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Original Article

Postpartum Pelvic Floor Conditioning Using Vaginal Cones: Not Only for Prophylaxis Against Urinary Incontinence and Descensus

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Abstract: Seventy-one women were examined 6–8 weeks after spontaneous delivery by pelvic floor (PF) palpation, inspection, manometry and gravimetry. Re-examination was performed in the same way after 4–6 weeks of daily cone training. Control groups included 20 women prior to and after conventional puerperal exercises, and 8 nulliparae prior to and after the same cone training, using a five-cone set. The number of puerperae not capable of voluntary PF contraction declined from 34% before to 6% after training. Optimum initial and post-training responses were exhibited by all nulliparae. Differences between cone and conventional exercise groups were of minor importance. Contractility increased from 5 to 10 mmHg on average in puerperae and from 15 mmHg to 21 mmHg in nulliparae. Cone nos. 1–3 were most frequently required at the beginning of training, and nos. 3–5 towards the end. Cone training works well as an alternative or complement to conventional postpartum exercises, and may therefore be recommended especially to puerperae who are not capable of holding vaginal cones of 20–70 g 6 weeks after delivery.

Keywords: Conditioning; Pelvic floor; Puerperium; Vaginal cones

Introduction

The female pelvic floor (PF) is attracting growing attention as an integral component of the pelvic organs. Its connective-tissue contact with adjacent organs enables its involvement in all functional processes [1,2]. It therefore appears plausible to use regular PF training with a view to maintaining or improving the opening and closing mechanisms of the urethra and vagina. In the context of childbirth, the pelvic floor is exposed to stress or even damage [3,4]. Postpartum re-education of the pelvic floor is therefore of fundamental importance to prophylaxis against descensus and sphincter incompetence [5–7].

Conventional puerperal exercises quite often remain ineffective because of inadequate practice or lack of intensity. Cone training of the pelvic floor musculature (PFM), which was actually developed for women with urinary incontinence (UI), may be a useful alternative or supporting approach [8,9].

An analysis is made in this prospective study of the effectiveness of a 4–6-week postpartum cone training program, following spontaneous vaginal delivery, in several risk groups, paralleled by identical examinations of women prior to and after programs restricted to gymnastic exercises (without cones). The findings are also compared with conditioning results obtained from cone training of nulliparae at the same age level. Apart from the usefulness of postpartum cone training, interest was focused at the indications and criterias for application.

Materials and Methods

Seventy-one puerperae were ready for involvement in the cone study. They were split up into three risk groups, following a proposal by Pigné [10]. Included in group 1 were 30 women after normal childbirth with no episotomy nor perineal laceration and birth weights below 4000 g. Group 2 included 37 women with episio-

