RESULTS

Overall Results: *table(5)*50 Patients were operated, lateral release was done in 14 cases, proximal realignment in 18 cases and distal realignment in 18 cases. Excellent results was achieved in 26 cases *(52%)*, good results in 13 cases *(26%)*, fair results in 7 cases*(14%)* and poor results in 4 cases *(8%)*.

Table (5) The overall results

Operation	No. patient	Excellent	Good	Fair	Poor
Proximal	18	10	4	3	1
Distal comb	18	8	6	2	2
Lateral	14	8	3	2	1

Results related to age: *Patient of age group below 20 years*: lateral release was done in 2 cases, proximal realignment in 2 cases and distal realignment in 5 cases. Excellent results were achieved in 4 cases, good results in 3 cases and fair results in 2 cases. *Patient of age group between 20-30 years* lateral release was done in 6 cases, proximal realignment in 13 cases and distal realignment in 12 cases. Excellent results were achieved in 18 cases, good results in 5 cases, fair results in 4cases and poor results in 4 cases. *Patient of age group between 31-40 years*: lateral release was done in 4 cases, proximal realignment in 2 cases and distal realignment in 2 cases. Excellent results were achieved in 3 cases, good results in 3 cases and fair results in 2 cases. *Patient of age group over 40 years*: lateral release was done in the two patients and no proximal or distal realignment was done. Excellent results were achieved in one case and good results in the other.

Results related to sex: 29 female patients were operated, lateral release was done in 9 cases, proximal realignment in 10 cases and distal realignment in 10 cases. Excellent results was achieved in 13 cases, good results in 7 cases and fair results in 8 cases and poor result in one case. 21 male patients were operated, lateral release was done in 5 cases, proximal realignment in 7 cases and distal realignment in 9 cases. Excellent results was achieved in 13 cases, good results in 5 cases and poor results in 3 cases.

Results related to symptoms: *table(6)*Pain while descending stairs was the most common symptoms, *(80%)*. Knee flexion pain was a close second *(72%)*. Giving way and swelling after activity occurred in *(68%)*. Pain while going up stairs and pseudolocking occurred in less than one half of patients.

Table (6) Symptoms in 50 patients (%)

Symptoms	No. of patients	(%)
Pain (down stairs)	43	86%
Pain on flexion	36	72%
Giving way	34	68%
swelling	34	68%
Pain (up stairs)	24	48%
Locking	23	46%

Results related to signs: *table(7)* **signs in order of decreasing frequency, were peripatellar tenderness either over lateral retinculum or infrapatellar present in all cases, also half-squatting test is +ve in all cases. Patellar glide test was +ve in all cases in 22 patients more than two quadrants laterally (subluxaion group), in 12 patients more than three quadrants laterally (dislocation group), and in 16 patients less than 1 quadrant medially (tilt group). Q angle. >20° in 16 patients, it ranges from 12° (case30) to 31°(case25, 37). Other signs include grinding test, apprehension's test, VMO dysplasia, patellar tilt, patellar squinting, ober's test, patella alta, genu valgum and femoral anteversion. Hypermobility tests are negative in all cases.**

Table (7) Signs in 50 patients %

Sings	Number of patients	%
Peripatellar tenderness	all	100%
Half squatting test (+v)	all	100%
Patellar glide test (+v)	all	100%
Grinding test (+v)	44	88%
Apprehension test(+v)	35	70%
VMO dysplasia	31	62%
Patellar tilt	26	52%
Patellar squinting	20	40%
Ober's test (+v)	17	34%
Patella alta	16	32%
Genu valgum	9	18%
Femoral anteversion	6	12%

Results related to radiologic findings: **Preoperative and postoperative radiographic parameters are calculated:**

➢ **In proximal realignment group:** *table(8)***congruence angle was reduced in range from 8° *(case42)* to 40° *(case3, 43)* with an average 24° in cases with excellent result. In cases of good and fair results, it was decreased in 5 cases *(33,41,39,35,18)* with range from 6° to 35°. It increased in one patient with fair result, from 9° became 13° *(case9)* and unchanged in *(case26)*with fair result 0° to 0° *(case26)*.**

➢ **In distal realignment group:** *table(9)* **both congruence angle and patellar height are decreased on 8 patients with excellent prognosis. The decrease in congruence angle range from 12 *(case29)* to 40 *(case16)*and patellar height decrease with range from 0.6 *(case: 4,17,21)* to 0.1 *(case10)*. In cases with good prognosis, congruence angle decreased from 35° *(case12)* to 8° *(case6)*. Patellar height decreased in all cases with range from 0.02 *(case37)* to 0.44 *(case6)*. In cases with fair and poor results congruence angle reversed in (case50) from 6° to 10° and unchanged in *(case44)*. Patellar height unchanged on *(case2)*, remained 1.03.**

➢ **In lateral release group:** *table(10)* **tilt angle was decreased In 8 patients with excellent result the decrease range from 7° *(case30)* to 22° *(case8)*. Also it was decreased in all patients with good results with range from 4° *(case1)* to 23° *(case28)*. It decreased in one case with fair result *(case23)* and unchanged in the other case *(case34)*. Also it was unchanged in *(case 22)* with poor result.**

Table (8) Radiographic parameters in proximal realignment patients

Case No.	Congruence Angle		Tilt Angle		Sulcus Angle	Prognosis
	pre	post	pre	post		
3	42	2	22	3	126	Excellent
36	26	16	5	5	140	Excellent
15	18	0	23	0	142	Excellent
20	20	9	18	0	144	Excellent
24	43	13	18	8	152	Excellent
38	32	10	5	5	134	Excellent
42	8	0	5	0	134	Excellent
43	40	0	0	4	136	Excellent
47	36	0	20	8	136	Excellent
49	18	0	13	0	126	Excellent
18	18	12	24	8	140	Good
33	45	10	20	5	142	Good
41	8	0	10	0	134	Good
39	24	8	22	0	110	Good
9	9	13	10	0	144	Fair
26	0	0	26	5	140	Fair
35	18	8	20	4	144	Fair
48	25	12	10	5	134	Poor

