STUDY OF FRACTURE PATELLA TREATED WITH TENSION BAND WIRING

By

DR.MAHENDRA.B.GUPTA

Dissertation Submitted To

SBKS MEDICAL INSTITUTE & RESEARCH CENTRE

SUMANDEEP VIDYAPEETH, PIPARIA, VADODARA

In Partial FulfillmentOf The Requirements For The Degree Of

M.S.

in

ORTHOPEADICS

Under the Guidance of

DR. SARVANG M. DESAI

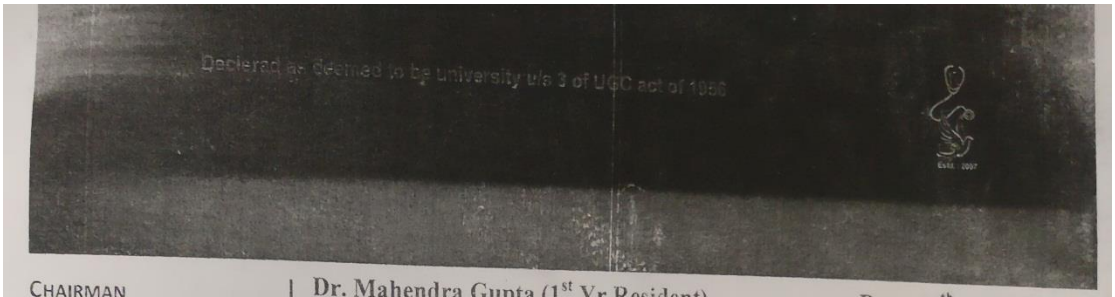
PROFESSOR

M.S., (ORTHO)

DEPARTMENT OF ORTHOPEDICS

SBKS MEDICAL INSTITUTE & RESEARCH CENTRE,PIPARIA, VADODARA

YEAR 2015-2018



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Date: 18th Jan 2016

SUMANDEEP VIDYAPEETH
INSTITUTIONAL ETHICS COMMITTEE
OUTWARD: SVIEC/Onimed/BNPG15/16006
DATE: 18/Jan/2016
SIGN:

Ref: Your study synopsis entitled "Study of different treatment modalities of Fracture Patella." Submitted to the SV IEC for approval.

Sub: Approval for conducting the referenced study

Dear Dr. Mahendra,

The Sumandeep Vidyapeeth Institutional Ethics Committee (SV IEC) is in receipt of your above mentioned study document and as the research study classifies in the minimal risk category; as recommended by HRRP SBKS MI&RC. The SV IEC approves your study to be conducted in the presented form.

The approval remains valid for a period of 1 year. In case the study is not initiated within one year, the Ethics Committee expects to be informed about the reason for the same and a fresh approval will have to be obtained subsequently.

The Sumandeep Vidyapeeth Institutional Ethics Committee expects to be informed about the progress of the study (every 6 months), any Serious Adverse Event (SAE) occurring in the course of the study, and if any changes are made in the protocol or patient information/informed consent the SVIEC needs to be informed about this in advance and an additional permission is required to be taken. The SV IEC also requires you to submit a copy of the final study report.

Dr. Niraj Pandit
Member Secretary
SV Institutional Ethics committee

INSTITUTIONAL ETHICS COMMITTEE
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SVIEC/UNMED/BNPG16/D17015
DATE 06/05/17
SIGN

Sub: Request for change in the title of your Dissertation

Ref:

1. **Your application letter no. SVIEC/IN/MEDI/BNPG16/D17015, 04th May 2017.**
2. **Letter of permission no. SVIEC/ON/MEDI/BNPG15/D16006, 18th Jan 2016 from SVIEC**

Dear Dr. Mahendra,

We have received your application requesting the SVIEC to allow change in the title of your dissertation study. The same has been recommended by your guide and HRRP coordinator of your college.

The matter has been reviewed by SVIEC. We are pleased to allow change in the title of your dissertation from **"Study of Different Treatment Modalities of Fracture Patella"** to **"Study of Fracture Patella Treated with Tension Band Wiring**. since there is no other change in your dissertation as per synopsis submitted by you earlier.

The other terms and conditions shall remain the same as contained in the original permission letter under above mentioned reference no. 2.

Dr Niraj Pandit
Member Secretary
SV Institutional Ethics committee

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017110

Date: 28th September 2017

STUDY COMPLETION CERTIFICATE

This is to certify that your study synopsis entitled: "Study of Fracture Patella Treated with Tension Band Wiring" Research Project was done by **"Dr. Mahendra Gupta"** (PG Student, Dept of Orthopedics, S.B.K.S MI & RC, Dhiraj Hospital, Piparia, Waghodiya road, Vadodara-391760, Gujarat) and it was conducted to the satisfaction of the Sumandeep Vidyapeeth Institutional Ethics committee.

Dr. Niraj Pandit
Member Secretary
SV Institutional Ethics committee

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PMR
S.B.K.S.M.I.R.C.
Outward No.: 990
Date: 29/09/2017
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SUMANDEEP VIDYAPEETH

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation / thesis entitled **"STUDY OF FRACTURE PATELLA TREATED WITH TENSION BAND WIRING"** is a bonafide and genuine research work carried out by me under the guidance of **Dr. Sarvang M. Desai (professor and head of unit department of orthopaedics)**

Date: **Signature of the candidate**

Place:Piparia, Vadodara **Dr. Mahendra Gupta**

SUMANDEEP VIDYAPEETH

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation entitled **"STUDY OF FRACTURE PATELLA TREATED WITH TENSION BAND WIRING"**is a bonafide research work done by **DR.MAHENDRA B GUPTA** under my guidance and in partial fulfillment of the requirement for the degree of **M.S. ORTHOPEDICS.**

Signature of the Guide

DR.SARVANG M. DESAI

Professor

Department of Orthopedics

SBKS MI & RC, Piparia.

Date:

Place: PIPARIA

SUMANDEEP VIDYAPEETH

ENDORSEMENT BY THE HOD & DEAN OF THE INSTITUTION

This is to certify that the dissertation entitled **"STUDY OF FRACTURE PATELLA TREATED WITH TENSION BAND WIRING"** is a bonafide research work done by **DR.MAHENDRA B GUPTA** under the guidance of **DR.SARVANG DESAI, Professor of Department of Orthopedics.**

Seal & Signature Of The Hod
DR. P. P. GOLWALA
Professor of Orthopedics

Date:
Place: PIPARIA

Seal & Signature Of The Dean
DR. G. V. SHAH
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Place: PIPARIA **DR.MAHENDRA B GUPTA**

ACKNOWLEDGEMENT

First and foremost, I bow down to **"The God"** for giving me energy, inspiration, courage to complete this task. Without "His" supreme blessings and benevolence, nothing is possible. He has always given me courage to walk on tough roads of life.

I am just wordless to express my deep sense of gratitude towards my P. G. Guide, **DR.SARVANG DESAI AND Dr. JAGDISH PATWA** Professor of Orthopedics, S.B.K.S. M.I. & R.C. PIPARIA whose sagacious suggestions, immense interest in subject, keen evaluation and constructive criticism have promoted completeness to this work. His patience guidance, objective critique and inspiring support at all times have made me able enough to bring this dissertation to its present status. To be his student is not only a proud privilege, but working under his patronage and encouragement is an extremely rewarding experience He has always respected my individual thoughts and ideas too. There is much to thank you for, if only the words could suffice. But deep inside I know I can never repay you for the care you took to nurture us. **Sir, "I am really grateful to you for being there.**

I express my sincere thanks to Hon. **Dr. Mansukh Shah** Hon. president, Sumandeep Vidhyapeeth, **Dr. Dixit Shah** executive trustee Sumandeep Vidhyapeeth for providing all the necessary facilities.

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This thesis work could have been much exhausting and demanding if I didn't have my seniors for guiding me and fellow colleagues helping me out at various stages. I am thankful for their support.

I whole-heartedly thank **all my patients** for their support during the study without whom the study would not be possible.

I express my earnest obligations to the Member Secretary of Institutional Ethics Committee (Human) of SUMANDEEP VIDYAPEETH for approval to accomplish the study & providing enough facilities for the present study.

Dr. Mahendra B Gupta

ABSTRACT

TITLE:- "STUDY OF FRACTURE PATELLA TREATED WITH TENSION BAND WIRING"

INTRODUCTION:- It is the study of patella fractures treated with tension band wiring. We wanted to study To study the surgical management and to assess its functional outcome in patella fractures. To study the range of movement, functional outcome, duration of union, complications and compare the results of operated cases with other operative study.

MATERIALS AND METHOD:- The study consists of 35 patients sustaining patella fracture operated with tension band wiring. Clinical & functional outcomes were assessed by knee society scoring system.

RESULT:- We have operated total 35 cases with tension band wiring in patella fractures. Average union was achieved in 12 - 13 week. We have obtained 85.71 % of excellent outcome.

CONCLUSION:- In case of transverse fracture of patella pleasing results were obtained with tension band wiring technique that allows early motion and rehabilitation. This technique has benefit of early mobilization & early return of independent function.

With strict adherence to anatomical reduction, aseptic soft tissue handling & soft tissue repair & proper & in time physiotherapy protocol we can get satisfactory results in almost all the patients.

INDEX

INTRODUCTION

The patella is a sesamoid bone and serves several important functions. It protects knee joint from direct trauma. The patella is part of an extensor component mechanism of knee. It serves to increase the mechanical advantage of quadriceps muscle..

Fracture of patella make up approximately 1% of all fractures. These fractures are seen in active individuals between the ages of 20 and 50. Commonly patella fracture is transverse.

The most common mechanism is direct or indirect trauma. Direct trauma due to direct blow during fall onto knee or because of hitting hard object. Indirect fracture can be due to sudden jumping, or rapid flexion of knee against fully contracted quadriceps.

A major sequalae when the treatment is not entirely successful are post traumatic arthritis of patello-femoral joint and decrease in the range of motion of knee joint.

Different opinions are there for the treatment of fractures of patella . Non-operative treatment has been limited to fracture that shows intact quadriceps component, separation less than two-millimeter and no significant displacement of articular surface .

Tension band wiring is commonly used treatment for displaced transverse fractures of patella. The principle of Tension band wiring is distractive forces at fracture site are converted to compressive forces. The implant absorbs the tension and bone compression.

We have studied 35 cases of displaced transverse fractures of patella treated with tension band wiring in present series.

AIMS OF STUDY

The study is aimed to:-

1. Evaluate the result of tension band wiring technique in patella fractures.
2. Comparing the outcomes achieved by tension band wiring of our study with other studies.

REVIEW OF LITERATURE

- 1980 Weber Et Al Matched Different Types Of Fixation For Patella Fractures And Found That Modified Tension Band Wiring technique gives Most Secure Fixation.[22]
- 1981 Dudani and Sancheti (1981) in his study of patella fracture treated with tension band wiring shows, 73% of cases had more than 120º of flexion.[56]
- 1981 Boatman And Chen Et Al In A Study To Treat Patella Fractures Have Reported The Results From Good To Excellent In 50 To 80 Percent With Anterior Tension Band Method[76].
- 1985 Levack B et al in his study on patellar fracture witnessed 49 years was average age for patellar fracture in his study of 30 cases, 21 fractures were seen in men & 9 fractures were seen in females. In his study Males were more susceptible to trauma due the apparent added outdoor activities.[8]
- 1986 Srinivasulu Et Al In His Study Of Transverse Patella Fracture Treated With Tension Band Wiring Stated 10.5% Cases having Restricted Movements greater Than 20 Degrees. Though The Physiotherapy Protocol & Quick Mobilization With Weight Bearing. In his Study Fair Range Of Motion And Better Results Were Due To Early Functional Rehabilitation.[54]
- 1987 Benjamin Et Al in his study of done on Biomechanical Properties Of Four Different Types Of Fixation In Transverse Patella Fractures observed That, The Modified Tension Band Wiring Technique Had Stronger Fixation compared to Other Methods.[64]

- 1990 Curtis Mj Et Al Assessed results of Modified Ao Tension Band wiring, BlendingCirclage Wiring, & Tension Band. The Blend Of Circlage& Tension Band Wiring Proved To Be Considerably Stronger & Is preferred.[58]
- 1994 Burvant Et Al. studied The Strength Level Of Patella Fracture Fixation done by Circular Wire Around The Bone & Tension Band Wiring & Concluded That The Tension Band Wiring provides Stronger Fixation & superior Stability.[85]
- 1996 In 26 Cases Of Patella Fracture During Ndiaye Et Al. Treated 18 Cases With Modified Tension Band Wiring Technique, And other Cases With Circular Wire. According To Them, The First Approach Has Been Associated With Better Results For Transverse Fractures Or Crushing The Middle Part Of Patella.[62]
- 1997 Smith Et Al studied outcome of patella fracture in 51 Patients out of which 49 Patients were managed with Modified Tension Band Wiring & 2 patients were managed With Tension Band Wires Threaded Through CannulatedCancellous Screws & showed Excellent Results in almost 90 % Of Patients.[50]
- 1997 Schimitsch Et Al In His Study Of Patella Fracture Treated With Tension Band Wiring Reported 25(52%) Of Their 50 Patients presented with Associated Injuries. But, This Did Not Disturb The Result At Their Final Follow Up.[95]
- 1997 Berg Ee Et Al in his study concluded That facture union was observed radiologically in Transverse Fracture Of Patella At A Mean Age Of 13 Weeks. Good Results are observed in Transverse Fractures of Patella treated by tension band wiring as observed In This Study. It Is less expensive; The Technique Is Rather Simple With A Short Period Of Learning Curve.[66]
- 1998 Chen A Et Al observed The Use Of Metallic Tension Band Fixation in treatingPatella Fractures in 38 Patients who Were Followed For 2 Years &

Concluded That It Can Be Used With No Need For A Second Operation for implant Removal not required once Bone Union achieved .[74]

- 1998 ChatakonduSc Et Al in his study of tension band wiring in patella fractures using Stainless Steel Wire concluded that Patients whose Fractures were Fixed With stainless steel achieved Union With Good Re-establishment Of Knee Function.[75]
- 1999 Mehdi Et Al. studied The outcomes in 203 patients sustaining Patella Fractures operated by Tension Band Wiring Technique. The Mean Age & Follow-Up Age Of Patients Were 36 And 6 Years Respectively. The Excellent & Good outcomes Were seen In 83% & the Fair & Poor outcomes In 17% of Patients. Commonest Side Effects Were Pins loosening In 10% , fracture Nonunion In 4% & Osteoarthritis In 5.8%. [61]
- 2001 GosalHs, Singh P Et Al in his study of Use of Metal Wire & Non-Absorbable Polyester for Tension Band Wiring in Patellar Fractures concluded that out Of 37 Cases , Excellent Results were seen In 34 Cases.[73]
- 2001 Ozdemire Et Al Piloted A Study On Fracture of patella treated With Modified Tension Band Wiring in 20 patientsTestified Good & Fair Results 55% & 35% Patients Respectively.[81]
- 2001 Gumula Et Al observed 45 patients with patella fracture out of which 20 Patients were treated With Tension Band Wiring, 14 Cases treated With Partial Patellectomy& 11 Patients treated By Total Patellectomy, concluded that Most Of Good And Excellent Results Were Reported In patients treated with Tension Band Wiring .[81]
- 2002 Maini Ps Et Al in his study concluded that 70 % of patella fractures were Transverse type In Their Study Which Was Similar To 34c1.1 Fractures As Per

Ao Classification. One patient had Superficial Infection which was due to Stitch Abscess Which resolved after Vicryl Removal & proper Antibiotics. Out Of 30 Patients 22 Patients Had No Extensor Lag & 8 Patients Had Extensor Lag Ranging From 0`-15` With Mean Of 2.3.[94]

- 2003 Yang Kh, Byun Et Al clinically Assessed comminuted Fractures involving Inferior Pole Of The Patella treated with Distinct Vertical Wiring Technique . InAll The Fractures united At A Mean Of Seven Weeks (6 To 10). No Breakage Of A Wire Or Infection was seen. This Technique preserved length of patella securing Comminuted Fragments Of The Inferior Pole & allowing early mobilization of knee .[86]
- 2005 Gardner Michael J Et Al stated That Tension Band Fixation done anteriorly Constructs were The Backbone Of Treatment Of Patella Fractures & gives most Reliable Results in Simple Transverse Fracture Patterns.[71]
- 2012 AkhileshRathi Et Al in his study Showed at last Follow-Up, each Patients Recovered Full Extension. The Objective Score Was Excellent In 20 Patients & Good In 3, While The Subjective Score Was Excellent In 17, Good In 5, & Fair In One patient Who Complained Of Irritation By Hardware impingement, Knee Stiffness, & Kneeling Discomfort. Each Patients Had Radiological Union At 8 WEEKS.[87]
- 2013 Kin Jy Et Al Stated That Tension Band Wiring DONE Using Stainless Steel Wire Gives Excellent Clinical & Radiologic Results in Transverse Patella Fracture.[88]
- 2013 Hoshino et al, in his retrospectively studied surgically treated patellar fracture patients concluded that Implant was removed electively in 37 % & 23 % patients treated correspondingly with K-wires & cannulated screws.[55]

- 2013 Della RoccaGj concluded That displaced Patella Fractures Effects Disturbance to The Extensor Mechanism Of The Knee. Prerequisite For Unassisted Gait is An Undamaged Extensor Mechanism. Therefore, Operative Treatment Of The Displaced Patella Fracture Is Largely Recommended.[89]
- 2014 Sudheendra P Et Al In His Study Of Transverse Patella Fracture Treated With Tension Band Wiring Shows, In Nearly 84% Of Cases, Radiological Union Was Seen By 16 Weeks in almost all cases .Mean union Time was 15 Weeks. Greater Than 75% Patients Had No Pain Or Only Mild Pain. Only 10(23.3%) Patients Had Noteworthy Extensor Lag. Quadriceps Strength was normal in Almost 2/3 Of The Patients. In His Study, He Achieved 97.7% Patients Had Full Range of knee flexion . Excellent results Were Achieved In 58% (25 Cases), Good In 16% (7 Cases) Fair In 18.6 (8 Cases) & Poor In 4.7% (2 Cases).[91]"
- 2016 Tarek et al in his study of patella fracture treated with tension band wiring showed knee society score excellent in 75 % patients good in 20 % patients and fair in 05 patients out of 30 patients.[97]
- 2017 HanumantharayaGh Et Al in his study achieved Excellent results in 75 % patients And Good Results In 18% patients Treated By Modified Tension Band Wire technique in Patellar Fractures.[92]

ANATOMY OF PATELLA

The patella, or kneecap, is a triangular sesamoid bone, about 5cm in diameter, which is embedded in the tendon of insertion of quadriceps femoris muscle. When the quadriceps is relaxed, the patella can be moved from side to side and, to a lesser extent, upward and downward.

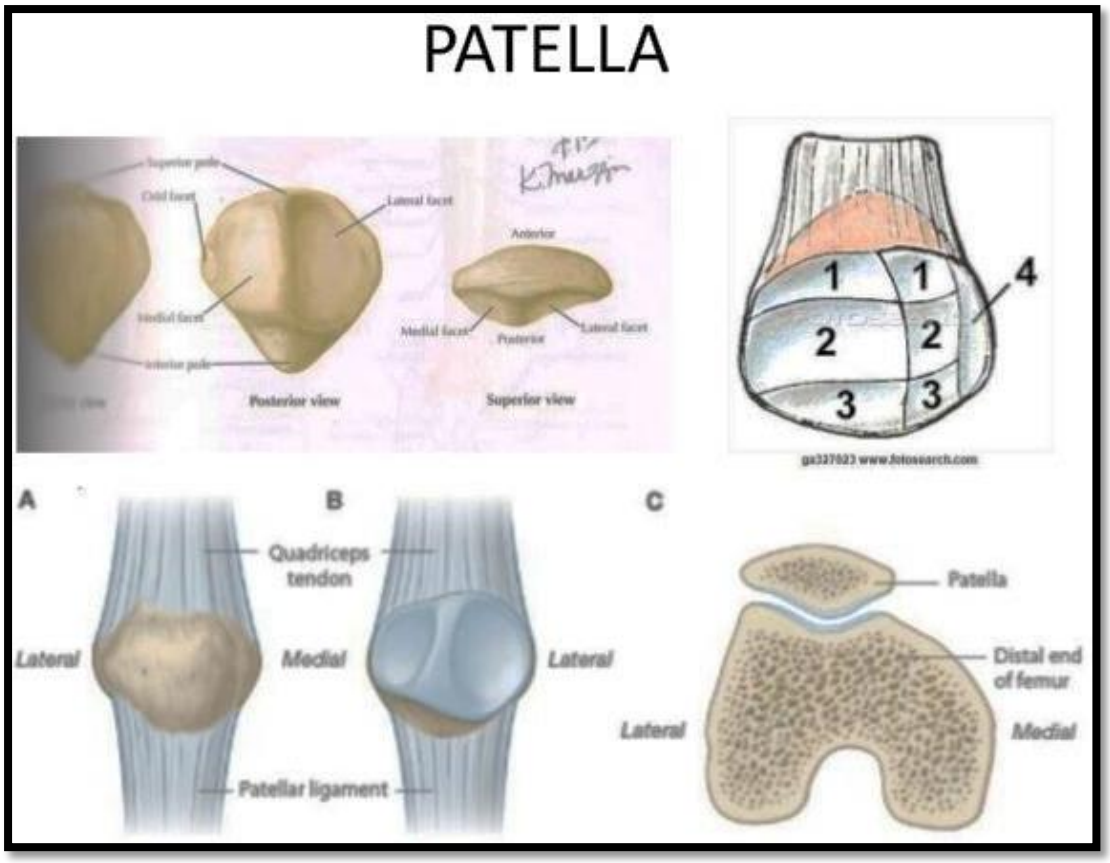
It forms articulation behind with the patellar surface of femur condyles . The ossification centers usually appear at 3to 5 years of age, but may be delayed until as late as 6 years.

It has a pointed apex projecting downward. The ligamentum patella, which is formed from the extension of the quadriceps tendon, attaches to the apex & the inferior part of the adjacent posterior surface. When the ligament is taut The apex designates the knee joint level.

The lateral and medial edges are rounded and receive fibers of vastuslateralis and vastusmedialis respectively. These, with associated fibres of fascia lata, form the retinacula of patella; the posterior surface patella is largely occupied by an oval articular surface for femur.