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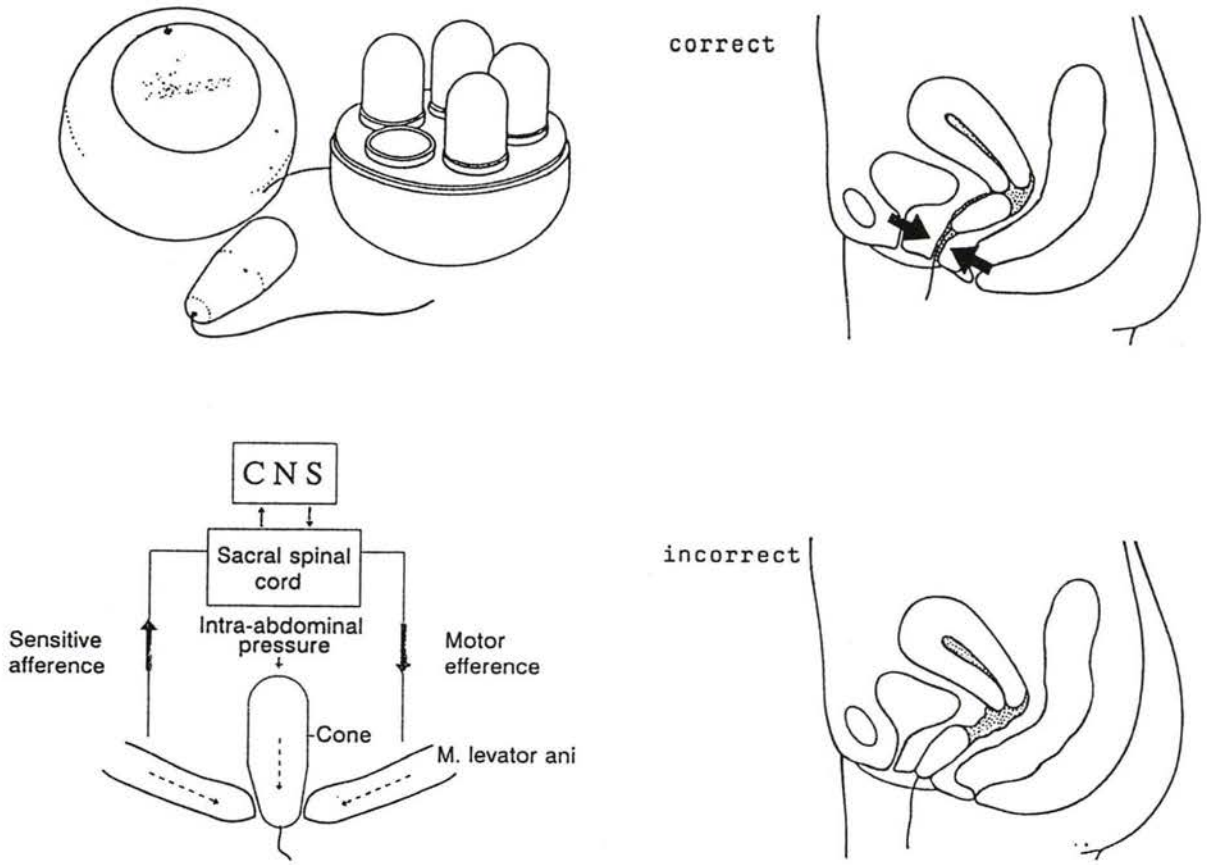

Fig. 1. Working principle and correct placement of intravaginal cone.

tomy or perineal laceration and/or more than two previous childbirths, with the most recent birth weight above 4000 g. Group 3, in conformity with the subject of this study, included 4 women with urinary incontinence (UI) during pregnancy, with no particular consideration of delivery circumstances. They had reported the onset of UI symptoms in the last 4 weeks of pregnancy. In 2 of them the complaint had disappeared by the time of our first examination, but persisted in the other 2. Patients were aged between 19 and 41. Average age levels were 25.5 years in group 1, 28.7 in group 2 and 28.0 in group 3. All were to undergo a 6-week vaginal cone training program (Femcon® cones, between 20 and 70 g).

Prior to the beginning of training all subjects were tested to find out whether they could hold at least the lightest cone (no. 1 = 20 g) intravaginally. Women who lost even this, or could hold the highest weight (no. 5 = 70 g) without difficulty would be considered unsuitable. This did not apply to any of our subjects, who were asked to do two to three exercises a day, for 10–15 minutes each, by introducing the heaviest tolerated cone as deeply as possible into the vagina and hold it while doing chores (Fig. 1). As soon as they found that they could hold a cone without difficulty, they were encouraged to continue by inserting the next heavier one. Duration of applications and cone numbers were recorded.

A control group (KG) included 8 nulliparae, on average 25 years of age, with no pathological gynecologic findings. These underwent the same vaginal cone training program.

We also tried to compare vaginal cone training with the effectiveness of conventional pelvic floor exercises in puerperae, and therefore tested another 20 women for PF conditioning prior to and after 4–6-weeks of physiotherapeutically controlled exercises of the pelvic floor muscles and abdominal wall. Their average age was 26 years.

