

The Mulligan Concept; The Next Step in the Evolution of Manual Therapy

Jack Miller B.Sc.(PT), Dip. Manip. Ther. (NZ), FCAMT, MCTA
Accredited Mulligan Concept Teacher

Key Words: Nags, Snags, Manual Therapy, Mulligan, Mobilization with Movement

(Published Orthopaedic Division Review May/June 1999)

Summary

Brian Mulligan's novel concept of the simultaneous application of therapist applied accessory mobilizations and patient generated active movements is described. The indications for use of this unique approach and examples of commonly treated clinical presentations are outlined. Increased function and decreased pain are expected to be immediate and sustained with the application of these techniques with no pain experienced during their utilization.

Introduction

The Physiotherapy treatment of musculoskeletal injuries has progressed from its foundation in remedial gymnastics and active exercise to therapist-applied passive physiological movement and on to therapist-applied accessory techniques. Brian Mulligan's concept of mobilizations with movement (MWMS) is the logical continuance of this evolution with the concurrent application of both therapist applied accessory and patient generated active physiological movements. These techniques were developed by Mulligan in New Zealand through his role as the principle clinical instructor for the New Zealand Manipulative Therapy Associations Graduate Diploma program and over 30 years in private clinical practice. First used in the cervical spine, MWMS quickly found their way into the treatment of peripheral joint dysfunctions and have undergone clinical refinement and expansion to all areas of the spine and most extremity joints.

Principles of Treatment

In the application of manual therapy techniques, Physiotherapists acknowledge that contraindications to treatment exist and should be respected at all times. (1) Although always guided by the basic rule of never causing pain, therapist choosing to make use of SNAGS in the spine and MWMS in the extremities must still know and abide by the basic rules of application of manual therapy techniques.

Specific to the application of MWMS in clinical practice, the following basic principles have been developed:

1. During assessment the therapist will identify one or more comparable signs as described by Maitland (2) These signs may be; a loss of joint movement, pain associated with movement, or pain associated with specific functional activities (i.e. lateral elbow pain with resisted wrist extension, adverse neural tension).
2. A passive accessory joint mobilization is applied following the principles of Kaltenborn (3) (i.e. parallel or perpendicular to the joint plane) This accessory glide must itself be pain free.
3. The therapist must continuously monitor the patients 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 parallel or perpendicular glides to find the correct treatment plane and grade of accessory movement.
4. While sustaining the accessory glide, the patient is requested to perform the comparable sign. The comparable sign should now be significantly improved (i.e. increased range of active motion, muscle contraction and free of the original pain).
5. Failure to improve the comparable sign would indicate that the therapist has not found the correct treatment plane, grade of mobilization, spinal segment or that the technique is not indicated.
6. The previously restricted and/or painful motion or activity is repeated by the patient while the therapist continues to maintain the appropriate accessory glide. Further gains are expected with repetition during a treatment session particularly when pain-free overpressure is applied. Self-treatment is often possible using MWM principles with sports type adhesive tape and/or the patient providing the glide component of the MWM and the patients own efforts to produce the active physiological movement. Pain is always the guide. Successful

MWM techniques should render the comparable sign painless while significantly improving function during the application of the technique. Sustained improvements are necessary to justify ongoing intervention. (4)

NAGS

In the cervical spine, Mulligan describes an oscillatory mid to end range manual therapy technique performed in seated weight bearing. As the therapists gliding force is always performed parallel to the surface of the relevant apophyseal joints under treatment they have been termed "Natural Apophyseal Glides" or "NAGS".

Their application is well described by Mulligan and therapists using these this technique find excellent results in both the mid and lower cervical as well as upper thoracic spine. (5)

NAGS provide the therapist with an opportunity to both assess and treat the patient in the closed kinetic chain weight bearing position where most patients experience their symptoms. They are often indicated in the elderly and highly useful in the management of the acute post-injury patient when other manual therapy techniques would be poorly tolerated.

