



Comparative Study on the Effectiveness of Pnf (Hold-Relax Technique) With Mobilisation Versus Contrast Bath with Mobilisation in the Management of Volar Plated Wrist.

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KEYWORDS

Fracture, Plating, Proprioceptive neuromuscular facilitation, Contrast bath, Range of motion, Muscle strength, Goniometer, Patient Rated Wrist Evaluation.

ABSTRACT:

The aim of the study is to compare the effectiveness of PNF (hold-relax technique) with mobilisation versus contrast bath with mobilisation in the management of volar plated wrist.

BACKGROUND STUDY: PNF (proprioceptive neuromuscular facilitation) helps in regaining muscle strength and also helps in re-education of the muscle action. Improves coordination and develops certain skills of the population. Contrast bath is an alternate heat and cold therapy which helps in the stimulation of the weak muscle group and prepares them for better action, so that the range of motion can be improved. It also helps in limiting the deformity of the individual in the society.

METHODOLOGY: The Study design is Comparative Study with a pre and post type based on inclusion and exclusion criteria 30 subjects were selected and using randomized sampling method it was conducted in Out Patient Department ACS Medical College and Hospital for a period of 6 weeks. **PROCEDURE:** 30 subjects were selected and divided into two groups Group A and Group B. **GROUP A:** PNF (Hold-relax technique), hold (5-10 secs), repetition (5-10 times). **GROUP B:** Contrast Bath (Alternate Cold And Heat Therapy), hot pack (3mins), cold pack (1min). **RESULT:** Comparing pre and post tests within Group A and Group B on VAS and Patient related wrist hand evaluation scores shows a highly significant difference in the mean values at $P \leq 0.001$.

1. Introduction

Volar locking plates are the most commonly used metallic device in the open reduction and internal stabilization distal radius fractures. These Devices allow immediate post operative return of motion and are good at preventing angular displacement. Their careful positioning is however key to prevent iatrogenic injuries during surgery or chronic sequelae such as late onset tenosynovitis.

Volar locking plate implantations have multiple early and late complications, many of which can be picked up on plain film, stress penetrating the dorsal cortex of the radius may damage extensor tendons, whilst the flexor compartment can be injured during volar plate positioning.

According to the International PNF association, PNF

(proprioceptive neuromuscular facilitation) stretching was developed by Dr. Herman Kibler in the 1940s as a means to treat neuromuscular conditions. PNF stretching may be the most effective stretching technique for increasing range of motion. One of the PNF techniques is hold-relax. This involves putting a muscle in a stretched position (also called as passive stretch) and holding for a few seconds. Contracting The Muscle Without moving (also called as isometric), such as pushing gently against the stretch without actually moving. Relaxing the stretch and then stretching again while exhaling. This second stretch should be deeper than the first. Relax the joint or muscle and then gently stretch for 30 seconds, then there is 30 seconds rest and process is repeated again several times. The progressive stretching and change between the contraction and



relaxation allows the muscle to adapt to its new position each time it is held in position. This allows it to stretch further next time. The normal range of movement of wrist is given by., Wrist flexion - 0-90 degrees, Wrist extension - 0-80 degrees, Radial deviation - 0-20degrees,Ulnar Deviation - 0-30degrees

Contrast bath therapy is a form of treatment where a limb or the entire body is immersed in hot water followed by the immediate immersion of the limb or body in cold ice water. This procedure is repeated several times, alternating hot and cold. This works under the principle of Lewis hunting reaction. Contrast bath is performed using a whirlpool tub. One tub is filled with warm water and another tube with cold water. The warm tub should be between 98-100 degrees Fahrenheit and the cold tub should be between 50-60 degrees Fahrenheit.

Once both the tubs are at the correct temperature, place the injured body part in the warm whirlpool, where it should stay for 3-5 minutes. We can also perform gentle motion exercises at that

time. Then quickly move the part being treated to cold water for about one minute. This sequence is repeated for 20-30 minutes. The theory behind the use of the contrast bath is that the rapid change from warm to cold helps quickly open up and close tiny capillaries (blood vessels) in the body.

Warmth causes these small capillaries to open, whereas the cold causes them to close. This rapid opening and closing of blood vessels near the site of your injury creates a pumping action that is thought to help decrease swelling and inflammation around injuries. Decreasing the swelling and inflammation helps to alleviate the pain and improve mobility.

2. Objectives

The aim of the study is to compare the effectiveness of PNF (hold-relax technique) with mobilisation versus contrast bath with mobilisation in the management of volar plated wrist.

PNF (proprioceptive neuromuscular facilitation) helps in regaining muscle strength and also helps in re-education of the muscle action. Improves coordination and develops certain skills of the population. Contrast bath is an alternate heat and cold therapy which helps in the stimulation of the weak muscle group and prepares them

for better action, so that the range of motion can be improved. It also helps in limiting the deformity of the individual in the society.

