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# Effectiveness of Maitland mobilisation technique on pain and hand functions in the postoperative management of Colles fracture

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**Abstract**
This study compared use of the Maitland mobilisation and conventional mobilisation techniques for improving pain and range of motion postoperatively in patients with Colles' fracture. The subjects were 60 patients with colles' fracture who had been managed surgically. The subjects were divided in two groups, those who received Maitland mobilisation or those who received conventional mobilisation. Pain and hand functions were evaluated pre- and post-intervention in both groups. Paired t-tests were used to compare the pre- and post-intervention results in both groups, and independent t-tests were used to compare groups. Both groups exhibited significant decreases in pain post-intervention. Moreover, the hand functions increased significantly post-intervention in both groups. However, there was significant difference between groups with better results observed in the Maitland group with respect to pain improvement and hand functions.

**Keywords:** Maitland mobilisation, Colles, postoperative, fracture

## Introduction
A Colles' fracture is a fracture of the distal radius in the forearm with dorsal and radial displacement and impaction, but without an involvement of the articular surface [1]. The fracture is sometimes referred to as a "dinner fork" or "bayonet" deformity due to the shape of the forearm adequate after injury. Colles' fractures are the result of a fall on the outstretched hand. The complications like neuropathy of median nerve, ulnar nerve, mal-united fracture and post traumatic stiffness have been frequently reported [2]. Rehabilitation of fractures is very important improper management can lead to stiffness, deformity and limitation of functions.
Colles fractures are seen in all adult age groups and demographics and are the most common type of distal radial fracture [1]. They are particularly common in patients with osteoporosis, and as such, they are most frequently seen in elderly women [2]. Physiotherapy and early wrist movement hastens functional recovery and led to earlier resolution of wrist swelling [3].
Physiotherapy is mainly aimed at regaining range of motion, reducing pain and improving functional outcomes. This includes proper patient education to protect the fracture, oedema control, preservation of normal skin condition and a gradual return to activity. In order to achieve this, passive, active and resisted exercises are employed. Passive joint mobilisation techniques help to restore functional range of pain free active motion. Many physiotherapeutic interventions includes Electrotherapy & Exercise therapy programmes. (Including isometric exercises, active range of motion and intrinsic hand muscle exercises)
Maitland's technique includes application of pressure and accessory oscillator movements to treat stiffness which are mechanical in nature. The aim is to restore the motion. This technique includes 5 levels of grades. Grade 1 (Small amplitude range performed at the beginning of the range) and Grade 2 (large amplitude movement performed within a resistance free part of the range) used primarily for pain and Grade 3 (large amplitude movement performed into resistance or up to the limit of the range) and Grade 4 (small amplitude movement performed well into the resistance) are utilised for stiffness.

**Aim of the study**

To evaluate the effectiveness of Maitland Manipulation techniques following surgical treatment of colles' fracture on pain and functional outcome and to evaluate the complication, if any of the above treatment protocol.

**Material and Methods**

This was a retrospective study conducted on 60 patients who had undergone operative management for colles fracture in a tertiary care hospital. The study period extended from August 2014 to October 2015. Both inpatient and outpatients were included in the study. All the patients had been radiologically confirmed with a diagnosis of Colles fracture. Patients' details like diagnosis, age, gender, affected duration, etc. were collected from medical records and by interviews (including telephonic conversations).

The inclusion criteria were males and females of 18-65 years of age, who had suffered from a colles fracture and were managed with elective surgery with either internal or external fixation.

The exclusion criteria consisted of patients who refused to give consent for their data to be included in the study, were treated conservatively, had ipsilateral fracture in the upper limb, had a previous colles fracture, uncooperative patients, arthritis of the wrist, any other co-morbid condition which affected their day-to-day activities, inflammatory joint conditions, congenital deformity of hand or forearm or any neuromuscular disease. Patients with wrist mobility defects accompanying neurological damage, such as stroke or Parkinson's disease, as well as those with diabetes, malignant tumours, rheumatism, osteoporosis or radiating pain from a cervical lesion were also excluded.