SNAGS

Mulligan's other spinal manual therapy treatment techniques involve the concurrent application of both therapist applied accessory apophyseal joint gliding and end range active physiological movement on the part of the patient. As these techniques are sustained at the end of available pain-free range and still follow the plane of the apophyseal joints under treatment, they have gained the name "Sustained Natural Apophyseal Glides". "SNAGS" was of course the acronym of choice. (6)

Mulligan claims these to be a new and unique approach as they:

1. Are performed exclusively in weight bearing.
2. Are mobilizations which are combined with active or passive physiological movements.
3. Follow the Kaltenborn treatment plane rule that applies to both spinal and extremity joints. (7, 3)
4. Are sustained at the end of range where pain-free overpressure may be applied.
5. Are applicable to all spinal joints.
6. Allow the therapist to quickly decide if they are indicated and will become part of a given therapy regime.
7. Are painless when performed correctly and clinically indicated.
8. Produce immediate and sustained gains in pain-free function. (8)

Peripheral MWMs

Mobilizations with movement in the peripheral joints are also the simultaneous combination of therapist-applied accessory gliding techniques and patient and/or therapist generated physiological movements. They are applicable to most extremity joints and result in immediate and sustained improvement in mobility and function.(9)

Physiotherapists seeking to expand from a basic recipe treatment format to an analytical problem solving approach based on a solid foundation of; anatomy, arthrology and biomechanics will find this system of intervention rewarding to both the patients under their care and to their own professional development. Mulligan readily admits that his discovery of NAGS, SNAGS and MWMs was by chance and therefore encourages his students to emulate Louis Pasteur who stated that; "In the field of scientific discovery chance only favors the prepared mind".(8)

Clinical Examples

SNAGS for Cervical Extension

A commonly seen clinical presentation is the patient who following an acceleration rear-end auto collision experiences an ongoing painful and significant loss of active and passive cervical extension. Practitioners familiar with the system of treatment advocated by McKenzie may wish to use the patients own forces in this direction to centralize symptoms and "reduce a posterior derangement"(10).

Unfortunately attempts to do so are often met with resistance on the part of the patient due to unacceptable levels of central cervical pain and/or an increase in their peripheral symptoms particularly in the acute phase.

SNAGS for extension are a reliable means to safely and efficiently restore the range of cervical extension and decrease the pain associated with this maneuver. The treating therapist will of course have completed a full orthopaedic and neurological scan of the patient ensuring that this is an appropriate candidate for the application of manual therapy techniques. (24)

In order to accomplish one or both of the desired tasks of pain reduction and recovery of function, the patient is seated in a supportive low back chair with the therapist positioned behind. It may be useful to have the patient sit facing a large wall mounted mirror as it allows the therapist to observe the patients facial expression and therefore reaction during the early stages of the technique.

The current range of cervical extension (the comparable sign) is checked for range, rhythm, deviation and limiting factors such as; increasing pain during range, pain at end of the available range or painless stiffness at the end of a reduced range of motion.

The therapist uses the medial border of one thumb reinforced by the pad of the other thumb to apply an antero-superior accessory glide through the superior spinous process of the involved motion segment. The direction of this mobilization must follow the plane described by the surfaces of the apophyseal joints under treatment.

The cervical apophyseal joint planes are directed antero-superiorly with the inclination increasing at lower levels. A general rule of thumb is that the planes of the cervical apophyseal joints converge at or near to the eyes of the patient. (12)

While sustaining this pain-free accessory glide, the patient is instructed to actively perform the comparable sign of cervical extension. The expectation is that the range displayed will significantly increase and any pain previously experienced will be virtually abolished.

As the patient progresses through the increasing physiological range, the therapist must "track" with the spinous process to maintain his/her glide parallel to the changing treatment plane. As such, the therapists forearms circumscribe an arc whose apex faces antero-superiorly (see figure one). The end range physiological movement is sustained for several seconds. Overpressure may be given at the end of range by the patient to enhance the effect and the procedure is repeated in sets of five to ten.

The patient's post-treatment range should now be re-evaluated to observe the overall gain without the application of the mobilization component. The therapist should have a clear concept of the patients level of irritability and perform between one to four sets depending on this assessment.(11)



Figure One: Cervical SNAGS

A home program shown in figure two may be performed between treatment sessions utilizing the SNAGS principles and a towel to impart the glide component to maintain gains achieved during treatment.

