505

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OVERACTIVE PELVIC FLOOR MUSCLES (OPFM): IMPROVING DIAGNOSTIC ACCURACY WITH CLINICAL EXAMINATION AND FUNCTIONAL STUDIES

Hypothesis / aims of study
To review the current terminology and diagnostic criteria of overactive pelvic floor muscles (OPFM), and identify its functional correlation with cystoscopic and fluoroscopic urodynamic studies (FUDS) including urethral pressure measurements.

Study design, materials and methods
Patients refractory to conservative therapy including bladder retraining, medications and pelvic muscle exercises for a variety of storage and voiding disorders were evaluated. Data from 174 consecutive patients, who underwent flexible cystoscopy and FUDS between 1 January 2014 and 31 August 2015 were extracted. Using pelvic floor tenderness as a key distinguishing examination feature for OPFM, a comparative analysis was performed for patients with and without the examination finding. Factors studied included history of lower urinary tract symptoms, voiding patterns, physical examination, cystoscopic findings, functional studies (bladder compliance, maximum urethral closing pressure (MUCP) measurement, detrusor opening pressure) and fluoroscopic imaging during filling and voiding.

Results
Of the 174 patients recruited, 81 patients were diagnosed with OPFM based on clinical presentation and presence of pelvic floor tenderness on examination. Statistical methods used for analysis were the Chi squared test and Student T test for means. Younger women appeared to be affected more commonly, with the presence of pelvic floor tenderness occurring at the mean age of 50 compared to those without at the age of 58 ($p= 0.004$). Those with pelvic floor tenderness also suffer from a higher incidence of recurrent UTI, 59% versus 41% ($p= 0.006$), and symptoms of pelvic pain, 81% versus 19% ($p<0.001$).
Significant objective differences were also noted between the 2 groups of patients on functional studies with FUDS and urethral pressure measurement. Subjects with pelvic floor tenderness were found to have a higher MUCP at 95.4 cmH2O compared to 81.1 cmH2O ($p=0.007$). Differences were also noted in the detrusor opening pressure, with a mean of 22.6 cmH2O in individuals with pelvic floor tenderness versus 27 cmH2O in those without ($p=0.026$).
No statistical differences were seen between the 2 groups with regards to incidence of urgency urinary incontinence ($p= 0.089$), non-bacterial cystitis ($p=0.201$), stress incontinence ($p=0.78$) and post-void residuals ($p=0.08$).

Interpretation of results
In this study, maximum urethral closing pressure (MUCP) during filling and detrusor opening pressure during voiding observed during FUDS provided objective differences in patients with OPFM compared to patients with other functional lower urinary tract problems. We have found that patients with OPFM have a significantly higher MUCP and lower detrusor opening pressure. The systematic use of these functional studies and cystoscopy in the evaluation of OPFM allows the clinician to rapidly rule out other disorders of the bladder neck (e.g. bladder neck obstruction, detrusor sphincter dyssynergia) and storage disorders such as poor bladder compliance, symptoms of which may be identical.
OPFM implies a physical state of heightened activity within the pelvic floor muscles. Diagnostic criteria for this condition are being developed. Muscle tone or tension is measured by the change in resistance or force per unit change in length. Clinically, the tone of pelvic floor is assessed by palpation as the resistance is felt when passive stretch is applied to the muscles [1]. Normal contraction refers to contractile activity that occurs in a partially relaxed muscle, but can be controlled voluntarily, or due to reflex activation. On the other hand, muscle spasm is defined as an abnormal or involuntary contraction. The relationships between the different sources of muscle tone (active and passive), and their relative contribution of different elements of OPFM remain under investigation. In select cases, one element of OPFM may trigger another element in a sequential pattern. For example, a persistent lack of muscle relaxation may lead to involuntary muscle contraction. This may develop further into a pelvic pain syndrome, involving taut bands and trigger points [2]. The pain associated with non-relaxing muscles may be caused by the shearing forces between the muscle fibres or muscle ischemia due to persistent compression of its own blood vessels.
Early recognition of OPFM allows earlier tailored intervention for patients. Emphasis on pelvic floor muscle awareness and relaxation exercises, and/or manual stretches, down-training and trigger point release techniques can be incorporated into physiotherapy [3]. For patients undergoing surgery for stress incontinence, the identification of concomitant OPFM and early physiotherapy may reduce risks of post-operative voiding difficulties.
When OPFM and poor bladder compliance co-exist, OPFM may be the driving factor. As such, combination therapy with pelvic floor relaxation and pharmaceuticals (anticholinergics/ Botox injections) may yield better results than medications alone. Sexual dysfunction such as dyspareunia caused by OPFM may also be amenable to physiotherapy.

Concluding message
Our study has shown that there are distinct characteristics of OPFM on clinical examination and functional studies. In patients refractory to conservative treatments we have found specific urodynamics tests to be useful in sub-categorising patients. When OPFM is diagnosed, the impact on patient management is significant, and targeted intervention with pelvic floor physiotherapy is central in the multimodal approach of this complex condition.

References
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Disclosures
Funding: NONE **Clinical Trial:** No **Subjects:** HUMAN **Ethics not Req'd:** it was a retrospective study on de-identified patients. Data that had previously been collected as part of routine clinical care was used for the purposes of this study. Given that this is a retrospective study, there is no deviation from the usual standard of care provided to patients **Helsinki:** Yes **Informed Consent:** No