion, projects approximately 1 cm into the vagina and is covered by the vaginal epithelium.

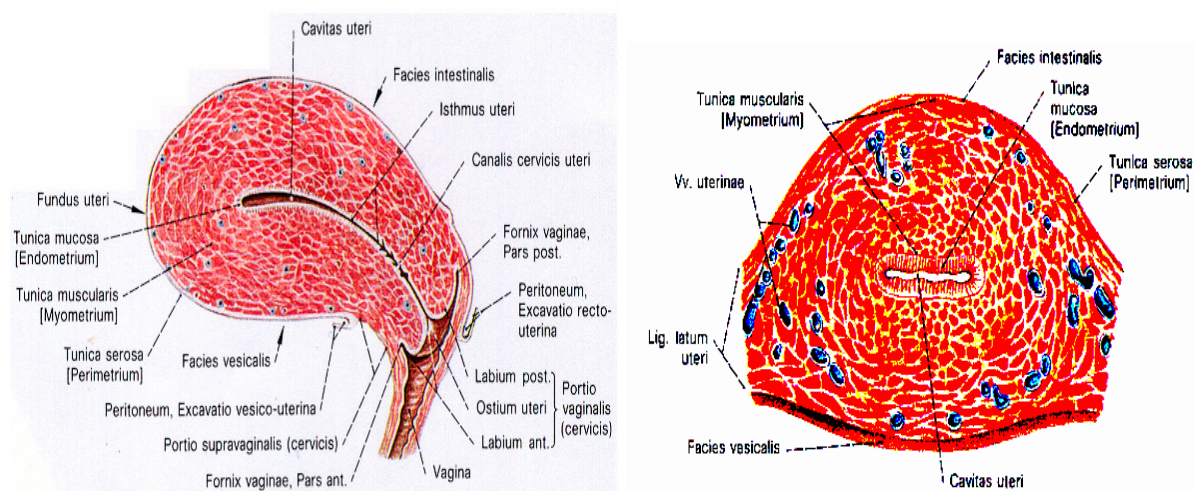
The *canalis cervicis* communicates through the *ostium uteri*, the exterior uterine orifice, with the vaginal cavity on the level of the *portio vaginalis*.

2.2.3.3. The cavity of the uterus

Cavum uteri, is a 1 – 2 cm broad area, in non pregnant women, lined with a mucous secretion, called *endometrium*. It responds to the hormonal stimulation of oestrogen and progesterone. It is triangular in shape, the base being formed by the superior surface.

2.2.3.4. The wall of the uterus

mainly consists of a layer of smooth muscles, the myometrium, which contains a large number of blood vessels. The exterior layer, the perimetrium, fuses with the myometrium. It is a part of the peritoneum and unites laterally with the lig. latum.



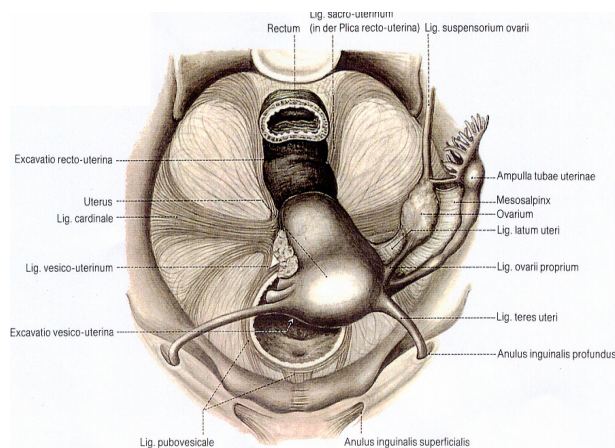
III. 6 and 7: Cross-section and median-sagittal section of the uterus

J. Staubesand, Sobotta (ed): 1988

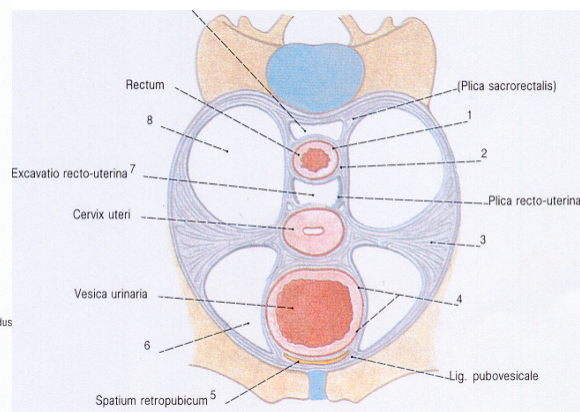
2.2.3.5. Fixing of the uterus

In the fundus portion, the peritoneum affixed the uterus to above. Commencing on either side of the tubal angle the round ligament (lig. rotundum), also referred to as lig. teres uteri, arches laterally and ventrally through the lig. latum. It then passes through the inguinal canal to the labia majora in which it becomes lost. This ligament keeps the corpus uteri flexible in its forwardly tilted position (anteversion). The lig. latum arises from the lateral rim of the uterus and inserts into the lateral abdominal wall. It is situated on the front level and tips forward with the uterus. Anteriorly, it becomes lost in the peritoneal wall of the bladder and posteriorly, in the anterior surface of the rectum. The portions attached to the lig. latum by folds are known as mesosalpinx and mesovar.

The lig. latum divides the pelvic cavity into two portions: an anterior and a posterior peritoneal pouch; viz. excavatio vesicouterina and the excavatio rectouterina. The excavatio rectouterina is the lowest point of the peritoneal cavity.



III. 8: Ligament attachment of uterus and ovary at the height of the cervix uteri
Raubert/Kopsch: Anatomie des Menschen, 1987

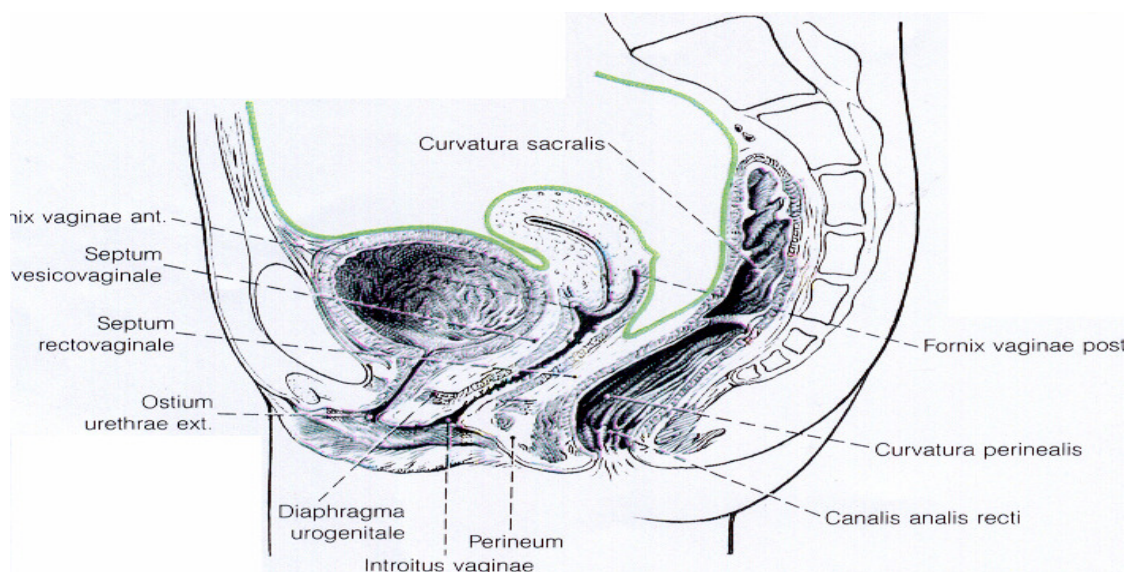


III. 9: Fixing of the uterus, transversal section
J. Staubesand, Sobotta (ed), 1988

2.3. Anatomy of the pelvic floor

2.3.1. Pelvic cavity and pelvic floor

The pelvic cavity, *cavum pelvis*, is the part of the peritoneal cavity situated in the lesser pelvis. The urinary bladder, the internal genitals, and the rectum are positioned there. These lie below the peritoneal intestines and fill up the lesser pelvis.



III. 10: Median section through the female pelvis
Benninghoff (ed), Drenckhan und Zenker, 1993

The pelvic cavity is surrounded by the pelvic skeleton of the lesser pelvis. The line determining the superior aperture of the pelvis is termed *linea terminalis*. The inferior aperture is marked off by the bones of the coccygeal apex, the ischial tuberosity and the descending rami of the pubis. The osseous pelvic ring is stabilised by strong ligaments: the *ligg. iliolumbalia*, the *ligg. iliosacralia*, the *lig. sacrospinale*, the *lig. sacrotuberale*, and the *lig. sacrococcygeum*.

The female pelvis is deeper and laterally more prominent. In females, the anterior iliac are more widely separated and the *foramen obturatum* is extended more transversely. The inferior aperture of the pelvis, as well as the superior aperture is larger in the female, compared to those of the male. The distance of the *ala ossis illi* and the *tuber ischiadicum* is larger the sacrum is broader. The female pubic

symphysis is less deep, and the pubic arch, arcus sub-pubicus, is wider at an angle of more than 90°. The female pelvis is developed to enable childbirth.

The inferior pelvic aperture is closed by plates of muscles and connective tissue, the **pelvic floor**.

2.3.1.1. The pelvic floor

The pelvic floor passes caudally and constitutes the termination of the trunk. It has a double function, as it secures the position of the pelvic- and the abdominal organs, and additionally partly supports the intestines. Furthermore, it is responsible for controlling the opening of the lower urinary- and genital tract, and of the intestinal tract through the sphincter muscle. At birth, it provides an important part of the obstetric canal. The pelvic floor consists of staggered plates of muscles and connective tissue. The double function also poses a threat:

the frequent and extreme increase of the intraabdominal pressure, the weakening of the connective tissue, or injuries of the muscles of the pelvic floor (after difficult childbirth) might lead to a lowering or a prolaps of pelvic organs, which, in turn, increases the risk of incontinence.

The pelvic floor, which consists of striped muscles and plates of connective tissue, can be divided into three portions:

the **pelvic diaphragm** (the superior portion);

the **urogenital diaphragm** (inferior portion).

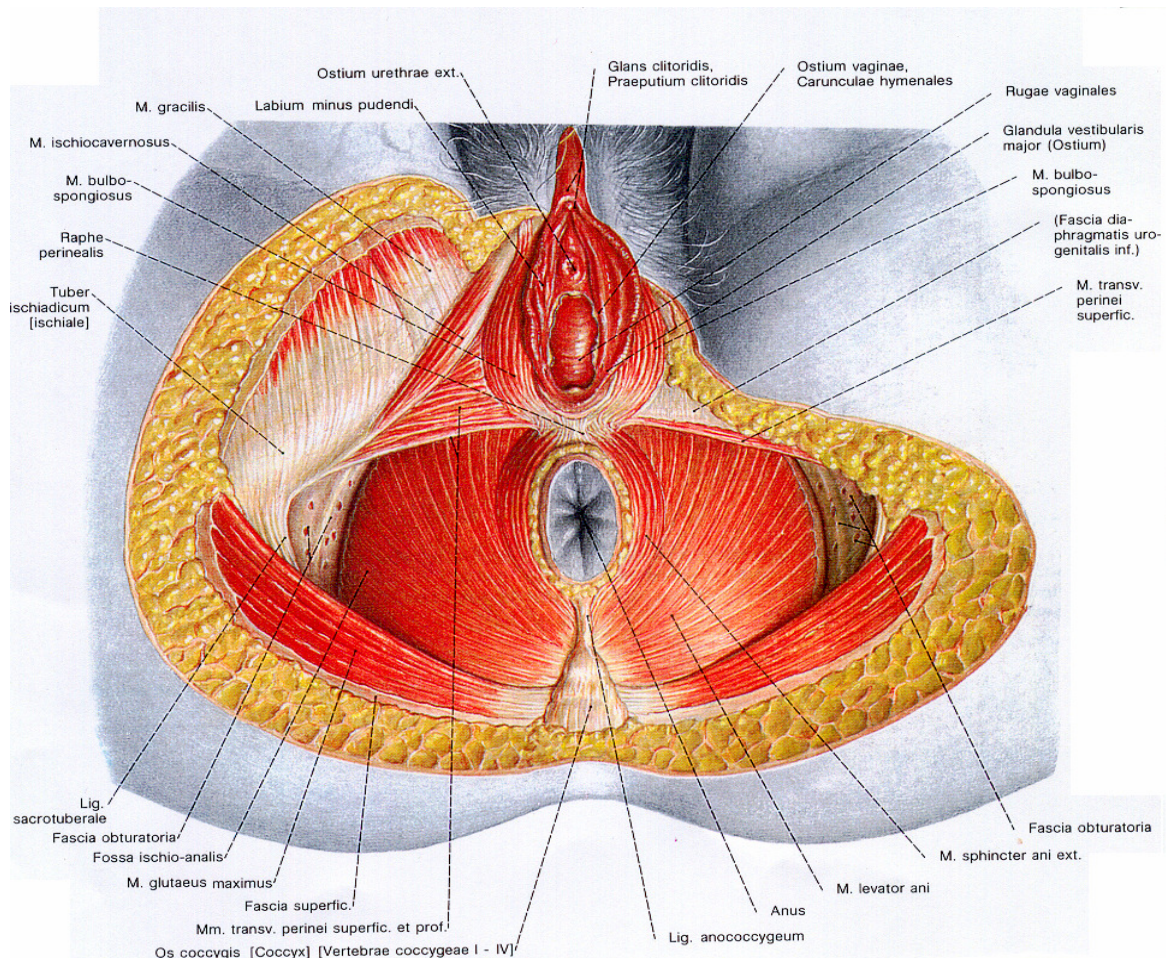
the third portion contains the sphincters of the orifices of the urogenital- and peritoneal tract.

Each diaphragm is composed of a plate of muscles, strengthened by fasciae. Fibro-muscular connective tissue diffuses the striped muscles. This connective tissue contains plenty of smooth muscles and its development is **dependent on hormones**.

2.3.1.1.1. Diaphragma pelvis

The pelvic diaphragm closes the major part of the pelvic orifice and has the form of a funnel shaped bowl bent slightly outward. It is composed of the m. levator ani, the

rudimentary m. coccygeus and of the superior and inferior fasciae, the fascia diaphragmatis pelvis superior and the fascia diaphragmatis inferior. Posteriorly, the muscular plates of both sides are attached to the median plane partly by connective tissue and partly by muscles. Between these a triangular gap opens up; the levator hiatus.



Ill. 11: Perineum and muscles of the pelvic floor, diaphragma pelvis

J. Staubesand, Sobotta (ed), 1988

The M. levator ani extends from the pubic bone with two wing-shaped plates and inserts into the spina ischiadica. Each plate of muscles consists of three parts:

- m. puborectalis,
- m. pubococcygeus, and
- m. iliococcygeus.

The m. pubococcygeus has relations with the pelvic organs. It proceeds horizontally from the pubic bone to the coccyx. Thus, it causes a sagittal tension of the pelvic floor. The medial fibres arising from both sides form the levator crus. These mark off

the levator hiatus, which has a length of approximately 3 cm at the pubic bone. They encircle the rectum from behind with a strong loop, m. puborectalis, and are thus effective sphincters of the rectum. Females are able to narrow the vagina consciously by contracting the levator crus.

The **m. puborectalis** arises from both sides of the pubic bone. Both muscles form a loop behind the rectum, whose median fibres mark off the levator hiatus. Pre-rectal fibres divide the levator hiatus into a posterior portion through which the rectum passes, and into an anterior portion containing the orifice of the urogenital tract. Together these form a loop which is connected with the posterior wall of the m. transversus perinei profundus through the fascia. In females, it acts as a m. levator vaginae. The muscle loop is anchored in the centrum tendineum perineum.

The **mm. iliococcygei** arise from both sides as a supporting plate of muscles and insert into the lig. anococcygeum, into the coccyx, and into the sacrum. They can lift the pelvic floor up, which causes the convexity of the muscle to flatten.

Frequently, the **m. coccygeus** is only developed rudimentarily. Dorsally, it is attached to the m. levator ani and originates from the spina ischiadica. By its base it is inserted into the margins of the coccyx and into the side of the lowest piece of the sacrum. The muscle is situated above the lig. sacrospinale with which it is partly united. It may also be replaced by fibrous tissue.

The muscle and the ligament have a supporting function. The m. coccygeus is separated from the m. levator ani by a gap of connective tissue. A triangular muscle-free area might occur between these muscles, which is due to a reduction of the fibres of the m. iliococcygeus. It is filled with fat and connective tissue, and is covered by the pelvic fascia.

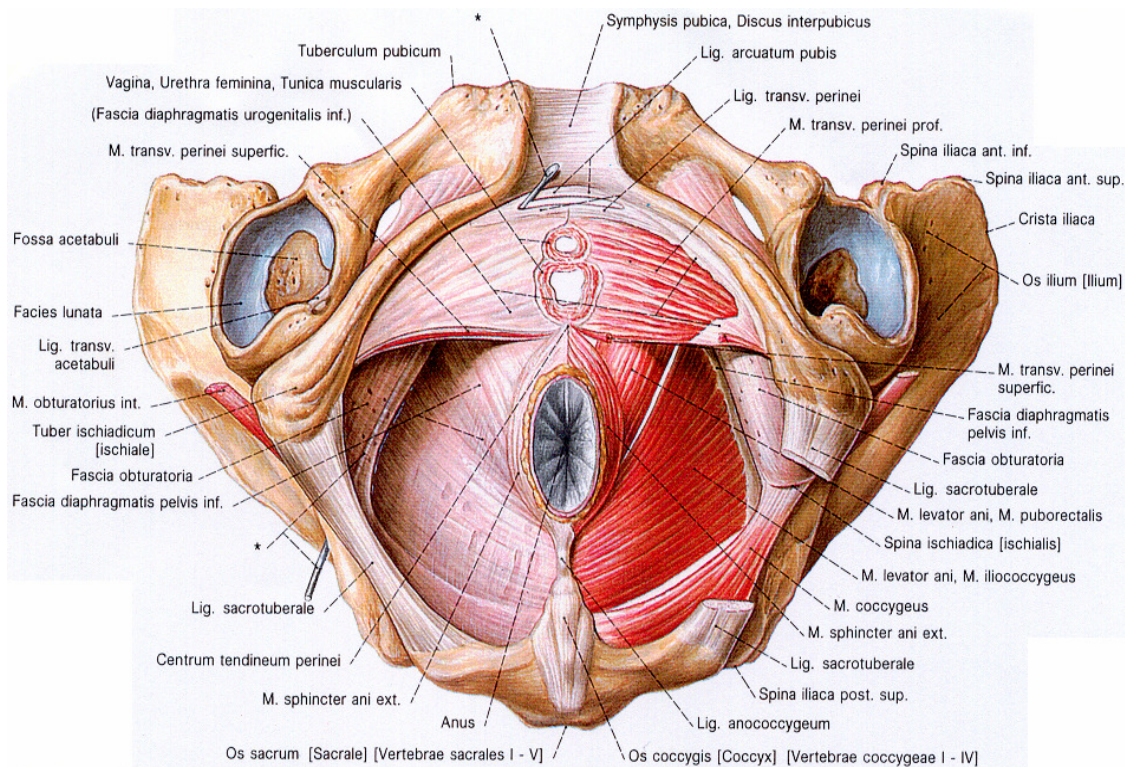
The **innervation** of the mm. levator ani and of the coccygeus results from the direct rami coming from the **nn. sacrales** (S3 and S4). By muscles they mark off the cavity above the pelvic floor; the half of the m. obturatorius internus, which lies above the base ligament, as the lateral wall, and the m. piriformis lying before the os sarum as the posterior wall.

2.3.1.1.2. Urogenital diaphragm

The urogenital diaphragm mainly consists of the *m. transversus perinei profundus* and its superior and inferior fasciae. As a thin plate of muscles, it arises at an angle between the inferior rami of the pubis transversely to the levator hiatus and closes the latter largely from below. The superior, ventral portion between the descending ramus of the pelvic bone is free of muscles. Here the two fasciae blend into a single ligament, the *lig. transversum perinei*.

While the posterior fibres of the muscle are directed almost transversely, the anterior ones encircle the urethra as the voluntary sphincter; the *m. sphincter urethrae* - in females as the *m. sphincter urethrovaginalis*, whose exterior fibres encircle both hollow organs together, while the deeper fibres encircle both orifices separately. The muscles on the wall of the hollow organs continue helically on the wall of the vagina. The angle below the symphysis is closed solely by a connective tissue, known as *lig. transversum perinei*. Between the symphysis and the *lig. transversum perinei*, the *v. dorsalis clitoris profunda* extends to the *plexus venosus vesicalis*.