2 groups were created for comparison purposes. The first 30 patients whom we came across and had been managed with conventional physiotherapy were included in the 1st group.30 other patients who had been managed with Maitland technique were included in the 2nd group.

The visual analogue scale (VAS) was used to measure the intensity of pain both pre- and post-intervention as it is considered a reliable and valid pain evaluation tool [8]. We asked the patients to mark the pain that they felt on a 10-cm line; with the left end indicating no pain (0 points), and the right end indicating the maximum pain intensity (10 points).

Patients in group A were started with general mobilization of the wrist with flexion and extension exercises. The exercises were done with the patient sitting with the palm over the edge of the table and hand stabilized by putting the palm of the other hand over it. The forearm was gradually lowered downwards for flexion and upwards for extentions. It was repeated for 15 times. This session was repeated every day for the next 15 days. Passive wrist mobilization was also done for the patients for same duration of 15 days.

Patients in group B were started on mainland mobilization. Grade 1 and 2 were applied in the first seven days of treatment while grade 3 and 4 were applied for the next 8 days. 15 sets of oscillation lasting 20 to 30 seconds, (1 or 2 oscillations / second) followed by slow stretch and stationary. Each mobilization sitting was for a duration of 30 min.

For wrist flexion: the patient starting position was with the forearm supine in the middle of the plinth with elbow flexed to 90 degrees. The therapist used to stand on the affected side of the patient just beyond the flexed elbow. The medial border of the patient's hand was grasped by the same side hand of the therapist. The thumb was placed against the dorsum of the patients metacarpals. The fingers were placed by the palm of the patient's hand. The opposite hand of the therapist stabilized the forearm of the patient midway just proximal to the wrist joint. Then the therapist's thumb flexes the patient's wrist and hand to the limit of its range; followed by the therapist's finger returning the patient's wrist to its starting position. The return movements were controlled by placing the index finger near the patient's MCP joint. Similarly the extension exercises were carried out.

In both the groups the physiotherapy was started 3 weeks after surgery.

Hand functions were measured by hand function assessment tool based on Rancho Loa Amigos Hospital test. (Carrol 1965).

**Results**

**Table 1:** Patient details

| Sl. No. | | Conventional (A) | Maitland (B) |
|---|---|---|---|
| 1 | Age(years) | 46.86 +/- 12.3 | 48.0 +/- 13.43 |
| 4 | Sex | 17 m/13 f | 16 m/ 14 f |

**Table 2:** Changes in pain and function of hand.

| Sl. No. | | Conventional | | Maitland (n = 30) | |
|---|---|---|---|---|---|
| | | Pre | Post | Pre | Post |
| 1 | Pain (VAS) | 8.13 +/- 1.04 | 4.43 +/-1.07 | 8.73 +/- 0.98 | 4.03 +/- 1.03 |

**Note:** The t value for group A was 27.03 and p value was 0.00.The t value was for group B was 23.00 and p value was 0.00.

| | | | | | t | p |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | | |
| Group A | 4.53 | 2.40 | 11.13 | 2.25 | -24.48 | 0.00 |
| Group B | 2.20 | 1.71 | 9.86 | 2.68 | -21.11 | 0.00 |

**Discussion**

The concept is named after its pioneer Geoffrey Maitland who along with several of his colleagues is considered a pioneer of musculoskeletal physiotherapy [4, 5]. The application of the Maitland concept can be on the peripheral or spinal joints, and their main theoretical approach is similar in both [6, 7].

Our study had certain limitations. Firstly, our sample size was not large enough to generalise our results to other populations. Secondly, even though patients were selected according to strict inclusion criteria, the strength of the third stage of mobilisation differed according to each patient's recovery. Thirdly, the study allowed all movements during daily activities and was therefore unable to control for the diverse motions of each patient.

**Conclusion**

Both the group showed significant improvement following 15 day of treatment. But the group in which the maitland technique had been employed showed superior results in both pain control and hand function as compared to the group where we had employed conventional physiotherapy techniques. We also found that both male and female participants in the study responded differently in terms of

functional recovery. We conclude that the maitland technique is superior to traditional, conventional methods although we suggest that future studies should include a larger sample size in a prospective study to conclusively prove the superiority of the maitland technique.

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