Chapter 1

General Introduction and Outline

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The Netherlands
History of the physiotherapy

For all we know, physiotherapy has always played an essential role in the process of rehabilitation. Since thousands of years people with illnesses and disorders were treated with various methods, making use of exercises and massage as well as water, heat and cold, electricity and light. The ground for the introduction of medical gymnastics in the Netherlands was prepared around 1840 (1).

When we state that the origins of Dutch Physiotherapy have to be looked for in the first half of the nineteenth century we have to be aware of the fact that the use of the word physiotherapy is of course inappropriate here. It is an anachronism, for it was no sooner than the end of the nineteenth and beginning of the twentieth century that words like Physikalische Heilmethode, Physikalische Therapie, Physical Therapy and Physiotherapy were used as a generic term that stood for a complex of different therapies, which included exercises, massage, hydrotherapy, balneo therapy, electrotherapy, light and air-therapy, cryo- and heat-therapy (2).

The first signs of the actual use of these therapies were spotted in publications around 1840.

The spreading of the Enlightenment-ideas on education-mainly coming from Germany had already been of influence on the way of thinking about the educational system in the Netherlands in the years before 1848. It was emphasized in various Dutch publications on education that mental education was heavily overrated in the schools and more attention should be paid to physical education (3).

With the ongoing discourse on the importance of physical education within the educational system, teachers and physicians gradually became more receptive for other views on how to use gymnastic exercises. In their classrooms and practices they often were the first to be confronted with children who suffered from disabements and illnesses. Since conventional medical interventions had barely or no effect, the enthusiastic reports from Sweden and Germany must have led these teachers and physicians to believe that what was called “medical gymnastics” could be a remedy to cure these kinds of disorders.

In the second half of the 19th century the interest for the application of medical gymnastics increased. It was considered a ‘relative new and very promising field in medicine’ by some physicians and was more and more referred to as ‘heilgymnastics’ (heilgymnastiek).
In July of the year 1889 two heilgymnasts, E. Minkman (1848-1912) and J. H. Reijs Jr. (1854-1913) send a circular to nine of their colleagues with an invitation for a meeting. They wrote that heilgymnasts should unite themselves in solving the problems that the field of heilgymnastics was facing. The many different ways to treat patients with certain disorders asked for a thorough analysis to separate the good treatments from the bad. This resulted in the founding of the Society for Practicing Heilgymnastiek in the Netherlands (Genootschap ter beoefening van de Heilgymnastiek in Nederland, hereafter referred to as Genootschap). Physicians began to take an interest in heilgymnastics and other forms of physical therapy on a bigger scale. In an attempt to gain control over this particular field of medicine, three similar organizations were founded in this period by physicians, who were active in the field of physiotherapy and orthopedics (in both of these fields heilgymnastics was included): the Dutch Orthopedic Association (Nederlandse Orthopaedische Vereeniging) in 1898, the Medical Association for Physical Therapy and Hygiene (Geneeskundige Vereeniging voor Physische Therapie en Hygiëne) in 1902 and the Association for Physical therapy (Vereeniging voor Physische Therapie) in 1903. The members of the Genootschap tried to acquire the legal status for their profession in many different ways, but it would last until 1942, fifty years after the foundation of the Genootschap before heilgymnastics received the legal status. During the German occupation, an act was sanctioned that stated that heilgymnastics was to be regarded as a “paramedical” in stead of a “medical” activity. At the moment research on the developments in the field of physiotherapy in The Netherlands in the late nineteenth and first half of the twentieth century is in progress, by Dr. Thom Terlouw, secretary of the association of the History of the Physiotherapy in the Netherlands.

Physiotherapy is a term which was coined by the Office of the Surgeon General of the Army to describe what until then had been known amongst the profession as “physical therapeutics”, and which is now also called “physical therapy” (4). Many believe that to have an understanding of physical therapy requires a deep study of electricity and physics. According to Titus this is not necessary because it is easy to recall what we all studied in physics and physiological laboratories. Since it is not necessary that one knows exactly how to administer treatments in order to prescribe them, it does not require very deep painstaking study to acquire knowledge of the fundamentals. The biggest part of physical therapy is medical common sense. An understanding of the pathology and of what reaction you desire to bring about in the patient can be
called the common sense part. Three percent of physical therapy is technical knowledge of whether the modalities can be applied effectively, conveniently and safely to the part to be treated and how those modalities will work when brought into play. Two percent of physical therapy is the actual knowledge of the technique so that you yourself can administer the treatments. Therefore, the common sense part of the subject is ninety-five per cent. The basic action of practically all physical therapy is chemical, thermal or mechanical (4).