The ***m. transversus perinei superficialis*** supports the posterior portion of the *m. transversus perinei profundus*. The superficial, thin fibres arise from the *tuber ischiadicum* to the *hiatus urogenitalis*. The innervation of the *m. transversus perinei profundus et superficialis*, as well as that of the *m. sphincter urethrae* is generated by the ***n. pudendus***.



III. 12: Muscles of the perineum, pelvic floor, diaphragma pelvis et urogenitalis
 J. Staubesand, Sobotta (ed), 1988

2.3.1.1.3. Sphincters of the orifices of the urogenital-and peritoneal tract

The **m. bulbospongiosi** both arise from behind the centrum tendineum of the peritoneum. Laterally, they cover the bulbus vestibulis. Fibres pass along the bottom of the clitoris and are inserted into the mucous membrane of the vestibulum vaginae. Anteriorly and posteriorly of the vestibulum vaginae, the muscles are connected by a raphé perinei. Single bundles pass forward on the other side of the dorsal raphé to be inserted into the m. sphincter ani externus of the opposite side, thus creating the shape of a pair of spectacles.

Mm. ischicavernosi arise from the ischial ramus to the dorsal portion of the clitoris. The muscles intensify the erection of the clitoris and are weaker than the corresponding muscles in the male.

M. sphincter ani externus surrounds the margin of the anus in a cuff like manner below the m. levator ani. It consists of three strata: a pars profunda, a pars superficialis and a pars subcutanea. The fibres of the left and the right side decussate in front and behind the anus. The m. sphincter ani externus acts together

with the m. puborectalis, who takes up the more important part, as the sphincter. Both constantly contract and relax for the expulsion of the feces.

Innervation: ramus of the n. pudendus – nn rectales inferiores.

2.3.1.2. The perineum

The perineum is the elevated bridge of soft parts situated between the anus and the posterior commissure of the labia majora. In the centre of the perineum, there is a tendinous plate, known as the centrum tendineum perinei. It is formed by tendinous extensions of the m. levator ani, the m. transversus perinei profundus et superficialis, the m. bulbospongiosus and the m. sphincter ani externus.

The centrum tendium perinei thus turns into a flexible plate, secured from all sides. Therefore, it is considered an important centre for the mechanics of the muscles of the pelvic floor. Fibres of smooth muscles running transversely between the two levator cruses build a muscular basis of the centrum tendineum perinei. Inferiorly, the muscles are covered by the fascia perinei superficialis, which is connected with the back wall of the m. transversus perinei profundus; laterally they are fused with the ischial- and the pubic rami and inserted into the superficial abdominal fascia.

Innervation: n. pudendus

The destruction of the centrum tendineum, as it might occur after an episiotomy, thus affects the function of numerous muscles. This makes clear how important the function of the perineum is with regard to stress incontinence of urine.

3. PATHOLOGY

3.1. Types of incontinence of urine

Generally, distinctions are made between:

a) **Stress incontinence:** Involuntary loss of urine due to an insufficiency of the closure of the urethra.

Einteilung in 3 Schweregrade:

Grades of urine incontinence:

Grade I: Loss of urine when coughing, sneezing, laughing or jumping.

Grade II: Loss of urine when lifting heavy loads, walking up stairs or running

Grade III: Loss of urine when standing, but not when lying

b) **Urge incontinence:** involuntary loss of urine due to a strong desire to urinate and non-inhabitable bladder motorics.

c) **Unconscious or reflex incontinence:** Involuntary loss of urine without the desire to urinate due to the detrusor contracting involuntarily. It is caused by an interruption of the nerve tract.

d) **Overflow incontinence:** Involuntary loss of urine happening to people who cannot empty their bladders or whose bladder motorics are absent.

Enuresis

Since only patients suffering from **stress incontinence** participated in my study, I will mainly focus on this type of incontinence.

3.2. Causes of urinary incontinence

University professor Dr. Engelbert Hanzal⁵ defines incontinence of urine as the "loss of the voluntary control of the expelling of urine". He explains that due to the complex physiology of the storage and expelling of urine, a number of etiological factors might be responsible for urinary incontinence. Therefore, a rough division according to the anatomy of the inferior urinary tract is made:

⁵ Univ. Prof. Dr. Engelbert Hanzal: Wie wird man inkontinent? In: Fortbildungsheft zum Thema Inkontinenz der Medizinischen Gesellschaft für Inkontinenzhilfe Österreich, Ärztinformation S 6

- factors affecting the urethra,
- factors affecting the detrusor,
- other factors like fistulas.

Frequently, a combination of these patho-physiological reasons is found. On account of these factors, a number of different types can be deduced, as I have explained in section 3.1. Types of incontinence

3.2.1. Urethra

The pressure, that has to be built up in the urethra, to exceed the pressure of the bladder in order to secure continence, depends on **intrinsic** (urethral epithelium; submucous vascular plexus, the smooth and the striped sphincter urethrae) and **extrinsic factors** (muscles of the pelvic floor and connective tissue). Only infrequently, the cause is a **congenital** weakness of the connective tissue. These cases are cases of **stress incontinence of urine** (involuntary loss of urine when the intra-abdominal pressure increases).

3.2.2. Detrusor

A hyperactivity of the bladder muscle (detrusor), which might even lead to a loss of voluntary control, is termed instability of the detrusor. These symptoms are typical for **urge incontinence**.

3.2.3. Other factors

A urethrocele might lead to minor involuntary loss of urine, which is not necessarily due to stress. Fistulae between the bladder, the urethra, the ureter and the vagina occur iatrogenically due to tumors, post-inflammably, or posttraumatically, further factors might be embryologic malformations. In reality often combinations of these factors occur. The most frequently occurring one is the combination of urge and stress incontinence of urine.

3.3. Pelvic floor

The muscles of the pelvic floor have a double function: viz. to hold the pelvic organs in their correct positions and to ensure urinary and faecal continence even when the pressure increases. The muscular force has to be effective in two directions.

Incontinent women show a significantly stronger descensus of the neck of the bladder. Additionally, these women suffer from a pathologically decreased innervation of the muscles of the pelvic floor. Most women with stress incontinence of urine often have weakened pelvic floor muscles, which can be proved by the EMG – introitus. Already during gravidity, the electric activity decreases noticeably, which might explain why incontinence of urine occurs during pregnancy and continues after childbirth.

3.4. Childbirth and trauma of the pelvic floor

B. Schübler and K. Baeßler⁶ pointed out that **vaginal delivery**, but not the elective Caesarean section, bears the risk of neuromuscular and connective tissue injury of different extents. These can be responsible for incontinence of urine, faeces and flatulence. Every vaginal delivery causes direct or indirect damage of the total system of the pelvic floor, with its muscles, connective tissue and neural supply. Univ.-Professor Dr. Peter Husslein⁷ describes the causal problem of a vaginal delivery as follows: In the course of the evolution, the size of the head has been increasing due to the increasing cerebral volume. The dilation of the bony pelvis, however, could not be adapted accordingly to maintain the mobility necessary for running and walking. Additionally, the lumbar lordosis, caused by the erect posture, further complicates childbirth.

Obstetric interventions, such as **episiotomy**, which are performed to shorten the expulsive stage of labour, to reduce the risk of trauma of the pelvic floor, and to prevent incontinence are untenable.

⁶ B. Schübler, K. Baeßler, Frauenklinik Luzern: Prophylaxe von Inkontinenz und Prolaps: Ein Merkmal zukünftiger mütterlicher geburtshilflicher Qualität? In: Geburtshilfe und Frauenheilk, 58(1988) 588-596, Thieme Verlag

⁷ Univ.-Prof. Dr. Husslein Peter: "Behandlungsalternative" Sektio? In: Österreichische Ärztezeitung Jänner 2001 p. 42-43

A **forceps delivery** bears a higher risk of causing insufficiency of the pelvic floor than a **vacuum extraction**. During the latter, the child's head can rotate and adjust to the obstetric canal.

Concerning the relation between an **epidural anaesthesia** and stress incontinence there are studies with different results.

Position during delivery: Delivery in a lying position, especially with leg supporters, may lead to more perineal injury.

3.5. Musculus levator ani

The m. levator ani is the primary muscle of the pelvic floor. After childbirth, the levator plate loses its tonus. Furthermore, a perineal descensus and a decrease of the conscious contractions may occur. In most cases, these alterations regress spontaneously during the first eight to ten weeks after delivery. Only very rarely, the ability to contract the pelvic floor consciously gets lost; in many cases the ability to contract is reduced.

The descensus of the levator plate six to eight weeks postpartum, at rest and during squeezing, has been described by Snooks et al in 1984, by Small and Wynne in 1992, and by Sultan et al in 1994. Simultaneously, the contractile force is reduced. This regresses in most cases during the first six to ten weeks postpartum; and the ability to contract voluntarily improves considerably.

3.6. Neuromuscular injury

A neuromuscular injury as described above is considered proved today. The EMG (electromyography), histo-morphological analyses and measurements of the conduction velocity of the nervus prudendus are possibilities of assessing an injury and its consequences onto a neuromuscular unit.

Histomorphologically, Dimpfl et al⁸. noticed a reduction of type I muscle fibres in the levator, an increase of the circumference of the fibres and of the plane in females

⁸ Dimpfl T., W. Müller Felber, C. Anthuber, R. Brandmaier, B. Schlüssler: Histomorphology of the pelvic floor muscles under specific consideration of age and parity. *Neuroural Urodynam.* 15 (1996) 333-334

who have had a vaginal delivery, compared to nulliparous women. These alterations are signs of a reinnervation after a denervation, as Smith et al.⁹ have observed in patients suffering from stress incontinence or prolapses. Gilpin et al.¹⁰ also pointed out the distinct injury of the muscular fibre in the posterior portion of the m. pupococcygeus in females who have had a vaginal delivery. The increase of the muscle-fibre density during vaginal child birth, as well as the elongation and increase of the amplitude of the potential of the motor unit, comparing the condition before and after childbirth, have been described as proofs for the denervation during a vaginal delivery by Coats et al. in 1980 and Snooks et al.¹¹ in 1984. A check-up of multiparous women, carried out five years after the delivery, showed a further increase of the density of the muscular fibres on the EMG, which indicates a progression of the process. (Snooks et al.¹²) As a consequence, motor units are lost, the maximal time of contraction reduces, the normal recruitment of muscles is disturbed, and the motor units are not activated. A further symptom of a neural injury resulting from childbirth is the prolonged conduction velocity of the nervus pudendus. The extent of the denervation, however, has to be seen in relation to the age and the number of deliveries of the patient.

3.7. Urethral sphincter complex

According to Schübler¹³, a number of studies proved that when the mobility of the urethra increases during physical activities like pushing, coughing etc. and when the pressure of the urethra decreases at rest, the sphincter complex is directly affected.

⁹ Smith A.R.B., G.L. Hosker, D.W. Warrell: The role of partial denervation of the pelvic floor I in the aetiology of genitourinary prolapse and stress incontinence of urine. A neurophysiological study. Br. J. Obstet. Gynaecol.96 (1989) p. 24-28

¹⁰ Gilpin S.A., J.A. Gosling, A.R.B. Smith, D.W. Warell: The pathogenesis of genitourinary prolapse and stress incontinence of urine. A histological and histochemical study. Br.J.Obstet.Gynaecol.96 (1989) 15-23

¹¹ Snooks S.J. et al: Injury to Innervation of pelvic floor sphincter musculature in childbirth. Lancet 8 (1984) 546-550

¹² Snooks S.J. et al: Effect of vaginal delivery on the pelvic floor, a 5 year follow up. Br.J.Surg.77 (1990) 1358-1360

¹³ B.Schübler, K.Baeßler, Frauenklinik Luzern: Prophylaxe von Inkontinenz und Prolaps: Ein Merkmal zukünftiger mütterlicher geburtshilflicher Qualität? In: Geburtshilfe und Frauenheilk, 58(1988) 588-596, Thieme Verlag

It has, however, not become clear which reasons are responsible for this phenomenon. An injury of the urethral closing and opening device; of the connective tissue, and the neural supply might be a possibility, as well as a general decrease of the tonus of the pelvic floor.

Pre- and postpartum check-ups showed a considerable decrease of the urethral closing pressure and of the functional length.

Pigné et al.¹⁴, on the other hand, only noticed that the transmission of pressure onto the urethra diminished during coughing, while the pressure profile at rest remained unaltered. Through urodynamic measuring, Losif et al¹⁵. found out that in women suffering from postpartum stress incontinence the functional length of the urethra was reduced and similarly also its closing pressure decreased. During pregnancy, the connective tissue of the rectus abdominis and of the obturator fascia becomes more expandable, but at the same time **weakens**. Therefore, Landon et al.¹⁶ assumed that these alterations of the connective tissue might have consequences onto the **retrovesical angle**. Other studies on postpartum incontinence revealed connections between the duration of the expulsive stage, during which the child's head strains the pelvic floor for hours, and the weight at birth.

4. PREVENTION

4.1. Birth preparation

To reduce injuries of the pelvic floor and functional impairment, it helps to perform pelvic floor exercises daily during the pregnancy, but also to exercise regularly.

¹⁴ Pigné et al: Consequences of pregnancy and delivery on the parameters of the urethral pressure profile. ICS Proceedings (1985) 119-120

¹⁵ Losif et al: Postpartum incontinence. Urol. Int. 36(1981) 53-58

¹⁶ Landon et al: mechanical properties of fasciae during pregnancy: a possible factor in the development of stress incontinence of urine. Contemp.Rev.Obstet.Gyneacol.2(1990) 40-46

4.2. Caesarean section

According to Univ.-Professor Dr. Husslein¹⁷ there is a clear indication for a section after a status post perineal tear of grade III, in order to prevent any further damage of the pelvic floor. The indication is, however, less strong for patients suffering from irreversible incontinence of urine and faeces after delivery. This is not meant to be a preventive measure, but should prevent further damage.

5. THERAPY

5.1. Classical therapeutic measures

5.1.1. Pelvic floor exercises

Currently, this type of exercise is the most frequently applied method. Even if one already suffers from stress incontinence, the consequent performing of the PME results in a better co-ordination and a strengthening of the pelvic floor muscles. Through the active strengthening of the closure mechanism of the urethra's sphincter muscles a thorough reduction of leakage can be achieved.

5.1.2. Biofeedback

Additionally, PMEs are combined with biofeedback to maximise the effect. This helps to establish a better awareness of the bodily functions and results in a better control.

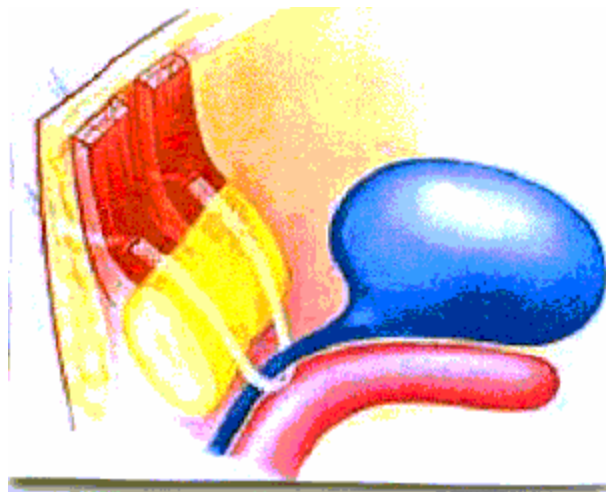
¹⁷ Univ.-Prof. Dr. Husslein Peter: "Behandlungsalternative" Sektio? In: Österreichische Ärztezeitung 25.Jänner 2001, p. 42-43

5.1.3. Electrical stimulation

This treatment is especially helpfully for women who have forgotten how to contract their pelvic floor actively. By contracting the partially inactive muscles, their function improves.

5.1.4. Surgery options

Surgery is a viable option for patients for whom conservative methods did not bring an improvement. The suburethral sling, or TVT ("tension-free vaginal tape"), which has been developed in Sweden, has achieved a high cure rate and is therefore regarded as a rather effective method.¹⁸ Other effective methods are the Burch-method and the vaginal plastic.



III. 13: Tension free Vaginal (TVT) operational technique
<http://www.aerztezeitung.de/doc/2000/08>

¹⁸ Ärztezeitung vom 4.8.2000 Online www.aerztezeitung.de/docs

5.2. Osteopathic point of view and method of treatment

Since in osteopathy the human being is perceived holistically as in his entirety of body, soul and spirit, my method of treatment is individually and dynamically aimed at with the individual human being. The osteopathic treatment consists of manipulations on the structural, visceral and cranial level.

While in classical medicine, the focus of attention is mainly directed to the pathological alterations in the treatment of stress incontinence of urine, like for instance to the weakness of the pelvic floor and the consequences involved, I am focusing on a rather dynamic approach of the connections and methods of treatments.

Osteopathy is based on the same anatomical and patho-physiological fundamentals as classical medicine, but additionally it also considers further factors like the musculo-skeletal interplay, which contribute to the development and continuance of stress incontinence of urine.

From the point of view of osteopathy, incontinence of urine can be classified into four levels, viz.

- the mechanical level
- the neurological and
- the hormonal level
- the psychoemotional level.

5.2.1. The mechanical level

In the case of the pelvic organs, gravity has a stronger effect than the force of thoracic inhalation. Therefore, it can be concluded that the pelvic organs are not supported by the diaphragm.

It is the pelvic floor which is responsible supporting and stabilising the pelvic organs. If all factors responsible for the optimal functioning of the pelvic floor are operating correctly, ptosis should not occur.

If the pelvic floor is too hypertonic or too hypotonic, the pelvic organs are exposed to a considerably increased pressure caused by the above located visceral column. The pelvic floor must be able to cushion this permanent pressure and to compensate the temporarily increased pressure occurring for instance during a pregnancy, or during a cough or a sneeze. In short, the pelvic floor has to be elastic.

The orifices of the pelvic floor are weak-points, especially in females where there are three exits, viz. the urethra, the vagina and the rectum. Thus, the pelvic floor is considerably more fragile. It should also be considered that the musculature serves a double function, viz. to tighten and relax the pelvic exit selectively.

The position of the urethra is the one of the important causes of incontinence of urine. The principal problem of the urinary bladder is a result of a malfunction of the supporting structures. There is a higher risk in a forceps delivery, and a smaller one in a vacuum extraction. A too largely performed episiotomy. causes a fibrosis of the perineum Thus, the pelvic floor is no longer able to absorb the alternating pressure optimally, and loses its supporting function for the above lying structures (bladder, cervix uteri, rectum) The effects of an episiotomy largely depend on its execution. The pelvic floor loses a lot of its ability to contract and its elasticity, which also influences the function of the sphincter urethra.

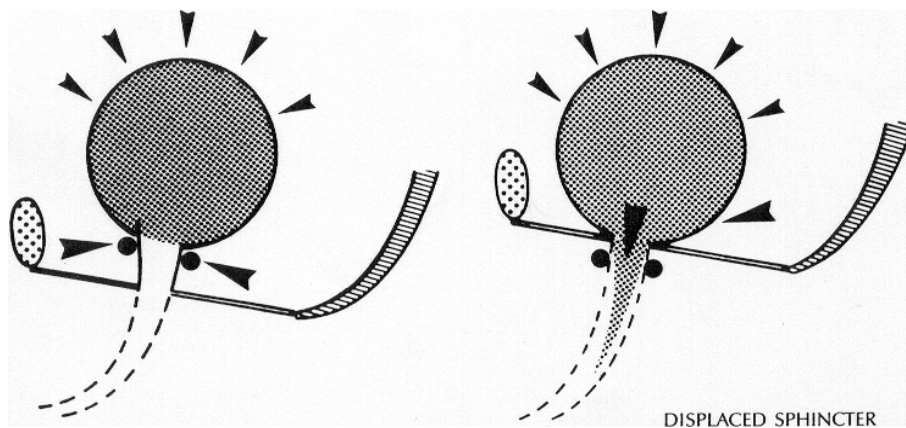
Other causes might be a ptosis of the abdominal organs, which exert pressure onto the bladder, as well as long-lasting depressions. The age of the patients also has to be taken into consideration, as the elasticity of the tissue decreases with advancing years. Generally, everything exerting increased pressure onto the urinary bladder or onto the pelvic floor, or causes any damage as those described above, may lead to a dysfunction.