The therapist may use passive intervertebral movement (PIVM) and/or passive accessory vertebral movement (PAVM) procedures as well as typical pain patterns but preferably, logically structured clinical experimentation based on sound clinical reasoning when deciding which segment and direction to mobilize. (12)

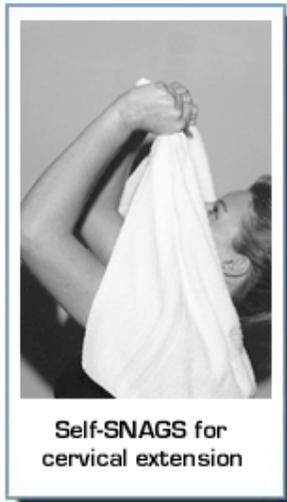


Figure Two: Self-SNAGS for cervical extension

Unilateral SNAGS over the articular pillars may also be attempted for symptoms not responding to centrally applied techniques.

One of the most exciting aspects of SNAGS mobilizations is the ability to treat a patient dynamically through a range of movement. Painful arcs or deviations of movement may be addressed dynamically through the affected range as opposed to statically in a series of positions. The possibilities for treatment of combined movements with SNAGS are most rewarding. (13)

Discussion

Patients regularly seek an explanation for the dramatic increase in range and decrease in pain that is often achieved in one session. Some therapists use the analogy of a "drawer stuck in its runners". The drawer is not "out of place" but rather it is "not tracking properly".

Biomechanically oriented Physiotherapists will accept that, due to trauma or muscle recruitment imbalance, the patella may develop a "tracking mechanism problem" (14)

It is suggested that such a phenomenon may equally occur with the spinal apophyseal joints.

Our tendencies as clinicians is to compartmentalize clinical presentations into single pathologies. However MacNab presents the concept of the spinal motion segment as being equivocal to a three legged stool.(15) One cannot move one leg without affecting all legs in some manner. Failure of the posterior column joints to glide properly may result in an altered instantaneous axis of rotation and increased anterior column stress. (16, 17, 18)

It may be this intimate relationship that can best explain why SNAGS which would appear to principally affect apophyseal joint function are often dramatically effective for those patients suffering from what many therapists would agree are comparable signs consistent with anterior column pathology. (19)

In the extremities, it is well acknowledged that an "attack strategy" of restoring a painful restriction of joint motion (i.e. loss of shoulder elevation treated by passive physiological and accessory mobilization) is both safe and effective.(2)

In the spine, particularly in the acute pain-control stage of recovery, it seems that Physiotherapists generally follow an "avoidance strategy" of treatment choosing physiological treatment directions that are the least painful. Maigne exclusively advocates techniques in the pain-free direction.(20)

SNAGS mobilizations allow the therapist to directly "attack" the painfully restricted movement, even in the acute stage, by using a movement that would normally increase the patients symptoms but are now pain-free or centralize the pain through the successful application of a SNAG.

The phenomenon of centralization (21, 22, 23) is well recognized as a positive prognostic change and should be used to guide the treatment used by therapists employing SNAGS in clinical practice. SNAGS should not increase the pain of complaint during or after their successful application and any technique resulting in a

peripheralization in symptoms should be discarded. What may however occur is that a physiological movement that peripheralizes symptoms may in fact centralize pain when combined with the appropriate SNAG to the correct segment.

Hip Internal Rotation MWM

Kaltenborn describes the capsular pattern of the hip as being a proportionate loss of movement in the following order from greatest to least loss: internal rotation, extension from zero, abduction, flexion and external rotation.(3) A greater loss of internal compared to external rotation is therefore often seen as an early sign in degenerative hip pathology (24).

There also appears to be a relationship between loss of hip mobility and mechanical lumbar dysfunction. (25, 26)

Due to the high degree of joint surface congruency present in the hip, true joint gliding parallel to the joint plane is minimal at best.(27)

The application of a perpendicular/ distractive mobilization may be easily accomplished through the use of a mobilization seat belt. Having measured the present range of internal rotation, an infero-lateral distraction is applied by the seat belt which is looped around the therapists buttocks and the patients inner thigh (as folded towel pad helps with any local tenderness).

