# RESULTS

## ASSESSMENT OF THE RESULTS

Assessment of our results was done according to the criteria described by Hughston (1983). These are subjective, objective and functional criteria.

The period of follow up ranged between six and twenty three months with an average of fifteen months.

**A. Subjective Criteria:**

These include:

1. Pain: either
   - no pain
   - mild infrequent knee pain with excessive activity.
   - Moderate pain with excessive activity.
   - Frequent pain with routine activity.
2. Swelling: either
   - no swelling
   - mild occasional swelling with excessive activity.
   - Moderate swelling with excessive activity.
   - Evident swelling with routine activity.

3. Giving way, either:

- no giving way and no limitations
- mild limitation e.g. inability to squat.
- occasional feeling of giving way with excessive activity.
- Feeling of giving way with routine activities.

**B. Objective Criteria:**

These include:

1. Knee effusion, either:

- No effusion
- mild effusion
- moderate effusion
- severe effusion

2. Range of motion, either

- full range of motion
- mild limitation of motion (less than 10° in flexion).
- moderate limitation of motion (10 to 20 degrees in flexion)
- severe limitation of motion (more than 20 degrees).

3. Knee stability, either:

- no instability
- 1+ instability
- 2+ instability
- 3+ instability

C. **Functional Criteria:** either

- return to full preinjury athletic or recreational activities without limitation.
- return to full preinjury activity with minor limitation.
- routine daily activities can be performed without limitation.
- There is functional disability and restriction of normal daily activities.

## Subjective Criteria

**Pain:**

**1. Group A: Isolated medial compartment injuries:**

Nine cases had no pain during the period of follow up, ten cases had mild infrequent pain with weather changes or excessive activity. Three cases had moderate pain with excessive activity. (and no case had pain with routine activity).

**2. Group B: Isolated ACL injuries:**

Seven cases had no pain, four cases had mild infrequent pain with excessive activity, two cases had moderate pain with excessive activity, only one case had pain with routine activity.

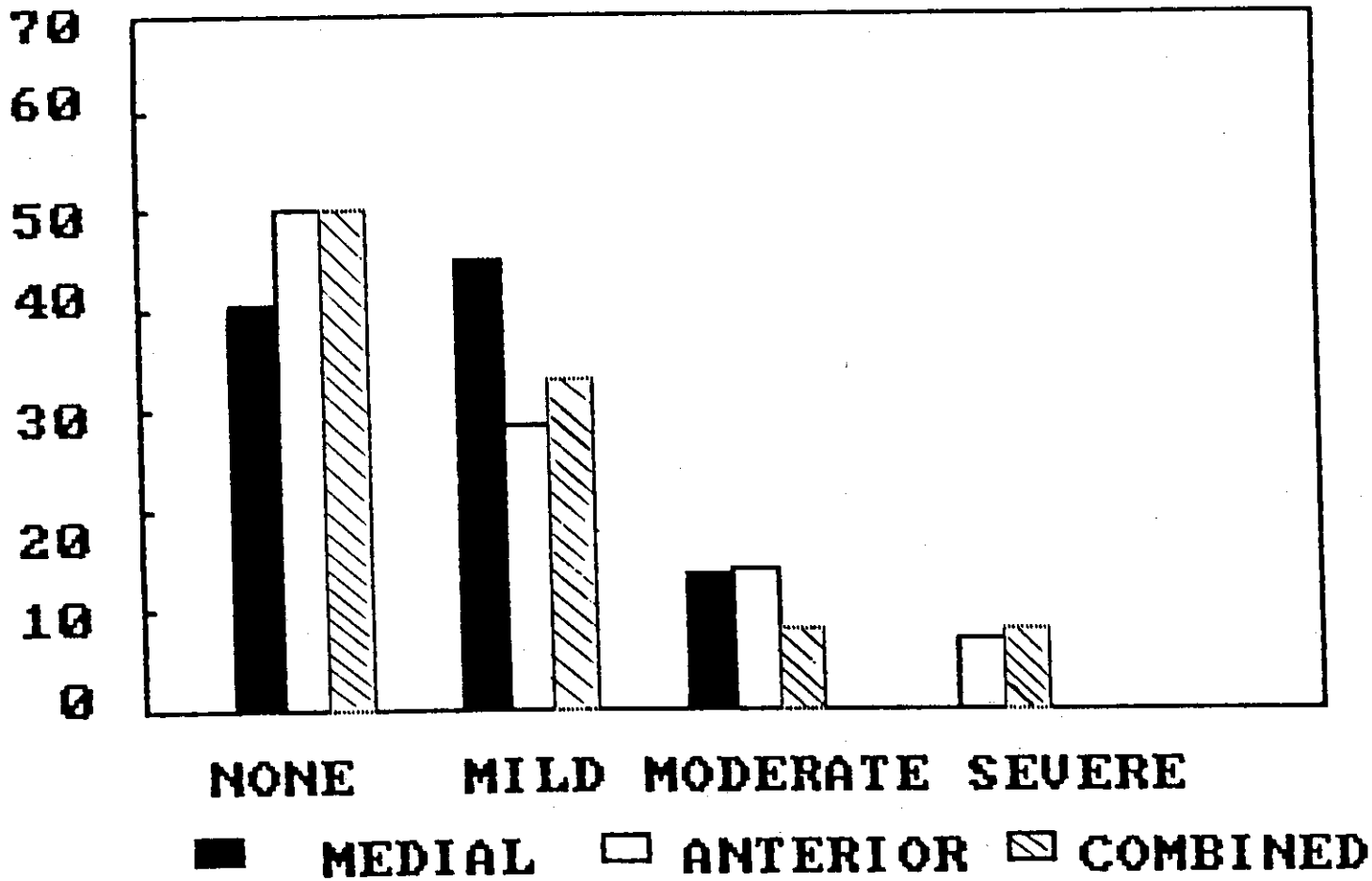
**3. Group C: Combined MCL & ACL injuries:**