Hugier and Bethoux¹⁹ investigated the consequences of urethovesical malposition. For their purpose, they used introvesical and intraurethral recordings. Their study is important because it pinpoints the wide-ranging consequences of the malposition of organs, even if these are minimal. In continent females, the bladder is positioned correctly in the abdominal cavity.

¹⁹ Huguier M., Bethoux A. (1965): Une technique radiologique d'exploration des prolapsus genitaux et des incontinenes d'urine: Le colpocystogramme: Annales des Radiologie; 8 :809-828

The organs located above encompass the urinary bladder and the proximal urethra with a certain pressure and so strengthen these. If the proximal urethra leaves the abdominal unit, followed by a perineal collapse, the urethral sphincter will no longer be supported by the abdominal pressure.

On the contrary, the pressure within the bladder increases and thus causes incontinence. Generally, this conclusion is applied to all sphincter of the human body, which in turn leads to better understanding of the dysfunctions caused by visceral restrictions and ptosi.²⁰



Ill. 14: Patho-physiology of the urethro-vesicular collapse

Jean-Pierre Barral et al, 1997

The tonus of the bladder is essential, too. Every mechanical alteration of the tension can increase the pressure of the urinary bladder and so has a weakening influence onto the sphincter of the urethra.

The physiological movement of the urinary bladder should be synchronised with the sacrum and the uterus, i.e. postero-superior during inhalation and antero-inferior during exhalation.

The wrong position of the urinary bladder (ptosis) causes the physiological movement to change and in consequence also influences the function of the bladder and of the urethra. This also affects the sphincter urethrae and in consequence also the sphincter's physiology.

It is important to consider the bony structures connected with the urogenital area and the pelvic floor. These are above all the sacrum, the coccygis, the hips and the

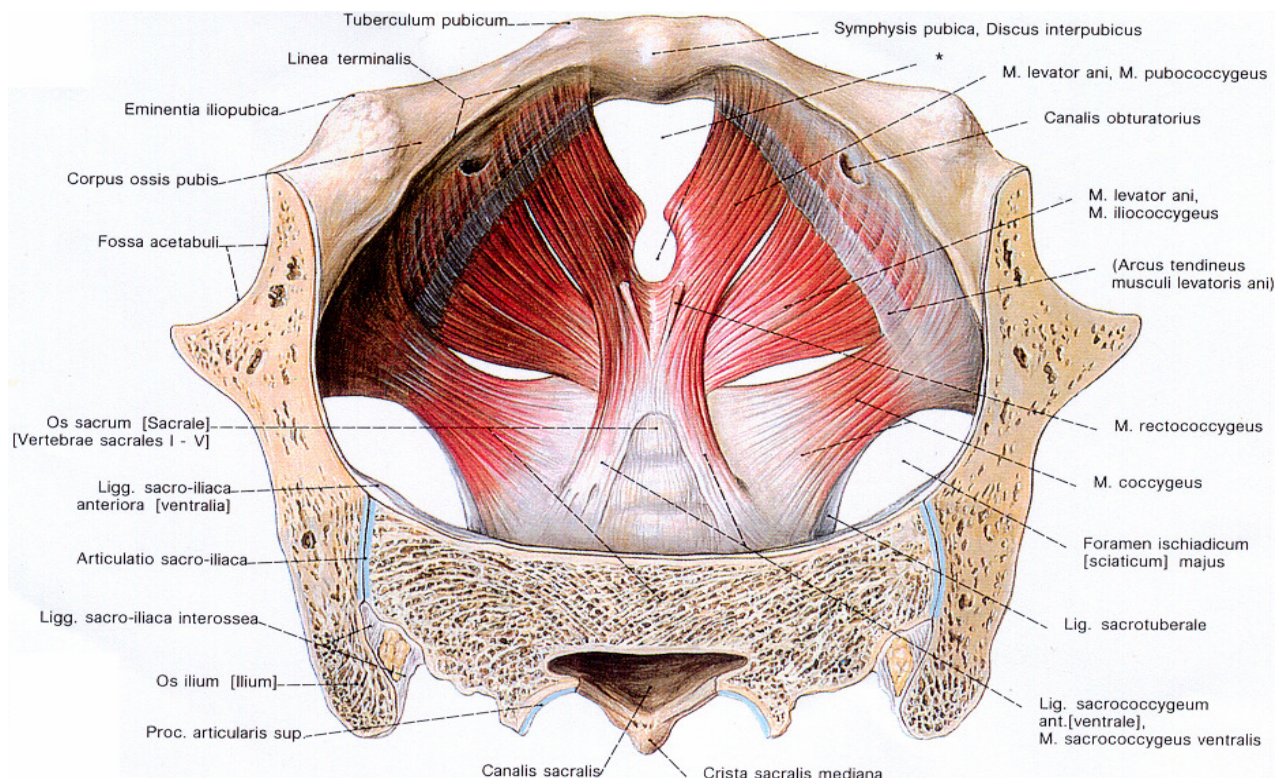
²⁰ cited from Barral & Mercier: Visceral Manipulation, Eastland Press, Seattle, 1988, page 222

osseous pelvic ring. The fixing of the hips, whether in external or internal rotation, can cause large mechanical problems, especially concerning the foramen obturatorium.

The foramen obturatorium is often connected with fixings of the uterus and the urinary bladder, and thus affect their function. An alteration of the tension of the foramen obturatorium may be caused by an arthrosis of the hip joint, for instance.

Attention has also be paid to malpositions of the sacro-coccygeal joint. A sudden slip onto the coccyx may lead to an anteriorisation of the coccygis.

A reduction of the distance between the coccygeus and the symphysis – i.e. that the base and the origin of the muscles approximate – causes the fibromuscular fibres to shorten and to lose a part of its ability to contract. In consequence the tonus of the pelvic floor musculature changes, which in turn influences the ability to support the urethral sphincter. This explains why seemingly harmless slips onto the coccyx may cause incontinence problems²¹.



III. 15: Muscles of the pelvic floor

J. Staubesand, Sobotta (ed): 1988

²¹ Barral & Mercier: Visceral Manipulation, Eastland Press, Seattle, 1988, p. 222

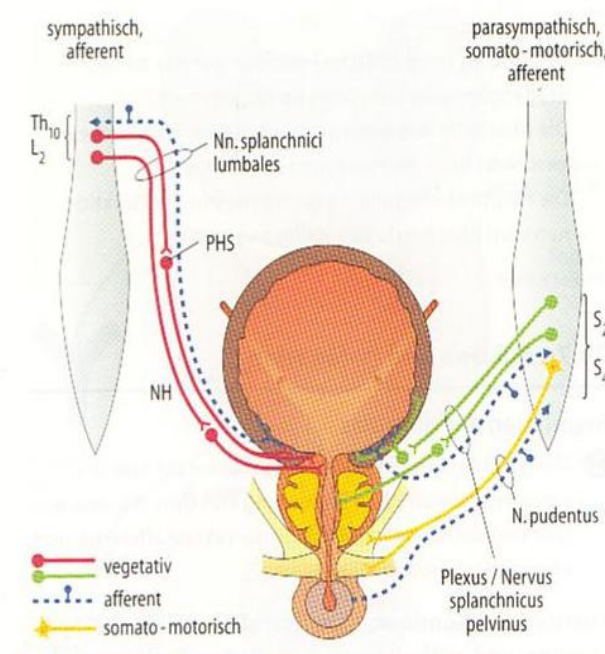
5.2.2. Neurological level

The following reference book serves as a basis for the next chapter:

Schmid, Lang, Thews²²,

Physiologie des Menschen mit Pathophysiologie

The muscles of the bladder are activated by parasympathetic fibres, which originate at the 2-4 sacral segments and run through the N. splanchnicus pelvinus. This innervation is the prerequisite for regular control of emptying the bladder.



III. 16: Innervation der Harnblase

R. Schmidt, F. Lang, G. Thews, 2005

The sympathetic innervation of the bladder has an inhibitory effect onto the detruser and activates the muscles of the trigonum vesicae and of the M sphincter vesicae internus (bladder cervix) It originates at the lower thoracal segments and the upper lumbar segments (thoacal 11 and lumbar 2). Their main function is the improvement of bladder continence. Innervation of the sphincter urethrae externus originates from

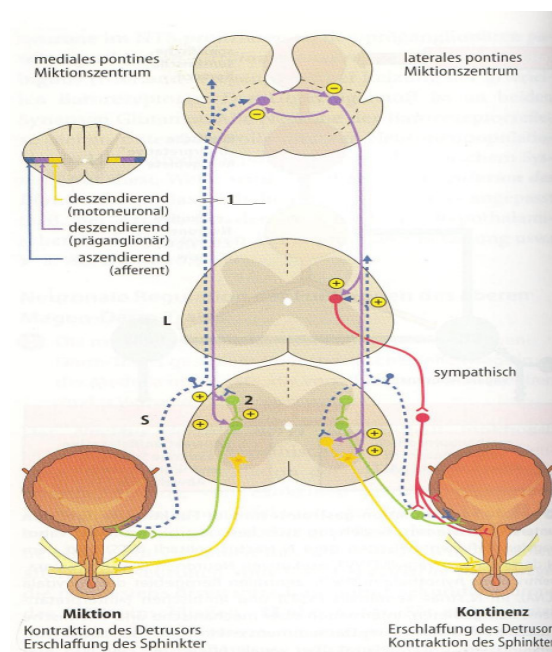
²² Schmid, Lang, Thews, Physiologie des Menschen mit Pathophysiologie, 2005, 29.Auflage, p. 446-447, Springer Medizin Verlag

the sacral marrow and runs through the N. pudendus, The grade of filling of the bladder is reported to the CNS by distension sensors in the bladder wall and via afferent fibres of the N. splanchnici pelvici.

Neural regulation of micturition: Distension of the bladder wall stimulates the dilation receptor. Via the reflex circuit parasympathetic neurons are stimulated and transmit to the detrusor vesicae. At the same time activity in sacral motoneurons to the M sphincter urethrae externus is inhibited. This causes the detrusor vesicae to contract. The reflex circuit depends on the anterior pontine region (median pontine micturition center) located in the brainstem

Neural regulation of continence: Serval neural mechanisms are responsible for continence.

Stimulation of the motoneurons to the sphincter urethrae externus is promoted by the lateral pontine micturition center. Neurons located in the medial micturition center stimulate the pre-gangliar neurons towards the bladder. Sympathetic neurons to the inferior urinary apparatus are stimulated by sacral reflex systems. They inhibit the detusor and contract bladder cervix and trigonum.



III. 17: Reflexwege für die Regulation von Miktion u. Kontinenz

R. Schmidt, F. Lang, G. Thews, 2005

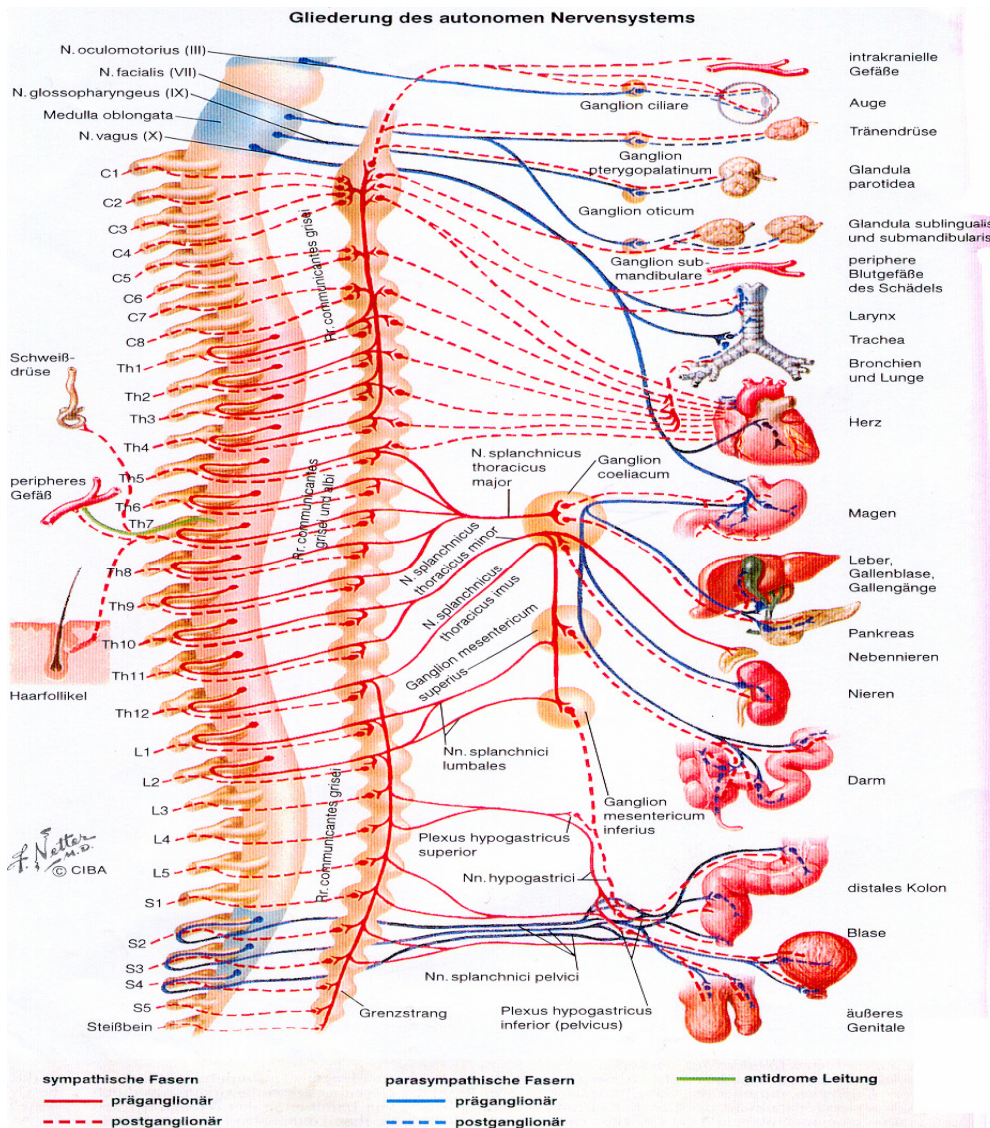
Superordinated to this system, emptying of the bladder and continence are driven by the the superior brain stem, the hypothalamus and the cerebrum

Taking a closer look at these complex mechanisms, it can be seen that the cause of urinary incontinence can be found on a number of different levels Therapy has to take this into consideration Blockage of vertebrae in the sympathetic or parasympathetic area (inferior thoracal area, superior lumbar area or sacrum) could for instance cause dysfunction of the bladder muscles, the bladder itself and the surrounding organs. Nerval supply of the pelvic floor has to be taken into consideration and thus the os coccygis has to be included.

Although for reasons of objectivization, only structural and visceral techniques have been applied. Treatment of the cranium should not be excluded, especially with regard to neural but also hormonal control. (see chapters 5.2.3 and 5.2.4)

When the nervous system is exposed to an increased input, the bladder is stimulated too much and the detrusor contracts too much, which leads to an increased pressure of the bladder and also influences the function of the sphincter muscle.

Since via the central nervous system the spine has an influence onto the innervation of the organs, blockings in the vertebral area have effects onto urinary incontinence. The segments throacal 11 – lumbar 2 "sacrum and coccygis" are connected with the nerval provision of the urinary bladder. Vertebral blockings in this area may cause a malfunction of the bladder musculature, as well as of the neighbouring organs.



III. 18: Structure of the autonomic nervous system

Günter Krämer (ed), 1987

5.2.3. Hormonal component

Effects of oestrogen, especially in menopause, are frequently discussed. During the climacteric period, the lack of female sexual hormones can cause the tissue of pelvic floor and urethra to lose its elasticity. Due to the absence of oestrogen the mucous coat at the exit of the bladder degenerates, which facilitates urine loss. Oestrogen stimulates the blood circulation and thus indirectly influences incontinence. Furthermore, imbalance on the level of hormones weakens the tonus of the ligaments and the musculature of the perineum and the whole pelvic ring. The hormonal imbalance also explains why many women suffer from urinary incontinence after delivery and around menopause.

5.2.4. Psychoemotional level

The influence of emotional stress has long been known. In females who have had emotional problems or have been dejected or depressed over a period of time, the whole muscular body tonus lessens. Consequently posture changes, which in turn again leads to ptosis of the organs. Accordingly, the interplay of the musculature is also weakened and impaired in its function, which leads to the emergence of incontinence of urine.

6. METHOD OF REALIZATION

6.1 Range of problem

The test persons of the present study were only women suffering from stress incontinence of urine. Especially middle-aged women and women who just delivered are affected by this condition. Certain physical activities cause these women to leak urine, ranging from a mere dribbling to major leakage. This involuntary loss of urine without any sensation of the need to urinate, is referred to as stress incontinence of urine. This is due to a sudden increase of intra-abdominal pressure produced from physical activities. This pressure is transmitted to the pelvic floor which cannot compensate it.

Despite its high prevalence, the women affected never discuss the condition with their doctors. The problem is not even discussed with specialists. Only when asked directly, urinary incontinence is mentioned. Medically, this loss of urine occurring during certain physical activities is referred to as "Stage I" of urinary incontinence. In a study within a preventive health examination carried out in 1998/99, S. Madersbacher et al²³. report on the prevalence of urinary incontinence. Of the 1260 women participating, 26.4% (332 persons) admitted that they had been leaking urine during the past four weeks. The problem, however, increases with advancing years: 10.8% of the 30 – 39 year olds (n = 176) 22.9% of the 40 – 49 year olds (n = 397) and already 34.9% of the 50 – 59 year olds suffered from urinary incontinence. Projecting these figures to the total population of Austria, this would mean that currently an estimated 850000 women are suffering from incontinence of urine. Although only 18.3% of the women affected reported that incontinence had a negative impact on their quality of life ranging from "moderate" to "severe" (projected approx. 155000), these figures give evidence of the high prevalence of the socio-economic importance of this disorder.²⁴

²³ Maderbacher, G. Haidinger, C. Temml: Prävalenz der weiblichen Harninkontinenz in einer urbanen Bevölkerung: Einfluß auf Lebensqualität und Sexualleben in: Speculum Nr.2/2000, 18. Jg., Schering Wien GmbH, Hrsg. Univ.Prof. Dr. Peter Husslein und Univ. Prof. DDr. Johannes Huber

²⁴ Maderbacher et al.

6.2. Research question

My study is sought to investigate systematically the effectiveness of an osteopathic treatment of stress incontinence.

The **research question** is whether a proved **stress incontinence** improves or eases completely after three osteopathic treatments carried out within a period of four to six weeks.

In my **study** I will investigate if three osteopathic treatments improve urinary incontinence considerably, or if at least stage I or II can be re-established.

6.3 Test plan

Women with stress incontinence of urine, test group and control group. Medical clarification – "Quality of Life" questionnaire - PAD test – treatments – final check up test.

6.3.1. Questionnaire

My study is based on the "Quality of Life" questionnaire used by the Universitätsfrauenklinik Freiburg for patients with urinary incontinence. One question, however, has been altered slightly²⁵. See: enclosure.

The questionnaire is divided into two parts. The first part contains questions concerning the subjective evaluation of the bladder function, like frequency and amount of urine loss. In the second part the influence of involuntary urine loss onto daily life is evaluated. There were three to five possible answers for the first part; and four possible answers for the second part.

²⁵ I added "during coughing, jumping, sneezing" to the first question of A- Function of the bladder: "How often do you lose urine involuntarily? - seldom, eg. only when I have a cold"

6.3.2. PAD test (1 hour) to assess the quantity of urine leakage

Since a subjective assessment of incontinence does not provide a reliable indication of the extent of the incontinence, an objective, comparable standardised test is necessary. The PAD test, which has already been clinically tested, is an easy to carry out standard test. It has the advantage of closely following the day to day situations and of assessing the discharged quantity of urine.

For the PAD test, the patient has to put in a pre-weighted waterproof pad without urinating previously. Then the patient has to consume 500 ml of non-carbonated fluid within max. 15 minutes. Afterwards she has to sit down quietly for 30 minutes. During this period the patient filled in the "Quality of life" questionnaire.

The PAD test includes motions such as going around, climbing stairs, standing up from a seat, lifting something off the floor and washing one's hands under running water. Since the programme can be adapted to the possibilities of the patients, I, additionally, included jumping and performing the manoeuvre that normally results in urine loss (like laughing, sneezing). The clients are not allowed to go to the toilet during that hour. Afterwards, the pad is removed and weighed again. The amount of urine loss is the difference between the first and the second reading.