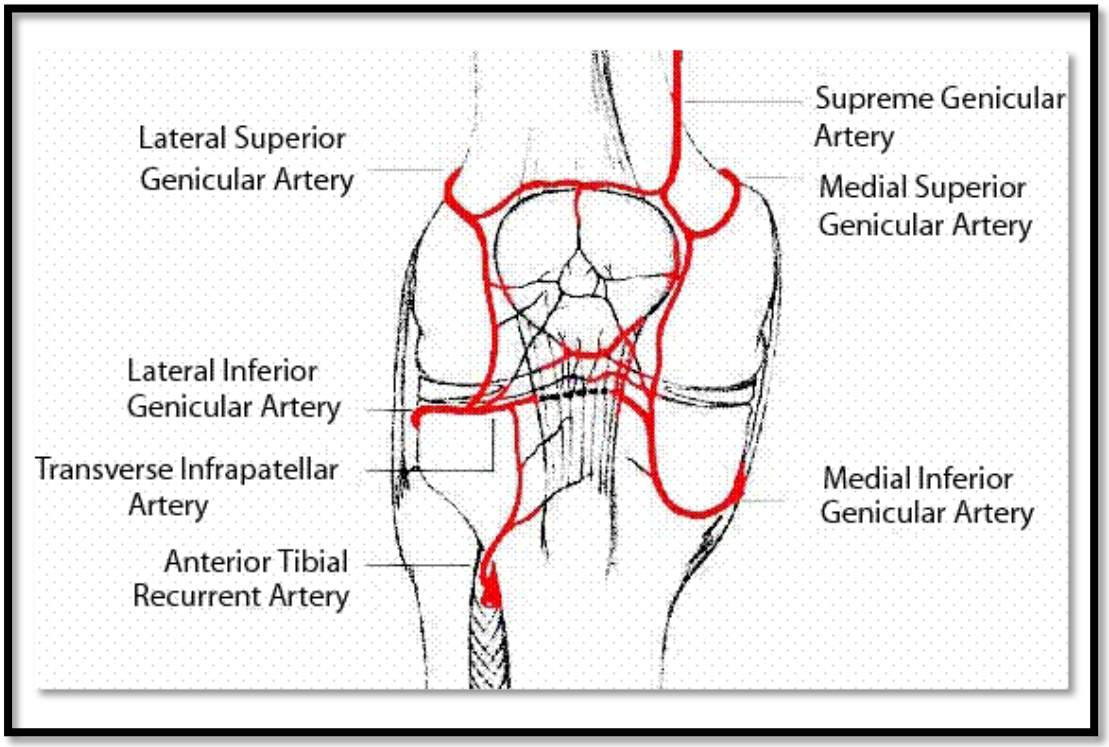
This is divided into a larger lateral part & a smaller medial part by a vertical ridge for the corresponding areas on the patellar surface of femur.

These areas may be subdivided further to correspond to the parts in contact with the femur in different phases of flexion and extension. The attachment of Ligamentum patellae below & the quadriceps tendon above are each separated from articular surface by a non-articular area related to synovial membrane & fat. These areas are frequently perforated by blood vessles.


PATELLA
Posterior view
Superior view
Anterior
Medial facet
Lateral facet
Posterior
1
1
4
2
2
3
3
A
B
C
Quadriceps tendon
Lateral
Medial
Lateral
Patellar ligament
Patella
Distal end of femur
Lateral
Medial

BLOOD SUPPLY

Blood supply to patella originates from as many as twelve nutrient arteries at the inferior pole, running upward in a series of furrows of bone on anterior surface. Blood supply is also from mid patellar vessels, penetrating the middle 1/3 of anterior surface and inferior poles vessels that anastomose at the inferior pole of patella. These primary vessels are feeded by Geniculate system, the anterior tibial recurrent artery, the inferior medial & lateral genicular artery.



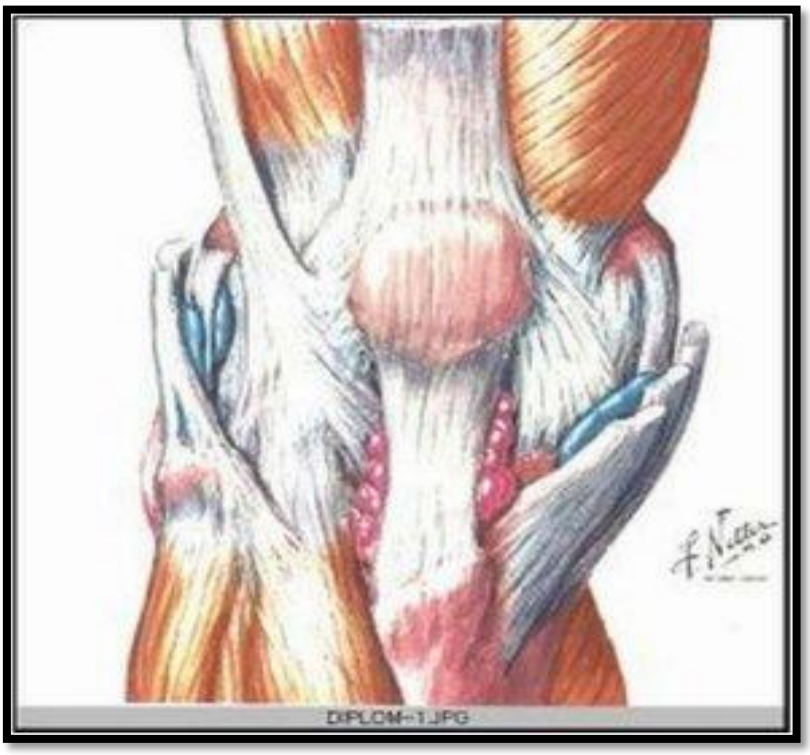
IMPORTANCE OF EXTENSOR

APPARATUS OF KNEE JOINT[34]

The extensor apparatus of knee joint consist of the rectus femoris and vastus-muscles, together called the quadriceps muscle. This group is inserted into the upper tibia by strong central band, which contains the patella, and medial and lateral expansion, which cover the femoral condyles.

Extensor apparatus may rupture from upper margin of patella, across patella, lower margin of patella, avulsion of tibial tuberosity.

- Extensor apparatus not only assist knee joint extension but also provides knee joint stability.
- Extensor lag and decreased flexion range are well recognized after disruption in extensor mechanism. Extensor lag is inability of the patient to perform the last 10° of extension
- **EXTENSOR MECHANISM IS ANTIGRAVITY MECHANISM.**



BIOMECHANICS OF PATELLO-FEMORAL JOINT[34]

The patello-femoral joint is intrinsically unstable as the tibial tubercle lies lateral to the long axis of femur & the quadriceps muscles, & the patella is so subjected to a laterally directed force. Thus minimizing "design fault" which causes resistance of trochlea's lateral lip during lateral movement of patella during flexion.

The patella is situated at the upper trochlear end during full extension & as flexion begins & enters its groove, it is important for stability that the trochlea should be engaged properly.

Patella upsurges that mechanical benefit of extensor muscle by transmitting forces across knee at greater distance from axis of rotation. Patella upsurges functional lever arm of quadriceps in addition to changing direction of pull, of quadriceps mechanism approximately 7cm of translation from full flexion towards extension.

At more than 90° of flexion quadriceps tendon starts to contact trochlea in full flexion when patella is entirely in intercondylar notch, it increases lever arm of quadriceps by only 10%.

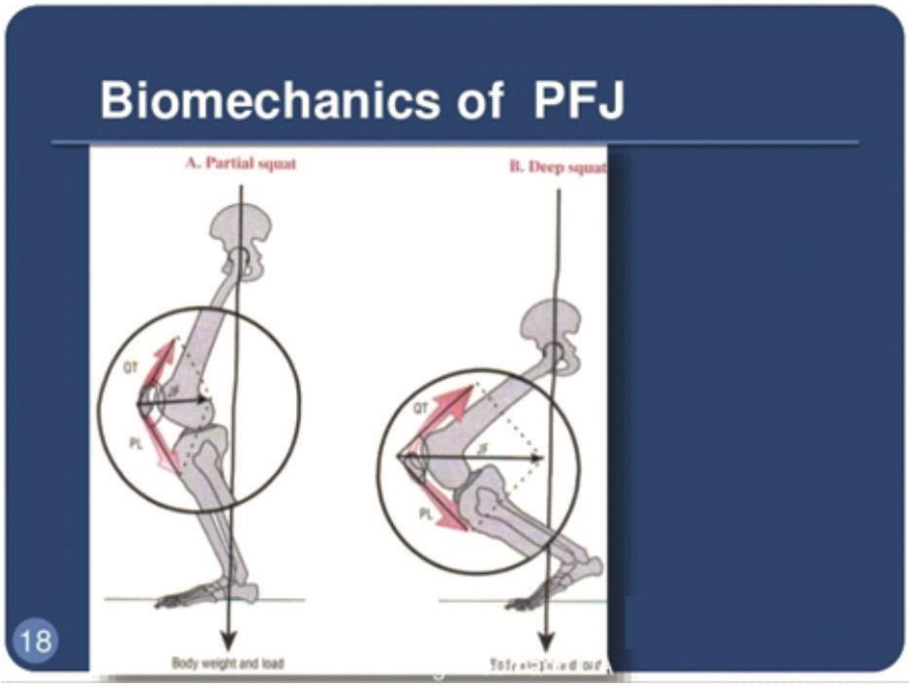
When knee starts to come into extension patella's involvement upsurges until 45* of flexion at which patella lengthen lever arm by 30%. It than declines when more extension proceeds. The fulcrum of the extensor mechanism is served by patella. Thus quadriceps acts as a tendon of largest extensor muscle in the body, & the patellar tendon inserting in the tibial tuberosity.

Massive forces are transferred through the patello- femoral joint. Maximum forces measured within the quadriceps tendon ranged up to 3,200 N, within the patellar tendon 2,800 N, and in young, physically fit men up to 6,00033 corresponding three

to seven times the body weight & specifies the load-bearing capacity needs of an osteosynthesis. The patellar has thickest cartilage of human body having 4-5 mm in depth. Tracking of patella are directed by the position of the extensor mechanism & quadriceps muscle balance.

The patellar articulation congruency with the femur changes significantly from extension to flexion. The patellar articulating surface is directly connecting the anterior femur starting From full extension towards 45°of flexion. The posterior surface of the quadriceps tendon articulates with femur facets for patella when knee flexed greater than 45. This upsurge in the lever arm, for illustration, the distance from the quadriceps tendon -patellar tendon linkage to the axis of the knee rotation.

The increased lever arm of the extensor mechanism, due to height of patella, adds an additional 60% of the force needed to gain full (e.g., the final 15%) extension. So before patellectomy is performed this fact must be kept in mind, because full extension power will be reduced postoperatively.

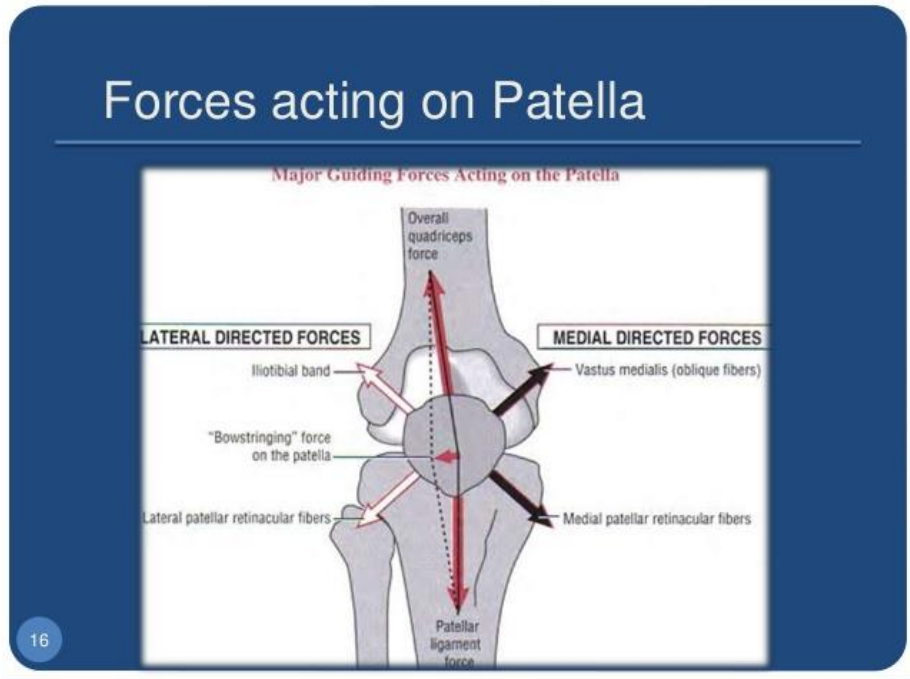


PATELLO FEMORAL JOINT REACTIVE FORCE[34]

The primarily patella is loaded in tension when knee in extension. With knee flexion, posterior surface of patella is loaded in three points bending due to compression by the distal femur force, denoted as patella- femoral joint reactive force.

Patella is exposed to complex loading when knee is in extension; it transmits nearly all the forces of quadriceps contraction & thus is loaded primarily in tension.

When knee is flexed, its posterior surface comes in contact with distal aspect of femur and is subjected to compressive force. As knee move inflexion, bending forces become increases and important magnitude of tensile forces in anterior surface of patella increases and becomes maximum at 45° of knee flexion.



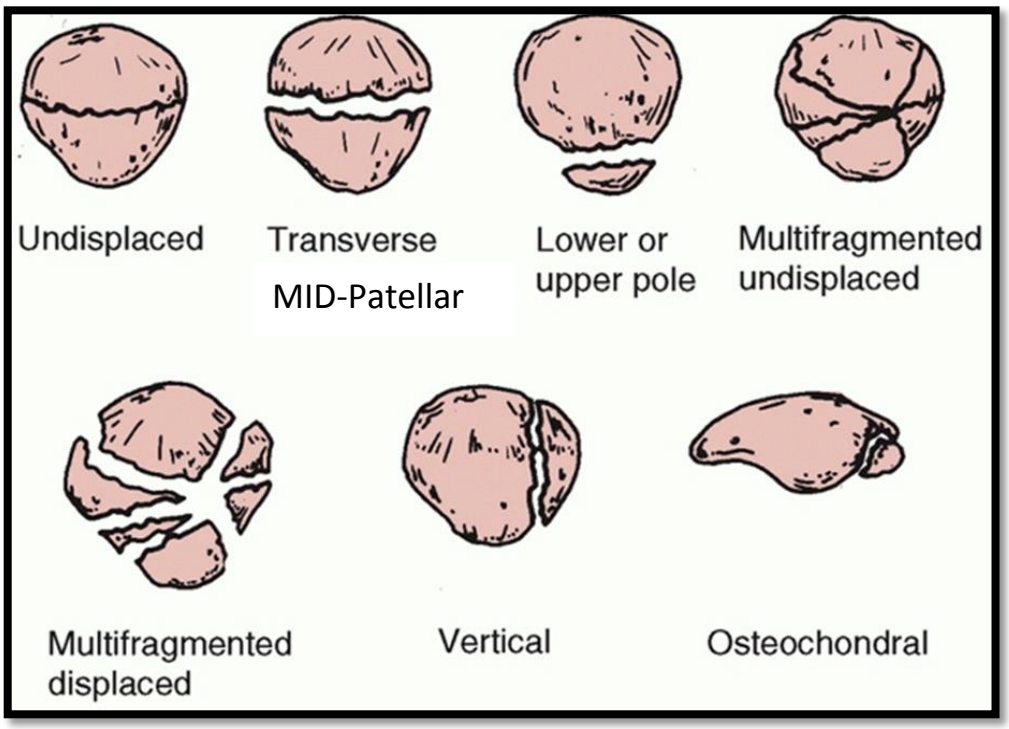
CLASSIFICATION OF PATELLAR FRACTURES[34]

Patellar fractures are classified as:

1. Displaced mid patellar Transverse.
2. Stellate or communited.
3. Longitudinal or Marginal.
4. Proximal pote or distal pole.
5. Osteochondral.

Transverse fractures are the most common, constituting 50% to 80% of patella fracture

Stellate and communited fractures account for 30% to 35%, whereas longitudinal or marginal vertical fractures make up 12% to 17%. Osteochondral fractures are usually observed in-patient of 15 to1 20 years of age. Anomalies of ossification usually are related to an accessory, ossification center at center at the superolateral corner of the patella. This is called bipartite patella .If a similar lesion is present in the opposite knee, the diagnosis is clear.



MECHANISM OF INJURY[34]:-

Patellar fracture results from direct and/or indirect forces. The majority of patellar fractures results from direct injuries a fall on knee or a direct blow sustained in vehicular trauma are common etiologies, ipsilateral femoral shaft fracture or posterior dislocation of hip also may be seen with direct injuries.

Patellar fracture from indirect forces occurs when the intrinsic strength of patella is exceeded by the pull of musculotendinous units attaching to it. The typically occurs in the act of stumbling or partially falling.

Combined direct/indirect injuries are characterized by evidence of direct trauma to skin and considerable fragment separation. Association between fragmentations of distal pole has been noted.

MATERIALS AND METHODS

Source of data:

- The patients of S.B.K.S Medical College and Research Center,Waghodia .

Duration:

- 22 months.

Study design:

- Prospective study.

Inclusion criteria :

- Fracture of patella in all age group .

Exclusion Criteria:

- Open fractures
- Undisplaced patella fractures
- Pathological fractures.
- Patient not consenting for surgery
- Patient Not Fit For Surgery.

Follow-up:

- Patients were followed every 2 monthly for minimum period of 6 months.

Methods of collection of data :

- Patient treated and admitted in Dhiraj general hospital and followed up in orthopedic outdoor department. After admission and patient is stable and fit for surgery operative procedure was done.
- In current study only those cases which were treated with tension band wiring were included.

TENSION BAND WIRING[40]:-

- This is performed with two K-wires introduced longitudinally across the fracture, wire loop being passed behind the tips of Kirchner wires and over the anterior surface of patella in the form of figure of eight.

OPERATIVE PROCEDURE[40]:-

- The tension band wiring procedure was performed twelve hours to three days after injury.
- After approaching the patella by mid line incision, blood clots and small fragments were removed and fracture surface cleaned, extent of extensor expansion tear explored and trochlear groove inspected for damages to femur.
- Proximal and distal fragments reduced and held firmly with clamps, with special attention to restoring smooth articular surface. Two Krishner wire drilled from inferior to superior through each fragments, these wires were placed about 5 millimeters deep to the anterior surface of patella along lines dividing patella into, medial, central and lateral thirds. Wires were parallel to each other and protruding beyond the patella and quadriceps tendon to the inferior and superior fragments.
- A 18 -gauge wire passed through the quadriceps tendon attachment as close to the bone as possible, deep to the protruding k-wires than over the anterior surface of the reduced patella than transversely through the patellar tendon attachment on the inferior fragment and deep to the protruding K-wire, than back over the anterior surface of patella, tightened at the upper end, alternatively placed wire in figure of eight pattern.
- Articular surface of patella checked by palpation in extended knee position.

- Both upper end of K-wire bended acutely and anteriorly and cut them short and rotated 180 degree and with an impactor wire loops inferiorly protruding wires cutted short, extensor expansion tear repaired with interrupted suture.

POST OPERATIVE CARE:-

In stable fixation of simple transverse fracture achieved early rehabilitation of knee joint with partial weight bearing should be started as patient becomes pain free.

Static quadriceps and hamstring strengthening exercises were started immediate post operatively.

Active extension started on 4th week Active flexion started on 2nd week In cases with associated extensor expansion tear flexion started after 3 weeks and without extensor expansion tear after 2 weeks

Non weight bearing walking with extension brace was done till 2nd day and in associated injuries at 8th or 10 th week respectively. Partial wt bearing was continued till 2nd week and in associated injury till 8th and 10 th week. Full wt bearing was started after 2nd week and in associated injury after signs of union of associated fracture seen.

After discharge patients were followed up on 2nd week, 4th week , 2 month ,4th month and 6th month and thereafter every 2month in outdoor unit.

Xrays were repeated on 4 th week, 2nd month , 4th month and 6th month and thereafter every 2 month till radiological union.

At every follow up movements of knee, quadriceps strength were noted. All the patients were examined and interviewed an than for evaluation we used knee society score to see the results of surgical treatment patella fracture treated with tension band wiring Each patient was scored according to knee Society score[98]

Pain (50 Maximum)

Walking

- None 35
- Mild or occasional 30
- Moderate 15
- Severe 0

Stairs

- None 15
- Mild or occasional 10
- Moderate 5
- Severe 0

Range of movement (25 Maximum)

- 8^{o} = 1 point

Stability (25 Maximum)

Medial/Lateral

- 0-5 mm 15
- 5-10 mm 10
- > 10 mm 5

Anterior/Posterior

- 0-5 mm 10
- 5-10 mm 8
- > 10 mm 5

Deductions

Extension lag

- None 0
- <4 degrees -2
- 5-10 degrees -5
- >11 degrees -10

Flexion Contracture

- < 5 degrees 0
- 6-10 degrees -3
- 11-20 degrees -5
- > 20 degrees -10

Malalignment

- 5-10 degrees 0
- (5^{o} = -2 points)

Pain at rest

- Mild -5
- Moderate -10
- Severe -15
- Symptomatic plus objective 0

TOTAL SCORE **100**

- Patients below 60 were considered Poor .60-69 were considered fair , 70-79 were considered good ,80-100 were considered excellent

The criteria for fracture union were free movements on walking and sitting and union was also assessed radiographically and clinically.

No case was declared united unless it was fit on criteria of assessment. Non-union has been defined as lack of healing for short time as six months to as long as 18 months."

OBSERVATION AND RESULTS

This study was carried out in SBKS &M.I.R.C FROM JANUARY 2016 TO SEPTEMBER 2017

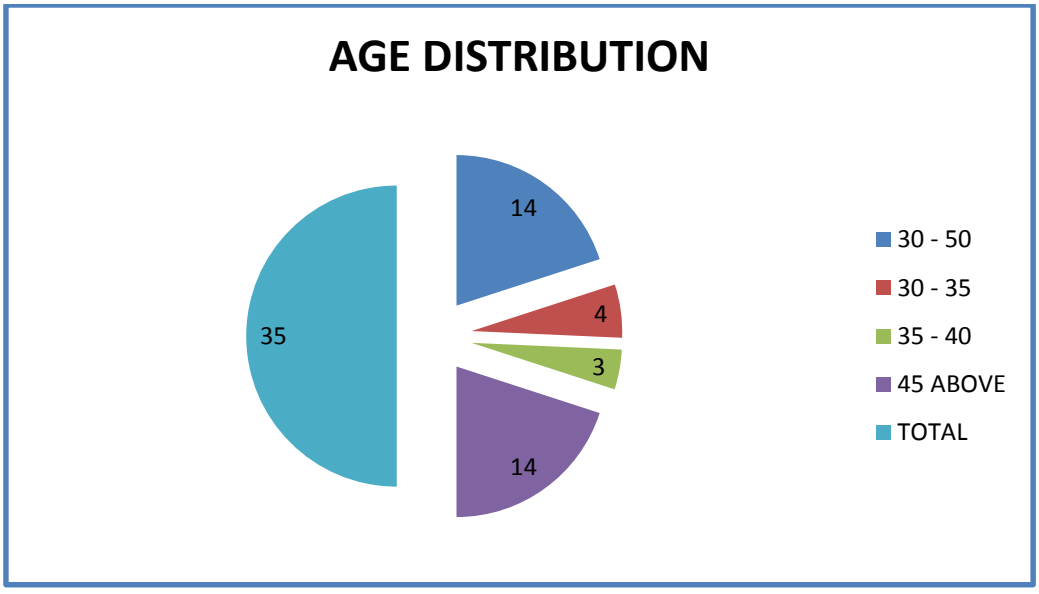
In this study TOTAL 35 patients were included; there were 27 male and 8 female.

The age at the time of fracture ranged from 18 to 75years.