In the beginning of the 1980’s application forms disappeared from the package of insurance. Most physiotherapists decided not applying some treatment methods anymore, e.g. electrostimulation. Within the pelvic floor physiotherapy electrostimulation remained standard care. It is remarkable electrostimulation is nowadays also standard care in cardiology (5), neurology (6) and urology (7).

History of the pelvic floor disorders

The pelvis and its pelvic floor have always interested scientists. In modern times, the study of the genital apparatus of male and female is highly advanced. Despite this, knowledge of the muscles, nerves and ligaments of the pelvis and its organs has allowed priority in current research. Urinary and fecal incontinence, a most serious problem for young and elderly people is, due to lack of knowledge of the normal structure and function of the pelvis, a poorly understood affliction. Moreover the layman is badly informed, and incontinence is still regarded as shameful, which also hinders research (8). The birth of the scientific Anatomy in Europe can easily be pinpointed. Andreas Vesalius (1514-1564) is the scientist who changed the title of the anatomical science in favor of a real analysis of the human body (9;10). In his opus magnum "de humani corporis Fabrica libri septum", Vesalius gave only a superficial description of the internal musculature of the pelvis, but he paid much attention to the male genital apparatus in the part "de musulis penis peculiaibus". He did show the bony pelvis to consist of three bones: os ilium, os coxendicum and os pubis, that were present on both sides of the os sacrum. Attention was given to the ossi cocygix as being vertebrae containing holes for the nerves. This description corresponds to the modern view in the relationship with sacral neuro modulation (SNS).

Hendrik van Deventer (1651-1724) studied the form and the width of the bony pelvis in female, and is considered founder of the “pelvic science” (11). Van Deventer was
deeply interested in obstetrics. In those days, the entry of a physician into the delivery room, in which a man should not be present during delivery, indicated that something was badly wrong. He taught the midwives about the pelvis, its bony structure and their different appearances, because he thought the knowledge of the bones to be genuinely necessary for all those who want to help women in delivery. The idea of the narrowed pelvis as the cause of a difficult delivery had already been pointed out by Vesalius. The pelvic bones should part to make way for the child.

**History of urology**

The knowledge of the changes which urine, this very important excretory product of our body, was already recognized in antiquity and examined with utmost shrewdness with respect to health and disease. An attempt was made to identify the relation between the patient’s condition and his urine. The written history of uroscopy starts 4000 years ago with scripts of Babylonian medicine. In ancient Greece, Hippocrates (469-399 B.C.) repeatedly described the usefulness of uroscopy in diagnosis and prognosis. He pointed out of the influence of food and drink on secretion, color, odor and translucency of the urine (12). Paulus Aegineta (± 660) also explained the importance of uroscopy for the diagnosis and he described clearly the possibility of solving the problem of bladder stones (13) by different types of bladder irrigation. For all practical purposes, the world shrunk considerably in size as we enter the beginning of the Dark Ages. Medical education became only available at the various monasteries who kept the manuscripts of the early writers. Surgical education was at that time the same as for all craftsmen and consisted of closely observing the experienced and spending a lot of time as a helping hand at the surgery and in the barber-shop. The middle ages are not known for their great achievements in the field of medicine and/or surgery.

History progressed in the Netherlands at a slow pace. In the archives evidence is found that traveling lithotomists were active in several places. The barber-surgeons practiced bleeding, cupping and minor surgery. During the middle ages, all accounts of lithotomy describe very much the same technique. In the fourteenth century, barber-surgeons became organized into guilds, the guild of Surgeons and Barbers combined their interests. So, during the eighteenth century, surgery became respectable. Lithotomy was at last accepted and began to take its place as one of the
most important operation of surgery. A promising step was the foundation of the
Dutch society of Medicine in 1849 and in 1902, the Dutch society for surgery was
founded in Amsterdam. The urologists in Holland derive from this group of early
specialists. Only with the rapid development of endoscopic instruments and the
refined diagnostic use of the X-ray, the urological specialization was finally accepted.
The Dutch Association “de Nederlandse Vereniging voor Urologie” was founded in
1908. The further development of sophisticated instruments and the refinement of
the diagnostic possibilities created a situation in which the general surgeons had to make
way for urologists. Until after the Second World War, most doctors had to go abroad
for an up-to-date training in urology. It was not until January the 1th 1965 dr. W.A.
Moonen had been appointed as an extraordinary professor in Nijmegen in order to
organize an academical department of Urology. On April 1th 1962 dr. P.J. Donker
became an extraordinary lecturer of Urology in Leiden. On January 1th 1965 he
became an extraordinary professor of Urology in Leiden shortly after the appointment
of dr. W.A. Moonen and 1968 the first full professor of Urology in the Netherlands.
Urology has now become a fully fledged specialism and research started. Within the
urology, different specialisms developed in time, such as the oncology and the
functional urology, the area where Urology and pelvic floor physiotherapy met each
other, followed by gynecology and proctology resulting in the first Pelvic Floor
Center in Leiden (1996).

