The Mulligan Concept Teachers Association

Present

2nd International Mulligan Concept Conference
Porto, Portugal - June 11-14, 2011

with

Brian Mulligan, F.N.Z.S.P. (Hon.), Dip. M.T

Key Note Speakers

Dr Bill Vicenzino, PhD, MSc, Grad Dip Sports Physiotherapy, BPhty

Dr Darren A. Rivett, PhD, BAppSc, MAppSc

Dr Toby Hall, PhD, MSc, GDMT, FACP, MCTA

Dr Wayne Hing, PhD, MSc, ADP, Dip MT, MCTA

Dr Jeremy Lewis, MAPA, MCSP, MMACP, MMPA

Mark Oliver, Dip Physio, Dip Manip Therapy, Grad Dip Manip Physio, MSc

Conference Committee

Dr. Wayne Hing, Dr. Toby Hall, Francisco Neto
Welcome to
the 2nd International Mulligan Concept Conference

It is my pleasure to welcome you all to our 2nd International Conference here in Porto.

The work in mounting such an event is enormous and stressful especially in harsh economic times.

Francisco Neto, Toby Hall and Wayne Hing have been incredible and to see so many people here today is wonderful.

My MCTA teaching colleagues have been truly busy teaching our concepts and more countries have been added to lists where courses have been run.

I have run introductory courses since our last conference in different countries which were well received (of course) but I must mention Denmark where I taught for the first time. Our Danish teacher Joseph Andersen has made quite an impact and we had a huge class. Francisco Neto in Portugal and has successfully launched teaching programs in not only in his country but Spain and France and participant numbers are growing in Israel due to the efforts of Yuval David. These three valuable colleagues joined the MCTA’s teaching ranks last year.

This year Elseviers published “Mobilisations with Movement, the art and the science.”

Authors were Bill Vicenzino, Wayne Hing, Darren Rivett, and Toby Hall (all PhDs). In a forward Dr Gwen Jull wrote “What is appreciated and valuable in this text, is the authors’ balanced approach between the science and the art and their determination to advance the field.”
This will be a worthwhile asset in every library.

In a message of welcome for our last conference I mentioned how I was asked to run a course for specialist medical practitioners. This was a first for me. At the time of writing (11\textsuperscript{th} May 2011) I should mention that I am off to Beijing next week to run a program for Chinese Surgeons. I am thrilled to have a chance to show what we can do with our approach to the medical profession.

In the USA I lecture on our concepts and share the podium with a Dr Kevin Wilk who would arguably be the best sports rehabilitation therapist in the US. We run a two day program and have about 100 participants each time. Kevin’s presentation is power point and mine is basically treating patients showing colleagues what we can do. The feedback is wonderful. Patients are filmed and we are building up a substantial library. Proof???

I look forward to talking with as many of you as possible over our three days together.

Enjoy and learn from our conference

Thank you for being here.
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2ND INTERNATIONAL MULLIGAN CONCEPT CONFERENCE  
Porto, Portugal - 11th-14th June 2011
PRECONFERENCE COURSE
“A DAY WITH BRIAN MULLIGAN”
INTRODUCTION to Mulligan Concept

“Mobilisation with Movement”. (MWM)
A simple definition of a ‘Mobilisation with Movement” is: The sustained repositioning of one articular surface on its partner with a movement or function.
We always now, when teaching our MWM techniques begin with the acronym “PILL.” When MWMS are applied as an assessment they will tell you immediately they are indicated as a treatment when they have a “PILL" effect.
“PILL" effect?
P.....Pain free:
There will be no pain felt by the patient with the sustained mobilisation (repositioning) and there will be no pain with the movement taking place.
I....Immediate result:
There will be an immediate improvement in the function being undertaken.
L....Long
L....Lasting: The improvement gained must be long lasting.
If you do not get the PILL effect, MWMs are not indicated. There is no exception to this rule. However having said that, the good result obtained at the time of delivery may not be retained due to the patient not complying with activity advice given. Because MWMS are never used as a treatment when you do not get the PILL effect one could never be criticised for teaching them and because they are pain free they are safe. This is important in countries where litigation is a thriving industry.
To correctly reposition joint surfaces you need excellent handling skills and knowledge. It is helpful here to remember the acronym “CROCKS”

C...Contraindications:
MWMS are a form of manual therapy and thus the contraindications that apply to manual therapy apply to MWMs.
R...Repetitions:
If on applying an MWM it has the desired PILL effect then you would repeat the technique several times. With extremity joints you can apply up to three sets of ten (use common sense). With spinal joints it is often prudent to just do three repetitions on day one as sometimes after any form of manual therapy the patient can get a latent reaction.

**O...Overpressure:**
To get the maximum benefit from an MWM you need to apply overpressure. This of course is passive and may be applied by the therapist, patient or a third party.

**C...Communication with patient:**
The patient must know what you are doing and why you are doing it. You need their cooperation to ensure success. They must for instance tell you immediately if they feel any discomfort. I would not treat a patient that I could not communicate with. You might need an interpreter.

**S... Sense:**
You must be able to sense the movement you are undertaking. This means you need good handling skills. Another sense is common sense and when handling patients this may include a “sixth sense”.

**....Sustain:**
When you reposition joint surfaces, maintain that correction throughout the movement. Start to finish. (Rfluxing!)

Today they can be used successfully on all parts of the body. I believe that the sustained mobilisation corrects minor positional faults. These faults are so insignificant that they are rarely palpable or visible on x-ray. The big exception to this is the shoulder girdle where the scapula can be visibly seen to be sitting irregularly when compared with the other side*. In a study by three American authors they found x-ray evidence of Fibular positional faults in patients with chronic instability of the ankle and there have been other articles published on this subject.

**Proof.**
On our webpage [www.bmulligan.com](http://www.bmulligan.com) you will see a list of references. These are articles that support what we are doing. From that list you will
see that we now have evidence based support for our treatment of headaches, ankle sprains, dizziness and tennis elbow. Much is in the pipeline and you will hear about this from our keynote speakers. In the latest April 09 issue of “Manual Therapy” is an article that is not yet in our reference list titled “Displacement of the head of the humerus while performing “mobilisation with movements’ in the glenohumeral joint”.

K.y. Ho.A.-T. Hsu. The authors found that an anterior-posterior MWM technique during passive abduction was effective in changing the kinematical characteristics of the glenohumeral joint in a cadaver.

**PRINCIPLES OF MWM TREATMENT**

1. During assessment the therapist will identify one or more objective signs, such as “comparable signs” as described by Maitland. These signs may be: a loss of joint movement, pain associated with movement, or pain associated with specific functional activities.

2. A passive accessory joint mobilization is applied following the principles of Kaltenborn (i.e. parallel or perpendicular to the joint plane).

3. The therapist must continuously monitor the patient’s reaction to ensure no pain is recreated. Utilizing his/her knowledge of joint arthrology, a well-developed sense of tissue tension and clinical reasoning, the therapist investigates various combinations of glides to find the correct treatment plane and grade of mobilization.

4. While sustaining the accessory glide, the patient is requested to perform the objective sign, which should now be significantly improved.

5. The application of overpressure at the end of available range is necessary for lasting improvement.

6. The patient typically undertakes 3 sets of 10 pain-free repetitions of the previously provocative movement to promote lasting improvement.

7. Failure to improve the objective sign would indicate that the therapist has not found the correct treatment plane, grade or direction of mobilization, spinal segment or that the technique is not indicated.
Mobilizations with Movement (MWM)

Mobilizations with movement in the peripheral joints are also the simultaneous combination of accessory gliding techniques and physiological movements.

**Indications:** restricted and/or painful movement

**Guidelines:**
- Produce NO PAIN – search for direction
- Expect immediate alteration in range of motion
- Use minimum force necessary
- Sustain mobilization without restricting movement
- Perform repetitions
- Apply overpressure
- Teach self-MWMS
- Tape to sustain positional correction

*If symptoms remain unchanged after MWM, it could be due to:*
- Improper technique application, try changing mobilization direction, force or location
- Incorrect joint selection (i.e. shoulder MWM vs. C4 SMWAM)
- Incorrect spinal level
- Poor handling skills
- Poor communication with the patient
- Technique is not indicated
- Local discomfort (distinguished from “their pain”) which may be relieved by using a foam pad

**UPPER QUARTER TECHNIQUES**

1. Shoulder *(6th ed text page 83)*
   A. Manual Technique with elevation
      **Indications:** painful arc, or painful and/or restricted flexion or abduction.
      **Contact:** stabilize scapula, thenar eminence of other hand over the medial head of the humerus (avoid coracoid process).
      **Direction:** posterolateral, possibly slightly inferior glide.
      **Movement:** Perform repetitions with weight (e.g., punching) or overpressure.
      **Variations:** supine for flexion and abduction.
Shoulder References:


B. Belt MWM
- **Indications:** painful arc, or painful and/or restricted flexion or abduction
- **Contact:** stabilize scapula hand inside the belt, other hand holds belt in place.
- **Direction:** posterolateral, and slightly inferior glide (perpendicular to scaption plane.
- **Movement:** perform repetitions with weight (e.g., punching)
2. Shoulder Girdle MWM  (*6th ed text page 89*)

**Position:** sitting with PT standing on the pain-free side.

**Contact:** Reach across and place your hand on the patient’s scapula. Your thenar eminence should lie along the distal spine of the scapula. Your other hand lies over the medial clavicle (hypothenar aspect).

**Glide:** Approximate the scapula on the chest wall giving counter pressure with your other hand on the clavicle. You also rotate the distal scapula downwards and move it caudally and medially. Some variations may be needed here.