While the original PAD test accepts weighing mistakes up to 1g, I increased accuracy to 0.1g. In a pilot study I have found out that 1g corresponds to 20 drops of water from a pipette. Thus, I considered the graduation of the original test inadequate. Therefore, I changed it to 0.1g. I used the precision scale AND of the series HL 200 EX with a measuring range of 200 and a graduation of 0.1g, which has proved to be absolutely suitable during the pilot study.

6.3.3. Selection of the test persons

24 women suffering from stress incontinence of urine participated in my study. The test persons were divided randomly into two groups, viz. **the test – and the control group**.

The test persons had to fulfil the following criteria:

- Stress incontinence of urine in stage I
- Ptosis of uterus and vagina
- Exclusion of hormonal causes
- Exclusion of organical problems, such as inflammations and tumours.

As hormonal causes were excluded by the gynaecologist, there was not an age limit for the test persons.

6.4. Procedure

The test group (TG) consisted of 12 women who were treated with general osteopathic methods. The 10 women of the control group (CG) were touched on the hips, the abdomen, and the head for some minutes without the intention of treating them or to take any influence on their body system, instead of receiving the same osteopathic treatment as the TG.

All women underwent a slightly modified **PAD test** and filled in a **”Quality of Life” questionnaire**. The TG received three osteopathic treatments within a period of four to six weeks, while the CG was given placebo treatments during the same period. (They were touched on hips, abdomen and head.) Both groups had to redo the PAD test and fill in the questionnaire once again at the end.

6.4.1. Medical clarification

Patients suffering from partial urinary incontinence were examined by the gynaecologist Dr. Bartosch to rule out any medical problems, like tumours or inflammable diseases such as infections of the urinary tract. Patients suffering from urge incontinence or ones with hormonal disorders were excluded. He diagnosed the urinary incontinence and assessed the degree of the ptosis.

6.4.2. Test programme

The test programme was carried out in my office. Every participant (from the TG, as well as from the CG) were given detailed information concerning the purpose of the study, an "ALWAYS" pad, and the information sheet of the PAD test. They were asked not to go to the toilet during the test. Subsequently, the test persons drank **500ml of tapwater** within 15 minutes and then filled in the prepared "**Quality of Life**" questionnaire²⁶. 30 minutes later they started the **PAD test**²⁷ with the following activities:

- Strolling around the room (for 2 minutes)
- Climbing up and down the stairs (2 minutes)
- Standing up from sitting (15 times)
- Coughing vigorously (15 times)
- Running on the spot (1 minute)
- Jumping up and down (30 seconds)
- Bending down and picking something off the floor (10 times)
- Performing the movement which results in the largest amount of urine to be lost (20 times)
- Washing one's hands under running lukewarm water (for one minute).

²⁶ Quality of Life Questionnaire for patients with urinary incontinence of the UFK Freiburg, Geburtshilfe und Frauenheilkunde 58 (1998)

²⁷ PAD test <http://www.continet.org/77%20ICS.htm> 31.07.00

At the end of the test, the women removed the pad and it was weighed. I filled in the weighing results in the index card. The amount of urine lost resulted from the difference between the first and the second reading. This way I obtained exact figures on how large the loss of urine was under stress.

The test group got three osteopathic treatments for free within four to six weeks, while the control group were given the already described placebo treatments. For ethical reasons, the control group will be treated osteopathically after the study has been terminated.

Finally, there was a **final test** for both groups, which consisted of the same elements as the first test, viz. filling in the "Quality of Life" questionnaire, and a PAD test which assessed the possible loss of urine. This procedure enabled me to obtain information on how much osteopathy improves the loss of urine.

6.4.3. Osteopathic examination and treatment (only test group)

I did not use any specific techniques in the course of this study; I rather focused on the demands and needs of the patients. In the treatment, I only attended these lesions, which I regarded to be connected to the problem. The reasons for urinary incontinence are so numerous that a single technique would not be successful.

6.4.3.1. Test group

After an extensive **medical history** including any illnesses, operations, accidents and problems, I will focus on the symptoms of stress incontinence of urine, especially, however, on pregnancy and course of delivery.

At first, I examine the **posture of the women standing**. Any asymmetries of the body or blockages in the zone of the spine and the pelvis might already indicate possible dysfunctions related with urine leakage. From a posterior posture, for instance, a general ptosis of the organs can be inferred.

The **examination of the women sitting** verified the lesions found in erect posture. I

palpate the diaphragm, the liver, and starting from there the lig. falziforme and the urachus while the patients are sitting

I focused on the position and the mobility, as well as the motility of the bladder and the uterus during the **examination lying**. Afterwards, I checked the mobility of the hips, the position of the pelvic bones, of the os pubis and the symphysis, as well as of the thoraco-lumbar transition, the lumbar spine, the os sacrum and the os coccygis. The palpation of the membrana obturatoria and of the pelvic floor is very important. Equally important is the harmonic movement of the sacrum, the uterus and the bladder, as well as the mechanical movement of every single part.

I did not examine nor treat the cranium and its lesin chains, as patients with hormonal and/or neural dysfuctions were excluded from this study. The second reason for this decision was to facilitate objectivation of the study.

The **osteopathic treatment** was applied to the spot, where I could recognise pathological patterns during my examination, i.e. to too much tension in the ligaments, the membrana obturatoria or in the pelvic floor; malpositions of the spine, the os sacrum, the os occygis, the os illium, the os ischii and the os pubis; ptosi and fixations of bladder and uterus, or muscular dysbalances in the pelvic floor or the perineum. Other lesions, which were not related to stress incontinence from my point of view, were not treated.

The perineum is treated solely with the indirect technique; a finger is placed on the perineum in order to centre it and to bring it into a membranous balance. I feel the very strong reaction when applying this technique.

The type of treatment of the structures mentioned above was applied individually. Lesions in the zone of the lumbar spine are manipulated in young patients, for elder ones I might apply the Mitchell techniques, for instance.

6.4.3.2. Control group

I also drew up a medical history for the patients of the CG. Then I asked them to lie on their backs. Instead of treating them osteopathically, I placed my hands onto the hips, the abdomen, and the sacrum, as well as onto the occiput for some minutes, however, **without the intention of treating their problems**.

I have decided fort his type of placebo treatment because this way is not obvious for the patient whether real treatment has been done or not. Thus, expectations and

reaction are the same as for any real treatment.

I have to say that it is very difficult in osteopathy to touch a patient without treating him in some way. I believe, however, that there is a reaction to treatment which is not specific to incontinence and thus has no influence onto the results of my study.

7. RESULTS

The starting point of my study was my claim that three osteopathic treatments would result in an improvement of stress incontinence of urine. In the following chapter, I would like to present the results.

The objective PAD-test, as well as the subjective criteria (state of health questionnaire) of both groups before and after the treatment were evaluated statistically.

7.1. Evaluation of the PAD-test

Evaluation of the test- and the control group before and after the treatment:

- a) Individual evaluation, personal data and comparison of the loss of urine in gram.
- b) Individual evaluation, personal data and comparison of the loss of urine, alteration in percent
- c) average value in gram and
- d) average value in percent for the whole group

The individual alteration in percent is calculated by

$$\text{rel. change} = \frac{(\text{loss of urine}_{\text{after}} - \text{loss of urine}_{\text{before}})}{\text{loss of urine}_{\text{before}}} \cdot 100\%$$

With this variable a u-test is performed under the following assumptions:

Dependent variable: rel. change (Relative change of the loss of urine).

Independent Variable: Group

Null hypothesis: There is no difference between the test and the control group.

Alternative hypothesis: Due to the osteopathic therapy, an improvement in the test group compared to the control group can be observed (one sided test). Thus, the two groups differ.

Level of significance: $\alpha=0,05$

7.1.1. Results of the test group

This group consisted of 12 patients, 11 of which noted a considerable improvement of their loss of urine.

Initially, the loss of urine is in a range from 1,0 gram to 27,4 gram (Cf. Table I., graphical charts in Appendix).

Patient Number	Measurement in gram		Alteration in gram	Alteration in percent*
	Beforehand	Afterwards		
1	6,1	1,0	-5,1	-83,6
2	22,0	24,0	2,0	9,1
3	27,4	21,3	-6,1	-22,3
4	14,0	5,0	-9,0	-64,3
5	1,0	0,1	-0,9	-90,0
6	1,4	0,3	-1,1	-78,6
7	1,0	0,4	-0,6	-60,0
8	1,1	0,2	-0,9	-81,8
9	18,6	3,7	-14,9	-80,1
10	24,6	4,6	-20,0	-81,3
11	7,8	1,5	-6,3	-80,8
12	8,7	0,8	-7,9	-90,8
Average value	11,1	5,2	-5,9	-67,0
Std deviation	9,9	8,3	6,5	30,4
Minimum value	1,0	0,1	-20,0	-90,8
Maximum value	27,4	24,0	2,0	9,1
Median value	8,3	1,3	-5,6	-80,5

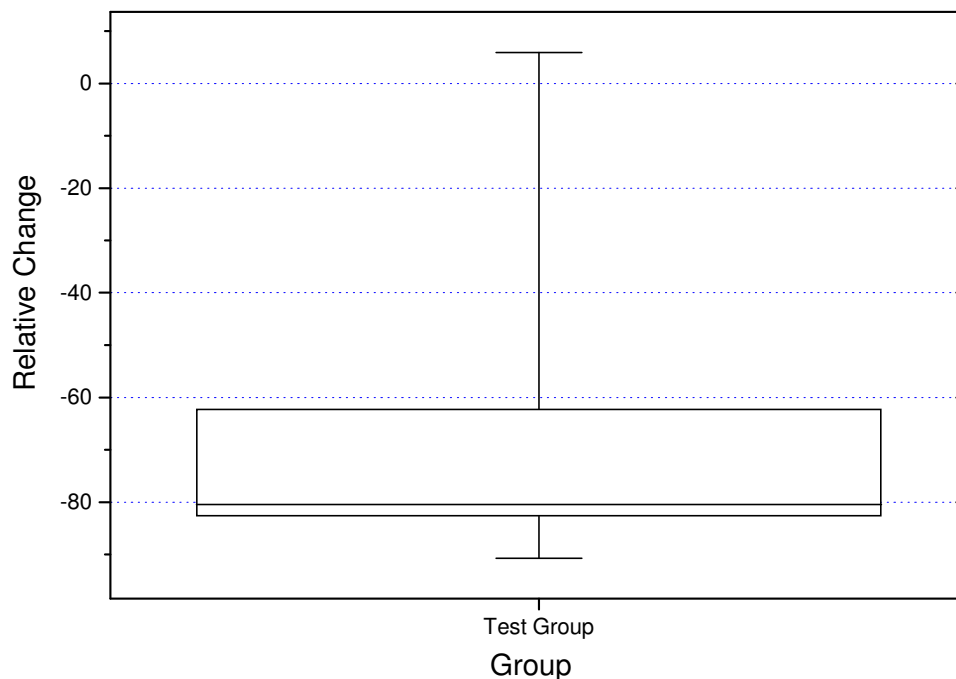
III.:Table I.: Measurement of the Test group. *... dependent variable rel. change.

On average, an improvement of 11,1 to 5,2 gram could be noted after the treatments. I recorded individual improvements ranging from 0,6 to 20 grams for 11 patients. Only in one patient, who showed a high loss of urine with 22 grams from the beginning, the loss of urine increased to 24 gram.

In percent, there was an average improvement of 67% to be noted in the test group. The improvement ranged between 22% and 91%, except for the one subject, who showed a deterioration of 9 %, which might, however, be due to daily fluctuations. According to the median value, 50% of the patients showed an improvement better than 80.5%.

From the following box and whisker plot (Graph. I) the relative changes of the loss of urine for the test group can be read (from top to bottom):

- upper end of the whisker: 95% percentile
- upper margin of the box: 75% percentile
- horizontal line within the box: median
- bottom margin of the box: 25% percentile
- lower end of the whisker: 5% percentile



III.:Graph. I.: Box-and-whisker plot of the relative changes of the loss of urine, calculated from the results of the PAD-Test, Test group.

Table I shows that for 5% of the test group subjects experienced an improvement of the loss of urine of more than approx. 90%.

An improvement between 82 and 90 % could be observed at another 20% of the women.

In total, 50% of the women lost 80% less urine after the treatments than they did before. Another 25% of the women had improvements between 62 and 80%. That means, that only 25% of the patients had improvements less than 62% or in a single case a deterioration.

7.1.2 Results of the control group

The control group consisted of 10 patients. There were hardly any alterations concerning the loss of urine after the placebo treatments to be noted. In the beginning, the loss of urine is in a range from 1.1 gram to 42.0 gram. In the second test the loss of urine is in a range from 1.3 to 37.7 gram. The individual alterations range from deteriorations of 1.2 gram (18.2%) to improvements of 4.3 gram (12.5%). The average alteration of all members of the control group is a deterioration of 0.3%, which could be explained by daily fluctuations.

Patient Number	Measurement in gram		Alteration in gram	Alteration in percent
	Beforehand	Afterwards		
1	20,4	21,6	1,2	5,9
2	18,4	16,8	-1,6	-8,7
3	30	29,1	-0,9	-3
4	18,4	17,6	-0,8	-4,3
5	1,1	1,3	0,2	18,2
6	1,6	1,4	-0,2	-12,5
7	12,9	13,5	0,6	4,7
8	42	37,7	-4,3	-10,2
9	3,2	3,5	0,3	9,4
10	5,6	5,8	0,2	3,6
Average value	15,4	14,8	-0,5	0,3
Std. deviation	13,4	12,3	1,6	9,7
Minimum value	1,1	1,3	-4,3	-12,5
Maximum value	42,0	37,7	1,2	18,2
Median	15,7	15,2	0,0	0,3

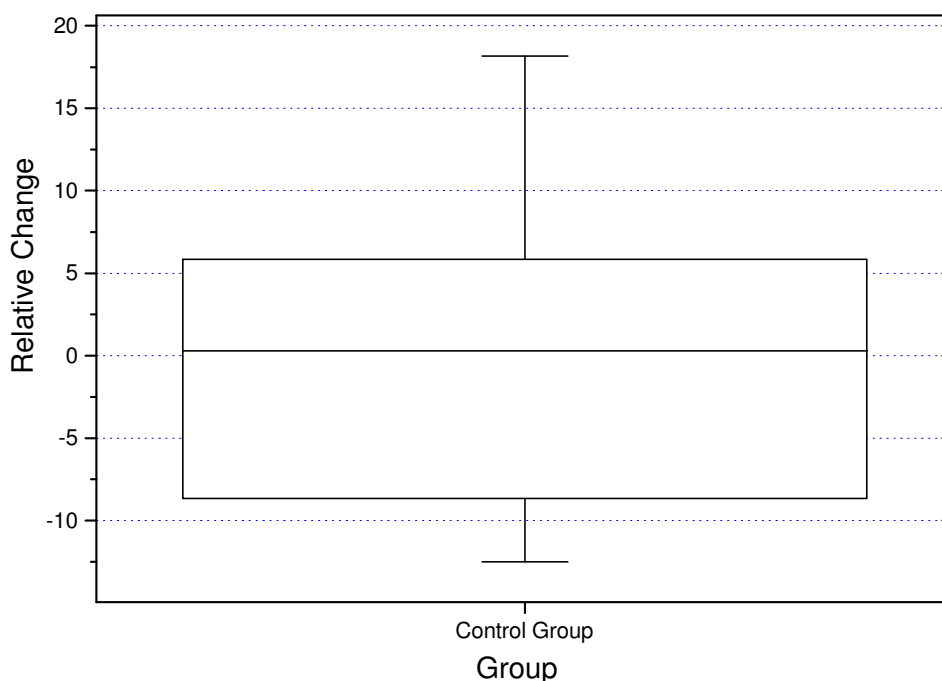
III.:Table II: Measurement of the Control group

According to the median and also the individual results (cf. table I and annex) an improvement could be noted in the results of five patients, another five patients showed a deterioration.

The range of the improvements can be quantified within a range from 3% and 12.5%. For the five patients, who suffered a deterioration, this range was from 3.6% to 18.2%.

In Illustration Graph. II. the results are summarized in a box and whisker plot. Again, from here the following statistical values of the relative changes of the loss of urine for the control group can be read (from top to bottom) :

- upper end of the whisker: 95% percentile
- upper margin of the box: 75% percentile
- horizontal line within the box: median
- bottom margin of the box: 25% percentile
- lower end of the whisker: 5% percentile



III.:Graph. II: Box-and-whisker plot of the relative changes of the loss of urine, calculated from the results of the PAD-Test, Control group.

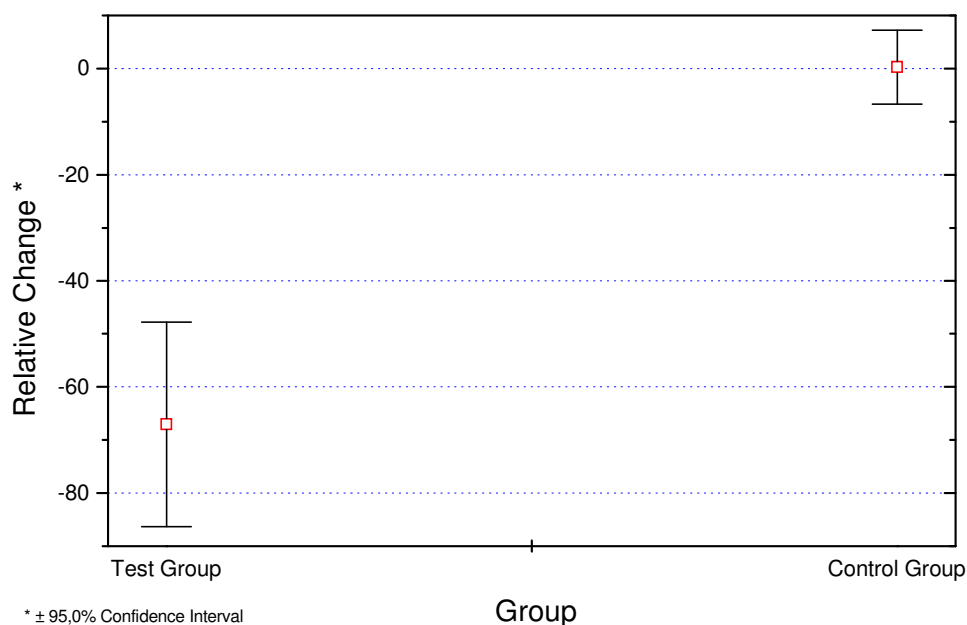
Graph. II. depicts the improvement of the loss of urine of 5% (5%-percentile) of the women in the test group, which was higher than approx. 12.5%. In comparison, the 5%-percentile value was 90% in the test group.

An improvement between approx. 8% and 12.5% could be observed at another 20% of the women.

In total, 50% of the women lost less urine during the second test than they did in the first one and 50% suffered a deterioration during this time.

7.1.3. Comparison of the two groups

Comparing the results of the two groups, it clearly can be noted that there has been considerably more improvement in the women of the control group than in those of the control group. The following graphical presentation clearly depicts the difference between the two groups (test- and control group).



III.:Graph. III: Comparison of the mean values (+/- 95%-confidence intervals) of the test- and control group.

Graph.:III shows the mean values for the relative change of the loss of urine measured in the tests for both groups (small boxes) and the 95% confidence interval of the mean values (whiskers). Since there is no overlapping of the whiskers it can be stated that the two groups are diverging by a high value. Also the results of the u-test show that the improvement in the test group is significantly higher than in the control group ($u=8,0$, $p=0.0003$).

7.2. Results of the questionnaires and comparison of the two groups

In this chapter I will present the results of the questionnaires and the evaluation of the answers of the test- and control group before and after the treatment.

The catalogue of questions consisted of:

- a) Questions concerning the function of the bladder with three to five possible answers, and
- b) The influence urinary incontinence has onto situations of the daily life. with four possible answers.

7.2.1. Questions concerning the function of the bladder

In the test group all women noted a subjective improvement after the treatments, especially with regard to the frequency and the amount of urine loss. For the most part, this result tallies with the objective data of the PAD-test. The women noted an improvement in the necessity to use pads or changing their underwear and the frequency and amount of their loss of urine were felt to be lower. The involuntary loss of urine was rated to be less annoying than previously.

With regard to the frequency of urine loss, the women in the control group did not notice any improvement after the placebo treatment. One woman, however, noted an improvement of the quantity. Also, they did not notice a change in how often they had to wear pads. One woman found it no longer necessary to change her underwear during the day.