AGE DISTRIBUTION

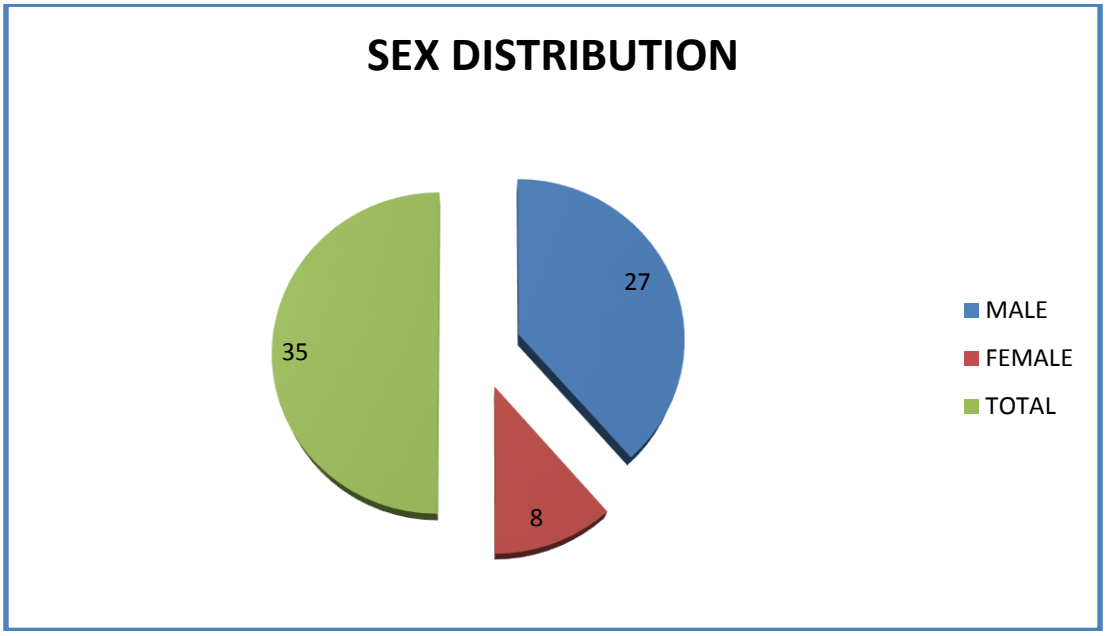
RANGE (18-75 years)	NO OF PATIENTS	%
20-30 YEARS	14	40 %
30-35 YEARS	04	11.42 %
35-40 YEARS	03	8.57 %
45-ABOVE YEARS	14	40 %
TOTAL	35	100 %

OUT OF 35 PATIENTS 21 (60 %) PATIENTS WERE BETWEEN 20-40 YEARS OF AGE 14 (40%) PATIENTS WERE ABOVE 45 YEARS AGE.



SEX DISTRIBUTION

MALE	FEMALE
27(77.15%)	8(22.85 %)
TOTAL	35 (100%)

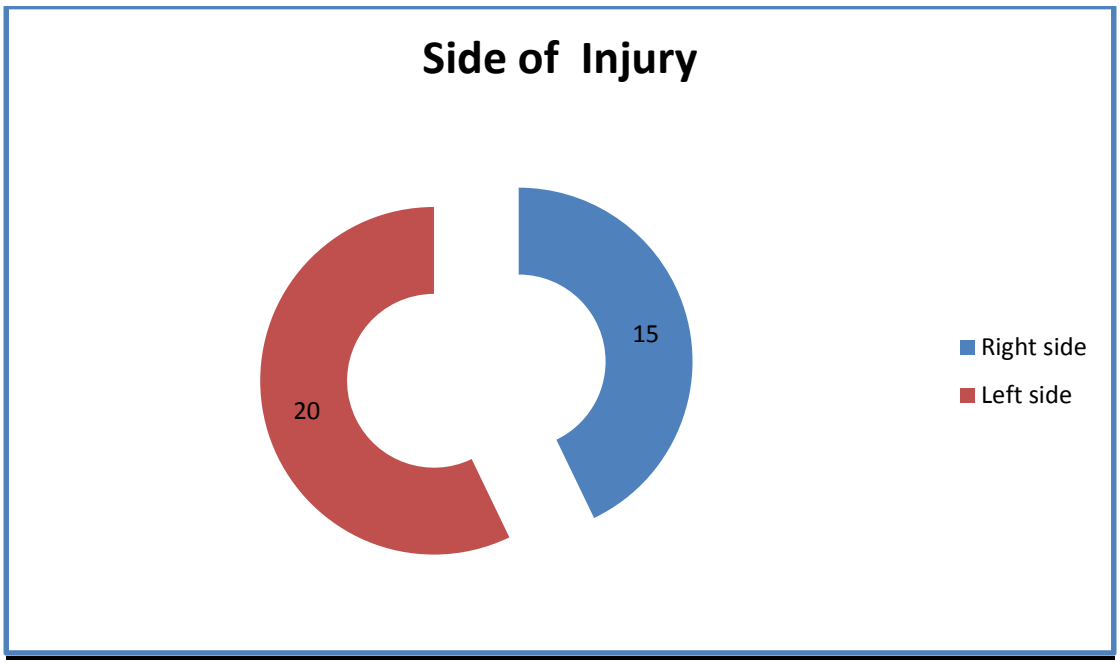


Out of 35, 27 (77.14%) patients were male and 08 (22.85%) were female.

SIDE OF INJURY

Out of 35 patients 20 (57.14 %) patients had Left side involvement and 15 (42.86 %) patients had Right sided involvement .

Right side	Left side
15(42.86)	20(57.14)
TOTAL Patients	35 (100%)

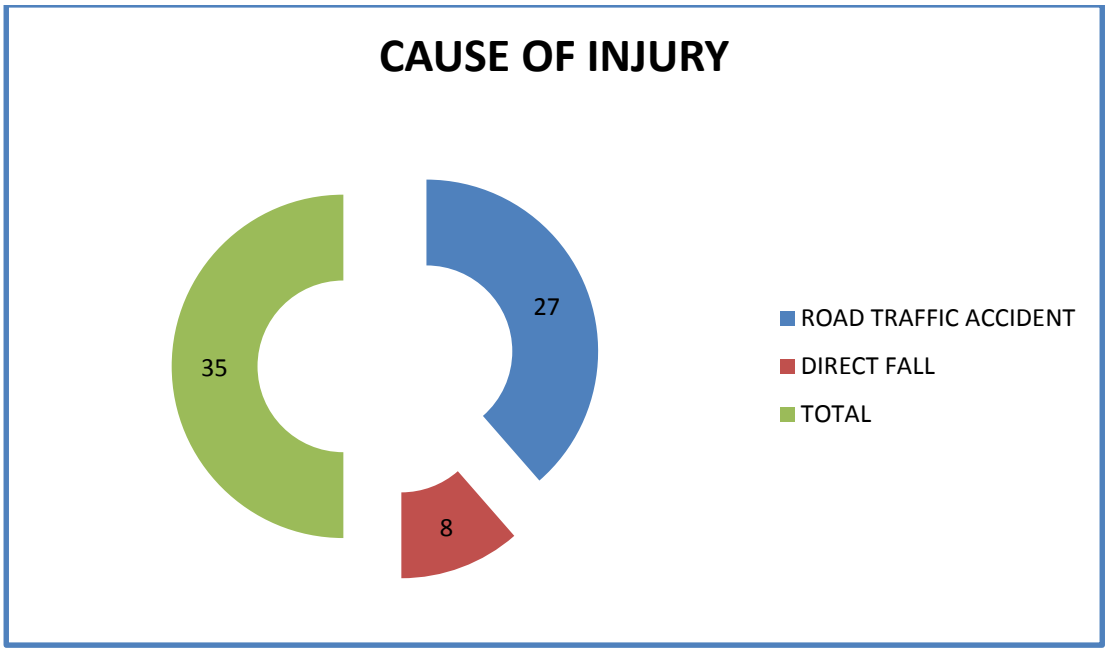


CAUSES OF INJURY

The main cause of injury 27 out of 35 (77.14 %) was road traffic accident in cases.

All cases of Road traffic accident was from two wheelers .08 (22.85 %) cases were direct injury due to slip while walking or climbing up on stairs.

NO. OF PATIENTS	%	MECHANISM OF INJURY
27	77.15 %	Road traffic accident.
08	22.85 %	Direct injury due to fall.
35	100 %	TOTAL



The main cause of injury was road traffic accident .

HOSPITAL STAY

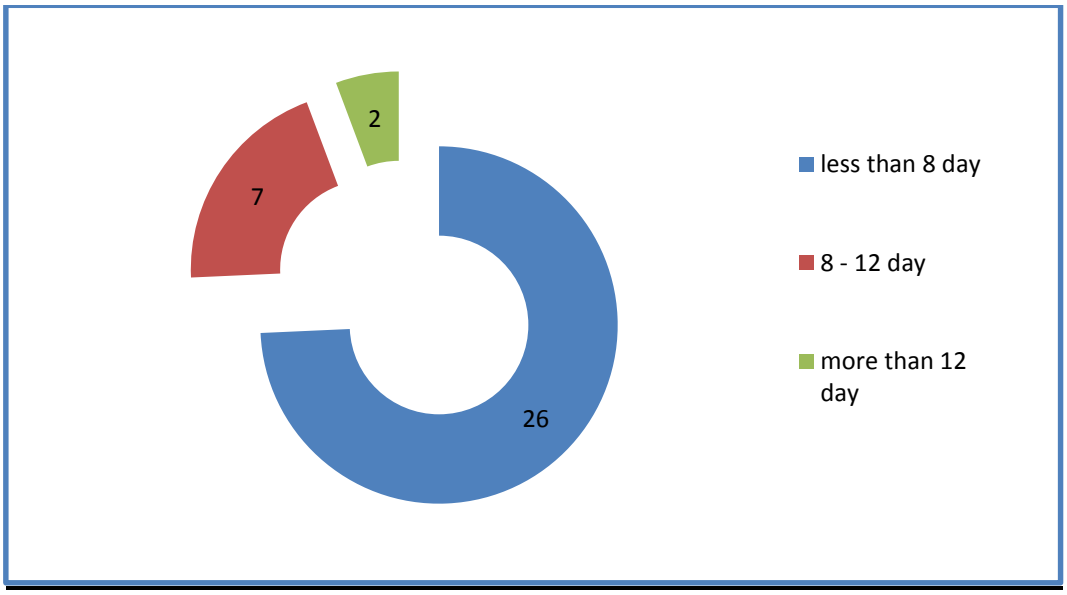
NO. OF PATIENTS	Range	Mean Hospital Stay
35	5 – 15 days	11 days

Average hospital stay was 11 days

NO, OF PATIENTS	Range	Percentage
26	Less than 8 days	74.29 %
07	8 days – 12 days	20 %
02	More than 12 days	5.71 %

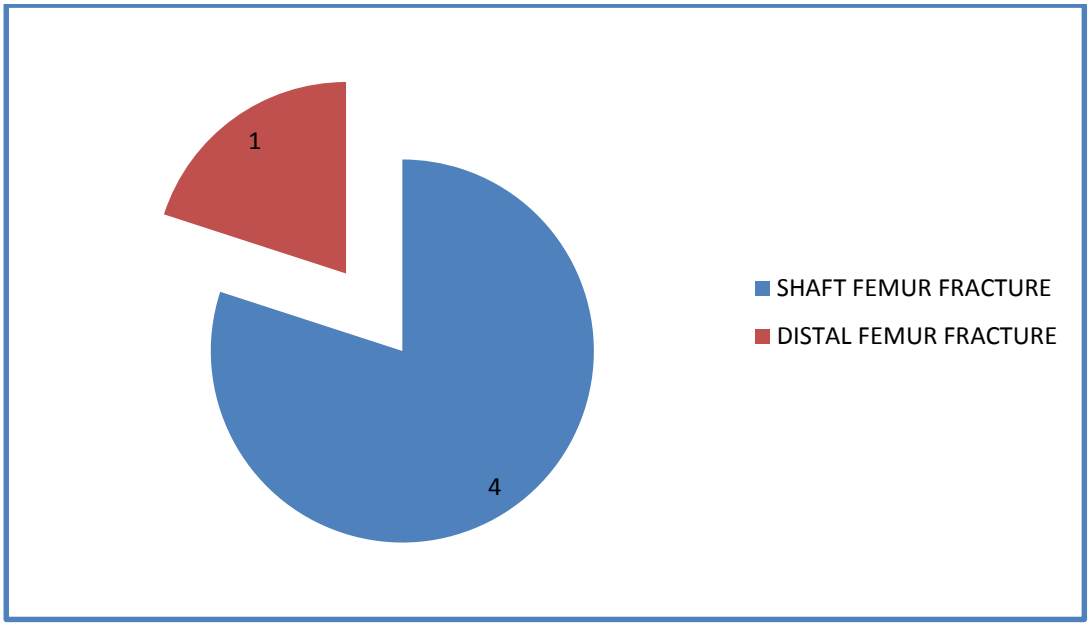
26 patients (74.29 %) were discharged under 8 days after surgery while 07(20 %) patients were discharged between 8-12 days after surgery and 02 (5.71 %) patients were discharged after more than 12 days after surgery.

Patients discharged after 12 days postoperatively has longer stay due to associated injuries.



ASSOCIATED INJURY

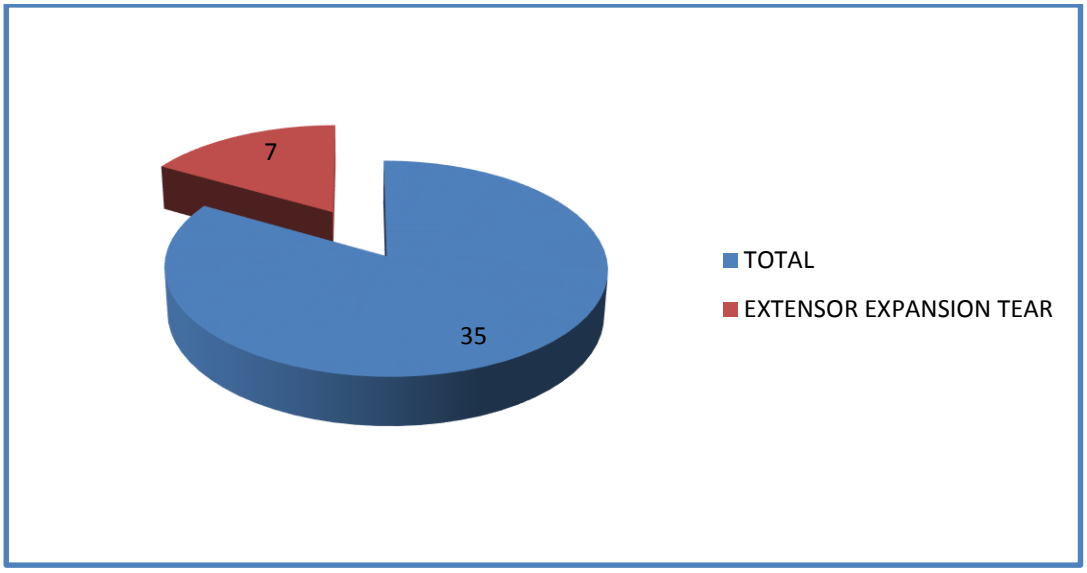
ASSOCIATED INJURY	NO OF PATIENTS	%
IPSILATERAL SHAFT FEMUR FRACTURE	04	11.42
IPSILATERAL DISTAL FEMUR FRACTURE	01	2.85
TOTAL OUT OF 35	06	14.32%



05 PATIENTS OUT OF 35 (14 %)WERE HAVING ASSOCIATED INJURIES MOST OF WHICH WERE IPSILATERAL SHAFT FEMUR FRACTURE 04 OUT OF 35 (11.42 %) AND 01(2.85 %) PATIENTS WITH IPSILATERAL DISTAL FEMUR FRACTURE.

EXTENSOR EXPANSION TEAR

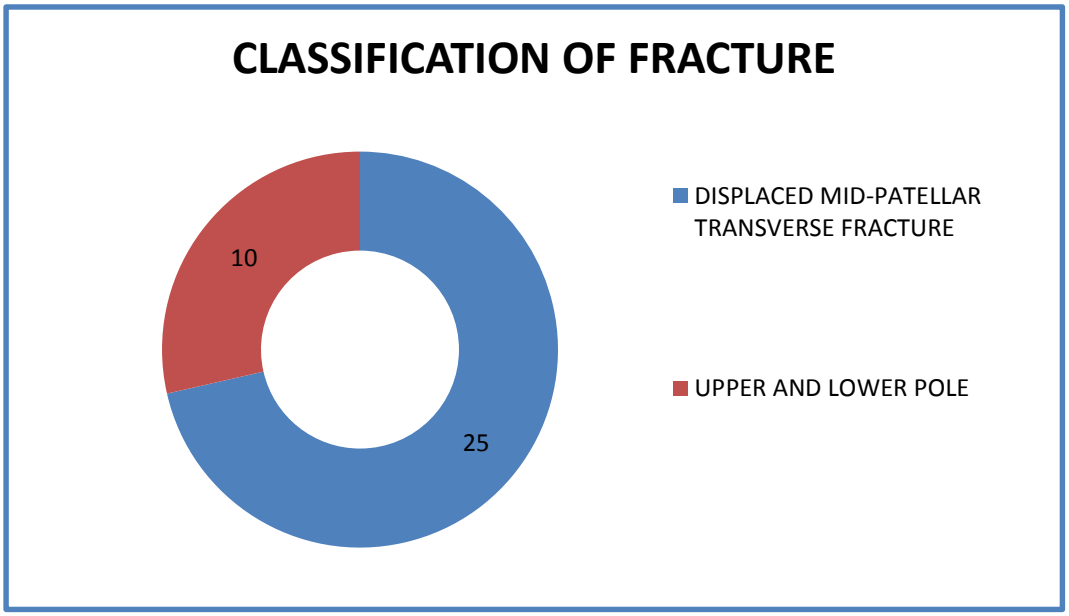
	NO OF PATIENTS	PERCENTAGE
Extension expansion tear	06	20 %
TOTAL PATIENTS	35	100 %



EXTENSOR EXPANSION TEAR WAS NOT POSSIBLE TO DIAGNOSE ON CLINICAL EXAMINATION . BUT DURING SURGERY ON EXPLORATION EXTENSOR EXPANSION TEAR WAS IDENTIFIED ON PALPATION IN 06 (17.14 %). PATIENTS OUT OF 35PATIENTS.

CLASSIFICATION OF FRACTURE

NO. OF PATIENTS	%	Fracture type
25	71.42 %	DISPLACED MID-PATELLAR TRANSVERSE FRACTURE
10	28.57 %	UPPER OR LOWER POLE
0	0	Stellate (Multifragmented)
0	0	Vertical

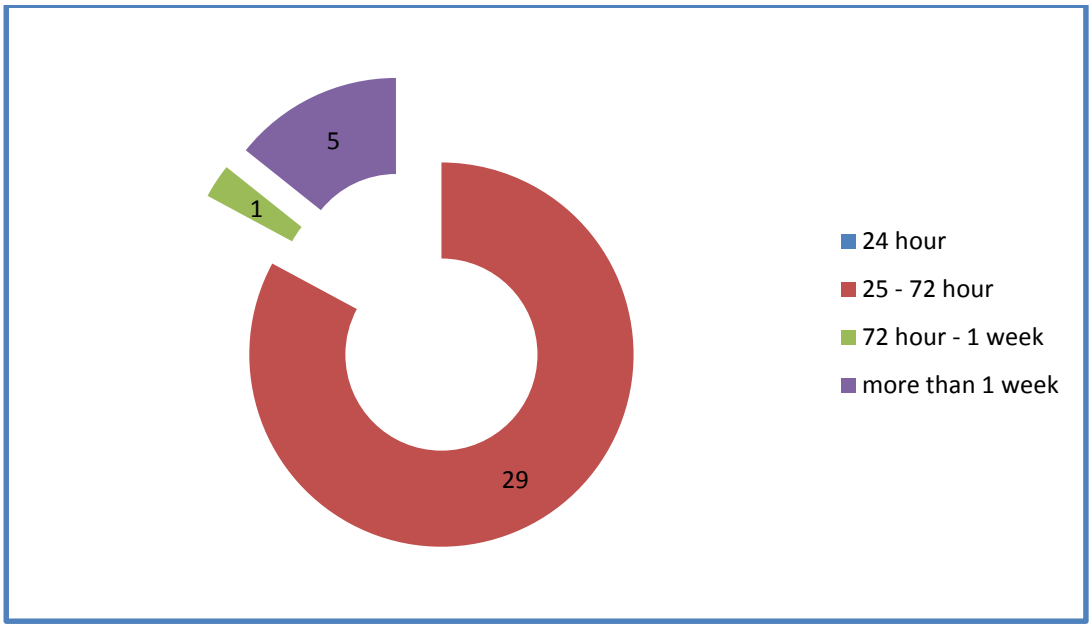


MOST OF THE PATIENTS WERE HAVING DISPLACED MID-PATELLAR TRANSVERSE PATELLA FRACTURE 25 OUT OF 35 (71.42 %)

DURATION BETWEEN INJURY AND ADMISSION

29 (82.85 %) patients presented within 72 hours of Injury while 01 (2.85 %) patients presented between 72 hours to 1 week after injury and 05 (14.18 %) patients presented after 1 week of Injury

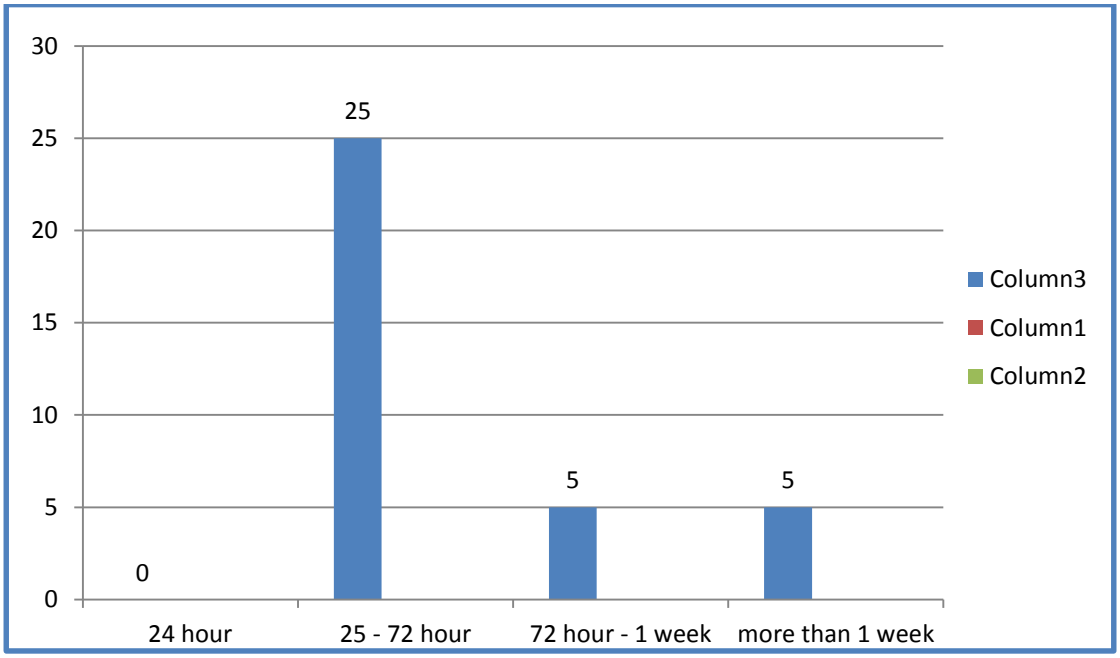
DURATION	NO OF PATIENTS
24 HOUR	O
25-72 HOUR	29 (82.85 %)
72 HOUR- 1 WEEK	01 (2.85 %)
MORE THAN 1 WEEK	05 (14.18 %)
TOTAL PATIENTS	35(100%)



DURATION BETWEEN INJURY AND OPERATION

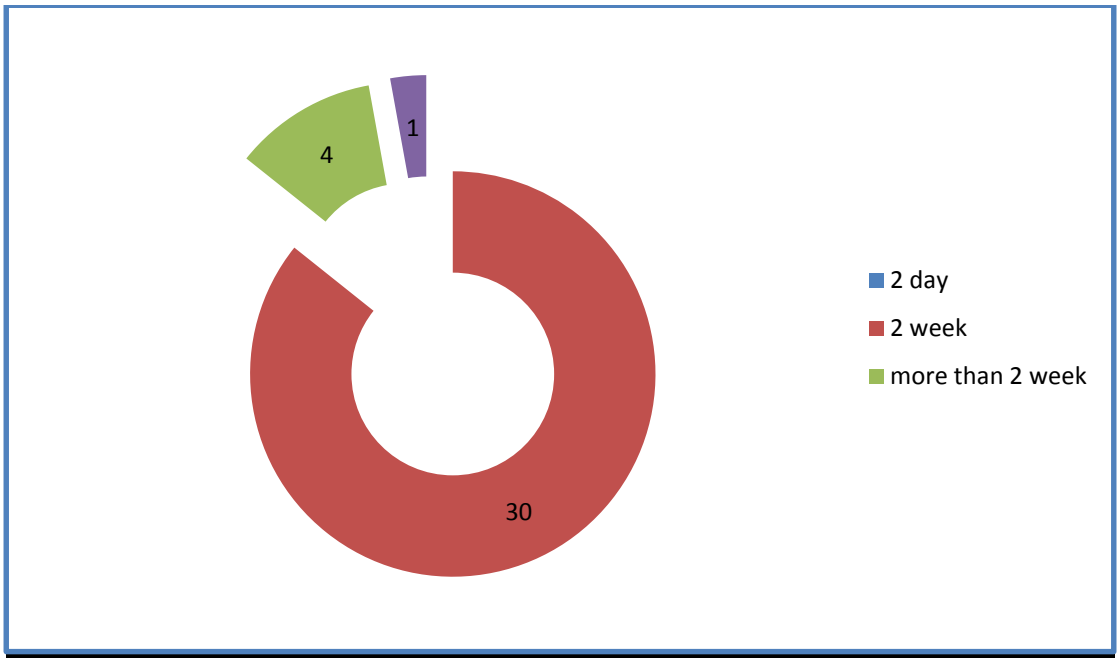
25 (71.43 %) patient were operated within 72 hours of injury while 05 (14.85 %) patints were operated between 72 hpurs to 1 week after injury and 05 (14.85 %) patients were operated 1 week after Injury.