**Movement:** The patient is now asked to raise the arm.
3. Acromioclavicular Joint (6th ed text page 123)

Position: Patient standing with PT standing on opposite side
Contact: Push down and back on distal end of clavicle
Movement: Active movement in the provocative direction 2-3 sets of ten
*Note: The sternoclavicular joint can be similarly mobilized proximally.
Alternate Mob: Stand behind and pull with fingers (see second picture next page)

AC MWM

1st Alternate AC MWM

AC Jt. Second Alternate Technique

Indication: top of shoulder pain with abduction not cleared with other AC MWM.
Position: Patient sitting with PT standing behind
Contact: Ulnar border of hand on outer clavicle with other hand reinforcing.
Direction: Inferior/anterior glide of clavicle
Movement: Vigorous active elevation x 2-3 repetitions
SNAGs are Sustained Natural Apophyseal Glides – pain-free spinal manual therapy treatment techniques involving concurrent accessory joint gliding and active physiological movement, with overpressure at end-range.

A. Rotation
Indications: e.g. painful and/or limited C5/6 rotation right.
Position: Pt sitting upright with head in neutral.
Contact: medial border distal phalanx of right thumb on articular pillar, left thumb contacts other side of right thumb to provide the mobilization force.
Glide: up toward the right eyeball in the plane of the facet.
Movement: patient rotates right and provides overpressure with hand on cheek while PT maintains glide through the entire movement.

B. Extension
Indications: painful and/or limited extension.
Position: pt sitting upright with head in neutral.
Contact: medial border distal phalanx of one thumb on SP, other
thumb contacts other side of thumb to provide the mobilization force.

**Glide**: up centrally toward the eyeballs in the plane of the facets. **Movement**: patient extends while PT maintains glide through the entire movement.

**Cervical References**:


5. MWM for Cervical / Thoracic Spine  

**Indications:** painful/limited cervical rotation, sidebend, flexion, extension or quadrants.

**Example:** (C5/C6) left rotation

**Contact:** tip left thumb left side of C5 SP lateral to muscles, right thumb right side of C6 SP lateral to muscle bulk.

**Glide:** transverse glides C5 to right, C6 to left.

**Movement:** pt rotates left and gives overpressure on cheek

6. Spinal Mobilization with Arm Movement (SMWAM)

**Indications:** arm pain with UE movement of spinal origin

**Example:** C4 R Abd  
(for limited/symptomatic right shoulder abduction)

**Contact:** medial border left thumb right side of C4 SP lateral to muscles

**Glide:** transverse glide to left pressing soft tissue into side of SP, effectively causing a right rotation of C4
Variation: can be used with neural tension positions.

Neural tension median nerve

Neural tension ulnar nerve

Spinal Mobilization with Movement References:

7. Thoracic Spine SNAGs (6th ed text page 48-49)
Position: patient straddles bed, back to PT
Contact: hypothenar eminence just distal to pisiform on spinous process or transverse process as indicated with elbow of mobilizing hand caudal and tucked in to PT side. Other arm wrapped around front of trunk above the level to be mobilized with hand on opposite scapula.
Glide: mobilize cranially by PT coming up from partial squat while pt performs provocative movement (flexion, extension, rotation or sidebending). Add end of range overpressure using anterior arm (superior to the mobilizing hand)
LOWER QUARTER TECHNIQUES

HIP TECHNIQUES

8. Tight hamstrings
For this technique to work it is necessary that the ‘patient’ can raise their straight leg to at least 40 degrees. We have been able, using this procedure, to improve the status of ‘patients’ who have failed to respond markedly to other forms of stretching. Let us assume we have a patient who has right hamstring stiffness. The ‘patient’ is supine on a very low bed or on the floor and you stand facing his right side. You get him to actively raise his leg without your assistance and you both note the range. You now grasp his lower leg proximal to the ankle joint and raise it off the bed to a position just short of the ‘painful’ range. (A comfortable way to secure the leg is to place the back of the leg in the fold of your bent elbow and secure it with your other hand. Flex your knees and hold the clasped leg to your chest. When you extend your knees this will effectively apply a longitudinal traction to the leg provided the bed is low enough and you are tall enough. Sustain this traction and undertake a straight leg raise as far as it will go provided there is no pain. If there is pain you may find that it disappears if you slightly rotate or abduct the hip as you raise the leg. When pain free, stretch with traction three times and watch as the patient reassesses his movement. There should be smiles all round. When successful you may on subsequent visits do more than three repetitions. To stretch with traction painlessly in this manner must surely defy the textbook rationale already mentioned. Remember that the technique is only part of the therapy.
Observers have noted, that many patients with recurring low back pain appear to have tight hamstrings. Try a straight leg raise (SLR) with
traction, and you may be surprised at the rapid increase in the range of movement. You would never get the same result with a conventional hamstring stretch. I often see patients who present with a chronic “hamstring strain”. The SLR is reduced and when you use the SLR with traction technique the problem is resolved in just a few treatments. This procedure is so effective that I believe it could enhance the performance of athletes such as hurlers if applied before they perform.

9. **Tight rectus femoris (hip flexors) or positive femoral nerve test**

Let us assume the ‘patient’ has a tight rectus femoris (or positive femoral nerve sign?) on the right side. The 'patient’ lies on his left side on the plinth. The right knee is flexed. You stand near the end of the bed behind the ‘patient’. Grasp the right thigh just above the bent knee with the loop of the treatment belt around your hands securing your grip. The belt is in a figure of eight. The loop at the other end of the belt is around your body. An assistant is necessary to stabilise the pelvis. You now lean back and apply a distraction to the leg. The belt around your hands tightens as you apply traction. It makes the traction effortlessness for you and comfortable for the ‘patient’ as the pressure around the thigh is evenly distributed. You extend the hip provided the ‘patient’ feels no pain. Your body controls the amount of knee flexion. Repeat the stretch three times and reassess. As you extend the hip the patient tends to rotate and thus the need for an assistant. Please try this. It can be really effective. The technique can also be applied with the ‘patient’ prone and knee flexed. A belt can be used to fixate the pelvis. The ‘patient’ lies prone well down the plinth. The right knee is flexed. You stand at the foot of the bed. You place a looped treatment belt around your waist. Now make a figure of eight
with the belt and grasp the right thigh just above the bent knee with the loop of the treatment belt around your hands securing your grip. The loop at the other end of the belt is around your body. An assistant is necessary to stabilise the pelvis or a belt may be used to secure the pelvis to the plinth. Now lean back and apply a distraction to the leg. The belt around your hands tightens as you lean back. It makes the traction effortless for you and comfortable for the ‘patient’ as the pressure around the thigh is evenly distributed. You raise the leg from the bed (extend the hip) provided the ‘patient’ feels no pain. Your body controls the amount of knee flexion. Repeat the stretch three times and reassess. As you extend the hip the ‘patient’ tends to rotate and thus the need for an assistant or extra belt.

10. **Tight adductors or chronic adductor strain**
Yes traction with an adductor stretch can astonish you, the ‘patient’, and when I am teaching, the participants with what can be achieved. If the ‘patient’ has tight right adductors have her on a plinth with her knees bent and lower legs over each side. In this way one side is secured when you stretch the other side. You now grasp the right lower thigh using the belt, traction and stretch the adductors by laterally abducting the hip. (What usually happens is that the ‘patient’ feels no muscular stretch discomfort in the leg being treated but they feel it in the other side. That side gets stretched at the same time but is receiving no traction.

11. **Tight Abductors or tensor fascia lata.**
These structures also respond unexpectedly to a stretch combined with traction. You can decide on how you would do this. It can be done is side lying slightly obliquely near the edge of the plinth. The leg beneath is flexed at knee and extended at the hip to get it out of the way while you apply traction the affected leg and adduct it towards the floor. An
even better way would be to have the ‘patient’ lying with two pillows under the hips. This extends the hips and when you choose the leg to be stretched you will find that the other leg is out of the way when you apply an adduction stretch with traction. The ‘patient’s’ pelvis needs to tied down with a belt or an assistant can stabilise.

My prediction is that these last described techniques will have an important place in the management of prime athletes. I have no explanation as to why the above tractions with a conventional stretch markedly change any stretch being felt by the patient until later in the range of stretching. What do you think?

12. Knee IR –non wt bearing and wt-bearing (6th ed text pg 102)

Indications: limited or painful knee flexion.
Contact: left knee: PT left heel of hand behind proximal fibula and other hand fingers capture spine of tibia.
Glide/Movement: Internally rotate tib/fib then flex the knee.

NWB

FWB

Or

Knee Taping Internal Rotation (6th ed pg 103)

Indications: positive response to IR MWM.
Position: pt in stride stance with involved knee in front. Knee flexed around 5-10 degrees, and lower leg internally rotated. Pt then slightly externally Rotates femur in closed chain position.
**Taping:** secure tape laterally behind fibular head & wind it diagonally up the leg with the tape crossing the joint line medially and spiraling up the posterior thigh. (avoid too high into patella tendon).

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13. **Knee Squeeze Technique (6th ed text pg 120)**

**Indications:** for loss of knee flexion or extension with positive signs of a meniscal lesion.

**Contact:** pt supine. Medial border of one thumb, reinforced by the other over joint space which is tender.

**Glide/movement:** patient actively flexes knee and when you feel the joint space open up beneath you thumbs squeeze centrally.

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**Indications:** limited or painful inversion after inversion sprain.

**Contact:** thenar eminence on the ventral distal 2-3 cm of the distal fibula.

**Glide:** glide the fibula in a dorso-cranial direction. (This results in some visible passive eversion of the foot).
**Movement:** inversion with overpressure pain free.

**Ankle sprain MWM References:**


**QUESTION AND ANSWER SESSION………………?**
2nd INTERNATIONAL MULLIGAN CONCEPT CONFERENCE
Keynote speakers

Brian Mulligan is a registered Physical Therapist who lives in Wellington, New Zealand. He has been on the International Lecture Circuit since 1972. At the time of writing he has taught in the USA (over 85 cities) as well as UK, Australia, Netherlands, Germany, Ireland, Malta, Sweden, Singapore UAE, Italy, Canada, Switzerland and India. He is an honorary teaching fellow of Otago University. Brian’s special interest has always been in manual therapy since being introduced to the field by Stanley Paris in the early 1960s. He acknowledges as his mentor Freddy Kaltenborn but has also found invaluable the contributions to his knowledge from James Cyriax, Geoff Maitland, Robin McKenzie and Robert Elvey.