Attention has to be paid to the fact that at the beginning two patients rated their loss of urine to be disturbing, while at the end it were four persons. This might be due to the higher awareness the problem of urinary incontinence.

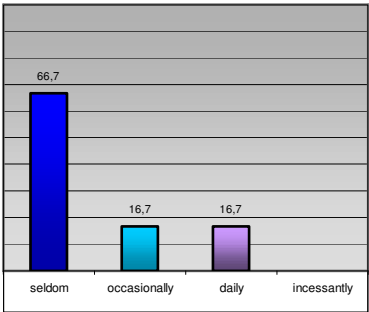
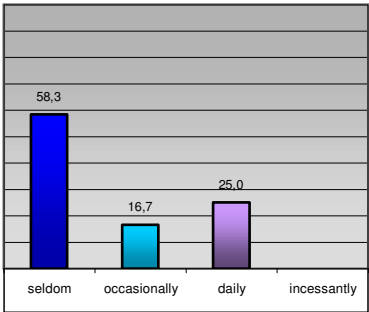
On the following pages the single topics will be presented. It has to be born in mind, that a single patient equals 8.3 to 10% due to the low sample number.

A) 1. How often do you lose urine involuntarily?

Test Group

Before

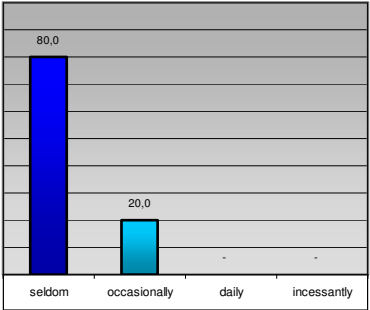
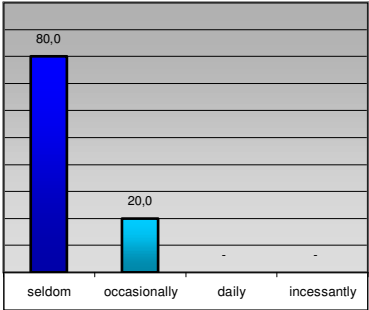
Afterwards



Control Group

Before

Afterwards



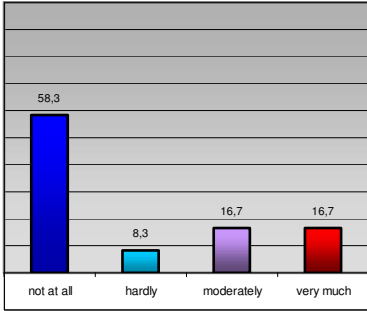
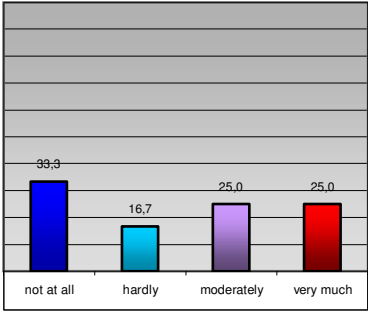
While there was no improvement noted for the control group with regard to the frequency of involuntary loss of urine, the women of the test group answered considerably more often that they were hardly losing urine any more. Furthermore, it is obvious that a comparatively higher number of control group patients were experiencing less involuntary loss of urine from the beginning, i.e the test group was anyway predisposed.

B) 2. When I go shopping, the involuntary loss of urine disturbs me...

Test Group

Before

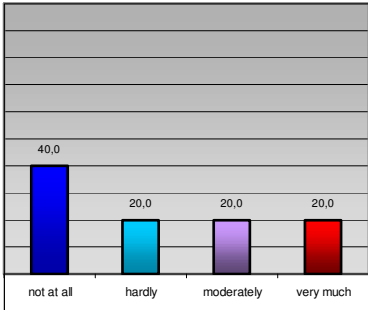
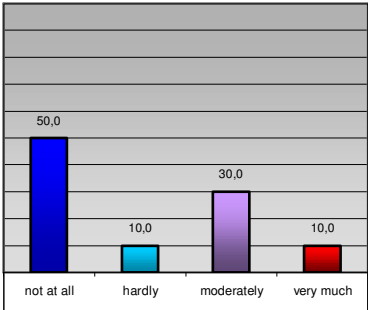
Afterwards



Control Group

Before

Afterwards



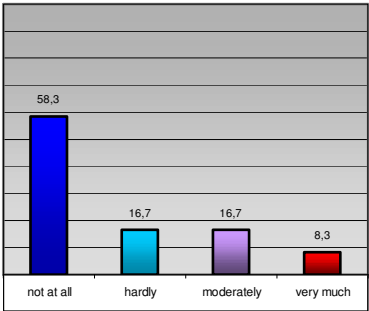
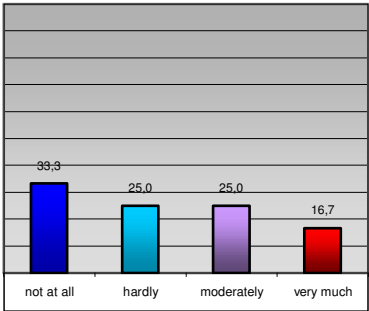
As for the last question, there is a deterioration in the subjective feeling. For the testgroup, however, there was a higher improvement and at the end 58.3% of the women were no longer disturbed by the loss of urine during shopping – while this was only true for 33.3% during the first poll.

B) 3. At my workplace, the involuntary loss of urine disturbs me...

Test Group

Before

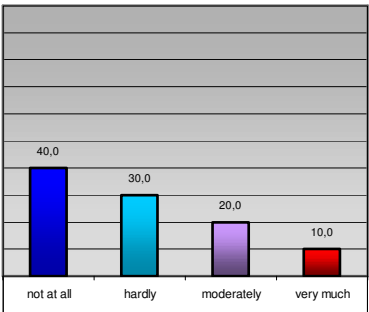
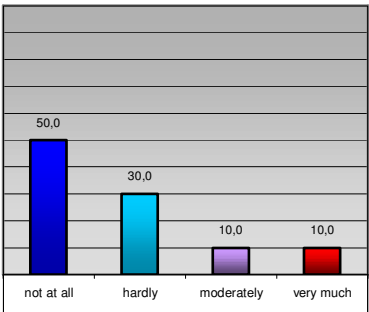
Afterwards



Control Group

Before

Afterwards

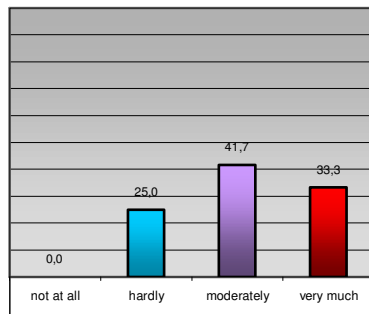


58.33% of the test group women reported to not feel disturbed by the loss of urine at their workplace after the treatment, while initially only 33.3% had said so. In total, the number of patients who felt the most affected has decreased to 50%. This percentage, however, is the same in the control group, although less patients said that they were not affected at all.

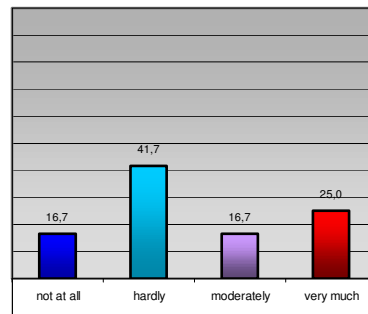
B) 4. In my free time and during performing my hobbies, the involuntary loss of urine disturbs me...

Test Group

Before

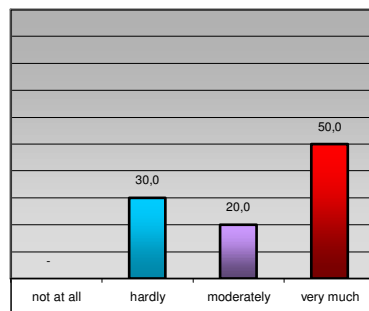


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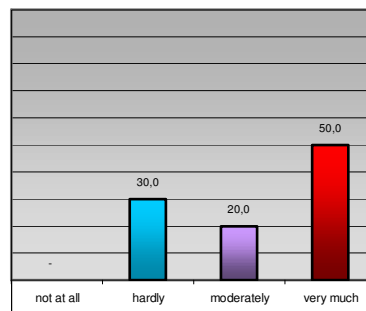


Control Group

Before



Afterwards

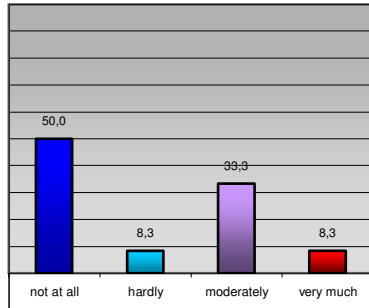


While after the placebo treatment no changes were reported in the control group there is a significant improvement in the testgroup – where patients had initially reported moderate to high impediment in their free time. After the treatment the percentage came down to 41.7%. For the control group the percentage remained the same with 70%. 16.7% of the women in the test group did not feel impaired any more after the treatment.

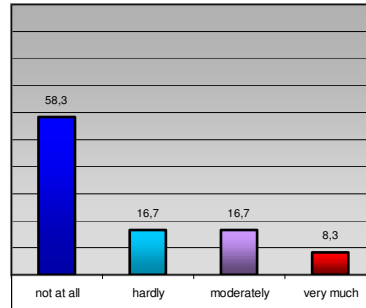
B) 5. During short trips, the involuntary loss of urine disturbs me...

Test Group

Before

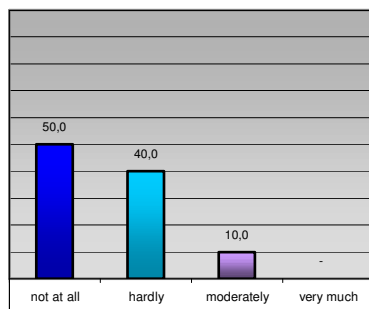


Afterwards

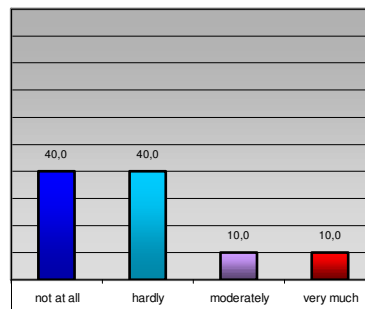


Control Group

Before



Afterwards



Also for this question, improvements caused by the treatment can be noted, while the women from the control group reported a change for the worse after the placebo treatment. One subject even reported heavy impediment. In sum, however, less women from the control group felt little or heavily affected compared to the test group, which can be attributed to their inferior initial situation

7.3.2 Influence of the involuntary loss of urine onto situations of the daily life

In the answers of all the questions B1 to B16 a positive improvement was noted in the **test group**.

For daily routines like house work, shopping, work a significant improvement in the feeling of being disturbed by the loss of urine occurred. The same for hobbies, short trips and when on travel. The overall well-being, as well as the mental and nervous well-being clearly improved.

Choice of clothes and social life became less restrictive. In total, these improvements brought about less fear of smelling and embarrassing situations.

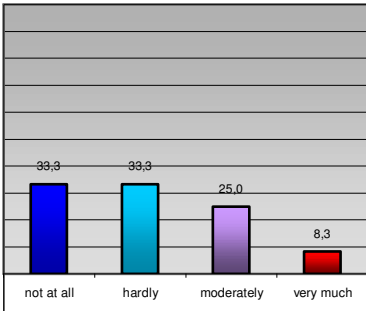
These changes were less obvious when patients received guests, than when they visited someone themselves. Also the effects onto family relationships became less. . Improvements but also deterioration were observed in sex life, which could eventually be attributed to higher sensitization

Concerning the control group, the answers of the questions B1 to B16 did not result in a single, definite result, neither in one nor in the other direction, as the evaluation of the individual questions remained the same or differed. This result is also represented by the following graphs, which will be presented on the following pages. It has to be beared in mind, that a single patient equals 8.3 to 10% (test group and control group, respectively) due to the low sample number.

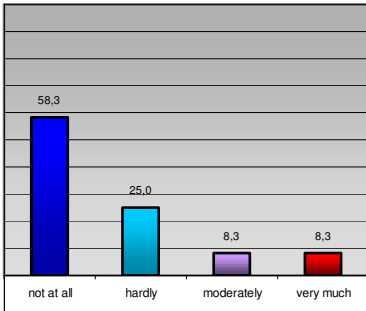
B) 1. During house work, the involuntary loss of urine disturbs me...

Test Group

Before

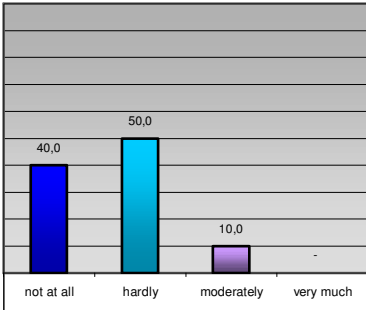


Afterwards

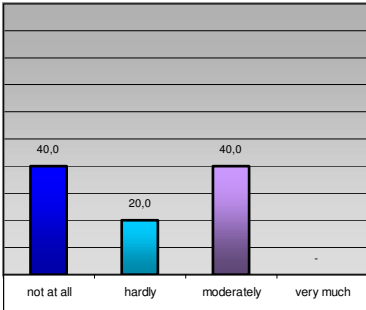


Control Group

Before



Afterwards

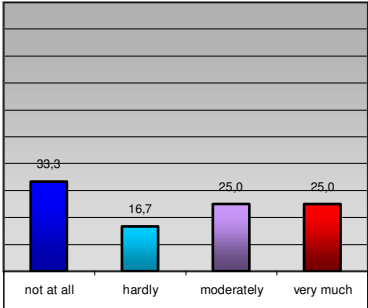


While there was a subjective deterioration during housework for the control group, the situation of the test group patients improved. The group of patients which felt most affected by the loss of urine during housework, is however, not affected by this change.

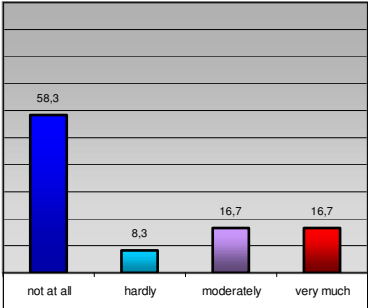
B) 2. When I go shopping, the involuntary loss of urine disturbs me...

Test Group

Before

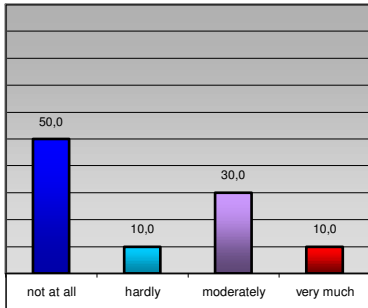


Afterwards

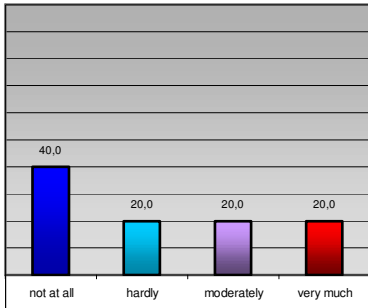


Control Group

Before



Afterwards

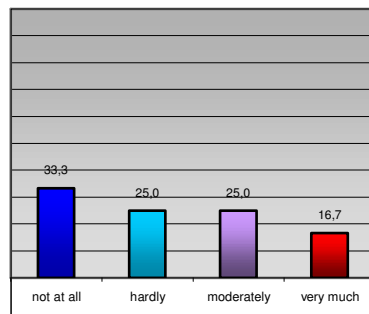


Just like in the previous question, the subjective feeling of the control group deteriorated, The improvement in the testgroup, though, was extremely high, and at the end 58.3% of the women did not feel disturbed by urine loss while shopping compared to 33.3% in the initial poll.

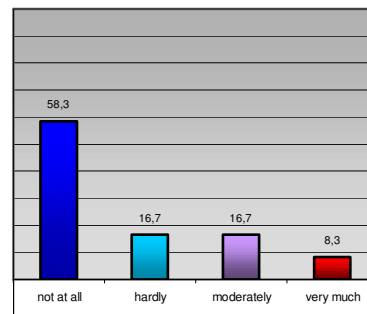
B) 3. At my workplace, the involuntary loss of urine disturbs me...

Test Group

Before

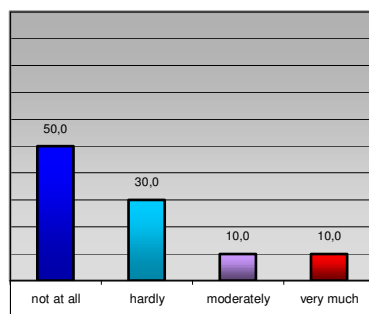


Afterwards

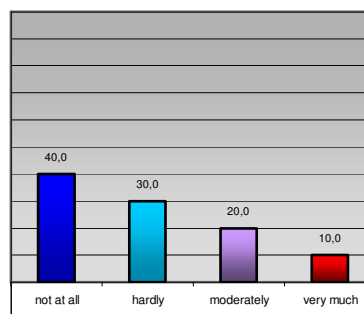


Control Group

Before



Afterwards

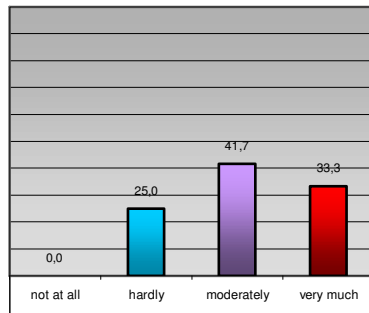


58.3% of the test group reported not to feel disturbed by urine loss at work after the treatment, compared to 33.3% at the beginning. In total the number of patients who felt heavily affected before the treatment has decreased by 50%. This percentage remained the same for the control group, where however less patients reported to not be affected at all.

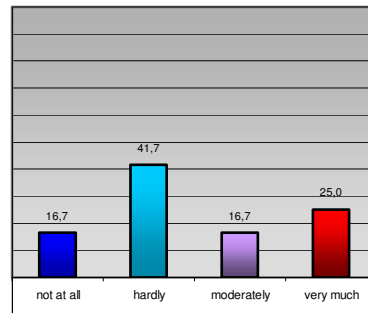
B) 4. In my free time and during performing my hobbies, the involuntary loss of urine disturbs me...

Test Group

Before

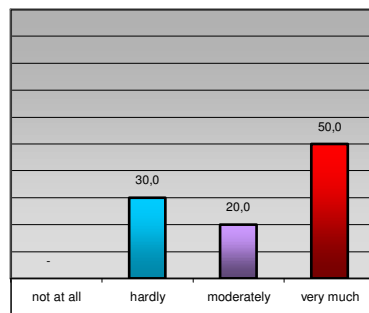


Afterwards

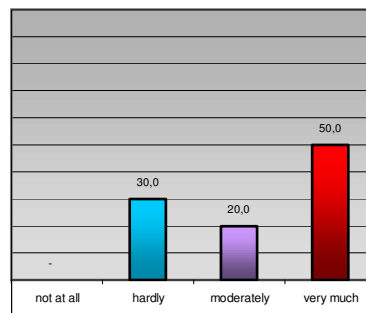


Control Group

Before



Afterwards

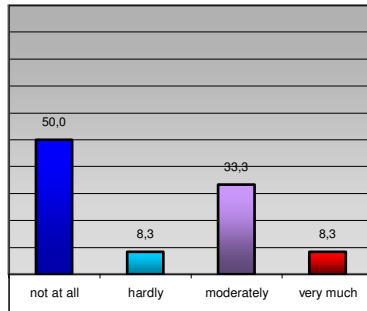


While there is no change to be noted for the control group, the percentage of test group patients affected moderately or heavily in their free time decreased from 75% to 41.7%. The percentage for the control group remained the same with 70%. 16.7% of the test group did not feel impaired after the treatment any more.

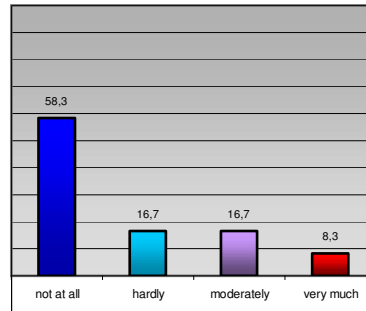
B) 5. During short trips, the involuntary loss of urine disturbs me...

