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# Going for gold at the male pelvic floor Olympics

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**Abstract**
For men to achieve gold-standard pelvic floor muscle (PFM) fitness, they need to receive both maximal and submaximal muscle training, and develop the ability to recruit these muscles speedily. This paper discusses the deep and superficial male PFMs, the prevalence and types of urinary incontinence (UI), and the subjective and objective assessment of the pelvic floor. Those who may benefit from PFM training include men suffering from stress UI, urge UI, post-micturition dribble, faecal incontinence and/or erectile dysfunction.

*Keywords:* erectile dysfunction, men, pelvic floor muscles, pelvic floor muscle exercises, urinary incontinence.

## Introduction

### *To win gold*

Men should train their pelvic floor muscles (PFMs) using maximum effort to hypertrophy both their slow- and fast-twitch muscles. Training should include fast recruitment of these muscles in order to develop fast-twitch muscle fibres. Endurance training should be performed at a submaximal level. To be competitive, every maximal contraction should be stronger than the previous one performed. Men need to believe in their capabilities in order to "go for gold".

### *What muscles need training?*

In the male, the PFMs extend from the anterior to the posterior of the bony pelvis, forming a diaphragm covering the pelvic outlet that, along with the pelvic fascia, supports the urethrovesical system and rectum.

## Deep pelvic floor muscles

The male deep PFMs are shown in Fig. 1.

### *Levator ani*

The levator ani consists of the pubococcygeus and iliococcygeus muscles. Together with the ischiococcygeus muscle, these form a muscular diaphragm that supports the pelvic viscera and opposes the downward thrust caused by an increase in intra-abdominal pressure.


**Figure 1.** Deep pelvic floor muscles in men.

### *Pubococcygeus muscle*

The pubococcygeus muscle arises from the back of the pubic bone and the anterior part of the obturator fascia, and inserts into a fibromuscular layer between the anal canal and the coccyx.

### *Iliococcygeus muscle*

The iliococcygeus muscle arises from the ischial spine and the arcus tendineus of the pelvic fascia, and is attached to the coccyx and the median raphe of the perineum.

### *Ischiococcygeus muscle*

The ischiococcygeus arises from the pelvic surface of the ischial spine, and is inserted into the side of the coccyx and lower sacrum. It is responsible for pulling the coccyx forward after defecation.

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### *Puborectalis muscle*

The puborectalis muscle arises from the pelvic surface of the pubic bone, blends with the levator ani and is inserted into the muscle from the other side, posterior to the rectum, at the anorectal flexure. It can be considered part of the pubococcygeus muscle and helps maintain faecal continence by maintaining the anorectal angle.

### *External urethral sphincter*

The external striated urethral sphincter mechanism in the urethra surrounds the membranous urethra and lies deep to the urogenital diaphragm. The superficial muscle fibres arise from the transverse perineal ligament and surrounding fascia, and insert into the perineal body. The deep fibres form a continuous circular formation around the membranous urethra. The muscles from both sides come together to form a sphincter compressing the membranous urethra and assisting in the maintenance of urinary continence.

### *Anal sphincter*

The anal sphincter consists of elliptical muscle fibres on each side of the anal canal that are attached to the tip of the coccyx posteriorly and inserted into the perineal body anteriorly. Inferiorly, it blends with the skin surrounding the anus; superiorly, it forms a complete sphincter and blends with the puborectalis muscle. The anal sphincter is in a normal state of tonic contraction, but can provide greater occlusion of the anal aperture when needing to contain faeces and flatus.

## Superficial pelvic floor muscles

The male superficial PFMs are shown in Fig. 2.

### *Bulbocavernosus muscle*

The bulbocavernosus (also called the bulbospongiosus) muscle arises from the median raphe and the perineal body. The middle fibres encircle the bulb and corpus spongiosum of the penis. The middle fibres assist in erection of the corpus spongiosum penis by compressing the erectile tissue of the bulb. The anterior fibres spread out over the side of the corpus cavernosum and are attached to the fascia covering the dorsal vessels of the penis, contributing to erection by compressing the deep dorsal vein of the penis. The bulbocavernosus muscle empties the bulbar canal of the urethra. The fibres are relaxed during voiding and come into action to arrest micturition. Rhythmic contractions of the bulbocavernosus muscle propel the semen down the urethra, resulting in ejaculation.

