

# Comparison of Maitland Mobilization and Mulligan Mobilization with movement on pain and hand function in patients having post Colle's Fracture Stiffness

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## ABSTRACT

**Background:** Post-surgical rehabilitation of Colle's fracture requires manual and exercise therapy to restore normal hand function.

**Aim:** To compare the effectiveness of Maitland mobilization and Mulligan's mobilization with movement on hand function and pain after Colle's fracture.

**Study Design:** Non randomized clinical study.

**Methodology:** Study was conducted after ethical approval, at physiotherapy department Mayo hospital Lahore in 2019-20. Sample of 60 patients estimated by epitool, was divided into three equal groups (A, B & C). Subjects were screened on the basis of predefined eligibility criteria. All three groups received the respective therapy along with baseline treatment on alternate days for 4 weeks. Pre and post treatment and follow up assessments included VAS, patient rated wrist evaluation questionnaire and wrist ranges of motion with goniometer.

**Results:** Mean age of participants was 45.38±6.58 years. No significant measures were found in any of the outcome measure between Maitland and Mulligan mobilization ( $p < 0.05$ ). Statistically significant improvement was found in all groups. **Conclusion:** We concluded that the Mulligan mobilization with movement was effective to reduce pain and improve hand function in management after Colle's fracture.

**Keywords:** Colle's Fracture, Post Fracture Stiffness, Radius Fracture, Mobilization and Mulligan's Mobilization.

## INTRODUCTION

Distal radius fracture (DRFs) also recognized as Colle's fracture named after the person Abraham Colle's in 1814, is one of the commonest fractures of upper extremity. Colle's fracture is an extra-articular injury which arises as the result of a fall on an out-stretched upper extremity (FOOSH) and they are the early indicator of osteoporosis. Though seen in all age groups and demographics, Colle's fracture is prominently seen in senile population specifically in elderly women with the history of osteoporosis<sup>1</sup>.

The pattern of Colle's fracture may be the result of age-related impairments in the swiftness and strength of spreading the limb for safety of other parts of the body during a fall event<sup>2</sup>. Apart from old age and osteoporosis, the obese adults are more prone to wrist fractures<sup>3</sup>. Studies have reported that walking and self-reported physical activity for exercises are interlinked with greater risk of fracture around wrist. Although exercise and walking results in reducing the risk of fracture but it varies with the intensity and duration of exercise. High intensity can result in higher chances of fractures<sup>4</sup>.

DRFs are entertained mostly in outpatient departments. The minimally displaced fractures are treated in a conservative manner which contains padding, plaster cast and splinting. The displaced fractures are treated surgically with external fixation, percutaneous pinning, closed reduction or with ORIF<sup>5</sup>. The physical therapy has a great participation in post fracture management of the Colle's fracture<sup>6</sup>. The aims of physiotherapy include improvement in the ROM's, strength & activity during and after the immobilization. Physical therapies like exercises, soft tissue techniques, manual therapy, passive mobilization and electrotherapy<sup>7</sup>.

Maitland's mobilization technique is one of the widely used manual therapy techniques to treat hypomobile joints<sup>8</sup>. This

technique includes application of accessory oscillatory movements and pressure to the joints to address mechanical stiffness. These oscillatory movements activate different mechanoreceptors present in the joint and helps in breaking adhesions caused by hypo mobility<sup>9</sup>. The Maitland concept gives five grades of mobilization: grade I-V which are used as per indications and contraindications<sup>10</sup>.

B. Mulligan's Mobilization with the movement (MWM) is a category of manual techniques which is extensively utilized in addressing the musculoskeletal pains. It includes the application of a passive sustained glide by a therapist manually to a joint, while a simultaneous movement of the joint is actively performed by the patient<sup>11</sup>.

In the literature there is enough evidence available on the technique of Maitland mobilization on improving pain and hand function for patients having Colle's fracture but there is no evidence of Mulligan mobilization with the movement. As this is a novel technique, easy to use and cost effective.

The objective of the study was to compare the effectiveness of Maitland mobilization and Mulligan's mobilization with movement on hand function and pain after Colle's fracture.

