The Mulligan concept of mobilizations with movement (MWM) is a specific therapeutic intervention designed to couple accessory mobilization with physiological motion. The concept was developed by Brian Mulligan on the basis of his clinical experiences and the influences of noted physical therapists Freddy Kaltenborn, Geoff Maitland, Robin McKenzie, and Robert Elvey and orthopedic physician, Dr. James Cyriax. Mulligan experimented in clinical practice to develop his theory of MWM. The purpose of this report is to provide an overview of the Mulligan concept of MWM and to present documented therapeutic outcomes.

**Key Points**

- Mobilizations with movement can be used to assess and treat a variety of musculoskeletal conditions.
- Mobilizations with movement can produce immediate and long-lasting therapeutic benefits.
- Patients can be taught self-mobilizations with movement to decrease reliance on the clinician.

**The Mulligan Concept**

Clinicians often deal with pathology that produces abnormal joint mechanics (e.g., hypomobility or hypermobility). The difficulties a clinician faces are determination of the cause of mechanical dysfunction and selection of the most appropriate clinical intervention. A possible cause of mechanical instability that is often overlooked is a positional fault, which is a sustained malalignment of a joint or a subluxation that is too subtle to detect through palpation or to visualize on a radiograph. Injury can theoretically result in a positional fault that alters joint kinematics of the spine and peripheral joints. The positional fault can be responsible for pain and decreased range of motion, which should be resolved when the positional fault is corrected.

An example of a positional fault is mechanical instability of the ankle following a lateral ankle sprain. A plantar flexion and inversion mechanism of injury is likely to result in a sprain of the anterior talofibular ligament and possibly the calcaneofibular ligament as well. Mulligan suggested that mechanical instability and limited function may be caused by a primary injury (e.g., ligament pathology) or a secondary tissue response (e.g., edema) that induces a positional fault. An anterior positional fault of the fibula may result from either the ATFL pulling its distal portion into an anterior and caudal subluxation, or edema in the ankle joint may be responsible. The talus, which lacks muscle attachments, could also be pulled into an anterior subluxation. Any combination of these factors may result in a positional fault that would cause pain, instability, and decreased function.
The theory that positional faults occur in the ankle following injury has been supported by comparison of the position of the fibula to that of the tibia with an external measurement device, fluoroscopic examination, and magnetic resonance imaging (MRI). Kavanagh theorized that an anterior positional fault of the fibula would result in increased anterior-posterior movement of the fibula following a lateral ankle sprain, which was observed in one-third of the subjects who had recently sustained an acute ankle sprain (2/6). Hubbard and Hertel reported fluoroscopic evidence of significant anterior positional faults in the injured ankles of subjects with subacute lateral ankle sprains compared to their contralateral ankles and compared to the ankles of side-matched control subjects. Hubbard et al. reported that a statistically significant anterior position fault was present in patients suffering from unilateral chronic ankle instability (CAI). Thus, a therapeutic technique that addresses the positional fault may be needed to restore normal joint function.

**Technique**

The Mulligan concept of MWM is a manual therapy technique that has been designed to address positional faults for restoration of normal arthrokinematic and osteokinematic motion. Mulligan hypothesized that a positional fault has been identified and corrected when MWM abolishes pain, restores function, and provides a long-lasting therapeutic effect. MWM may be appropriate for relief of pain, movement impairments, reduced muscle length, and positional faults. All precautions and contraindications associated with joint mobilization and manual therapy are applicable to MWM, which could have an adverse effect on an injured joint.

MWM involves a sustained passive joint glide while the patient actively moves the joint (or motion segment). The accessory glide may or may not be applied by the clinician while the patient is performing active movements. The acronyms “PILL” and “CROCKS” (Table 1) guide the administration of MWM. The “PILL” acronym refers to Pain-free mobilizations that produce Immediate effects, and achieve Long-lasting results. If a “PILL” response does not occur, the clinician does not continue to administer the MWM technique. Upon completion of the MWM technique, the clinician assesses the ability of the patient to perform the same movement without manual application of the accessory glide or the patient’s ability to perform a functional task (e.g., reaching for an object in a range of motion that was previously impaired).