Six cases had no pain, four cases had mild infrequent pain with excessive activity, one case had moderate pain with excessive activity, and another one had pain with routine activity.

RESIDUAL PAIN IN DIFFERENT INJURIES

| | Medial | | Anterior | | Combined | | Total | |
|---|---|---|---|---|---|---|---|---|
| | no. | % | no. | % | no. | % | no. | % |
| None | 9 | 40.90 | 7 | 50.00 | 6 | 50.00 | 22 | 45.83 |
| Mild | 10 | 45.46 | 4 | 28.57 | 4 | 33.33 | 18 | 37.50 |
| Moderate | 3 | 13.64 | 2 | 14.28 | 1 | 8.33 | 6 | 12.50 |
| Severe | 0 | 0.00 | 1 | 7.15 | 1 | 8.34 | 2 | 4.17 |
| TOTAL | 22 | | 14 | | 12 | | 48 | |

CHI SQUARE 2.88 D.F= 6 P>0.05




RESIDUAL PAIN IN DIFFERENT INJURIES

**Swelling:**

**Group A: Isolated medial compartment ligament injuries:**

Fourteen cases had no swelling during the period of follow up, five cases had mild occasional swelling with excessive activity, three cases had moderate swelling with excessive activity, no case had swelling with routine activity.

**Group B: Isolated ACL injuries:**

Eight cases had no swelling, three cases had mild infrequent swelling with excessive activity, two cases had moderate swelling with excessive activity, and only one case had joint swelling with routine activity.

