

# Effect of Mirror Therapy on Range of Motion In Post Operative Knee and Ankle Dislocation

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## Abstract

### Background

Fractures of the leg bone unit of dimension the foremost common fractures. The leg bone is connected to the long bone by associate degree interosseous membrane, forming a kind of joint called a syndesmosis. The forward flat a section of the leg bone is known as the fibia, generally confused with the fibula<sup>1</sup>. The periodic prevalence of open fractures of long bones is numerable to be 11.5 per persons, with ordinal being among the lower limb<sup>2</sup>. Mechanisms of injury for tibia-fibula fractures could also be divided into a pass of orders as low- energy injuries like ground situations falls and athletic injuries and high- energy injuries. Case may complain of pain, swelling, and incapability to run with leg bone fracture<sup>3, 4</sup>. Managing broken branch quality and reducing the pain, constitutes a fancy and tough issue for physiotherapists. The approach is believed to give implicit relief through the visual dominance called “Mirror Therapy”. Mirror Therapy (MT) was fictional to help palliate the vision pain, throughout that cases feel they still have a pain among the branch indeed once having it amputated<sup>5</sup>. Mirror Therapy offers clinicians associate degree easy-to- use and low cost adjuvant remedial fashion. Still, its effectiveness as a stage-alone modality largely arises from quality evidence. Rather, there's a larger weight of evidence in favors of its use as a combined or periodical medical aid, like graded Motor Imagery<sup>6</sup>. Total thirty subject taken to be boxed-in in these in procedure. During Mirror Therapy, perform each vary of stir exercises a minimum of formerly a day for a minimum of 10<sup>14</sup>. A pass of weeks of intervention ar reaching to be done to look at for the effectiveness of Mirror Therapy. The entire treatment got to be estimated with receiver once a pass of weeks of medical aid. Mean, friction and share were used for analysis of descriptive word of patients. Therefore, it completely was everywhere that just about all of the actors had bettered vary of stir once the intervention of Mirror Therapy

**Keywords:** Mirror Therapy, Range of Motion, Goniometer, Post-Operative, Rehabilitation.

## Background

The tibia, is a long bone of the lower leg factory between the patella and the ankle. It's generally recognized as the strongest weight- bearing bone of the body. It forms the medium part of the ankle joint and is the second largest bone coming to the femur. In the womanish, it has a slightly oblique direction over and laterally, to compensate for the lower opaqueness of the femur. The tibia is prismoid in form, which means it's polyhedron-suchlike in shape with similar planes containing an equal number of points. It's wider at the top, where it enters into the knee- joint, contracted in the lower third and again enlarged but to a lower extent towards the ankle joint. The tibia derives its arterial blood force from two sources the nutrient thruway (main source) and the periosteal vessels derived from the anterior tibia thruway. The forward flat part of the tibia is called the fibia, constantly confused with the fibula<sup>1</sup>.

The fibula also known as the thigh bone, is a long, thin bone running parallel to the tibia. Its upper extremity is small, placed toward the reverse of the head of the tibia, below the position of the knee- joint, and barred from the conformation of this joint. Its lower extremity inclines a little forward so that it's on an airplane anterior to that of the upper end. It projects below the tibia forming the side part of the ankle joint. The blood force to the fibula is important for planning free kerchief transfer because the fibula is generally used to reconstruct the beak. The shaft is supplied in its middle third by a large nutrient vessel from the fibular thruway. It's also perfused from its periosteum which receives multitudinous small branches from the fibular thruway. The proximal head and the epiphysis are supplied by a branch of the anterior tibia thruway.

Lower leg fractures embrace fractures of the leg bone and calf bone. Of those 2 bones, the leg bone is that the solely weight bearing bone. Fractures of the leg bone area unit usually related to calf bone fracture, as a result of the force is transmitted on the interosseous membrane to the calf bone. Fractures of the leg bone that is the foremost common longum fractures. The periodic oftenness of open fractures of long bones is assumed to be 1.5 per persons, with 40 being within the lower limb<sup>3</sup>. The foremost common fracture of the lower branch happens at the leg bone longum. Isolated midshaft or proximal fibula fractures are uncommon<sup>4</sup>

Mechanisms of injury for tibia-fibula fractures can be divided into 2 orders as low- energy injuries analogous as ground situations falls and athletic injuries and high- energy injuries analogous as motor vehicle injuries, rovers struck by motor vehicles, and gunshot injuries. Case may report a history of direct (motor vehicle crash or axial loading) or indirect (twisting) trauma. Case may complain of pain, swelling, and incapacity to walk with tibia fracture.

