Posture – It's A Pain
Speaker Notes

Dr. Christopher McCarthy

Literature on sub-classifying low back pain will be discussed with the results of a national study using cluster analysis to identify clinical subgroups

Non-Specific Low Back Pain (NSLBP) accounts for over 85% of all Low Back Pain diagnoses. Homogenous subgroups of patient presentation may exist within this heterogeneous condition. This study evaluated a typical physiotherapy clinical examination's item reliability and ability to identify homogenous subgroups of patients with NSLBP.

There is a body of evidence suggesting that targeting treatment to subgroups of patients with NSLBP is more effective than not adopting this strategy of management. Importantly, valid subgroups of NSLBP are yet to be fully established. This work evaluated the contribution that a typical physiotherapy examination made to identifying subgroups of NSLBP.

Three hundred and one patients with NSLBP, referred from primary and secondary care, were examined by 54 physiotherapists. The study was undertaken in 27 physiotherapy departments across the UK. The sample of patients demonstrated moderate disability and pain. The physiotherapists were experienced (average years since qualification 13) and the majority had post-graduate qualifications.

Patients were examined by physiotherapists using a standardised clinical examination, developed using a Delphi consensus technique. Each patient was examined by two physiotherapists, to allow an inter-tester reliability study to be conducted. Only the items with acceptable reliability were then entered into the next stage of analysis. Data were then analysed for the presence of distinct subgroups using k-means cluster analysis. Clusters identified by the first rater were then compared with the clusters identified by the second rater in a cross validation technique.

Clinical examination items were analysed for agreement using kappa coefficients and weighted kappa coefficients for ordinal data. 95% C.I.s were calculated. K-means cluster analysis was conducted to examine for between 2 and 5 potential clusters. Agreement in the numbers of clusters identified in rater one and rater two's data was assessed using kappa coefficients.

The inter-tester reliability of the majority of items was moderate to substantial (52% of items with kappa > 0.40). A k-means cluster analysis of the two data sets revealed substantial agreement on the presence of two subgroups (k = 0.63). One group (n=47, 16%) had higher fear avoidance beliefs related to physical activity, sensory pain, anxiety and disability. They were more likely to be provoked by, and avoidant of, pain provocative tests. They were also more likely to be judged as having central sensitisation and a dominant psychosocial component to their pain presentation. Tests that highly predicted membership of the hypervigilant group included the presence of allodynia whilst a negative straight leg raise reduced the probability of membership of this group significantly.

The identification of a group of hypervigilant NSLBP patients should allow the development of effective interventions, targeted specifically towards this group. A valid, standardised clinical examination does make a contribution to the diagnostic management of NSLBP. However, considerable numbers of tests and questions did not contribute to the discrimination of any subgroups of NSLBP.

Posture – It's A Pain
Speaker Notes

Professor Stuart McGill
Low back disorders – dispelling the myths

What really causes low back injury? Why may only one individual become injured among a group of workers performing an identical job? How is it that a person can perform a physically demanding job all day and then "throw their back out" at night picking up a pencil? Why do some exercise based rehabilitative approaches works with some patients yet exacerbate others? We have all experienced injury of various sorts throughout our lives, but why do we become injured at all – and why do some not recover? The purpose of this lecture is to introduce some biomechanical concepts of low back injury to be directed towards developing better injury risk reduction strategies together with how they may be employed to enhance rehabilitative outcome.

Success in parlaying spine biomechanics into successful clinical treatment depends on four parts – which forms this lecture. Part one is a brief review of the injury mechanisms of individual tissues of the low back, and the second section describes injury pathogenesis and injury scenarios. Mechanically based provocative testing of patients forms the next part to identify exacerbators of pain and motions and loads to be avoided. The final component is to quantify the mechanical demands of various exercises and match them to the tolerable capabilities, and rehabilitation objectives, of each patient.