Brian’s favourite quote has always been Louis Pasteur’s; “In the field of discovery chance only favours the prepared mind”

Manual therapists are fortunate that by chance and his prepared mind Brian discovered and developed a new field within manual therapy he called "Mobilisations with Movement" (MWMs). This was in 1985 and two years later under similar circumstances he discovered "Pain Release Phenomenon" techniques (PRPs).

Brian Mulligan wrote his first textbook on his techniques in 1999 and it is now in its 6th edition (January 11, 2010). It is available in Chinese, Portuguese, Spanish, Polish, Greek, Korean and Japanese. He wrote another book in 2003 titled "Self Treatments for the Back, Neck and Limbs." This was written for the public. It is now in its second edition.

Well over 100 articles supporting Brian’s MWM techniques have been published in scientific journals around the world. A regularly updated reference section is available on this web site.

For his services to the Physiotherapy profession in New Zealand Brian Mulligan was made an "Honorary Fellow of the New Zealand Society of Physiotherapists" in 1996.

The "World Confederation for Physical Therapy" presented him with an International Service Award in 2007 in recognition for his exceptional contribution to physical therapy.

To meet the huge demand from therapists wishing to learn his techniques and ensure high teaching standards he set up an international organisation in 1995 to
accredit teachers. Currently there are 45 Mulligan Concept Teachers Assn (MCTA) members who have met this criteria from 17 nations.

There is also a growing network of accredited Mulligan Practitioners (CMPs) around the world so that those patients wishing to avail themselves of his concepts can be assured of a high standard of treatment.

Brian Mulligan has been married to Dawn for over 50 years. They have a son, two daughters, a grandson and five granddaughters. As a typical New Zealander he loves the outdoors. He enjoys playing golf and his piano. He had his private pilot’s licence, enjoyed flying, but had to give it up due to his multifaceted professional life.

The Musculoskeletal Physiotherapy Assn. (MPA), a special group of the Australian Physiotherapy Assn, honoured Brian Mulligan by making him their Teacher/Lecturer for 2008 which involved lecturing and running courses in all the main centres.

Dr. Jeremy Lewis PhD is a New Zealand born, Australian trained physiotherapist who currently works as a Consultant Physiotherapist at St Georges Hospital, London, and, as the Research Lead for the Therapy Department at Chelsea and Westminster Hospital, London, and as a Visiting Reader at St George’s University of London. He is also a Visiting Professor at the University of Haifa.

Jeremy has been involved in clinical, biomechanical and cadaver research investigations of the shoulder. He also has a Master of Science in Musculoskeletal / manipulative Physiotherapy, and Postgraduate Diplomas in Sports Physiotherapy and in Biomechanics and has completed MSc modules in; (i) injection therapy for joints and soft tissue pathology and (ii) ultrasound imaging.

Jeremy has presented lectures at many international conferences as an invited and keynote speaker. He has lectured and taught on international continuing professional development courses and workshops in Australia, Cayman Islands, USA, Middle East, Switzerland, Holland, Ireland, South Africa, Poland, India as well as in the UK. His main area of clinical and research interest is the rotator cuff and shoulder pain.

Jeremy is currently involved in a number of research studies and is supervising Masters and PhD students. He also works as a consultant for health companies and conducts research investigations to help establish proof of concept and
clinical efficacy on their behalf. Jeremy is also an associate editor for the journal: Shoulder and Elbow.

Dr Darren Rivett is Professor of Physiotherapy and Head of the School of Health Sciences at the University of Newcastle in Australia. Darren was self-employed in private practice for over 10 years and coordinated postgraduate manipulative physiotherapy programs at both the University of Sydney in Australia and the University of Otago in New Zealand. He completed his PhD on the validity of pre-manipulative vertebral artery testing at the University of Otago in 2000 and in 2001 he established the discipline of Physiotherapy at the University of Newcastle.

In 2004 Darren published the successful text ‘Clinical Reasoning for Manual Therapists’ with Mark Jones which has now been translated into several languages, including Korean, Japanese and German. He has given invited and keynote presentations on clinical reasoning at national and international conferences in many countries and has authored papers and book chapters on clinical reasoning. Darren served as sub-editor of the international journal Manual Therapy for over 10 years and has attracted over $1,000,000 in research grants.

Presently he is Chairperson of Musculoskeletal Physiotherapy Australia (MPA), the largest national group of the Australian Physiotherapy Association and became a member of the Standards Committee for the International Federation of Orthopaedic Manipulative Physical Therapists in 2006, after stepping down as Chair of the MPA Professional Practice Standards Committee. Darren was the recipient in 2000 of a national award in New Zealand for the development of an interactive educational resource for the promotion of clinical reasoning skills in manipulative physiotherapy.

Dr Bill Vicenzino is the newly appointed Chair of Sports Physiotherapy and head of the Division of Physiotherapy in the School of Health and Rehabilitation Sciences at the University of Queensland. The establishment of the new Chair in Sports Physiotherapy is recognition of the future demands that will be placed on this field as the population ages and younger people undergo less incidental physical activity in their formative years. Sport and physical activity is an important area of health and well being with research required to help develop the knowledge base of the most effective ways to manage, treat and prevent injury.
Since graduating in 1980, Bill has worked in musculoskeletal and sports physiotherapy, mainly in private practice. During studying for his Sports and Musculoskeletal Physiotherapy qualifications he developed a particular interest in the underpinning evidence for physical therapies – which ones work, why and how? His PhD (2000) focused on mechanisms of spinal manipulative therapy and resulted in publication of an evidenced based theoretical model for this physical treatment.

Lately his clinical research has focused on treatments for tennis elbow and neck pain, and the evidence supporting in-shoe orthotics versus manual therapy and exercise in the management of anterior knee pain. For example, a recently completed randomised clinical trial (RCT) funded by the NHMRC and published in the BMJ has shown that an active physiotherapy treatment of joint manipulation and exercise is on the whole better than steroid injections. His team is currently completing another NHMRC funded RCT into the use of orthoses in anterior knee pain whilst commencing an ARC linkage project that is seeking to better understand the role of both exercise (cross training) and physical therapies such as tape and orthoses on neuromuscular control of the leg and foot. This project is a collaborative effort with the AIS and several international researchers/laboratories and includes a team of 4 PhD scholars and a post-doctoral fellow. His research since his PhD has been supported by approximately $4.1M in competitive research grants.

Bill has communicated his findings from his research in 69 peer reviewed publications and over 120 workshops, seminars and conference presentations, largely over the past 6 years. He has supervised 6 PhD candidates and 15 Honours students to graduation.

Bill is the coordinator for the coursework Master of Sports Physiotherapy program at the University of Queensland and teaches across undergraduate and postgraduate programs in musculoskeletal healthcare, focusing on lower limb and sports physiotherapy. He contributes to the publication of knowledge through service as an Associate Editor for the Journal of Orthopaedic and Sports Physical Therapy, as a member of the International Editorial Panel for Manual Therapy as well as an ad hoc reviewer to a number of sport and rehabilitation journals. He is also the UQ Chair of the Medical Research Ethics Committee and Chair of the Physiotherapy Registration Board of Queensland.

Dr Wayne Hing is an Associate Professor and Head of Research within the School of Rehabilitation and Occupation Studies at the Auckland University of Technology (AUT) and also a physiotherapy consultant to FlexaClinic. Within AUT Wayne teaches on a number of postgraduate papers which include Ultrasound Imaging, Musculoskeletal Physiotherapy, Clinical Anatomy and
Western Acupuncture. He also teaches within the undergraduate physiotherapy programme on the Musculoskeletal Physiotherapy papers.

Wayne followed his Postgraduate and Manipulative Physiotherapy qualifications with the completion of a Master of Science in Exercise Physiology and then completed his PhD in Anatomy. He has also gained his Fellowship of the New Zealand College of Physiotherapy.

His experience in the Sports Physiotherapy field is extensive, having been team physiotherapist for a number of sports teams over the past years. These have included the sports of Soccer, Rugby, Hockey and Rugby League at a National and International Level.

Wayne was the past President of the New Zealand Manipulative Physiotherapy Association (NZMPA) and is currently on the Executive Board. He also lectures and examines on its current courses. He has been on the Academic Board for the College of Physiotherapy.

Wayne is also on the international editorial board for the journals 'Manual Therapy' and the 'Journal of Manual and Manipulative Therapy' and reviews for a number of other international journals.

Despite his heavy workload, Wayne enjoys a balanced lifestyle, health and fitness, reflected not only in his dedication to his work, but by ensuring there is quality time for his children and himself. Wayne is particularly interested in golf, cycling and martial arts, as well as personal down-time for wine, music and reading.

Dr Toby Hall gained his undergraduate qualification in physiotherapy in the UK in 1985. He traveled to Perth to complete the postgraduate Diploma in Manipulative Therapy at Curtin University in 1990. He then went on to complete a Master of Science by thesis in 1996 and a PhD in 2010. He has taught on Curtin University’s Manual Therapy programs, including the Master in Manipulative Therapy for many years and has lectured extensively within Australia and many overseas countries. He is extensively involved in research at Curtin University, the University College Dublin, and other centers. He has many teaching commitments. Toby has presented at many conferences, is the author of a new textbook published in 2011 by Elsevier titled "Mobilisation with movement: The art and the science. He has also published a range of book
chapters as well as articles related to research in the area of neural tissue dysfunction, cervicogenic headache and the Mulligan Concept. Toby is a member of the international advisory board of Manual Therapy Journal and Associate Editor for the Journal of Manual and Manipulative Therapy. Toby has taught manual therapy in over 25 countries. These courses are well received by physiotherapists who have a wide range of backgrounds and manual therapy experience.

Mark Oliver is a New Zealand and Australian qualified Manipulative Physiotherapist. He is a Clinical Educator with 30 years clinical experience and Australia’s most experienced accredited Mulligan Concept teacher.