**MWM for the Distal Tibiofibular Joint (Inversion Ankle Sprain)**

Following an inversion ankle sprain, MWM for the distal tibiofibular joint can be used as a test or a treatment. To perform the MWM, the patient is positioned supine with the heel off the end of the treatment table. The

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clinician places the thenar eminence of one hand over the anterior and distal portion of the lateral malleolus and uses the other hand to support the patient’s leg (Figure 1). The MWM is performed by gliding the fibula posteriorly and obliquely on the tibia. The direction of the glide is performed along the line of the ATFL as a sustained anterior-posterior dorso-proximal glide. While the glide is manually sustained, the patient is instructed to perform a plantar flexion and inversion movement. The clinician then uses his or her abdomen to generate a force against the dorsum of the patient’s foot (i.e., overpressure) to further displace it beyond the limit of the active movement (Figure 2). If pain is elicited by the glide, the clinician should alter the direction of the manual force until the movement becomes pain-free. If the pain is caused by the pressure of the clinician’s thenar eminence on the fibula, a foam pad can be used between the clinician’s hand and the surface of the patient’s ankle. Upon completing the MWM treatment, the application of tape may help to maintain the fibula repositioning that was achieved (Figure 3).

**Treatment Outcomes**

Although the quality and quantity of available research evidence supporting the use of MWM is insufficient to draw a definitive conclusion about its clinical effectiveness, clinicians have reported rapid decreases in patient self-report of pain and improved function after a single treatment or after completion of a course of treatment. Hetherington used a sustained distal tibiofibular joint MWM with active motion and overpressure to treat acute ankle sprains, which was followed by tape application for maintenance of fibula position. She reported increased pain-free inversion range of motion, improved gait, and improved postural balance among an unspecified number of patients. Stubbs et al. utilized the same procedures to treat a lateral ankle sprain in a collegiate soccer player, which immediately relieved the patient’s symptoms and allowed him to start participating in activities.
return to competition without reinjury for the remainder of the season. O’Brien and Vicenzino also utilized the previously described MWM and taping procedures, which were reported to produce rapid improvements in range of motion, pain, and functional outcomes scores for two patients.

Other ankle MWM techniques have also been utilized for treatment of a lateral ankle sprain. Vicenzino et al. reported that both weight-bearing and nonweight-bearing MWM produced significantly improved posterior talar glide and ankle dorsiflexion in 16 subjects with chronic ankle instability when compared to measurements for the same subjects in a control condition. Collins et al. also reported significant improvement in ankle dorsiflexion in 16 subjects who had recently sustained an ankle sprain. Green et al. reported a more rapid return to pain-free ankle dorsiflexion among 19 patients with an acute ankle sprain who were treated with MWM (i.e., fewer treatments) compared to 19 patients who did not receive the MWM treatment.

Case studies have demonstrated MWM effectiveness for treatment of a locked lumbar zygapophyseal joint, DeQuervain’s disease, lateral epicondylalgia, chronic thumb pain, and chronic shoulder, arm, and neck pain. A pilot study on the use of MWM for treatment of shoulder impingement provided preliminary evidence that it may help to reduce pain and improve function. The use of MWM for treatment of lateral epicondylalgia has generally increased pain-free grip strength. Two studies have documented an increase in pain-free grip strength and pressure-pain threshold to a greater extent than that of placebo or control groups. Abbot reported that treatment of the elbow with MWM improved shoulder range of motion in patients with lateral epicondylalgia.

Summary

Although MWM has demonstrated potential therapeutic benefits for patients with a variety of musculoskeletal conditions, it is not appropriate for every patient. To increase clinical success and minimize clinical failures, the clinician must complete a thorough physical examination. Positional faults are not present in every patient; however, a search for positional faults can be integrated with other components of a clinical examination to improve therapeutic outcomes. The clinician should remember to follow Mulligan’s principles, which are represented by the “PILL” and “CROCKS” acronyms to achieve the greatest clinical benefit.

The MWM concept has the potential to produce immediate and long-lasting effects, even in patients that had not previously responded to other treatment for an extended period of time. The technique of MWM administration can easily be adjusted (e.g., amount of force and direction of force application), and the patient can be taught to perform self-mobilizations. The current body of evidence supports the use of MWM in clinical practice, but further well-designed research is needed to better understand the positional fault phenomenon and the therapeutic effects of MWM.

References


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