## METHODOLOGY

This non-randomized clinical study was conducted during 2019-20 at the physical therapy department, Mayo Hospital Lahore Pakistan, after ethical approval. Patients between age 35-55 years, irrespective of their gender and side of fracture, with healed colle's fracture confirmed by the radiograph were included in the study. Whereas, patients with metacarpal fracture or compartment syndrome, mal-union, non-union and metal implants were excluded. After obtaining consent for participation in the study, the subjects were divided equally in 3 groups, with 20 subjects in each group. The outcome measures were pain measured through visual analogue scale<sup>12</sup>, wrist functional score measured through a 15-item patient rated wrist evaluation questionnaire<sup>13</sup> and wrist range of flexion, extension, ulnar deviation & radial deviation, with small

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goniometer<sup>14</sup>. PRWE comprises of scoring for Pain and function (Usual & specific activities) total score ranges from 0-150, lower score means least pain and disability and vice versa. The outcomes were measured at baseline, after four weeks and on follow up. Baseline treatment consisted of thermotherapy through moist hot pack and passive range of motion exercises for wrist in all directions with three sets of 15 repetitions each. Total of 14 sessions were administered to all subjects, of 30 minutes each. Follow up assessment was done at the end of the 6<sup>th</sup> week.

**Group A** received Maitland mobilization with Volar and Dorsal glides for flexion and extension (Grade I & II) in the week one and later followed by (Grade III & IV) for the next 3 weeks<sup>15</sup>. There were 15 oscillations each lasting 20 to 30 seconds, followed by a slow stretch.

**Group B**, the Mulligan mobilization with movement was performed<sup>16</sup>. Mulligan mobilization with movement (MWM) technique, lateral and medial glides were performed with active wrist extension and flexion in prescribed position. Ten repetitions were performed and the patient was advised to apply over pressure with his free hand to get further range.

In **Group C**, only baseline treatment in the form of moist heat pack and PROM exercises was given.

**Statistical Analysis:** The data analysis was done by SPSS Version 25. Data is found normally distributed on Shapiro wilk's test. The descriptive statistics are presented in the form of mean ±

SD. T-test is performed to check the difference between the groups.

**RESULTS**

Mean age in group A was 47.25±7.56, in group B was 42.50±6.17 and in group C was 46.40±6.02. Comparison of VAS scale score between group A, B & C has shown a significant difference between post treatment scores, post treatment mean VAS score was 3.25±1.20 in Maitland group, 1.90±1.16 in Mulligan group and 3.90±1.16 in the conventional treatment group with the P value of 0.000, showing that Mulligan mobilization is better than other two treatments in reducing pain. On comparison of PRWE between the groups A, B and C, there was significant difference between post treatment scores, which was 38.65±6.65 in Maitland group, 25.95±4.85 in Mulligan group and 41.60±6.97 in conventional treatment group (P= 0.000), showing that Mulligan mobilization is better than other two treatments in improving functional status (Table-1).

The comparison of wrist and forearm ROM between group A, B and C has shown that there was significant difference between post treatment wrist and forearm mobility in mulligan group, (P=0.000) for each range, showing that Mulligan mobilization is better than other two treatments in improving wrist and forearm mobility (Table-2).

Table 1: Pain and Disability Within Group Analysis

Outcome variables	Study Group	Baseline	4 <sup>th</sup> week	Follow Up	P value
VAS* Score	Maitland	6.28±0.63	3.25±1.20	2.35±1.01	0.110
	Mulligan	6.79±0.82	2.70±1.52	1.90±1.65	0.000
	Conventional	6.83±0.84	3.90±1.65	2.86±1.09	0.104
PRWE ** Score	Maitland	95.00±1.53	38.65±6.65	25.84±1.01	0.120
	Mulligan	105.00±0.79	25.95±4.85	19.98±2.15	0.000
	Conventional	103.81±1.17	41.60±6.97	28.00±1.73	0.103

VAS\*: visual analogue scale; PRWE\*\*: Patient Rated Wrist Evaluation.