DURATION	NO OF PATIENTS
24 HOUR	O
25-72 HOUR	25 (71.43 %)
72 HOUR- 1 WEEK	05 (14.85 %)
MORE THAN 1 WEEK	05 (14.85 %)



KNEE FLEXION STARTED ON

NO OF PATIENTS	KNEE FLEXION STARTED ON
30 (85.72 %)	2nd day
04 (11.43 %)	2nd week
01 (2.85 %)	After 2 weeks
Total Patients	35 (100%)



PATIENTS WERE ADVISED AMBULATION ON WALKER WITH EXTENSION KNEE BRACE WITHOUT BEARING WEIGHT ON THE NEXT DAY.PARTIAL WEIGHT BEARING WAS STARTED AS SOON AS PATIENT TOLERATED.

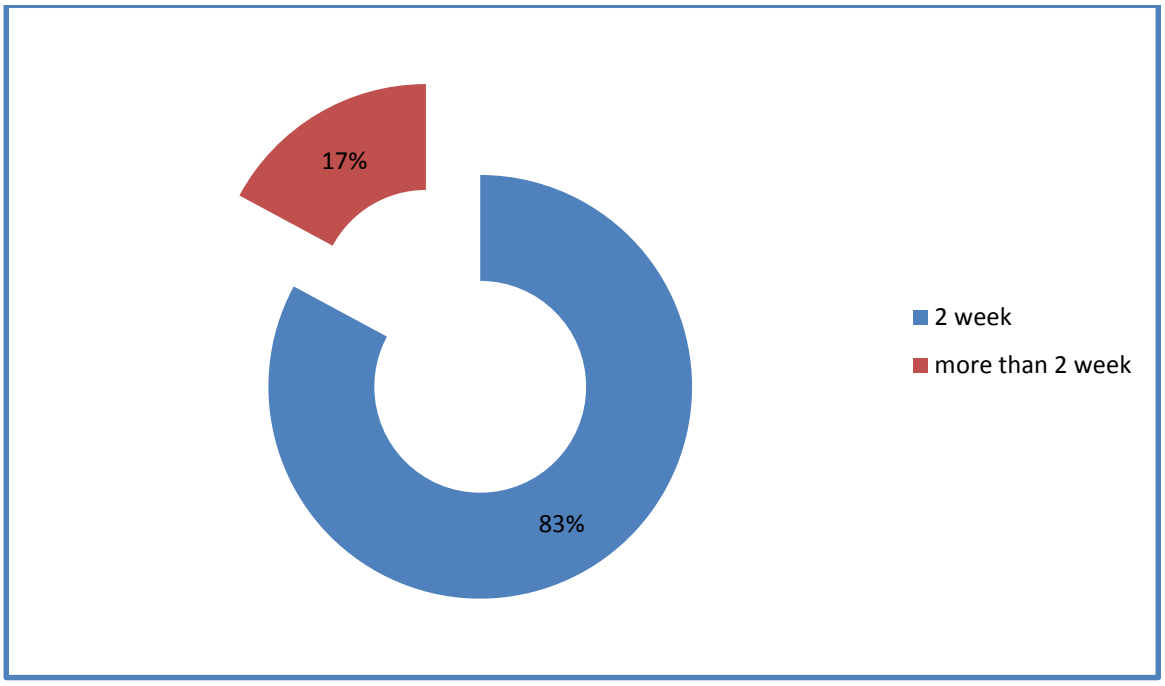
PATIENTS HAVING ASSOCIATED FRACTURE WERE NOT SUBJECTED TO WEIGHT BEARING TILL OTHER FRACTURE (FEMUR) SHOWS SIGNS OF HEALING.

MOBILIZATION STARTED ON

NOOF PATIENTS	MEAN MOBILIZATION STARTED ON
35	2.42 weeks

NO, OF PATIENTS	MOBILIZATION STARTED ON
29(82.86 %)	2 weeks
6 (17.14 %)	After 2 weeks

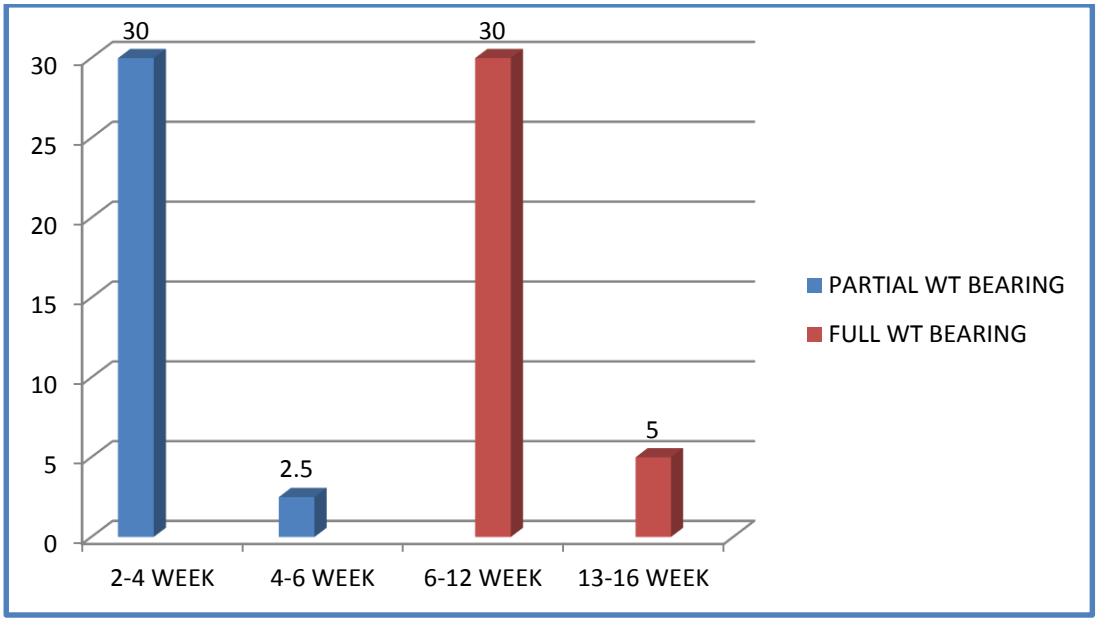
Average mobilization was started on 2-3 weeks postoperatively .The patients with extensor expansion tear were advised knee motion after 3 weeks and patients without associated injury mobilization was started after 2 weeksIn none of the patients cpm was started.



Mean mobilization was started at 2.42 weeks

WEIGHT BEARING STARTED WHEN

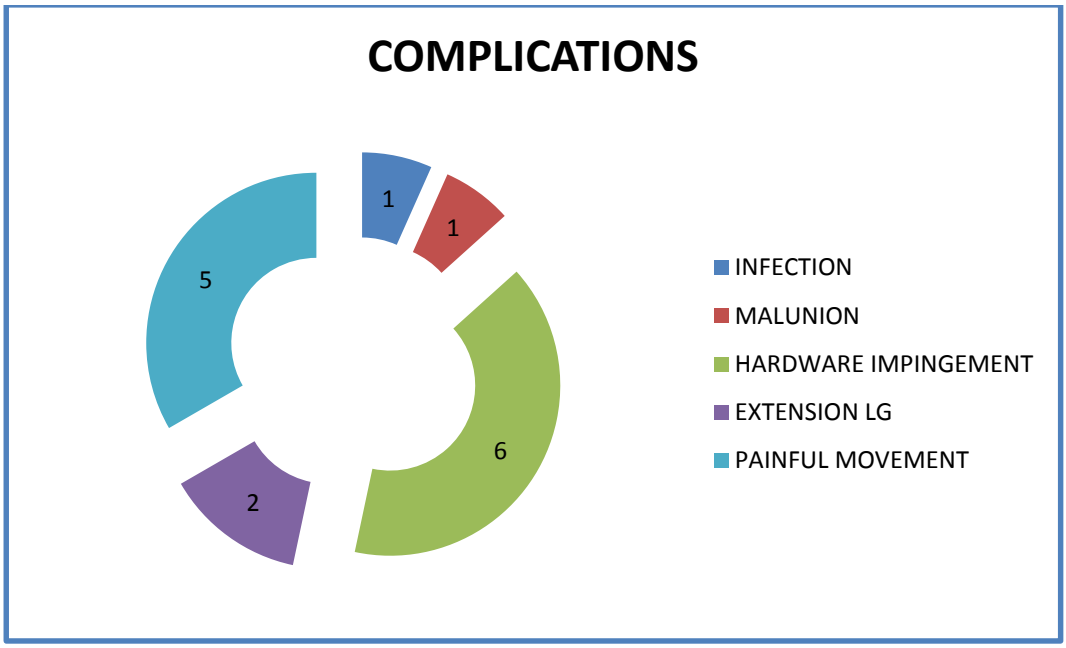
TOTAL NO OF PATIENTS	PARTIAL WT BEARING	NO OF PATIENTS	FULL WT BEARING
30	2-4 WEEKS	30	6-12 WEEKS
05	4-6 WEEKS	05	13-16 WEEKS



All patients with delayed weight bearing were due to associated secondary injuries

COMPLICATIONS

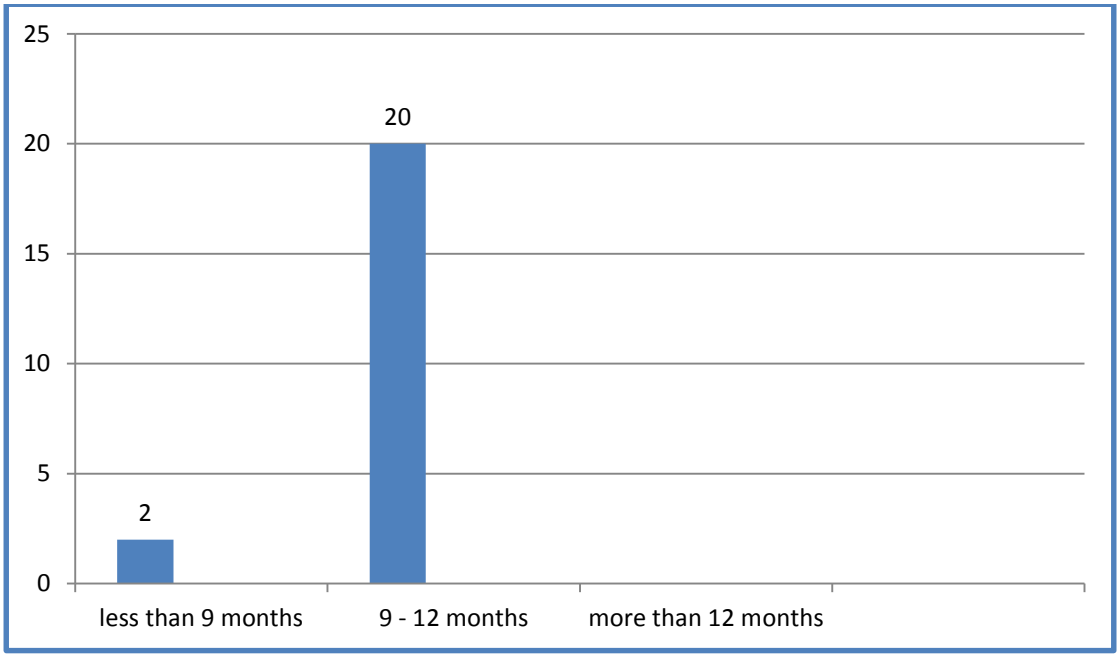
COMPLICATIONS	NO OF PATIENTS	%
INFECTION	01	2.85 %
MAL UNION	01	2.85 %
Hardware IMPINGEMENT	06	17.14 %
EXTENSION LAG	02	5.71 %
PAINFUL MOVEMENT	05	14.28



O1 (2.85 %) HAD POST OPERATIVE INFECTION O1 (2.85 %) HAD MALUNION DUE TO INACCURATE REDUCTION06 (17.14 %) HAD HARWARE IMPINGEMENT WHICH WAS REMOVED AFTER UNION 02 (5.71 %) HAD EXTENSION LAG WHICH WAS DUE TO IN ACCURATE REDUCTION AND OSTEOARTHRITIS. 05(14.28 %) HADPAINFUL MOVEMENTS WHICH WAS DUE TO MAALUINION AND OSTEOARTHRITIS.

DURATION OF FOLLOW UP

RANGE7 – 16 months	NO OF PATIENTS	%
Less than 9 months	02	5.72 %
9– 12 months	20	57.14 %
More than 12 months	13	37.14 %



20 patients came for follow up between 9 – 12 months for follow up , 13 patients came for follow up more than 12 months after surgery and only 2 (5.72 %) patients came for follow up for less than 9 months.

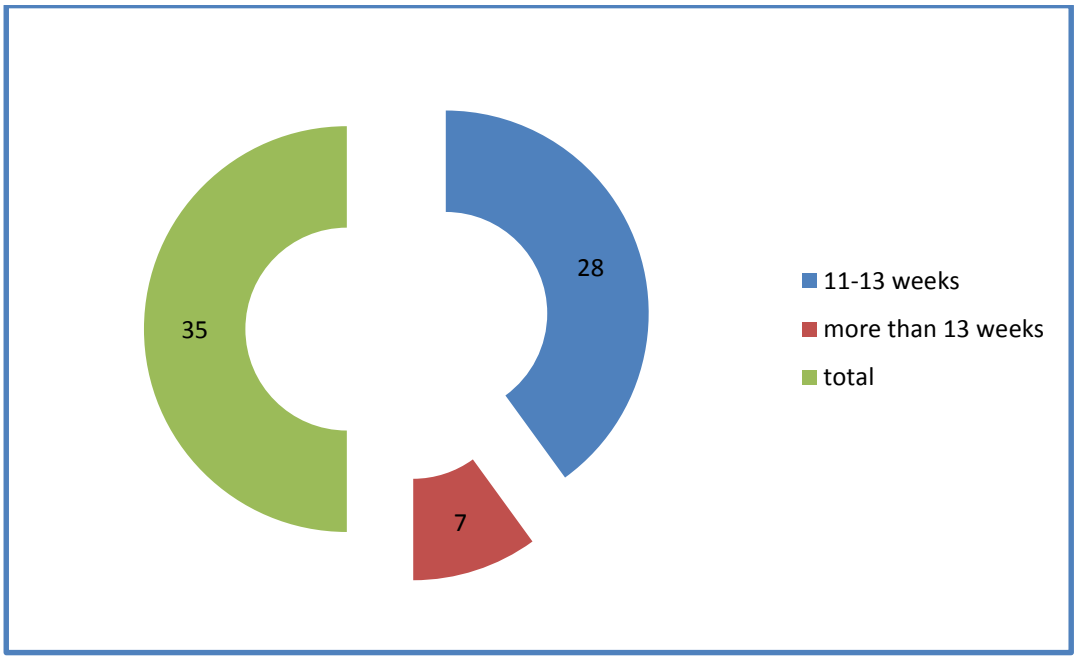
UNION TIME

NO OF PATIENTS	Range	Percentage
28	11 – 13 weeks	80 %
07	More than 13 weeks	20 %
Total	35	100 %

Union was observed in 11 – 13 weeks in 28 (80 %) of patients while 7 (20 %) patients showed union in more than 13 weeks but all patients achieved union before 16 weeks

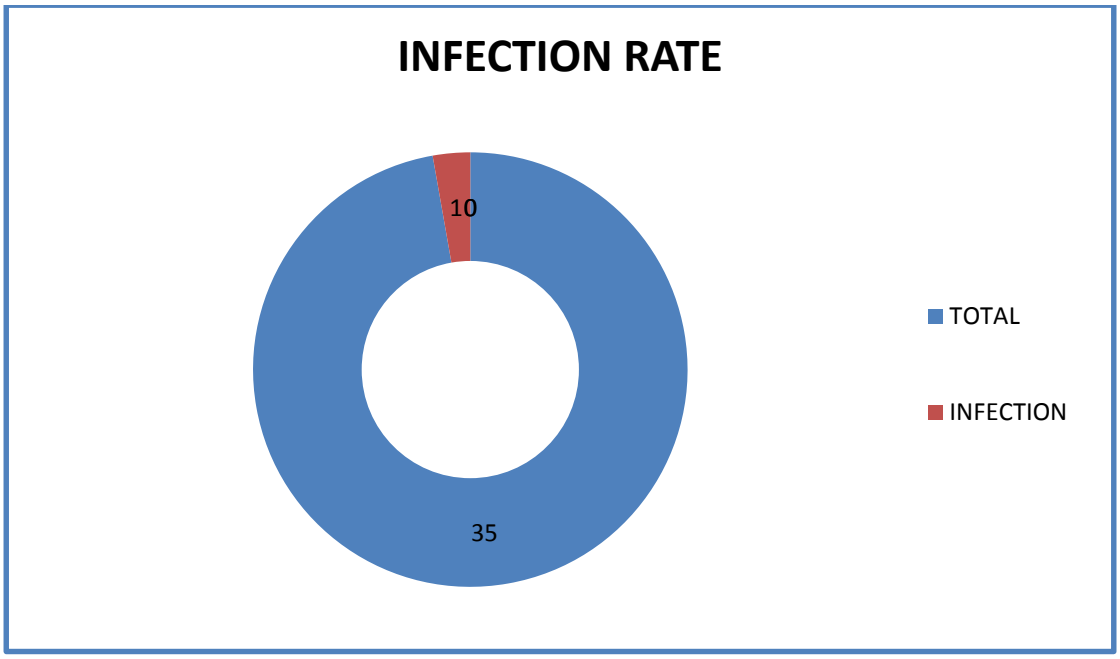
There were no cases of Non-Union seen in any patients .

AVERAGE UNION TIME WAS 12 – 13 WEEKS



INFECTION RATE

NO. OF PATIENTS	%	NATURE OF INFECTION
01	2.85 %	SUPERFICIAL INFECTION

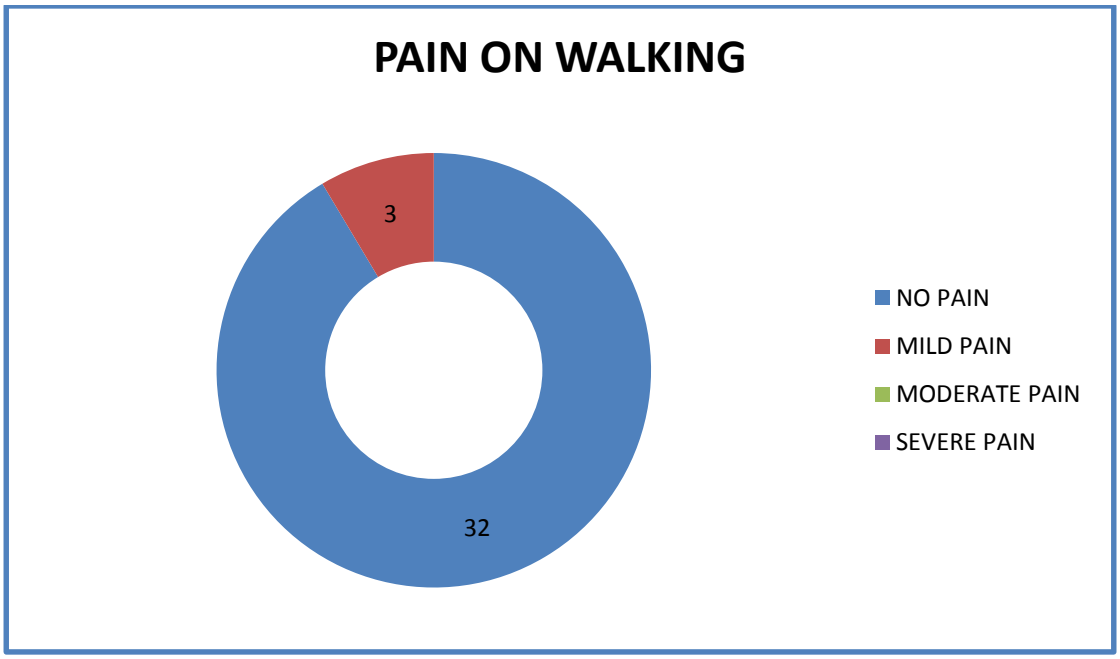


In 01 (2.85 %) patient postoperative wound infection seen. Which was debrided and treated by antibiotic according to culture and sensitivity report and wound healed uneventfully.