Many low back exercise programs are based on the philosophy to enhance the range of motion and build strength. Yet following this approach sometimes leads to the creation of more patients and/or current patients are exacerbated. Because spine instability both causes incidents which lead to tissue damage and is a consequence of damage, stabilization exercises have become popular. While many have claimed that "stabilization exercises" were employed in their study one must wonder – how did they know the exercises were actually stabilizing? How did they know the spine needed a stabilization approach at the outset? Why are some patients cured while others fail? Examples of a progression of exercises will be justified across the continuum from rehabilitation to high performance using evidence from analysis of stability, motor patterns, spine loads and performance enhancement and framed within continual patient assessment.

Sources:

McGill, S.M. Low back disorders: Evidence based prevention and rehabilitation, Human Kinetics Publishers, Champaign, IL, U.S.A., 2002. ISBN 0-7360-4241-5

McGill, S.M. Ultimate back fitness and performance, Wabuno Publishers, Waterloo, Canada, 2006. ISBN 0-9736018-0-4 (www.backfitpro.com).

Posture – It's A Pain
Speaker Notes

Professor Mark Tagoe
The unstable ankle

Pain and instability of the foot and ankle is a frequent presentation in musculoskeletal departments. It often affects the individual's quality of life, and remains a significant factor in the "down time" experienced by athletes as a result of injury.

The acquired flat foot frequently presents with an insidious onset. Patients often alter their behaviour to accommodate the pathology. In many cases loss of alignment and secondary changes are well established before the patient seeks advice. In contrast laterally ankle instability normally follows an acute inversion, plantar flexion injury. Patient's frequently seek advice and are treated with rest, ice, compression and elevation. A proportion of these individuals develop chronic symptoms with residual pain, instability and reduced function.

This lecture hopes to impart to the audience the clinical features of both conditions. The ability to differentiate between the benign presentation and one that requires further review. The anatomical structures that impart support and stability will be outlined, along with the appropriate investigations required to determine the degree of pathology. The subsequent treatment algorithms will be discussed with emphasis placed on the surgical management.

Posture – It's A Pain
Speaker Notes

Dr Roderic MacDonald

Imagining better body use - 25 years of training the trainers

At the London College of Osteopathic Medicine, forty years ago, the doctors being trained there in osteopathy began to be given the opportunity to learn methods of patient education based on the work of F M Alexander.

Today this training continues. The *Principle* laid down by Alexander is accepted: this concerns both the potential for *Mis-Use of the Self* to be a cause of illness and the nature of the changes necessary for a remedy. His refusal to split the *Self* into body and mind is acknowledged as anticipating by fifty years the popular movement towards holistic models of health.

The *Technique* that bears his name and is practised worldwide is not taught at the LCOM : the method presented is aimed at busy NHS practice, or as an adjunct to other modalities, and involves a strong input of visualization by the patient to bring about change.

Functional brain imaging has revealed that the majority of cortical activity proceeding the generation of the motor pattern of an action is indistinguishable from that occurring when the action is visualized without it being performed. This overlap between the processes of volition and visualization has encouraged an approach whereby it is the imagination of the patient, rather than the practitioner's hands, that moulds and guides the actions of the *Self* .

Frequent repetition of corrective movements by the patient is required to achieve proprioceptive pattern recognition abilities (termed by Alexander *Reliable Sensory Appreciation*) that enable changes in *Use* to be maintained.

While empirical evidence is scanty, the methods are based on a rational utilitarian concept of minimizing the forces in, and work done by the musculoskeletal system. Most of the concepts and methods developed by Janda that inform current physiotherapy are entirely consistent with this approach.

However technique is not directed to individual muscle groups: their improved function is expected as adaptation to changed central control of the region of which they are components.

Once conscious improved *Use* is achieved, associative learning methods are employed to alter unconscious use including habitual patterns of response that may predispose to pain and impairment and are often emotionally triggered.

POSTURE - IT'S A PAIN, 2 DECEMBER 2006
POSTER PRESENTATIONS - MONARCH SUITE FOYER

POSTER NUMBER: 1

TITLE: Effect of different upright sitting postures on spinal-pelvic curvature and activity muscles in a pain-free population

AUTHOR(S): Dr. Peter O' Sullivan, Dr Wim Dankaerts, Dr. Angus Burnett, Garreth Farrell, Evie Jefford, Clare Naylor, Kieran O' Sullivan.
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Department of Rehabilitation Sciences and Physiotherapy, Ghent University Ghent, Belgium.