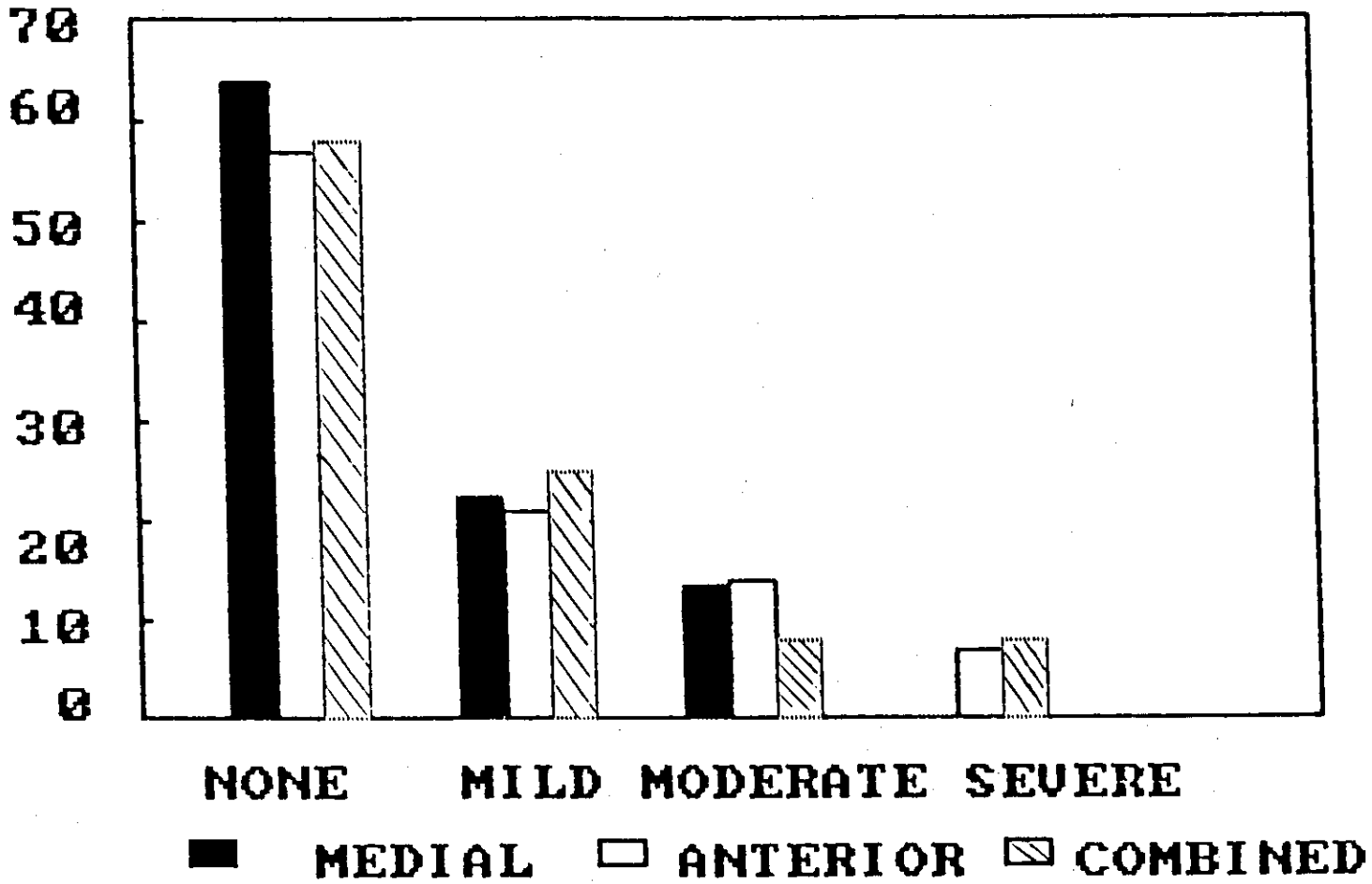
**Group C: Combined MCL & ACL injuries:**

Seven cases had no swelling, three cases had mild occasional swelling with excessive activity, one case had moderate swelling with excessive activity and one case had joint swelling with routine activity.

