RESULTS

The Hospital for Special Surgery knee service rating system (H.S.S) was used pre as well as post-operatively for clinical evaluation of the knee state accordingly, the minimal clinical score pre-operatively was 58 points while the maximum was 85 points with an average of 72.9 points (S.D ± 9.5). More than half of the cases (54.76%) had knee score ranged from 70 to 84 points (Table 16).

Table (16): Preoperative clinical score

Score	No. of cases	%
Satisfactory:		
Excellent	4	10%
Good	19	47.5%
Unsatisfactory:		
Fair	14	35%
poor	3	7.5%
Total	40	100.00

According to Hospital for Special Surgery knee service rating system (H.A.S), the assessment of final end results was done.

The results were collected and a sum of 100 points was gained and graded.

Excellent results were recorded in 22 patients (55%), good in nine (22.5%), fair in two (10%) and poor in five patients (12.5%). (Table 17)

Table (17): Clinical score of postoperative results

Score	No. of cases	%
Satisfactory:		
Excellent	22	55%
Good	9	22.5%
Unsatisfactory:		
Fair	4	10%
poor	5	12.5%
Total	40	100.00

- The results of the study could be categorized under five major categories:

I. Relation between postoperative results and Preoperative data.

II. Relation between operative data and postoperative result.

III. Relation between post operative clinical results and Duration of follow up.

IV. Assessments of final results.

V. Complications.

I) Relation between postoperative results and Preoperative data

[Preoperative clinical score, age, sex, duration of symptoms, different preoperative clinical parameters]

1) *Relation between preoperative clinical score and postoperative results:*

By comparing the pre-operative clinical scoring with the final post-operative result, it was found that the average pre-operative score was 72.9 points (S.D± 9.5) (range 53-90 points). While postoperatively it was 87.47 points (S.D.±16.84) range (59 – 100 points) with an average gain of 14.17 points.

There were 23 patients (57.5%) who had a pre-operative clinical score above 69 points, 20 patients out of them (86.69%) had satisfactory results.

There is a significant relation between preoperative clinical score and postoperative results. (Table 18) showed that the more the pre-operative clinical score the best post-operative results.

Table (18) : Relation between pre-op. clinical score & post-op. results.

Pre-op. Clinical score	Post-operative results				Total
	Excellent	good	Fair	Poor	
Excellent	4	0	0	0	4
Good	10	6	1	2	19
Fair	8	3	1	2	14
poor	0	0	2	1	3
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

X^2 22.05 **P ≤0.05** **S**

2) - *Relation between age of patient and post-operative end results:*

Out of the 40 patients examined, it was found that excellent results were 27.5% in those patients less than thirty years; 25% in group of patients from thirty to forty years and 2.5% in those above 40.

Statistically there was significant difference in the clinical results among each age group.

3) - *Relation between sex and post-operative result:*

There were 22 males (55%) out of which 19 had satisfactory results (86.4%) while out of the 18 females (45.2%) 12 cases (66.7%) had satisfactory results.

There was shown that sex incidence had no significant effect on the final post-operative result.

4) *Relation between the duration of symptoms and the post-operative results:*

Thirteen patients were presented with symptoms duration equal or less than one year all of them gave satisfactory results. 22 patients was presented with symptoms duration from more than 12 months to 3years, 16 (72.7 %) of theme gave satisfactory results, 5 patients was presented with symptoms duration of more than three years 2 (40%) of theme gave satisfactory results. (Fig. 55)

The difference between four groups found to be statistically not significant.