Test Group

Before

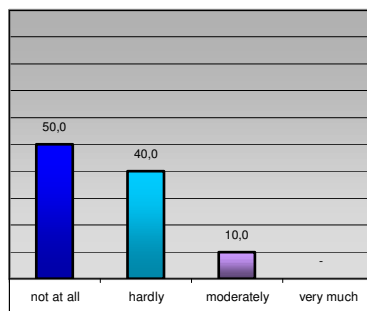


Afterwards

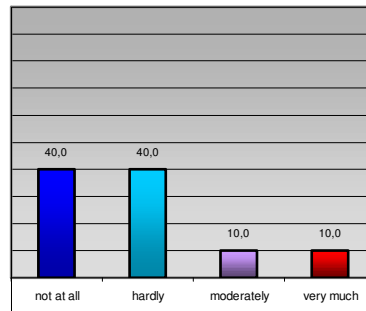


Control Group

Before



Afterwards

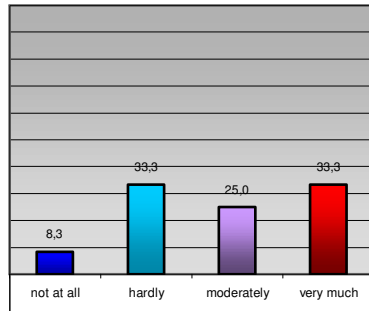


Also here I noticed improvements caused by the treatment, while patients of the control group reported change fort he worse after the placebo treatment. One subject additionally felt heavily impaired. On overall, however, less women of the control group felt hardly or heavily impaired compared to the test group, which can be attributed to their generally worse situation at the beginning of the study.

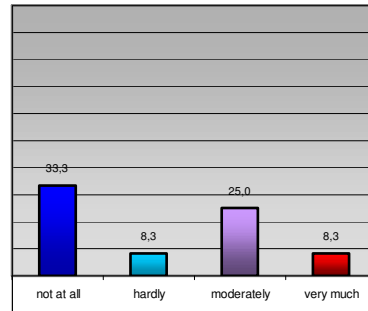
B) 6. On longer journeys or in the holidays, the involuntary loss of urine disturbs me...

Test Group

Before

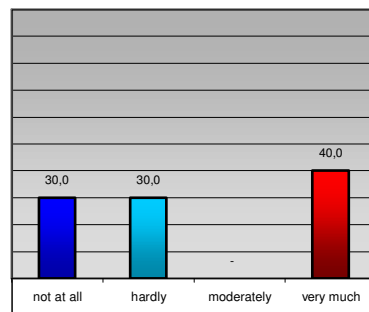


Afterwards

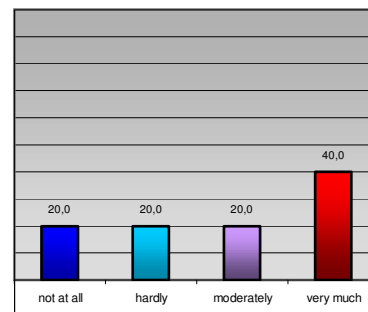


Control Group

Before



Afterwards

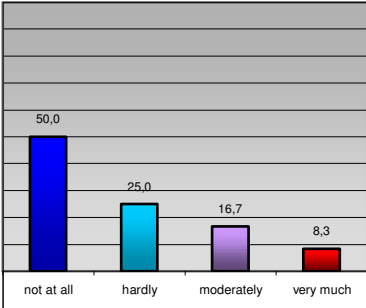


On longer journeys the impediment of the test group could be reduced from 1/3 of the patients to 8.3%, while still 40% of the control group patients felt heavily afflicted. Since an additional 20% of the control group patients reported slight disturbance after the placebo treatment, deterioration can be noted. Slight affection by the problem remained the same in the test group, however the answer that there is no disturbance felt by urine loss increased from 8.3% to 33.3%

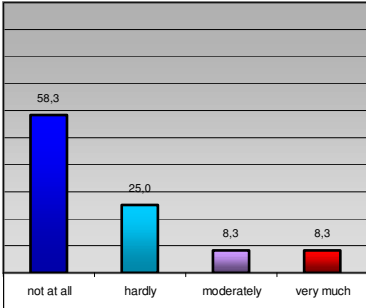
B) 7. When I have visitors, the involuntary loss of urine disturbs me...

Test Group

Before

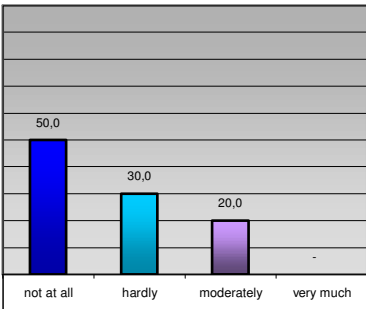


Afterwards

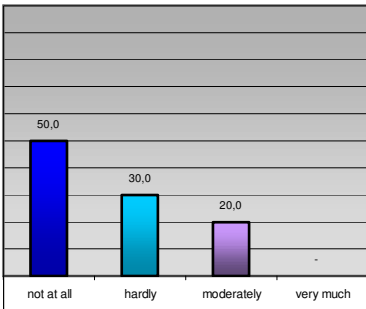


Control Group

Before



Afterwards

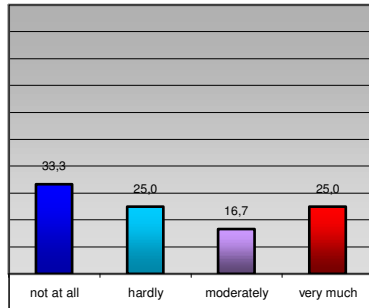


For the test group we see a slight improvement with regard to impediment during visits from other people. Again, the percentage in the answers of the control group remains the same.

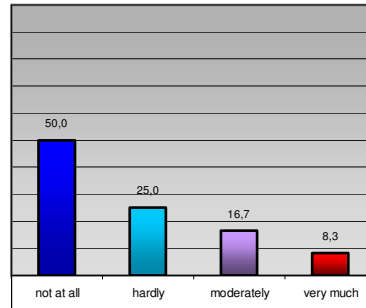
B) 8. When I visit someone, the involuntary loss of urine disturbs me...

Test Group

Before

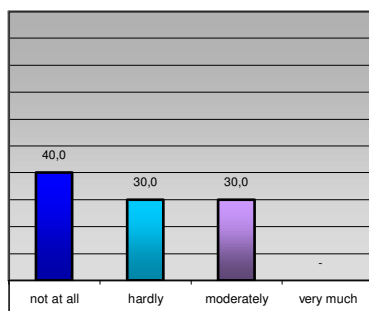


Afterwards

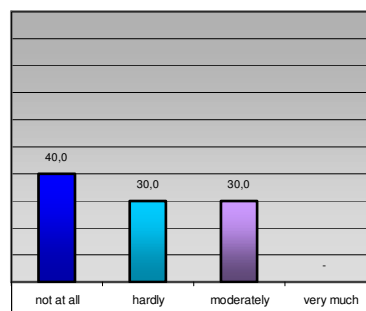


Control Group

Before



Afterwards

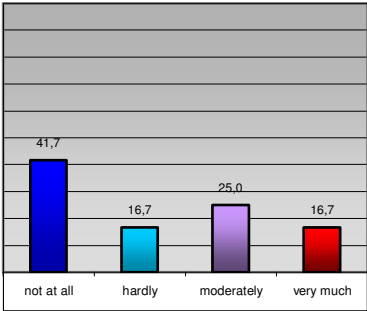


When visiting others, again we notice a significant improvement in the test group and no change in the control group. The relative frequency of the answers „heavily affected“ decreased from 25% to 8.3%, while the answer „not affected“ increased from 33.3% to 50%.

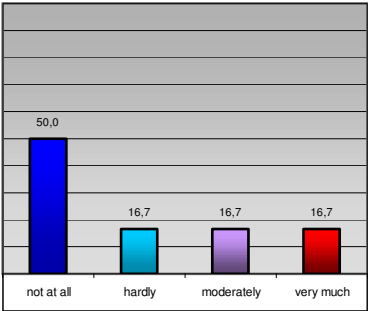
B) 9. The involuntary loss of urine has a negative impact on my relationship to my family and my husband...

Test Group

Before

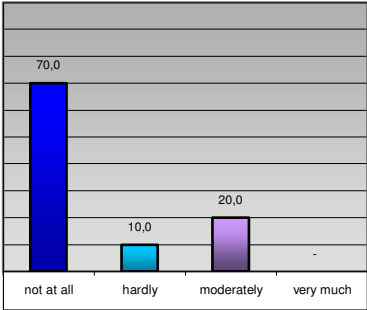


Afterwards

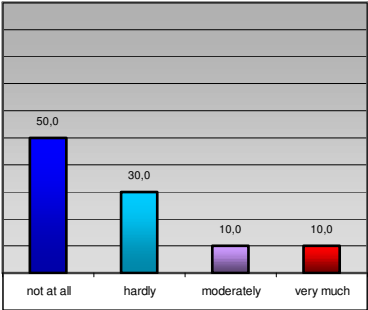


Control Group

Before



Afterwards

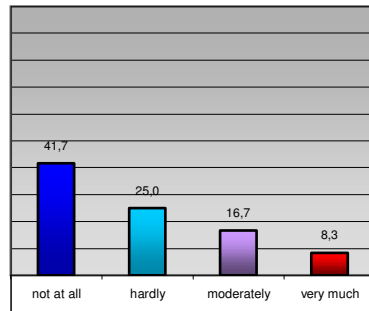


For this question slight improvements can be noted for the test group in contrast to deterioration for the control group.

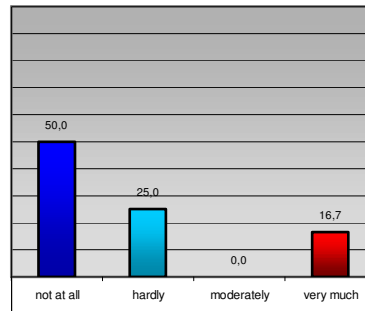
B) 10. When I have sex, the involuntary loss of urine disturbs me...

Test Group

Before

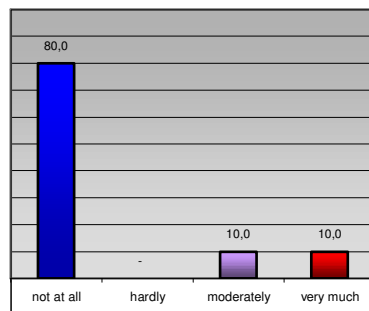


Afterwards

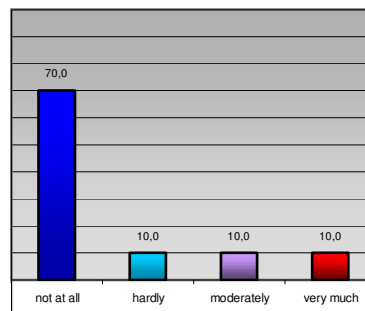


Control Group

Before



Afterwards



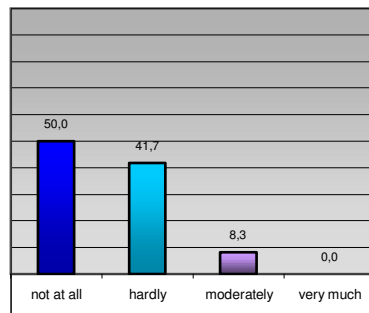
While answers for this question were just minorly different for the control group (one subject reported „slightly affected“ after the placebo treatment instead of „not affected“), there are improvements to be noted for the test group. The percentage of women without any effects onto sex life increased from 41.7% to 50%.

$\frac{3}{4}$ of the women saw hardly any to no negative effects after the treatment, compared to $\frac{2}{3}$ of them before the treatment. One additional subject, however, reported heavy impediment in the second poll.

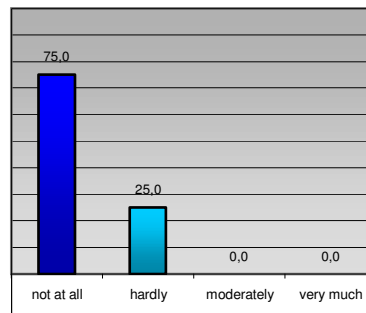
B) 11. The involuntary loss of urine restricts me in choosing my clothes...

Test Group

Before

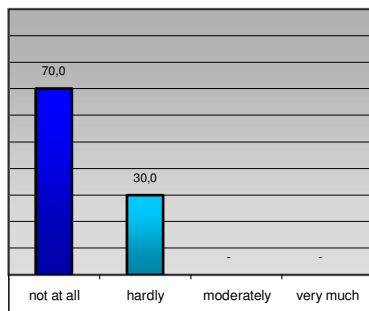


Afterwards

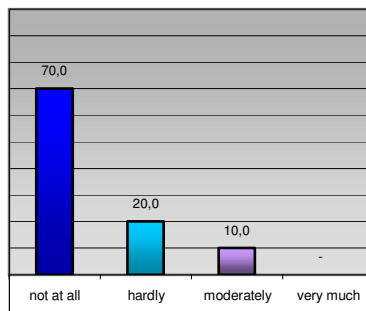


Control Group

Before



Afterwards

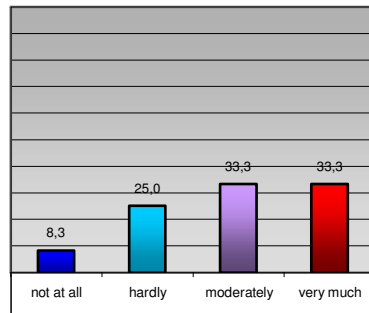


After the treatment restriction in clothes choice were only report by 25% of the test group subjects, and these restrictions were felt to be minor. Before the treatment this was the case for 50% of the women. The percentage for the control group stayed the same with 30%, One subject answered with „moderately“ in the second poll – in the first poll the 30% all answered with „hardly“.

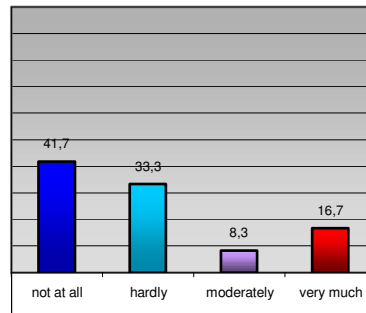
B) 12. The involuntary loss of urine has a negative impact on my social activities...

Test Group

Before

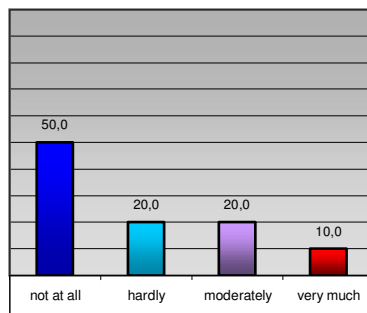


Afterwards

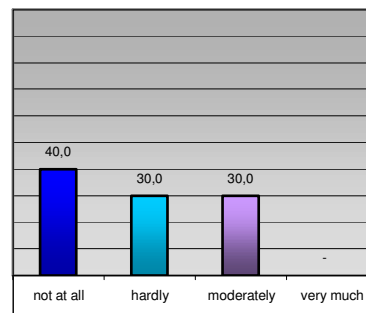


Control Group

Before



Afterwards

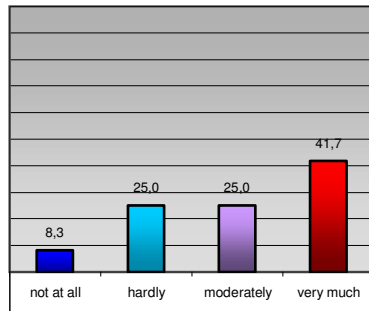


The situation at the time of assessment for this question was quite diverse in the two groups. One third of the test group subjects felt very much affected before the treatment, a second third moderately and only 8.3% did not feel affected at all. In the control group 50% of the patients reported not to be affected and 10% said they were very much affected. After the second poll, 16.7% still reported to feel very much affected, however hardly any or moderate affection were reported more than in the control group, where no one felt very much affected any more

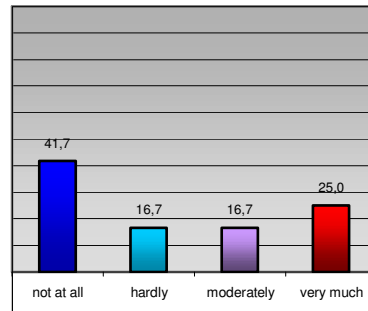
B) 13. My personal well-being is disturbed by the involuntary loss of urine...

Test Group

Before

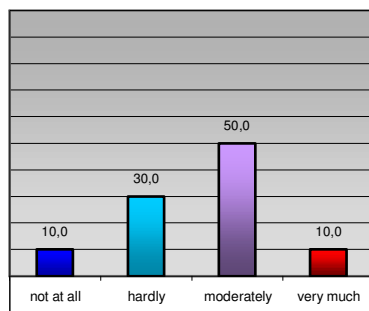


Afterwards

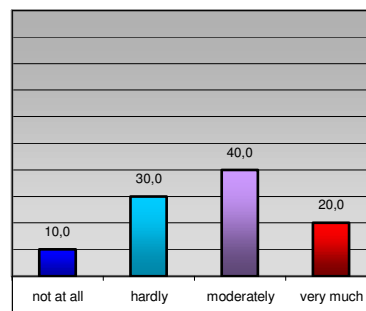


Control Group

Before



Afterwards



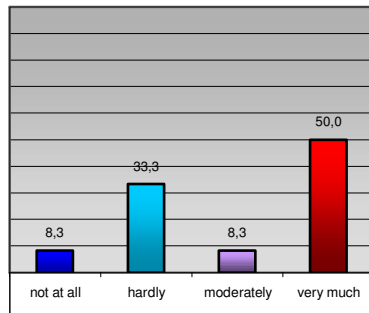
Between the two polls only slight changes for the worse in the number of the answers „moderately“ and „very much“ can be seen.

In the test group, however, the relative frequency of the answer „very much“ decreased from 41.7% to 25%. In return, the number of people without any affection increased from 8.3% to 41.7%. At the same time, the relative frequency of the answers „hardly“ and „moderately“ was decreasing.

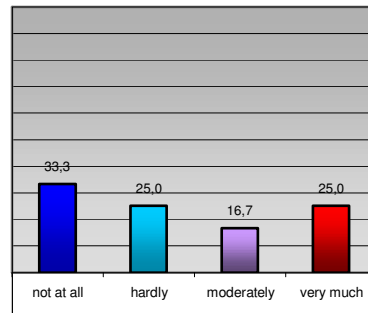
B) 14. My mental and nervous well-being is disturbed by the involuntary loss of urine...

Test Group

Before

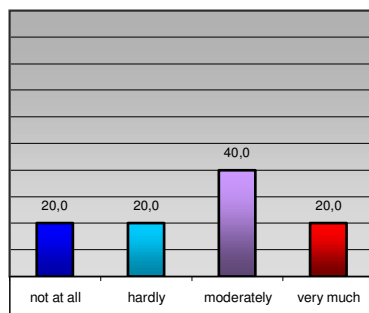


Afterwards

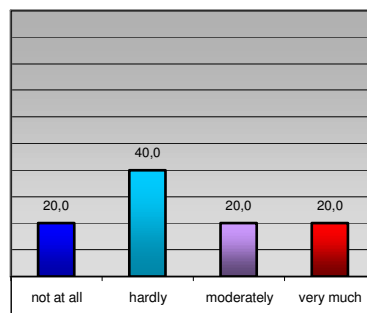


Control Group

Before



Afterwards

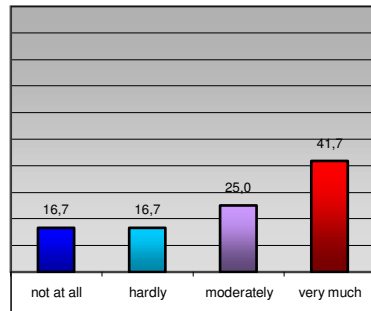


While changes in the control group between the two polls were only obvious in the number of the answers „hardly“ and „moderately“. There is a trend towards improvement since the number of women who felt that their nervous well-being was very much affected by the loss of urine has been cut to half. At the end, 58.3% of the patients felt hardly or not at all affected in their mental and nervous well-being, while at the beginning of the treatment this was true for 41%.

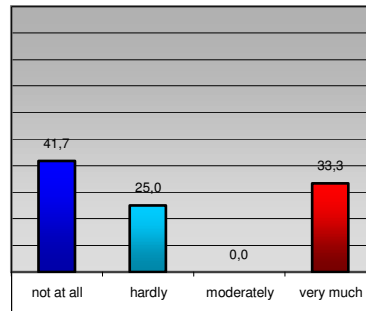
B) 15. I fear smelling due to the involuntary loss of urine...