Mark has completed a research Masters examining lumbar spine biomechanics, has published in international journals, written textbook chapters and was a lecturer on the Graduate Diploma in Manipulative Therapy and Sports Physiotherapy courses at Curtin University. He has a private practice in Perth with a special interest in orofacial pain and complex pelvic and sacroiliac joint dysfunction. Mark has developed new methods of evaluation and treatment for sacroiliac joint and TMJ disorders utilising mobilisation with movement techniques and conducts lectures and clinical workshops on these subjects internationally.

Mark was recently presented with an Australian Physiotherapy Association (WA) award for contribution to physiotherapy education "An award presented to an APA member who has made an outstanding contribution to physiotherapy education".
SUNDAY
12th JUNE
A recent systematic review identified a number of high quality randomized clinical trials into MWM, which have shown that it is superior to a comparator in the management of such seemingly disparate musculoskeletal conditions as tennis elbow and cervicogenic headaches/dizziness. This confirms the findings of a substantial number of case series and case study reports in the literature and from practitioners who use the technique regularly in their practice. A feature of a successful MWM is that it produces immediate pain relieving effects, prompting the question of how does it work. This question will be the focus of this presentation. The presentation will show how the many laboratory studies that have been conducted to date lead to a theoretical model of MWM induced hypolagesia, and that this model encapsulates both mechanical and neurophysiological (as well as psycho-motor/social) mechanisms. It will conclude that there is some solid evidence underpinning how MWM brings about its highly effective pain relieving effects in clinical practice. It will also provide key details of how practitioners might be able to optimize the therapeutic effect by applying some of this evidence to every day practice.
The relationship of clinical reasoning to Mobilisation With Movement (MWM) is the basis of this presentation. The relatively recent paradigm shift to evidence-based medicine is discussed, highlighting its limitations in informing clinical decision-making in musculoskeletal practice given the unique and multifactorial presentation of each patient. Clinical reasoning is defined and its pivotal role in patient-centred collaborative musculoskeletal clinical practice is explored in the context of the two main models: hypothetico-deductive reasoning and pattern recognition. Categories of hypothesis generation and interpretive reasoning strategies identified through observational research are considered, including those features of reasoning typical of the clinical expert. Pattern recognition is identified as the predominant reasoning strategy of the expert musculoskeletal physiotherapist and its observed elements and advantages are discussed, particularly the central role of effective knowledge organisation. Guidelines for promoting the development of skill in clinical reasoning in the clinic and common errors in clinical reasoning are outlined. Results of a recent study which provides evidence that pattern recognition in manual therapy is more likely to produce an accurate diagnosis than hypothetico-deductive reasoning (p=0.01) are presented. The theory and understanding of clinical reasoning is applied to MWM and it is contended that MWM is entirely consistent with and actually promotes skilled reasoning, and is not ‘cookbook’ practice. Patient-centred reasoning is facilitated by MWM as
collaborative reasoning and effective communication are pivotal, as is the client specific impairment measure (CSIM) and inherent hypothesis testing. Moreover, MWM promotes knowledge organisation through the growing underpinning evidence base, the integration of physical examination findings, and the acquisition of clinical patterns.
The aim of this presentation is to outline the application and use of mobilisation with movement (MWM) techniques for temporomandibular joint (TMJ) dysfunction.

TMJ mobilisation with movement (TMJMWM) techniques developed by the presenter will be described with their application to specific TMJ conditions within the clinical reasoning constructs of the Mulligan concept.

Because the techniques are new and not widely known, evidence for their efficacy is not available. Published literature is confined to a single clinically reasoned case study. It is hoped that as more clinicians become aware of these techniques, appropriate research will be conducted.

Successful application of MWM for temporomandibular dysfunction (TMD) is dependent on an understanding the functional anatomy of the immediate region, sensorimotor neurophysiology and and on the inter-relationships of jaw function with other parts of the body including the spine.

If the Mulligan concept guidelines are followed, the presenter has found the TMJMWM techniques to be very specific, effective and safe. Principles of application are the same as for MWM of other joints but the application is more complicated, because of the upper and lower joints within the single TMJ and the significant mobility of the contralateral TMJ.
In order to effectively apply a MWM technique to the TMJ, the technique must be applied in relation to the “joint plane”. There is significant variability in the joint plane of the upper joint of the TMJ between individuals and the method of determining the joint plane for will be demonstrated.

The TMJMWM techniques can be used specifically for TMJ internal derangements, long standing joint hypomobility (caused by capsular tightness and intra-articular adhesions), non-specific restriction of range of movement, acute malocclusion and jaw deviation and deflection movement patterns caused by muscular dysfunction. TMJMWM techniques can also be integrated into existing exercises for re-education of poor movement patterns.

Examples of TMJ MWM techniques for each presentation will be described with the appropriate clinical reasoning process. Although mobilisation comprises a small component of treatment for TMD, it is the presenters contention that MWM techniques will become a useful addition to the current range of treatment options. Perhaps just as important will be the introduction of the clinical reasoning process of the Mulligan concept to clinical management of TMD.
Headache is the most prevalent pain condition affecting the majority of the population, and present at all stages of life. Although estimates of the burden of headache have been largely underestimated, people who suffer from this condition have disturbed quality of life, which affects relationships, and negatively impacts on work productivity. The underlying pathological bases for headache symptoms are many and diverse. Indeed, head pain may arise from many different disorders or may be a disorder in itself. Hence classification of headache is important to ensure that correct treatment is administered. Classification of headache is based on the evaluation of headache symptoms as well as clinical testing. Although manual therapy has been advocated to treat a variety of different forms of headache, the current evidence only supports treatment, including the Mulligan Concept, for cervicogenic headache (CGH). CGH arises from a disorder of the neck, and consequently can be identified from other headache forms by a comprehensive musculoskeletal examination. Examination and subsequent diagnosis is essential not only to identify patients with headache where manual therapy is appropriate but also forms a basis for selection of the most appropriate treatment for the identified condition. Clinically, the major diagnostic challenge is to distinguish CGH from migraine. Both have similar features, and consequently many patients
receive an incorrect diagnosis. This may be explained by the complex nature of the symptoms or the presence of a number of different headache forms in the same patient. One study revealed that 33% of patients with CGH also met criteria for migraine, and another showed that an incorrect diagnosis occurred in up to 50% of cases. It follows that correct classification of the headache disorder is very important for practitioners of the Mulligan Concept, so that appropriate treatment can be given. It could be argued that manual therapists have an ethical obligation to make an accurate diagnosis so resources are not wasted on physical treatment when patients would be better directed to more appropriate therapy.

The International Headache Society and Cervicogenic Headache International Study Group (CHISG) have identified characteristics of CGH. Classification is firstly based on headache and other symptoms. Neck pain alone is not a sufficient defining characteristic of CGH as up to 70% of individuals with frequent intermittent headache report accompanying neck pain, with only 18% thought to be symptoms of neck pathology and therefore potentially CGH. Clinical physical examination is required to differentiate headache forms where there are similar subjective presentations.

It has been shown that the key physical features that distinguishes CGH from other headache forms are the presence of impairment of motor control demonstrated by the craniocervical flexion test, impairment of cervical range of motion, and upper cervical joint dysfunction identified by manual examination. The presence of all three factors is highly sensitive and specific for differentiating subjects with CGH from those with migraine, and those with tension-type headache.
Manual examination incorporates tests of palpation and segmental motion. The cervical flexion-rotation test (FRT) is an objective method of determining upper cervical joint dysfunction that has been shown to be valuable in the identification of people who suffer from CGH. Recently the validity of the FRT as a measure of upper cervical mobility has been demonstrated using magnetic resonance imaging. In addition this test has been shown to have a high degree of reliability, sensitivity and specificity, even when used by inexperienced examiners. The FRT test has good long-term stability measured over 2-weeks, with a minimal detectable change of less than 7°. Normal range of motion has been reported as 44° to each side, with a cut-off point for a positive test indicated by range less than 30°.

Another study has evaluated the association between CGH and associated headache symptoms and cervical spine impairment identified by the FRT. Regression analysis revealed that the variance in FRT mobility was explained by an index of headache severity or component parts but not by other characteristics. These findings indicate a relationship between cervical movement impairment and the presence and severity of CGH. Furthermore these findings provide further evidence for the clinical utility of the FRT, possibly also indicating a role for the FRT in monitoring outcome following intervention for CGH.

This presentation will outline in clinical terms, the classification of headache, so that the clinician can readily identify those patients with headache suited to treatment using the Mulligan Concept. In addition the evidence for management of CGH will also be discussed.
**THE SHOULDER: THE DILEMMA OF DIAGNOSIS**

Dr Jeremy Lewis

**Introduction:** Musculoskeletal disorders of the shoulder are extremely common, with 1 in 3 people experiencing shoulder pain at some stage of their lives. In addition to the high incidence, shoulder dysfunction is often persistent and recurrent, and associated with substantial morbidity, with 54% of sufferers reporting on-going symptoms after 3 years. The most common diagnosis made by GP’s and other healthcare professionals is that of rotator cuff tendinitis. There is considerable uncertainty if this is a valid diagnosis. Furthermore there is some uncertainty whether the tests recommended to diagnose rotator cuff disease have acceptable accuracy. The aim of this presentation is to review literature on clinical testing and diagnostic imaging relating to rotator cuff disease in order to make recommendations to inform clinical practice.

