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Pelvic Floor Rehabilitation in Anal Incontinence

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Additional information is available at the end of the chapter

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1. Introduction

Anal incontinence (AI) tends to be underreported to health professionals due to cultural aspects, embarrassment, mistaken perception that it is a normal consequence of aging, or because it causes little discomfort to the patient.

Maintenance of continence is essential for the normal functioning of individuals. Continence disturbances may contribute to the development of introverted behaviors, resulting in social isolation from family and friends, and may lead some people to seek help from health professionals. Elderly persons with fecal incontinence (FI) usually seek professional help or institutionalization because of precarious housing conditions, poor relationships with their partner and family members (caregivers or not), impaired cognition, presence of debilitating diseases, and financial difficulties, which seem to play a major role in their decision.

If not treated, the frequency of incontinent episodes and the amount lost increase, leading to foul odor, wet or soiled clothes, and even falls associated with fractures and death in more severe cases. Sexually active older women may fear having incontinent episodes during sexual activity, resulting in distress and sexual abstinence[1]. People only seek professional help when feeling very uncomfortable with their condition. However, health professionals may or not may be sensitive to the concerns of patients, meaning that some patients receive information and treatment while others do not.

Thus, although AI poses no immediate health risk, several studies have reported the negative impact of this condition on quality of life, leading to social isolation, concerns, decreased self-esteem and embarrassing situations [2, 3, 4, 5, 6, 7, 8, 9, 10, 11]. Besides sociocultural aspects,

the Brazilian health system is based on the treatment of diseases, and actions focused on early diagnoses and prevention are still in initial stages. In the field of elderly care, the Brazilian health system has a recent National Health Policy for the Elderly, which is beginning to lead to the implementation of preventive and diagnostic measures. However, although health services for the aged have the means to assess urinary incontinence (UI) and FI, they are in small number. This can be mainly attributed to the lack of specialists, nurses, physiotherapists and physicians, resulting in reduced access to treatment for a significant portion of the population [12]. These factors certainly point to the need to increase the number of studies on the health of the elderly, which is the age group with the highest incidence of AI.

Anal incontinence has been defined in various ways, but the definition established by the International Continence Society (ICS) as “the involuntary loss of feces or flatus” is the most widely accepted [13].

Epidemiological research on AI comprises studies with different designs that have been conducted in the elderly and women, with a smaller number being conducted in the general population, people with diabetes mellitus, pregnant women, and among those with neurological disorders.

Studies have reported a high prevalence of AI of up to 33% [14], especially among women [15], beginning after childbirth and aggravating with multiple births and advanced age (above 65 years of age) [16].

In Brazil, there are few studies on AI in both general and specific populations. A study conducted in a random sample of 519 adults from the general population of a city in Minas Gerais reported a prevalence of FI of 7%, with higher prevalence rates (4%) among women¹. Other study performed in a random stratified sample of 1162 adults living in the city of Londrina (Paraná) found a self-reported prevalence of AI of 3.6% (4% among women and 3% among men); with 70.1% of participants with AI reporting liquid stool incontinence. A study carried out in Porto Alegre (Rio Grande do Sul) with 1168 patients from general health services observed that 37% of patients aged 41 years and older had AI, with 44% of them being women¹⁸. In a group of 40 elderly persons participating in a program for the improvement of daily living and instrumental activities, only one of them (2.5%) had FI¹⁹. Another study reported prevalence rates of 2% for solid stool incontinence, 15% for liquid stool incontinence, and 27% for flatus incontinence in 100 postmenopausal women aged 45 years or older²⁰.

Few studies on this field with varying prevalence rates are found in the international literature. A study conducted in a random sample of 4277 elderly persons of both sexes, aged 75 years and older found a prevalence of FI of 16.9%, increasing with age [21]. A second study reported a prevalence of FI of 12%, with men having higher rates (12.4%) than women (11.6%) [22]. In a recent survey performed in Taiwan with people aged 65 year and older, 6.9% of 1345 men and 9.3% of 1370 women reported having FI²³. In patients from gastroenterology and gynecology clinics in Switzerland, AI was more prevalent among women (7.5%) [24]. A prevalence of FI higher than 55% was found among women attending gynecology clinics and a local family planning clinic in the UK [25]. A lower prevalence of FI (10.4%) was observed in a sample of 4815 women aged from 82 to 87 years living in Australia [26].