Table (9) Radiographic parameters in distal realignment patient

Case No.	Congruence Angle		Tilt Angle		Height		Sulcus Angle	Prognosis
	Pre	post	pre	post	Pre	post		
4	22	8	24	8	1.5	0.9	130	Excellent
5	30	8	18	0	1.4	0.9	154	Excellent
10	30	0	6	3	1.1	1	134	Excellent
16	40	0	25	14	1.3	0.9	144	Excellent
17	40	12	34	12	1.3	0.7	110	Excellent
21	24	6	26	14	1.36	0.7	142	Excellent
29	22	10	24	10	1.54	1	120	Excellent
25	28	10	26	24	1.1	0.9	128	Excellent
6	8	0	16	5	1.47	1.03	138	Good
11	10	0	0	0	1.3	1.09	128	Good
12	45	10	0	8	1.2	1.16	140	Good
27	30	12	25	8	1.33	1.1	130	Good
37	20	8	12	5	1.4	1.2	136	Good
39	24	8	22	0	1.3	1	110	Good
2	28	4	16	0	1.03	1.03	134	Fair
50	6	10	8	4	1.23	1.13	136	Fair
44	22	22	0	0	1.3	0.8	148	Poor
40	40	0	20	0	1.2	1	122	Poor

Table (10) Radiographic parameters in lateral release patients

Case No.	Tilt Angle		Congruence Angle		Sulcus Angle	Prognosis
	Pre	Post	Pre	Post		
7	17	5	8	0	138	Excellent
8	26	8	4	3	116	Excellent
13	20	6	8	8	138	Excellent
14	20	3	7	9	142	Excellent
30	12	5	0	4	136	Excellent
31	15	0	5	0	100	Excellent
32	19	6	0	0	140	Excellent
41	10	0	8	0	134	Excellent
1	18	14	21	8	138	Good
28	28	05	0	11	133	Good
19	13	4	20	0	136	Good
23	25	10	16	0	140	Fair
34	8	8	8	0	134	Fair
22	18	18	18	18	142	Poor

Results related to associated pathology:

1. **Chondromalecia patellae: Ninteen cases**
   a. **Grade I & II: 11 cases.***(case 1,5,6,11,12,18,19,20,27,28 & 33).*
   b. **Grade III & IV: 8 caes.** *(case 2,22,23,26,35,40,44 & 48).*
2. **Torn meiscus:**
   a. **Three cases:** *(case 9, 19 & 30).*
3. **Torn anterior cruciate ligament:**
   a. **One case.** *(case 41).*
4. **Osteoarthritis:**
   a. **Tibiofemoral osteoarthritis: One case** *(Case 48).*
   b. **Patellofemoral osteoarthritis One case** *(Case 40).*

Results of various types of surgical procedures:

I) Satissfatory results:

♦ **Excellent results were achieved in 26 patients; ten in proximal realignment group, eight in distal realignment group and eight in lateral release group. All patients have no complications.**

♦ **Good results were achieved on 13 patients; four with proximal realignment, six with distal realignment and three with lateral release. Six patients experienced pain during frequent upstairing** *(case: 1,5,23,27,34,37)* **and five patients during sports activities** *(case: 18,33,39,41,35)* **and two cases after prolonged kneeling** *(case: 11,27).*

II) Unsatissfatory results and Complications

1. **Recurrence of instability:**
   a. **One case : one attack of dislocation** *(case2).*
   b. **Two cases: two episodes of dislocation***(Case 9&45).*
2. **Infection**
   a. **One case superficial wound infection** *(Case48).*
   b. **One case deep wound sepsis** *(Case40).*
3. **Limitation of range of movement:**
   a. **One case: flexion loss15°***(Case34).*
   b. **One case: extension lag and flexion loss 20°***(Case35).*
   c. **One case: Flexion loss 20°***(case50).*
   d. **One case: Flexion loss 30°** *(Case44).*
   e. **One case: Flexion loss 45°***(Case48).*

4. **Persistance of pain:**
    a. **Mild pain during daily living activities** *(Case23).*
    b. **Moderate during daily living activities** *(Cases 22,40&48).*
    c. **Moderate after frequent upstairing***(Case9).*
    d. **One case: mild retropatellar pain during participation on sports activities,** *(Case45).*
5. **Hemarthrosis: One case:** *(Case22).*
6. **Quadriceps atrophy: Two cases atrophy grade 3***(Case22 & 48).*
7. **Synovial fistula: One case:** *(Case34).*
8. **Retropatellar fibrisis: One case:** *(Case48).*

Analysis of unsatisfactory results and complications:

Lateral release group:

➢ **Case23***(fair result)*: **she suffered mild pain during daily living activities which may be due to associated chondromalecia patellae grade3 as diagnosed by preoperative arthroscopic examination.**

➢ **Case34***(fair result)*: **she developed flexion loss15°. The R.O.M started to improve gradually 6 months after operation and became full in 12 months but the patient still suffered mild pain during DLA. This patient had postoperative synovial fistula treated by resuturing of the synovium and immobilization on cylindrical cast for three weeks.**

➢ **Case22***(poor result)*: **he suffered moderate retropatellar pain during daily living activities and quadriceps muscle atrophy grade 3, this patient had postoperative hemarthrosis aspirated twice, and recollected. It need reopening the wound to evacuate hematoma and ligate the bleeder.**

Proximal realignment group:

➢ **Case9***(Fair result)*: **she developed two episodes of dislocation postoperatively, 1st one 3 months and 2nd one 7 months postoperatively, both occurred during sports activity. After that during the rest of 1st year and 2nd year there was no more dislocation. She had moderate retropatellar pain after frequent upstairing. This patient had bucket handle tear of medial meniscus, which was removed arthroscopically at the same situation of reconstruction.**

➢ **Case35** *(Fair result)*: **she complained of extension lag and flexion loss 20°. He suffered postoperative knee stiffness and need MUGA**

four weeks after initial operation, and CPM use for three days. Following manipulation the R.O.M become full but the patient still suffering mild pain during DLA.

- Case45*(Fair result)*: she experienced two attacks of dislocation postoperatively, (1st attack occurred 5 months postoperatively after fell down stairs and 2nd one 9 months postoperatively during sports activity) she had also, mild retropatellar pain during participation on sports activities, this may be due to failure to correct associated patella alta (patellar height index 1.3 pre and postoperatively).

