

# Graded Exercises for the Pelvic Floor Muscles in the Treatment of Urinary Incontinence

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**Key words:** Pelvic floor exercises, urinary incontinence.

**Summary:** Pelvic floor exercises (PFE) have been shown to reduce the symptoms of genuine stress incontinence (Kegel, 1948; Shepherd, 1983). The muscles of the pelvic floor contain a mixture of slow twitch and fast twitch muscle fibres.

Exercise induced changes in slow twitch muscle fibres will require many repeated contractions, whereas fast twitch fibres are activated only with maximal effort. As the fast twitch fibres are recruited to maintain continence during sudden increases in abdominal pressure, eg coughing, sneezing, it seems appropriate to give fast twitch fibre exercises to patients with genuine stress incontinence (GSI).

This paper presents methods of fulfilling the above criteria; one using the resistance offered to the withdrawal of a vaginally located cuffed catheter, the second describing the use of weighted vaginal cones, whereby the muscles of the pelvic floor are contracted to prevent the cone 'falling out'. Both methods have been shown to be effective and acceptable to patients.

**Biography:** Josephine Laycock trained at the Bradford Hospitals School of Physiotherapy between 1959 and 1962, and is currently conducting research into the effects of interferential therapy and pelvic floor exercises on urinary incontinence as a postgraduate student of the University of Bradford, having first become interested in this work through the Association of Chartered Physiotherapists in Obstetrics and Gynaecology (ACPOG).

## Introduction

STRESS incontinence is the involuntary loss of urine when the pressure in the bladder exceeds maximal urethral pressure, in the absence of a detrusor contraction.

Methods of increasing urethral pressure will therefore promote continence. These methods include surgery, drug therapy, electrical stimulation and pelvic floor exercises. The urethral closure mechanism is strengthened, and the urethro-vesical junction (bladder neck) may be elevated into an area of transmitted pressure.

## Anatomy

The urethral closure mechanism consists of the intrinsic urethral sphincter and the periurethral muscles of the pelvic floor, mainly the pubococcygeus. This muscle consists of a heterogeneous mixture of slow and fast twitch muscle cells, innervated by the pudendal nerve (Gosling, 1979). Large diameter fibres form the bulk of this striated muscle, and a proportion are functionally of the fast twitch type, capable of rapid contraction, but only for short time periods. Consequently, the pubococcygeus reinforces the intrinsic urethral sphincter by increasing the urethral resistance during coughing, straining, etc. It also plays an important role in the forceful closure of the urethra, which occurs when micturition is voluntarily interrupted during the 'stop test' described by Gosling (1979).

From the literature it can be deduced that the effects of contraction of the pubococcygeus are to support, lengthen, and compress the urethra, and to elevate the urethro-vesical

junction into an area of transmitted abdominal pressure (De Lancey, 1986). Also, the detrusor nucleus in the sacral micturition centre is directly inhibited (McGuire, 1979), so pelvic floor exercises can be utilised in the management of detrusor instability. An increase in the tone of the pelvic floor muscles is said to raise the micturition threshold (Mahoney *et al*, 1977), and explains why patients report a decrease in frequency and urgency following a course of pelvic floor exercises.

## Aetiology of Pelvic Floor Weakness

Weakness of the pelvic floor is said to be a direct result of childbirth, where perineal descent leads to a pudendal nerve neuropathy (Snooks and Swash, 1985). Also, following the repair of a tear, or episiotomy, the patient will have a painful perineum. This causes inhibition of the muscle function similar to that often found in the quadriceps muscle immediately after meniscectomy. In many women, cortical control is lost during the puerperium, and may never be regained (Shepherd, 1983).

Age is associated with a decrease in fast twitch muscle fibres; also fast twitch fibre atrophy frequently occurs in patients who have been confined to bed, or who have been engaging in very limited physical activity (Rothstein, 1982).

## Re-education of the Pelvic Floor Muscles

When re-educating the pelvic floor muscles, attention must be paid to the different needs of fast and slow twitch muscle fibres. In any progressive contraction, slow twitch motor units are activated before fast twitch motor units. To train fast twitch muscle fibres requires maximum effort — either maximum tension or maximum speed. Exercise induced changes in slow twitch fibres will require many repeated contractions (Rothstein, 1982).

The aims of pelvic floor exercises are to increase the static tone and strengthen the rapid response of the levator ani, and will therefore include repetitive contractions and resisted exercises. The intrinsic urethral sphincter, innervated by the pelvic nerves, is said to be under the control of the central nervous system (Gosling, 1979), and its slow twitch striated muscle fibres should respond to the same repetitive exercises as the slow twitch fibres of the pubococcygeus, thereby further increasing the urethral resistance. Kegel (1948) recommended 300 contractions per day and the use of a perineometer twice daily; the same principles apply to-day, but the perineometer can be replaced by a less expensive means of providing resistance.

Patients are taught to contract their pelvic floor muscles and instructed to practise contractions a little and often, some quick one-second contractions, and some lasting up to ten seconds. These exercises should be performed during daily activities in standing, sitting and lying. The stop test described by Gosling (1979) is included, and patients are instructed to stop or slow down the flow of urine during every act of micturition. Stress exercises involving active pelvic floor contraction prior to any incontinence-provoking act, such as coughing, bending, etc, are taught and progressed, and confidence is increased with practice.