ABSTRACT

Study Design. A normative within-subjects single group study.
Objective. To compare spinal-pelvic curvature and trunk muscle activation in 2 upright sitting postures ("thoracic" and "lumbo-pelvic") and slump sitting in a painfree population.
Summary of Background Data. Clinical observations suggest that both upright and slump sitting postures can exacerbate low back pain. Little research has investigated the effects of different upright sitting postures on trunk muscle activation.
Methods. Spinal-pelvic curvature and surface electromyography of 6 trunk muscles were measured bilaterally in 2 upright (thoracic and lumbo-pelvic) sitting postures and slump sitting in 22 subjects.
Results. Thoracic, compared to lumbo-pelvic, upright sitting showed significantly higher thoracic extension (*P* _ 0.001), with significantly less lumbar extension (*P* _ 0.001) and anterior pelvic tilt (*P* _ 0.03). Furthermore, there was significantly less superficial lumbar multifidus (*P* _ 0.001) and internal oblique (*P* _ 0.03) activity, with significantly higher thoracic erector spinae (*P* _ 0.001) and external oblique (*P* _ 0.04) activity in thoracic upright sitting. There was no significant difference in superficial lumbar multifidus activity between thoracic upright and slump sitting.
Conclusions. Different upright sitting postures resulted in altered trunk muscle activation. Thoracic when compared to lumbo-pelvic upright sitting involved less coactivation of the local spinal muscles, with greater coactivation of the global muscles. These results highlight the importance of postural training specificity when the aim
is to activate the lumbo-pelvic stabilizing muscles in subjects with back pain.
Key words: trunk muscles, electromyography, lumbar
spine, sitting posture.

POSTER NUMBER: 2

TITLE: The effect of core stability training on the spinal-pelvic stability during running and on the single leg-hop-for-distance perfornance test in female runners

AUTHOR(S): L Sheeran, V Sparkes, Physiotherapy Department, School of Healthcare Studies, Heath Park, Cardiff University, Cardiff CF14 4XN

Background: Spinal-pelvic stability is described as the ability of the spinal-pelvic complex to prevent buckling and to return to equilibrium after perturbation (Pope and Panjabi,1985). Spinal-pelvic stability during locomotion is achieved by coordinated and timed activity of the spinal-pelvic-hip musculature (Nadler et al, 2000). The inability of the spinal-pelvic complex to resist the perturbations manifests itself in increased pelvic and spinal angular displacements, linked to a characteristic lower limb mal-alignment and injury (Ireland, 2002). Core stability training (CST) that includes abdominal, paraspinal and gluteal muscle strengthening, is therefore performed to improve proximal stability, prevent injury and enhance performance.

Objective: To determine whether CST has any effect on spinal-pelvic stability (spinal and pelvic angular perturbations control) during commonly executed athletic task such as running. Also, the study aimed to establish whether CST has any effect on single leg support performance test.

Method: Group of thirty five female runners, matched for weight, height and training status, were divided into CST group (n=16) and control group (n=20). CST group undertook 6-week long training that included abdominal, paraspinal and gluteal muscle strengthening as well as standing, walking, lunging and running drills with focus on maintaining neutral spine position. A frontal plane pelvic obliquity (PO) and spinal side flexion (SSF) during stance phase of running was measured using Matlab two-dimensional motion analysis system. Single leg hop-for-distance (SLHD) was performance outcome measure. A reliability study was also carried out to assess the intra-rater and test re-test reliability of the Matlab two-dimensional motion analysis system.

Results: Matlab system demonstrated a high intra-rater and test re-test reliability in measuring PO (r=.990; r=.960 respectively) and SSF (r=.974; r=.982 respectively). The CST programme led to a reduction in SSF ($p \leq 0.05$) and PO ($p \leq 0.05$) in the training group. The subjects in the training group also demonstrated improvements in SLHD ($p \leq 0.05$). The correlation analysis showed however, that the improvements in SLHD performance test were unrelated to the improvements in spinal-pelvic stability (reduction in PO and SSF).