KNEE SOCIETY SCORE TABLES

PAIN ON WALKING

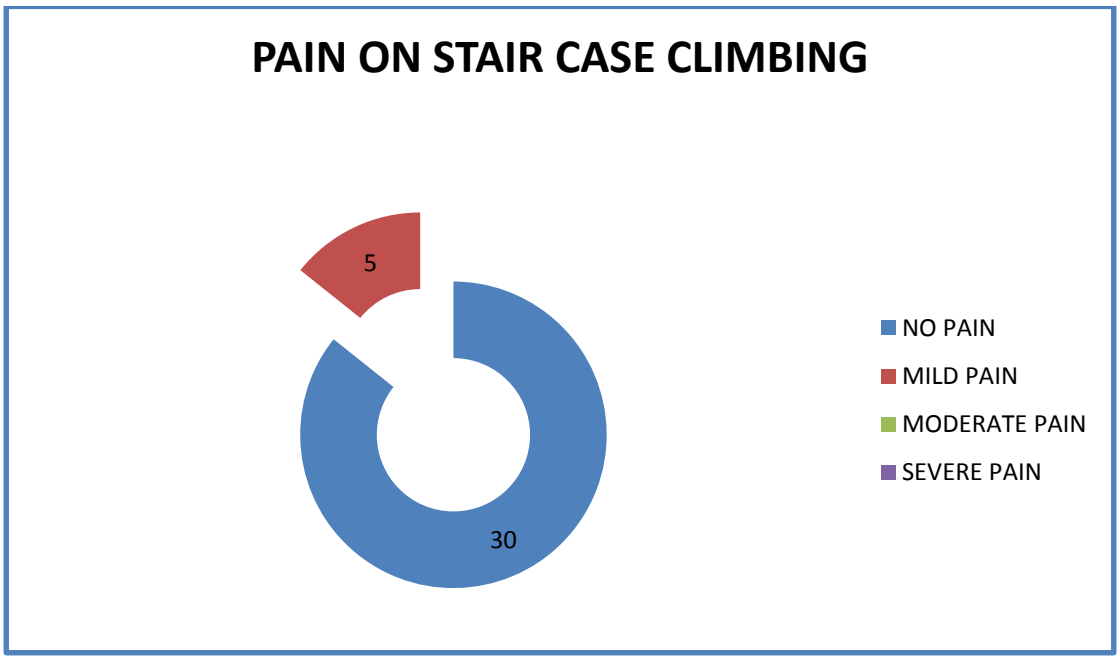
NO. OF PATIENTS	NO PAIN	MILD PAIN	MODERATE PAIN	SEVERE PAIN
35	32	03	00	00



OUT OF 35 PATIENT S 32 (92 %) PATIENTS HAD No PAIN AND 03 (8 %) HAD MILD PAIN ON WALKING.

PAIN ON STAIR CASE CLIMBING

NO. OF PATIENTS	NO PAIN	MILD PAIN	MODERATE PAIN	SEVERE PAIN
35	30	05	00	00



OUT OF 35 PATIENTS 30 (85.71) HAD NO PAIN ON STAIR CASE CLIMBING AND 05 (14.28) HAD MILD PIN ON STAIR CASE CLIMBING.

MEDIO-LATERAL INSTABILITY

NO OF PATIENTS	0-5 MM	5 – 10 MM	>10 MM
35	0	0	0

OUT OF 35 PATIENTS NO PATIENT HAD MEDIAL OR LATERAL INSTABILITY.

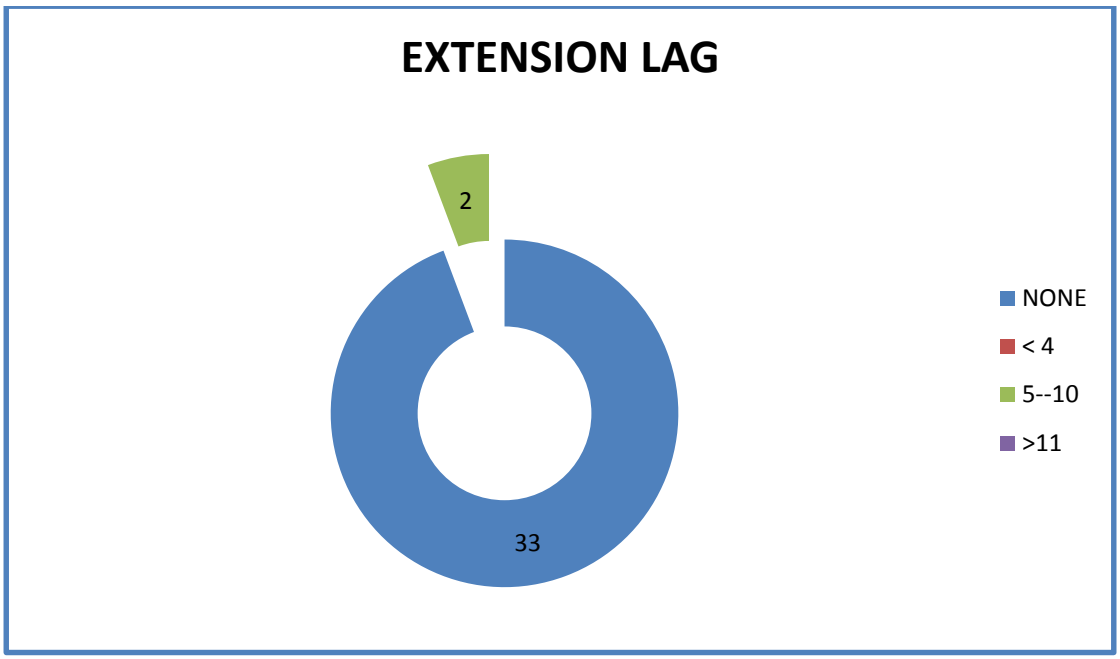
ANTERIOR – POSTERIOR INSTABILITY

NO OF PATIENTS	0-5 MM	5 – 10 MM	>10 MM
35	0	0	0

OUT OF 35 PATIENT NO PATIENT HAD ANTERIOR AND POSTERIOR INSTABILITY

EXTENSION LAG

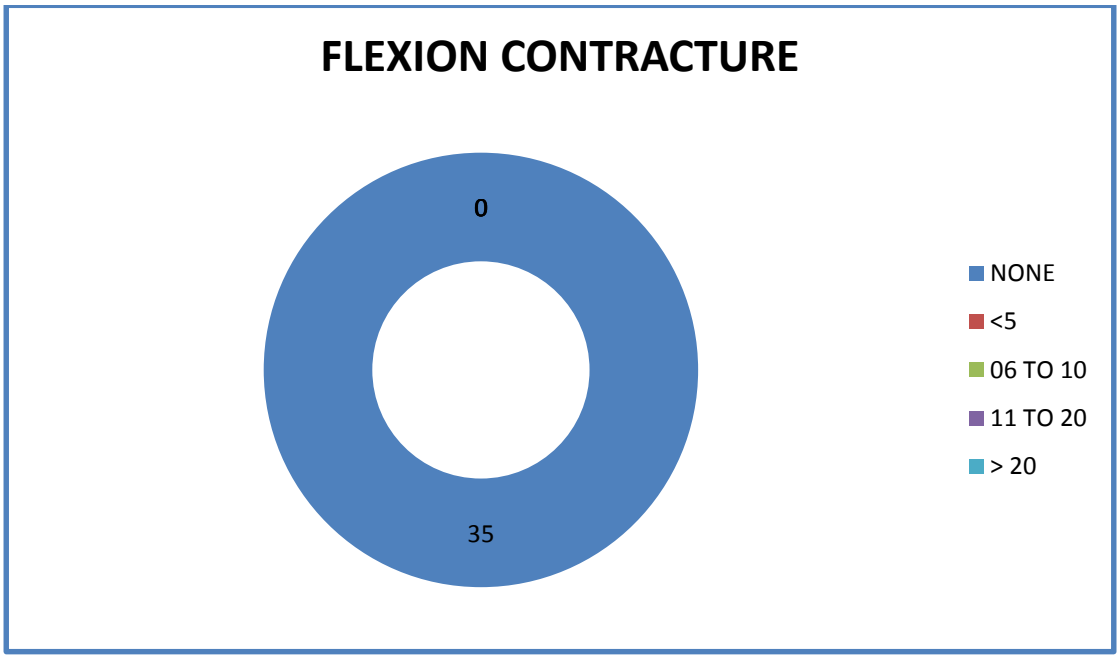
NO OF PATIENTS	NONE	< 4	5– 10	>11
35	33	0	2	0



OUT OF 35 PATIENTS 33 PATIENTS (94.28 %) HAD NO EXTENSION LAG AND 02 95.7 %) HAD EXTENSION LAG WHICH WAS LESS THAN 10 DEGREES

FLEXION CONTRACTURE

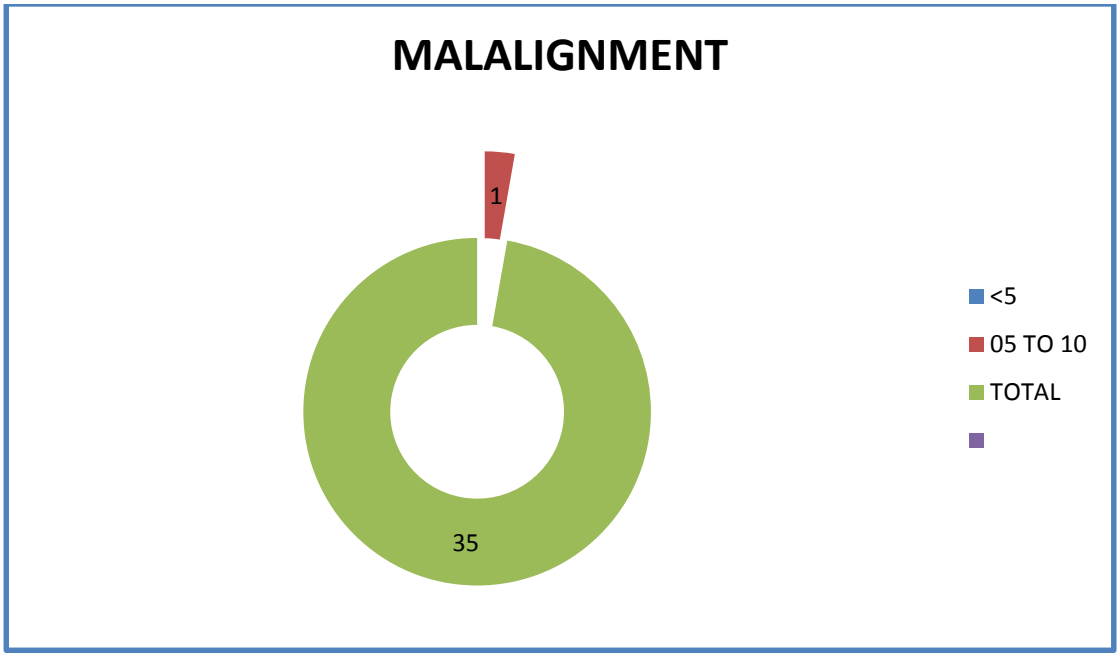
NO OF PATIENTS	<5	6 – 10	11 - 20	>20
35	0	0	0	0



NO PATIENT HAD FLEXION CONTRACTURE.

MALALIGNMENT

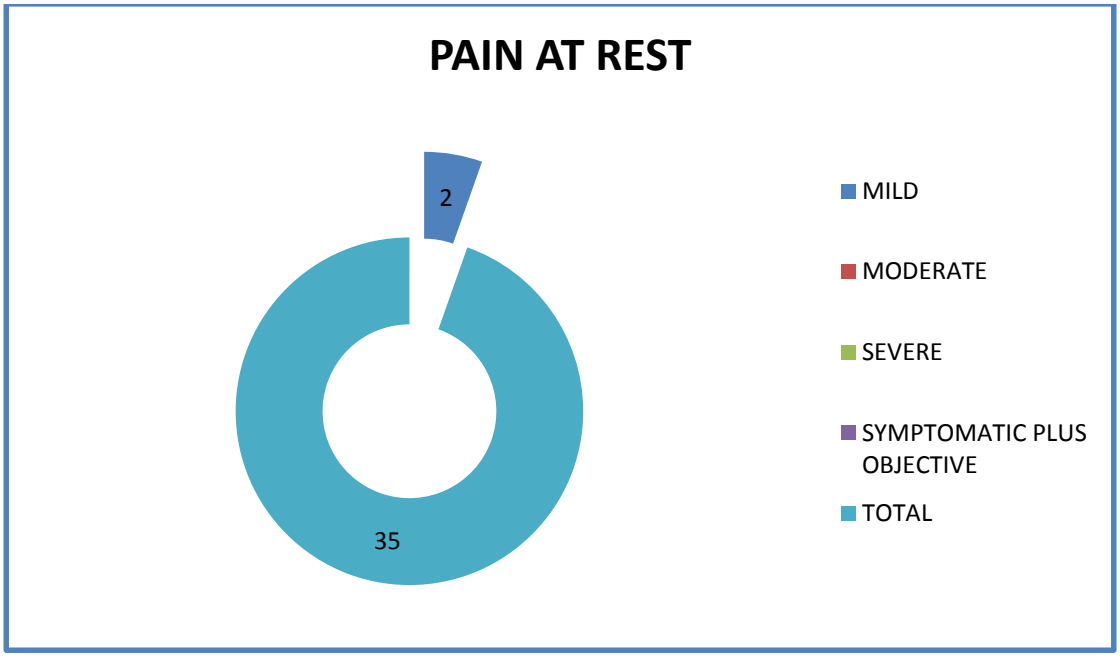
NO OF PATIENTS	<5	5-10 degree
35	0	1



OUT OF 35 PATIENT S Only ONE (2.85 %) PATIENT HAD MALALIGNMENT WHICH WAS DUE TO PREVIOUS OSTEOARTHRITIS

PAIN AT REST

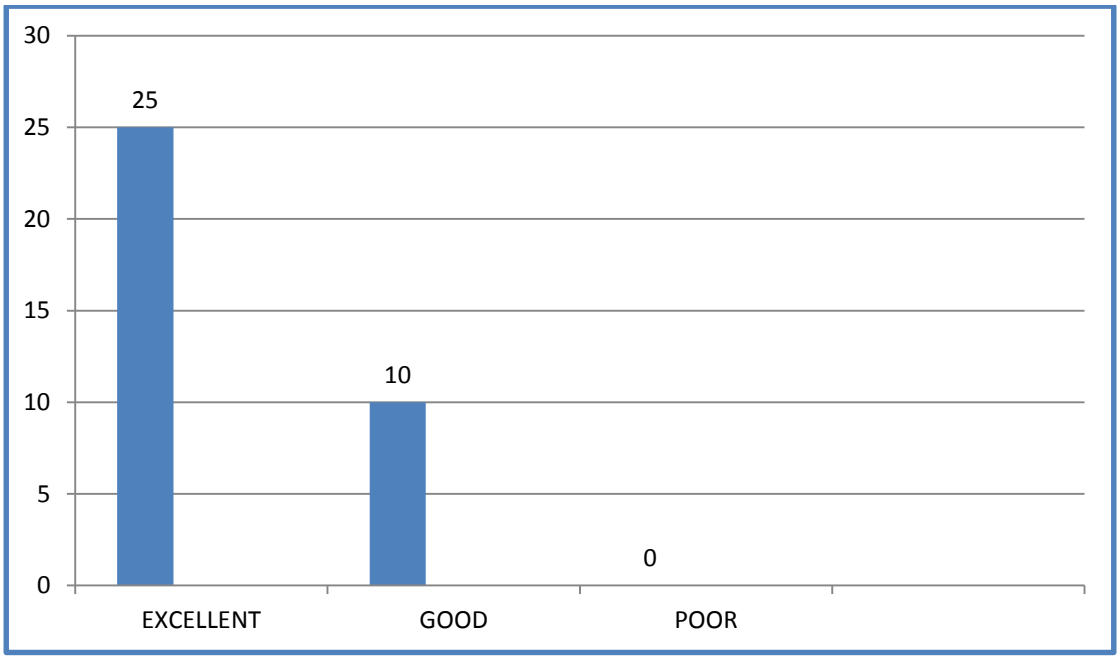
NO OF PATIENTS	Mild	Moderate	Severe	Symptomatic plus Objective
35	02	0	0	0



OUT OF 35 PATIENT 33 PATIENTS HAD NO REST PAIN AND 02 (5.7 %) HAD PAIN AT REST

RANGE OF MOVEMENT

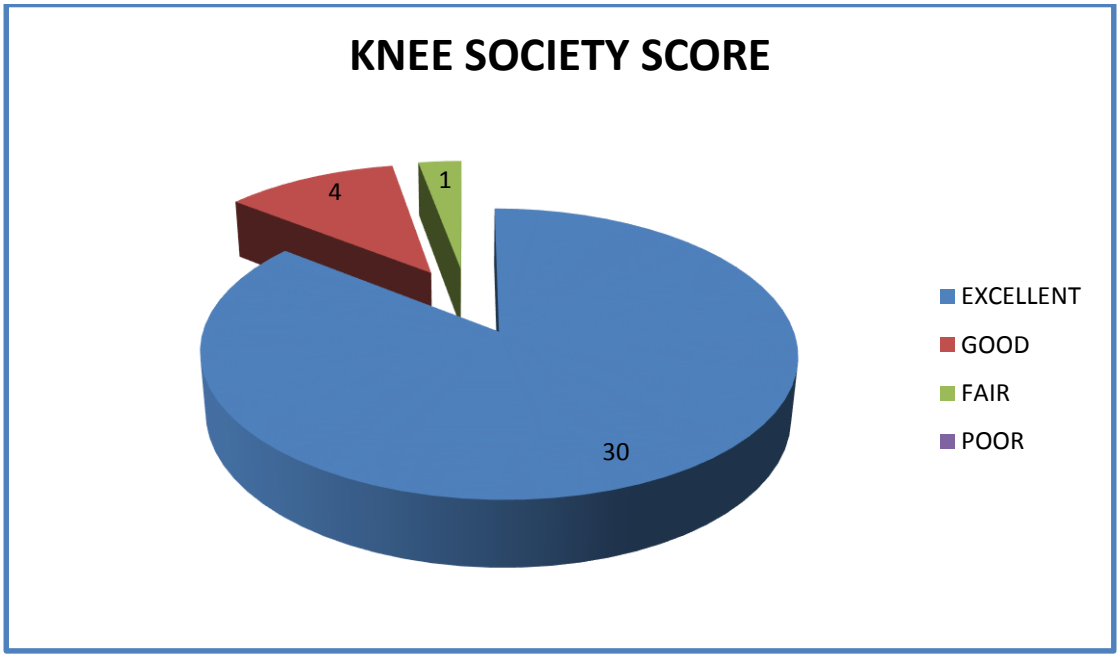
NO. OF PATIENTS	RANGE OF MOVEMENT	STATUS	%
25	>110	Excellent	71.42 %
10	90 – 110	Good	28.57 %
00	LESS THAN 90	Poor	0.0 %



25 OUT OF 35 (71.42%) WERE HAVING EXCELLENT RANGE OF MOVEMENT 10 OUT OF 35 (28.5%) WERE HAVING GOOD RANGE OF MOVEMENT

KNEE SOCIETY SCORE

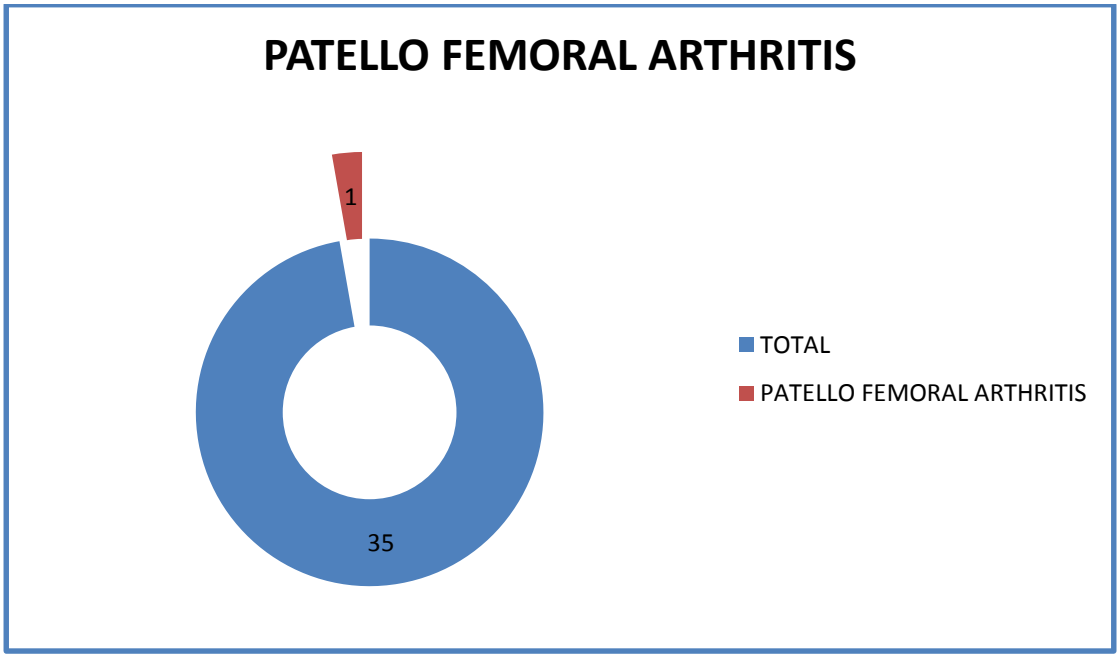
NO. OF PATIENTS	POINTS	STATUS	%
30	80 - 100	Excellent	85.71 %
04	70 - 79	GOOD	11.42 %
01	60 - 69	FAIR	2.85 %
00	< 60	POOR	0.0 %



KNEE SOCIETY SCORE FOR 30 (85.14%) PATIENTS WAS EXCELLENT , 04 (11.42 %) WAS GOOD AND 01 (2.85 %) WAS FAIR.

PATELLO-FEMORAL OSTEOARTHRITIS

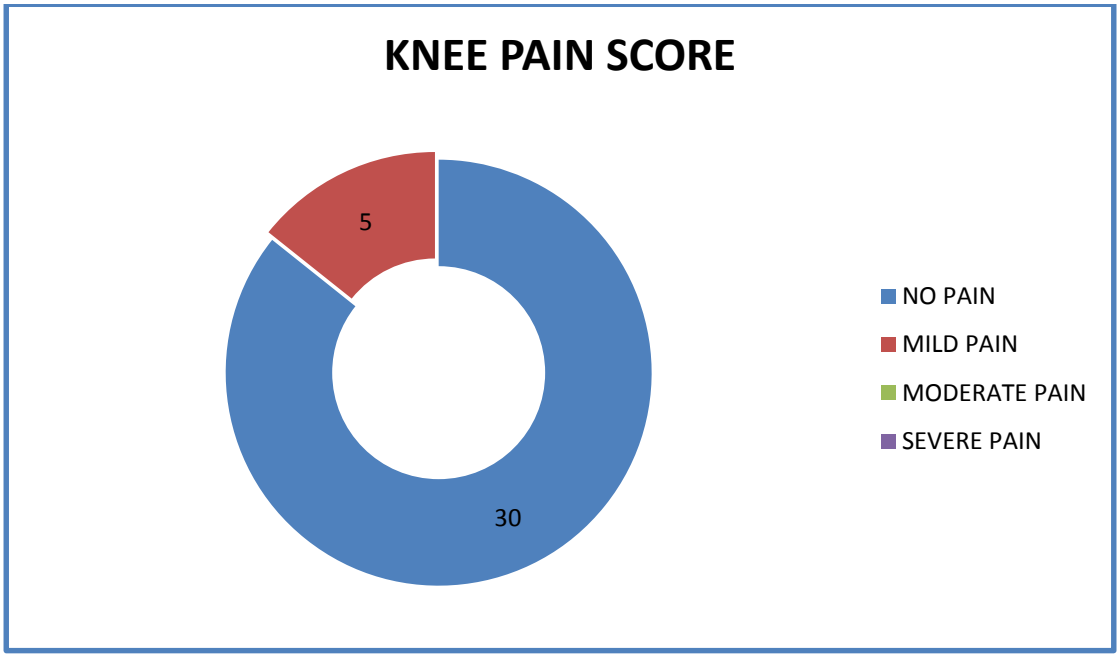
In our study there were early osteo-arthritic changes, seen in 01 PATIENT above the age of 50 years out of them 01 were male.