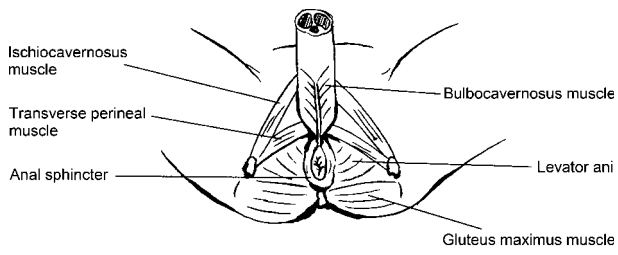


**Figure 2.** Superficial pelvic floor muscles in men.

### *Ischiocavernosus muscle*

The ischiocavernosus muscle arises from the inner surface of the ischial tuberosity and pubic ramus, and inserts into an aponeurosis in the sides and under the surface of the crus penis. Contractions of the ischiocavernosus muscle produce an increase in the intracavernous pressure and influence penile rigidity.

## Which men will benefit from pelvic floor training?

Men with stress urinary incontinence (UI), urge UI (UUI), post-micturition dribble, faecal incontinence and erectile dysfunction may benefit from PFM training.

## Prevalence of urinary incontinence

A large multi-centred trial by Glazener *et al.* (2011) found that 65% of men were incontinent of urine 6 weeks after a transurethral resection of the prostate (TURP). These authors also reported that 89% of men were incontinent of urine 6 weeks after radical prostatectomy. Preoperative erectile dysfunction rather than age or nerve-sparing is considered to be a predictor of post-prostatectomy incontinence (Wille *et al.* 2007).

## Types of urinary incontinence

Urge UI can be caused by infection, bladder cancer, bladder stones or idiopathic detrusor overactivity. It has been found that dysfunction of the prefrontal cortex or limbic (emotion) system can influence this condition (Griffiths & Tadic 2008).

Stress UI usually occurs after prostatectomy, but it can be caused by weak PFMs, especially in older men.

Post-micturition dribble occurs when the bulbocavernosus muscle fails to empty by reflex

action and the urine left in the U-shaped bulbar urethra dribbles out when walking away from the toilet.

## Assessment of the male pelvic floor

### *Subjective assessment*

The subjective assessment is based on the patient's account of his symptoms and should include questions relating to the following categories:

- the patient's age, occupation, hobbies and activities;
- the principal complaint and other symptoms;
- the duration and severity of symptoms;
- the amount of leakage;
- the frequency of leakage;
- the urine stop test (this question provides an opportunity to explain that this form of exercise can lead to retention of urine and counteracts the normal micturition reflexes, and therefore, should not be practised);
- bowel activity;
- diet;
- surgical history (e.g. dates of TURP, radical prostatectomy, abdominal surgery or spinal surgery);
- medical history (including prostatitis, diabetes, latex allergy, metal implants, medications, radiotherapy and neurological problems);
- previous treatment;
- body mass index;
- sexual problems (e.g. difficulty achieving or maintaining penile erection, or premature ejaculation);
- functional factors (e.g. mobility and dexterity);
- motivation; and
- medical investigations (e.g. urinalysis of midstream urine, uroflowmetry, ultrasound postvoid residual, blood test for prostate-specific antigen, urodynamics, cystoscopy, 24-h pad test and frequency–volume chart).

### *Objective assessment*

The objective assessment includes abdominal, perineal, neurological and digital anal examinations. The patient should be given an opportunity to be chaperoned by either a partner or friend, or a member of staff.

The assessment should always begin with an explanation of the reasons for a digital anal examination. It can be explained that it is necessary to know whether the muscles that help to control continence are working. Furthermore, the strength and endurance of these muscles can best be assessed by feeling them, the method of exercising can be checked and the correct amount of exercise can be prescribed. The skin sensation can also be checked. If the patient is unhappy about a digital anal examination, he may allow a perineal examination, but he should not be persuaded against his wishes.

Following this detailed explanation, the patient should give signed informed consent to the objective examination.

For this examination, the patient should be lying on his back with two pillows under his head. His knees should be bent and his feet should rest on the plinth (the crook-lying position). He should be without his underwear, but have a sheet or paper sheet over his pelvis. The patient may retain his sheath and drainage system if he has one.

*Abdominal examination.* In the crook-lying position, the abdomen is palpated for pain, masses that need referral and bladder distension, which may indicate retention as a result of detrusor underactivity or urethral blockage. It may be possible to palpate a ridge marking the extent of a full, hard bladder with retention. A hard, swollen abdomen may indicate a distended bladder and the need for immediate referral to a urologist.