Conclusion: Improvements in the spinal-pelvic stability and the horizontal motion performance can be achieved by CST and could potentially provide a focus for future rehabilitation programmes. Based on the links betw een reduced spinal-pelvic stability, leg mal-alignment and injury (Leetun et al, 2004), the demonstrated improvements in spinal-pelvic stability may warrant its possible use in maximization of movement efficiency that may potentially prevent injuries in female runners.

References:

1. Ireland M. L. (2002) The female ACL: why is it more prone to injury? *Orthopedic Clinics of North America* 33: 637-651
2. Leetun D. T., Ireland M. L., Willson J. D. et al (2004) Core stability measures as risk factors for lower extremity injury in athletes. *Medicine and Science in Sports and Exercise* 36(6): 926-934
3. Nadler S. F., Malanga G. A., De Prince M. et al (2000) The relationship between lower extremity injury, low back pain and hip muscle strength in male and female collegiate athletes. *Clinical Journal of Sport Medicine* 10: 89-97
4. Pope M.H. and Panjabi M (1985) Biomechanical definitions of spinal instability. *Spine* 10: 255-256

POSTER NUMBER: 3

TITLE: What constitutes a normal trunk muscle response to a sudden lower limb perturbation?

AUTHOR(S): T M Bennett; Directorate of Rehabilitation Sciences, St Mary's College,Twickenham,TW1 4SX T M Bennett and P Greenhaff; Queens Medical Centre Campus, Nottingham University, Nottingham, NG7 2UH

OBJECTIVE: A considerable amount of research has focused on trunk muscle motor responses demonstrated in healthy individuals during upper and lower limb movements. With the aim of gaining greater understanding of how these responses may differ to individuals with low back pathologies. This research has normally chosen to focus on the evaluation of trunk muscle onset during limb movements consciously controlled and initiated by the test subjects. As yet little is known about how the trunk responds to a sudden unexpected lower limb perturbation of external origin. This study attempted to determine the onset of trunk muscle activity exhibited during such a perturbation.
METHOD: Nine asymptomatic male participants without a history of low back pain (LBP) (21.7 ± 3.2 yrs). All subjects were exposed to three sudden lower limb perturbations. Throughout each trial onset of trunk muscle activity of Transversus Abdominus (TvA), Obliques Internus (OI),Obliques Externus (OE), Rectus Abdominus (RA) and Multifidus (MU) was measured using surface EMG (sEMG) with onset determined via a computer derived algorithm. Ethical approval for testing was obtained from the ethics committee of St Mary's College.
results: In healthy subjects a sudden lower limb perturbation resulted in sEMG activation of TrA/OI (-18 ± 8 ms); OE (-20 ± 2ms) and RA (-17 ± 8ms) in advance of activity of the prime mover, activity of MU occurred (9 ± 21 ms) after the prime mover.
CONCLUSION: Subject data from this study adds to the growing evidence highlighting that in healthy individuals rapid movements are proceeded by increased activity in muscles of the trunk (prior to or shortly after) in a feedforward manner, possibly to minimize the postural disturbance caused by impeding limb movements (Friedli et al, 1994; Bouisset and Zattara, 1987; Lee et al, 1987). The finding that OE was the first muscle active in response to an unexpected perturbation although not statistically different to the onset of TrA/IO is a novel finding to this study. It is the consensus within the literature that the main functions attributed to OE are contra lateral trunk rotation, ipsilateral side flexion and trunk flexion alongside both RA and OI. The findings of the current study propose a secondary role for OE in stability when the body is exposed to a sudden lower limb perturbation of external origin.

POSTER NUMBER: 4

TITLE: Development of an observation index: To assess quality of walking of people with chronic pain

AUTHOR(S): J Clarke, Professor C. Eccleston, R Passingham
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Rheumatic Diseases FT NHS Trust, Bath, BA1 1RL

Introduction
This study aimed to develop a walking assessment index to identify and quantify characteristics of movement that reflect movement quality alterations or avoidance behaviours in chronic pain sufferers.

Method
Expert opinion and literature search generated 11 items. 56 patients attending the Bath Pain Management unit were videotaped performing a two minute timed walk test. Videotapes were observed and coded by two senior physiotherapists.