Test Group

Before

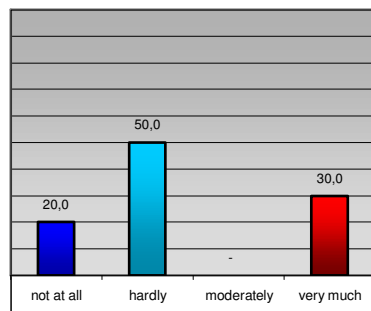


Afterwards

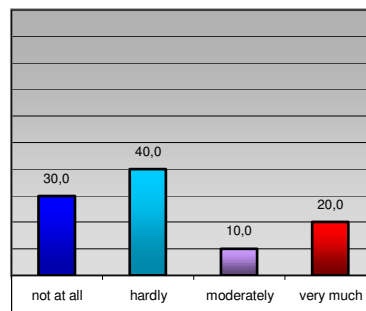


Control Group

Before



Afterwards

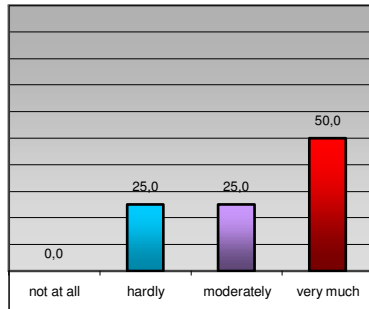


Fear of smelling was experienced less according to the second poll in the control as well as in the test group compared to the first poll. Since the initial situation of the test group was considerably worse than in the control group, the significant improvement of the test group can be made responsible for the fact that better results after the treatment were observed for the test group than for the control group. The frequency of the answer „not at all“ with regard to the fear of smelling increased from 16.7% to 41.7%.

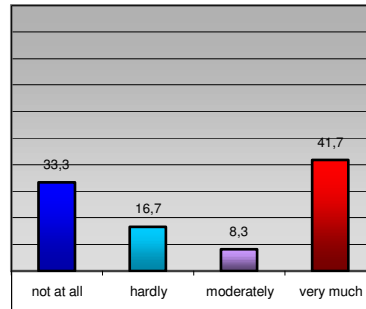
B) 16. I fear embarrassing situations caused by my involuntary loss of urine...

Test Group

Before

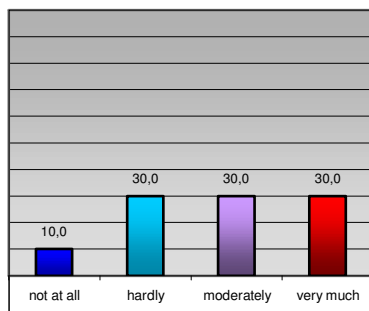


Afterwards

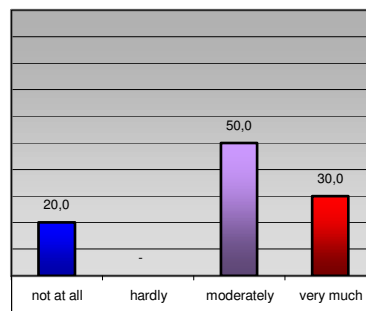


Control Group

Before



Afterwards



In this connection, the most eye catching fact ist that one third of the test group patients did no longer fear embarrassing situations, another 16.7% hardly feared those situation. In the control group only 20% no longer were afaraid of embarrassment. Further, however, it can be seen that the number of women who feared smelling could only be marginally reduced.

8. DISCUSSION

8.1.Hypothesis:

I believe that osteopathic treatment improves the contractile force of the pelvic floor, which is the primary cause of urinary incontinence. Furthermore, I assume that a ptosis of the uterus, the vagina and the bladder also diminishes, which in turn reduces the trouble.

In my study I will investigate if three osteopathic treatments improve urinary incontinence considerably, or if at least stage I or II can be re-established.

8.2. Methodological constraints

Preciseness could be improved if the female cycle had also been taken into consideration. Furthermore, a separation by age could have been considered, as well as a division by whether the subjects are nullipare. unipare or multipare.

Additionally it should be noted for how long the problem has been persistent and whether therapies have been undergone. Although none of the subjects in this study was simultaneously being treated by a different method, this should have been added as a disqualifying criterium.

Although of great interest from an osteopathic point of view, this study has not taken into consideration whether subjects have undergone lower abdominal surgery.

Subjects were asked not to urinate before the examination with the PAD-test, a time frame with regard to how long before the test they should not seek a bathroom, was not given. Also the fluid intake, including the type of drink, before the examination was not noted down for this study. Certain drinks, like tea or coffee, intensify the urge to urinate, just like certain food would result in a larger amount of urine. Verification of the test results would improve if these factors had been considered.

8.2.1. General constraints

Subject number in both groups was limited. Thus, arbitrary results could have an effect onto the generalization of the results. Therefore, it has to be pointed out that generalisation of the present results for all patients with involuntary urine loss have to be viewed with caution. We can already see a change of 10% from the subjective answers of the subjects. From the u-tests, which are independent of distribution, and the huge differences in the comparison of the mean values, as well as in consideration of the 95% confidence intervall, it can, however, be assumed that osteopathic treatment does bring about improvement.

8.2.2. PAD-test constraints

Fluctuation of the urine loss could be due to the daily constitution of the subjects. Urine loss could be more in case of emotional instability or simply because of tiredness. It has to be kept in mind as well that the test cannot always be carried out in exactly the same way, as patients will for instance jump more or less, which does have an influence onto the amount of urine lost. Additionally, there are of natural daily fluctuations.

8.3. Discussion of the results

In total, the PAD-tests show deterioration in only one of the 12 subjects. In the control group half of the women experienced improvement, while the other half experienced deterioration. The mean value of all ten relative changes from the PAD-test of the control group is $+0.3 \pm 7.0 \%$ - which shows a slight change for worse from the situation at the first test compared to the second test. The mean value of the test group, $-67 \pm 19.3\%$, clearly points towards an improvement. The 95% trust intervals do not UEBERLAPPEN at all, i.e. a significant difference can be observed. Apart from that, the results from the PAD- and the u-test are significantly different ($u=8,0$, $p<0.001$).

These enormous improvements of the test group and the little change experienced in the control group, are reflected in the answers of the questionnaire.

All test group subjects noticed a subjective improvement after their treatments especially with regard to the frequency and the amount of urine loss. The women noted an improvement in the necessity to use pads or changing their underwear and the frequency and amount of their loss of urine were felt to be lower. The involuntary loss of urine was rated to be less annoying than previously.

With regard to the frequency of urine loss, the women in the control group did not notice any improvement after the placebo treatment. One woman, however, noted an improvement of the quantity. Also, they did not notice a change in how often they had to wear pads. One woman found it no longer necessary to change her underwear during the day.

Attention has to be paid to the fact that at the beginning two patients rated their loss of urine to be disturbing, while at the end it was four persons. This might be due to the higher awareness of the problem of urinary incontinence.

A significant improvement was observed in daily routines like house work, shopping and work, as well as for hobbies, short trips and on travel. The overall well-being, as well as the mental and nervous well-being have clearly improved.

The result being less restriction in choosing clothes, less fear of smelling, and of embarrassing situation..

When patients received visitors the change was less obvious than when they visited someone themselves. Likewise, the impacts on to the family relationship were less. Improvements but also deterioration could also noted for sex life, both can be due to higher sensitisation.

8.4. General discussion

The starting point of this paper was my hypothesis that osteopathic treatments might improve stress incontinence of urine, and thus should rightly be regarded as an additional method of therapy. Several scientific investigations, which consider the primary cause of this problem to be a disturbance of the pelvic floor, served as the basis of my study. In the course of my investigations, I could confirm this point of view.

In classical medicine, however, an insufficiency of the pelvic floor is believed to be caused by vaginal delivery and the injuries involved. Two of my subjects, however, suffered from urinary incontinence without ever having had vaginal delivery: one had two Caesarian sections, the other had never been pregnant at all. This fact strengthens my theory that vaginal delivery is not the sole cause of the involuntary urine loss.

I hold, however, a different position concerning the use of the episiotomy, which in classical medicine is often applied to prevent an insufficiency of the pelvic floor and because it speeds up delivery.. An episiotomy reduces the risk of tearing the perineum and thus serves to prevent severe injury of the pelvic floor. In obstetrics, an episiotomy is frequently carried out even if there is no strong reason for it, for instance to speed up a delivery. It should, however, be noted that every scar-tissue can only function as a substitution, and that the perineum so loses its physiological efficiency, which becomes especially apparent when the episiotomy was too large. Scrutinising the anatomy, it can be noted that the centrum tendineum is cut. As has been stated in the chapter "anatomy", see 2.3.1.1.4. this plays an important role in the functional interplay of the pelvic floor. This defeats the traditional view that an episiotomy has to be regarded as a preventive measure in any case.

Detailed examinations of each pathology were described accurately. From my point of view, these play an important role with regard to stress incontinence of urine. There are diverging points of views concerning the question whether the size of the child and the duration of the delivery have a crucial influence onto the grade of injury of the pelvic floor. Personally, I could not find a connection due to the small number of subjects.

In my study, I was also able find other causes for stress incontinence of urine, apart from an injury of the pelvic floor, which, from my point of view, are equally important. A reason for this assumption results from the practical work, but was to a large part proved and supported by Jean Pierre Barral's book "Visceral Manipulation".

Through a detailed medical history and manual examinations, followed by the treatments, I could find a large number of lesions which were just as important as the insufficiency of the pelvic floor cause by vaginal delivery. Almost all patients had

structural alterations, like malpositions of the os coccygis, which is connected to the tension of the pelvic floor, or thoracal and lumbal lesions.

Lesions in the vertebrae can have an important impact onto urinary incontinence, as I was able to observe in one of my patients: This particular patient, who had related about significant improvement after the first treatment, fell right before her second treatment. She suffered from spinal pain, at the same time the urine loss changed for the worse. During the examination I noticed a lesion between the L3 and the L4 of the lumbar spine caused by the accident. After manipulating this vertebra, the back pain eased off and the urine loss improved again. This event again served as an indicator for the connection between vertebral lesions and urine incontinence. Furthermore, it confirmed again the need of a holistic view and treatment.

Further, I would like to point out the importance of good mobility of the hip and the related balanced tension of the membrane obturatoria. I noticed an increased tension (single or on both sides) of the membrana obturatoria in all test persons, which cannot just be sheer coincidence. The majority of the patients also suffered from ptosis of bladder and/or uterus and disharmony in the synchronic movement of the sacrum with the urogenital organs.

I also found a number of lesion chains, which repeated themselves in many patients and appeared to be very important to me. These were for instance the connection from the liver via the lig. falzforme to the bladder, which in turn depends on good mobility of the diaphragm. Also the perineum, which sometimes shows increased or less tension and flexibility often caused by the above mentioned episiotomy, plays an important role in urinary incontinence. In treating the perineum I could often achieve a general relaxation going through the whole body, which had a positive effect onto the women themselves, as well as onto their psycho-emotional level. A global view onto these pathologies shows us that all the diaphragms of the human body are important, as they regulate pressure and tension from top to bottom, and thus the whole organism. Some of these pathologies tally with my assumptions at the beginning of the study where I have explained them in detail. I was surprised, though, by how often these disturbances occurred and by their effect onto urinary incontinence.

After treating these lesion chains, a significant improvement could be archived for 11 of 12 patients. The reason why one patient did not experience improvement is yet unclear. The reasons could be numerous and in different areas, which I might not have noticed and thus not treated. There are a number of factors outside my scope and maybe a cranial approach would have been needed for this particular patient.

The success archived in this study allows the conclusion that the problem of stress incontinence of urine cannot solely be attributed to a malfunction of the pelvic floor caused by an injury during delivery, but rather to a number of causes, which I described in great detail. I have tried to include all components and connections known to me into my work with the patients, and so find the individual treatment for each patient. The starting point for this was a detailed medical history. This was of great importance in order to find hints which areas problems have been manifested, and also in order to base the treatment thereon. Since only patients suffering from urinary incontinence without hormonal component took part in the present study, I have not carried out any cranio sacral treatments or any other techniques which have influence onto the hormonal system. In retrospective, I cannot exclude that this aspect might also have been important and lead to a further improvement. This will have to be investigated in a sequel study.

The evaluation was done by a Quality of Life-questionnaire documenting the subjective improvement and by the PAD Test, measuring the quantity of urine lost. The PAD test does bring out a few sources of error which I have described in chapter 8.2. Generally, this test can still be regarded as a good way of measuring urine loss.

Although this questionnaire only allows a subjective assessment, I still found it to be highly interesting and relevant for this problem. In this connection I would say it is as efficient as the PAD-test. Urinary incontinence is an emotional and very subjective issue. Well illustrated by the questionnaire and surprising for me were the different evaluations of my subjects. Some women, who for instance only had little loss of urine, considered themselves impaired a lot more than some of the women who objectively suffered from a lot more urine loss. It was very interesting for see that the subjective assessment of the subjects did not always tally with the measurements, which means that some patients rated the improvement of their nervous well-being

after the treatment higher than could have been assumed from the PAD-test measurements, and vice versa. Overall, the test group achieved a significant reduction of the symptoms in comparison to the control group; in the subjective test as well as in the objective measuring.

The small number of test persons examined, however, does not result in a clear statistical relevance. Nevertheless, the results of this study show the importance and the necessity of a holistic point of view and treatment. It has to be considered, however, that the evaluation only took place after the end of the treatments. If, and to which grade, the improvement lasted, could not be included in this study. Out of personal interest, I will ask the patients again half a year later, which, alas, will not be the topic of this study.

At this point, I would like to stress how important it was for me, to write a paper about the taboo-topic of urinary incontinence, in order to attribute to osteopathy its importance in medicine.

At the end, I would like to thank to everyone who helped me to write this study.

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III.:Graph. II: Box-and-whisker plot of the relative changes of the loss of urine, calculated from the results of the PAD-Test, Control group.

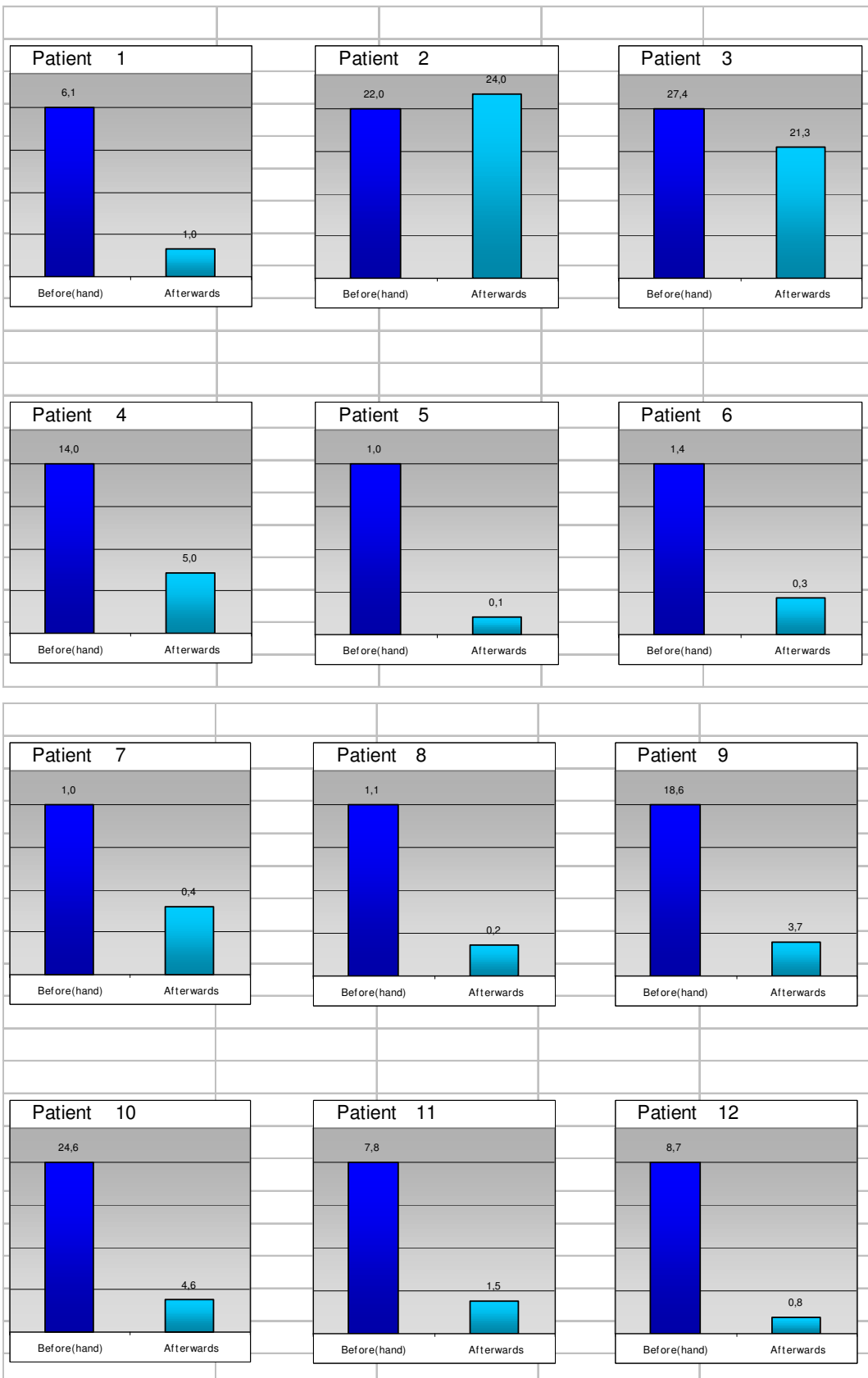
III.:Graph. III: Comparison of the mean values (\pm 95%-confidence intervals) of the test- and control group.