- Case48*(poor result)*: she suffered flexion loss 45° was found in association with continuous retropatellar pain during daily activities. she had also quadriceps muscle atrophy grade3. This patient developed postoperative deep wound sepsis, which need incision & drainage on 10th postoperative day, with resultant retropatellar fibrosis and limitation of R.O.M.

Distal realignment group:

case2*(fair result)*: she suffered one attack of dislocation occurred 5months postoperatively during sports activity and also, there is moderate knee swelling after daily living activities. This attributed to failure of inferior shift of tibial tuberosity as determined by unchanged patellar height with Insall-Salvati ratio 1.03. Swelling occurred is due to associated chondromalecia patellae.

- Case50 *(fair result)*: she had flexion loss about 20°. this patients developed knee stiffness after removal of cast 6weeks postoperatively and need MUGA 2½ months after original operation. Following manipulation the R.O.M become full but the patient still suffering moderate swelling after DLA (at the end of the day).

-

- Case44*(poor result)*:he developed flexion loss 30°and chronic pain during daily living activities. This patient had loose osteochondral fragment removed arthroscopally before reconstruction . He had also chondromalecia grade4.
- Case40*(poor result)*: he complained of chronic knee pain during daily living activities with flexion loss 45°. He developed superficial wound infection need to make plaster window &daily dressing. He had also advanced patellofemoral O.A with chondromalecia grade4.

The higher incidence of usaisfactory results in females (27%) than males (14%) is atrriputed to: *(1)*males are more coordinated with physiotherapists postoperatively, *(2)*the majority of females still postoperatively do their work or sit on kneeling position.

Case Presentation

10) Case No 28 fig.38

- **Pathology:** Tilt. **Procedure:** Lateral release.
  Prognosis: Good.
- Male 50Yrs old (Porter). From farwania Kuwait.
- Sever left knee pain during knee flexion, associated with mild swelling after DLA & occasional locking.
- **Examination:** Atrophy of VMO, tenderness over lateral retinculum & inferior surface of patella. +ve apprehension test, +ve patellar glide test (<1 quadrant medially)and +ve patellofemoral grinding test. Q angle 19°.
- **Preoperative radiographs:** Sulcus angle133°. Congruence angle0°. Tilt angle28°. Patellar hight1.
- **Postoperative radiographs:** Congruence angle11°. Tilt angle5°. Q angle19°.
- **Associated pathology:** C.M.P grade1.
- **Postoperative:** mild pain after prolonged squatting & frequent climbing stairs, associated with mild swelling.

9) Case No8 fig.39

- **Pathology:** Tilt. **Procedure:** Lateral release.
  Prognosis: Excellent
- Male 36 Yrs old (Photographer). From Sharabia Cairo.
- Left knee pain during knee flexion & ascending stairs, associated with frequent swelling.
- **Examination:** Atrophy of VMO, tenderness over lateral retinculum & inferior surface of patella. +ve apprehension test, +ve patellar glide test (<1 quadrant medially)and +ve patellofemoral grinding test. Q angle16°.
- **Preoperative radiographs:** Sulcus angle116°. Congruence angle4°. Tilt angle26°. Patellar hight0.8.
- **Postoperative radiographs:** Congruence angle3°. Tilt angle°. Q angle16°.
- **Postoperative:** no complication.

Figure38:Case*28* lateral release (A) preoperative axial view, (B) preoperative lat. View& (c) postoperative axial view

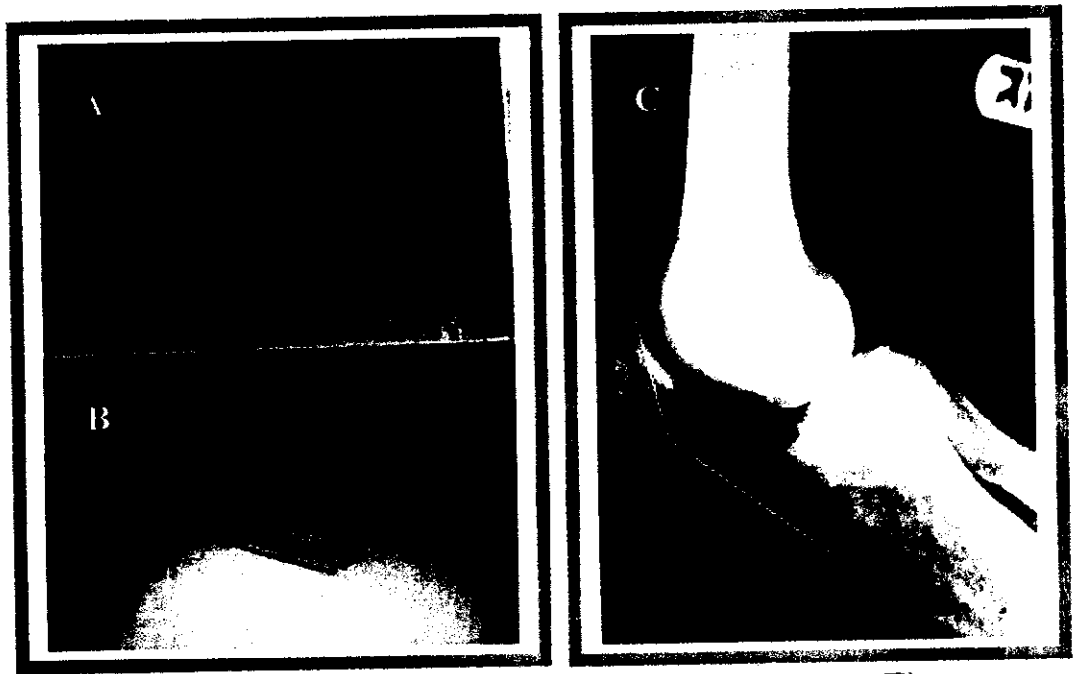

Figure39:Case*8* lateral release (A) preoperative axial view, (B) preoperative lat. View& (c) postoperative axial view

11) Case No 23 fig.40

- **Pathology:** Tilt. **Procedure:** Lateral release.
  Prognosis: Fair.
- Female 38Yrs old (Housemaid). From Salmyia Kuwait.
- Right knee pain during descending stairs & after prolonged knee flexion, associated with occasional swelling.
- **Examination:** Atrophy of VMO, tenderness over lateral retinculum & inferior surface of patella. +ve apprehension test, +ve patellar glide test (<1 quadrant medially)and +ve patellofemoral grinding test. Q angle15°.
- **Preoperative radiographs:** Sulcus angle140°. Congruence angle16°. Tilt angle25°. Patellar hight1.17.
- **Postoperative radiographs:** Congruence angle0°. Tilt angle10°. Q angle 15°.
- **Postoperative complications:** moderate pain during DLA, moderate swelling after strenuous activities & mild restriction of DLA.

