

## Review

# Hypopressive Gymnastics: Evidences for an Alternative Training for Women with Local Proprioceptive Deficit of the Pelvic Floor Muscles

## *Ginástica hipopressiva: as evidências de uma alternativa ao treinamento da musculatura do assoalho pélvico*

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### Abstract

Although pelvic floor kinesiotherapy is, today, part of the gold standard for the treatment of pelvic floor dysfunction, one-third of women have local proprioceptive difficulty, what hinders the initiation of treatment. The hypopressive gymnastic is a new technique that promises reflex contraction of the pelvic floor muscles, but the evidence is sparse. *Methods:* Organizing the evidence, especially for imaging and electromyography, published so far. *Results:* Hypopressive gymnastics causes cranial momentum of the pelvic organs, which can be seen by ultrasound, magnetic resonance and direct observation by speculum. Electromyography suggests reflex activation of the pelvic floor muscles. *Conclusion:* Hypopressive gymnastics acts on the pelvic floor, and can be used as an adjuvant technique for the proprioceptive awareness of pelvic floor muscle.

**Key-words:** hypopressive gymnastic, kinesiotherapy, pelvic floor, proprioception, physiotherapy.

### Resumo

Apesar de a cinesioterapia para o assoalho pélvico fazer parte do padrão áureo para o tratamento das disfunções do assoalho pélvico, um terço das mulheres apresenta dificuldade de identificação daquela musculatura o que tolhe o início do tratamento. A ginástica hipopressiva é técnica recente que promete contração reflexa da musculatura do assoalho pélvico, mas é parca a evidência a este respeito. *Métodos:* Organização da evidência, especialmente por exames de imagem e eletromiografia, publicada até o momento. *Resultados:* A ginástica hipopressiva provoca momento cranial das vísceras, o que pode ser observado por ultrassonografia, ressonância magnética e observação direta via espéculo. A eletromiografia durante a manobra sugere ativação reflexa da musculatura do assoalho pélvico. *Conclusão:* A ginástica hipopressiva age no assoalho pélvico, e pode ser utilizada como técnica adjuvante para o despertar proprioceptivo da musculatura local.

**Palavras-chave:** ginástica hipopressiva, cinesioterapia, assoalho pélvico, propriocepção, fisioterapia.

### Introduction

Since the pioneering studies of Kegel □ carried out 60 years ago □ the training of Pelvic Floor Muscles (PFM) has been successful for treating pelvic floor dysfunctions, especially urinary and fecal incontinence, genital prolapse and diverse sexual dysfunctions, since it has been recently reported in systematic reviews [1].

Currently, urogynecological physiotherapy is considered an essential part of the gold standard treatment recommended by the International Continence Society [2]. One of the remarkable tools employed by this specialized physiotherapist was kinesiotherapy. Randomized controlled studies have reported that this therapy is more effective than other alternative treatments such as electrotherapy [3].

Submitted on July 15, 2011, accepted on October 15, 2011.

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One of the biggest challenges in using kinesiotherapy to treat women suffering from pelvic floor dysfunctions is to achieve proprioceptive awakening in a part of the body that, especially in Western culture, is associated with poor body awareness. PFM are not easily recognized by women [4]. In addition, more than 30% of women are incapable of contracting these muscles in an appropriate way. It is in this field where new kinesiotherapy techniques can make a difference by encouraging local proprioceptive awareness in a way that differs from the traditional invasive approach. One of these techniques, the Hypopressive Gymnastics (HG) has been increasingly employed in urogynecological treatments.

This recent technique created by French researchers in the 80's is based on the active contraction of abdominal muscles □ diaphragmatic aspiration □ and the alleged correspondent reflex contraction of PFM. It is widely used among professionals and it is also part of their training courses in our country; yet, lack of concrete scientific evidence remains. The purpose of this study is to organize the current visual evidence available.