SWELLING AFTER OPERATION IN DIFFERNT INJURIES

| | Medial | | Anterior | | Combined | | Total | |
|---|---|---|---|---|---|---|---|---|
| | no. | % | no. | % | no. | % | no. | % |
| None | 14 | 63.64 | 8 | 57.14 | 7 | 58.34 | 29 | 60.42 |
| Mild | 5 | 22.73 | 3 | 21.43 | 3 | 25.00 | 11 | 22.92 |
| Moderate | 3 | 13.63 | 2 | 14.29 | 1 | 8.33 | 6 | 12.50 |
| Severe | 0 | 0.00 | 1 | 7.14 | 1 | 8.33 | 2 | 4.16 |
| TOTAL | 22 | | 14 | | 12 | | 48 | |

CHI SQUARE 2.047198 D.F= 6 P>0.05




SWELLING AFTER OPERATION IN DIFFERNT INJURIES

**Giving Way:**

**Group A: Isolated MCL injuries:**

Eight cases had no giving way and no limitations in the knee joint motion. Eleven cases had mild limitation e.g. inability to kneel or squat fully, two cases hadoccasional feeling of giving way with excessive activity, and only one case had feeling of giving way with routine activity.

**Group B: Isolated ACL injury:**

Six cases had no giving way and no limitations in the knee joint movements following the strict protocol of rehabilitation after ACL reconstruction, five cases had mild limitation e.g.(inability to squat fully). Two cases had occasional feeling of giving way with excessive activity, one case had feeling of giving way with routine activity.

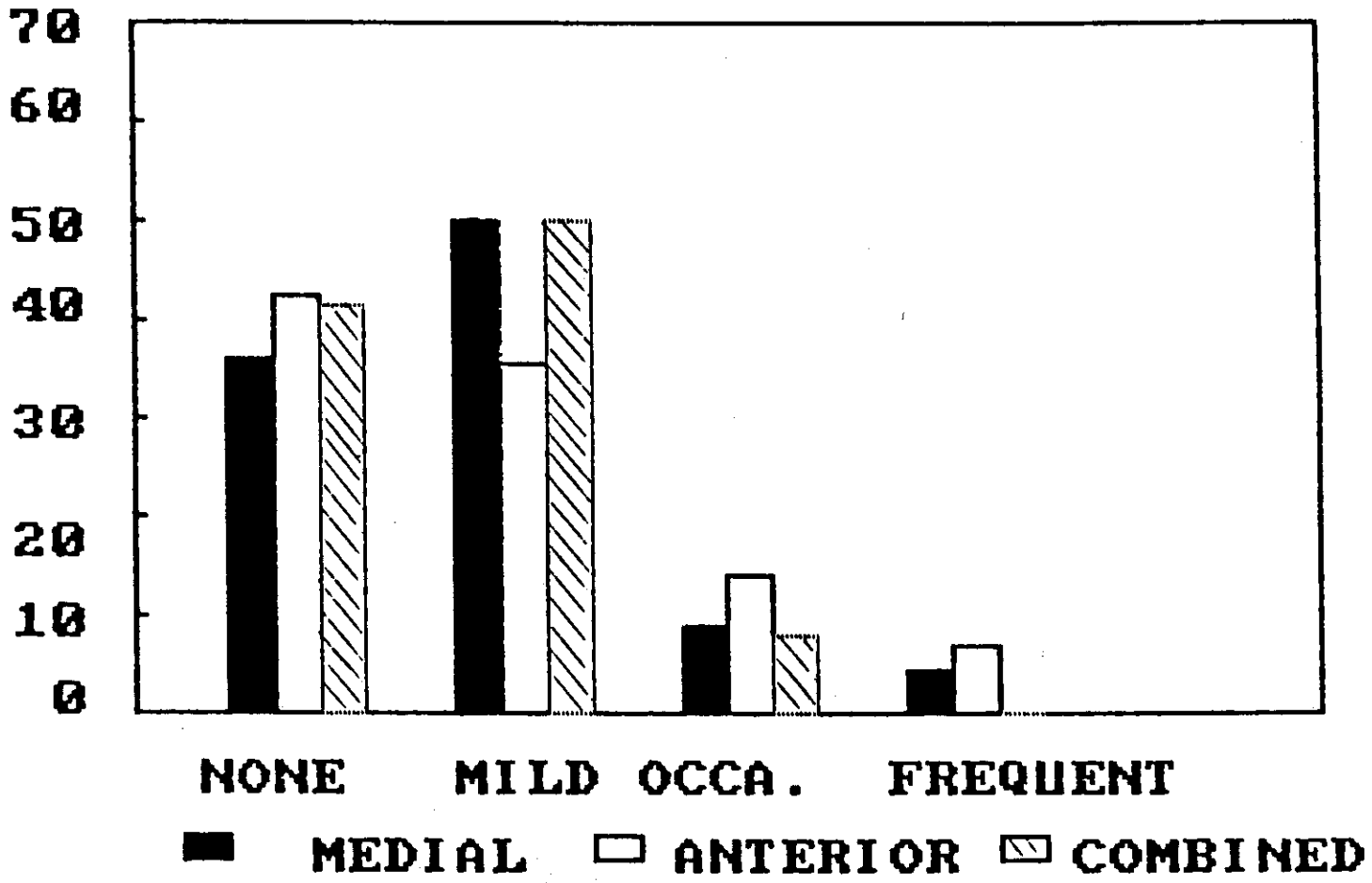
**Group C: Combined MCL & ACL Injuries:**