**Methods:** A systematic review of the literature was conducted to investigate the diagnostic accuracy of the tests and investigations recommended to diagnose rotator cuff disease. These included; clinical investigations and diagnostic imaging. Literature was identified through the Medline, PubMed, CINAHL and Cochrane databases. Search terms included; shoulder, glenohumeral, subacromial, rotator cuff, tendinitis, tendinosis, tendinopathy, bursa, bursitis, palpation, injection, assessment, tests, imaging, ultrasound, radiograph, magnetic resonance imaging, arthroscope, outcome measures.
Conclusions: Within the spectrum of musculoskeletal disorders of the shoulder, pathology involving the rotator cuff and subacromial bursa are the most common. A myriad of clinical tests have been proposed to selectively compress, stretch, contract or relax the tissues of the rotator cuff and subacromial bursa, which aim at differentiating the involved structure(s). The findings of this review suggest that there are an insufficient number of studies that have evaluated the spectrum of clinical tests in the same manner, using the same reference tests to draw definitive conclusions to guide practice regarding the clinical assessment of the rotator cuff and subacromial bursa. Clinical tests require a reference test to be compared against to determine the diagnostic accuracy of the test. No reference test has emerged that may be considered as ‘the’ gold standard. This is because the reference tests identify structural pathology and there is no evidence for the correlation of structural pathology and symptoms. Our understanding of factors leading to rotator cuff disease and the disease process itself are limited and based more upon clinical theory than conclusive evidence. Assessment procedures used to investigate rotator cuff disease lack sufficient sensitivity and specificity to confirm the absence or presence of the condition. Further research is required in order to identify more accurate tests. A new method for shoulder assessment is presented.
THE ASSESSMENT OF THE POSITIONAL FAULT HYPOTHESIS
IN THE SHOULDER BY DIAGNOSTIC
ULTRASOUND IMAGING

Associate Professor Wayne Hing

Purpose: The objective of this research was to establish a reliable method of assessing the ‘Acromiohumeral’ (AH) distance within the shoulder and the effect of a Mobilisation with Movement.

Relevance: To utilise this measure to investigate the effect of Mulligan’s Mobilisation with Movement’s applied to the shoulder using Diagnostic Ultrasound.

Participants: Participants without history of significant shoulder pathology (25) and a further 12 participants with shoulder pathology were studied. Subjects were recruited in a manner of convenience.

Method: A diagnostic ultrasound scan of the right shoulder by an experienced sonographer using a Phillips HD 11 with a L12-5 MHz linear array transducer was performed. The transducer was aligned in a long oblique plane in relation to the supraspinatus tendon. The landmarks were the anterior margin of the greater tuberosity to the anterior margin of the acromion process. Callipers were placed on the apex of the acromion process to measure the distance between these two points.

Real time imaging of the coracoacromial ligament followed by active abduction through the scaption plane from 0 to 100 degrees was also
obtained. Finally, a shoulder MWM was dynamically imaged and collected. The shoulder MWM applied to the right glenohumeral joint consisted of posterior stabilisation of the scapula while a posterolateral glide was applied to the humerus (Mulligan, 2005).

**Analysis:** Intrarater reliability was assessed over a series of three measurements. An analysis of the reliability of measurement was carried out using SPSS (version 15, SPSS Inc., Chicago, IL). Repeated measures (test-retest) reliability analyses utilised interclass correlation coefficients (ICC, 3.1) and 95% confidence intervals.

**Results:** The comparison of AH measurements in normal participants revealed excellent ICC at the three initial reliability measurements (0.979, CI 0.959 - 0.999). There was a significant effect of the MWM on the AH distance (p=0.000) in both normal and pathological groups.

**Conclusion:** The results provide strong evidence that the use of ultrasound imaging in the identification of the AH distance is highly reliable. There was a significant ‘positional change’ in the AH distance due to the application of Mulligan’s MWM’s. Further research is being carried out investigating the latent effect of the applied MWM in relation to the AH distance (which will be presented at the conference) and also the effect of this mobilisation in a clinical population of shoulder impingement patients.

**Keywords:** Ultrasound imaging, reliability, mobilisation with movement, shoulder
In the field of manual therapy and rehabilitation, chronic forms of low back pain are still proven as a challenge to the individual, society and dedicated teams of rehabilitation specialists and medical experts. An approach that has been well documented and specific to the management of low back pain was proposed by Brian Mulligan of New Zealand (Mulligan 1989). The efficacy of Mobilisations with Movement (MWM) for peripheral joints has been documented for a number of conditions, such as Tennis elbow (Bissett et. al 2006). Similarly, a recent study by Reid et. al. (2008) using MWM for spinal segments known as SNAGs has also supported the use of Mulligan’s techniques. Some even consider this approach of manual therapy to provide the best existing evidence for treatment of dizziness associated with cervical spine dysfunction. The relationship between spinal MWMs (SNAG) and low back pain (LBP) warrants further investigation within the clinical setting. This presentation presents a series of case studies collected in a clinical setting over a two year period of chronic LBP patients. Patients were treated by SNAGs performed in the 4-point kneeling position for three-five sessions. They were further advised to move as normally as possible within their pain free ROM. Patients were videoed and photographed performing specified active movement tests along with specific functional tasks on day one, two and at a long term follow up.
Spinal SNAGs offered an effective treatment option to the majority of chronic LBP patients who failed to respond to previously applied treatment methods. The results illustrated changes in functional ability, reported pain parameters, medication use and participation and quality of life parameters.

Spinal SNAGs could be considered as a favourable choice of treatment for a range of LBP patients who have failed to respond to established treatment regimes which include conventional physiotherapy, Chiropractic, medical treatment or operative procedures. Whilst the cases presented within this two year collection period only provide examples of the effectiveness of SNAGs for LBP sufferers they do illustrate and command strong support for their clinical utilisation. This study generated a number of questions and clearly further robust scientific research is required.

For the reader of scientific literature visualization of reported changes in the ‘true’ clinical setting is often not captured or impossible. The extensive video footage collected over the two year period provides concise, valid and exciting visual evidence of the effect of spinal MWMs.

**Key words:** SNAGS, MWM, Mulligan Concept, Chronic Low Back Pain, Manual therapy, Video case reports.
A FLUOROSCOPIC COMPARISON OF GENERAL AND SEMI-SPECIFIC TRACTION OF THE CERVICAL SPINE

Rob Werstine, Jack Miller

**Background:** A commonly used treatment for neck pain is traction, whereby a longitudinal force is applied through to the cervical spine. Traction of the cervical spine can be applied by a mechanical device (mechanical traction) or by a therapist’s hands (manual traction). A specific form of traction was described by Mulligan, to induce localized, segmental effects. The proposed mechanism for the effectiveness of traction is based upon the separation that occurs between consecutive vertebrae. Despite this proposed mechanism, there is a paucity of literature describing separation between vertebrae using manual traction, or comparing different manual traction techniques.

**Study Design:** One physiotherapist during one test session applied two variations of manual traction to the cervical spine of healthy participants while the separation between vertebrae was measured with fluoroscopy. Objectives: To quantify and compare the amount change in inter-vertebral space (IVS) between the C3-4, C4-5 and C5-6 spinal segments using general (force applied to the occiput) and semi-specific (force applied to C5) manual traction. It was hypothesized that 1) both techniques would increase the IVS, 2) Semi-Specific traction would create more IVS separation between the C5-6 spinal segments, and 3) Semi-Specific traction would create less IVS separation between C3-4 and C4-5 spinal segments.
Methods: During one test session general and semi-specific manual traction of 20 kg of force were applied through a Mulligan belt in a randomized order to the cervical spines of 20 healthy participants while the separation between vertebrae was measured with fluoroscopy. Fluoroscopic images of the cervical spine were obtained prior to and during the application of the two traction techniques. De-identified digitized images of the cervical spine imported into a custom-written Matlab program, landmarks on the vertebrae were identified and distances between vertebral landmarks were calculated. The primary outcome was the comparison of the percentage of change in the IVS of C3 to C6 for both traction techniques.

Results: An ANOVA indicated significant interactions between technique and position, and technique and level (p<0.05). Post hoc testing indicated that when combining levels, semi-specific traction created significantly greater IVS separation anteriorly (p=0.003). When combing anterior and posterior positions, semi-specific traction created significantly greater IVS separation at the C5/6 level only (p=0.006).

Conclusion: 1) Manual traction produces IVS separation similar in magnitude to previous reports for mechanical traction; 2) Semi-specific traction creates more separation at C5/6; 3) Semi-Specific traction provides no protective effect that limits separation at levels above the level at which the traction force is being applied. More research to verify the proposed mechanisms by which manual therapy achieves outcomes is needed to enhance the professions credibility.

Keywords: cervical, fluoroscopy, traction, manual, inter-vertebral
Background: Cervicogenic headache is a common form of headache predominantly arising from dysfunction in structures of the upper cervical spine. Recent studies have shown a high incidence of C1-2 dysfunction, evaluated by the flexion-rotation test (FRT). Two different approaches to manage such dysfunction have been described by Mulligan and Rocabado. However, the effectiveness of these techniques has not been established.

Design: Double-blind randomized placebo controlled trial with three phases: pre-intervention, intervention, and post-intervention.

Objectives: To determine and compare the immediate effects of two manual therapy interventions (Mulligan C1/2 SNAG and Rocabado Atlas derotation) on range recorded during the flexion-rotation test, in subjects with cervicogenic headache. The SNAG and Atlas derotation techniques were applied as a single intervention and compared with a placebo.

Methods: A sample of 60 subjects with cervicogenic headache and FRT limitation were randomly allocated into one of three groups: Mulligan C1/2 SNAG, Rocabado atlas derotation, or placebo group. The primary
outcome measure was range recorded during the FRT, which was determined prior to and immediately following the intervention.

**Results:** No differences were found in baseline measures between groups. Immediately after the intervention, range recorded during the FRT increased by 21.8° (SD, 4.7) for the C1/2 SNAG group, 15° (SD, 5.1) for the Atlas derotation group, and 0.6° (SD, 0.7) for the placebo group. A 2-by-3 mixed-model ANOVA revealed a significant main effect for time (P<.001) and group (P<.001), as well as a significant interaction between group and time (P<.001) for the variable FRT range. These results indicate that group differences were dependent on time. A pairwise post hoc comparison revealed that both the C1/2 SNAG and Rocabado Atlas derotation techniques increased FRT range of motion significantly more than a placebo (P<.001 and P=.001, respectively). However, neither intervention was significantly better than the other (P=.42).