The skin and hypodermic towel square measure terribly skinny over the anterior and medium thigh and as a results of this; a big range of fractures of the lower leg square measure open. The thin, soft towel will come compromised in unrestricted fractures further. In distinction, the shin bone is well lined by soft towel over utmost of its course with the exception of the side malleolus. The thigh and shin bone articulate at the proximal tibia-fibular syndesmosis. Fractures of the thigh will involve the leg bone highland, leg bone excrescence, leg bone eminence, proximal thigh, leg bone shaft, and leg bone plafond<sup>3</sup> Managing fractured branch mobility and reducing the pain, constitutes a complex and grueling issue for physiotherapists. When cases fail to respond to remedial tools including thermal modalities, splinting, colorful homemade interventions, functional conditioning, or indeed anti-inflammatory specifics, "allowing outside the box", and beyond just the painful branches, can help.. The approach is allowed to offer implicit relief through the visual dominance called "Mirror Therapy".

Mirror remedy (MT) was constructed by Vilayanur S. Ramachandran to help palliate the phantom branch pain, in which cases feel they still have a pain in the branch indeed after having it amputated<sup>5</sup>. Rothgangel AS et al., reviewed clinical aspects of glass remedy in fracture recuperation. They plant that little is known about which cases are likely to profit utmost from MT, and how MT should rather be applied<sup>6</sup>. Altschuler E. et al examined glass remedy in a case with a fractured wrist and no active wrist extension. Case was trained by moving both hands while watching the reflection of the present or good hand in a parasagittal glass. Mirror remedy was plant extremely useful after a fractured wrist. Unborn studies with clear descriptions of intervention protocols should concentrate on standardized outgrowth measures and totally register adverse effects<sup>7</sup>.

Mirror remedy offers clinicians an easy-to- use and low- cost adjuvant remedial fashion. Still, its effectiveness as a stage-alone modality largely arises from low quality substantiation. Rather, there's a lesser weight of substantiation in favors of its use as a combined or successional remedy, similar as Graded Motor Imagery<sup>6</sup>.

Mirror remedy can be an effective option in treating the case with habitual pain that has not responded to other interventions. Helping cases change the way they reuse sensitive information is vital for pain reduction, functional gain, and overall quality of life. By expanding their knowledge of, and development of new remedial ways, physiotherapists can offer their cases a wider range of options for treating and prostrating the challenges of habitual pain and fragility. Mirror remedy is more common form of treatment in neurosciences activity, although, its effectiveness can be shown in musculoskeletal activity as well, hence this study is conducted. Mirror remedy becomes an easy outfit for the cases to be used at home as it's available fluently. Occasionally, it's inconvenient for the

cases to visit the sanitarium for their recuperation program. This system of recuperation is used to increase the range of stir in the fracture cases and to check the effectiveness of glass remedy in fracture recuperation which may eventually help them in their recovery.

## Need For Study

Mirror Therapy is additional common variety of treatment in neurosciences therapy, although, its effectiveness may be shown in contractor therapy similarly, therefore this study is conducted. Mirror Therapy becomes a simple equipment for the patients to be used reception because it is offered simply. Sometimes, it's inconvenient for the patients to go to the hospital for his or her programme. This methodology of rehabilitation is employed to extend the vary of motion within the fracture patients and to envision the effectiveness of mirror therapy in fracture rehabilitation which can finally facilitate them in their recovery.

## Materials and Methodology

**Study design:** Experimental Study.

**Sampling Technique:** Convenient sampling.

**Sample size:** 30 participants.

**Target study sample:** Male and Female individuals with clinical diagnosis of tibia and fibula fracture who will be referred to Orthopedic Ward and who will be willing to participate in the study

### Inclusion Criteria:

- 20-40 years of age.
- Both male and female participants
- Patients clinically diagnosed with tibia and fibula fracture
- Post-operative tibia and fibula fracture
- Unilateral tibia fibula fracture.

### Exclusion Criteria

- Non operative tibia and fibula fracture participants.
- Participants with other form of orthopedic or neurological impairments
- Participants not willing.