Five cases had no giving way and no limitations in the knee joint movements. Six cases had only mild limitations. They were unable to kneel or squat fully. One case had occasional feeling of giving way with excessive activity, and no case had feeling of giving way with routine activity.

GIVING WAY AFTER OPERATION IN DIFFERENT INJURIES

| | Medial | | Anterior | | Combined | | Total | |
|---|---|---|---|---|---|---|---|---|
| | no. | % | no. | % | no. | % | no. | % |
| None | 8 | 36.36 | 6 | 42.86 | 5 | 41.67 | 19 | 39.58 |
| Mild | 11 | 50.00 | 5 | 35.71 | 6 | 50.00 | 22 | 45.83 |
| Occasional | 2 | 9.09 | 2 | 14.28 | 1 | 8.33 | 5 | 10.42 |
| Frequent | 1 | 4.55 | 1 | 7.15 | 0 | 0.00 | 2 | 4.17 |
| total | 22 | | 14 | | 12 | | 48 | |

CHI SQUARE 1.643746 D.F= 6 P>0.05




GIVING WAY AFTER OPERATION IN DIFFERENT INJURIES

## Objective Criteria:

**Joint Effusion:**

**Group A: isolated MCL injury:**

Twelve cases had no effusion following repair of the medial compartment ligaments, Seven cases had mild effusion in the early postoperative period, three cases had moderate effusion, in these three cases the patients attempted running before proper development of the knee musculature and no case had severe effusion.

**Group B: Isolated ACL injury:**

Six cases had no effusion following surgery and during the period of rehabilitation. Five cases had only mild effusion in the early postoperative period which disappeared spontaneously. Three cases had moderate effusion due to improper development of the quadriceps muscle. No case had severe effusion.