**Conclusion:** A Mulligan C1/2 SNAG and Rocabado Atlas derotation technique produced a clinically and statistically significant effect on FRT range, but neither technique are superior. These results provide preliminary evidence for the efficacy of both manual therapy techniques in the management of individuals with cervicogenic headache and FRT limitation.

**Key Words:** Headache, cervical spine, manual therapy, clinical trial, Mulligan, Rocabado
A CASE-SERIES OF SUB-ACROMIAL IMPACT SYNDROME
MANAGED BY MULLIGAN SHOULDER MOBILIZATION WITH
MOVEMENT AND EXERCISE

Ken Lennington, Dr Toby Hall

**Purpose:** Mulligan mobilization with movement (MWM) techniques have been described to manage shoulder pain and limitation of movement. The purpose of this study was to investigate the effect of MWM on a case series of people suffering from sub-acromial impaction syndrome (SAIS) presenting with shoulder pain and functional disability.

**Relevance:** SAIS is a common disorder affecting the shoulder. A previous single case study, and a randomized pilot clinical trial, has shown efficacy of a combination of MWM together with exercise and manual therapy to manage this condition. However, further studies are needed to investigate the benefit of the Mulligan Concept for SAIS.

**Participants:** Eighteen participants (13 male, mean age 52 years) with clinical evidence of SAIS were studied. Mean duration of symptoms was 102-days (range 15-365). Subjects were selected retrospectively from a review of a private physiotherapy outpatient clinic in the United States.

**Methods:** Ethical approval was internally approved for this study by the group practice. The rights of individuals were respected at all times and all subjects provided written informed consent. Treatment consisted of shoulder MWM, followed by isometric shoulder strengthening exercise. Treatment continued as required. Mean number of consultations were 18.1 (range 5-45). Follow up took place at the final consultation.
Analysis: Outcome measures comprised a self-reported pain numerical rating scale (NRS) and the American Shoulder and Elbow Surgeons functional disability scale (ASES).

Results: Mean functional disability at initial assessment was 69 (range 33-96) improving to 84.1 (range 62-98), indicating a 15.1-point change on the ASES scale. Mean pain at initial assessment was 6.0 (range 2-9) improving to 1.4 (range 0-4), indicating a 4.6-point change on the NRS. With respect to the minimal clinically important difference, 72% of patients had improved function, and 88% improved pain.

Conclusions: Mulligan shoulder MWM combined with isometric exercises improved pain and functional disability in 72% of subjects with shoulder pain and a clinical diagnosis of SAIS. Further investigations are required to corroborate these findings in a randomized controlled trial.

Implications: Mulligan shoulder MWM and exercise may be a viable treatment option for SAIS syndrome.

Keywords: Sub-acromial impaction syndrome, Mulligan concept.
COMPARISON OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION AND MULLIGAN’S BENT LEG RAISE TECHNIQUE TO IMPROVE HAMSTRING FLEXIBILITY

Dhillon Paramjot, Asst. Prof. Saini S.S., Assoc. Prof. Benjamin

Background: Hamstring muscle extensability varies among individuals, but excessive hamstring tightness impairs optimal physical performance. A number of methods have been described to improve hamstring flexibility including among others static and ballistic stretching, Proprioceptive Neuromuscular Facilitation (PNF), and the Mulligan Bent Leg Raise technique (BLT). Despite the plethora of options to improve hamstring flexibility, there has been limited research investigating the comparative benefits of these techniques.

Objective: The aim of this study was to compare the effectiveness of a PNF technique to Mulligan BLT for improving hamstring flexibility in asymptomatic individuals.

Design: Comparative intervention design.

Methods: A sample of convenience consisting of 80 asymptomatic females (22.7, 2.1 years) with hamstring tightness, defined as more than 45° lack of active knee extension in 90° hip flexion. Subjects were randomly allocated to receive either PNF Hold Relax (n=40) or Mulligan BLT (n=40). Exclusion criteria were any history of injury or pathology of the low back or lower limb, or history of lower quarter pain. The primary outcome measure was hamstring flexibility (knee extension range of movement at 90° hip flexion) evaluated by a standard universal
goniometer. Range of movement was evaluated by an assessor blind to group allocation. Intervention was given on 7 consecutive days. Each session consisted of 3 repetitions of the intervention, either PNF or Mulligan BLT.

**Results:** There was no difference between groups in knee extension range prior to the intervention; with range of 35.2° (3.9) and 36.4° (4.8) for the BLR and PNF groups respectively. Hamstring flexibility increased significantly (p<0.0001) in both groups by 16.1° (standard error of difference 0.6, 95% CI 17.4 - 14.7) and 10.0° (standard error of difference 0.7, 95% CI 11.4 - 8.6) in the BLT and PNF groups respectively. The relative increase in hamstring flexibility was significantly greater in the BLR group than in the PNF group (P<0.0001).

**Conclusions:** Mulligan’s BLT was more effective than a PNF technique in increasing hamstring flexibility in asymptomatic subjects with tight hamstrings.

**Key Words:** Flexibility, Hamstring, Mulligan technique, Proprioceptive neuromuscular facilitation
MONDAY
13th JUNE
LATERAL EPICONDYLALGIA AND MWM: 
WHAT IS THE EVIDENCE?

Professor Bill Vicenzino

Lateral epicondylalgia, an overuse injury involving the wrist extensor tendons at the lateral elbow, can be notoriously difficult to successfully manage, with some 20-30% of cases becoming chronic, recurrent and recalcitrant to many forms of treatment. Evidence is emerging that exercise, judiciously applied, will lead to resolution of the condition, better outcomes and prevention of recurrence, but that this requires a sustained period of time to bring about such benefits. A high quality randomized clinical trial has demonstrated that combining exercise with MWM at the elbow will produce high rates of success early, similar to that of corticosteroid injections, but without the deleterious latter term effects of the injections. In this lecture I will address the practical implications of applying MWM in this soft tissue condition in order to bring about both short and long term improvements.
It was Brian Mulligan who first proposed the positional fault hypothesis (PFH) after noticing that patients demonstrated amazing improvements in pain and range of motion following the application of a Mobilisation with Movement (MWM). Of significance was that it appeared that the direction of glide was critical to the outcome of the technique. He speculated that patients who presented with a ‘positional fault’ had this fault corrected with the application of his novel mobilisation treatment technique. The positional fault has been likened to a bony incongruence that may occur after a sprain, strain or other (micro- or macro-) injury and is responsible for the ongoing symptoms and interference with normal function.

Clinicians have been compelled through history to seek explanations for treatments that exert remarkable effects. In the field of manual therapy, there are many examples of this phenomenon such as the intervertebral disc derangement hypothesis of McKenzie and the vertebral subluxation theory of Palmer in chiropractic in relation to spinal adjustment. This presentation will provide an overview on the PFH in regard to: (a) the evidence for the existence of positional faults and their measurement or detection; (b) an explanation of how positional faults may produce pain, impairment and disability; as well as (c) the capacity of MWM to reverse these faults. There is both direct research into the PFH as it relates to the MWM concept and also research into joints such as the patellofemoral and glenohumeral that has not directly investigated the MWM concept.
but which includes studies into the presence of possible minor positional incongruities that highlight key aspects of the PFH. To date, the direct MWM research has focussed on the inferior tibiofibular joint. A review of relevant literature pertaining to the ankle, patellofemoral and shoulder joints will be presented.
The use of sacroiliac joint mobilisation (SIJMWM) techniques is now relatively widespread in clinical practice.
In addition to the techniques described by Brian Mulligan, the presenter and other Mulligan Concept practitioners have developed a wide range of SIJMWM techniques.
There is a significant body of research supporting the clinical reasoning process used in the application of SIJMWM techniques, but no studies have been done to assess their effectiveness.
The current research contributing to “evidence informed practice” and the clinical reasoning process used to apply SIJMWM techniques will be presented.
It has been demonstrated that altered nociceptive and mechanoreceptor neural afferent activity from SIJ structures can alter muscle recruitment and movement patterns. Stimulation of nerves and mechanoreceptors in the SIJ and joint capsule of pigs substantially alters the function of multifidus, gluteus maximus and quadratus lumborum. Human individuals experiencing SIJ pain have altered lumbopelvic recruitment patterns in single leg standing. Electromyographic studies demonstrate alteration in muscle recruitment of abdominal muscles, multifidus, gluteus maximus and hamstrings on the supporting side.
The SIJ plane is variable between individuals, between sides and in the transverse and coronal planes. The joint plane must be determined for each individual in order accurately apply the SIJMWM techniques. The
method for determining the SIJ joint plane will be demonstrated. The SIJ has a relatively small amount of movement, but that movement has a significant effect on other parts of the body, particularly the neighbouring lumbar spine and hip joints.