## Material and methods

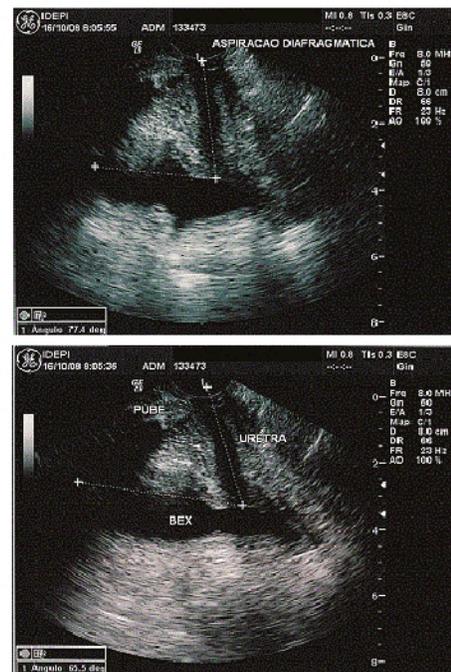
Data were organized through a multicentric effort. First, a bibliographic review of original publications about HG was conducted at a European level. The exercise was recorded in different ways in order to report the action of the diaphragm aspiration □ the main exercise of HG □ on female pelvic structures. 1) Video recording of the female urogenital area and the pelvic organs during the exercise; 2) measurement of the angle modification between the urethra and the vaginal wall using ultrasound, 3) measurement of the distance between the levator ani muscle and the sacrum through Magnetic Resonance Imaging (MRI); 4) measurement of the angle modification between the uterus and the vaginal wall through ultrasound, 5) simultaneous measurement of eletrelectromyographic activity of the active abdominal muscles, and of the supposedly reflex activity of PFM during the maneuver; 6) measurement through biofeedback of the abdominal activity during the maneuver, with no active contraction of PFM in supine position; 7) measurement through biofeedback of the isolated activity of PFM during the exercise, with no active abdominal contraction in supine position; 8) simultaneous measurement through biofeedback system of the PFM activity and the diaphragmatic aspiration in supine position; 9) measurement of the abdominal activity during the exercise through biofeedback , with no active contraction of PFM in supine position.; 7) measurement of the abdominal activity during the exercise through biofeedback , with no active contraction of PFM in prone position; 8) simultaneous measurement through biofeedback of the PFM activity and the diaphragmatic aspiration in prone position.

## Results:

In 1991, Marcel Caufriez's thesis described HG in four movements: Diaphragmatic slow and deep inhalation followed by slow and deep exhalation, immediately followed by a progressive contraction of the transversal abdominal muscles linked to intercostal muscles. This exercise was defined by the author as "diaphragmatic aspiration", and it ends with 10 seconds of apnea.

The video of the internal visualization of the vaginal canal using a speculum □ produced in Spain by J. Amostegui □ [6] shows the behavior of the deeper part of the vaginal cavity during the diaphragmatic exercise. It is possible to clearly visualize how the anterior vaginal and, especially, the rectouterine pouch wall rise, which provides evidence of the creation of a caudocranial kinetic momentum in the uterus and in the anterior vaginal wall.

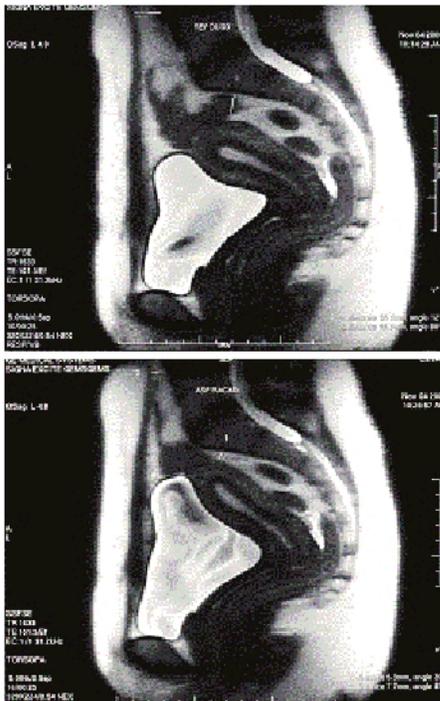
**Figure 1:** Ultrasound of the angle between the urethra and the bladder wall during the diaphragmatic aspiration.



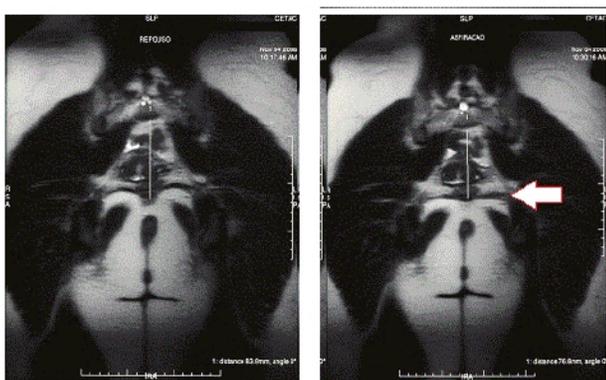
The angle between the urethra and the vaginal wall increases by 12°, from 65 to 77°, during the diaphragmatic maneuver in resting position [7].