11. APPENDIX:

11.1. Raw data of the PAD-Test for the individual patients

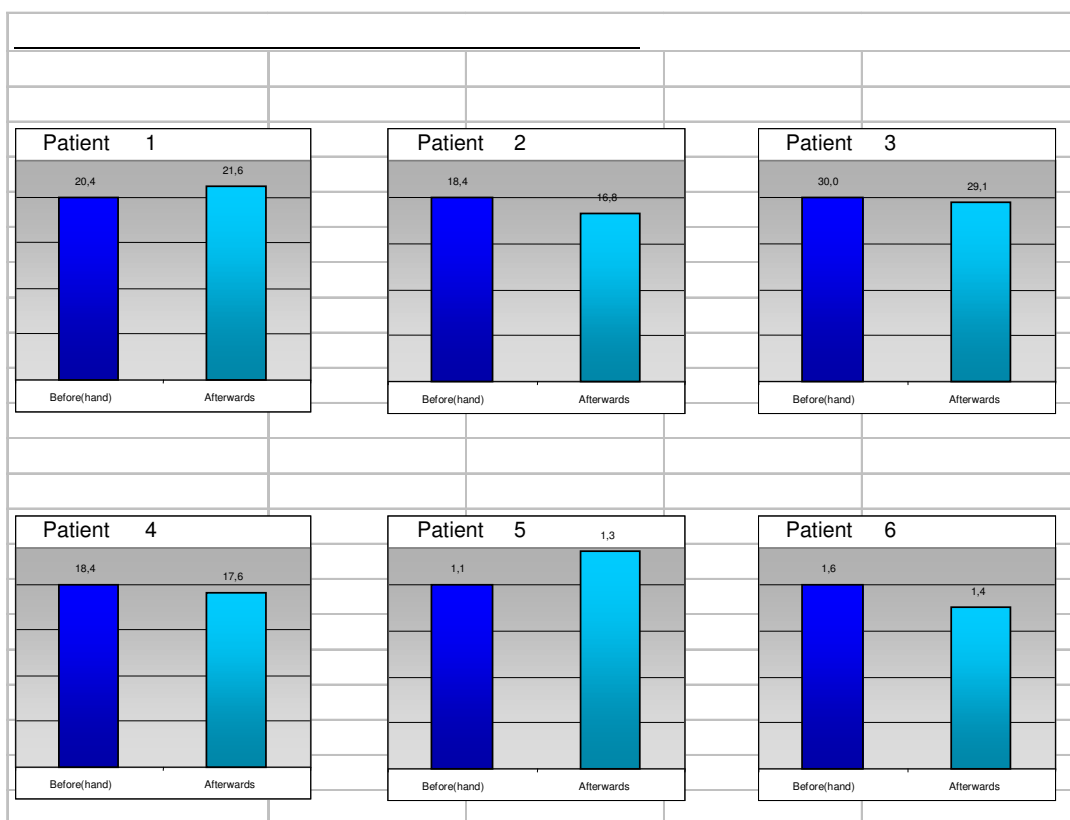
11.1.1. Individual assessment - PAD-Test – test group

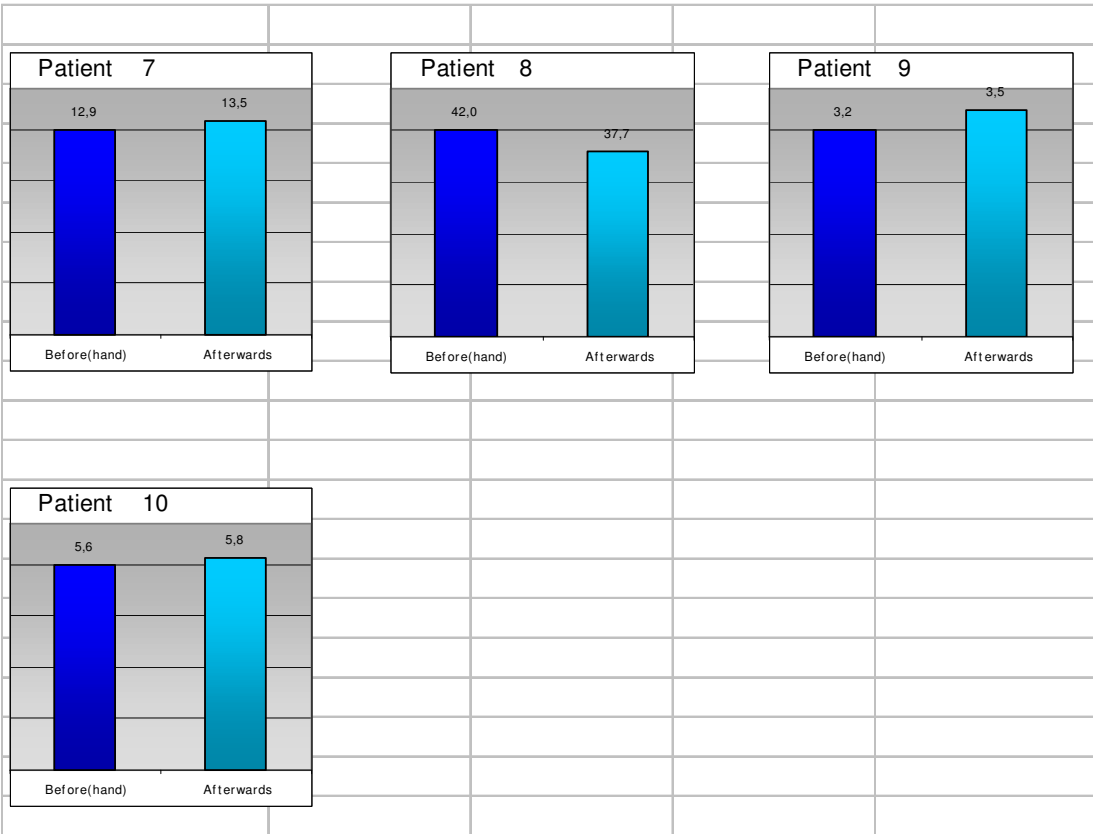
The following bar graph of the test group gives an overview of the urine loss assessed by the PAD-test before and after treatment. The first bar shows the value before the treatment, the second after the treatment. All measurements were made in gram. The test group consisted of 12 female subjects.



11.1.2. Individual assessment – PAD-Test – control group

The bar graph below represents an overview of the urine loss before and after treatment as experienced by the control group. The first bar shows the value before treatment and the second one after the treatment. All measurements were made in gram. The control group consisted of 10 female subjects.





11.2. Results of the Questionnaires (Absolute Numbers)

11.2.1. Questions concerning the function of the bladder – Test Group

		Test group									
Question		Before(hand)					Afterwards				
A) 1.	How often do you lose urine involuntarily?	seldom	occasionally	daily	incessantly		seldom	occasionally	daily	incessantly	
		7	2	3	0		8	2	2	0	
A) 2.	How would you classify the volume you lose per accident?	a few drops	Splashes	larger quantities			a few drops	Splashes	larger quantities		
		6	4	2			9	2	1		
A) 3.	How often do you have to change your underwear per day because it got wet?	not necessary	once a day	several times a day			not necessary	once a day	several times a day		
		6	6	0			8	4	0		
A) 4.	Do you regularly wear pads, cotton or pantyliners?	not necessary	only when going out	at home	for sleeping	always	not necessary	only when going out	at home	for sleeping	always
		4	6	0	0	2	7	3	0	0	2
A) 5.	That I leak urine,	does not disturb me	sometimes disturbs me	disturbs me a lot	disturbs me extremely		does not disturb me	sometimes disturbs me	disturbs me a lot	disturbs me extremely	
		0	3	3	6		1	5	2	4	

11.2.2. The influence urinary incontinence has onto situations of the daily life – Test Group

		Test group							
Question		Before(hand)				Afterwards			
		not at all	hardly	moderately	very much	not at all	hardly	moderately	very much
B) 1.	During house work, the involuntary loss of urine disturbs me...	4	4	3	1	7	3	1	1
B) 2.	When I go shopping, the involuntary loss of urine disturbs me...	4	2	3	3	7	1	2	2
B) 3.	At my workplace, the involuntary loss of urine disturbs me...	4	3	3	2	7	2	2	1
B) 4.	In my free time and during performing my hobbies, the involuntary loss of urine disturbs me...	0	3	5	4	2	5	2	3
B) 5.	During short trips, the involuntary loss of urine disturbs me...	6	1	4	1	7	2	2	1
B) 6.	On longer journeys or in the holidays, the involuntary loss of urine disturbs me...	1	4	3	4	4	1	3	1
B) 7.	When I have visitors, the involuntary loss of urine disturbs me...	6	3	2	1	7	3	1	1
B) 8.	When I visit someone, the involuntary loss of urine disturbs me...	4	3	2	3	6	3	2	1

		Test group							
Question		Before(hand)				Afterwards			
		not at all	hardly	moderately	very much	not at all	hardly	moderately	very much
B) 9.	The involuntary loss of urine has a negative impact on my relationship to my family and my husband...	5	2	3	2	6	2	2	2
B) 10.	When I have sex, the involuntary loss of urine disturbs me...	5	3	2	1	6	3	0	2
B) 11.	The involuntary loss of urine restricts me in choosing my clothes...	6	5	1	0	9	3	0	0
B) 12.	The involuntary loss of urine has a negative impact on my social activities...	1	3	4	4	5	4	1	2
B) 13.	My personal well-being is disturbed by the involuntary loss of urine...	1	3	3	5	5	2	2	3
B) 14.	My mental and nervous well-being is disturbed by the involuntary loss of urine...	1	4	1	6	4	3	2	3
B) 15.	I fear smelling due to the involuntary loss of urine...	2	2	3	5	5	3	0	4
B) 16.	I fear embarrassing situations caused by my involuntary loss of urine...	0	3	3	6	4	2	1	5

11.2.3. Questions concerning the function of the bladder

		Control group									
Question		Before(hand)					Afterwards				
A) 1.	How often do you lose urine involuntarily?	seldom	occasionally	daily	incessantly		seldom	occasionally	daily	incessantly	
		8	2	0	0		8	2	0	0	
A) 2.	How would you classify the volume you lose per accident?	a few drops	Splashes	larger quantities			a few drops	Splashes	larger quantities		
		6	2	2			6	3	1		
A) 3.	How often do you have to change your underwear per day because it got wet?	not necessary	once a day	several times a day			not necessary	once a day	several times a day		
		7	3	0			8	2	0		
A) 4.	Do you regularly wear pads, cotton or pantyliners?	not necessary	only when going out	at home	for sleeping	always	not necessary	only when going out	at home	for sleeping	always
		3	3	0	0	4	3	3	0	0	4
A) 5.	That I leak urine,	does not disturb me	sometimes disturbs me	disturbs me a lot	disturbs me extremely		does not disturb me	sometimes disturbs me	disturbs me a lot	disturbs me extremely	
		0	4	4	2		0	4	2	4	

11.2.4. The influence urinary incontinence has onto situations of the daily life

		Control group							
Question		Before(hand)				Afterwards			
		not at all	hardly	moderately	very much	not at all	hardly	moderately	very much
B) 1.	During house work, the involuntary loss of urine disturbs me...	4	5	1	0	4	2	4	0
B) 2.	When I go shopping, the involuntary loss of urine disturbs me...	5	1	3	1	4	2	2	2
B) 3.	At my workplace, the involuntary loss of urine disturbs me...	5	3	1	1	4	3	2	1
B) 4.	In my free time and during performing my hobbies, the involuntary loss of urine disturbs me...	0	3	2	5	0	3	2	5
B) 5.	During short trips, the involuntary loss of urine disturbs me...	5	4	1	0	4	4	1	1
B) 6.	On longer journeys or in the holidays, the involuntary loss of urine disturbs me...	3	3	0	4	2	2	2	4
B) 7.	When I have visitors, the involuntary loss of urine disturbs me...	5	3	2	0	5	3	2	0
B) 8.	When I visit someone, the involuntary loss of urine disturbs me...	4	3	3	0	4	3	3	0

		Control group							
Question		Before(hand)				Afterwards			
		not at all	hardly	moderately	very much	not at all	hardly	moderately	very much
B) 9.	The involuntary loss of urine has a negative impact on my relationship to my family and my husband...	7	1	2	0	5	3	1	1
B) 10.	When I have sex, the involuntary loss of urine disturbs me...	8	0	1	1	7	1	1	1
B) 11.	The involuntary loss of urine restricts me in choosing my clothes...	7	3	0	0	7	2	1	0
B) 12.	The involuntary loss of urine has a negative impact on my social activities...	5	2	2	1	4	3	3	0
B) 13.	My personal well-being is disturbed by the involuntary loss of urine...	1	3	5	1	1	3	4	2
B) 14.	My mental and nervous well-being is disturbed by the involuntary loss of urine...	2	2	4	2	2	4	2	2
B) 15.	I fear smelling due to the involuntary loss of urine...	2	5	0	3	3	4	1	2
B) 16.	I fear embarrassing situations caused by my involuntary loss of urine...	1	3	3	3	2	0	5	3

11.3. Measuring urinary loss – information sheet

In order to assess the degree of the partial incontinence of urine, an objective testing method is necessary. This is also important for the treatment of the patients with their problems and personal circumstances.

For this purpose, a simple standard test, the so-called PAD test, is used. This test can be applied for every patient. This way, homogenous results can be achieved, no matter from which type of incontinence the patient suffers.

To make practical comparisons, the circumstances should be similar to the patient's day to day life, but nevertheless the conditions should be the same for all participants. As a basis, international pilot studies recommend a one hour test during which situations from the daily life are performed. The total volume of urine lost is calculated by weighing a waterproof pad before and after the test.

Test procedure

1. Please start the test without going to the toilet previously.
2. Please put in the pre-weighed pad and the test can begin.
3. You will get 500 ml of non-carbonated fluid, water or tea which have to be drunk within a short period (max. 15 minutes). Then kindly sit down quietly and fill in the questionnaire.
4. **Half an hour later**, the following tasks have to be performed:
 - Strolling around the room (for 2 minutes)
 - Climbing up and down the stairs (2 minutes)
 - Standing up from sitting (15 times)
 - Coughing vigorously (15 times)
 - Running on the spot (1 minute)
 - Jumping up and down (30 seconds)
 - Bending down and picking something off the floor (10 times)
 - Performing the movement which results in the largest amount of urine to be lost (20 times)
 - Washing one's hands under running lukewarm water (for one minute).

5. After finishing the test, the pad will be removed and is weighed again.
6. Now you may go to the toilet.

You are asked not to go to the toilet during the test.

The volume of the urine lost is the difference between the first and the second measuring. This way you will obtain exact figures on how large your urine loss during stress is.

The test group will get three free osteopathic treatments. Finally, there will be a final test. This way, I will obtain information from the test group on how much the loss of urine has improved.

Thank you for your effort and good luck!

11.4. QUESTIONNAIRE

Name: _____

Date of birth: _____

A) Questions concerning the function of the bladder. Please tick the appropriate:

1. How often do you lose urine involuntarily?

- seldom, e.g. when you sneeze, cough, or during exercise or when you have a cold?
- occasionally (approx. 1 –2 a week)
- daily (approx. once or twice)
- incessantly (several times a day, during the day and in the night)

2. How would you classify the volume you lose per accident?

- a few drops
- dashes
- larger amount

3. How often do you have to change your underwear per day because it got wet?

- not necessary
- once a day
- several times a day

4. Do you regularly wear pads, cotton or panty liners?

- not necessary
- only when going out
- at home
- for sleeping
- always

5. That I leak urine,

- does not disturb me
- sometimes disturbs me
- disturbs me a lot
- disturbs me extremely

B) Influence of involuntary loss of urine on the everyday life:

1. **In my free time and during performing During housework,** the involuntary loss of urine disturbs me

- not at all 0
- hardly 0
- moderately 0
- very much 0

2. **When I go shopping,** the involuntary loss of urine disturbs me

- not at all 0
- hardly 0
- moderately 0
- very much 0

3. **At my workplace,** the involuntary loss of urine disturbs me

- not at all 0
- hardly 0
- moderately 0
- very much 0

4. **my hobbies** (like sports club, going for a walk, riding a bike), the involuntary loss of urine disturbs me

- not at all 0
- hardly 0
- moderately 0
- very much 0

5. **During short trips,** the involuntary loss of urine disturbs me

- not at all 0
- hardly 0
- moderately 0
- very much 0

6. **On longer journeys or in the holidays,** the involuntary loss of urine disturbs me

- not at all 0
- hardly 0
- moderately 0
- very much 0

7. **When I have visitors,** the involuntary loss of urine disturbs me

- not at all 0
- hardly 0
- moderately 0
- very much 0

8. **When I visit someone,** the involuntary loss of urine disturbs me

- not at all 0
- hardly 0
- moderately 0
- very much 0

9. **The involuntary loss of urine has a negative impact on my relationship to my family and my husband**

- not at all 0
- hardly any 0
- moderately 0
- very much 0

10. **When I have sex,** the involuntary loss of urine disturbs me

- not at all 0
- hardly 0
- moderately 0
- very much 0

11. **The involuntary loss of urine restricts me in choosing my clothes**

- not at all 0
- hardly 0
- moderately 0
- very much 0

12. **The involuntary loss of urine has a negative impact on my social activities** (like public events, parties, theatre)

- not at all 0
- hardly 0
- moderately 0
- very much 0

13. My personal well-being is disturbed by the involuntary loss of urine

- not at all 0
- hardly 0
- moderately 0
- very much 0

14. My mental and nervous well-being is disturbed by the involuntary loss of urine

- not at all 0
- hardly 0
- moderately 0
- very much 0

15. Do you fear smelling due to the involuntary loss of urine

- not at all 0
- hardly 0
- moderately 0
- very much 0

16. I fear embarrassing situations caused by my involuntary loss of urine

- not at all 0
- hardly 0
- moderately 0
- very much 0

Should you want to add any further comment to this questionnaire, please use the following lines:

Thank you very much for your effort.

Renate Gabriel

11.5. Quantification of Urine Loss

Subjective grading of incontinence may not indicate reliably the degree of abnormality. However, it is important to relate the management of the individual patients to their complaints and personal circumstances, as well as to objective measurements.

In order to assess and compare the results of the treatment of different types of incontinence in different centers, a simple standard test can be used to measure urine loss objectively in any subject. In order to obtain a representative result, especially in subjects with variable or intermittent urinary incontinence, the test should occupy as long a period as possible; yet it must be practical. The circumstances should approximate to those of everyday life, yet be similar for all subjects to allow meaningful comparison. On the basis of pilot studies performed in various centers, an internal report of the ICS [6] recommended a test occupying a 1-hour period during which a series of standard activities was carried out. This test *can* be extended by further 1-hour periods if the result of the first 1-hour test were not considered representative by either the patient or the investigator. Alternatively, the test can be repeated, after filling the bladder to a defined volume.

The total amount of urine lost during the test period is determined by weighing a collecting device such as a nappy, absorbent pad, or condom appliance. A nappy or pad should be worn inside waterproofunderpants or should have a waterproofbacking. Care should be taken to use a collecting device of adequate capacity. Immediately before the test begins the collecting device is weighed to the nearest gram.

Typical Test Schedule:

Test is started without the patient voiding.

1. Preweighed collecting device is put on and first 1-hour test period begins.
2. Subject drinks 500 ml sodium-free liquid within a short period (max. 15 min), then sits or rests.
3. Half-hour period: subject walks, including stair climbing equivalent to one flight up and down.
4. During the remaining period the subject performs the following activities:
 - a) Standing up from sitting, 10 times.
 - b) Coughing vigorously, 10 times.
 - c) Running on the spot for 1 min.
 - d) Bending to pick up small object from floor, 5 times.
 - e) Washing hands in running water for 1 min.
 - f) Repeat the movement during which the patient loses urine (for example jumping) about 20 times.
5. At the end of the 1-hour test the collecting device is removed and weighed.

If the collecting device becomes saturated or filled during the test it should be removed and weighed, and replaced by a fresh device. The total weight of urine lost during the test period is taken to be equal to the gain in weight of the collecting device(s). In interpreting the results of the test it should be borne in mind that a weight gain of up to 19 g may be due to weighing errors, sweating, or vaginal discharge.

The activity program may be modified according to the subject's physical ability. If substantial variations from the usual test schedule occur, these should be recorded so that the same schedule can be used on subsequent occasions.

In principle the subject should not void during the test period. If the patient experiences urgency, then he / she should be persuaded to postpone voiding and to perform as many of the activities in section 5 as possible in order to detect leakage. Before voiding the collection device is removed for weighing. If voiding cannot be postponed, then the test is terminated. The voided volume and the duration of the test should be recorded. For subjects not completing the full test the results may require separate analysis, or the test may be repeated after rehydration.

The test result is given in grams urine lost in the 1-hour test period in which the greatest urine loss is recorded.

Additional Procedures:

Provided that there is no interference with the basic test, additional procedures intended to give information of diagnostic value are permissible. For example, additional changes and weighing of the collecting device can give information about the timing or urine loss; the absorbent nappy may be an electronic recording nappy so that the timing is recorded directly.

Presentation of Results:

The following details should be given:

1. Collecting device.
2. Physical condition of subject (ambulant, chair bound, bedridden)
3. Relevant medical condition of subject.
4. Relevant drug treatments.
5. Test schedule.

In some situations the timing of the test (e.g., in relation to the menstrual cycle) may be relevant.

Findings: A record should be made of the weight of urine lost during the test (in the case of repeated tests, greatest weight in any stated period). A loss of less than 19 g is within experimental error and the patient should be regarded as essentially dry. Urine loss should be measured and recorded in grams.

Statistics: When performing statistical analysis of urine loss in a group of subjects, nonparametric statistics should be employed, since the values are not normally distributed.

ABSTRACT

Topic: This study investigates urinary incontinence at a descensus of vagina and bladder, after ruling out any medical problems, like tumours or inflammatory diseases, like infections of the urinary tract, as well as urge incontinence or hormonal disorders.

Question: Improvement of urinary incontinence through three osteopathic treatments at a four to six weeks interval.

Parameter: Quality of Life-questionnaire for the subjective evaluation, as well as the PAD-test for assessing the quantity of urine lost.

Method: Treatment with global osteopathic techniques, which are connected to the pathology of stress incontinence of urine. Two groups, test group and control group, were formed by random selection. Only the test group was treated. The control group got a placebo treatment.

Results: The questionnaire was divided into two sections:

- a) Questions concerning the function of the bladder
- b) Influence of the involuntary loss of urine onto situations of the daily life

In the evaluation of the test group, all women noted a significant improvement concerning the frequency and the amount of loss of urine. These data also corresponded to the results of the PAD-test. The involuntary loss of urine was reported to be less disturbing. In the control group, only one woman reported an improvement of the amount of urine loss.

All 16 questions concerning the influence of involuntary loss of urine onto situations of the daily life were graded better by the test group. The result of the control group was not a single definite one, neither in one nor in the other direction. The results of the PAD-test of the test group showed an improvement by 67% compared to the 0,3% of the control group.

Conclusion: A significant improvement of stress incontinence of urine could be achieved by oestopathic techniques. The outcome of the study has to be regarded as successful and should be integrated into classical medicine.