Pelvic Floor Muscle Training for Women With Pelvic Organ Prolapse

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Aim

This aim of this article is to discuss the incidence, pathophysiology and risk factors associated with pelvic organ prolapse and also the evidence for pelvic floor muscle training as a conservative treatment.

Introduction

Pelvic organ prolapse (POP) is the downward displacement of the pelvic organs into the vagina, often accompanied by urinary, bowel, sexual or local pelvic symptoms (Thakar & Stanton, 2002). It is a complex, multifactorial, and dynamic condition. Prevalence has been reported to be 30–50% in parous women (Braekken et al, 2010; Nygaard et al, 2008) although the condition can be asymptomatic (Olsen et al, 1997). The lifetime risk for prolapse surgery is estimated to be 19% for women up to the age of 80 years (Smith et al, 2010). The rate of recurrence of POP after surgery is reported to be 41-58% (Miedel et al, 2009), with rates for further surgery estimated to be 10-29% (Miedel et al, 2009; Olsen et al, 1997).

Anatomy

The pelvic organs (bladder, urethra, uterus, vagina, rectum and anus) sit within the bony pelvis supported by a complex structure called the pelvic floor. The pelvic floor is a supportive mechanism composed of the levator ani muscles (LAM) and various types of connective tissue including tendons, ligaments, fascia, collagen and elastin fibres (Schwertner-Tiepelmann et al, 2012). Interactions between all these components of the pelvic floor create a near horizontal 'shelf' support for the pelvic organs.

Muscular support is provided at rest by tonic contractions of the LAM as well as the paired coccygeus muscles, the muscle activity changing with variations in posture, increased vaginal distension, and intra-abdominal pressures (Jones & Moalli, 2010). The LAM have the ability to contract quickly with any sudden increase in abdominal pressure resulting in the compression of upper vagina against these muscles, thereby maintaining pelvic organ support.

The endopelvic fascia connects the pelvic organs to the pelvic walls and is one continuous unit with various thickenings and condensations in specific areas of the pelvis. It is composed

of collagen fibres interlaced with elastin, smooth muscle cells, fibroblasts and vascular structures (Herschorn, 2004).

Further anatomical detail of the pelvic floor can be found in the Female Stress Urinary Incontinence protocol by Julia Herbert.

Pathophysiology of Pelvic Organ Prolapse

Damage to any component of the pelvic floor can lead to downward displacement of the pelvic organs towards the vaginal opening (Mantle et al, 2004). When structural defects or dysfunction occur within the pelvic floor, the vagina may become more vertical so that its shelf-like supportive quality is diminished. Any downward pressure then directs the vagina towards the pelvic openings through the natural gap in the pelvic floor muscles known as the levator hiatus. The vagina and PFMs are then susceptible to repeated stretch and the development of prolapse. It is important to note that the development of prolapse is multi-factorial; therefore the causes and progression of prolapse will vary between individuals (Jones & Moalli, 2010).

Causes of prolapse

Risk factors that can lead to the development of prolapse can be grouped as inciting, promoting, predisposing and decompensating factors as shown in Table 1 (Bump & Norton, 1988).

Table 1: Risk Factors for developing Pelvic Organ Prolapse

Incite	Promote	Predispose	Decompensate
Pregnancy and childbirth	Obesity	Genetics	Aging
Surgery for prolapse	Smoking	Race (> in Caucasians)	Menopause
Myopathy	Chronic coughing	Gender (> in females)	Myopathy
Neuropathy	Constipation		Neuropathy
	Heavy lifting		Medication
	Strenuous exercises		Debilitation
			Bump & Norton, 1988

It has been established that trauma to the pelvic floor muscles during childbirth increases the risk of POP (Dietz, 2012). Levator avulsion appears to double the risk of significant anterior (bladder) and central (uterus & vagina) compartment prolapse, with less effect on posterior (rectum & small intestine) compartment prolapse (Dietz & Simpson, 2008). Some women may be predisposed to prolapse by certain genetic disorders, as well as inherent connective tissue weakness or a family history of prolapse (Jia et al, 2008). An increased risk of

developing prolapse is posed by any chronic or repeated increase in intra-abdominal pressure (Bump & Norton, 1998) such as regular straining to pass a motion, heavy lifting, over training the abdominal muscles and frequent coughing due to a chronic lung disorder. Having hysterectomy has also been found to increase the risk of developing a prolapse (Hunskaar et al, 2005).