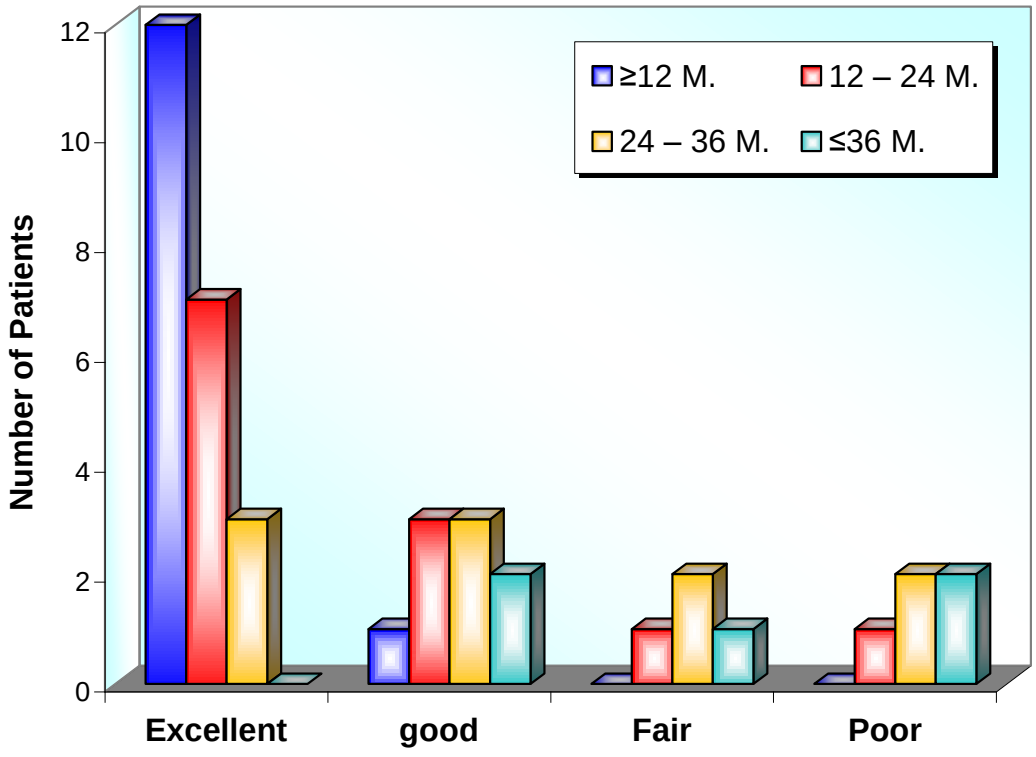

Figure (55): Relation between symptoms duration and post-operative results.

5) *Relation between different clinical parameters and post-operative results:*

A} Pain and postoperative results.

There were 25 patients (62.5%) had moderate pain preoperatively. Patients presenting with mild pain (25%) proved to give more satisfactory results. There was significant effect of pre-operative pain on post operative results.(Table 19, 20)

Table (19): Pain grade distribution preoperatively

Pain degree	No. of cases	%
Mild	10	25
Moderate	25	62.5
Sever	5	12.5
Total	40	100.00

Table (20): Relation between pre-op. pain and post-operative results.

Pre-operative pain	Post-operative results				Total
	Excellent	good	Fair	Poor	
Mild	9	1	0	0	10
Moderate	13	5	4	3	25
Sever	0	3	0	2	5
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

X2: 15.58 **P≤0.05** **S.**

B} Walking ability and post-operative results.

There were 33 patients (82.5%) who hade the ability to walk for more than 300 meters preoperatively. (Table 21)

About eighty –seven percent of the patients who could walk more than 300 meters gave satisfactory result. Statistically, it was proved that pre-operative walking ability had no significant effect on the post-operative results. (Table 22)

Table (21): Pre-operative walking ability

Preoperative walking ability	No. of cases	%
≤100 M	3	7.5
100 – 300 M	4	10.0
300 – 500 M	18	45
≥500 M	15	37.5
Total	40	100.0

Table (22): Relation between walking ability and post-operative results

Pre-op. walking ability	Post-operative results				Total
	Excellent	good	Fair	Poor	
≤100 M	2	0	0	1	3
100 – 300 M	1	0	1	2	4
300 – 500 M	8	6	2	2	18
≥500 M	11	3	1	0	15
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

X2: 13.39 **P>0.05** **N.S.**

C} Climbing stairs and postoperative results

There were twenty seven patients (67.5%) who could climb stairs only with support; twenty three cases out of them (88.5%) had satisfactory results. Statistically, there was no significant correlation between the final outcome and the ability to climb stairs. (Table 23)

Table (23) : Relation between pre-operative climbing stairs and post-operative results.

Climbing stairs ability	Post-operative results				Total
	Excellent	good	Fair	Poor	
Unsupported	8	2	2	1	13
Supported	14	7	2	4	27
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

X^2: 1.498 **P> 0.05** **N.S.**

D} Relation between flexion range and postoperative result

There were 29 cases (72.5%) who could flex the knee more than 100 degrees

Only eleven (27.5%) patients presented with Preoperative flexion range 81^0 – 100^0 in their knees. (Table 24)

About seventy –two percent of the patients who presented with a loss of complete flexion range in their knees which was less than five degrees gave satisfactory result. Statistically, it was proved that pre-operative flexion range had no significant effect on the post-operative results. (Table 25)

Table (24): Pre-operative knee flexion range

Preoperative flexion range	No. of cases	%
≤61	0	0
61 – 80	0	0
81 – 100	11	30
≥100	29	70
Total	40	100.0

Table (25) : Relation between preoperative flexion range and post-operative results.