First examinations were 6–8 weeks after delivery. A thorough explanation of the importance of the pelvic floor and its trainability was followed by a general gynecologic examination and levator palpation.

To test reflex and voluntary PF contraction, subjects were first asked to relax and then to cough. They were then encouraged to contract the pelvic floor and to 'pinch', as if to retain feces or urine. PF muscle contractility was tested digitally and was rated as none, moderate, good or very good.

To objectively measure PF contraction capability, manometry was performed. For this purpose a balloon catheter was filled with 20 ml air, placed intravaginally at the levator level and connected to a sphygmomanometer. Artefacts which might have been caused by contraction of the abdominal or gluteal muscles were

largely ruled out by manual control of the abdominal, femoral and gluteal muscles.

To visually quantify PF contractility the so-called speculum lift test was used [2]. This allows the investigator to assess the amount by which the vaginal lumen is narrowed during levator muscle contraction by the inserted posterior part of a Sims' speculum (0% = no levator contraction, 100% = very good contraction; Fig. 2).

The above examinations were repeated on completion of the training program. Unfortunately, 18 of the cone group (25%) and 7 of the pelvic floor exercise group (35%) failed to present for the follow-up examination. When motivation for cone training was rated 1–5 (very good to very bad), the worst mark was given to cases of premature discontinuation or failure to attend for follow-up. Women were finally interviewed for their individual attitudes towards cone training. Some results were published recently [11].

The SPSS/PC+ statistical program was used for evaluation. Methods used included the Sign test, the Wilcoxon test, the Kruskall–Wallis test and the *t*-test for isolated and interlinked random samples. A 95% confidence interval was assumed.

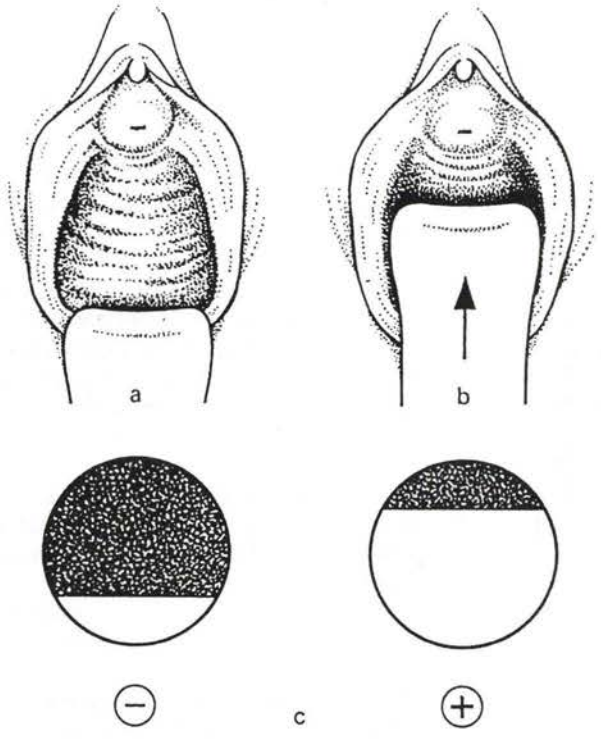

Fig. 2. Speculum lift method for functional testing of levator musculature. (a) Insertion position of posterior speculum blade is largely unchanged by contraction (negative speculum lift = poor levator response); (b) posterior speculum blade is getting visibly closer to the anterior vaginal wall by contraction (positive speculum lift = good levator reponse); (c) effects on vaginal introitus.
⊖negative levator test = lumen narrowing <25%.
⊕positive levator test = lumen narrowing >75%.