Table-2: Wrist Ranges of Motion Within Group Analysis

Wrist ROM's (In degrees)	Study Groups	Baseline (In degrees)	4 <sup>th</sup> Week (In degrees)	Follow Up (In degrees)	P value
Flexion	Maitland	16.10±1.07	29.45±5.58	37.65±1.26	0.123
	Mulligan	12.79±2.73	36.95±4.95	41.65±0.96	0.003*
	Conventional	13.57±1.29	28.00±2.62	30.05±2.17	0.110
Extension	Maitland	12.16±5.28	24.50±4.45	53.24±2.76	0.012
	Mulligan	10.79±3.21	32.35±7.64	65.27±1.93	0.000*
	Conventional	11.38±2.63	21.35±4.89	47.18±2.48	0.137
Ulnar Deviation	Maitland	5.05±1.51	17.90±2.80	31.38±1.57	0.103
	Mulligan	5.67±2.34	25.80±3.07	39.37±2.37	0.000*
	Conventional	6.02±1.68	17.80±1.90	32.00±2.03	0.156
Radial Deviation	Maitland	3.91±1.59	14.40±2.11	14.71±0.48	0.120
	Mulligan	4.03±1.62	18.20±1.76	20.00±1.00	0.000*
	Conventional	3.70±1.81	12.55±1.90	14.64±0.74	0.132

\*Statistically Significant

**DISCUSSION**

In a randomized controlled trial M Tomruk et al (2020) concluded that with the addition of early manual therapy there was more improvement in wrist flexion than standard physiotherapy alone (26.50±13.19 versus 16.21±16.06). The results of their findings suggested that the addition of early manual therapy to standard physiotherapy may be more effective in increasing wrist flexion in patients with distal radial fractures<sup>5</sup>. The results of this study support our findings where incorporation of Maitland mobilization and Mulligan MWM showed more improvement in wrist flexion as compared to conventional physical therapy. According to another study by Susan A Reid (2020) adding MWM to exercise and advice gives a quick and greater improvement in motion impairments for non-surgical management of distal radius fracture. The results indicated that the supination was greater in the experimental group by 12° (95% CI 5-20) at 4 weeks and 8° (95% CI 1-15) at 12 weeks. However, there was no patient related outcome measures in the said study; in our study apart from the objective measures we also used PRWE to evaluate the effects of MWM in terms of

patient functional outcomes as in any rehabilitation of the upper extremity complete recovery must be achieved, otherwise the quality of life and functional independence may be comprised<sup>17</sup>.

U Albert Anand in 2014, in a randomized study resulted that Maitland's mobilization technique combined with electrical neuromuscular stimulation helps in alleviating pain and enhances hand grip strength in patients having post Colle's fracture stiffness<sup>18</sup>. In another study conducted by Naik Varsha, Maitland's mobilization technique was considered to be an effective treatment in improving the active and also the passive wrist flexion. In most of the patients of Colle's fracture wrist flexion and extension are highly affected. Maitland's Grade I & II mobilizations are used for pain management in post fracture rehabilitation while Grade III, IV & V are used for the range of motion<sup>19</sup>.

The purpose of therapeutic interventions post immobilization, for fractures of distal radius include improving the ROM, strength and functional performance by means of numerous modalities such as passive mobilization, soft tissue techniques, exercise, splinting, electrotherapy, and intervention to control odema<sup>20</sup>. While these interventions are frequently used for the rehabilitation

purpose of patients post distal radius fracture, till now there is inadequate research estimating their effectiveness. This study demonstrated that the application of the Mulligan's MWM technique to participants with a painful restriction of wrist movements produced an immediate and significant improvement in ROM and pain after 4 weeks of intervention. Decreased pain provided the opportunity to performance activities with freedom. Normal hand function provides us the ability to perceive and manipulate objects in the surrounding environment<sup>21</sup>.

This research is the rare clinical study to compare two manual techniques; Maitland mobilization and Mulligan's MWM in patients after colle's fracture reduction. According to the result Mulligan mobilization with the movement was found effective in improving pain and range of motion at wrist joint after post colle's fracture.

## CONCLUSION

We concluded that Mulligan Mobilization with movement may be an effective treatment to reduce pain and improve hand function in management of post Colle's fracture.

**Limitations:** The study has few limitations as well. The size of the sample was not enough to generalize the results over all patients. Limited resources were available.

**Authors' Contribution:** MJ & SA: Conceptualized the study, analyzed the data, and formulated the initial draft, SA & WP: Contributed to the histomorphological evaluation, UA, JA & ZM: Contributed to the analysis of data and proofread the draft

**Conflict of interest:** Nil

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