The most cited risk-factors or predictors associated with AI are female gender [15, 24, 25], advanced age [16], perineal and surgical lesions combined with a feeling of incomplete defecation [27], multiple births [28], and anorectal and urogynecologic surgeries [17]. In addition, other authors have also cited idiopathic factors, rectal prolapse, menopause, and traumas [29]; diarrhea whether infectious or not [17]; inflammatory bowel disease combined with abusive use of laxatives, fecal impaction, rectal neoplasia and neuropathy [30]; immobility and dementia [31]; neurological diseases and disorders such as multiple sclerosis and Parkinson disease [17]; fistulotomy and ileal pouch reconstruction [8]; and median episiotomy [31, 14].

The association of diabetes with AI, especially among the elderly, is worthy of note. In a group of 113 elderly persons, who were receiving outpatient follow-up, 2.4% of them reported having AI at least 5 years after diabetes diagnosis [32]. Diabetes was one of the factors associated with AI in a group of 4815 women aged 82-87 years [26]. The effects of hyperglycemia on anorectal motor and sensory function was assessed in 18 patients with diabetes (8 with type 1 and 10 with type 2 diabetes) by a systematic measurement of blood glucose and measurements of anorectal motility and sensation. The results revealed that acute hyperglycemia inhibits external anal sphincter function and decreases rectal compliance, potentially increasing the risk of FI [33]. An experimental study with male Wistar rats suggested that high glycemic levels may cause hypotonia of the anal sphincter, which may lead to complications such as FI [34].

2. Conservative treatment of anal incontinence

Epidemiological data on AI and its impact on the quality of life of individuals indicate the need for early diagnosis and prevention of this condition. However, this is not always possible because AI tends to be underreported by patients and underinvestigated by health professionals.

Anal incontinence can usually be treated by surgical or conservative means, according to the etiology and severity of the condition, and clinical status of the patient.

In this chapter, only the conservative treatment of AI is described and discussed.

The conservative treatment consists of nutritional-hygienic interventions and perineal rehabilitation through pelvic floor muscle training (PFMT).

2.1. Nutritional-hygienic interventions (behavioral change)

Behavioral change is part of the conservative treatment, consisting of techniques that contribute to restoration of continence, especially in the presence of fecal urgency.

In these cases, where the urgency situation itself may lead to anxiety, it is recommended that the individual's ability to retain fecal matter be increased by delaying defecation, which can be achieved by training on the toilet. The individual should be instructed to seat on the toilet when feeling the urge to defecate and try to retain the passage of feces for 1 minute on the clock. The next step is to increase the contraction duration to 5 minutes and then gradually to

10 minutes. After achieving success, the training should be performed in the bedroom far from the bathroom. In this way, the person will also be working at the emotional level. The use of pelvic floor muscle exercises, as will be described, completes the treatment [35]

Among other behavioral interventions, the patient should be instructed to:

- Avoid the use of laxatives
- Have a private and comfortable place to defecate
- Try to respond to the gastrocolic reflex by defecating 15 to 30 minutes after breakfast
- Seek treatment for anorectal diseases, such as hemorrhoids, fissures and fistulas
- Improvise a support for the feet during defecation, maintaining the legs elevated when in the seating position to prevent straining
- Have a dietary fiber* intake of 6 to 10 g/day and an adequate ingestion of liquids (8 glasses of water or 1500 ml/day, increasing the intake during summer)
- Take regular exercise (if not contraindicated) [36].

* people with diabetes mellitus should have systematic monitoring due to the ingestion of carbohydrates associated with dietary fibers [36].

In addition to these guidelines, it is important for the individual to develop a sense of complete evacuation and examine the stool for the presence of uncommon substances, such as blood and mucus.

2.2. Rehabilitation of the pelvic floor

Although the role of the pelvic floor muscle in AI is not fully understood [37], it is believed that this muscle is a key factor in maintaining anal continence. Pelvic floor muscle training is the conservative treatment most commonly used in the management of pelvic floor dysfunctions [38, 39, 40, 41]. However, the lack of scientific evidence to support this therapy may limit its indication, thus reducing its chances of success [42].

2.2.1. Pelvic floor exercises

The impairment of the sphincter function is the cause of or major contributing factor to anal incontinence. Exercises for PFMT are a strategy to improve sphincter function. Although there is no consensus among various authors, many of them believe that repeated contractions of the anal sphincter and pelvic floor muscle increase the strength, duration and speed of recruitment of the external anal sphincter, and also increases the patient's ability to contract the pelvic floor muscle alone and to maintain it contracted [43, 44, 35].

Improvements in muscle tone and sphincter strength lead to an increase in the strength of the anal canal and patient's ability to delay defecation [45]. Exercises for PFMT were first described by Arnold Kegel [46] in 1948 for the treatment of UI with the objective of improving pelvic floor muscle contraction and increasing urethral closure pressure. The exercises are based on

the principle that repeated voluntary contractions of the pelvic floor muscle, if correctly performed, contribute to an increase in urethral strength and resistance during muscle contraction and relaxation [47, 48].