Classification of Pelvic Organ Prolapse

POP can be classified subjectively according to which vaginal compartment is affected, i.e. anterior, posterior, cervical or apical, vaginal vault (when the cervix has been removed) and uterine. The prolapse can be also graded in terms of stage as observed on examination i.e. mild, moderate or severe (Townsend, 2008). There is also an objective classification system (see Table 2) consisting of five stages (0-4) called the POP-Q (Bump et al, 1996), which uses fixed points within the vagina to assess the prolapse according to the position of the bulge or protrusion in relation to the vaginal opening.

Table 2: The Pelvic Organ Prolapse Quantification (POP-Q) system; a grading system for the severity or degree of genital prolapse based on the position of the most distal portion of the prolapse during the Valsalva manoeuvre.

Stage	Description
0	No prolapse
I	More than 1cm above the hymen
II	Within 1cm proximal or distal to the plane of the hymen
III	More than 1 cm below the plane of the hymen but protrudes no further than 2cm less than the total length of the vagina
IV	There is complete eversion of the vagina

Bump RC, Mattiasson A, Bo K, et al The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. Am J Obstet Gynecol. 1996 Jul;175(1):10-7

Symptoms of Pelvic Organ Prolapse

POP can cause many different symptoms but the most common and specific to prolapse is awareness of a vaginal bulge. However, some women with prolapse experience no symptoms or are not bothered by them. The severity of symptoms correlates poorly with the stage of prolapse found on examination (Hunskaar et al, 2005), meaning that a more advanced prolapse does not necessarily give rise to more severe symptoms while conversely

a relatively mild prolapse can cause very bothersome symptoms. Women may seek help because of the impact of their prolapse on relationships, body image, and daily activities.
Severity of symptoms may also differ according to activity and time of day (Jarvis et al, 2005). While certain symptoms are common to all types, for example the awareness of a vaginal bulge, a pelvic dragging sensation and low back ache, each specific prolapse can present with specific symptoms (Elkermann et al, 2001) according to which compartment of the vagina that is most affected. With an anterior vaginal wall (bladder) prolapse, symptoms such as urinary frequency, urinary urgency and recurrent infections are common. Symptoms that may be associated with a posterior vaginal wall (bowel) prolapse are difficulty emptying the bowel and a feeling of 'incomplete bowel empting' on defecation. Vaginal flatus, heaviness and difficulty using tampons, pain during intercourse or laxity, are some of the symptoms of a middle compartment (uterus and cervix) prolapse.

Treatment Options

The treatment options for POP include surgery or conservative management. The choice of treatment depends on the severity of the prolapse and its symptoms, and how it is affecting the quality of life of the woman. Conservative treatment is considered for women with a mild degree of prolapse (stage 1 or ll), for those who wish to have more children, are frail or are unwilling to undergo surgery. Conservative management can be further categorised into 3 approaches (Hagen et al, 2009) as follows:-

1. Lifestyle interventions which seek to avoid exacerbation of the prolapse by decreasing intra-abdominal pressure (e.g. weight loss and avoiding heavy lifting)
2. Mechanical interventions which aim to manage the prolapse by supporting the pelvic area (e.g. using vaginal pessaries)
3. Physical therapy interventions which aim to improve pelvic floor muscle function via pelvic floor muscle training (PFMT)

Lifestyle interventions

This will usually involve advice about avoiding constipation, straining, heavy lifting, being overweight, unsuitable exercise (see further details later) and the management of respiratory conditions to avoid excessive coughing. Further detailed individual advice should be sought from a healthcare professional such as a GP, practice nurse, specialist nurse or specialist physiotherapist.