Digital evaluation of the pelvic floor muscle contraction is an essential part of the physiotherapy assessment, with suggested



grading as follows: nil=0; poor=1; fair=2; good=3; very good=4.

Isolation from abdominal, glutei, and adductor muscle contractions is important, as these may mask the pelvic floor contraction and fatigue the patient. Also, a strong abdominal contraction may irritate an unstable bladder.

Self-digital assessment should be encouraged, and the patient reassured that this is not a dirty habit and will do no harm. Resisted exercises for the pelvic floor muscles will invariably involve some invasive device, which will not be acceptable to all patients. However, the following techniques have been shown to be effective, and have high patient acceptance.

### Resisted Exercises for the Pelvic Floor Muscles

#### Method 1: Using an inflated cuffed catheter (fig 1)

Using a small quantity of KY jelly, or similar lubricant, an inflated cuffed catheter is inserted into the vagina, into the area where a tampon would be located. The patient is then instructed to tighten the pelvic floor muscles to prevent the withdrawal of the catheter by the therapist. Gentle traction is applied which stretches the pelvic floor muscles, and provides a sensory biofeedback to initiate their contraction. The procedure is repeated with varying amounts of traction, and the patient shown how to manipulate the catheter and give self-resistance. A second exercise involves maintaining the catheter in the vagina by contracting the pelvic floor muscles, during coughing, bending, lifting, etc. The catheter is washed with soap and water, and dried between practice sessions; a weekly soaking in disinfectant will help to avoid infection. The cuff can be inflated with air or water (5 ml to 30 ml), depending on the laxity of the vagina. The cheapest latex catheter costs 50p and this method should be suitable for hospital or community-based physiotherapists and nurses. A pilot study with volunteers carried out in this unit to assess the usefulness and acceptability of this technique gave the results shown in tables 1 and 2.

Ten volunteers (91%) claimed that this method increased their awareness of pelvic floor muscle action. Seven (77%) (excluding the patients) considered that the technique would be a useful adjunct to pelvic floor re-education, and 91% judged the method acceptable.

Careful patient selection is important when using an invasive technique requiring dexterity and cognisance.

Further work is required to evaluate the effect on the pelvic floor muscles and their effect on GSI.

#### Method 2: Using Femina cones (fig 2)

Plevnik (1985) has shown that women can be trained to contract their pelvic floor muscles in order to retain cones of increasing weight in the vagina. When a cone of the appropriate weight is inserted into the vagina, it tends to slip out. The feeling of 'losing the cone' provides a powerful sensory biofeedback, which makes the pelvic floor muscles contract around the cone to retain it. Resting muscle strength is assessed as the heaviest

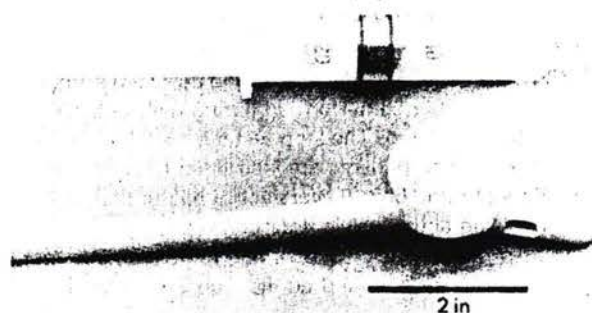


Fig 1: Inflated cuffed catheter for resisted pelvic floor exercises

Table 1: Characteristics of subjects (n = 11)

Average age: 34 (21 to 51)	
Occupation:	
physiotherapists	8
nurse	1
patients	2
Parity:	
nulliparous	6
para 1	1
para 2	3
para 3	1
Incidence of stress incontinence:	
never	5
very occasional	2
occasional	4

Very occasional = less than one per month

Occasional = more than one per month

Table 2: Results

Cuff filling medium	
Air preferred	2
Water preferred	8
No difference	1

cone retained in the vagina for one minute while walking.

Active pelvic muscle strength is considered as the weight of the heaviest cone that the patient can retain by contracting the pelvic floor muscles. Patients are assessed and given the appropriate cone with which to exercise. The next heaviest cone is given when the previous cone can be retained for ten minutes while walking. As muscle strength increases, there is less effect on fast twitch muscle fibres, as maximum effort is not required. However, the fast twitch fibres are again recruited when a heavier cone is used and resistance increased.

Cones are available in sets of nine, with weights varying from 20 g to 100 g.

A recent study by Stanton *et al* (1986) has shown this method to be effective in exercising the pelvic floor muscles, and reducing urine loss in women with stress incontinence.

Two ten-minute exercise sessions per day, using the cone or catheter, are recommended, with repetitive contractions practised during the day, as described earlier.