Dr. Kegel’s perineometer
History of pelvic floor physiotherapy abroad

In 1948 Arnold Kegel, MD (14) stated that, "the passage of the fetal head through the vagina during delivery is inevitably attended by muscle injury. Never, however do the organs resume their original integrity of form and function." While noting the equal occurrence of pelvic floor muscle weakness in women who did not gave birth to children, in 1956 he stated that, "the stretching process of childbirth... is merely a precipitating factor and not the primary cause of pelvic floor muscle weakness", but the lack of exercise and consequent muscle atrophy is. Optimistically, he noted that, "after having been stretched over a wider range than any other muscle (the pelvic floor muscles) can regain physiological tension and are able to recover their function after many years of disuse and partial atrophy". He proclaimed, "...it is not enough merely to keep a woman alive; it is important to preserve function... the relaxation of the vaginal outlet (and muscle responsible for urinary control, pelvic organ support, and sexual response) is caused by a lack of tone of the (pelvic floor) muscles".

Prior to World War II the accepted treatment of injured or weakened muscles was prolonged rest and passive exercise. According to a War summary, when treating disabled veterans, it was found that, "in the preservation or restoration of muscle function nothing is more fundamental than the frequent repetition of correctly guided exercises... carried out against progressively increasing resistance, since muscles increase in strength in direct proportion to the demands placed on them".

Dr. Kegel further observed that in a large series of women, the same percentage of women who had not gave birth to children compared to those who had, suffered symptoms of pelvic discomfort, bladder dysfunction and sexual disturbances. He concluded that for all women, "early pelvic floor muscle education and resistive exercise offer new hope in lasting relief".

The need for a method in which the pelvic floor muscles may be preserved and developed has long been recognized. Hippocrates tried oil clysmata, hot showers and ointments; Soranus (110 A.D.) attempted support by hand. Kegel tried the cumbersome, awkward curved spatula retained perineometer in 1948.

Today, most people refer to the vaginal squeeze, hold, and release exercises as Kegel's exercise. Dr. Kegel's perineometer (pictured above) which gave resistance to this exercise and made it work has long been forgotten.
History of pelvic floor physiotherapy in the Netherlands

The Dutch Association for Physical Therapy for Pelvic Floor Disorders and Pre- and Postnatal Healthcare (NVFB) originated from the NVFP, the Dutch association for physiotherapy and pre- and post-partum health care. The NVFP was founded in 1981. The association’s main activities dealt with physiotherapy in regard to pregnancy and birth.

At the end of the eighties pelvic floor problems started to generate a lot of attention. These problems were firstly noticed in the peripartum care. At that time it appeared to be logical that this “new” patient population consulted the physiotherapists practicing the Pre- and Postnatal Healthcare.

The treatment of pelvic floor-dysfunction has taken off in the years that followed and soon not only women but also men and children were seen for treatment. Although pelvic floor dysfunction has long been related to the lower urinary tract and, more recently, to lower gastrointestinal symptoms, it is now considered to be an influential factor in the normal function and behavior of the genital system in both men and women. Invasive procedures whilst treating these disorders also evolved, e.g. research when treating pelvic floor dysfunction using invasive palpation and/or massage, myo-feedback, electro-stimulation and the rectal practice-balloon. Safeguarding the quality of treatment is one of the main occupations of the NVFB.

The interwovenness of complaints in the areas of the abdomen, the pelvic floor and the lower back has become increasingly evident over the past years. This has resulted in a description of the functions and competences of the pelvic floor physiotherapist. Thus, official standards and requirements for the educational program for pelvic floor physiotherapists were created by the NVFB. Physiotherapists must hold an official certification in order to be able to enroll in the special register for pelvic floor physiotherapists.

At the end of 2003 pelvic floor therapy received official recognition as a specialization within general physiotherapy in the Netherlands.