Mechanical interventions

This typically means having a vaginal pessary fitted under the care of a GP or consultant although the fitting may be carried out by a specialist nurse or physiotherapist. Pessary treatment is well described at http://www.aafp.org/afp/2000/0501/p2719.html.

Current evidence for the effectiveness of physiotherapy for POP

The preventive role of PFMT

As yet there has been no research to prove that PFMT can prevent prolapse but a there is a growing body of evidence demonstrating the close relationship between poor pelvic floor muscle function and the presence of POP.

Rationale for PFMT in the treatment of POP

There have been positive results from five randomised controlled trials (RCTs), including the recent POPPY trial in the UK (Hagen et al, 2009), providing good quality evidence for the effectiveness of PFMT in the treatment of prolapse (Piya-Anant et al, 2003; Hagen et al, 2009; Ghroubi et al, 2008; Braekken et al, 2009; Braekken et al, 2010).

Women with POP tend to have thinner, lengthened pelvic floor muscles (PFMs) with reduced strength, reduced endurance and an enlarged levator hiatus. Consequently, the pelvic organs sit in a relatively lower position and the muscles are less able to elevate them (Nygaard et al, 2008; Delancey et al, 2007). These problems can all be improved by PFMT (Braekken et al, 2010). An effective pelvic floor muscle contraction will create an upwards and forward lift and will also narrow the levator hiatus (Thompson & O'Sullivan, 2003; Braekken et al, 2008). Training the muscles will increase strength and endurance and bring about positive changes to the percentage of collagen and muscle fibres making up the internal architecture of the muscles (Balmforth et al, 2004). Research has shown that after training, the pelvic organs are elevated and the levator hiatus is narrowed, even when the muscles are in their resting position, giving increased support for the organs (Braekken et al, 2010). Improvement of the prolapse itself has been demonstrated by reversal of POP-Q stage as well as reduced bladder and bowel symptoms (Stupp et al, 2009).

Principles of PFMT for POP

It is generally recognised that PFMT needs to be part of a program that is individually tailored to the needs of the woman. Ideally this program should be formulated after examination and assessment by a physiotherapist specialising in pelvic floor rehabilitation. The program should be intensive providing adequate time for each training session and a

sufficient number of sessions within a realistic timeframe. Research using strength training principles from sports science suggests that PFM exercises should be performed in 3 sets of 8-12 repetitions per day over a period of 6 months to achieve significant results. Sticking to the program can be a challenge therefore supervision and some form of measurement to monitor progress is usually advantageous (Braekken et al, 2010; Hagen et al, 2009; Hagen & Stark, 2011).

The following principles are important for success of the PFMT program:
(Schwertner-Tiepelmann et al, 2012)

- Finding the muscles and feeling the contraction. This may not be easy for some women but is essential for the success of the training program (Stupp et al, 2009).

- The muscle contraction needs to be ***effective.*** The direction of contraction should be upwards and forwards with the ability both to resist downward movement of the pelvic organs and as well as to draw the pelvic floor muscles around the levator hiatus in order to reduce its diameter (Bo et al 2001; Slieker-Ten Hove et al, 2009).

- Endurance: muscles need to build up endurance to be able to maintain support through the day.

- Co-ordination: this is required for effective and subconscious co-ordination with other muscles during any normal activity that raises the intra-abdominal pressure e.g. during a lift or cough.

- Tone: pelvic floor muscles need to be able to maintain tone constantly to support pelvic organs.

- Relaxation: the muscles need to be able to release tension between contractions and also need to be able to relax to allow passage of urine and faeces.

- Fast contractions: the muscles need to have the ability to contract quickly and suddenly with any increase of IAP e.g. a sneeze, in order to minimize the risk of leakage or prolapse.

- The Knack: a fast and effective contraction before any action involving lifting, bending, pushing, pulling, or coughing should be practiced.

Using Verity Medical equipment for PFMT

Biofeedback EMG and electrical stimulation can be very helpful in applying some of these PFMT principles and are often used by pelvic floor rehabilitation specialists alongside other skills for assessment, treatment and monitoring.