METHODS: The Study design is Comparative Study with a pre and post type based on inclusion and exclusion criteria 30 subjects were selected and using randomized sampling method it was conducted in Out Patient Department ACS Medical College and Hospital for a period of 6 weeks.

STUDY DESIGN: Comparative Study **STUDY TYPE:** Pre and post-test type **SAMPLE SIZE:** 30 Subjects, **STUDY METHOD:** Randomized sampling method, **STUDY SETTING:** Out Patient Department ACS Medical College and Hospital **STUDY DURATION:** 6 weeks, **INCLUSION CRITERIA:** Both male and female, All age group, Within two weeks after volar plating, **EXCLUSION CRITERIA:** Mentally retarded patients, Hypersensitive skin, Unconscious patients, Unco-operative patients, Muscular Dystrophy, Drug Abuse, **OUTCOME MEASURES:** Pain measurement using Visual Analogue Scale (VAS), Patient Rated Wrist Evaluation (PRWE), Evaluation of range of motion by goniometry.

Hold relax: Direct treatment

The therapist or the patient moves the joint or the body segment to the end of the passive or pain free range of motion. Active motion is preferred. The therapist asks for an isometric contraction of the restricting muscles or pattern (antagonists). The contraction should be maintained for at least 5 to 8 seconds. The resistance is increased slowly. No motion is intended by either the patient or the therapist. The joint or the body part is repositioned either actively or passively to the new limit of range. Active motion is preferred if it is free. The motion may resist if that does not cause pain. The final stretch must be held for 10 to 15 seconds.

Hold relax: Indirect treatment

In the indirect treatment with hold relax, the therapist resists the synergists of the shortened or painful muscles and not that painful muscles or painful motion. If that still causes pain resist the synergistic muscle of the opposite pattern instead.



CONTRAST BATH DESCRIPTION:

STEPS:

Water in the cold container should be between 50-59°F (10-15°C), and water in the hot container should be between 95-113°F (35-45°C).

Immerse the injured part in warm water for 1 to 3 minutes. Immediately follow with a 1-minute dip in Coldwater. Repeat this process for approximately 20 minutes, ending with cold-water.

DATA ANALYSIS

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using the statistical package for social science (SPSS) version 24. Paired t- test was adopted to find the statistical difference within the groups & Independent t-test (Student t- Test) was adopted to find statistical difference between the groups.

3. Results

On comparing Pre test and Post test within Group A & Group B on VAS and Patient Rated Wrist Evaluation Score shows highly significant difference in mean values at $P \leq 0.001$.

4. Discussion

In this study, VAS score and PRWE score significantly improved as a result of 6 weeks PNF (hold relax technique). These findings are in agreement with the previous findings by Florian Schneider et al., (2009) from determining the effects of 2 different post-operative therapy approaches after operative stabilization of the wrist fractures. After a 6-week period of postoperative treatment, the patients (n=23) performing an independent home exercise program using a training diary showed a significantly greater improvement of the functionality of the wrist. Grip strength reached 54% ($p=0.03$) and ROM in extension and flexion 79% ($p<0.001$) of the uninjured side. Patients who were performing the home training after operation recorded an improved function with a nearly 50% lower value ($p<0.001$) in the PRWE score.

However, even though our results in pain reduction and improvement in PRWE score are consistent with these similar findings with increase in functionality of wrist,

range of motion and grip strength, there is also some evidence that can't be associated with our result. Contrary findings by Ercole C Rubini et al., shows there was no significant difference between the stretching protocols. There was no significant effect on RT, MT showed a negative main effect for time ($p<0.05$) showing 3.4%.

Peanchai Khamwong et al., (2011) reviewed that stretching with proprioceptive neuromuscular facilitation (PNF) is frequently used before exercise. 28 healthy males were randomly divided into the PNF group (n=14) and control group (n=14). PNF was used before eccentric exercise induction in the wrist extensors. All subjects were tested to examine muscle damage characteristics including sensory-motor functions at baseline immediately, and from 1st to 8th days after the exercise-induced muscle damage (EIMD). The results demonstrated that the PNF group showed a lesser deficit in some sensory-motor functions ($p<0.05$) than the control group.

Table-3 reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre- test and post-test within Group – A & Group – B. There is a statistically highly significant difference between the pre-test and posttest values within Group A and Group B (***- $P \leq 0.001$).

Table- 4 reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A & Group – B. There is a statistically highly significant difference between the pre-test and post test values within Group A and Group B (***- $P \leq 0.001$).

Although earlier studies recommended that PNF techniques are an adjunct to conventional disability, improving range of motion when compared to conventional therapy alone in conservatively managed distal radius fractures, they are consistent with our findings in the pain reduction and limitation of disability. Overall, because of finding a significant change in the VAS score and PRWE score of the PNF (hold relax technique) group when compared to contrast bath, it seems that well effective interventions are needed to reduce the treatment duration and improve the independency of an individual in doing their activities of daily living.



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