Preoperative flexion range	Post-operative results				Total
	Excellent	good	Fair	Poor	
≤61	0	0	0	0	0
61 – 80	0	0	0	0	0
81 – 100	6	2	3	0	11
≥100	16	7	1	5	29
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

X^2: 1.498 **P> 0.05** **N.S.**

II) Relation between post-operative result and operative data:-

[Size, Site, Chondral congruence, Operative time, Meniscal injury, Arthroscopic finding]

1) *Relation between Size of chondral defect and postoperative results*

There were 23 cases (57.5%) had chondral defect up to one cm. and 17 (42.5%) patients had chondral defect more than one cm. (Table 26)

About eighty percent; of the patients who had chondral defect up to one and half cm in their knees gave satisfactory results. Statistically, it was proved that size of chondral defect had highly significant effect on the post-operative results. (Table 27)

Table (26): Size of chondral defect

Size of chondral defect (cm)	No. of cases	%
<1 cm	23	57.5
1 – 1.5 cm	14	35
> 1.5– 2 cm	3	7.5
Total	40	100.0

Table (27) : Relation between size of chondral defect and post- operative results.

Size of chondral defect (cm)	Post-operative results				Total
	Excellent	good	Fair	Poor	
<1 cm	19	3	1	0	23
1 – 1.5 cm	3	5	2	4	14
> 1.5– 2 cm	0	1	1	1	3
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

X^2 23.67 **P≤0.01** **H.S.**

2) *Relation between Site of chondral defect and postoperative results*

Articular lesions were detected in medial femoral condyle in 35 (87.5%) knees, while lateral femoral condyle was affected in 5(12.5%) knees. (Table 28)

About eighty percentages of patients that had articular cartilage defect on medial femoral condyle have satisfactory results; on other hand patients that have lesions in lateral femoral condyle three patients (60%) out of them have satisfactory results.

The difference between lesions in medial and lateral femoral condyle found to be statistically not correlated. (Table 29)

Table (28): Site of chondral defect

Site of chondral defect	No. of cases	%
Medial femoral Condyle	35	78.5
Lateral femoral condyle	5	12.5
Total	40	100.0

Table (29) : Relation between site of chondral defect and post-operative results.

Site of chondral defect	Post-operative results				Total
	Excellent	Good	Fair	Poor	
Medial femoral ondyle	20	8	3	4	35
Lateral femoral condyle	2	1	1	1	5
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

3) Relation between chondral congruence and post-operative results

Articular cartilage congruence was achieved in thirty one cases (77.5%) about (89%) of them have satisfactory results. Nine patients (22.5%) failed to have accurate cartilage congruence 6 patients out of them (66.6%) have non satisfactory results.

The relation between articular cartilage congruence and end results was found to be statistically highly significant. (Table 30)

Table (30) : Relation between articular cartilage congruence and post-operative results.

Articular cartilage congruence	Post-operative results				Total
	Excellent	good	Fair	Poor	
Congruent	21	7	2	1	31
Non-congruent	1	2	2	4	9
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

X^2 25.67 **P≤0.01** **H.S.**

4) Relation between operative time and post-operative results

In the present series, the time of the operative interference ranged from one hour to two hours with a mean 1.6 hours.

The relation between the operative time and end results was found to be statistically non significant.

5) *Associated meniscal injuries*

There were 26 patients (65%) have meniscal injury, most of the patients had medial meniscal injury, 19 patients (73.1 %) out of them had satisfactory results. It was found that there was no statically significance between meniscal injury and the postoperative end result. (Table 31, 32)

Table (31): Meniscal injury

Meniscal injury	No. of cases	%
With meniscal injury	26	65.0
Without meniscal injury	14	35.0
Total	40	100.0

Table (32): Relation between meniscal injury and post-operative results.

Meniscal injury	Post-operative results				Total
	Excellent	good	Fair	Poor	
With meniscal injury	14	5	3	4	26
Without meniscal injury	8	4	1	1	14
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

X^2: 1.117 **P>0.05** **N.S.**

III) – Relation between post-operative clinical results & duration of follow up.

The patients were evaluated after O.A.T periodically every three weeks for six weeks, and then every three months till the end of first year, then once a year. The shortest period of follow up was twelve months and the longest period was 36 months with mean of 21 months.