The sequence of ultrasound images (Figure 2), showed that the angle between the urethra and the vaginal wall had augmented by 12° (from 65° up to 77°), during the exercise of diaphragmatic aspiration [7]. The distance between PFM and the sacral promontory in MRI is diminished by 83.8mm for the 76.8 mm, providing evidence, again, of caudocranial moment [7]. The increase of the acute angle formed by the retroverted uterus with the vaginal canal, from 31° to 41°, visualized by magnetic resonance during the maneuver, confirms the caudocranial momentum

**Figure 2-** MRI showing the behavior of abdominal muscles, uterus and vagina during the diaphragmatic aspiration maneuver.



The first image shows the abdominal muscles at rest, the second one, during the diaphragmatic aspiration maneuver. The angle between the uterus and the vagina changes from 31° during rest (top) to 45° after the exercise (bottom).



These images show the changes in distance between the levator ani muscles and the sacrum: from 83.3 millimeters during rest (left), to 76.8mm during diaphragmatic aspiration (right) [7].

The electromyographic study yields evidence on the activity of the abdominal muscles and some activity in the PFM, which takes place milliseconds after the first one in a trained woman who knows how to keep her PFM relaxed while doing this aspiration maneuver, therefore suggesting that the abdominal contraction employed in that exercise will lead to a reflex activation of the PFM [8].

Using the intracavitary biofeedback system it was also possible to observe that during the diaphragmatic aspiration maneuver there was some PFM activity. Yet, the

contraction of the PFM when performed together with the diaphragmatic aspiration maneuver was visibly higher than when performed in isolation. This effect is verified when the maneuver is carried out both in supine and prone position [9].

## Discussion

The anterior vaginal wall is closely linked to the bladder [10] and the diaphragmatic aspiration maneuver provokes a cranial kinetic momentum in the anterior vaginal wall. The cranial momentum of the urethra is indirectly proved by the aspiration maneuver. In fact, the urethra is cranially moved during the maneuver, according to the sequence of ultrasound images at different levels and, as a consequence, not only the urethra but also de bladder and the uterus are raised up.

Caufriez [11] described that the diaphragmatic aspiration maneuver causes the lifting of pelvic organs towards the respiratory diaphragm, which would lead to a reflex contraction of the PFM. Exactly the same was suggested by the electromyography study [8] and the study that used biofeedback [9]. Meanwhile, more studies are necessary to provide solid evidence on this topic, especially, by engaging a higher number of female participants. It was proved that hypopressive gymnastics are effective when performed in prone position [9], thus making of it a suitable option for bedridden patients.

In 1991, the first PhD thesis of Marcel Caufriez described HG as an adjuvant technique, not as a treatment per se. Bertotto & Costa [12] described significant reflex activity of PFM which was verified by electromyography during HG performance. Bertottol & Rodrigues [13] described in a non-controlled pilot clinical study that the group who carried out the exercises of simple contraction of PFM had poorer outcomes than the group that carried out the same exercises associated to HG.

Recently, a study with nulliparous women was carried out to assess the function of the diaphragm and the PFM during calm breathing using MRI. It was observed that, during inhalation, when lungs got filled up, a lowering of the diaphragm domes occurred. PFM presented a similar functioning, they went down accompanying the moment of the diaphragm while breathing. On the other hand, during exhalation, both the diaphragmatic domes and the PFM were lifted, suggesting a synergy between these muscles during the movement [14]. These findings are in line with the proposed theory of HG which affirms that a lifting of the diaphragmatic domes during diaphragmatic aspiration exercises occurs at the same time that the pelvic organs and the pelvic floor are lifted by reflex action [15].

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Bertotto & Costa, 2008, described significant reflex activity of the PFM verified by electromyography during HG. Bertotto & Rodrigues, 2008, described in a pilot clinical study that the group submitted to the exercises of simple contraction of PFM had a poorer outcome than the group that performed the same exercises associated to HG.

In a controlled randomized study that compared electromyography data on the activity of transverse abdominis and the PFM during active contraction of levator ani and the diaphragmatic aspiration in 34 nulliparous women, Stüpp *et al* [16], reported that the aspiration exercise actually produced the activation of the PFM when compared to its state at rest. This activation, as expected, was inferior to the activation of the PFM caused by the active contraction of those muscles. Nevertheless, when the contraction of levator was made simultaneously to the diaphragmatic aspiration maneuver, the activation of the pelvic floor was not significantly bigger than the isolated contraction of the PFM. This would suggest that there is no reason for recommending HG if the goal is to reinforce the contraction of levators. Nonetheless, due to the involuntary activation of PFM during the aspiration manoeuvre, HG could be useful as an adjuvant technique in the case women are, by any reason, unable to consciously contract her pelvic floor muscles.

