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Assessment of the anal sphincter muscle: Comparison of a digital and a manometric technique☆

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Abstract

Objectives To determine if there is a relationship between digital anal use of the modified Oxford Scale for assessment of anal sphincter muscle strength and anal manometric assessment.
Design A prospective, correlational, within-subject design, using two different techniques, in random order, at the same session.
Setting The physiotherapy outpatient department of a district general hospital.
Participants Seventy subjects (57 females) with a mean age of 56.3 years. All were attending for physiotherapy treatment of pelvic floor dysfunction.
Interventions Subjects carried out three consecutive pelvic floor muscle contractions each, for digital assessment and for manometric assessment.
Main outcome measures The relationship between the median of the three digital and the mean of the three manometric measurements was examined using the Spearman rank correlation coefficient.
Results There was a low, positive correlation between the median of the digital scores and the mean of the manometric pressures ($r_s = 0.33$, $P < 0.005$).
Conclusions This study poses questions about the use of the modified Oxford Scale for assessment of the anal sphincter muscle. Issues include the subject's body mass index and the probe design. The quality of anal resting tone, though crucial to its function, is not addressed by the modified Oxford Scale. Further work is needed to develop a robust method of anal sphincter assessment.

Keywords: Digital assessment; Anal sphincter; Pelvic floor dysfunction

Introduction

The modified Oxford Scale (MOS), devised for vaginal assessment of the pelvic floor muscles, has shown strong correlation with vaginal manometric (pressure) measurement. It has also been described for digital anal assessment, but no studies have been found comparing its use with anal manometry.

Pelvic floor dysfunction in women and men includes urinary and anal incontinence, genital prolapse and constipation. It can have a major impact upon an individual's quality of life [1]. There is a wide variation in the literature on prevalence in both sexes because of differences in definitions and study design; approximate prevalence percentages are summarised in Table 1.

Many factors have an influence on pelvic floor dysfunction. Prevalence of incontinence increases with age in both men and women [6]. Stress urinary incontinence is predominant in younger women, with urge and mixed urinary incontinence more common in older women [7]. High body mass index (BMI) has been implicated in faecal [8] and in urinary [9,10] incontinence in both sexes, as well as prolapse in both women [11] and men [12].

Surgical interventions are available as treatment for pelvic floor dysfunction, but they are costly and have variable rates of success. Over time, their benefits can deteriorate

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Table 1
Prevalence of pelvic floor dysfunction

Reference source	Condition	Setting	Prevalence
Perry (UK) [2]	Urinary incontinence	Community	14% female; 5% male
Nelson *et al.* (USA) [3]	Anal incontinence	Community	2.2% (of which, 63% female)
Chiarelli (Australia) [4]	Constipation	Community	3 to 17% female; 1 to 8% male
Glowacki and Wall (USA) [5]	Genitourinary prolapse	Community	50% of parous females

and symptoms can recur [13]. Because of these limitations, there is interest in the development of conservative treatments [14], including pelvic floor muscle exercises [15] with or without biofeedback [16]. Biofeedback can display a computer-generated image of any change of manometric or electromyographic activity around a vaginal or anal probe, allowing patients to monitor their efforts when contracting or relaxing the pelvic floor muscles. Examination of the pelvic floor muscles is a key part of the initial assessment of patients with pelvic floor dysfunction [17,18] in order to monitor progress and determine the outcome measure at conclusion of conservative therapy [19–21].

Anatomy

The anatomy and morphology of the pelvic floor is beyond the scope of this paper and is well described in other texts [22]. Its superficial position makes it easily palpable at the 30–40 mm depth of an examining finger both per vagina and per rectum (Fig. 1.).

The anal sphincter is 20–40 mm long and is shorter in women than in men [23]. The internal anal sphincter is smooth, involuntary muscle and is responsible for 75–85% of the resting tone. The external anal sphincter is striated muscle, contributes approximately 25% of the resting tone and contains a majority of Type I (slow twitch) fibres, suited to maintaining constant tone over time [24]. Recent advances in imaging have shown the structure of the anal sphincter in three dimensions.

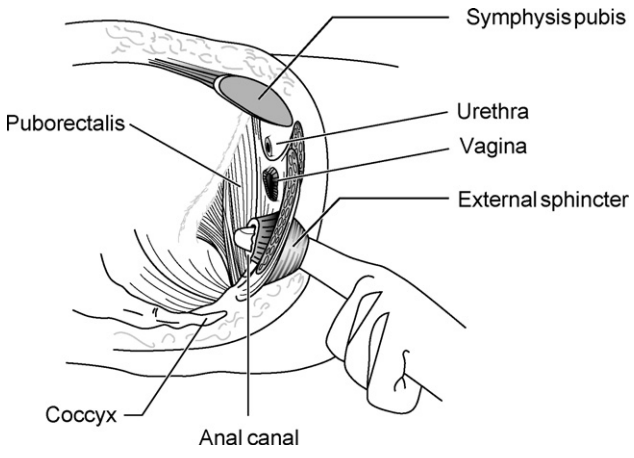

Fig. 1. Median sagittal section of the pelvis, showing examining finger in the anal canal.

This muscle is thinner anteriorly in women [25] and is funnel shaped [26]. Vectormanometry displays a three-dimensional pressure profile of the anal canal and can accurately measure the area of highest mean resting pressure. When compared with an asymptomatic group, the area of highest mean resting pressure is more proximally located in the anal canal in incontinent subjects [27]. This can adversely affect the pressure gradient between the proximal and distal anal canal, compromising continence.

Digital assessment

The MOS was described by Laycock in 1992 [28] and later validated by Laycock and Jerwood [29] to assess the strength and endurance of a pelvic floor muscle contraction, using digital vaginal examination. In their study, digital grading was compared with manometric readings using a bespoke, vaginal perineometer. The digital grading was found to be reproducible and reliable. The study was robust in its sample size ($n = 233$) and spectrum of subjects. The results showed strong correlation between the two methods ($r = 0.79$, $P < 0.001$) for measurement of muscle strength. The MOS method of assessment has become widely used by clinicians in the field, as a simple technique that needs no specialised equipment. Two further studies have compared this scale with vaginal manometry [30,31]. Both established an association between the two methods. The scale was used for vaginal assessment of the pelvic floor muscles in an inter-tester reliability study and showed a high percentage of agreement between clinicians who had appropriate training [32].

The scale has also been described for use in digital anal examination [20,33], but to date no study has been found to either support or refute this. An earlier correlational study of anal manometry with a different digital scale found a low correlation ($r_s = 0.44$, $P < 0.05$) [34].

Since evidence-based practice requires evaluation of all the methods used to determine the value and effectiveness of physiotherapy interventions [35], the purpose of the present study was to compare the MOS when used for anal examination with an anal pressure measurement. Manometry was used rather than electromyography to allow comparison with the original study [29]. In addition, electromyography is considered to be an indication of bioelectrical activity in the muscle, rather than a true measurement of muscle strength [36]. The aim of the study was to establish any relationship between digital and manometric assessment.