01 OUT OF 35 (2.85%) HAD PATELLO FEMORAL ARTHRITIS.

KNEE PAIN SCORE

	NO PAIN	MILD PAIN	MODERATE PAIN	SEVERE PAIN
NO. OF PATIENT'S	30	05	00	00
PERCENTAGE	85.71	14.29	0.0 %	0.0 %

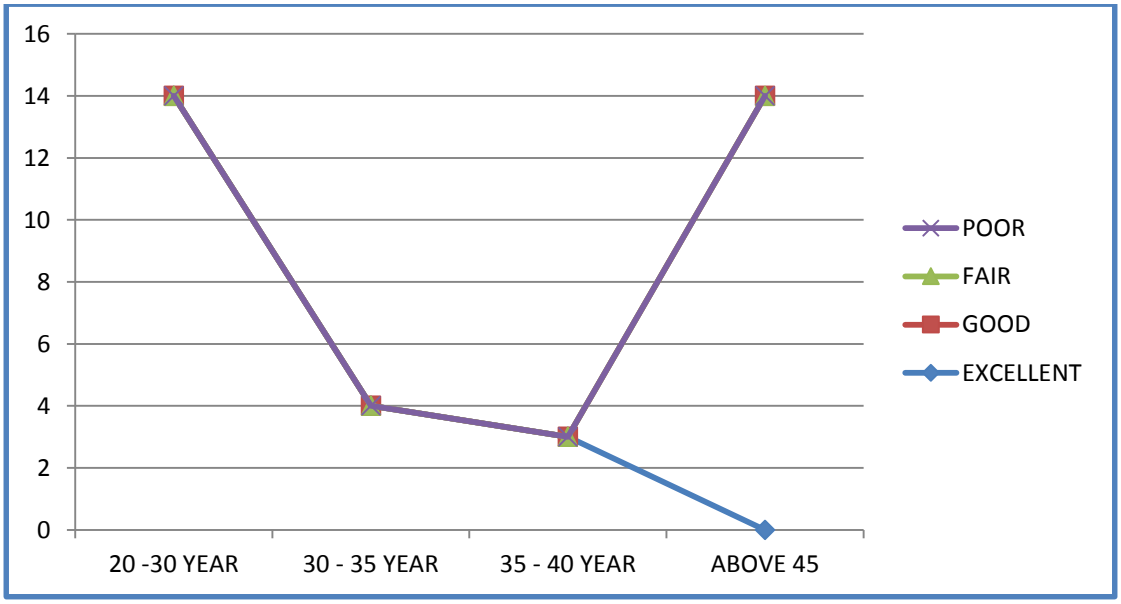


30 (85.71%) HAD NO PAIN

05 (14.29%) HAD MILD PAIN

Age Vs Result

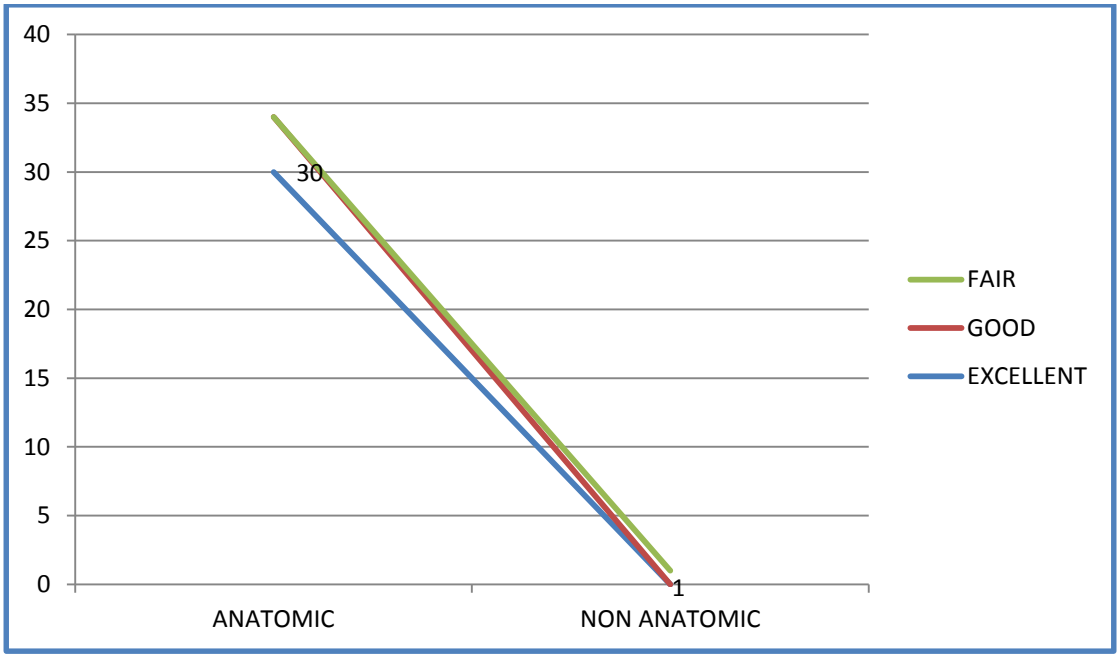
RANGE	NO OF PATIENTS	RESULT
20-30 YEARS	14	EXCELLENT
30-35 YEARS	04	EXCELLENT
35-40 YEARS	03	EXCELLENT
45-ABOVE YEARS	14	EXCELLENT 09 GOOD 04 & FAIR 01



21 OUT OF 21 (100 %) IN THE AGE BETWEEN 20 – 40 YEARS HAD EXCELLENT OUTCOME .14 OUT OF 14 (100%) IN AGE ABOVE 45 YEARS HAD EXCELLENT RESULT IN 09 PATIENT GOOD IN 04 PATIENTS AND FAIR IN 01 PATIENTS GOOD OUTCOME WHICH WAS DUE TO OSTEOARTHRITIS.

ANATOMIC REDUCTION V/S RESULT

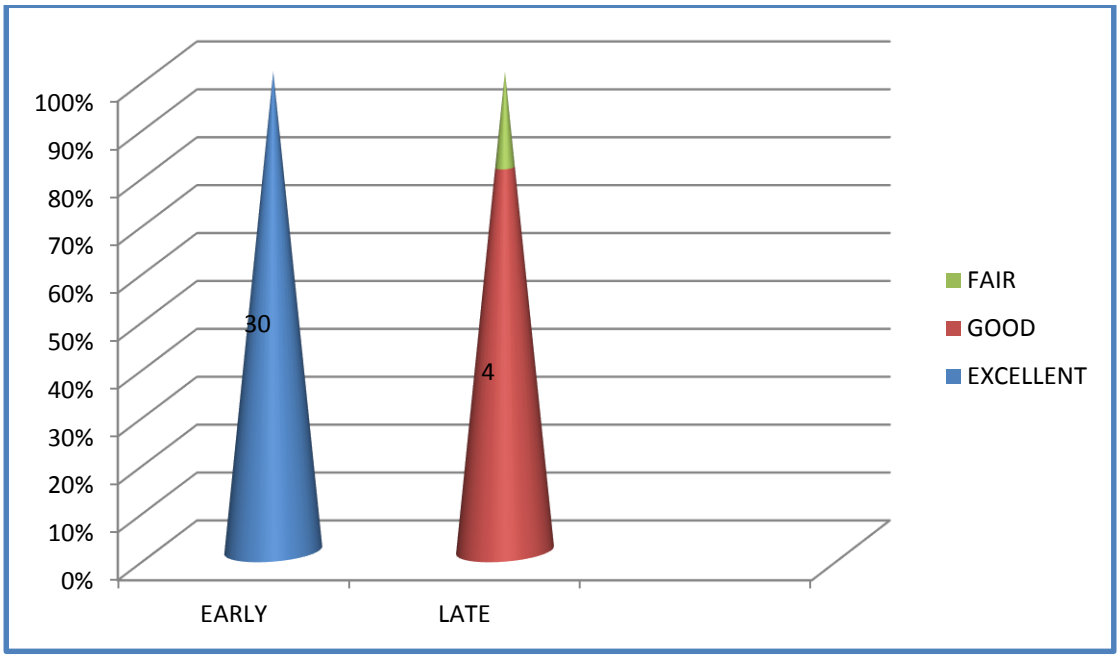
REDUCTION	NO OF PATIENTS	RESULT
ANATOMIC REDUCTION	34	Excellent 30 GOOD 04
NON ANATOMIC REDUCTION	01	FAIR



ALL PT HAVING ANATOMIC REDUCUTION WAS HAVING EXCELLENT RESULT IN 30 (85.71%) PATIENTS AND GOOD RESULTS IN 04 (11.42%) PATIENTS O1 (2.85 %) PATIENT WITH NON ANATOMICAL REDUCTION WAS HAVING FAIR RESULT

POST OP REHABILITATION V/S RESULT

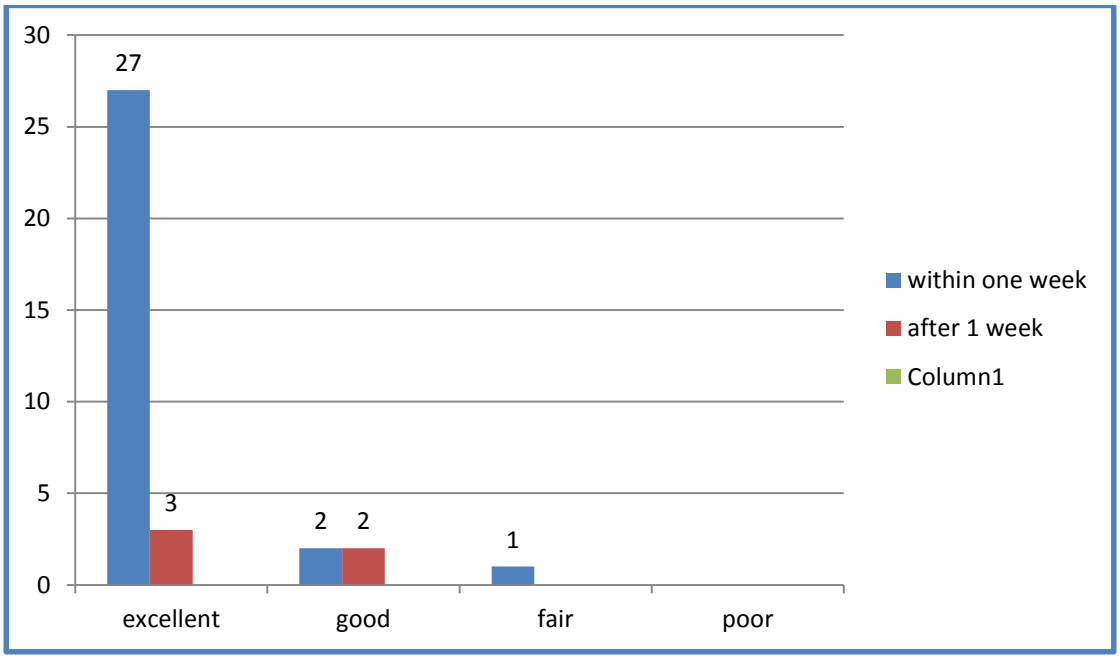
REHABILITATION	NO OF PATIENTS	RESULT
EARLY	30	Excellent
LATE	05	Good 04 FAIR 01



3O PATIENTS WITH EARLY POST OP REHABILITATION WERE HAVING EXCELLENT RESULTS O4 (11.42 %) WITH LATE POST OP REHABILITATION HAD GOOD RESULT AND 01 (2.85 %) HAD FAIR RESULT

DURATION BETWEEN INJURY AND SURGERY v/s RESULT

Duratio between injury & surgery	No of patients	Excellent	Good	Fair	Poor
WITHIN 1 WEEK	30	27 (90 %)	02 (7.15 %)	01(2.85%)	00
MORE THAN 1 WEEK	05	03 (60%)	02 (40%)	00	00

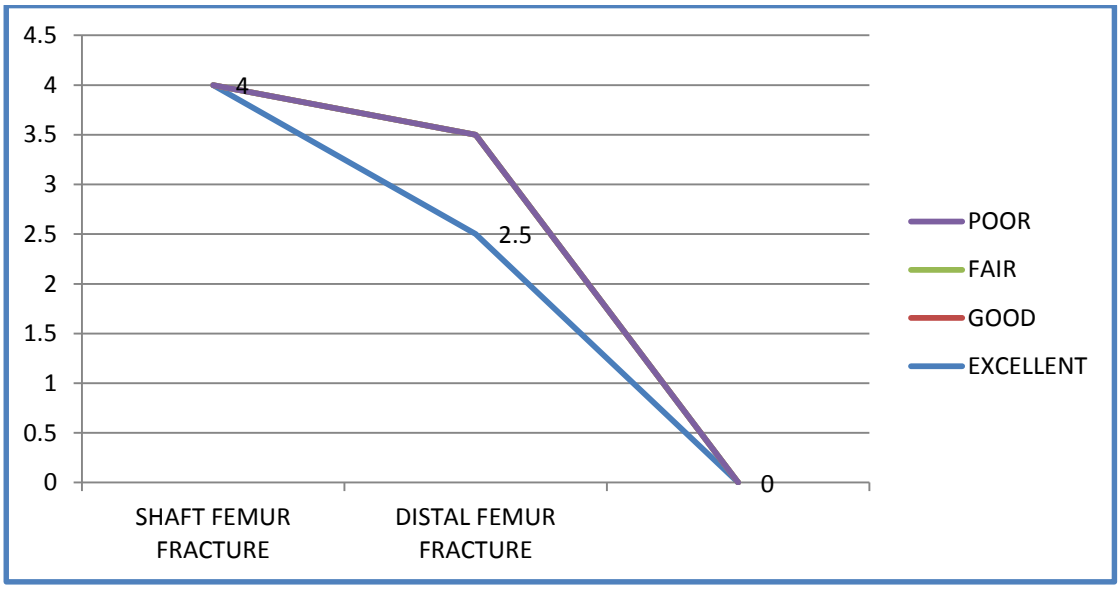


OUT OF 30 PATIENTS OPERATED WITHIN ONE WEEK OF INJURY HAD EXCELLENT RESULTS IN 27 (90 %) , GOOD IN 2 (7.15%) , FAIR IN 1 (2.85%).

OUT OF 5 PATIENT OPERATED MORE THAN 1 WEEK AFTER INJURY HAD EXCELLENT RESULTS IN 03 (60%) , AND GOOD IN 2 (40%).

RESULT OF PATIENTS WITH ASSOCIATED INJURY

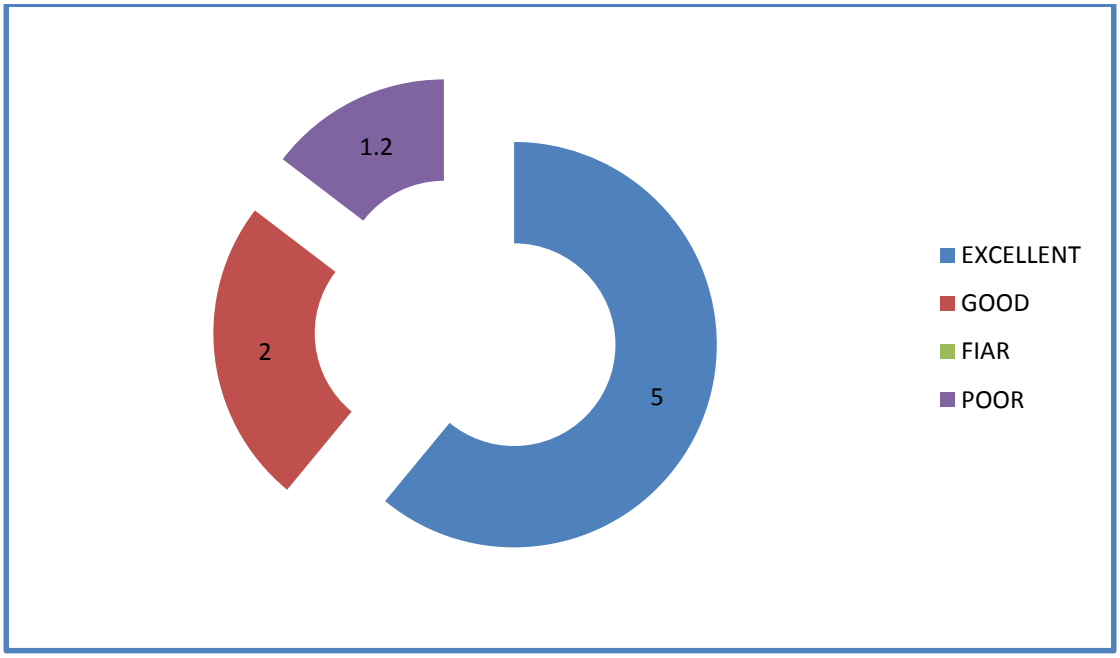
Associated injury	No of patients	Excellent	Good	Fair	Poor
IPSILATERAL SHAFT FEMUR FRACTURE	04	04	00	00	00
IPSILATERAL DISTAL FEMUR FRACTURE	01	00	01	00	00



ALL PATEITNS WITH ASSOCIATED SHAFT FEMUR FRACTURE HAD EXCELLENT RESULT. 01 HAVING DISTAL FEMUR FRACTURE HAD GOOD RESULT.

RESULT OF PATIENT WITH ASSOCIATED EXTENSOR EXPANSION TEAR

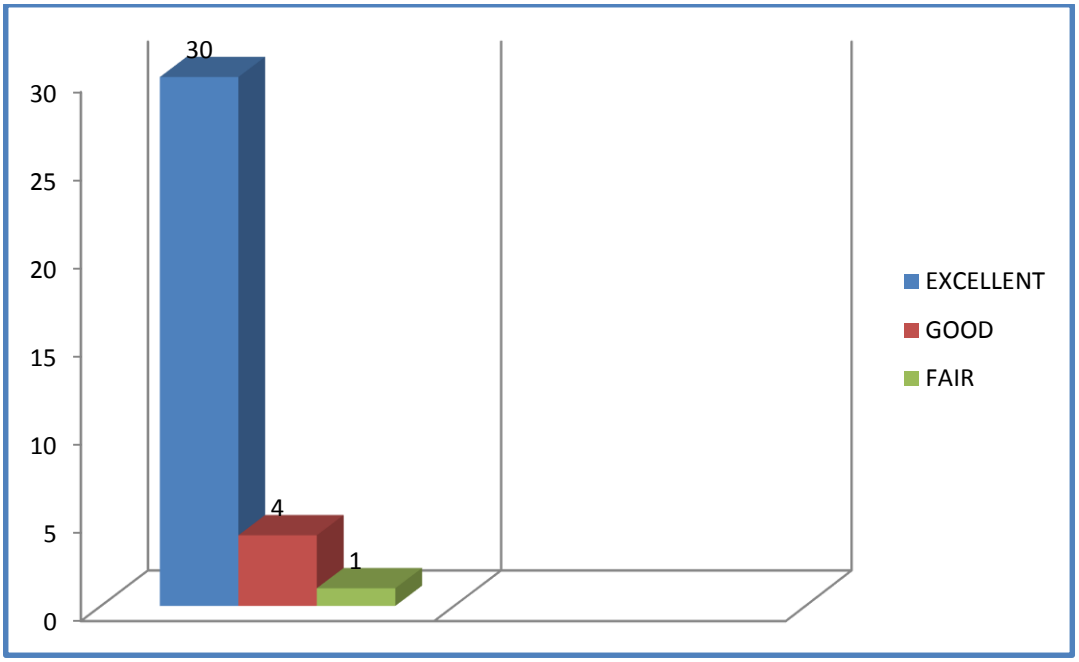
	NO OF PATIENTS	EXCELLENT	GOOD	FAIR	POOR
EXTENSOR EXPANSION TEAR	07	05 (71.4 %)	02 (28.5 %)	00	00



THIS HAPPENED SO BECAUSE ASSOCIATED FRACTURES WERE DEALT WITH PROPER FIXATION SO THAT EARLY MOBILIZATION OF KNEE WAS POSSIBLE.

FINAL RESULT.

NO. OF PATIENTS	STATUS	%
30	Excellent	85.71 %
04	GOOD	11.42 %
01	FAIR	2.85 %



FINAL RESULTS WERE :- EXCELLENT IN 30 (85.14 %)
GOOD IN 04 (11.42%)
FAIR IN 01 (2.85 %)

PATIENT'S ASSESSMENT

NO OF PATIENTS RETURNED TO THEIR ORIGINAL JOB
35 (100%)

NO OF PATIENTS HAVING FULL LEVEL OF DAILY ACTIVITIES
35 (100 %)

TOTAL NO OF PATIENTS	SATISFIED	PERCENTAGE	UNSATISFIED	PERCENTAGE
35	34	97.14	01	2.85

0UT OF 35 , 34 (97.14 %) PATIETNS WERE SATISFIED WITH TREATMENT AND OUTCOME. 01 (2.85 %) PATIENT WAS LESS SATISFIED. ALL THE PATIENTS HAD RETURNED TO FULL LEVEL OF THEIR DAILY ACTIVITIES ALL THE PATIENTS HAD RETURNED TO THEIR ORIGINAL JOB.

DISCUSSION

The treatment of fracture of patella may be either operative or non-operative but in most reports non operative treatment has been limited to fracture that show intact quadriceps mechanism less than 2 millimetres of separation and without significant displacement of articular surface.

If there is rupture of quadriceps mechanism and displacement of patellar fragments more than 3mm it should be openly reduced and internally fixed. There are many surgical techniques for open reduction and internal fixation of transverse fracture of patella but at the degree of 90° of flexion of knee joint articular surface was distracted by posterior angulation of fracture fragment (Weber et al 1980)[22] .

But after application of tension band wiring technique chances in the articular surface distraction are not seen and early mobilization can be started as noted by Weber 1980[22] , B. Levak et al 1985[8].Tensile forces of quadriceps is converted to compressive force by anteriorly placed wire. Surgical treatment of transverse fractures of patella can lead to favourable results after tension band wiring.

As males are more prone to Road traffic accidents there were more number of male patients presented with patella fracture.

In this study total number of 35 patients were included out of which 27 were male and 8 patients were female as most common cause of injury in 27 (77.14%) were due to road traffic accidents and 08 patients were due to direct fall.

Out of 35 20 (57.14 %) had left sided involvement and 15 (42.86 %) had right side involvement.

All 27 (77.14%) patients who were injured during road traffic accident were below 45 years age and all 08(22.85%) patients sustaining injury due to direct fall while walking or climbing stairs were above 45 years age.

This directly correlates the main cause behind the injury in elderly people was primary osteoporosis and the cause of injured patella in young patient was due to road traffic accident as they are bread winners for the family ,remains outdoor and live more active life they are more prone to road traffic accident.