**Tools and Materials:-**

- Consent form
- Pen
- Goniometer
- Mirror

**Outcome Measure****Goniometer:**

The range of stir of knee and ankle joint of the post-operative tibia and fibula fracture cases will be taken by goniometer. The range of stir for knee flexion extension will be taken as, the party will laboriously extend or flex their knee and the monitor will measure the common range with the goniometer. Place the axis of a goniometer at the side femoral condyle. The stationary arm is placed along the side aspect of the ham, following the line from the knee joint to the lesser trochanter at the hipsterism. The portable arm is placed along the side aspect of the fibula and the measure knee range of stir with the party supine on an test table long enough to support the legs. This dimension will be taken for affected knee in this study party. Range of stir for ankle dorsiflexion and plantar flexion will be taken as, the axis of the goniometer is placed roughly 1.5 cm inferior to the side malleolus. Stationary arm will be resemblant to the longitudinal axis of the fibula, lining up with the fibula head and the portable arm will be resemblant to the longitudinal axis of the 5th metatarsal. And the range of stir for inversion and eversion will be taken as, the axis of the goniometer is placed on the front of the ankle at the mid-point between the medium and lateral malleoli. Stationary arm will be along the tibial crest whereas the portable arm will be in line with the 2nd metatarsal.

**Mirror Therapy:**

A glass is employed with dimension that covers the complete affected branch and may enable cases to ascertain all major movements within the glass. The affected branch ought to be deposited on a height malleable bed and set during a safe and immaculately comfy position behind the glass. The

case ought to essay to grease a pictorial “ glass vision” ( glass image perceived because the affected branch) by matching the position and image of thenon-affected branch to the affected hand. The glass is deposited before of the case’s distance, in order that the affected branch is completely lined by the glass and thus the reflection of the innocent branch is completely visible the necessary purpose once conforming the position of the glass is to assure that the reflection still matches with the perception of the affected branch. throughout glass medical care, perform every vary of stir exercises a minimum of formerly on a diurnal base for a minimum of tenminutes<sup>14</sup>.This procedure are going to be finished all the ranges in knee and articulation. two weeks of intervention are going to be done to fantasize for the effectiveness of glass medical care. the complete treatment ought to be estimated with direction finder when two weeks of medical care. The treatment ought to be stopped just in case of patient negative hand goods or if unguided coaching solely is decent.

## Methodology

All the participants with clinical diagnosis of tibia and fibula fracture in orthopedic ward will be screened for the study. As per the suitable

Inclusion and exclusion criteria, participants will be allocated in one group and an informed written consent will be obtained. Mirror therapy will be done for 2 weeks of intervention. Total 30 participants will be included in these in procedure.

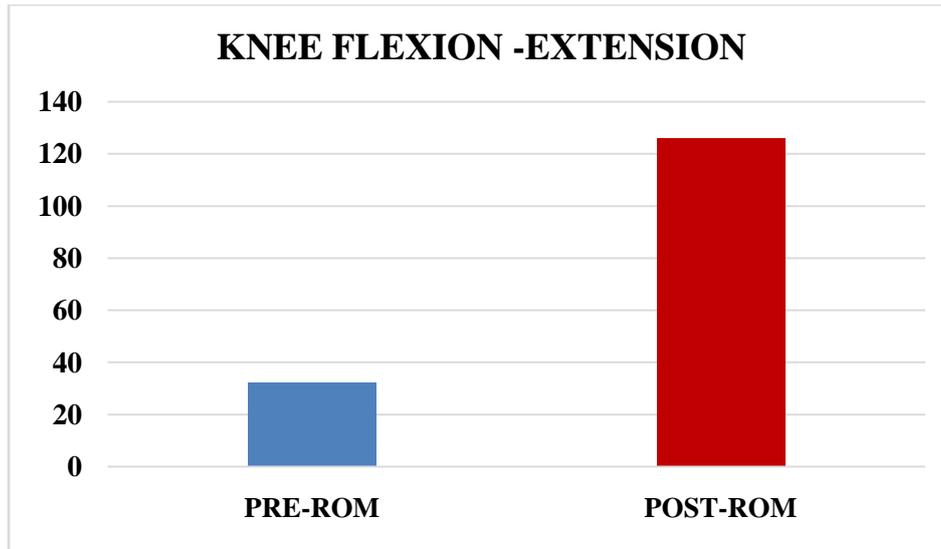
## Data Analysis

The statistical analysis was done using SPSS v17. Mean, standard deviation and percentage were used for analysis of descriptive data of patients. Thus values were calculated to analysis the effect of mirror therapy on range of motion of post operative knee and ankle dislocation patients.