*Perineal examination.* Initially, it is necessary to observe the pelvic area in the crook-lying position in order to check for congenital abnormalities such as hypospadias, in which the urethral meatus opens on the underside of the penis. At this stage, an enlarged testis, warts, haemorrhoids and tumours may be identified. The condition of the skin should be examined for evidence of redness, infection and excoriation in the penile, perineal, scrotal and anal areas.

The patient may then be asked to tighten his anus, as if to prevent wind escaping, while the anal wink is observed. Then he can be asked to tighten at the front, as if to prevent the flow of urine, and feel a scrotal lift and the base of the penis pull back toward the abdomen. After this, he is asked to give an unguarded cough, which may provide evidence of leakage. The patient is then requested to cough while he is tightening his PFMs to prevent leakage, which may provide evidence of urinary control.

The S4 dermatome can be tested by using a cotton wool ball or a gloved finger to stroke

gently either side of the anus and either side of the perineum while asking the patient if it feels the same on both sides. If there is neurological deficit, the S2 dermatome can be checked on the lateral surface of the buttock, lateral thigh, posterior calf and plantar heel, and the S3 dermatome can be assessed on the upper two-thirds of the inner surface of the thigh. If neurological impairment is suspected, the bulbocavernosus reflex can be tested during the digital anal examination. The patient should be warned in advance. Gentle pressure on the glans penis during this examination elicits an anal sphincter contraction unless there is neurological impairment.

*Digital anal examination.* The patient is placed in the crook-lying position. The therapist applies a gloved index finger, which should be amply covered with lubricating gel, to the anal meatus, allowing the patient to feel the gel. The patient is then asked to bear down on to the finger as if he is letting wind escape. While the patient is bearing down, the finger is inserted straight, in a cephalad direction (i.e. toward the head), with the finger pad toward the coccyx. The finger can then be introduced to a distance of 1–2 cm from the meatus, and the integrity and tone of the external anal sphincter can be felt. Any areas of pain should be noted.

With a lax anal sphincter, it may be possible to feel areas of scar tissue in the external part of the sphincter where there is no muscle contraction. The patient should be asked to contract his anus and hold for 5 s while the therapist grades the strength of the contraction and notes the duration of the hold. This can be repeated twice and then the ability to perform a fast contraction noted.

The examining finger can then be introduced to a distance of 3–4 cm from the meatus and the anterior pull of puborectalis gently felt. This muscle is then graded, as for any voluntary muscle in the body, on a seven-point (0–6) scale of muscle strength for both the duration of the hold and the ability to perform a fast contraction. From this digital anal examination, the anal sphincter and the puborectalis can then be assessed and recorded using the Modified Oxford Scale: (0) nil; (1) flicker; (2) weak; (3) moderate; (4) good; (5) strong; and (6) very strong (Dorey *et al.* 2009).

## Stress urinary incontinence

Stress UI in men may occur as a result of internal urethral sphincter damage following a prostatectomy. Physiotherapy treatment for this condition relies on a competent external urethral sphincter and the surrounding PFMs.

### *Pelvic floor muscle exercises for stress urinary incontinence*

Pelvic floor muscle exercises (PFMEs) should be patient-specific. The hold time in seconds is ascertained from the digital anal assessment. The rest time should exceed the hold time so as to allow muscle fibre recovery. There is no evidence for an optimum number of repeat contractions, but ongoing objective assessment will help to determine what is appropriate for each patient. The quality of contractions is more important than the quantity.

Exercises should be practised every day. A typical programme practised twice a day could be: three maximal contractions in the crook-lying position; three maximal contractions in a sitting position; and three maximal contractions when standing. The contractions can be held for up to 10 s, but this is only a guide. Some contractions can be activated quickly and others slowly. The patient can also be encouraged to lift his pelvic floor up to 50% of the maximum while walking, which will encourage the supporting role of the PFMs and increase endurance. Men can be taught ''the Knack'' of tightening the PFMs before and during activities that increase intra-abdominal pressure; for example, coughing, sneezing, rising from a seated position and lifting (Miller *et al.* 1996).

Advice on the amount and content of fluid intake should be given. Bladder output over a 24-h period should be about 1500 mL.

## Urge urinary incontinence

The filling symptoms of frequency, nocturia, urgency and UUI can be treated with PFMEs, urge suppression and advice on fluid intake.