The best results were observed with patients who were followed for a period up to 36 months. About 90% of those patients had satisfactory results. (Table 33)

Statistically, there was a highly significant effect of follow up duration on the postoperative results.

Table (33) : Relation between duration of follow-up and post-operative results.

Duration of follow-up (M)	Post-operative results				Total
	Excellent	good	Fair	Poor	
≤12	0	1	1	2	4
>12 – 24	8	5	2	3	18
>24 - 36	14	3	1	0	18
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

X^2: 13.047 **P≤0.05** **H.S.**

IV) – Assessment of final end results

1) - *patient assessment*

About 72.5% of the patients were enthusiastic or satisfied with their results.

All of these patients had satisfactory results. Statistically, there was highly significant correlation between patient assessment and postoperative results. (Table 34, 35)

Table (34): Patient assessment

Patient assessment	No. of cases	%
Enthusiastic	13	32.5
Satisfied	15	37.5
Non-committed	7	17.5
Disappointed	5	12.5
Total	40	100.0

Table (35): Relation between patient assessment and post-operative results.

Patient assessment	Post-operative results				Total
	Excellent	good	Fair	Poor	
Enthusiastic	13	0	0	0	13
Satisfied	9	6	0	0	15
Non-committed	0	2	4	1	7
Disappointed	0	1	0	4	5
Total	22 (55%)	9 (22.5%)	4 (10%)	5 (12.5)	40 (100%)

X2 57.1 **P≤0.01** **H.S.**

2) – Symptom evaluation:

A} Pain

Nineteen patients (47.5%) had no pain during athletic activities, while eleven patients (27.5%) have mild pain with activity or sleep. six patients (15 %) had moderate pain during activity or sleep. (Table 36)

Table (36): Post-operative pain

Post operative pain	No. of cases	%
No pain	19	47.5
Mild	11	27.5
Moderate	6	15.0
Sever	4	10.0
Total	40	100.0

Patients with sever pain pre-operatively had moderate pain post-operatively. Statistically there was a high significant improvement in pain degree post-operatively. (Table 37)

Table (37) : Relation between pre and post-operative pain.

Pre-operative pain	Post-operative Pain.				Total
	No pain	mild	moderate	sever	
Mild	8	2	0	0	10
Moderate	11	8	4	2	25
Sever	0	1	2	2	5
Total	19 (47.5%)	11 (27.5%)	6 (15%)	4 (10%)	40 (100%)

t 2.2 **P≤0.01** **H.S.**

B} Walking ability

Twenty six patients (65.5 %) can walk for more than 500 meter post operatively. (Table 38)

The three cases (7.5%) that could walk up to 100 meter pre-operatively, two out of them (66.7%) improved to walk more than 500 meters post-operatively. Statistically, there was no significant difference between pre and post-operative walking ability. (Table 39)

Table (38): Post-operative walking ability

Post operative Walking	No. of cases	%
≤100 M	0	0.0
>100 – 300 M	1	2.5
>300 – 500 M	13	32.5
>500 M	26	65.0
Total	40	100.0

Table (39) : Relation between pre and post-operative walking ability

Pre-operative walking ability	Post-operative walking ability				Total
	<100	>100-300	>300-500	>500M	
≤100 M	0	0	1	2	3
>100 – 300 M	0	0	3	1	4
>300 – 500 M	0	1	5	12	18
>500 M	0	0	4	11	15
Total	0 (0.0%)	1 (2.5%)	13 (32.5%)	26 (65.5%)	40 (100%)

t 3.2 **P>0.05** **N.S.**

C} Climbing stairs

Preoperatively, there were 27cases (6 7.5%) who could climb stairs with support, seventeen cases out of them (62.9%) improved to climb stairs unsupported post operatively.

Statistically, there was highly significant improvement in postoperative climbing stairs ability in relation to preoperative state. (Table 40)

Table (40) : Relation between pre and post-operative climbing stairs ability.

Pre-operative Climbing stairs	Post-operative Climbing stairs.		Total
	Unsupported	Supported	
Unsupported	12	1	13
Supported	17	10	27
Total	29 (72.5%)	11 (27.5%)	40 (100%)

t 3.55 **P ≤0.01** **H.S.**

D} Range of flexion

Majority of cases 40 patients (90 %) have range of flexion more than 100 degrees postoperatively. Preoperativly, there were 11 cases (27.5%) with maximum flexion from 81 – to 100 degrees, Eight of them (72.7 %) had flexion range more than 100 degrees postoperatively. Statistically, this relation was proved to be highly significant. (Table 41)

Table (41) : Relation between pre and post-operative maximum flexion.

