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### POST OPERATIVE KNEE STIFFNESS - ROLE OF ISOKINETIC DYNAMOMETER –A CASE REPORT.

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**Abstract:** The knee joint is a complex joint consisting of tibiofemoral and patellofemoral joints. Post operative or Post immobilization knee stiffness is a condition which results in reduced functional abilities of the subject. This case report describes about a subject who sustained fracture of proximal 1/3<sup>rd</sup> of Tibia and fibula and underwent Intramedullary nailing of the tibia. The subject has limitation of range of motion in the right knee joint and reduced muscle power in the knee musculature. Isokinetic analyzer (Biodex) is used to increase the range of motion and thereby enhanced the functional activities of this subject. Wax therapy is also used to reduce the adhesions in the knee joint.

**Keywords:** Knee Stiffness, Isokinetic Analyzer, Wax Therapy



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## **INTRODUCTION**

Fractures of the tibia are the most serious long bone fractures, due to their potential for nonunion, malunion and long-term dysfunction. Intramedullary nailing is the gold standard treatment option for displaced closed or open tibial shaft fractures which acts as an internal splint and permits early weight bearing along with fracture healing. One of the most frustrating surgical after effect for the patient is the development of a stiff knee. Patients require a knee flexion of 65° to walk, 70° to lift an object from the floor, 85° for stair climbing, 95° for comfortable sitting and standing, and 105° for tying shoelaces, and 115° to squat and pick up an object.

Isokinetic exercise is a form of exercise that permits maximum muscle contraction throughout the full range of joint movement. An isokinetic machine is a rehabilitative exercise device intended to measure, evaluate and increase the strength of muscles and the range of motion of joints.

### **Patient Characteristics:**

#### **Demographic Information:**

The subject aged 48 years by occupation is a security officer in an university sustained fracture of upper 1/3<sup>rd</sup> of tibia and fibula(right) in a road traffic accident due to a hit by bumper of a four wheeler on 19-11-2014. Immediately, he was shifted to hospital and he underwent Interlocking nailing of right tibia on 20-11-2014. Dressings were done for the suture site on alternate days till the date of discharge from the hospital on 27-11-2014. Ankle and toe movements were done regularly by the patient actively. He went for 1<sup>st</sup> review on 6-12-2014, during which knee bending exercises and static quadriceps exercises were taught and encouraged to do at home. Non weight bearing walking was encouraged with the aid of walker.

2<sup>nd</sup> review was done on 26-12-2014 and check radiograph was taken. Patient was advised to go for partial weight bearing and asked to continue static quadriceps exercises and knee bending exercises.

Patient was advised to go for full weight bearing from 9-2-2015. He came to SVIMS physiotherapy O.P on 25-2-2015 and then he underwent detailed assessment. The subject underwent treatment in the department of physiotherapy 40 min per day and 5 days per week for a total period of 2 weeks till 11-3-2015.

### **Assessment findings:**

#### **On observation:**

Built : Mesomorphic

Attitude of limbs: Normal

Obvious shortening of right lower limb.

Surgical scar present below the apex of patella on the right side.

**Range of Motion of Right knee joint:**

<b>Knee movements</b>	<b>AROM</b>	<b>PROM</b>
	<b>25-2-15</b>	<b>25-2-15</b>
<b>Knee flexion</b>	0°-70°	0°-75°
<b>Knee extension</b>	70°- 0°	75°- 0°

**Muscle power (MMT) on 25-02-2015:**

Knee (right) flexors: 4/5

Knee (right) Extensors: 4/5

**Limb length:**

Apparent length (on 25-2-2015):

<b>Right lower limb</b>	<b>Left lower limb</b>
<b>36 inches</b>	<b>37 inches</b>

Gait: Limping gait using cane leaning towards right side.

**Physiotherapy treatment:**

Patient underwent Paraffin wax therapy for 2 weeks followed by patellar mobilization. Then, the patient is positioned on the BIODEX isokinetic device. The seat is held at 90° rotation, Dynamometer at 90° position, Tilt of dynamometer is 0°. After documenting the patient details, the protocol was selected for the subject. The protocol set was unilateral passive mobilization in three different angular velocities namely 30°, 60° and 90°. The away limit (knee extension) and towards limit (knee flexion) are set in the machine according to the patient's pain and yielding and the limits were gradually increased and 50 repetitions were given in each angular velocity per day and similar protocol was continued 5 days per week for a period of 2 weeks.

The patient underwent strengthening exercises for the knee flexors and extensors using the Quadriceps chair.

The reassessment of the outcomes was done on 12-03-2015.

**Range of Motion of Right knee joint:**

<b>Knee movements</b>	<b>AROM</b> <b>12-3-15</b>	<b>PROM</b> <b>12-3-15</b>
<b>Knee flexion</b>	0°-120°	0°-125°
<b>Knee extension</b>	120°- 0°	125°- 0°

**Muscle power (MMT) on 12-03-2015:**

Knee (right) flexors: 5/5

Knee (right) Extensors: 5/5

Thus, the patient developed full range of knee flexion and extension using the BIODEX Isokinetic analyser with gradual increase in the flexion and extension limits in the machine. The isokinetic analyser has added advantage of maintenance of constant angular velocity with controlled accommodating resistance which we cannot do manually. The range of motion can be gained consistently without injuring the muscles in a short period of time.

**DISCUSSION:**

In isokinetic exercise, the speed of movement is controlled, allowing a maximum contraction at constant speed across the range of motion increasing the permeability of the membrane, thereby favoring substance exchange, particularly prostaglandins, which improves pain.<sup>1</sup> Isokinetic exercise machine is considered as safe since an individual will never meet more resistance than he can handle because the resistance is equal to the force applied. None of the studies retrieved reported any adverse events related to isokinetic exercise machine usage.<sup>2,3</sup> The subject developed full range of motion of the right knee and the muscle power also increased significantly. The subject is advised to correct the foot wear by raising sole of the right shoe by 1 inch which corrected his gait pattern.

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