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12) Case No22 fig.41

- **Pathology:** Tilt. **Procedure:** Lateral release.
  Prognosis: Poor.
- Male 25Yrs old (Male nurse). From Gabryia Kuwait.
- Sever right knee pain during squatting & deep knee bending.
- **Examination:** Tenderness over lateral retinculum & inferior surface of patella. +ve apprehension test, +ve patellar glide test (<1 quadrant medially) and +ve patellofemoral grinding test. Q angle17°.
- **Preoperative radiographs:** Sulcus angle142°. Congruence angle18°. Tilt angle18°. Patellar hight1.03.
- **Postoperative radiographs:** Congruence angle18°. Tilt angle18°. Q angle17°.
- **Associated pathology:** C.M.P grade3.
- **Postoperative complications:** hemarthrosis, quadriceps atrophy grade 3, moderate pain &swelling during DLA, moderate restriction of DLA and flexion loss 20°.

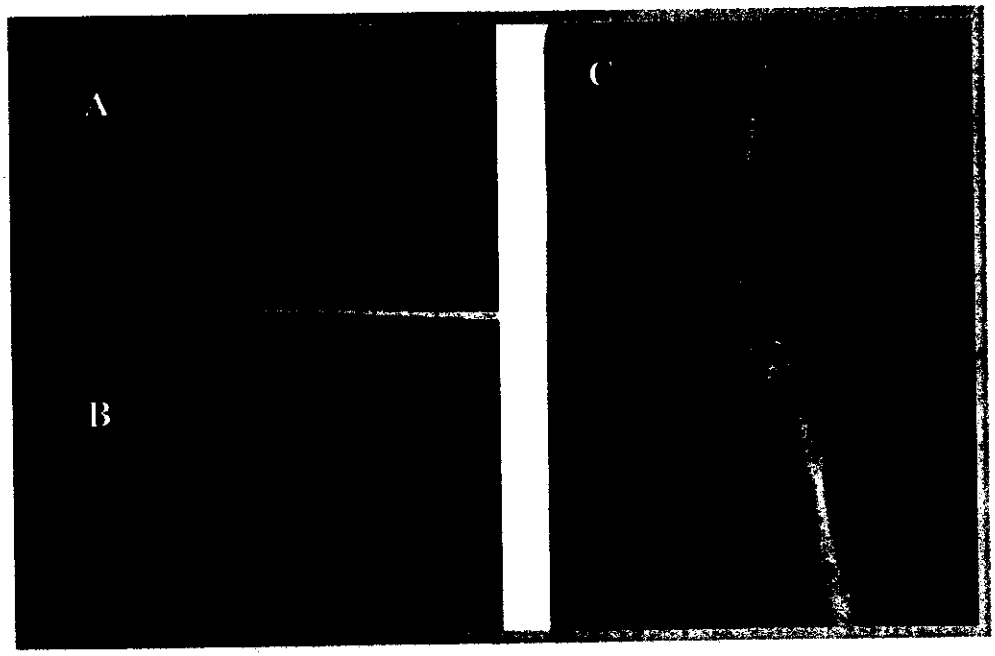

Figure40: Case*23* Lateral release. (A) preoperative axial view, (B) preoperative lat. View& (c) postoperative axial view

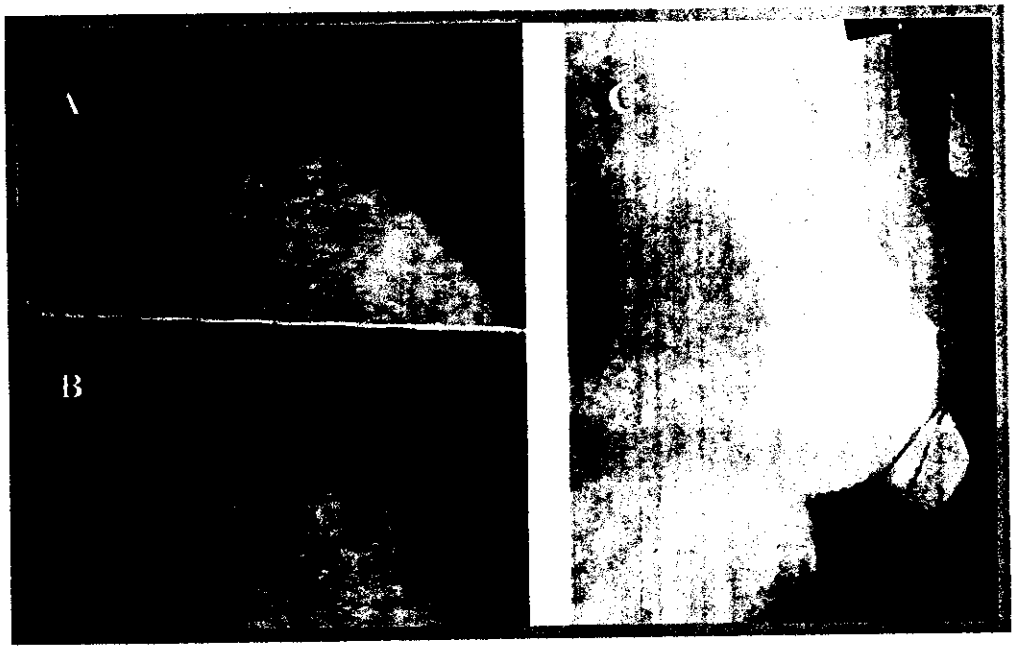

Figure 41:Case*22* Lateral release. (A) preoperative axial view, (B) preoperative lat. View& (c) postoperative axial view