## Results

**Table no 1: Showing the mean range of motion of knee flexion-extension taken pre and post intervention of mirror therapy**

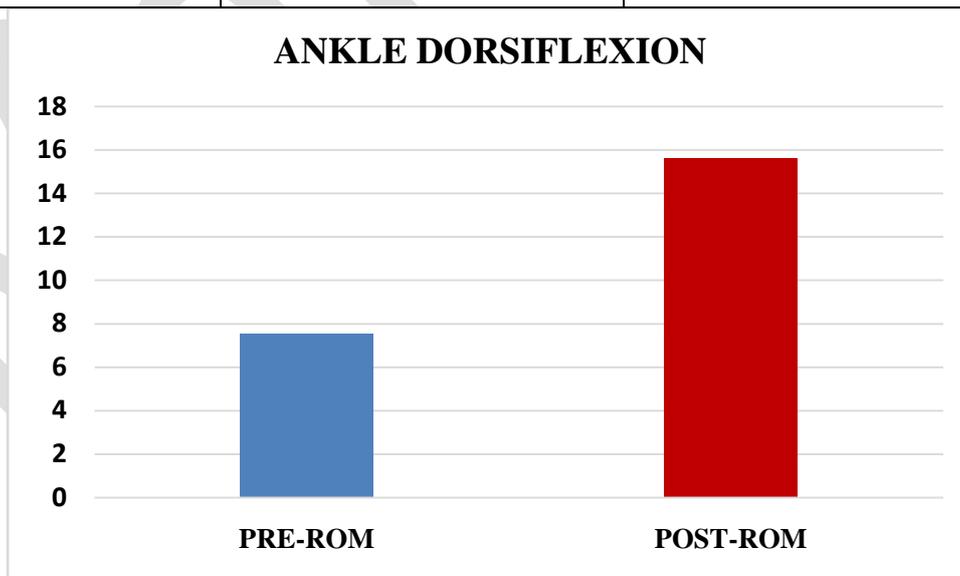
	<b>PRE-ROM</b>	<b>POST-ROM</b>
<b>KNEE FLEXION-EXTENSION</b>	<b>0-32.419</b>	<b>0-125.967</b>



**RESULT:** The above graph shows the mean range of motion of knee flexion-extension pre and post intervention of mirror therapy. The pre intervention range is 0-32.419 and the post intervention is 0-125.967.

**Table no 2:- Showing the mean range of motion of ankle dorsiflexion taken pre and post intervention of mirror therapy**

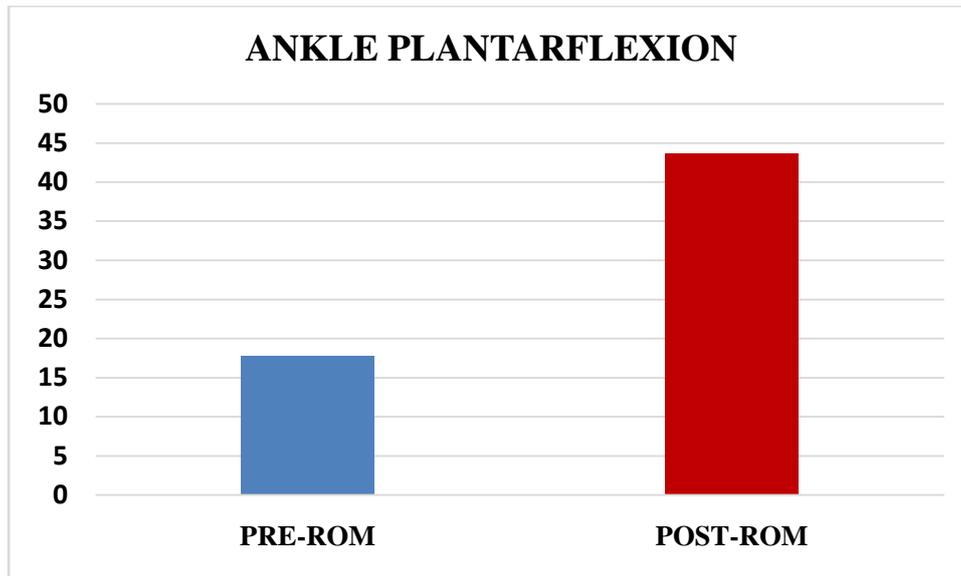
	PRE-ROM	POST-ROM
ANKLE DORSIFLEXION	7.548	15.612