### *Pelvic floor muscle exercises for urge urinary incontinence*

Pelvic floor muscle exercises can be used for UUI to strengthen the tone of the pelvic floor musculature.

There are several non-invasive techniques that, either singly or in combination, can improve the symptoms of frequency, nocturia, urgency and UUI. These include urge suppression, treating constipation, weight reduction, the adjustment of the type and timing of fluids, a review of medication (including diuretics), bowel

management, weight loss, smoking cessation (Haidinger *et al.* 2000), and treatment of urinary tract infection, all of which may improve symptoms.

Urge suppression is a method of consciously suppressing the urge to void. Strategies such as keeping calm and relaxing the abdominal muscles when the bladder is contracting slightly, signalling the need to void, can be accompanied by sitting on a hard surface or standing still while waiting for 1 min for the urge to disappear. Once the urge has abated, men can visit the bathroom. They should never dash mid-urge while the bladder is contracting.

For men with severe UUI, anticholinergic medication may be helpful while they are receiving conservative treatment. Side effects may include a dry mouth, drowsiness, constipation and vision accommodation difficulties.

## Post-micturition dribble

Contracting the PFMs after voiding urine while still poised over the toilet may facilitate a contraction of the bulbocavernosus muscle, which serves to eliminate urine from the bulbar portion of the urethra. Research has shown that PFMEs that include a strong post-void contraction are very effective in the treatment of post-micturition dribble (Dorey *et al.* 2004a).

## Post-prostatectomy research

Research shows that PFMEs undertaken before radical prostatectomy result in a significant improvement in urinary continence after surgery (Sueppel *et al.* 2001; Centemero *et al.* 2010). Van Kampen *et al.* (2000) reported that 95% of the participants in their study were continent 4 months after radical prostatectomy, and Filocamo *et al.* (2005) described a comparable figure of 94.6% at 6 months.

However, a large, multi-centred randomized controlled trial (RCT) showed no difference between a PFM training group and the controls 3 months after TURP and radical prostatectomy (Glazener *et al.* 2011). It should be noted that the men in the active group received only four PFME treatments (and some of them had fewer), some of the control group were given a list of PFMEs as part of their standard care (all the men knew about PFMEs, and those who were still incontinent may have gained knowledge from the Internet or other sources) and not all the therapists (i.e. physiotherapists and nurses) specialized in treating male incontinence.

## Pelvic floor muscle exercises for erectile dysfunction

In an RCT using a validated outcome measure, Dorey *et al.* (2004b) found that PFMEs were clinically effective for men with erectile dysfunction and this result was statistically significant. A urologist who was blinded to the subject groups found that 40% of the participants regained normal erectile function, a further 34.5% improved and only 25.5% failed to recover after 3 months of therapy and 3 months of home exercises.

If the activity of the ischiocavernosus muscle increases penile rigidity, then the weakening of the musculature caused by ageing could produce a decrease in penile rigidity and represent an important reason for erectile dysfunction. This concept sits well with the work of Colpi *et al.* (1999), who demonstrated that perineal muscle efficiency was decreased in older patients suffering from erectile dysfunction.

There appears to be no published literature on the use of preventive conservative treatment for erectile dysfunction. However, if the pelvic floor musculature is poor and PFMEs can be demonstrated to relieve erectile dysfunction, then it seems reasonable to suppose that preventive muscle strengthening may help to prevent erectile dysfunction. The adage ''use it or lose it'' very much applies to the pelvic floor musculature (Dorey 2004).

## Conclusions

The current evidence suggests that PFMEs are a realistic first-line conservative approach for the treatment of male UI. The same exercises can also be used as a first-line conservative approach for men with erectile dysfunction and there is a role for preventive PFMEs.

In order to achieve the gold standard, men should be advised to train their PFMs in the same way that Olympians train their voluntary muscles with maximal, submaximal and functional work.

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*She currently works as a consultant physiotherapist at the Nuffield Health Taunton Hospital, Taunton, and Queen's Medical Centre, Barnstaple. Grace runs male and female continence and sexual dysfunction study days for physiotherapists and nurses throughout the world. She has published 11 books and released three videos, and these are available via her website (www.yourpelvicfloor.co.uk).*

*In 2004, Grace was honoured with a Fellowship of the Chartered Society of Physiotherapy. She was made a Member of the Most Excellent Order of the British Empire in the Queen's 2012 New Years Honours List.*

 