Levack et al 1985 in his study of 30 patients 21 cases were male and 09 cases were female. He concluded men are more prone to road traffic accident due to more outdoor activities.[8]

STUDY	TOTAL NO OF PATIENTS	MALE	FEMALE
Levack 1985	30	21 (70%)	09 (30%)
Our Study	35	27 (77.14 %)	08 (22.86%)

Out of 25 (71.42%) patients had displaced tranverse mid patellar fracture all of which were patients below 45 years and 10 (28.57%) were having upper or lower pole fracture.. Transverse mid patellar fracture was seen in patients below 45 years of age while upper and lower pole fractures were seen in patients above 45 years age. Transverse mid patellar fracture was common with road traffic accident and upper lower pole fracture was common with direct fall on patella.

05 (14%) Patients had associated injury in form of ipsilateral shaft femur fracture 04 (11.42%) and ipsilateral Distal femur fracture 01(2.85 %), and Extensor Expansion Tear 07 (20%) all of them were due to Road traffic accident and all patients were below 45 years of age. This signifies that these injuries are associated with high energy trauma due to road traffic accidents.

Due to Affected injuries Immobilization was delayed to let tissue heal properly and after those patients was immobilized and strict post-operative physiotherapy protocol was followed.

29 (82.85 %) patients presented within 72 hours of Injury while 01 (2.85 %) patients presented between 72 hours to 1 week after injury and 05 (14.18 %) patients presented after 1 week of Injury

25 (71.43 %) patient were operated within 72 hours of injury while 05 (14.85 %) patients were operated between 72 hours to 1 week after injury and 05 (14.85 %) patients were operated 1 week after Injury. Most of the patients were operated 1 day after admission. The main reason for delay was patient presenting late for treatment which can be improved with proper education and if medical facility is readily available in remote areas.

Average hospital stay was 11 days. 26 patients (74.29 %) were discharged under 8 days after surgery while 07(20 %) patients were discharged between 8-12 days after surgery and 02 (5.71 %0 patients were discharged after more than 12 days after surgery. Patients discharged after 12 days postoperatively has longer stay due to associated injuries.

Patients were advised ambulation on walker with extension knee brace without bearing weight on the next day, partial weight bearing was started as soon as patient tolerated.

Patients having associated fracture were not subjected to weight bearing till fracture shows signs of healing.

Partial weight bearing was started in less than 4 weeks in 30 patients and between 4 & 6 week in 5 patients. Full weight bearing was started in 30 patients in less than 12 weeks and in 5 patients between 13 to 16 weeks.

Knee mobilization i.e Active knee flexion and Passive Extension was started on average 2- 3 weeks postoperatively .06 (17.14 %) patients with extensor expansion tear were advised knee motion after 3 weeks and in 29 (82.86 %) patients without associated injury mobilization was started after 2 weeks. In none of the patients CPM (continuous passive movement) was started.

Delay was due to adequate time was provided for soft tissue healing. Early mobilization of the knee was started to prevent joint stiffness and which proved to be fruitful and gave excellent to good result even in patients with associated injury.

20 patients came for follow up between 9 – 12 months for follow up, 13 patients came for follow up more than 12 months after surgery and only 2 (5.72 %) patients came for follow up for less than 9 months.

In our study only 2 (5.4 %) Patient had extensor lag less than 20 degree which was due to improper reduction leading to secondary patella femoral arthritis.

Srinivasulu et al 1986 in his study reported 10.5 % cases with restriction of movements more than 20 degrees and suggested early mobilization and physiotherapy protocol to get better results[54].

Maini et al 1986 in his study of 30 patients showed Extensor Lag in 8 (26.6%) patients.[94]

STUDY	EXTENSION LAG
SRINIVASULU 1986	10 %
Maini 1986	26.6 %
IN OUR STUDY	5.4 %

In our study (5.4 %) has comparatively less incidence of extensor lag than Maini [94](26.6 %). Extensor lag was seen only in patients with associated injuries .Delay in weight bearing and mobilization in 5 (14 %) was due to associated injuries. Adequate time for proper tissue healing was given after which Immobilization and Physiotherapy was started according to protocol and such patients also gave excellent to good results.

UNION

STUDY	TIME FOR UNION
HUNG LK 1985	12 WEEKS
SMITH ST 1997	16 WEEKS
IN OUR STUDY	12 - 13 WEEKS

The Union period in our study was observed in 11 – 13 weeks in 28 (80 %) of patients while 7 (20 %) patients showed union in more than 13 weeks but all patients achieved union before 16 weeks

There were no cases of Non-Union seen in any patients.

Mean union time was 12 - 13 weeks while, Hung LK et al 1985 reported 12-weeks[78], Smith st et al 1997 reported 16-Weeks[95].

Results are always better when proper reduction technique, aseptic measures and cooperation of patients in rehabilitation phase is applied. NO Non-union occurred in our study .Mal-union occurred in 01 (2.85%) patients which was due to improper reduction.

There was a significant step in one patient (no 14) seen in lateral view. Patient also did not came for follow up in Out Patient Department regularly and was not following physiotherapy protocol all these three factors added to produce unsatisfactory result.

PATELLO-FERMORAL OSTEO-ARTHRITIS

Study	No. Of patient	Osteo- arthritic Changes	Percentage
Hung LK 1985	13	High Number	
P. Levak 1985	64	11	17.18%
In our Study	35	01	2.85 %

In 01 patient there was persistent pain at the fracture site and painful knee movement, we observed early patello-femoral osteo-arthritic changes, which responded well with physiotherapy and analgesics.

In our result there was early degenerative changes found in 01 old patient who was above 45 years of age which was due to improper reduction which left articular step. This however reduced by analgesic, physiotherapy and weight loss.

DISTRACTION OF FRACTURED SEGMENTS AFTER TENSION BAND WIRING

STUDY	NO. OF PATIENT	DISTRACTION OF FRACTURE	PERCENTAGE
In our Study	35	00	0.0 %
Smith ST 1997	87	11	12.64%

In our study no patient had postoperatively distraction of fracture fragment.

Smith ST et al 1997 in his study of 87 patients showed distraction in 11(21.64%) patients which were implant loosening due to technical failure. These patient had inferior results than other. [95]

INFECTION

STUDY	TOTAL NO OF PATIENTS	NO.OF INFECTION	INFECTION RATE
Smith ST 1997	49	02	04%
Maini 1986	30	01	3.3 %
Our Study	35	01	2.85%

In our study 01 (2.85 %) patient had post-operative infection which was superficial and was treated with proper antibiotic according to culture report.

Smith St et al 1997in his study has 02 (04%) out of 49 has post-operative infection.[95]

Maini et al 1986 in his study showed 3.3 % of post-operative infection which was superficial was stitch abscess.[94]

REMOVAL OF HARDWARE

Study	Total no of Patients	No.of patient In which Hardware Removed	Percentage Of hardware Removal
Smith ST 1997	49	09	18.36%
Hoshino 2013	448	116	37 %
Our Study	35	06	17.14 %

In our study in six (17.14%) patients the removal of implant done due to prominence and irritation to soft tissue after one year.

We have recommended removal of hardware in all patients after clinical and radiological union but most of the patients were not ready.

Another study done by Smith ST et al 1997 in 49 patients removal of hardware done in 9 patients due to irritation.[95]

Hoshino 2013 in his retrospective study of 448 patella fractures showed implant removal in 116 (37 %) patients which was done due hardware impingement.[55]

We recommend knot to be bend at anterolateral edge of superior pole of patella and proper bending of wire ends .Also sharp ends of k wires should be made blunt so that they does not impinge on soft tissues.

We recommend hardware should be removed as early as possible after clinical and radiological union is established to prevent complications such as implant breakage and impingement.

Range of movement

In our study 25 (71.4%) patients had excellent range of motion while 10 (28.57%) had good range of movement.

In study done by Mehdi et al 1999 out of 200 cases 83 % had excellent ad good results and 17 % had fair and poor results.[61]

In Dudani and Sancheti (1981), 73% of cases had more than 120º of flexion: [56]

Result are always better when supported with proper post-operative physiotherapy protocol, Early mobilization , proper intraoperative surgical technique supported by pre-operative planning , Gentle tissue handling and less soft tissue damage, and also full co-operation of patients in rehabilitation phase.

Study	Total no of Patients	Excellent and good	Fair and Poor
Mehdi 1999	200	166 (83 %)	40 (17 %)
Sancheti 1981	15	10 (73 %)	6 (27 %)
Our Study	35	35 (100 %)	0

Out of 35 patients 21 patients had excellent results and 14 patients had good result

All the patient with excellent result were below 45 years of age and all the patients with good result were above 45 years of age.

The main cause of good result in elderly patient was due to associated osteoarthritis, slower tissue healing and less active life style.

Patients rehabilitated early were having excellent results and patients rehabilitated late were having good and fair results.

Out of 30 patients operated within one week of injury had excellent results in 27 (90 %), good in 2 (2.85 %) , fair in 1 (2.85%). Out of 5 patient operated more than 1 week after injury had Excellent results in 03 (60%), and Good in 2 (40%).

34 (97.15%) Patient in which anatomic reduction was achieved were having excellent and good results and 01 (2.85%) patient in which anatomic reduction was not achieved was having fair result. Thus anatomic reduction is very important in post-operative outcome.

Patients with associated injury and extensor expansion tear out of five patients with associated injury o4 patients with shaft femur fracture was having excellent result as post of immobilization was started early and in 01 (2.85) patient with distal femur fracture was having good outcome as post-operative immobilization was started late due to associated intra-articular fracture which was given enough time to heal.

7 (20%) patient had associated extensor expansion tear, out of which 05 (71.4%) had excellent result and 02(28.5%) had good result. extensor expansion tear was not possible to diagnose on clinical examination. But during surgery on exploration extensor expansion tear was identified on palpation in 07 (20%). Patients out of 35 patients.

Inspite of having extensor expansion tear if they are repaired properly and given time to heal before mobilizing so thereby giving excellent to good result in all cases.

KNEE SOCIETY SCORE

STUDY	TOTAL PATIENTS	EXCELELNT	GOOD	Fair
TAREK 2016	30	75 %	20%	05 %
Our Study	35	85 %	11.42 %	2.85 %

- Knee society score was excellent in 30 (85.71%), good in 04 (11.42%), and fair in 01 (2.85%) patients.
- Only two patients (5.4%) has mild rest pain , 02 patients (5.4%) had mild pain while walking and 05 patients had mild pain in stair case climbing .
- All such patients responded well to physiotherapy and Pain killers and had good results.
- Tarek et al 2016 in his study showed knee society score excellent in 75 % patients good in 20 % patients and fair in 05 patients out of 30 patients.[97]

FINAL RESULTS

In our study total 35 patients were included out of which 30 (85.71%) patients had excellent result. 04 (11.42 %) had good result and 01 (2.85%) had fair result.

Maini (1986) et al in his study of 30 patients showed excellent result in 22 patients and good in 08 patients.[94]

Sudheendra P.R (2014) in his study of 42 patients showed excellent result in 25 (58%) cases ,good in 07 (16%) cases and fair n 8 (18.6 %) and poor n 2 (4.2 %) cases.[91]

In Dudani and Sancheti (1981), in study of 15 cases of patella fracture treated with tension band wiring showed excellent result in 73 % of cases and good results in 27 % of cases.[56]

Study	Total patients	Excellent	Good	Fair and Poor
Sudheendra 2014	42	25 (58%)	07 (16%)	08 (8.6%)
MAINI 1986	30	22 (73.4%)	08 (26.6%)	0
Sancheti 1981	15	73 %	23 %	0
Our Study	35	30(85 %)	04(11.42 %)	01 (2.85 %)

Patients Satisfaction

- Out of 35 Patients 34 patients (97.14%) were happy and satisfied with the treatment and outcome
- O1 patient was not fully satisfied with the outcome as he was advised revision surgery to correct articular step-off.
- All the patients (100%) had returned to full level of their daily activities.
- All the patients (100%) had returned to their original job.
- This was one of the most important and most satisfying criteria for our study as this was the single criteria which explain all the result.

LIMITATIONS OF STUDY

- SMALL NO OF PATIENTS INCLUDED IN THE STUDY.
- PATIENT OPERATED WITH ENCIRCLAGE WERE NOT INCLUDED IN THIS STUDY.

CONCLUSION

In case of fracture of patella in 0ur study satisfactory results obtained with tension band wiring that allow early motion and rehabilitation.

This technique has advantage of early mobilization and early return of independent function.

With strict adherence to anatomical reduction, aseptic soft tissue handling and soft tissue repair and proper and in time physiotherapy protocol we can get satisfactory results in almost all the patients.

SUMMARY

From January 2016 to September 2017 a total number of 35 patients with recent fracture of patella were treated with tension band wiring technique. Those patients were selected in which fracture displacement was more than 3 millimetre. The best results were in the patients. The wire was anchored directly in bone and retinaculum was repaired (tension band wiring).

Out of 35 patients 21 (60 %) patients were between 20-40 years of age 14 (40%) patients were above 45 years age.

Out of 35, 27 (77.14%) patients were male and 08 (22.85%) were female.out of 35 patients 20 (57.14 %) patients had left side involvement and 15 (42.86 %) patients had right sided involvement.

The main cause of injury 27 out of 35 (77.14 %) was road traffic accident in cases. All cases of road traffic accident were from two wheelers .08 (22.85 %) cases were direct injury due to slip while walking or climbing up on stairs.

Most of the patients were having displaced mid-patellar transverse patella fracture 25 out of 35 (71.42 %). 05 patients out of 35 (14 %)were having associated injuries most of which were ipsilateral shaft femur fracture 04 out of 35 (11.42 %) and 01(2.85 %) patients with ipsilateral distal femur fracture.

Extensor expansion tear was not possible to diagnose on clinical examination, but during surgery on exploration extensor expansion tear was identified on palpation in 07 (20%) patients out of 35 patients.

25 (71.43 %) patient were operated within 72 hours of injury while 05 (14.85 %) patients were operated between 72 hours to 1 week after injury and 05 (14.85 %) patients were operated 1 week after injury.

Patients were advised ambulation on walker with extension knee brace without bearing weight on the next day. Partial weight bearing was started as soon as patient tolerated. Patients having associated fracture were not subjected to weight bearing till fracture shows signs of healing.All patients with delayed weight bearing were due to associated secondary injuries

Average mobilization was started on 2-3 weeks postoperatively the patients with extensor expansion tear were advised knee motion after 3 weeks and in other patients mobilization was started after 2 weeks. In none of the patients CPM (continuous passive motion) was started.

26 patients (74.29 %) were discharged under 8 days after surgery while 07(20 %) patients were discharged between 8-12 days after surgery and 02 (5.71 %) patients were discharged after more than 12 days after surgery. patients discharged after 12 days postoperatively has longer stay due to associated injuries.

20 patients came for follow up between 9 – 12 months for follow up, 13 patients came for follow up more than 12 months after surgery and only 2 (5.72 %) patients came for follow up for less than 9 months.

Mean time of union was 12 – 13 weeks, no non-union occurred in any patients. Post-operative wound infection was seen in 01 patient (2.85%).

O1 (2.85 %) had post-operative infection o1 (2.85 %) had mal-union due to inaccurate reduction 06 (17.14 %) had hardware impingement which was removed after union. 02 (5.71 %) had extension lag which was due to in accurate education and osteoarthritis. 05 (14.28 %) had painful movements which was due to malunion and osteoarthritis.

3o patients with early post op rehabilitation were having excellent results 0 4 (11.42 %) with late post op rehabilitation had good result and 01 (2.85 %) had fair result.

Out of 30 patients operated within one week of injury had Excellent results in 27 (90 %), Good in 2 (2.85 %) , Fair in 1 (2.85%) patients.

Out of 5 patients operated more than 1 week after injury had excellent results in 03 (60%), and good in 2 (40%).

Knee society score for 30 (85.14%) patients was Excellent, 04 (11.42 %) was Good and 01 (2.85 %) was Fair. One patient had 10 degree of extension lag which was due to improper reduction which left with significant step off. Osteoarthritic changes were in 01 (2.85 %) and no marked quadriceps weakness seen.

0ut of 35, 34 (97.14 %) patients were satisfied with treatment and outcome. 01 (2.85 %) patient was less satisfied. All the patients had returned to full level of their daily activities all the patients had returned to their original job.

We concluded that best results after surgical treatment of transverse patella are obtained by osteosynthesis of the fracture by using tension band technique.

CLINICAL CASES

CASE 1 (PATIENT NO .29)

25 YEAR OLD MALE PATIENT PRESENTED WITH HISTORY OF FALL FROM BIKE WAS OPERATED ON THE NEXT DAY WITH TENSION BAND WIRING AND HAD EXCELLENT RESULT.

PRE- OPERATIVE

POST- OPERATIVE

FOLLOW- UP

Case 2 (Patient No. 20)

48 YEAR OLD FEMALE PRESENTED WITH HISTORY OF FALL FROM STAIRS AND WAS OPERATED WITH TENSION BAND WIRING.PATIENT HAD IMPLANT IMPINGEMENT WHICH WAS REMOVED AFTER CLINICAL AND RADIOLOGICAL UNION WAS ESTABLISHED.

Complication Implant Impingement

PRE- OPERATIVE

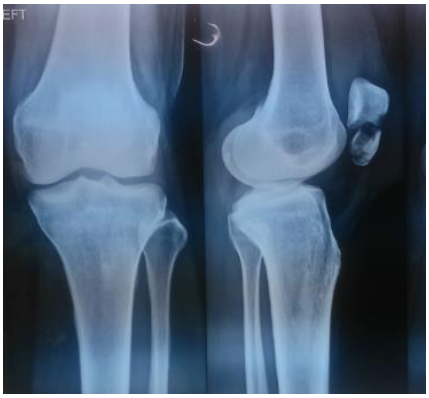
POST- OPERATIVE

AFTER IMPLANT REMOVAL

FOLLOW - UP

CASE 3 (Patient No. 28)

52 YEAR OLD FEMALE PATIENT PRESENTED WITH HISTORY OF FALL WHILE WALKING AND WAS OPERATED 2 DAYS AFTER INJURY AND HAD EXCELLENT RESULTS.



PRE- OPERATIVE

POST- OPERATIVE

FOLLOW -UP

CASE 4 (Patient No. 11)

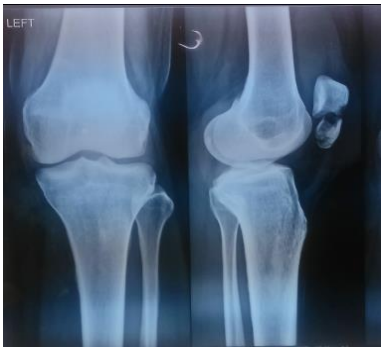
30 YEAR OLD MALE PATIENT PRESENTED WITH HISTORY OF ROAD TRAFFIC ACCIDENT AND WAS OPERATED 2 DAYS AFTER INJURY AND HAD EXCELLENT RESULT.

PRE- OPERATIVE **POST- OPERATIVE**

FOLLOW-UP

CASE- 5

26 YEAR OLD MALE PATIENT PRESENTED WITH HISTORY OF ROAD TRAFFIC ACCIDENT WAS OPERATED WITH TENSION BAND WIRING AND HAD EXCELLENT RESULTS.



PRE- OPERATIVE

POST- OPERATIVE

FOLLOW UP

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ANNEXURE-I

PROFORMA

OPD Case No : IPD NO:

Name :

Age :

Sex:

D.O.A. :

Address :Occupation :

DIAGNOSIS :

I) HISTORY :

Complaints :

Pain

Swelling

Duration

Side

Mode of injury:

- Direct injury or fall on to knee
- RTA

II) PAST HISTORY ;

VI) LOCAL EXAMINATION :

i) Inspection :

- Attitude
- Swelling
- Deformity
- Skin

ii) Palpation :

- Local rise of temperature
- Tenderness
- Bony irregularity
- Crepitus

iii) Movements :

iv) Neurovascular status :

v) Associated injuries

vi) Complications (if any)

VII) MANAGEMENT :

A) Investigations :

- Hb%
- TC Sugar
- ESR
- Blood urea :
- HIV
- Blood sugar:
- HBsAg
- S.creatinine:
- ECG
- X-ray knee AP & lateral view view

B) Treatment :

1 Surgical procedure: ORIF WITH TENSION BAND WIRING

2 Indication: CLOSED PATELLA FRACTURE

3 Classification of fracture

4 Date of surgery:

5 Type of Anaesthesia:

6 Antibiotics used:

7 Immobilization after surgery

- **Knee flexion started on**
- **Knee extension started on :**
- **Non wt Bearing till :**
- **Partial wt Bearing till :**

8 XRAY FINDINGS ON FOLLOW UP:

9 COMPLICATIONS :

- ANY RE SURGERY DONE
- REASON FOR IMPLANT REMOVAL

10 FOLLOW UP :

11 DATE OF FINAL FOLLOW UP

12 COMPLAINTS ON FINAL FOLLOW UP

13 PAIN ON

- Walking
- Climbing stairs
- At Rest

KNEE MOVEMENTS

- **Knee Flexion :**
- **Knee extension :**
- **RANGE :**

Extensor leg :

FLEXION CONTRACTURE

ANY SWELLING IN PATELLA

SIZE OF PATELLA AS COMPARED TO OPPOSITE PATELLA

MEDIOLATERAL INSTABILITY

ANTROPOSTERIOR INSTABILITY

MALALIGNMENT

Knee society score :

Patient satisfaction :

ANNEXURE-II

Knee society score System

Pain (50 Maximum)

Walking

- None 35
- Mild or occasional 30
- Moderate 15
- Severe 0

Stairs

- None 15
- Mild or occasional 10
- Moderate 5
- Severe 0

Range of movement (25 Maximum)

- 8^{o} = 1 point

Stability (25 Maximum)

Medial/Lateral

- 0-5 mm 15
- 5-10 mm 10
- > 10 mm 5

Anterior/Posterior

- 0-5 mm 10
- 5-10 mm 8
- > 10 mm 5

Deductions

Extension lag

- None 0
- <4 degrees -2
- 5-10 degrees -5
- 11 degrees -10

Flexion Contracture

- < 5 degrees 0
- 6-10 degrees -3
- 11-20 degrees -5
- > 20 degrees -10

Malalignment

- 5-10 degrees 0
- (5^o = -2 points)

Pain at rest

- Mild -5
- Moderate -10
- Severe -15
- Symptomatic plus objective 0

TOTAL SCORE **100**

- below 60 - Poor .
- 60 - 69 - fair .
- 70 - 79 - good .
- 80 - 100 – excellent.

ANNEXURE-III

PATIENT INFORMATION SHEET

Study Title: STUDY OF FRACTURE PATELLA TREATED WITH TENSION BAND WIRING

1. Introduction:

It is the study of patella fractures treated with tension band wiring. We wanted to study To study the surgical management and to assess its functional outcome patella fractures. To study the range of movement, functional outcome, duration of union, complications and compare the results of operated cases with other operative study.

2. What is the purpose of this study:

The purpose of this study is to gain experience with the surgical

Management of displaced patella fracture with tension band wiring.

3. Why have I been chosen this study?

Most of the people tackling fracture patella by other surgical means which leads to complication like malunion restriction of movement and pain at the site of fracture as well as patella femoral arthritis.so we wanted to study theses all complication whether they are solved by tension band wiring or not.

4. Do I have to take part?

Your participation in this study is voluntary and at your free will. You can refuse to participate in the study. More over you are also free to withdraw at any time without having to give a reason. Despite this, you will continue to receive your standard medical care and treatment.

5. How long will the study last?

From January 2016 to September 2017

6. What will happen to me if I take part?

If you are under the inclusion criteria of study you will be informed about the whole study procedure. *Screening Period of study is* From January 2016 to September 2017 Treatment period is 7 days.