The magnitude and direction of sacroiliac motion has been shown to be sufficient to “complement” hip joint motion and influence motion at the lumbosacral junction. Sectioning the anterior iliolumbar ligaments bilaterally significantly increases SIJ movement, indicating that alteration in SIJ movement can affect lumbosacral movement. A study examining accessory movement between the innominate and sacrum when performing the Stork" test demonstrated changes in directions of rotation and translation on the supporting leg comparing subjects with and without SIJ pain. The directions of rotation and translation found to occur in subject without pain are those found to be most often used successfully in SIJ techniques. SIJ techniques are used to “guide” the movement of the innominate in relation to the sacrum, and only small amounts of movement are required to make the techniques effective. The direction and magnitude of force are however, critical, and a video example of this will be presented.
Musculoskeletal disorders of the shoulder are extremely common, with reports of prevalence ranging from 1 in 3 people experiencing shoulder pain at some stage of their lives to approximately half the population experiencing at least one episode of shoulder pain annually. Pathology of the soft tissues of the shoulder including the musculotendinous rotator cuff and subacromial bursa are a principal cause of pain and suffering. Competing theories have been proposed to explain the pathoaeiology of rotator cuff pathology at specific stages and presentations of the condition. This review proposes a model to describe the continuum of the rotator cuff pathology from asymptomatic tendon through full thickness rotator cuff tears. The pathoaeiology of rotator cuff failure is multifactorial and results from a combination of intrinsic, extrinsic and environmental factors. Rotator cuff tendinopathy is associated with profound changes within the subacromial bursa that are strongly related to the resulting symptoms. Recently a new and generic model detailing the continuum of tendon pathology has been proposed. This model is relevant for the rotator cuff and provides a framework to stage the continuity of rotator cuff disease. Furthermore, it provides a structure to identify the substantial deficiencies in our knowledge base and areas where research would improve our understanding of the pathological
and repair process, together with assessment and management. The strength of this model, adapted for the rotator cuff tendons, will be tested in its ability to incorporate and adapt to emerging research.
SNAGS AND CERVICOGENIC DIZZINESS

Professor Darren A. Rivett

This presentation argues that cervicogenic dizziness is a real disorder and one that is quite amenable to treatment by Sustained Natural Apophyseal Glides (SNAGs). The benefits and complications of cervical spine manipulative/thrust procedures are discussed, concluding that other forms of manual therapy are likely of equal benefit and less risk in the management of mechanical neck disorders. In particular, the risk of vertebral artery injury/stroke is explored and placed in context. The evidence for screening procedures to identify patients presenting with vertebrobasilar insufficiency (VBI) and blood flow changes/hindbrain hypoperfusion during neck manoeuvres is scrutinised and found to be less than optimal. Recent research describing the typical clinical features of a dissecting craniocervical artery and associated risk factors is presented as a better basis for screening for inappropriate patients for manual therapy. Advocated guidelines for differentiating different causes for dizziness are summarised, leading to the common view that cervicogenic dizziness is a diagnosis of exclusion and difficult to differentiate from VBI. Cervicogenic dizziness is described as being caused by musculoskeletal dysfunction in the upper cervical spine leading to disturbed afferent input to the vestibular nuclei. It manifests as imbalance or unsteadiness related to positions/movements of the neck and/or cervical pain/stiffness. It is proposed that SNAGs are an effective and safe clinical tool for diagnosing cervicogenic dizziness and for its alleviation through restoring normal mechanical function in the upper
cervical spine and therefore afferent input to the vestibular nuclei. Recent research is discussed supporting this contention, and a simple biomechanical interpretation of responses to SNAGs is offered to assist in differential diagnosis of VBI and cervicogenic dizziness.
Ankle injuries are common and invariably result in limitation of ankle dorsiflexion and in approximately 40% of cases go onto become chronic. There is high level evidence that for acute ankle sprains, anteroposterior glides speed up the resolution of ankle function. There is also evidence that MWM of the ankle joint will improve ankle dorsiflexion and joint position error. The exact MWM application parameters, their effects and the underlying mechanisms will be the focus of this presentation. The objective being to ensure that you will have sufficient evidence to inform application of MWM in managing ankle injuries.
DE QUERVAIN’S DISEASE. SUCCESSFUL SYMPTOM RESOLUTION USING THE PRINCIPLES OF MWM. A CASE REPORT.

Osvaldo Ruiz

Aim: The purpose of this study was to investigate whether the Mulligan Concept including Pain Release Phenomenons (PRP) and Mobilisation with Movement (MWM) may be a valid treatment option for De Quervain’s disease.

Background: De Quervain’s disease is described as a tenosynovitis affecting the extensor pollicis brevis and the abductor pollicis longus of the thumb. It is thought to result from injury or overuse and is more prevalent in females. Reported treatments include medical management, anti-inflammatory drugs, infiltration, physiotherapy and surgery. Manual therapy has been advocated, either alone or associated with other modalities. This single case study reports the use of PRP and MWM, as management for a patient affected by De Quervain’s disease who had failed medical management and conventional physiotherapy.

Design: Case report.

Method: A 48-year-old female presented with a diagnosis of De Quervain’s disease which had been totally unresponsive to treatment with analgesic, anti-inflammatory drugs, splinting, and 30 sessions of physiotherapy consisting of electrotherapy and exercise over the
previous 5 months. Moreover, her symptoms had gradually worsened during this period. On initial evaluation Finkelstein’s test could not be administered due to the intensity of pain. The Disabilities of the Arm, Shoulder, and Hand functional disability questionnaire (DASH) was 43.3 points. Disability relating to work was 50, and relating to Sport/Art 75. Intervention consisted of PRP and MWM.

**Results:** Flexion range of motion (ROM) increased by a few degrees following PRP. The patient was instructed to perform this manoeuvre at home. As ROM reached a plateau a radius caudal anterior MWM, resulted in immediate full thumb extension range of motion, with no pain. Final disability assessment yielded a DASH of 5.0, Work and Sport/Art score of 0. Finkelstein’s test was negative and the patient was asymptomatic. The patient remained asymptomatic at 6 months, and continued to enjoy full mobility of the thumb.

**Conclusion:** A patient affected by De Quervain’s disease who had failed previous intervention, gained full pain free recovery using Mulligan PRP and MWM techniques. Final assessment yielded a DASH score of 5.0 and a negative Finkelstein’s test. The patient remained asymptomatic at 6 months, with full mobility of the thumb. This case study reveals that even an apparent inflammatory disorder of the tendon, such as De Quervain’s disease, may respond to MWM and PRP.

**Keywords:** De Quervain’s disease; mobilization; Radius position; tenosynovitis; manual therapy.
A CASE-SERIES OF FOREARM PAIN, DIAGNOSED AS INTERSECTION SYNDROME, MANAGED BY MULLIGAN TAPING

Hiroshi Takasaki, Shouta Kaneko, Dr Toby Hall

**Purpose:** Mulligan taping techniques have been described to manage a range of soft tissue disorders, utilising a principle of unloading. The purpose of this study was to investigate the effect of Mulligan taping on a case series of people suffering from intersection syndrome presenting with pain, crepitus, and/or swelling over the dorsal forearm.

**Relevance:** Intersection syndrome is an overuse syndrome of the forearm routinely managed by conservative management including rest, splinting, and corticosteroid injection. All these procedures impede normal daily function. An alternative, less restrictive treatment approach may be taping according to the Mulligan Concept, but there have been no reports for the management using this approach.

**Participants:** Four female participants (mean age 48 years) with clinical and magnetic resonance imaging evidence of intersection syndrome were studied. Mean duration of symptoms was 47-days (range 21-90). Subjects were recruited sequentially from a hospital orthopaedic outpatient clinic in Japan.

**Methods:** Shinoro Orthopedic Hospital provided approval for this study. The rights of individuals were respected at all times and all subjects provided written informed consent. Treatment consisted of non-stretch sports tape applied across the dorsal aspect of the forearm,
perpendicular to its long axis, in a direction that relieved symptoms. Taping was carried out daily for 3 weeks. Follow up took place at 1-week, 2-weeks, 3-weeks, 4-weeks, and 1-year from the initial consultation.

**Analysis:** Outcome measures included the presence of crepitus induced by active thumb and wrist movements in the un-taped situation, tenderness over the dorsal forearm, swelling and functional disability measured by questionnaire using the Disabilities of the Arm, Shoulder and Hand Japanese version (DASHJ).

**Results:** All patients demonstrated immediate abolition of crepitus with the application of tape. Crepitus induced by wrist movements, tenderness over the dorsal forearm, and swelling were no longer present at 3-weeks follow-up. Disability identified by the DASHJ questionnaire decreased at 3-week follow-up and this reduction was maintained at 4-weeks and 1-year.

**Conclusions:** Taping improved symptoms in this small series. One possible explanation for this may be the alteration of soft tissue alignment; however, further investigations are required.

**Implications:** Mulligan taping may be a viable treatment option for intersection syndrome.

**Keywords:** Intersection syndrome, tape, Mulligan concept.
THE IMMEDIATE EFFECTS OF MULLIGAN MOBILISATION TECHNIQUES IN SUBJECTS WITH LOW BACK RELATED LEG PAIN
Andrzej Szczygiel, Edyta Solak

**Purpose:** Mulligan mobilization techniques are frequently used to manage patients with low back pain (LBP) with referred limb symptoms. Treatment success is determined by range of straight leg raise (SLR) and reduction in leg pain. The purpose of this study was to see if the addition of Mulligan’s techniques to standard treatment improved outcomes in patients with LBP and limb symptoms.

**Participants:** 54 subjects with LBP and leg pain, with a diagnosis of lumbar nerve root pathology or lumbar degenerative changes, were divided into two groups. The Mulligan intervention group consisted of 29 subjects (14 female) aged 41-69. The comparison group consisted of 25 subjects (14 female) aged 37-65.

**Method:** All subjects received a standardized treatment over 21 days consisting of group exercises in a hydrotherapy pool, group land-based exercise and modalities. The Mulligan group additionally received up to 10 sessions of individually prescribed techniques based on the Mulligan treatment protocol (Bent Leg Raise (24), Gate Technique (4), and traction SLR (1)). Range of SLR and a verbal rating scale of leg symptoms were evaluated prior to and immediately following the intervention.

**Results:** Range of SLR angle increased by 38% in the Mulligan group, and 12% in the comparison group. Following the intervention, complete relief
of leg pain was reported by 27 subjects (96%) in the Mulligan group and 3 subjects (3%) in the comparison group.

**Conclusions:** Mulligan’s mobilization techniques with a standardized treatment protocol improved measures of SLR and leg pain more than standard treatment alone in subjects with LBP and referred limb symptoms.

**Key words:** Low back pain, SLR test, Mulligan Techniques
A STUDY ON THE EFFICACY OF MULLIGAN CONCEPT (NAGs) IN CERVICAL PAIN AND STIFFNESS

Dr Deepak Kumar, Sandhu J.S., Brota A., Guru Nanak

Purpose: The aim of the study was to evaluate the effects of NAGs for pain, pain in available end range, various ranges of motion, certain activities of daily living (ADL) and anxiety associated with cervical spine pain and stiffness.