**RESULT:** The above graph shows the mean range of motion of ankle dorsiflexion pre and post intervention of mirror therapy. The pre intervention range is 7.548 and the post intervention 15.612

**Table no 3:-** Showing the mean range of motion of ankle plantar flexion taken pre and post intervention of mirror therapy

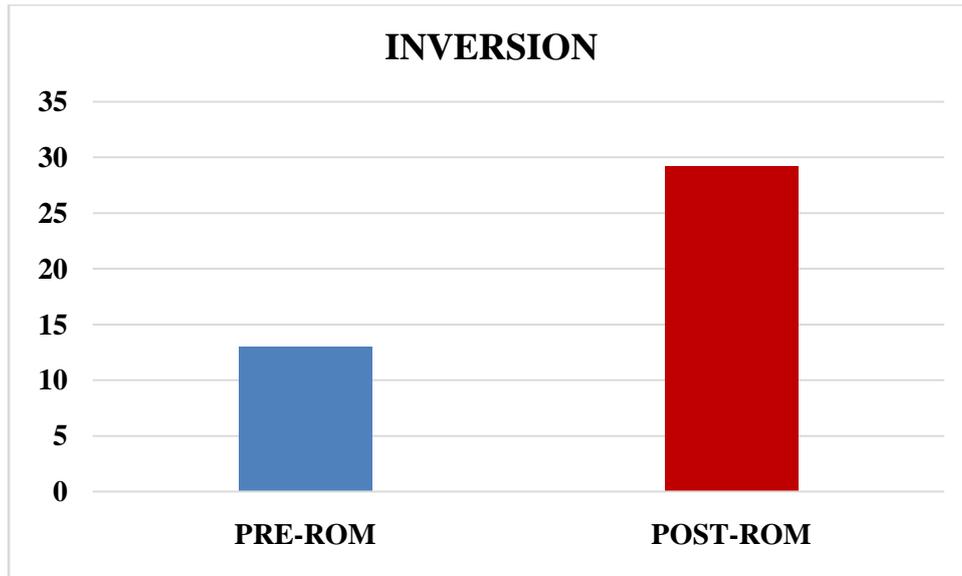
	PRE-ROM	POST-ROM
ANKLE PLANTARFLEXION	17.741	43.709



**RESULT:** The above graph shows the mean range of motion of ankle plantar flexion pre and post intervention of mirror therapy. The pre intervention range is 17.741 and the post intervention range is 43.709.

**Table no 4:-** Showing the mean range of motion of inversion taken pre and post intervention of mirror therapy

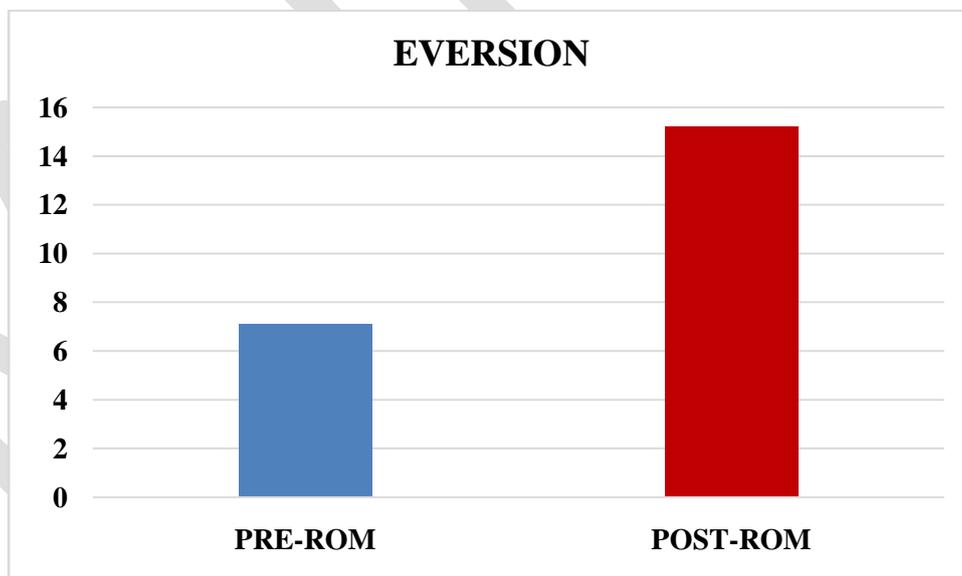
	PRE-ROM	POST-ROM
INVERSION	13.032	29.258



**RESULTS:** The above graph shows the mean range of motion of ankle plantar flexion pre and post intervention of mirror therapy. The pre intervention range is 17.741 and the post intervention range is 43.709.