Results

Inability to perform PF contraction was recorded at initial palpation in 31 of 91 subjects (34%) in the cone and pelvic floor exercise groups. This figure dropped significantly after training ($P<0.05$) to 3 of 53 (6%) in the cone group and 1 of 13 (8%) in the exercise group, although lower numbers provided a deceptive picture for risk group 3 and the exercise group (Fig. 3). According to expectation, much better initial reactions and responses to training, were recorded from another 8 women in the control group.

Women in the cone groups, notwithstanding their initial pressures, increased their contraction capability by 6 mmHg on average, as established by manometric assessment (Fig. 4). The lowest initial values were recordable from risk group 3 (women with manifest UI), which adds to the importance of their increase in contractility. Women in the exercise group, on the other hand, showed much better initial values: 8 mmHg on average, which could hardly be further improved by training (10 mmHg). Maximum PF muscle performance 3 months after childbirth seems to be limited to values of about 10 mmHg. Much higher initial and control values (15 and 21 mmHg) were recorded after cone training from the non-parous control group.

The speculum lift test, again revealed the absence of PF contractility in 30% of subjects prior to cone training. Twenty percent could narrow their introitus by a quarter to a half, whereas less than 30% in the initial examination were able to narrow the introitus by three-quarters or to close it completely (Fig. 5). A significant improvement of lifting power, by 32% on average, was achieved after cone training. Only 6% were left incapable of speculum lift at all, whereas 50% succeeded in good to very good introitus closure. No significant differences were found to exist between risk groups, so that all women could be listed together in Fig. 5. The control women were left out of this presentation, because even in the initial speculum lift test they had proved capable of full closure of the introitus (7 subjects) or three-quarter narrowing (1 subject).

Strengthening of PF muscle performance was much more clearly recordable from cone holding capability (Fig. 6). Exercises were started with cone nos. 1 or 2 by 39 women (55%), nos. 3 or 4 by 28 (39%) and no. 5 by 4 (6%). Cone holding capability was significantly improved ($P<0.05$) by one or two cone weight levels (12.5–25.0 g). PF capability was even increased by three cone numbers by 17% of subjects. In this context it should be borne in mind that possible improvement was anyway limited in women who had started their training with cone nos. 4 or 5. As no significant variation in cone holding improvement was recordable from the risk groups, all groups could be listed together in Fig. 6. Seven of 8 controls started cone training with the highest weight (no. 5 = 70 g) and 1 with no. 4 (57.5 g). Their training possibilities, too, were limited from the outset.

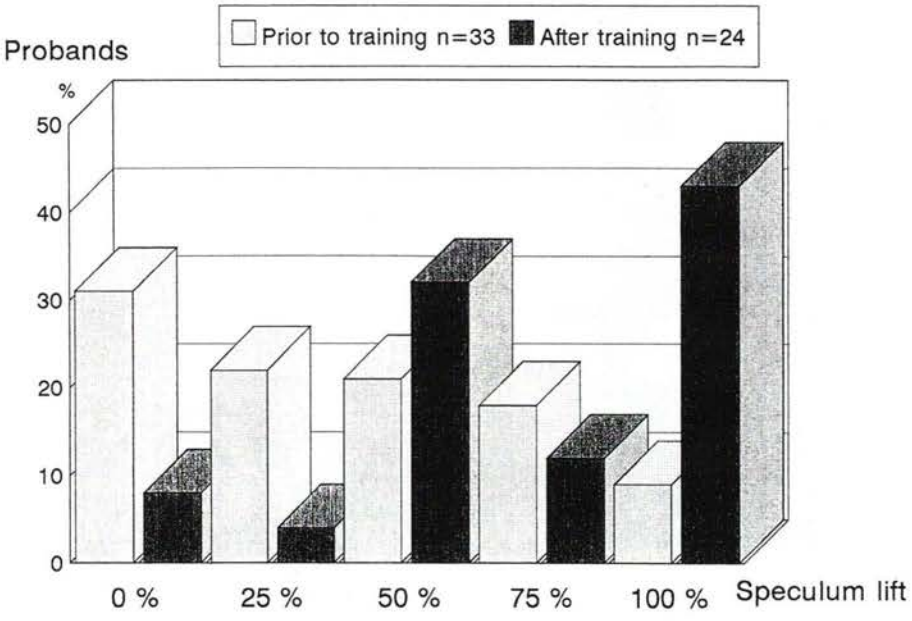

Fig. 5. Visual inspection of PF contraction capability prior to and after cone training by speculum lift test (postpartum average values).