Pelvic floor muscle exercise (PFME) programs are based on the assumption that it is possible to increase hypertrophy and aerobic and anaerobic capacity of muscles [49]. Strong and repetitive exercises increase muscle volume, and prolonged contractions of moderate intensity increase resistance and may improve resting pressure and contraction of the pelvic floor [50, 35]. Pelvic floor muscle training was introduced for the treatment of AI in the 1970s as a way to improve the results of PFME programs [51].

Although the objectives of PFME are well defined, little consensus exists among clinicians about the best exercise program. Specialists have recommended maintaining the contraction of the pelvic floor muscle between 1 to 30 seconds, with 30 to 45 repetitions per day or 1 to 50 repetitions per session. A not so recent but comprehensive work [52] (Wells, 1990) reviewed 22 studies on PFME and found protocols instructing participants to perform 15 to 160 contractions a day, holding each contraction for 2 to 30 seconds.

Moreover, there are variations in the specific exercise instructions among different authors. Some programs combine exercises for strengthening both type I and type II muscle fibers while other programs use separate sets of exercise for each type of muscle fiber [47, 53].

Sampselle and Miller (1994) [54] presented a five-level program of PFME. The first level consists of muscle identification and a series of fast contractions; the second level is involved in the improvement of muscle identification; the third and fourth levels comprise muscle strengthening exercises; and the fifth level is focused on maintaining muscle strength. For all levels, the total contraction duration of the pelvic floor muscle should range from 5 to 10 minutes a day, and from 5 to 10 minutes a week after the patient reaches the fifth level.

A panel of four specialists recommended a standardized program of up to 5 rapid contractions (type II muscle fibers) and 5 slow contractions (type I muscle fibers) to be performed 10 times a day [55] (Continence Foundation, 2000). This same protocol was used by Solomon and collaborators (2003) [56] in Australia, by Norton and Chelvanayagam (2004) [35] at the St. Mark's Hospital in London, and by health professionals at the Outpatient Biofeedback Clinic of the "Clementino Fraga Filho" University Hospital (HUCFF) in Brazil since 2006.

As in the St. Mark's Hospital (Norton e Chelvanayagam, 2001) [57], patients treated at the Outpatient Biofeedback Clinic (HUCFF) are advised to not expect immediate results from PFME. The sessions are scheduled at 2- to 4-week intervals, according to the patient understanding of the program, individual progress, and possibility of having the patient to come to the clinic for a training session. Weekly sessions are not recommended because positive results usually take 2 to 4 months to be obtained, resulting in a large number of PFME sessions before any improvement is noted, which may discourage the patient from continuing the treatment.

There is no evidence-based protocol for a PFME program; however, it should be tailored to the individual with respect to the number and duration of contractions, and number of repetitions. The instructions should be given in written form in the first session and orally reviewed during subsequent sessions.

2.2.2. Biofeedback: An important step in pelvic floor rehabilitation

Biofeedback refers to techniques that make unconscious body processes perceptible to the senses, so they can be manipulated by conscious control [35].

According to Norton and collaborators (2010) [58], there is no standardization in the literature about the use of biofeedback in the treatment of AI. These authors proposed three main training categories (strength, sensorial and coordination), which may be combined in a biofeedback program. Historically, PFMT is seldom used without biofeedback in the treatment of AI. The success of the PFMT depends on the ability of the patient to correctly perform a voluntary contraction of the pelvic floor muscle before beginning the Rehabilitation of the Pelvic Floor Program [58]. The combination of PFMT with biofeedback is also used in our daily practice.

One of the major obstacles in the re-education and rehabilitation of the pelvic floor muscle is that most patients have difficulty in correctly identifying and isolating the muscles [59]. Most women do not have the ability to recognize their pelvic floor muscle and do not know how to exercise it [60]; about 60% of women are unable to effectively contract this muscle, even when written or oral instructions are provided [35].

In order to increase muscle awareness and the ability to voluntarily contract the muscle, the patient will need to understand and find a way to control the pelvic floor muscle. This can be achieved using different approaches, with biofeedback being the best method for the treatment of AI. This technique improves symptoms in about 70% of cases by increasing the strength, duration and speed of recruitment of the external anal sphincter and the patient's ability to contract the pelvic floor muscle alone [61, 62, 63, 56, 35, 64].