The comparable sign of internal rotation (hip and knee flexed to 90 degrees) is now applied by both patient and therapist. The active-assisted range of internal hip rotation should now be significantly increased and any pain previously experienced should be virtually abolished.

Several repetitions to the end of available range should result in a sustained increase in range and only minimal discomfort at the end of the new increased motion. Overpressure may be safely applied to enhance the effect. (28) (see figure three)



Figure Three: Hip internal rotation MWM

Appropriate muscle balancing exercises (29, 17) would be given including stretches to maintain the improved range between treatment sessions. Several treatment sessions of three to four sets of ten MWMs will see progressive and lasting improvement in range and decrease in pain.

Concomitant lumbar and/or pelvic girdle pathologies should of course be fully investigated and treated appropriately.

Although individual MWMs may be applied for the various losses in hip joint range of motion observed, restoring internal rotation will often result in a resolution in other hip movement dysfunction. Those patients with concurrent hip and lumbar signs often respond well to treatment initially directed to the hip through this technique. Assessment of hip function should be an integral component of all lumbar examinations.

Discussion

It is curious that an accessory maneuver which actually increases joint capsule tension (lateral distraction) would

have such a profoundly positive effect on joint mobility during its application.

Due to this factor and the rapidly reversible nature of even long standing hip joint hypomobility, a simple soft tissue/capsular contracture model of joint dysfunction would not seem germane.

Mulligan originally postulated a "positional fault" (8) to explain the results gained through his techniques. Such a concept would seem more applicable to pain experienced during rest while the major benefit of MWMs is the restoration of mobility and/or the alleviation of pain with movement or functional activities. As such, a "joint tracking mechanism" model is now being used by teachers of the Mulligan concept to explain the phenomenon being observed on instructional courses and clinics (30)

Over the history of manual therapy many theoretical models have been proposed to explain the results achieved. "Joint dysfunction" (31), "spinal lesion" (32), "internal derangement"(24) "facilitated segment" (33), "lack of accessory glide" (3), "derangement of the disc complex" (21) and "altered muscle recruitment patterns" (17) models have all been postulated. Mulligan's concept of an "alteration in the joint tracking mechanism" (8) is equally vague but equally valid until more scientific research has been completed.

Other MWM applications

Although most commonly used to treat painful restrictions of spinal and peripheral joint mobility, therapists skilled in the application of MWMs have found them to be useful for other commonly seen orthopaedic conditions.



Figure Four: Posterior glide with active abduction MWM

Examples of comparable signs often treated successfully by MWMs include: • A painful arc of active shoulder elevation. (24)

A posterior glide of the head of the humerus within the glenoid cavity will often render a painful mid-range of abduction pain-free. (8)

(see figure four; previous page) • Pain experienced at the lateral elbow with resisted wrist extension and/or hand grip. (24)

A lateral glide of the forearm in relation to the distal humerus will significantly increase the pain-free resistance available. (34) (see figure five)

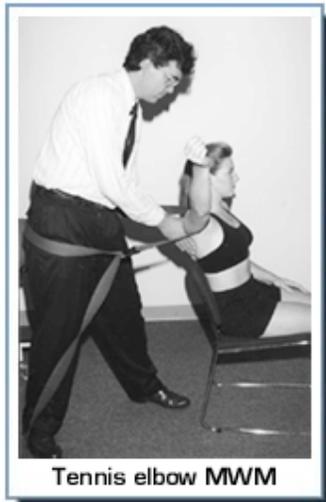


Figure Five: "Tennis elbow MWM"

Conclusion

Although yet to be fully validated in the laboratory, Mulligan's concepts of the fusion of therapist and patient-generated forces have been vindicated time and again in the best lab available to clinicians - the clinic "shop floor". Preliminary research has already been undertaken with positive results. Research oriented Physiotherapists are encouraged to take up the task of further scientific ratification of Mulligan's concepts. In the mean time, the application of NAGS, SNAGS and MWMs will prove a valuable tool to clinical Physiotherapists equipped with the necessary assets: a sound knowledge base, clinical reasoning skills and an open, prepared mind.

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