Follow period is 1 month, 3 months, 6 months

7. What do I have to do?

You will share information regarding the health problem with the investigator as required. You will agree to allow necessary investigations like blood, x-rays with regard to adverse events. These will be rarely required and cost of the same will be borne by the investigator.

8. What is the drug being tested?

None

9. What are the benefits of the study?

Value of tension band wiring and importance of fixation in post-operative knee movement and to find out that how the patient will be able to resume the activities early, and gain anatomical union .

10. What are the alternatives for treatment?

Conservative, wire encirclage , basket plate osteosynthesis , tension band wiring with fibre cables.

11. What are the side effects of the treatment received during the study?

Main side effects are the infection and pain in postoperative period but they will be managed accordingly.

12. What if new information becomes available?

Any new information will be not included in the study.

13. What happens when the study stops?

If because of any reason it stops other surgeons are always their to tackle the patient,so patient will not suffer.

14. What if something goes wrong?

Complication in any surgery is likely for which explanation already given but inspite of that if it happens then one has to bear with it.

15. Will my taking part be kept confidential?

Your information will remain strictly confidential and will not be revealed to any third party and will not be published anywhere without your prior permission.If your photographs are taken for documentation, it will be dealt with strict confidentiality. However, it will be used for scientific purpose, without your identity being revealed.

16. What else should I know?

Financial consideration - You will not have to bear any extra cost purely for the purpose of the study. However, if the investigator desires to carry out any additional investigation, other than the ones suggested by your treating doctor or the ones which are a part of treating protocols for your disease condition, the cost of the same will be borne by the investigator. You will not get any financial incentives for participating.

If you need any additional information with regard to the study, or if you require any clarification, or in case of any doubt, you are free to ask questions to the Investigator. You will be given a copy of this participant information sheet for your information and record. If you need more information at a later date, you may call the investigator or meet him.

17. Additional Precautions

We always take care that wire knots are bent properly and k wires tip are made blunt so that it doesnot impinge also we follow strict aseptic precautions intraoperatively.

18. Who to call with questions?

If you need to share any information or seek advice with regard to the study, you can contact –

Dr.mahendra gupta :+919426666354

Room no.185, NRI BLOCK, SumandeepVidyapeeth, Piparia, Taluka: Waghodia, District: Vadodara.

પરિશિષ્ટ-3

અભ્યાસનુંશીર્ષક: -- તાંત્ર બેન્ડ વિરીંગ સાથે તાલુકાના ફ્રેચરલ પાઠેલા અભ્યાસ

1. **પરિચય**:

   તે ટેન્શન બેન્ડ વાયરિંગ સાથે સારવાર કરવામાં આવેલી પેટેલા અસ્થિભંગનો અભ્યાસ છેઅમે . માગતા હતા સર્જીકલ મેનેજમેન્ટનો અભ્યાસ કરવા અને તેનું કાર્યાત્મક પરિણામ અભ્યાસ કરવા પેટે ફ્રેક્ચરનું મૂલ્યાંકન કરવુંચળવળની શ્રેણી ., કાર્યકારી પરિણામ, યુનિયનની મુદત, ગૂંચવાણો અને અન્ય ઓપરેટિવ અભ્યાસ સાથે સંચાલિત કેસોના પરિણામોની સરખામણી કરવા.

2. **આ અભ્યાસના હેતુ શું છે**:

   આ અભ્યાસનો હેતુ સર્જિકલ તણાવ બેન્ડ વાયરિંગ સાથે વિસ્થાપિત ઢાંકણી ફ્રેક્ચરનું સંચાલન સાથે અનુભવ મેળવવાનો છે.

3. **મને શા માટે આ અભ્યાસમાં પસંદ કરવામાં આવ્યા છે?**

   મોટાભાગના લોકો અન્ય સર્જીકલ માધ્યમથી અસ્થિભંગનો સામનો કરતા હોય છે, જે અસ્થિભંગના સ્થાને ચળવળ અને પીડાને લગતા ગુનાની સાથે સાથે ઢાંકણાના ફ્રેમોરલ આર્થ્રાઈટિસની જેમ જ ગૂંચવાણ તરફ દોરી જાય છેતેથી . આપણે તાણની તમામ ગૂંચવાણોનો અભ્યાસ કરવા માગીએ છીએ કે શું તેઓ તણાવ બેન્ડ વાયરિંગ અથવા નહીં

4. **મારે ભાગ લેવા જ જોઈએ?**

   તમે અભ્યાસ ભાગ ઈન્કાર કરી શકો છો. તમે વધુ પણ એક કારણ આપી કર્યા વગર કોઈપણ સમયે પાછી ખેંચી માટે મુક્ત છે. આમ છતાં, તમે તમારા પ્રમાણભૂત તબીબી સંભાળ અને સારવાર મેળવવા માટે ચાલુ રહેશે.

5. **ક્યાં સુધી અભ્યાસ ચાલશે?**

   અભ્યાસના સમયગાળા 2015 થી 2018 સુધી કાયમ રહેશે

6. **હું ભાગ લઇશ તો શું મને શું થશે?**

   જો તમે અભ્યાસના સમાવેશના માપદંડ લેઠળ છો, તો તમને સંપૂર્ણ અભ્યાસ પ્રક્રિયા વિશે જાણ કરવામાં આવશે. સ્ક્રીનીંગ પીરિયડ ઓફ સ્ટડી એટલે જાન્યુઆરી ૨૦૧૬ થી સપ્ટેમ્બર ૨૦૧૭ સુધી સારવારનો સમય 7 દિવસ છે.
   પાલન સમયગાળો મહિના 1, મહિના 3, મહિના છે 6

7. **મારે શું કરવું?**

   આવશ્યકતા મુજબ તપાસકર્તા સાથે સ્વાસ્થ્ય સમસ્યા અંગેની માહિતી તમે વહેંચશો. પ્રતિકૂળ ઘટનાઓના સંદર્ભમાં તમે રક્ત, એક્સ-રે જેવા જરૂરી તપાસની મંજૂરી આપવા માટે સંમત થશો. આ ભાગ્યેજ આવશ્યક છે અને તેનો ખર્ચ તપાસકર્તા દ્વારા લેવામાં આવશે.

8. **કેવિ દવા ચકસ્વામા આવી રહી છે?**

   કોઇ પણ નહિ.

9. **આ અભ્યાસના શું ફાયદા છે?**

   પોસ્ટ ઓપરેટિવ ઘૂંટણની ચળવળમાં ટેન્શન બેન્ડ વાયરિંગ અને ફિક્સેશનનું મહત્વ અને તે જાણવા માટે કે કેવી રીતે દર્દી પ્રારંભિક પ્રવૃત્તિઓ ફરી શરૂ કરી શકે છે અને એનાટોમિક યુનિયન પ્રાપ્ત કરી શકે છે.

10. સારવાર માટે વિકલ્પો કયા છે?

રૂઢિચુસ્ત, વાયર ઘેરો, બાસ્કેટ પ્લેટ ઓસ્ટીયોસંથેસિસ, ફાઈબર કેબલ્સ સાથે તણાવ બેન્ડ વાયરિંગ.

11. અભ્યાસ દરમિયાન મળેલી સારવારની આડઅસર શું છે?

મુખ્યત્વે ચેપ અને દુખવો પરંતુ તેનિ યોગ્ય સારવાર કર્વા મા આવસે.

12. નવી માહિતી ઉપલબ્ધ બને તો શું?

કોઇ પણ જાત નિ નવિ મહિતિ અભ્યાસ મા લેવા મા આવ્સે નહિ.

13. અભ્યાસ અટકે ત્યારે શું?

જો કોઇ પણ કારણો સર અભ્યાસ અટ્ક્સે તો બિજા ડોક્ટરો દરદિ નિ પુર્તિ સારર્વાર લેસે.

14. કંઈક ખોટું થાય તો શું?

ઓપરેશન દર્મિયાન આડ અસર થ્વાનિ સક્યતા હોય પરંતુ તેનિ પુર્તિ કાળજી લેવા મા આવસે.

15. મરિ ભાગ લેવાનિ મહિતિનિ ગુમાતા રાખવા મા આવ શે?

તમારી માહિતી ચોક્કસ રીતે ગુપ્ત રાખવામાં આવશે. તમારી માહિતી ની જાણ, કોઇ ત્રીજી વ્યક્તિને કે જાહેરમાં પ્રસિધ્દ્ કરવામાં નહિ આવે. જો માહિતી ના સંગ્રહ માટે તમારા ફોટોગ્રાફ્સ લેવામાં આવશે તો તેને ગુપ્ત રીતે સાયવવામાં આવશે.
પણ જો તેનો વૈજ્ઞાનિક હેતુ માટે ઉપયોગ કરવામાં આવશે તો તમારી ઓળખ જાહેર ના થાય તેવી રીતે પ્રસિધ્દ્ કરવામાં આવશે

16. મારે બિજુ શું જાનવુ જોઇયે?

નાણાકીયખુલાસો: તમારે આ અભ્યાસ માટે કોઇ વધારાનો ખર્યો ઉપાડવાનો નથી. જો તમારી સારવાર આપતા ડોકટરે કરાવેલા પરીક્ષણો સિવાય અભ્યાસકર્તા કોઇ અન્ય પરીક્ષણો કરાવવા માંગે તો તેનો સંપૂર્ણ ખર્યો અભ્યાસકર્તા ઉપાડશે.અભ્યાસ માં સામેલ થવાના લીધે તમને કોઇ વળતર અપાશે નહી કે નાણાકીય ફાયદો મળશે નહી.

જો તમને અભ્યાસ સંદર્ભે કોઇ પણ વધારાની જાણકારી જોઈતી હોય અથવા તમને કોઇ સ્પષ્ટતા ની જરૂર હોય તો,અથવા કોઇ શંકા હોય તો,તમે અભ્યાસકર્તા ને પ્રશ્નો પૂછી શકો છો.તમને તમારી માહિતી માટે આ પત્રકની નકલ આપવામાં આવશે.જો ભવિષ્યમાં તમને વધારે માહિતી જોઇતી હોય,તો તમે અભ્યાસકર્તા ને ફોન કરી શકો છો અથવા તેમને રૂબરૂ મળવા આવી શકો છો..

17. વધારાના સાવચેતીઓ?

અમે હંમેશાં ધ્યાન રાખીએ છીએ કે વાયરના ગાંઠો યોગ્ય રીતે વળેલા હોય છે અને વાયરની ટીપને છૂંદી કરવામાં આવે છે જેથી તે અથડાઈ ન શકે અને અમે સખત એસિટીક સાવચેતીને અંતઃપ્રાપ્ત રીતે અનુસરીએ છીએ.

18. કોને પ્રશ્નો પૂછવા?

જો તમને બીજી કોઇ પણ માહિતી જોઈતી હોય કે તમને કોઇ સલાહની જરૂર હોય તો તમે નીચે ની વ્યક્તિનો સંપર્ક કરી શકો છો.

ડૉ. મહેન્દ્ર ગુપ્તા :+919426666354

રૂમ નં .185, એનઆરઆઈ બ્લોક,સુમનંદીપ વિદ્યાપીઠ, પિપરિયા, તાલુકાવાઘોડિયા :, જીલ્લો : વડોદરા

ANNEXURE-IV

INFORM CONSENT

Study Title: STUDY OF patella fracture treated with tension band wiring

StudyNumber:

Subject's Initials: Subject's Name:

Date of Birth / Age:

Address of the Subject: _____

Qualification:

_____

Occupation: Student/ Self-Employed/ Service/ House-wife/Others:

(Please tick as appropriate)

Annual Income of the subject:_____

Details of Nominee (s):

Name of Nominee:_____

Address of Nominee:

Relation to Subject:_____

Please initial box (Subject)

(i) I confirm that I have read and understood the information sheet dated ……....….for the above study and have had the opportunity to ask questions. ☐

(ii) I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. ☐

(iii) I understand that the Sponsor of the clinical trial, others ☐

working on the Sponsor's behalf, the Ethics Committee and the regulatory authorities will not need my permission to look at my health records both in respect of the current study and any further ☐

Protocol No.: XXXXXX

research that may be conducted in relation to it,

even if I withdraw from the trial. I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published. ☐

(iv) I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s) ☐

(v) I agree to take part in the above study. _____

Signature (or Thumb impression) of the Subject/LAR:

Date:

Signatory's Name:_____

Signature of the Investigator:

Date:____/____/_____

Study Investigator's Name:_____

Signature of the Witness_____

Date: /__ ___/ _____

Name of the Witness:_____

Copy of the Patient Information Sheet and duly filled Informed Consent Form shall be handed over to the subject or his/her attendant.

પરિશિષ્ટ -4

ઇન્ફોર્મડ કન્સેન્ટ ફોર્મ

અભ્યાસનું શીર્ષક: - તાંત્ર બેન્ડ વિરીંગ સાથે તાલુકાના ફ્રેંચરલ પાઠેલા અભ્યાસ

સહ્ભાગી નો આંક સહ્ભાગી નું નામ

જન્મ તારીખ/ ઉમર:

સહ્ભાગીનું સરનામું

લાય્કાત
વય્વસાય _____
વાર્ષિક આવક _____

નોમિની નિ વિગત (s):

નામ _____
સરનામું _____

_____

સહ્ભગિ જોડે નો સંબંધ _____

(i) હું તારીખ _____ અને ઉપર ના અભ્યાસનું માહિતી પત્રક વાંચી અને સમજીને અભ્યાસ માં સામેલ થવાની ખાતરી આપું છું અને મને કોઇ પણ પ્રશ્નો પૂછવા ની તક આપવામાં આવશે. જેની મને ખબર છે. ☐

(ii) મારી અભ્યાસ માં ભાગીદારી સ્વૈચ્છિક છે અને હું મારી ભાગીદારી કોઇ પણ કારણ આપ્યા વગર, મારી તબીબી સારવાર ને અસર ના પહોચે અથવા મારા કાનૂની અધિકારોને અસર ના થાય તેમ ગમે ત્યારે પાછી ખેચી લેવા સ્વતંત્ર છું ☐

(iii) હું આ અભ્યાસના અભ્યાસ કર્તા, અભ્યાસ કર્તાના સહયોગી,એથીક્સ કમિટી અને રેગ્યુલેટરી ઓથોરીટી સને મારી પરવાનગી વગર મારા સ્વાસ્થ્ય નો રેકોર્ડ કેજે આ અભ્યાસ કે આ ભવિષ્ય માં થનારા પરીક્ષણ ના સંદર્ભ માં થશે તેને જોવાની સંમતિ આપુ છું. ☐

(iv) જો હું મારી સંમતિ પછી ખેચી લઉં તો પણ મારી માહિતી અભ્યાસ કર્તા મેળવી શકશે. છતાં, હું સમજુ છું કે, મારી ઓળખાણ કોઈપણ સ્વરૂપમાં ત્રીજી વ્યક્તિ ને અપાશે નહી કે જાહેરમાં પ્રકાશિત કરવામાં નહિ આવે.આ અભ્યાસ પરથી જે પરિણામ કે માહિતી મળે તેની પર હું પ્રતિબંધ નહિ મુકું. ☐

(v) હું ઉપર ના અભ્યાસમાં ભાગ લેવાની સંમતિ આપું છું. ☐

સહ્ભગિ નુ સહી અથવા અંગુઠાનું નિશાન_____
તારીખ_____

અભ્યાસ કર્તા ની સહી_____તારીખ_____

અભ્યાસના અભ્યાસ કર્તાનું નામ_____

MASTER CHART

SR.NO	Age	Sex		Mode of Trauma	intervan between injury and admission	Interval Between Injury And Operation	Hosital Stay	Type of Fixation	Classification of Fracture	EXTENSOR RETINACULUM TEAR	Co-morbidity	Associated Injury	Ambulisation started	Flexion Started On	Active extension Started on	Mobilization started on	Non Wt Bearing till	Partial Wt Bearing till	FULL WT BEARING AFTER
P1	18	Male	left	Road Traffic Accident	1 DAY	2days	7 DAYS	TBW	TRANSVERSE	NO	no	NO	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P2	20	Male	left	RTA	1 DAY	2 day	5 DAYS	TBW	Lower pole	NO	NO	SHAFT FEMUR FRACTURE	2 week	2 week	4 WEEKS	2 week	5 WEEKS	8 weeks	8 week
P3	45	Male	right	Road traffic accident	1 DAY	1 day	15 day	TBW	Transverse	NO	No	Shaft FEMUR FRACTURE	2 week	2 week	4 WEEKS	2 week	5 WEEKS	8 weeks	8 week
P4	42	Female	right	Road Traffic accident	1 DAY	1 Day	15 day	tbw	Transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P5	75	male	right	fall on knee	18 DAY	20 days	15 day	TBW	upper pole	YES	no	Distal femur	5 week	3 weeks	4 WEEKS	3 week	6 weeks	10 weeks	10 weeks
P6	27	male	left	RTA	1 DAY	2 day	7 days	TBW	Transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P7	26	male	left	RTA	2 DAY	3day	7 day	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P8	50	male	left	fall on knee	2 DAY	3 day	7 day	tbw	communited	NO	NO	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P9	35	male	right	RTA	2 DAY	3 day	7 day	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P10	38	Male	right	RTA	2 DAY	3 day	5 DAYS	tbw	TRANSVERSE	NO	NO	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P11	30	male	left	RTA	2 day	4day	10 days	Tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P12	70	male	right	fall on knee	8 day	10 day	7 day	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P13	28	male	left	RTA	2 day	4 day	7 day	TBW	Transvserse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P14	60	male	right	direct fall	12 day	14 day	7 day	tbw	transverse	YES	no	no	2nd day	3 weeks	4 WEEKS	3 week	2nd day	2 WEEKS	2 WEEKS
P15	40	female	left	RTA	2 DAY	3day	7 day	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P16	32	male	right	direct fall	28 day	1 month	10 days	tbw	transverse	YES	no	no	2nd day	3 weeks	4 WEEKS	3 week	2nd day	2 WEEKS	2 WEEKS
P17	48	female	left	direct fall	1 DAY	2 day	5day	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P18	18	male	left	RTA	1 DAY	2 day	5 DAYS	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P19	25	male	left	RTA	1 DAY	1day	7 day	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P20	27	male	right	RTA	2 DAY	3day	7 day	tbw	transverse	NO	NO	SHAFT FEMUR FRACTURE	2 week	2 week	4 WEEKS	2 week	5 WEEKS	8 WEEKS	8 WEEKS
P21	54	female	right	direct fall	1 DAY	2day	7 day	tbw	lowe pole	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P22	22	male	left	RTA	1 DAY	1 day	5 DAYS	TBW	LOWER POLE	NO	NO	NO	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P23	35	MALE	left	RTA	1 DAY	2 DAY	5 DAYS	TBW	UPPER PLOE	YES	NO	NO	2nd day	3 weeks	4 WEEKS	3 week	2nd day	2 WEEKS	2 WEEKS
P24	45	male	left	RTA	5 day	7 day	12 days	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P25	52	female	right	direct fall	8 day	10 day	12 days	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P26	42	male	right	RTA	2 DAY	3 day	7 day	tbw	Lower pole	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P27	35	male	right	RTA	2 DAY	3 day	8 day	tbw	Lower pole	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P28	52	female	left	direst fall	2 DAY	3day	7 day	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P29	25	male	right	RTA	1 DAY	1 day	7 day	tbw	upperpole	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P30	43	male	left	RTA	2 day	4 day	7 day	tbw	lower ploe	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P31	30	Female	left	RTA	1 DAY	1day	5 DAYS	tbw	transverse	YES	no	no	2nd day	3 weeks	4 WEEKS	3 week	2nd day	2 WEEKS	2 WEEKS
P32	42	female	right	direct fall	1 DAY	1 DAY	5 DAYS	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P33	38	male	right	RTA	2 DAY	3 day	7 day	tbw	transverse	NO	no	no	2nd day	2 week	4 WEEKS	2 week	2nd day	2 WEEKS	2 WEEKS
P34	40	male	right	RTA	1 DAY	2 day	7 day	tbw	lower pole	NO	no	SHAFT FEMUR FRACTURE	2 week	2 week	4 WEEKS	2 week	5 WEEKS	8 weeks	8 WEEKS
P35	25	male	left	RTA	2 DAY	3 day	7 day	tbw	Transverse	YES	no	no	2nd day	3 weeks	4 WEEKS	3 week	2nd day	2 WEEKS	2 WEEKS

MASTER CHART

SR.NO	follow up until month	Quadriceps Strength	Final Follow UP Pain On Walking	Pain on Stair case Climbing	Range of Motion	Medial lateral stability	Anterior posterior stability	extension Leg	Flexion Contracture	Malalignment	Pain at Rest	UNION TIME (WEEKS)	Infection	Hardware Removal	Non Union	SURGEONS'S ASSESMENT	PATIENT'S RESULT ASSESMENT	Joined Original Job	Level oF daily Activities
																Grading of Results According to Knee Society Score poor/fair/good/excellent)	SATISFIED/UNSATISFIED		
P1	11	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P2	7	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P3	13	5	NO	NO	0-110	stable	stable	0	NO	NO	NO	11	no	no	no	excellent	satisfied	yes	full
P4	12	5	NO	no	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P5	12	5	NO	NO	0-100	stable	stable	0	NO	NO	NO	13	no	no	no	Good	satisfied	yes	full
P6	11	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	11	no	no	no	excellent	satisfied	yes	full
P7	13	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	13	no	no	no	excellent	satisfied	yes	full
P8	14	4	YES	YES	0-100	stable	stable	0	NO	NO	YES	14	no	no	no	GOOD	SATISFIED	yes	FULL
P9	13	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	13	no	no	no	excellent	satisfied	yes	full
P10	15	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	11	no	yes	no	excellent	satisfied	yes	full
P11	14	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	14	no	no	no	excellent	satisfied	yes	full
P12	12	5	NO	yes	0-100	stable	stable	0	NO	NO	NO	14	no	no	no	good	satisfied	yes	full
P13	16	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	13	no	no	no	excellent	satisfied	yes	full
P14	13	4	YES	YES	10--90	stable	stable	10	NO	YES	YES	16	yes	YES	no	FAIR	UNSATISFIED	yes	full
P15	7	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P16	12	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	14	no	no	no	excellent	satisfied	yes	full
P17	15	5	NO	NO	0-110	stable	stable	0	NO	NO	NO	11	no	yes	no	excellent	satisfied	yes	full
P18	10	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P19	9	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P20	16	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P21	11	4	YES	YES	10-110	stable	stable	10	NO	NO	NO	14	no	yes	no	GOOD	satisfied	yes	full
P22	9	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	11	no	no	no	excellent	satisfied	yes	full
P23	10	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P24	11	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	13	no	no	no	excellent	satisfied	yes	full
P25	11	5	NO	YES	0-110	stable	stable	0	NO	NO	NO	13	no	no	no	excellent	satisfied	yes	full
P26	14	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P27	16	5	NO	NO	0-110	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P28	15	5	NO	NO	0-110	stable	stable	0	NO	NO	NO	12	no	yes	no	excellent	satisfied	yes	full
P29	14	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P30	14	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	11	no	no	no	excellent	satisfied	yes	full
P31	13	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full
P32	12	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	yes	no	excellent	satisfied	yes	full
P33	12	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	13	no	no	no	excellent	satisfied	yes	full
P34	11	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	13	no	no	no	excellent	satisfied	yes	full
P35	9	5	NO	NO	0-120	stable	stable	0	NO	NO	NO	12	no	no	no	excellent	satisfied	yes	full