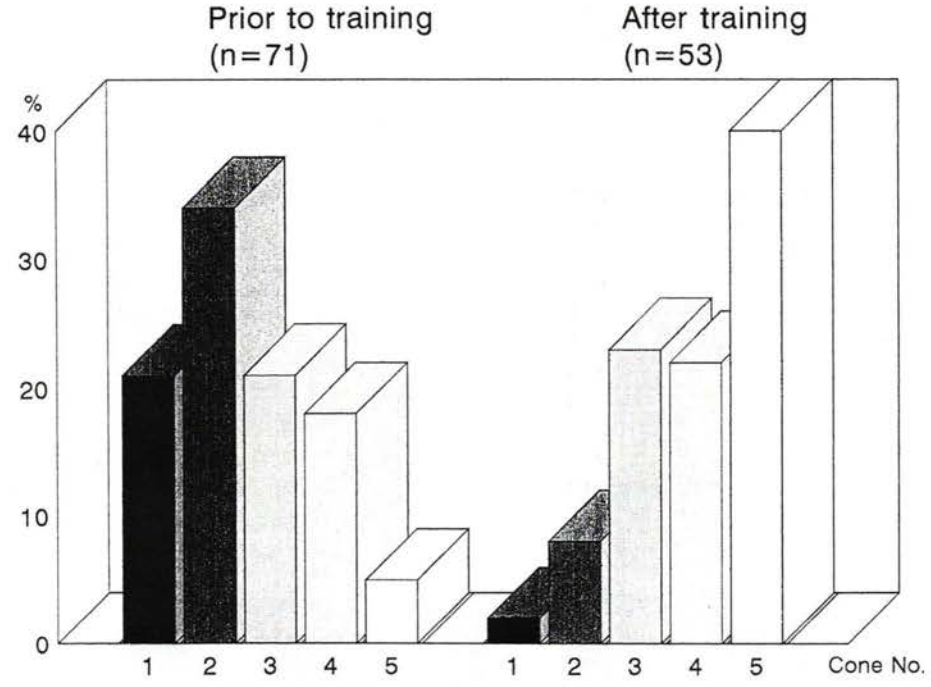

Fig. 6. Average distribution of cone weights required prior to and after postpartum cone training.

percent of all women practiced once a day, 56% twice and 11% three times a day. The average practice time was 10 minutes. Shortage of time was the excuse used to explain irregularity. Nevertheless, they did practice and could thus be included in this study. The lower the motivation and the shorter the training time, the lower were the improvements achieved in contraction capability.

PF contraction capability depended in 70% on coordination ability, which was reflected in the results obtained from manometry and speculum lift. Neither before nor after training was PF contraction capability affected by any of the following risk factors: episiotomy, perineal laceration, birth weight, duration of parturition, number of childbirths or advanced age.

Discussion and Conclusions

Functional tests of the female PF and targeted recommendations for exercises are not really common as yet in gynecological practice. In many base checks examiners restrict their efforts to the detection of descensus and, at best, palpation of the levator crura, along with a contraction and holding maneuver. If abnormalities are detected, further measures would depend on severity:

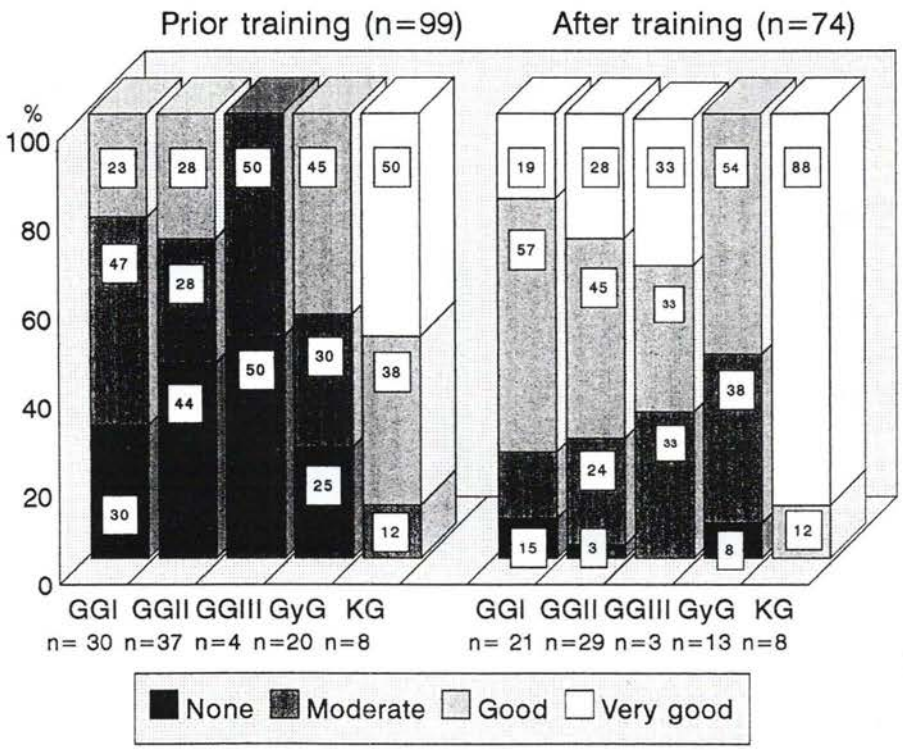

Fig. 3. Assessment by palpation of average contraction capability prior to and after training in cone groups (1–3 and KG) and a pelvic floor exercise group (GyG).

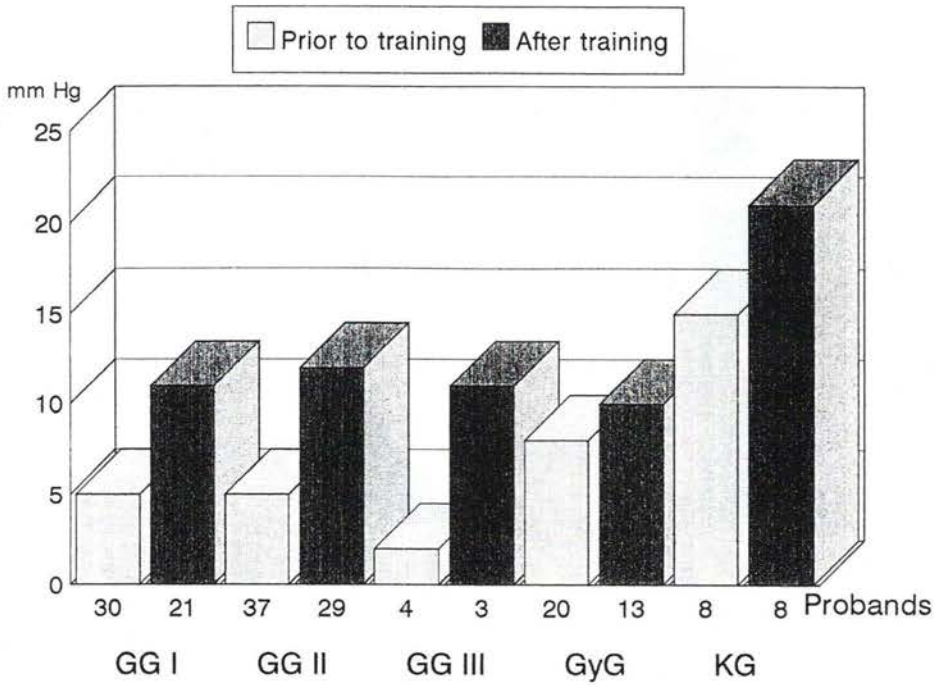

Fig. 4. Manometric assessment of average PF contraction before and after training in cone groups (1–3 and KG) and an exercise group (GyG).