1) Case No 42 fig.42

- **Pathology:** Tilt with subluxation. **Procedure:** Proximal realignment. **Prognosis:** Excellent.
- Female 19Yrs old (Artist) from Al-manial Cairo.
- Right knee pain during ascending & descending stairs & on deep knee flexion, associated with frequent giving way.
- **Examination:** Atrophy of VMO, tenderness over lateral retinculum & inferior surface of patella. +ve apprehension test, +ve patellar glide test (> 2 quadrants laterally)and +ve patellofemoral grinding test. Q angle 16°
- **Preoperative radiographs:** Sulcus angle136°. Congruence angle36°. Tilt angle20°. Patellar hight1.06.
- **Postoperative radiographs:** Congruence angle0°. Tilt angle8°. Q angle19°.
- **Preoperative diagnostic arthroscopy** revealed torn MSLC, and partial medial menisectomy was done followed by proximal realignment.
- **Postoperative:** no complications.

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2) Case No 33 fig.43

- **Pathology:** Tilt with subluxation. **Procedure:** Proximal Realignment. **Prognosis:** good
- Male 34Yrs old (Physician): From Salmia Kuwait.
- Left knee pain during descending stairs & deep knee flexion, associated with frequent giving way & mild swelling after climbing stairs.
- **Examination:** Atrophy of VMO, tenderness over lateral retinculum & inferior surface of patella. +ve apprehension test, +ve patellar glide test (>2 quadrants laterally)and +ve patellofemoral grinding test. Q angle14°
- **preoperative radiographs:** Sulcus angle142°. Congruence angle45°. Tilt angle20°. Patellar hight1.2.
- **postoperative radiographs:** Congruence angle10°. Tilt angle5°. Q angle19°.
- **Associated pathology:** C.M.P grade1
- **Postoperative:** mild pain during sports activity.
-

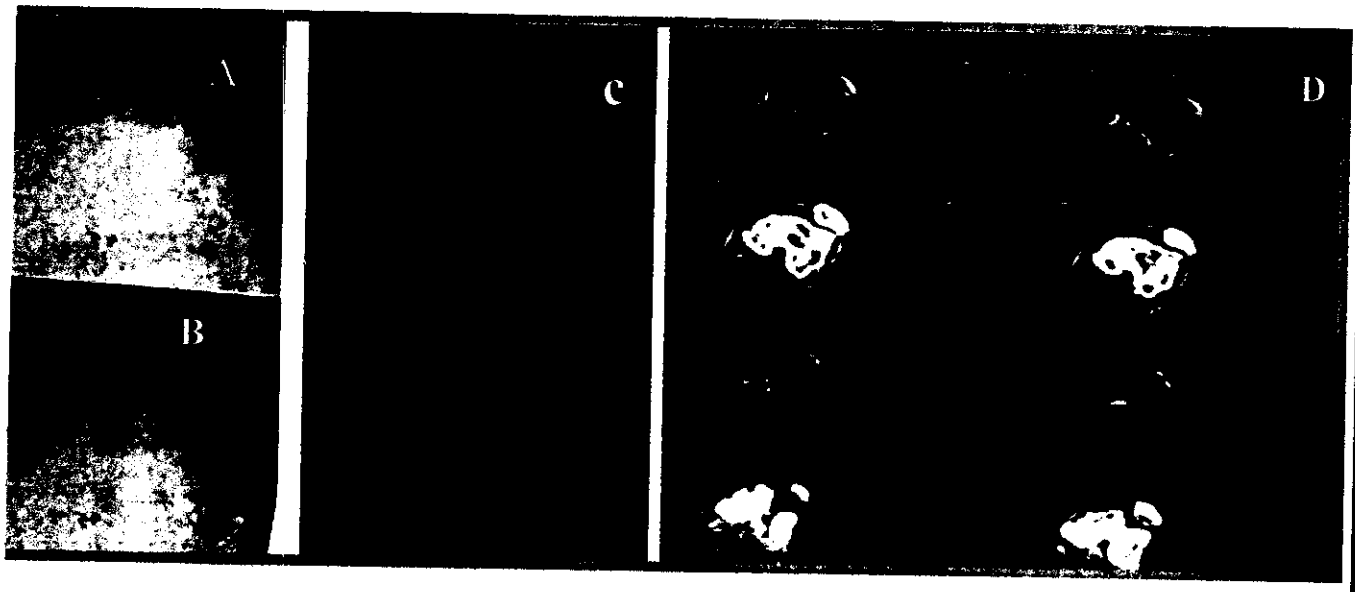

Figure 44:Case *45* proximal realignment. (A) preoperative axial view, (B) preoperative lat. View, (c) preoperative MRI & (D) postoperative axial view.

