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Case Report

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Post-Operative Shoulder Stiffness and MWM (A case Study)

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Introduction

Humeral shaft fractures account for 1 to 3% of all fractures in adults [1] and for 20% of all humeral fractures [2]. These fractures have an annual incidence from 13 to 14.5 per 1, 00,000 people [3]. Surgical options for treatment of humeral shaft fractures include open reduction and internal fixation with a compression plate, intramedullary nail, osteosysthesis and minimally invasive bridge plate fixation. Open reduction and rigid internal fixation with absolute stability using dynamic compression plates [4] is today's standard in humeral shaft fractures. These concepts are also being applied with the use of the intramedullary nail [5]. But no matter what surgical procedure being used, patients often suffer from restricted range of motion commonly known as frozen shoulder due to prolong immobilization. In our clinical practice, it is commonly seen, that longer the immobilization, more the restriction in range of motion. Frozen shoulder syndrome (FSS), clinically known as adhesive causalities, is a painful and debilitating condition affecting up to 5% of the population. Prolonged immobilization of a joint has been shown to cause several detrimental path physiologic findings, including: decreased collagen length, fibro fatty infiltration into the capsular recess, ligament atrophy resulting in decreased stress absorption, collagen band bridging across recesses, random collagen production, and altered sarcomere number in muscle tissue [6].

Though, there are a wide variety of manual therapy procedures available to the physiotherapist to treat shoulder dysfunction, in present case study, MWM was used along with active movement as non-aggressive physical therapy interventions are generally more effective than aggressive or intensive interventions [7]. The following case report describes a patient with 12 months old post-operative shoulder stiffness after getting operated twice for non-united fracture shaft of humerus. Though it was a long standing case of stiff shoulder, and difficult to gain lost range of motion, but this case responded dramatically to shoulder MWM technique developed by Brian Mulligan.

Shoulder MWM (Mulligan Concept)

Compared to conventional manipulative therapy treatment techniques, mobilizations with movement treatment techniques (MWM) are unique because they consist of the application of a sustained accessory glide to a joint while the patient performs a previously painful movement of that joint [8]. The most important feature of MWM is that when indicated, the treatment technique produces a total and immediate relief of pain and /or increase range of motion. If pain commences, the therapist must investigate different treatment planes and/or grades of accessory motion to ensure pain-free movement. This improvement is often enhanced and maintained following few repetitions (e.g. 2-3 sets of 6-10 repetitions) by therapist and self treatment by patient himself. Mulligan [8] postulated that the success of MWM in conferring this rapid pain relief and restoration of movement was due to its ability to reduce a positional fault of the bony segments. Hence the origination of the positional fault hypothesis of MWM. Studies have been published supporting the benefits of performing a shoulder MWM technique in treating shoulder dysfunction [9,10].

History/physical examination

A 39 years old male, presented with post operative right shoulder pain and stiffness. Twelve months back he met with a road traffic accident and suffered from fracture shaft of humerus. Open reduction and internal fixation was done on next day by using plates. After six months, he was operated again for non union of the fracture site. This time intramedullary nailing along with bone graft (auto graft) was done. Fearing delayed union, he was advice for complete immobilization for another 3 months. After three months, he was advised for physiotherapy in form of active range of motion only. However, no improvement was seen after three months of active physiotherapy. He was referred for manual therapy for further management, as fracture site showed sign of union.

Examination

On physical examination his shoulder (right) range of motion was grossly restricted. Pain was recorded 4 on VAS of 10. Marked muscle wasting seen having muscle power of 3. Functional score was recorded 6/60. Healthy, mobile surgical scar noticed.