For some authors, if AI is caused by damage of the pelvic floor, leading to sphincter weakness or inability to sense the presence of stool in the rectum, biofeedback is the treatment of choice, eliminating or decreasing the number of incontinence episodes, and resulting in a 90% improvement in 72% of cases [65].

Biofeedback therapy is relatively easy and safe to be performed, has no adverse effects, is well-tolerated, stimulates the patient, although it requires a specialist to conduct the program, and may be carried out using several techniques and devices.

Among the various techniques available, biofeedback by digital guidance and manometric biofeedback have been used successfully [66]. Both biofeedback programs assist the patient in perceiving muscle contraction in real time by either digital guidance and oral command or graphic visual display of the muscular contraction on a device screen, as will be described next.

2.2.2.1. Biofeedback by digital guidance, according to Solomon (2003) [56] and Doughty and Burns (2006) [59]

Patients in left lateral decubitus position with the legs flexed are instructed to contract the external anal sphincter by digital guidance and oral command. For this purpose, the index finger is inserted into the anus of the patient, who is instructed to contract the muscle upon request.

2.2.2.2. Biofeedback with anorectal manometry, according to Solomon (2003) [56]:

In this type of biofeedback, anorectal manometry is performed using a perfusion system with three or four channels to create a graphic visual display of the voluntary contraction pressure.

After application of lubricant gel, a catheter is inserted into the anal canal and coupled to a computer. The patient is then instructed to contract the external anal sphincter and observe the graphic display of the contraction on the computer screen. The graphic shows the muscle recruitment strength and duration of the voluntary muscle contraction, representing the muscle activity. At that moment, the patient is instructed on how to identify the sphincter function and to reproduce what was shown in real time on the computer screen.

This training is also performed with the patient in left lateral decubitus position and in front of the device display, so that the patient can immediately and clearly see the readings of contraction and relaxation pressures on the screen.

Several studies on biofeedback, using different methodologies, have reported improvement in objective indicators, including rest and contraction pressures, when comparing pre- and post-treatment values [67, 68, 69, 70, 71, 72]. Other studies have found positive results in subjective indicators, such as severity level of AI and quality of life [71, 9, 73] (Byrne, 2005; Yusuf, 2004; Bartlett, 2009) or in both objective and subjective indicators [56].

A non-randomized clinical trial on biofeedback combined with PFMEs was conducted in Rio de Janeiro (Brazil) with 38 patients, who were allocated to either the manometry group (n = 20) or digital guidance group (n = 18). For both groups, statistically significant increases in rest pressure and contraction pressure, as well as improvement in subjective indicators were found after 8 biofeedback sessions, when comparing pre- and post-treatment values [74].

Few clinical trials on the use of biofeedback as a conservative treatment in patients with AI can be found in the international literature. Despite the fact that this technique has been widely cited, studies have not properly described both the methods and evaluation criteria used.

3. Neuromuscular electrical stimulation

The conservative treatment of AI has recently included the use of neuromuscular electrical stimulation alone or in combination with other treatments in specific conditions.

3.1. Neuromuscular electrical stimulation of the pelvic floor

Neuromuscular electrical stimulation of the pelvic floor (NMESPV) is performed by applying electrical current to the pelvic floor muscle. Electrical stimulation using an excitomotor current provides muscle strengthening, hypertrophy, increased muscle tone, and perception of motor commands, increasing the patient's ability to contract the anal canal and defecate [75]. Functional electrical stimulation activates both sensory and motor axons [76].

NMESPV is mainly applied in the treatment of sphincter dysfunction and in the stimulated gracilis neosphincter operation [75]. The procedure is performed by placing two self-adhesive

transcutaneous surface electrodes on the perianal region or using endoanal probes. As technology has advanced, more comfortable surface electrodes have become available, either as skin or intra-anal plug devices with a battery box [77]. Electrical stimulation parameters, including pulse frequency, width, intensity, and on/off ratios should be properly set, because incorrect parameters may lead to fatigue and other damage [76].

The treatment is usually delivered in 2 to 3 weekly sessions, each of 20 to 40 minutes duration, varying according to the protocol, technique employed, and electrical parameters of the equipment used in the procedure. The mean length of treatment is about 3 months. At present, there is no experimental evidence upon which to select optimum electrical stimulation parameters for different symptoms and clinical conditions [76].

Contraindications for NESPV are pregnancy, use of a cardiac pacemaker, recent pelvic or abdominal surgery, hemorrhoids (in case of endo-anal electrical stimulation), radiotherapy to the pelvic region, denervation of the pelvic floor, and infection [78].

There are few studies in the literature on the application of electrical stimulation to the anal canal or perianal muscles for the treatment of FI. Electrical stimulation parameters vary among studies and the procedures are usually combined with those of other therapies.