Relevance: The studies on NAGs and its functional outcomes have not been reported in literature. Several questions regarding NAGs remain unanswered especially about its efficacy in pain and stiffness affecting ADL. However, a number of therapists throughout the world use this technique as an integral component of their practice. A limited number of papers including case studies and case series have documented a rapid reduction in pain and stiffness of other parts of the spine and the peripheral joints using Mulligan Concept. In the era of evidence based practice, there is urgent need to cross validate the claims made by the proponents of this technique. This study is an attempt to establish a scientific evidence to use NAGs for the benefit of the patients and future research.

Participants: One hundred subjects (N=100) of age group 30 to 60 years, attending OPD of orthopedic department, suffering from cervical pain and stiffness, without radicular pain, diagnosed as having cervical Spondylosis. Those who met the predefined criteria were included in the
sample with written informed consent. The sampling was incidental; subjects were randomly assigned to the four groups (n=25).

**Method:** Ethical approval was sought and obtained. It is a repeated measure design, with double blind controlled trials. Visual Analogue scale (VAS) score, Range of Motion (ROM), Neck Disability Index (NDI), and State-trait anxiety inventory (STAI) were the dependent measures. McGill Pain Questionnaire (MPQ) was used for the assessment and screening of the subjects for the study and to develop demographic data. All groups received hot packs for 12 minutes along with set of active exercises from day one to day twelve. In experimental group one, NAGs as mobilisation technique was added for all the 12 days while in experimental group two, it was withdrawn on day seven. In experimental group three, NAGs was added from day seven onwards. In the control group placebo effect was introduced for all the 12 days. All patients were assessed before and after the treatment on day one, two, six, seven, ten, and twelve. After six weeks was the follow up. ANALYSES: Analysis of covariance (ANCOVA) with post-hoc t-test with adjusted means and graphical presentations.

**Results:** A significant (p<.01) different in pain, ROM, neck disability index score was noticed in the experimental groups immediately after NAGs and was maintained on the day of observation in the sixth week. No significant difference seen in anxiety level.

**Conclusions:** The results indicate that the NAGs is a useful manual therapy technique for producing quicker and long lasting effects in reducing pain and restoring ROM with functional activities in patients suffering from pain and stiffness of cervical spine. Further, it is observed
that reduction in pain and improvement in range of motion improves the functional ability.

**Implications:** This study provides supportive evidence for the efficacy of NAGs in reducing pain, improving ROM and ADL affected due to painful stiff cervical spine. It further provides a base for future study to further explore the reasons for the differences observed between the groups.

**Keywords:** NAGs, ADL, and Cervical Spine.
Background: Cervicogenic dizziness and pain are common problems in the community. Previously we provided clear evidence for the short-term efficacy of Sustained Natural Apophyseal glides (SNAGS) in the treatment of cervicogenic dizziness and pain (Reid, Rivett, Katekar & Callister, 2008). However it is not known whether SNAGS treatment is similar or more or less effective than other manual therapy treatments such as Maitland passive joint mobilization.

Objectives: The aims of this study were to:

a) Evaluate the effects of SNAGs and self-SNAGs in reducing symptoms of chronic cervicogenic dizziness and pain using self-report and physical measures.

b) Compare the effects of treatment with SNAGs and self-SNAGs to Maitland passive joint mobilizations combined with range of motion exercises.

c) Compare the effects of both manual therapy treatments to a placebo intervention.

Design: A randomised controlled trial was conducted to compare the effects of SNAGs to Maitland passive joint mobilizations and both to a placebo control for the treatment of cervicogenic dizziness and neck pain. A blinded research assistant conducted assessments but
treatments were not blinded. Treatment was for 2-6 weeks, with follow-ups immediately post-treatment and at 6 and 12 weeks. Further follow-up will occur at 6 and 12 months to determine longer-term effectiveness.

**Methods:** Twenty-seven participants were randomised into three groups: SNAG treatment with self-SNAG home exercises (n=9); Maitland mobilization with range of motion exercises (n=9); and a placebo group of detuned laser (n=9). The outcome measures were the Dizziness Handicap Inventory (DHI) and a Visual Analogue Scale (VAS) to measure severity of cervicogenic pain as well as a VAS to measure severity of cervicogenic dizziness.

**Results:** Both SNAGs and Maitland mobilization reduced pain and dizziness after treatment, and at 6 and 12-week follow-up. Initial results show that after treatment in the SNAG group there was a 37% improvement in the DHI, 68% improvement in the VAS for dizziness and a 51% improvement in the VAS for pain. In the Maitland mobilization group there was 21%, 46% and 44% improvement for the same measures. There was no change in the placebo group participants. The group sizes are not sufficient at present to determine statistical or clinical significance however recruitment is continuing.

**Conclusion:** Manual therapy and related exercise may reduce the symptoms of dizziness and pain in patients with cervicogenic dizziness. Whether SNAGs treatment is more effective than Maitland mobilization requires continued investigation with a larger population.

**Implications:** This trial provides preliminary evidence supporting two types of manual therapy treatment for patients suffering from chronic cervicogenic dizziness and pain.
Further work: A 12-month follow-up of these patients is being undertaken. The cost of the illness and cost-effectiveness of the three interventions will also be analysed.

Key Words: Dizziness, pain, cervical spine, clinical trial, exercise, manipulative therapy
IMMEDIATE EFFECTS OF MOBILIZATION WITH MOVEMENT AND ACCESSORY GLIDE ON POSTERIOR TALAR GLIDE AND ANKLE DORSIFLEXION

Francisco Neto, Nuno Pinheiro, Sofia Santos, João Vasques

Background: Ankle sprains are common sports injuries causing significant disability. The evidence suggests that a decrease in the talar posterior glide and limitation of the range of ankle dorsiflexion are habitual consequences of ankle sprain. These limitations are usually treated by joint mobilization techniques, mainly focused on the talocrural joint. Maitland and Mulligan techniques have been described to increase dorsiflexion and there is evidence for their effectiveness. However, there are no studies comparing the effectiveness of these techniques.

Design: Double-blind randomized placebo controlled trial, with three phases: pre-intervention, intervention, and post-intervention.

Objectives: To determine and compare the immediate effects of a Mulligan talar dorsiflexion mobilisation with movement (MWM) and a Maitland antero-posterior (AP) accessory mobilisation technique in patients with history of unilateral ankle sprain and limitation of dorsiflexion. Both treatment techniques were applied in a single session and compared with a placebo.

Methods: A sample of 54 subjects with a history of unilateral ankle sprain and limitation of dorsiflexion range of motion (ROM) were randomized into three groups: talar dorsiflexion MWM, grade III AP accessory
mobilisation, or a placebo. The outcome measures used in this study were range of posterior talar glide and weight-bearing ankle dorsiflexion ROM. The measures were taken before and immediately after the intervention.

**Results:** No differences were found in baseline measures between groups. A one-way ANCOVA, followed by a pairwise post hoc comparison, revealed that, immediately after the intervention, the change in weight-bearing ankle dorsiflexion ROM was significantly greater in the Mulligan group (increase of 1.3 cm (SD, 0.2) than in the Maitland group (increase of 0.9cm (SD, 0.1) (P=.001). Both interventions produced a significant effect on weight-bearing ankle dorsiflexion ROM, when compared to the placebo (P<.001 for both groups). Posterior talar glide increased by 2.6º (SD, 0.6) for the Mulligan group, which was significantly more than 1.9º (SD, 0.4) for the Maitland intervention (P<.001). Both interventions produced a significant effect on posterior talar glide, when compared to the control group (P<.001 for both groups).

**Conclusion:** Talar dorsiflexion MWM produced a significantly greater range of posterior talar glide and ankle dorsiflexion than an accessory AP mobilization. These results provide preliminary evidence for the efficacy of MWM in the management of individuals with history of unilateral ankle sprain and limitation of ankle dorsiflexion.

**Key Words:** Ankle sprain, mobilization, Mulligan, Maitland, talus, dorsiflexion
Background: Ankle sprain is one of the most common musculoskeletal injuries. Impaired dorsiflexion range of motion (ROM) has been shown to be one of the consequences of this injury, as well as one of the contributing factors to recurrence. Several studies have shown the presence of an anterior positional fault of the fibula in injured ankles. Mulligan suggests that a distal tibiofibular joint mobilization with movement (MWM) technique can improve dorsiflexion following ankle injury. A cadaveric study revealed that a posterosuperior glide of the distal tibiofibular joint has the potential to improve dorsiflexion and to correct a positional fault of the distal fibula. However, the effectiveness of this technique has not been investigated in patients with impaired dorsiflexion and history of unilateral ankle sprain.

Design: Double-blind randomized placebo controlled trial, with three phases: pre-intervention, intervention, and post-intervention.

Objectives: To determine the immediate effects of a distal tibiofibular MWM on talar posterior glide and ankle dorsiflexion ROM in patients with history of unilateral ankle sprain and limited dorsiflexion ROM. The MWM technique was compared with a placebo in a single intervention.
**Methods:** A sample of 30 subjects with a history of unilateral ankle sprain and limitation of dorsiflexion were randomized into two groups: distal tibiofibular MWM or placebo. Outcome measures were posterior talar glide and weight-bearing (WB) ankle dorsiflexion ROM. Both measures were taken prior to, and immediately following the intervention.

**Results:** No significant differences were found in baseline measures between groups. A one-way ANCOVA revealed that, immediately after the intervention, there was an improvement in ankle dorsiflexion ROM in the MWM group (increase of 1.4 cm (SD, 1.0) significantly greater than in the placebo group (decrease of 0.2cm (SD, 0.6) (P<.001). Posterior talar glide increased by 1.5º (SD, 1.8) for the MWM group, and 0.8º (SD, 1.2) for the placebo intervention, but this difference was not significant (P=.113).

**Conclusion:** A distal tibio-fibular MWM produced a significant effect on WB dorsiflexion ROM, but not posterior talar glide. These results provide preliminary evidence for the efficacy of this mobilisation with movement in the management of individuals with history of unilateral ankle sprain and limitation of dorsiflexion.

**Key Words:** Ankle sprain, mobilization, Mulligan, distal tibiofibular joint, dorsiflexion
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