Figure 1: X-Ray, A.P. and Lateral view plating after 1st surgery and non union of fracture sit

Figure 2: X-Ray, A.P. and Lateral view Intramedullary nailing after 2nd surgery

Figure 3: Clinical presentation of patient

Treatment

Treatment was planned with the goal of increasing range of motion, reducing pain, improving muscle power and functional outcome. To achieve these goals shoulder MWM along with SMWAM at C4,5 was delivered. Scapular mobilization and gentle strengthening exercise for rotator cuff, deltoid, lower trapezius, serratus anterior and rhomboids were given. Patient was called 6 times a week and each session took 45 min. Method to delivering MWM was changed in progressive manner as the patient started showing increase in range of motion except external rotation which was still restricted. Range of motion, pain score, muscle power and functional assessment was recorded again after 12 and 24 sessions.

Variables	Pre intervention	Post intervention	Post intervention	Post intervention
	Day 1	Day 1	Day 12	Day 24
Pain (VAS Score)	4	4	3	2
ROM (Flexion)	20	35	115	150
ROM (Extension)	15	15	20	25
ROM (Abduction)	15	25	90	140
ROM (Int. Rot.)	40	45	60	70
ROM (Ext. Rot.)	10	15	35	50

Table 1: Outcome measures (Pain and ROM) recorded before and after intervention.

Variables	Pre intervention	Post intervention	Post intervention	Post intervention
	Day 1	Day 1	Day 12	Day 24
Functional Score	6	Not assessed	35	50
MMT (Flexors)	3	3	3 Plus	4
MMT (Extensors)	3	3	3 Plus	4
MMT (Abductors)	3	3	3 Plus	4
MMT (Int. Rot.)	3	3	3 Plus	4
MMT (Ext. Rot.)	3	3	3 Plus	4

Table 2: Outcome measures (Functional score and muscle power) recorded before and after intervention.

Figure 4: Pre (1st day) and Post (4th week) Abduction Range of Motion

Figure 5: Pre (1st day) and post (4th week) Internal rotation Range of motion.

Figure 6: Pre (1st day) and Post (4th week) flexion Range of motion

Figure 7: Post (4th week) External Rotation Range of motion

Discussion

In a systematic review, when compared to compression plate osteosynthesis, the use of the intramedullary nail presented a higher risk of shoulder impingement, shoulder pain, and restriction of movements [11]. In present case study, it's very encouraging, that the patient with intramedullary nail, who was not responding to conventional physiotherapy, responded extremely well to MWM (Table: 1, & 2) (Figure: 4, 5, 6, & 7). While comparing 1st day measurements with and 24th day, the range of motion, and muscle power improved and so the functional outcome. It's interesting to note that night pain also decreased slowly as the ROM and muscle power improved. MWM resulted in increase range of motion due to correction of positional fault [9]. Bang and Deyle [12] found statistically significant reductions in pain measures with subjects who received joint mobilizations in combination with supervised exercise compared to those receiving exercise alone. It would appear that excessive translation of the humeral head with relation to glenoid fossa, results in pain and functional impairment [13]. It has been suggested that the application of a postero-lateral glide MWM to the shoulder may correct this fault and allow optimal pain-free motion to occur [8]. Hsu et al., [14] in a study of 11 cadavers, found that the application of an anterior– posterior glide towards the end of range of abduction was effective in improving the range of Glen humeral abduction. The decreased in pain may also be due to activation of mechanoreceptors and inhibiting nociceptive stimuli through the gate-control mechanism [15]. Paungmali et al., [16] came with idea of neuro physiological effect resulting in reduction of pain, while working on lateral epicondylagia using MWM. Similarly, in this case study also, pain relief was there due to neuro physiological effect of MWM. In addition, active movement along with postero-lateral glide facilitated the synovial fluid movement and hence the nutrition to the joint. Capsular stretching and restoration of normal glen humeral arthrokinematics due to active movement along with MWM in available end range cannot be denied anyway.

Conclusion

MWM using postero-lateral glide may be used along with strengthening exercises of shoulder girdle muscles to increase range of motion, muscle power, functional independence and reduction in pain. It is possible to gain faster recovery even in long standing cases of post traumatic stiffness. However, further study with more number of cases highly recommended.

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