**Table no 5:-** Showing the mean range of motion of eversion taken pre and post intervention of mirror therapy

	PRE-ROM	POST-ROM
EVERSION	7.096	15.193



**RESULT:** The above graph shows the mean range of motion of eversion taken pre and post intervention of mirror therapy. The pre intervention range is 7.096 and the post intervention range is 15.193

## Discussion

The study delineate that among thirty actors, mean per- operative ranges of knee flexion and extension were  $0-32.419 \pm 0-16.454$  and when time period of glass medical aid intervention vary of stir were  $0-125.967 \pm 0-7.026$ , mean per intervention ranges of articulation flexion were  $seven.548 \pm 2.406$  and when time period of glass medical aid intervention ranges were  $fifteen.612 \pm 2.704$ , mean per-intervention ranges of articulation area flexion were  $seventeen.741 \pm 5.591$  and when time period of glass medical aid intervention ranges were  $forty three.709 \pm 9.217$ , mean per-intervention ranges of inversion were  $thirteen.032 \pm 4.086$  and when time period of glass medical aid intervention ranges were  $twenty nine.258 \pm 5.791$ , mean per-intervention ranges of eversion were  $seven.096 \pm 2.055$  and when time period of glass medical aid intervention ranges were  $fifteen.193 \pm 2.212$ . Therefore, it was plant that the maturity of the actors had bettered vary of stir when the intervention of glass medical aid.

This review was a clinically and scientifically applicable to be used each by clinicians and experimenters attached cases of unilateral post-operative shinbone and leg bone fracture. This review enclosed studies of all styles performing in nonuniformity not solely in interventions, outgrowth assessment still also in analysis and impact size. From the clinical posture they counsel that glass medical aid will accelerate recovery of perform in shinbone and leg bone fracture cases.

Range of stir is vital to assess as a result of it's possible confound in dimension conditions performance. To be ready to manage well in diurnal- life effects the vary of stir demands within the surroundings and within the tasks performed should be matched by the adding the vary of stir in post-operative conditions.

The results of this study correlates with different studies done by Oujamaa L et al., 2011 in their studies over that glass medical aid had showed positive goods accessible associated bottom recuperation following an injury or surgery. Rose ´n and Lundborg (2005) lately delineate 3 cases WHO WHO from glass medical aid wherever glass medical aid had bettered the vary of stir of the affected branch the maximum quantum as realizable, whereas observance the reflection of the great (non-injured) branch — both cases bettered significantly in each active vary of stir and strength.

MT has been shown to extend beast towel and spinal motor excitability, presumably through the impact on the glass physical cell system seven. Mirror Neurons accounts for regarding 2 hundredth of all the neurons gift during a mortal brain. These glass neurons square measure to condemn for laterality reconstruction i.e., capability to separate between the left and also the right hand. formerly victimisation the Mirror box, these glass neurons gets actuated and helps within the recovery

of affected factors. this fashion is assumed to use the observation of movement to stimulate the motor processes which might be concerned in this movement. Parallels are drawn with motor imaging wherever by the existent can mentally imagine movements rather of observant the reflection of a movement during amirror8.It's study that the smarts natural inclination to precedences visual feedback over all others would make MT a fresh important tool. it's to be noted that the main distinction within the physical cell reorganization whereas employing a glass box is that the ipsilateral semicircle's neurons provides cooperation to a analogous hand affected branches rather of the standard curatives that targets the physical cell reorganization of the contra-side semicircle . Hence it over that mirror therapy is a good live inpost-operative shinbone and leg bone fracture recuperation also as in contractile organ recuperation.

## Conclusion

Therefore, mirror therapy is an effective measure in post-operative knee and ankle dislocation rehabilitation as well as in musculoskeletal rehabilitation.

## Abbreviations

- **MT:** Mirror Therapy
- **ROM:** Range of Motion

## Acknowledgement

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