EMG Biofeedback

Biofeedback as a tool for neuromuscular re-education is useful for the following:

- enhancing awareness of the PFMs and the quality of contraction

- endurance training
- coordination and timing
- as part of a strengthening program to increase muscular stiffness and support

Neuromuscular electrical stimulation (NMES)

Electrical stimulation of the PFMs can be used to simulate an effective contraction. This increases awareness of the muscles, helping the individual to 'find' the muscle and appreciate the feeling of a PFM contraction. This can be used in combination with EMG biofeedback to enhance the re-education process. This is particularly useful for very weak muscles where the unaided contraction can be difficult to feel.

Please refer to the protocol 'Female urinary stress incontinence' by Julia Herbert on this website for detailed instruction about using NeuroTrac devices for PFMT.

PFMT and Fitness Exercise: General Exercise Advice for Women

PFMT should be integral to any general fitness or other exercise program to enable women to exercise safely. Women with PFM weakness should be encouraged to exercise but in ways that are not detrimental to the muscles and the structures in the pelvis that support the pelvic organs. Repeated pressure brought about by the lifestyle factors mentioned earlier may result in a floppy, stretched or weakened pelvic floor that would be further compromised by certain types of exercise. In addition, not all exercise equipment and popular exercise routines are suitable for the early post natal or mature female pelvic floor which may be vulnerable and susceptible to injury. Childbirth and menopause in particular bring about changes in the body that should be respected and allowed for. This may mean adapting exercise programs to avoid damage.

However, women ***without*** pelvic floor weakness may also be vulnerable. Impaired dynamic (or core) stability in the lower spine, pelvis, hip and abdominal muscles make women susceptible to increased intra-abdominal pressure and downward movement of the bladder during physical activity, lifting and shifting position (Dunbar & Wheeler, 2007). Therefore, PFMT is vital for maintaining a healthy and supportive pelvic floor and it is never too late to start.

Exercises to Avoid and Recommended Exercises (Kenway, 2012)

Abdominal Exercises: Women are often concerned about the appearance of the abdominal wall or 'tummy' and try to improve it with vigorous abdominal exercise programs. Over-

training or inappropriate abdominal training is a common mistake that poses a risk to the pelvic floor and may cause the development of prolapse.

The innermost layer of the abdominal muscles wraps around the body like a corset and can flatten the appearance of the tummy when in good condition. When weak and floppy it does not provide adequate support. This can occur after pregnancy, childbirth, or surgery and can be due to poor posture or being overweight. This inner layer of abdominal muscles is designed to work ***gently*** for long periods and therefore that is how they should be trained.

On the other hand the tummy muscles can be overactive and used too strongly e.g. during violent vomiting, chronic coughing, heavy lifting and over-training with 'sit ups' or 'crunchies'. This can create an excessive downward pressure that threatens to overpower the pelvic floor, especially if the PFMs are already weak. Some points for safe abdominal exercises are:

- Bracing and overloading should be avoided
- Breathe out along with the effort rather than hold the breath
- Low impact aerobic exercise is recommended
- Choose supported positions for using weights and don't spread the feet apart
- Recommended exercises when well executed include the squat, lunge, bridge, calf raise, low row and chest press
- Certain exercises should be modified (usually by using the knees for support) in the presence of weak PFMs such as the plank, hover and push up.

The following abdominal exercises should be avoided:
abdominals crunchies or curls , abdominal curl machines, oblique sit-ups, ball sit-ups, twisting crunchies, incline sit-ups, double leg raise, bicycle legs, hanging knee raise (Kenway & Goh, 2009).

Conclusion

There is evolving positive evidence regarding the effects of pelvic floor muscle training on pelvic organ prolapse and associated symptoms. Patients who decide to choose conservative management should be offered encouragement and support and should be informed that the success of this approach involves considerable time commitment and compliance. Since the causes of pelvic organ prolapse are multi-factorial, it is advisable to modify the risk factors

that promote pelvic organ prolapse in conjunction with pelvic floor muscle training and other conservative measures.

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