In 2 of 4 women with UI during pregnancy the symptom was no longer detectable by the time training was started, whereas in 1 woman it still was recordable in response to extraordinary exposure (horse riding). In 1 woman a final judgment was not possible, because she failed to attend for a follow-up examination or failed to practice cone training at all.

Motivation for cone training was good to very good in less than half of all cases, and was bad in one-third. Eighteen women (25%) failed to report for a second check and were awarded the lowest rating (Fig. 7). In the control group, however, 6 were very well motivated, and 2 were rated good; 6 of them asked for continuation with heavier weights. From among 61 subjects who completed the training program, in all risk groups and the control group, practice was undertaken with good regularity by 51% and irregularity by 49%. The average practice period amounted to 22 days. Thirty-three

or less regular cone training. Norton and Baker [9] have suggested the possibility of non-interventional self-improvement of impaired PF function 4–6 months after childbirth (on completion of PF reinnervation). A control group of such a kind, for all practical purposes, would be a good reason not to abandon PF training prematurely. The PF can never be fully immobilized. Undesirable postpartum exposures must therefore be expected, and appropriate conditioning should be started in good time.

Women who, in a gynecological examination 6–8 weeks after childbirth, are not capable of voluntary contraction of the levator musculature and of holding cone weight no. 5 (70 g) are particularly suitable candidates for postpartum cone training. Women with a better response will require nothing but general exercise, but those who cannot even hold cone no. 1 (20 g) will need special PF consultancy and electrostimulation.

Achievements in UI therapy still are unsatisfactory. More attention will therefore have to be given to prophylaxis. PF re-education, using vaginal cones, is a highly important approach to women of childbearing age for whom general practitioners and gynecologists are jointly responsible.

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EDITORIAL COMMENT: The investigators set out to show that vaginal cones can be used for postpartum pelvic floor conditioning, and their results do indeed indicate an improvement in pelvic floor strength based on the speculum lift test, manometry and cone holding. Unfortunately, the study does not answer, and was not designed to answer, whether the use of vaginal cones is better than, equal to or worse than pelvic floor exercises for reconditioning the pelvic floor after vaginal delivery. To answer this question requires randomization, blinding and appropriate control groups (i.e. postpartum patients who do not perform any type of exercise of the pelvic floor).