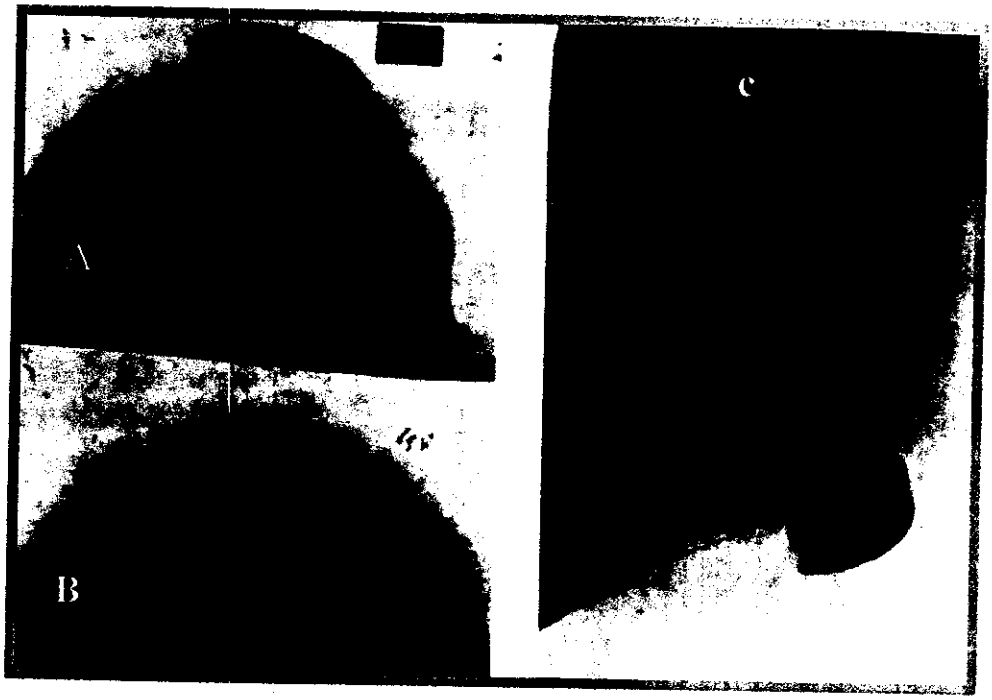

Figure 45:Case *48* proximal realignment. (A) preoperative axial view, (B) preoperative lat. View& (c) postoperative axial view.

5) Case No17 fig.46

- **Pathology:** Tilt with subluxation. **Procedure:** Distal realignment. **Prognosis:** Excellent.
- Female 20Yrs old (Student). From Imbaba Giza.
- Right knee pain during knee flexion & climbing stairs, associated with frequent locking & recurrent swelling.
- **Examination:** Bilateral genu varum, atrophy of VMO, tenderness over lateral retinculum & inferior surface of patella. +ve apprehension test, +ve patellar glide test (>2quadrants laterally)and +ve patellofemoral grinding test. Q angle28°.
- **Preoperative radiographs:** Sulcus angle116°. Congruence angle40°. Tilt angle34°. Patellar hight1.3.
- **Postoperative radiographs:** Congruence angle12°. Tilt angle12°. Patellar hight0.7. Q angle30°.
- **Postoperative:** no complication.

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6) Case No 6 fig.47

- **Pathology:** Tilt with subluxation. **Procedure:** Distal realignment. **Prognosis:** Good.
- Female 28Yrs old (Radiographer). From Alzahraa Cairo.
- Recurrent attacks of right patellar dislocation (4times on last year), severe knee pain during knee flexion & climbing stairs associated with recurrent locking followed by moderate swelling.
- **Examination:**

  Atrophy of VMO, tenderness over lateral retinculum & inferior surface of patella. +ve apprehension test, +ve patellar glide test (>3 quadrants laterally)and +ve patellofemoral grinding test. Q angle23°.
- **Preoperative radiographs:**

  Sulcus angle138°. Congruence angle8°. Tilt angle16°. Patellar hight1.47.
- **Postoperative radiographs:**

  Congruence angle0°. Tilt angle5°. Patellar hight1.03. Q angle28°.
- **Associated pathology:** C.M.P grade1.
- **Postoperative:** mild pain during climbing stairs.

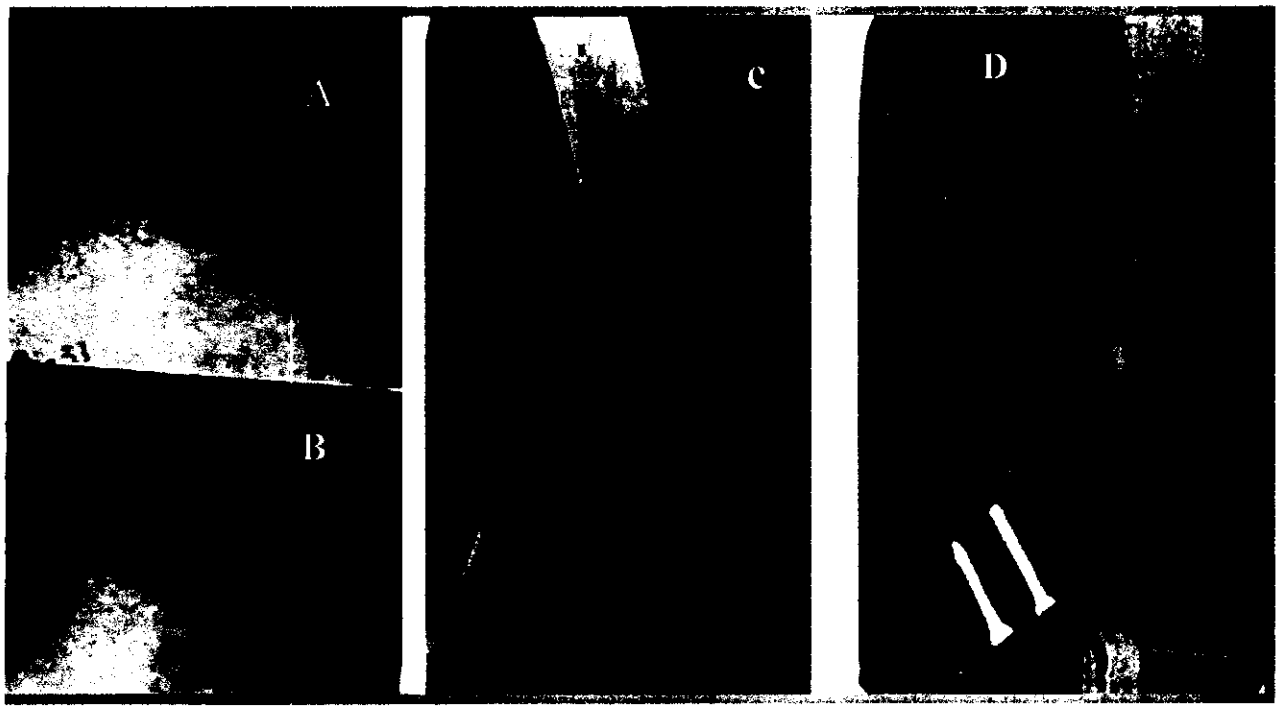

Figure 46: Case*17* distal realignment. (A) preoperative axial view, (B) preoperative lat. View& (c) postoperative axial view, (D) postoperative

