A Psychophysiological Investigation of the Pelvic Floor. The Mechanism of Vaginism
van der Velde, J.

Citation for published version (APA):
van der Velde, J. (1999). A Psychophysiological Investigation of the Pelvic Floor. The Mechanism of Vaginism
A psychophysiological investigation of the pelvic floor:
Introduction
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"...Take snake’s blood, Armenian clod, pomegranate bark, egg white, mastic, and oak galls – an ounce or two of each or as much as you like. Reduce to a powder and let them all be cooked together in heated water. Put some of this combination into the vagina. Or take oak galls, sumach, plantain, larger black briony, alum, and dwarf olives. Let them be cooked in rain water and let the private parts be fomented with this decoction" (Salerno, 1547/1940, p. 37). This treatment was Salerno’s answer to the manner of tightening of the vulva so that “even a woman who has been seduced may appear a virgin.” In 1861, James Marion Sims suggested to call this condition ‘vaginismus’. He described an involuntary spasmodic closure of the mouth of the vagina that formed a complete barrier to coition. Nowadays, the term ‘vaginismus’ is still used to describe a sexual dysfunction characterized by the recurrent or persistent involuntary contraction of the perineal muscles surrounding the outer third of the vagina. This contraction occurs when vaginal penetration with penis, finger, tampon, or speculum is attempted. By definition, vaginismus must cause marked distress or interpersonal difficulty (American Psychiatric Association, 1994).

The available treatment of vaginismus ranges from surgery, to progressive dilatation, sexual counseling and psychotherapy. Most studies (see Van de Wiel, Jaspers, Weijmar Schultz & Gal, 1990) report high success rates. However, the criteria for success are often not defined. More importantly, there is a lack of knowledge about the mechanism underlying vaginistic reactions.

The discrepancy between clinical practice, in which a variety of treatments is available, and the lack of knowledge about the mechanism of vaginismus was the direct cause for this research project. The purpose was to afford a glance behind the scenes of this involuntary muscle contraction.

In the literature vaginistic reactions are often associated with a defense mechanism (e.g. Frank, 1948; Haslam, 1965; DeMoor, 1972; Kaplan, 1974; Jackman, 1976; Everaerd, 1991). However, there is a lack of publications that elaborate on this mechanism. We used the theory of Buytendijk (1957) as a starting point. According to Buytendijk (1957) defensive reflexes develop as consequence of experience. They anticipate an oncoming event, and develop, by experience, into a movement that is adapted to the situation. Defensive reflexes are based on the startle reaction. This is a nonspecific reaction that consists of a motoric disorganization, a muscle cramp, followed by a paralysis. Although defense reactions are all learned and based on earlier experiences, they occur automatically from the beginning.

With regard to the mechanism of vaginismus, we assessed three main questions. First, voluntary control over pelvic floor muscles was examined. As is known from the maintenance of continence, the voluntary contraction of the pelvic floor plays a role in the control strategy (Fay, Jones, & Porter, 1976). For that reason, voluntary control over pelvic floor muscles is an important part of therapy. The ability to contract and relax the pelvic floor muscles may differentiate women with and without vaginismus. Second, since involuntary contractions of the pelvic floor characterize vaginistic reactions, this involuntary activity of the pelvic floor muscles was investigated. We assessed the situation that evoked changes in pelvic floor muscle activity, differences in involuntary pelvic floor muscle activity between women with and without vaginistic reactions, and occurrence of the same reaction in other muscle groups. Finally, we explored the
relationship between the subjective experience of threat and pelvic floor muscle activity.

In the literature the muscles involved in vaginismus are described in different ways. However, all muscles involved in the vaginistic reaction are muscles that are part of the pelvic floor. Recently, the impact of the pelvic floor on complaints related to micturition, defecation and sexuality, has received much attention (e.g. Bernstein, Philips, Linden & Fenster, 1992; Glazer, Rodke, Swencionis, Hertz & Young, 1995; Kuipers & Bleijenberg, 1985,1990; Whitehead, 1996; Uher & Swash, 1998). The investigation of vaginistic reactions is synonymous with research on (over)activity of the pelvic floor muscles.

Organization of the thesis

This thesis consists of several experiments that were aimed at clarifying the mechanism of pelvic floor overactivity. In these studies, activity of the pelvic floor muscle is investigated in women with and without vaginistic reactions. Vaginistic reactions can be simply generalized to other complaints related to pelvic floor overactivity. In the following paragraphs an outline of this thesis is given in greater detail.

In Chapter 2, the pelvic floor forms a supportive layer for the psychophysiological experiments in this dissertation. This chapter describes in a nutshell the relationship between the different muscle groups of the pelvic floor, the structures that help to give the pelvic floor its shape, and its innervation. Furthermore, the different functions of the pelvic floor are described. Finally, we reflect on the symptoms that may be related to under- and overactivity of the pelvic floor muscles.

The issue of the diagnosis of vaginismus is elaborated upon in Chapter 3. The usefulness of an anamnestic questionnaire to distinguish women with and without pelvic floor symptoms is assessed. In addition, this questionnaire is compared with the outcome of physical examination.

At the start of this research project, we decided to investigate pelvic floor muscle activity with the use of vaginal surface electromyography (EMG). We tested this measurement method for its usefulness in women with vaginistic reactions. The results of this study are described in Chapter 4.

Chapter 5 presents data on the voluntary control over pelvic floor muscles. Women with and without vaginismus were compared in their ability to relax and to perform exercises for the pelvic floor muscles and the surrounding muscle groups. This study investigated the assumption that women with vaginistic reactions have less voluntary control over their pelvic floor muscles compared to women without vaginistic reactions.

The involuntary activity of the pelvic floor muscles is the topic of Chapter 6. Pelvic floor muscle activity is investigated in an emotional situation. This study assessed the specificity of the pelvic floor reaction. It was hypothesized that the activity of the pelvic floor muscles would increase during exposure to threatening film excerpts. This reaction would not be restricted to the pelvic floor muscles, but occur in other muscle groups as well.

In Chapter 7 a study is reported that replicated the findings of the study described in chapter 6. In this chapter the relation between subjective experienced
emotions and pelvic floor muscle activity is described. Insight in this relationship may help to understand the mechanism of vaginismus.

Finally, Chapter 8 presents a discussion of the findings.

In the studies described in this thesis, activity of pelvic floor muscles was measured with a vaginal EMG device. Women inserted the device in their vagina in private. Alternative devices for the registration of pelvic floor muscle activity were either needle or surface electrodes. These devices had serious disadvantages. Needle EMG was considered as too invasive for the purpose of the study. The disadvantage of surface electrodes was the attachment to the pelvic floor. These surface electrodes require preparation of the skin and placement by the experimenter. For reasons of privacy and relaxation the vaginal device was used during the experiments. As a consequence, women who were not willing or able to insert this device in their vagina could not participate in the studies. Although there is no reason to assume a different mechanism underlying pelvic floor overactivity between women with vaginismus who are able to insert this device and women who are not able to do so, this limitation of the studies should be taken into account.

Several chapters of this thesis are published or submitted for publication. Since these articles are self-containing, the text of these chapters shows some overlap.