Mergulhão (2004) [75] reported on the efficacy of anorectal neuromuscular electrical stimulation, alone or in combination with biofeedback, in the treatment of FI in multiparous women. In contrast, other authors suggested that the main effect of anorectal neuromuscular electrical stimulation is possibly not sphincter contraction, but sensitization of the patient to the anal area, or simply the effect of intervening *per se* (Mahony et al., 2004; Norton, Gibbs and Kamm, 2006) [79, 77]. Norton, Gibbs and Kamm (2006) [77] found no difference between results from electrical stimulation at 35Hz and 1Hz, and concluded that any effect may be sensory rather than direct muscle strengthening, or even a placebo effect.

A Cochrane review conducted by Hosker, Cody and Norton in 2007 [80] concluded that there was not enough evidence up to that date to judge whether electrical stimulation has a positive effect on the management of FI. Exercises and electrical stimulation may be more helpful than perineal exercises alone for women with FI after childbirth. On the other hand, a recent systematic review of 13 randomized trials on the use of feedback alone or in combination with electrical stimulation has shown that there is sufficient evidence that biofeedback combined with electrical stimulation is more efficient than biofeedback alone [81]. Thus, further studies are necessary to evaluate the use of NESPV alone or in combination of other therapies in the management of AI [80, 76].

Norton and colleagues (2009) [76] made the following recommendations for future investigations on the use electrical stimulation in the treatment of FI:

- Randomized controlled trials with adequate sample sizes are necessary to investigate all aspects of the effectiveness of electrical stimulation in FI
- The effect of electrical stimulation in changing the patient's awareness of the pelvic floor muscles is one of the interesting future areas for research

- A basic knowledge of electrical stimulation parameters and their likely physiological effects is essential when planning future research

3.2. Other types of electrical stimulation for the treatment of AI – Neuromodulation

3.2.1. Sacral Nerve Stimulation (SNS)

Sacral nerve stimulation (SNS) is an alternative technique for the treatment of AI. If conservative treatments fail, this is a minimally invasive technique that allows modulation of the nerves and muscles of the pelvic floor and hindgut [82, 83, 84]. SNS uses electrical stimulation applied to the sacral nerves, eliciting a physiological effect on the lower bowel, anal sphincter and pelvic floor, resulting in clinical benefit [82]. It involves inserting electrodes in the lower back and connecting them to a pulse generator. The electrical pulses affect the nerves controlling the lower part of the bowel and the anal sphincters [82, 83]. SNS application is usually safe and easy, with a limited rate of complications or adverse events. The surgical procedure is usually made under local anesthesia. Initially, a temporary lead is connected to a pulse generator outside the body. The SNS effectiveness can be reliably tested for a short period of time before the decision for a permanent implant [84]. If symptoms have improved enough, the temporary lead is replaced with a permanent one connecting the electrodes to a pulse generator implanted in the abdomen or buttock [83].

Mowatt, Glazener and Jarrett (2007) [83] conducted a Cochrane Review and concluded that there is very limited evidence suggesting that SNS can improve continence in selected people with fecal/anal incontinence. The authors also pointed out that temporary percutaneous stimulation for a two-to-three week period does not always successfully identify those for whom a permanent implant will be beneficial. Thus, good quality randomized crossover trials are needed to assess the effects of SNS on these conditions with more certainty.

3.2.2. Electrical stimulation of the posterior tibial nerve

Electrical stimulation of the posterior tibial nerve (ESPTN) has been used in the treatment of UI [85] (Schreiner, 2009) and has also been evaluated by some authors for the treatment of AI, with favorable results. ESPTN involves the reflexive stimulation of the posterior tibial nerve and may be performed by means of acupuncture, electroacupuncture, and transcutaneous electrical stimulation. It may be applied by transcutaneous electrical nerve stimulation (TENS) using electrodes placed in the region of the tibial nerve near the malleolar region. Although first described more than 20 years ago, the action mechanisms of ESPTN are not fully understood [86].

4. Final considerations

Both the academic and practical aspects of AI have been little investigated in Brazil and in the world.

In countries such as Brazil, whose population pyramid is expected to be inverted within the next 30 years due to an ever-increasing aging population, it is essential that programs for early diagnosis and prevention of chronic health conditions including incontinences and particularly AI be implemented.

Coloproctologists, wound, ostomy and continence nurses, and physiotherapists need to conduct studies to develop appropriate, cost-effective and evidence-based protocols for the treatment of AI, aimed at improving objective and subjective indicators, including quality of life.

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