Due to the reflex activity of those muscles, HG can be an interesting alternative for treatment or, at least, it can be a starting point to advance in PFM awareness and finally, it can contribute to carry out the exercises of direct contraction in an appropriate way.

## Conclusion

HG promotes the lifting of all pelvic viscera as it causes a cranial kinetic momentum that can be verified through observation by speculum, MRI and ultrasound scan. Its exercises produce an activation of the PFM, which are apparently involuntary, verified in electromyographic studies and through intracavitary biofeedback. When it is simultaneously performed with HG, PFM are stimulated but not reinforced. The results do not vary whether the exercise is performed with women in supine or prone position. As an additional physiotherapeutic technique, the HG can be useful for women with proprioceptive difficulties in the pelvic floor. In one hand, it facilitates the beginning of proprioception and therefore, the awareness of this area for ulterior exercises of PFM contraction. On the other, it stimulates the contraction of PFM. In addition, this technique can be helpful immediately after childbirth, when the contraction of PFM is insufficient and also in the rest of cases where contraction of PFM is not enough, inefficient or not possible due to any other reason.

## References

1. Price N, Dawood R, Jackson SR. Pelvic floor exercise for urinary incontinence: a systematic literature review. *Maturitas* 2010 Dec;67(4):309-15.
2. Berghmans B, Bø K, Bernards N et al. Clinical practice guidelines for the physical therapy of patients with stress urinary incontinence. *Urodinâmica e uroginecologia* 2003;6(1):1-14.
3. Bø k, Talseth T, Holme I. Single blind, randomised controlled trial of pelvis floor exercises, electrical stimulation, vaginal cones, and no treatment in management of genuine stress incontinence in women. *BMJ* 1999;318:487-93.
4. Bump RC, Hurt WG, Fantl JA, Wyman JF. Assessment of Kegel pelvic muscle exercise performance after brief verbal instruction. *Am J Obstet Gynecol* 1991, 165(2):322-7;327-9.
5. Bø K et al. Evidence based physiotherapy for the pelvic floor. *Bridging science and clinical practice*. Elsevier; 2007.
6. Seleme MR, Dabadie L. The hypopressive gymnastic. 36° Annual Meeting of the International Urogynecological Association - IUGA 2011, Lisboa, Portugal.
7. Berghmans B et al. Pelvic floor rehabilitation. In: David Staskin DR, ed. *Atlas of bladder disease*. Berlin: Springer; 2010.
8. Seleme MR, Dabbadie L, Ramos L. Experimento eletromiográfico da manobra de aspiração diafragmática. Realizado na Escola Superior de Tecnologia da Saúde de Lisboa. Portugal: Research Labs; 2008.
9. Seleme MR. Ginastica hipopressiva in urofisioterapia - aplicações técnicas fisioterapêuticas nas disfunções miccionais e do assoalho pélvico. São Paulo: Paulo Palma; 2009.
10. Ashton-Miller JA, DeLancey JOL. Functional anatomy of the female pelvic floor. In: *Annals of The New York Academy of Sciences. Special Volume on Reproductive Biomechanics*; 2007.
11. Caufriez M. *Gymnastique abdominale hypopressive*. Bruxelles; 1997. p.8-10.
12. Bertotto A, Costa T. Avaliação do assoalho pélvico em mulheres adultas submetidas à técnica abdominal hipopressiva. [TCC]. Canoas: Universidade Unilasalle, Curso de Fisioterapia; 2008.
13. Bertotto A, Rodriguez B. Treinamento dos músculos perineais versus técnica abdominal hipopressiva: tratamento preventivo e conservador das disfunções do assoalho pélvico avaliados através do biofeedback eletromiográfico. [TCC]. Canoas: Universidade Unilasalle, Curso de Fisioterapia; 2008.
14. Talasz H, Kremser C, Kofler M, Kalchschmid E, Lechleitner M, Rudisch A. Phase-locked parallel movement of diaphragm and pelvic floor during breathing and coughing - a dynamic MRI investigation in healthy females. *Int Urogynecol J* 2011;22:61-8.
15. Seleme MR, Bertotto A, Ribeiro VW. Exercícios hipopressivos In: Palma P, ed. *Urofisioterapia: Aplicações clínicas das técnicas fisioterapêuticas nas disfunções miccionais e do assoalho pélvico*. Personal link; 2009. p.295-307.
16. Stüpp L, Resende APM, Petricelli, CD et al. Pelvic floor muscle and transverses abdominis activation in abdominal hypopressive technique through surface electromyography. *Neurourol Urodyn* 2011;30(8):1518-21.