Intra and inter rater reliability analyses were examined by calculating chance corrected kappa scores, leading to revision of the index. Finally psychometric qualities were investigated including internal consistency, concurrent and construct validity.

Results and Conclusion
3 items did not demonstrate adequate intra rater reliability (kappa < 0.6) and were discarded. Overall Cronbach's coefficient alpha (0.72) was adequate. Validity analyses demonstrated that higher walking quality was moderately associated with lower disability (sickness impact profile total score) r = 0.41, larger walking distances (two minute timed walk) r = -0.62 and higher numbers of sit to stands (one minute repeated sit to stand) r = -0.50, at a significance level of $p < 0.01$.

This index demonstrated promising psychometric qualities, is the first of its kind, and warrants further development.

POSTER NUMBER: 5
Also to be presented as a short oral presentation at 14.40

TITLE: The diagnosis, assessment and management of trochanteric bursitis - literature review

AUTHOR(S): Chris Shannon OStJ MSc MCSP Clinical Lead Physiotherapist, City Health Clinic, Peterborough, Cambs, PE1 5DU
Angela Clough MCSP MSc FSOM, Director of Sport and Undergraduate Rehabilitation, Faculty of Science, University of Hull
Debbie Cox MCSP MSc Extended Scope Physiotherapist, Accident & Emergency Dept, Sunderland

Introduction
The prime objective of this study was to review current literature from 1966 onwards with a view to defining available evidence for the assessment and management of trochanteric bursitis.

Trochanteric bursitis (TB), also described as greater trochanteric pain syndrome (GTPS), has been cited as one of the most common causes of pelvic and hip pain. This condition is one of the most common regional pain syndromes, often confusing, difficult to differentiate, and often overlooked as a cause of hip and pelvic pain (Karpinski 1985; Little 1979, Schapira 1986).

Method and Results
The author, using search terms trochanteric bursitis and greater trochanteric pain syndrome, carried out a literature search for English Language publications from the following databases; Allied and Complementary Medicine - 1985 to date, British Nursing Index - 1994 to date, CINAHL - 1982 to date, EMBASE - 1974 to date, and MEDLINE - 1966 to date. The search revealed 98 related articles, 33 being relevant to the subject; information from 2 articles prior to 1966 and 4 books were also included in the review.

Conclusion
The main conclusions were
1. A significant number of authors preferred the term greater trochanteric pain syndrome, justified on the basis of the co-existence of other trochanteric structures being affected.

2. Evidence of gluteal tendon pathology in cases of TB is a continuing theme in the literature and further consideration needs to be given to diagnosis.

3. Radiographic examination for simple TB is not considered to be of real value, MRI or bone scan are recommended in intractable cases.

4. GTPS/TB is characterised by a diffuse, dull aching pain over the lateral aspect of the hip and thigh. This review identified 3 specific indicators for the diagnosis of GTPS:

- Specific and marked tenderness over the greater trochanter on palpation, care being taken to palpate the opposite greater trochanter, posterior and anterior iliac spines.
- Pain elicited on passive flexion, abduction and external rotation. A positive Patrick Test strengthens the diagnostic criteria for GTPS, however, this test can also be indicative of other conditions.

- A positive response to injection therapy either with anaesthetic alone or a corticosteroid/anaesthetic mix.

5. The treatment of choice for TB/GTPS is injection therapy, (Shbeeb et al, 1996) however, corticosteroid/anaesthetic dosage appears arbitrary and further research is necessary.

References

Karpinski MRK, Piggott H. Greater trochanteric pain syndrome. *JBJS 1985*; 67-B (5): 762-763.

Little H. Trochanteric bursitis: a common cause of pelvic girdle pain. Can Med Assoc J 1979; 120: 456-458.

Schapira D, Nahir M, Scharf Y. Trochanteric bursitis: A common clinical problem. Arch Phys Med Rehabil 1986; 67: 815-817.

Shbeeb MI, O'Duffy J, Clement J, Michet J, O'Fallon, Matteson E. Evaluation of glucocorticosteroid injection for treatment of trochanteric bursitis. J Rheumatol 1996; 23: 2104-2106.