Pre-operative Climbing stairs	Post-operative Climbing stairs.		Total
	>100	81- 100	
>100	28	1	29
81- 100	8	3	11
Total	36 (90%)	4 (10%)	40 (100%)

t 2.48 **P≤0.01** **H.S.**

V) Complications:-

A) Early complications:

1) Haemarthrosis:-

Five cases (12.5 %) developed postoperative moderate haemarthrosis after removal of the intra-articular drain 24 hours after operation.

Aspiration, cold therapy, and continuous of post-operative medication were administrated that make improvement of knee condition.

Where, one cases (2.5 %) developed tense haemarthrosis not controlled with previous measures. Arthroscopic lavage and partial synovectomy were performed on the third day post operative.

All cases with postoperative haemarthrosis completely recovered without any aspect unless delayed hospital discharge.

2) Infection:-

One case (2.5 %) developed moderate effusion and fever for three days not improved by parentral broad spectrum antibiotic medication.

Arthroscopic lavage was made on the 4^{th} day. Culture and sensitivity test showed streptococcal infection.

Medication was given as response of culture result for three weeks and infection was cleared out but there was delayed recovery of knee as regard range of movement and the patient was rated poor knee.

B) Late complications:

1) Donor site morbidity:

Donor site morbidity was present in three cases (7.5 %) in the form of patellofemoral affection with friction between the patella and donor site presented by persistent knee pain especially with climbing stairs.

One case show marked improvement with extended physiotherapy program with strengthening of muscles around knee fore three months.

Lateral retinocular release done for two cases, within first sex months of follow up with marked improvement in one cases and mild improvement in the other one.

2) Graft failure:

All grafts were taken except in two cases (5%), one of these two cases was of the early cases; with graft instability and early weight bearing by the patient.

The other one was on of large size, not will engaged and the surface geometry of the graft did not exactly match the surface of articular lesion. (Fig. 56, 57)

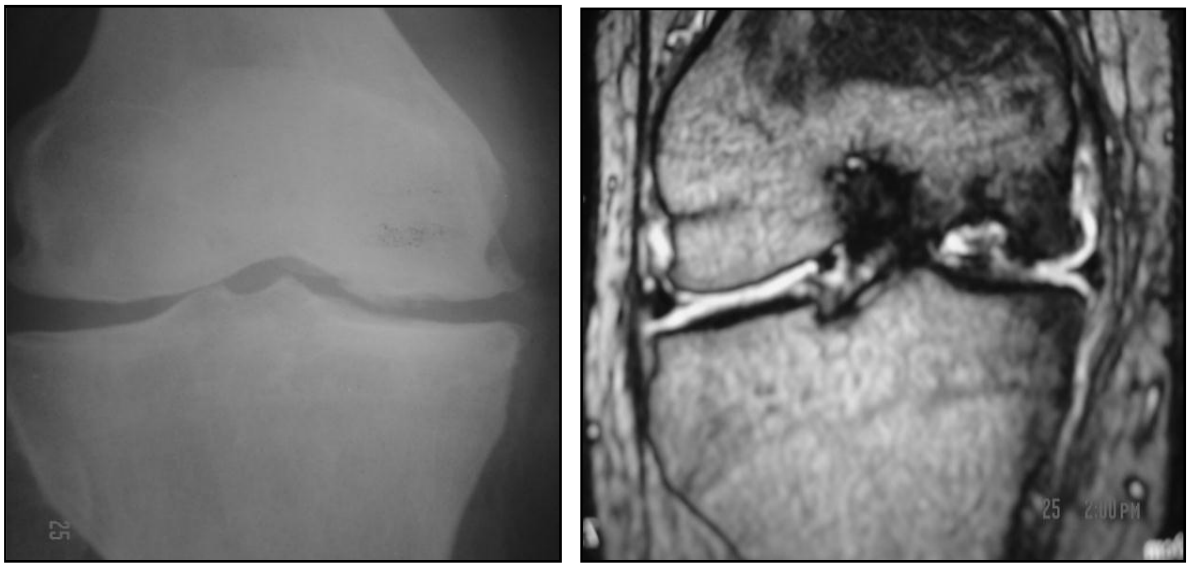

Figure (56): Shows x-rays & MRI scans of female 44 years old RT. knee with big focal defect about 2Cm, one of the early cases and little over weight patient.