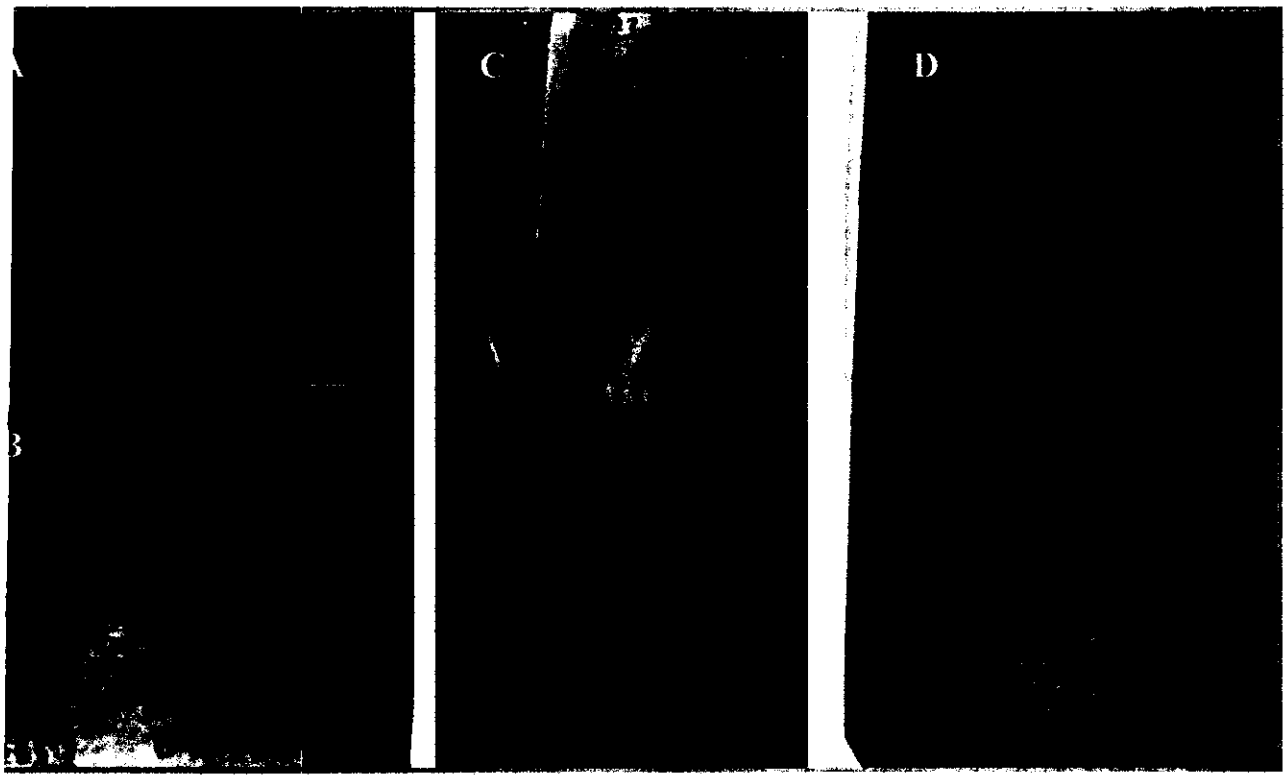

Figure 47: Case*6* distal realignment. (A) preoperative axial view, (B) preoperative lat. View& (c) postoperative axial view, (D) postoperative

7) Case No 50 fig.48

- **Pathology:** Recurrent dislocation. **Procedure:** Distal realignment. **Prognosis:** Fair.
- Female 20Yrs old (Long runner player) From Hawalli Kuwait.
- Right knee sever pain during climbing stairs, associated with frequent attacks of dislocations (6 attacks on last year).
- **Examination:** No VMO atrophy. Tenderness over medial retinculum & inferior surface of patella. +ve apprehension test, +ve patellar glide test (>3quadrants laterally)and +ve patellofemoral grinding test. Q angle18°.
- **Preoperative radiographs:** Sulcus angle136°. Congruence angle6°. Tilt angle8°. Patellar hight1.23. MRI was done revealed lateral patellar tracking.
- **Postoperative radiographs:** Congruence angle10°. Tilt angle4°. Patellar hight1.13. Qangle25°.
- **No associated pathology.**
- **Postoperative:** knee stiffness with R.O.M 0°-50° on two month follow up. MUGA was done 2½ month postoperatively. On 12-month follow up; there is flexion loss 20°.

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8) Case No40 fig.49

- **Pathology:** Tilt with subluxation. **Procedure:** Distal realignment. **Prognosis:** Poor.
- Male 29Yrs old (Student). From Helwan Cairo.
- Right knee sever pain during climbing stairs & prolonged knee flexion, associated with moderate swelling after football playing.
- **Examination:**

Atrophy of VMO , tenderness over inferior surface of patella. +ve apprehension test, +ve patellar glide test (>2quadrants laterally), +ve patellofemoral grinding test and +ve Ober's test . Q angle 15°.

- **Preoperative radiographs:**

Sulcus angle122°. Congruence angle40°. Tilt angle20°. Patellar hight1.25.

- **Postoperative radiographs:**

Congruence angle0°. Tilt angle0°. Patellar hight1. Q angle18°.

- **Associated pathology:** patellofemoral O.A & C.M.P grade4.

Postoperative complications: superficial wound infection, moderate retropatellar pain during DLA, moderate restriction of DLA and flexion loss45°.