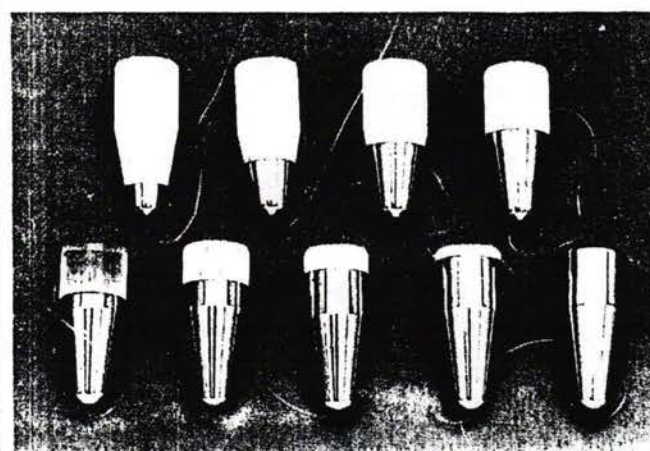


Fig 2: Femina cones for the testing and strengthening of pelvic floor muscles



Both these procedures teach the patient the appropriate muscles to contract, which is often the greatest hurdle in pelvic floor re-education. Shepherd (1983) reports that only 40% of women attending gynaecological clinics have voluntary control of the pelvic floor muscles. Inappropriate abdominal muscle contractions would serve to 'push' the catheter or cone out, and so these unwanted contractions can be more easily isolated and eliminated.

Whatever exercise regime is used, the completion of a daily or weekly diary will serve to remind the patient to exercise, and will provide a record of exercise sessions.

Patients can expect an improvement within two to twelve weeks, depending on the severity of symptoms.

### Conclusion

Stress incontinence can be treated by pelvic floor exercises aimed at increasing the urethral pressure and elevating the urethro-vesical junction into an area of transmitted abdominal pressure. In order to affect the fast and slow twitch muscle fibres, resisted exercises and repetitive exercises should be included. Resisted exercises can be given using the withdrawal of an inflated cuffed catheter, or weighted vaginal cones. A daily or weekly diary of exercise sessions acts as a reminder, and also as a record.

Suppliers: Femina Cones are available from ORMED Ltd, 32 Hyde Way, Welwyn Garden City, Hertfordshire AL7 3AW, price £95 plus VAT.

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## Periodical Review

This feature outlines the principal contents of newsletters and other publications issued by Occupational and Clinical Interest Groups and similar organisations.

### Association of Paediatric Chartered Physiotherapists Newsletter (quarterly)

Available from: Mrs J E Lamond, 22 Whernside Road, Cross Hill, Lancaster LA1 2TA, £2 per copy, cheques payable to APCP.

February 1987, no 42: *Child Abuse*

Child abuse: The work of the NSPCC	S J Creighton
Abused children	B Needham
The results of child abuse	A Milston
Health visitors and time abuse	Anon
The mechanics of care and protection	M Whitehead
Post-registration education report	P M Eckersley

### Journal of the Association of District and Superintendent Chartered Physiotherapists

Available from: Miss S D Collins, Abbey Building, Battle Hospital, Reading RG3 1AG.

Winter 1987, no 7

'In all labour there is profit'	M Stevens
Continuing education and training for health care within the NHS: Health link-up as a vehicle for meeting services needs and professional aspirations	C A Evans, J D Edmonstone
The wheelchair service and the McColl report	E Scott
Health education research project	P Lyne
Why do some patients do better than others?	C J Partridge
A summary of the history and development of the role of the physiotherapist in riding for the disabled	S Saywell
Clinical budgeting workshop (continued): The theory and application of management budgets	R L Hillman
An educational approach to solving management problems	J Allen
The certificate of health education: A force for attitude change	B M Edmunds
A case history: Introducing POMR!	J Mackintosh

### In Touch

Journal of the Organisation of Chartered Physiotherapists in Private Practice (quarterly)

Available from: Mrs M Briggs, Administrative Assistant, OCPPP, 50 Mannering Gardens, Westcliffe on Sea, Essex SS0 0BQ, £1 per copy including postage, cheques payable to OCPPP.

No 43, March/April 1986

Anterior knee pain in adolescents	D Wright
The Cyriax approach to the shoulder joint	S Saunders

### Physiotherapy in Sport

Journal of the Association of Chartered Physiotherapists in Sports Medicine

Available from: Mrs S Wilshaw MCSP, 12 Little Tufts, Capel St Mary, Ipswich, Suffolk LP9 2UD, £1 inland, £1.50 overseas, post free.

Volume X, no 1, Winter 1987

Personal experiences of injuries from running	B Webster
AIDS: An update on how AIDS affects sports people and physiotherapists	
Mental practice: An aid to performance — How the mind can be used to assist the body	J Whithead
Thermography as a diagnostic aid, how can it help	D P Paige-Thomas
The politics of athletics: 'Behind the scenes' views	M Turner

Volume X, no 2, June 1987

The acromio-clavicular joint and the 'painful arc'	J B Tracey
Effects of ice treatment	M A Harrison
Importance of pre-match routine in Rugby union	K Murphy
Muscle fatigue	I Francis
Physiological correlates of endurance and performance	E Winter
Ten years of Olympic physiotherapy	