Literature is scarce on the topic of pelvic floor investigation. Quantification of the function of the pelvic floor muscles is not easy, due to the lack of simple to use and reliable measurement techniques and the lack of cut-off values for pathological conditions. Furthermore the reproducibility of testing is questionable. Research on this topic is important, because many people suffer from the consequences of pelvic
floor dysfunction. Pelvic floor dysfunction affects social, psychological, domestic, occupational, physical and sexual life.

**Aims and outline of this thesis**

This thesis discusses the basic science and applications of pelvic floor dysfunction. First of all during the diagnostic process a complete medical and injury history should be documented. Our department has developed a new administered questionnaire in Dutch: the Pelvic Floor Inventories Leiden (PelFIs) for men and women, in an attempt to create a new condition-specific pelvic floor questionnaire addressing all symptoms of micturition, defecation and sexual dysfunction related to pelvic floor dysfunction for use by professionals active in this field (Chapter 2).

During the validation of the PelFIs in the total population with and without pelvic floor complaints a high percentage (13.3%) of sexual abuse was reported.

A selection of patients has been evaluated in our Pelvic Floor Center. This outpatient Pelvic Floor Center is a specialized part of our Urological department and consist a surgeon, gynecologist, urologist and a pelvic floor physiotherapist. Routinely all new patients were sent in advance a voiding diary and a questionnaire on pelvic floor complaints to be completed at home and discussed at the first visit of our Pelvic Floor Center. This questionnaire contains questions on defecation, lower urinary tract symptoms, obstetric information and also sexual complaints. One of the questions is about sexual abuse.

We were interested how reliable this standard self-administered questionnaire is in detecting the number of patients admitting sexual abuse (Chapter 3).

Before beginning therapy, specialists use various diagnostic tools such as urodynamics, a voiding diary, defecogram or even MRI. However, current diagnostic models have stressed the importance of a physical exam, as well as assessment of the relationship between pelvic floor function, sexual function, isolated functioning and the awareness of the relationship between structures like the bladder, rectum, anus and vagina. The aim of this study was, in this perspective, before starting treatment, to perform a specific diagnostic work-up focused on pelvic floor function. In our hospital, this diagnostic consultation is indicated as DIPFF: Diagnostic Investigation of Pelvic Floor Function (Chapter 4).
Intravaginal, intra-anal electrostimulation and biofeedback training are used for treatment of urinary urge- and stressincontinence, anal dysfunction, and sexual dysfunction. For optimal treatment, knowledge of the structures that are the main targets in stimulating and in biofeedback training is needed. This knowledge of both the anatomy of the pelvic floor and physiological aspects should result in optimal design of probes. However, lack of uniformity in description of the anatomy per se, the nomenclature of the pelvic floor, and stimulation techniques has been hampering such a design. Moreover, the available, commonly used probes have been developed empirically (Chapter 5).

Electrical stimulation of the pelvic floor was reported to be an effective alternative treatment. Extracorporeal magnetic innervation therapy (ExMI) is a more recent technique. In the present pilot study we evaluated the effects of ExMI, to assess whether ExMI is suitable for our patients (Chapter 6).

In literature the effect of neurostimulation at the level of the Tibial nerve [(invasive: Posterior Tibial Nerve Stimulation (PTNS)] and direct stimulation on the dorsal sacrum [neuromodulation or Transcutaneous Electrical Nerve Stimulation (TENS) S2-S3] have been described. The effect of the procedure has been attributed to stimulation of the afferents to the bladder. Both procedures have been used at our institution with varying success. Some patients appeared to be refractory to either procedure. In order to increase the success rate we have tried if the combination of both procedures would increase yield of the stimulation.

We decided to combine TENS on the tibial nerve and TENS applied at the S2-S4 foramina. We performed this study to quantify the acute effect of one single application of TENS in patients with symptoms of the overactive bladder syndrome using urodynamic parameters (Chapter 7).

The lack of controlled parameters has made it difficult to evaluate the true efficacy of intravaginal electro stimulation (ES). Moreover the stimulation equipments as well as the treatment regimens are not standardized and it is difficult to draw conclusions about electrical parameters of frequency, pulse duration, pulse – to - rest ratio, length of treatment, power and accurate success rates. Based on previous studies, induction of bladder inhibition is most effective when using a frequency of 5-10 Hz.
We performed this study to quantify the acute effect of one single application of intravaginal ES in patients with symptoms of the overactive bladder syndrome using urodynamic parameters (Chapter 8).

In Chapter 9 the summary and conclusions of this thesis are presented. The Dutch translation can be found in Chapter 10.
Reference List