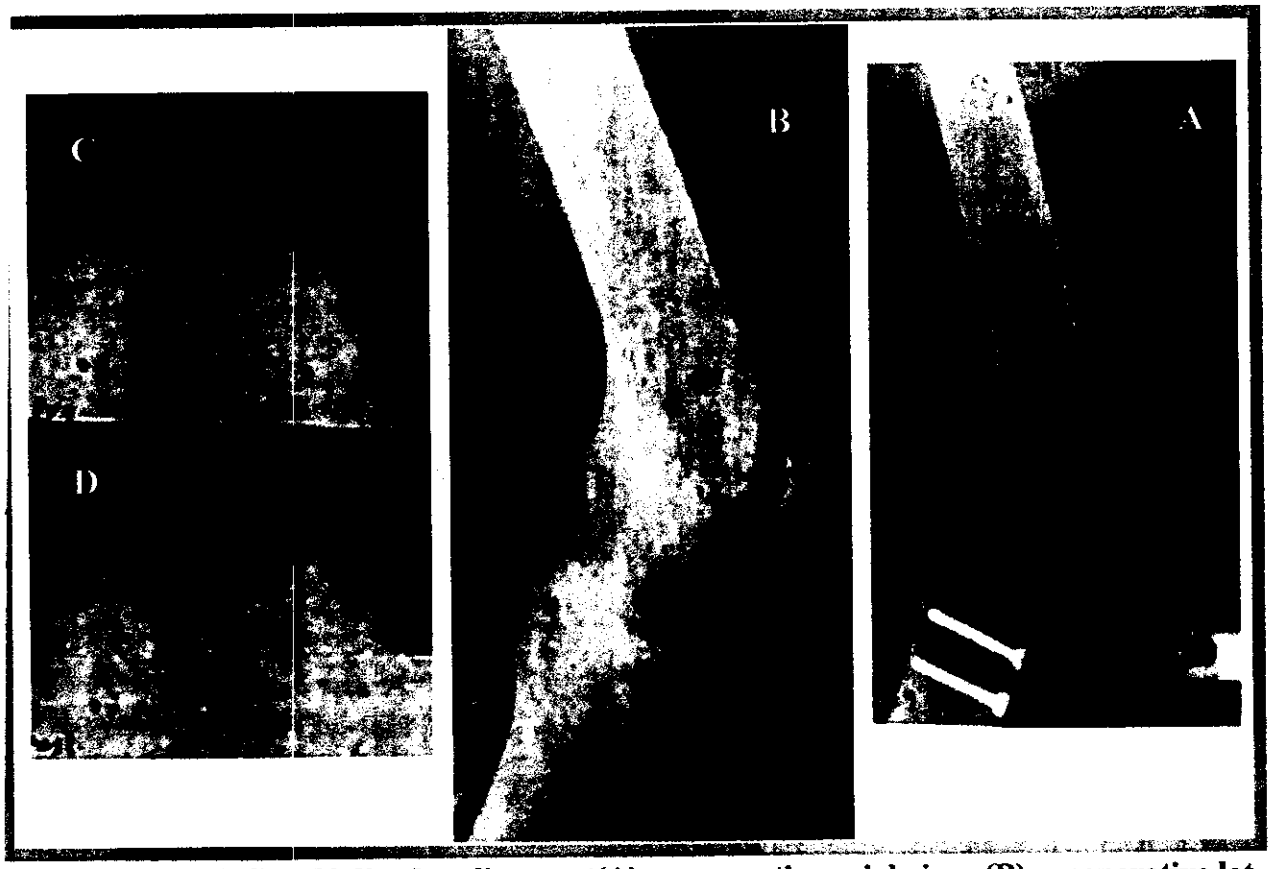

Figure 48:Case*50* distal realignment(A) preoperative axial view, (B) preoperative lat. View& (C) postoperative axial view(D) postoperative lat. View.

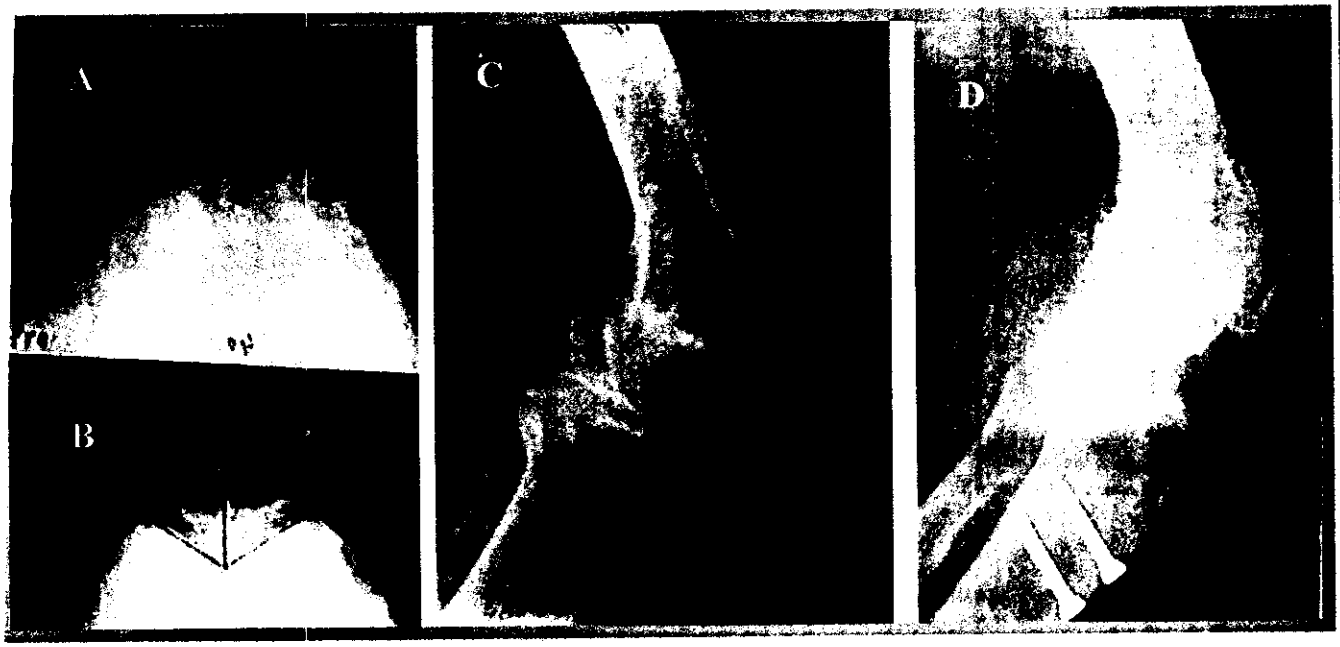

Figure 49 :Case*40* Distal realignment. (A) preoperative axial view, (B) preoperative lat. View& (c) postoperative axial view(D) postoperative lat. View.