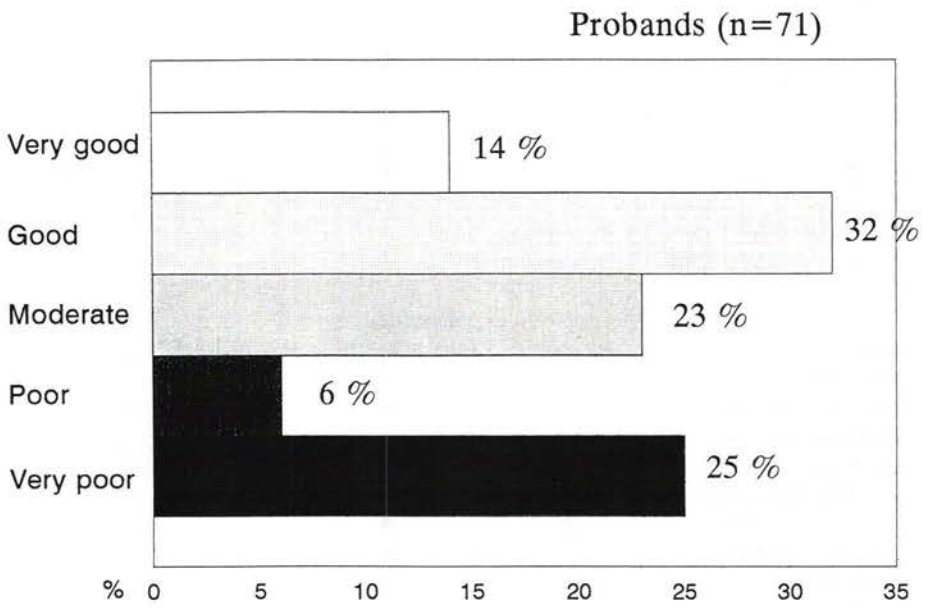

Fig. 7. Overall appraisal of motivation for postpartum cone training.

wait-and-see, PF exercises or admission to hospital for PF repair. We have learned, in the meantime, that without controlled guidance at least one-third of all women are not capable of proper PF contraction, and therefore not capable of an optimal response to conventional PF exercises. Visualization, or even measurement of PF contractility, however, will enable biofeedback training and quantifiable performance control. Remarkable success was achieved in this way by Kegel as early as the 1950s. The diagnostic potential of his perineometer and succeeding models was unfortunately, rarely utilized, and primarily isometric training effects did not adequately conform with exposure to everyday demands. On the other hand, cone training, as inaugurated by Plevnik [12], because of its reflex-related demands on the pelvic floor, is not only in conformity with but can be practiced under everyday conditions. After cone training has worked well in the early treatment of UI and descensus [13], it appears to be worth testing its prophylactic effectiveness in the wake of extraordinary PF exposures, as attempted in this study for postpartum situations. In an attempt to simplify the methodological approach to the problem, apart from perineometry, we resorted to the so-called speculum lift test [2].

However, a training-related increase in cone weights proved to be another reliable criterion for judgment. Our understanding, according to which 34% of all puerperae, when first examined, were not capable of palpable PF contraction, is in agreement with other postpartum observations and with experience obtained from PF exercises in UI patients [14]. Some women, partpartum, exhibit obvious signs of functional PF weakness of the same nature as those which would sooner or later lead to UI. As a normal response was exhibited by all nulliparae at the same age level in the control group, the assumption of a relationship with birth trauma seems to be justified. However, contrary to our expectations, we found no significant pre- or post-training differences between risk groups (Figs 3 and 4). There is no agreement in the literature as to the consequences of possible childbirth lesions [6,15], so it is quite obviously not the differentiated nature of intrapartum PF exposure but the childbirth trauma as a whole which is of relevance to muscle and connective tissue lesions and subsequent UI. Our risk group 3 was too small and was of no importance in this context, since it has been formed under the aspect of potential UI disposition due to UI symptoms already in the course of pregnancy, rather than under the aspect of childbirth trauma. More cone and exercise studies would therefore be appropriate, and should involve higher numbers of women.

Our results revealed no convincing training differences between the cone and the exercise groups. Hence, the kind of PF training seems to be less important than its proper implementation and duration [6]. Cone training, in this respect, has proved to be satisfactory, not only in our study but also in studies conducted by other authors [8,9]. Cone training is easy to learn, almost free of error and can be done without additional time consumption; it equally activates the slow twitch muscles fibers (type I) responsible for tonus at rest, and the fast twitch muscle fibers (type II) which are required for reflex-related and voluntary contractions.

There is another benefit, on top of the training effect, that should not be underestimated: the learning effect, 'familiarization' with one's own pelvic floor and the positive consequences for sexual activity. Young women who are fully preoccupied with their maternal duties are often better motivated for cone training by references to the sexual implications rather than by warnings against descensus or UI at sometime in the future. Also, only in the future will there be a definite answer to the question whether or not the usually multifactorial problem of UI can be prevented by more