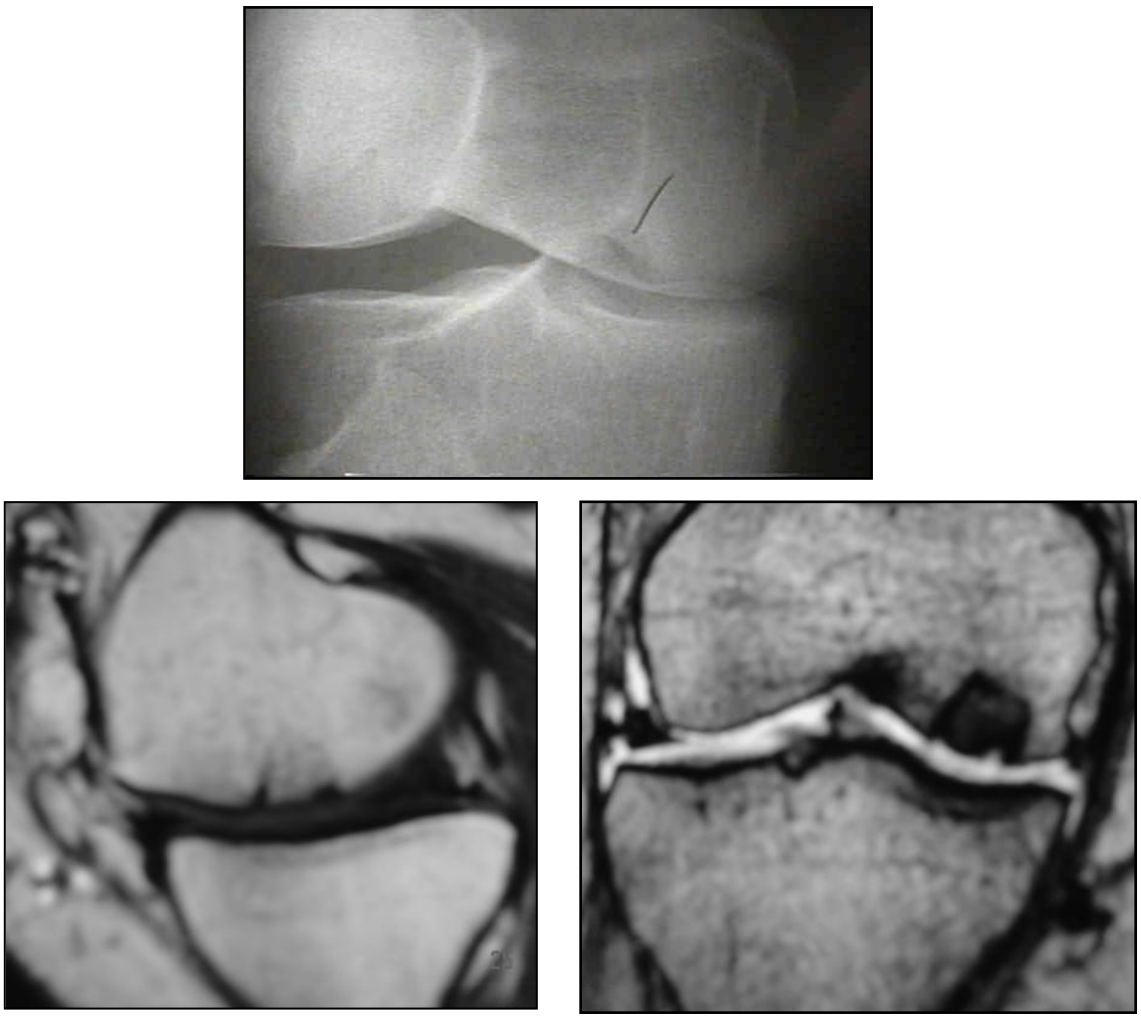

Figure (57): Shows follow up x-rays & MRI scans of the patient after three months; insufficient stability of the grafts and early weight bearing resulted in graft failure with poor results.

3) Movement:

Four cases (10.0 %) have knee stiffness, three of them stiffness was mild (75%) that shows improvement with extended physiotherapy and rehabilitation programs. and in one case it was marked (25%) which show moderate improvement after arthroscopic debridement and joint manipulation under anesthesia within first six months of follow up and the patient was rated poor knee.

* *Second arthroscopic interference* was done for four patients (10.0%) of unsatisfactory cases with knee reaction, resistant haemarthrosis and recurrent pain and effusion *.