**Group C: Combined MCL & ACL injuries:**

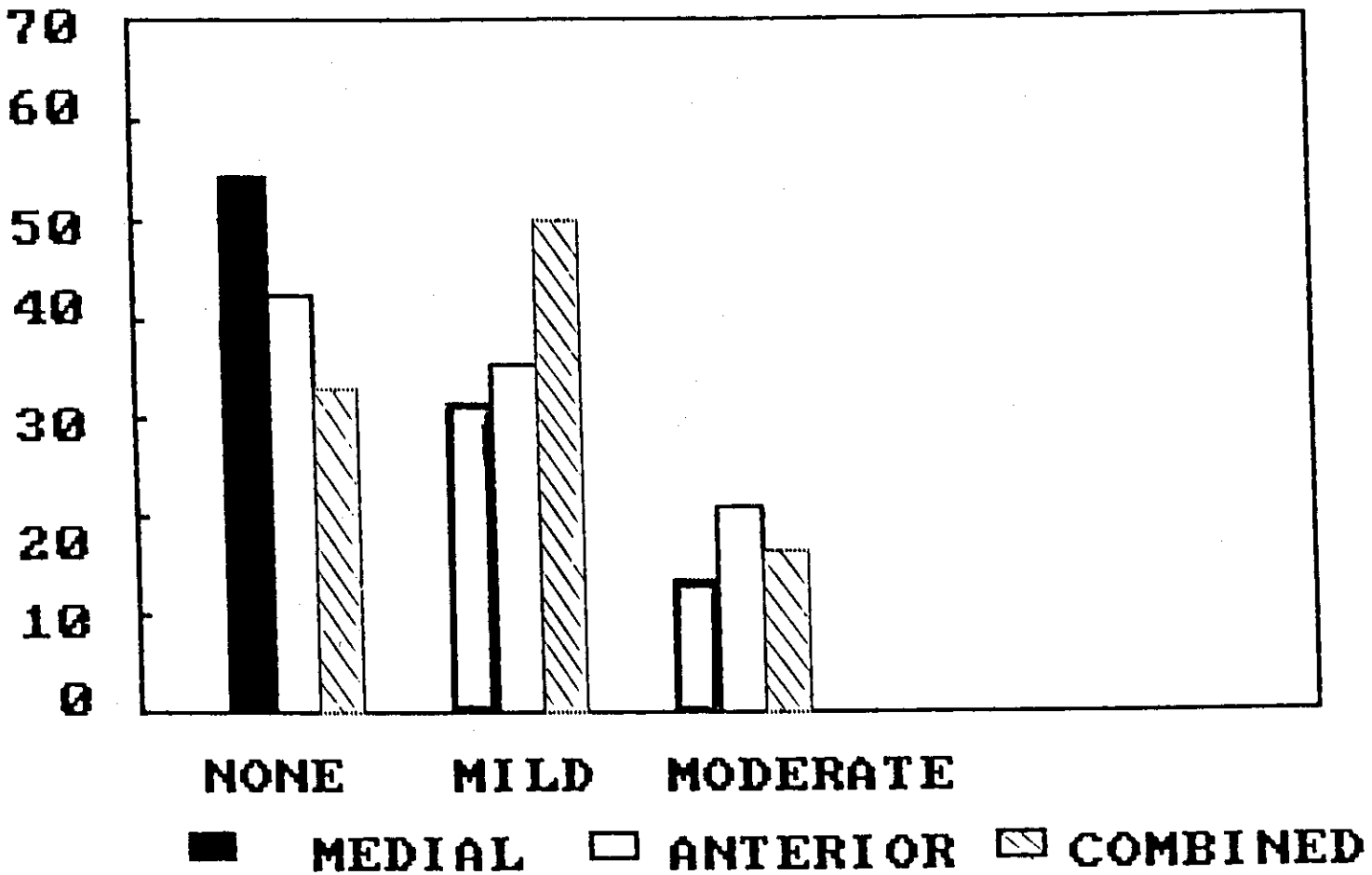
Four cases had no effusion following surgery and during rehabilitation. Six cases had mild effusion that disappeared spontaneously. Two cases had moderate effusion. One of them had muscle weakness, in the other one, the knee musculature was found to be properly

developed and effusion was suspected to be due to pre-existing patellar chondromalacia while the patient practised weight lifting from the flexed position. No case had severe effusion.

JOINT EFFUSION AFTER OPERATION IN DIFFERENT INJURIES

| | Medial | | Anterior | | Combined | | Total | |
|---|---|---|---|---|---|---|---|---|
| | no. | % | no. | % | no. | % | no. | % |
| None | 12 | 54.55 | 6 | 42.86 | 4 | 33.33 | 22 | 45.83 |
| Mild | 7 | 31.82 | 5 | 35.71 | 6 | 50.00 | 18 | 37.50 |
| Moderate | 3 | 13.63 | 3 | 21.43 | 2 | 16.67 | 8 | 16.67 |
| TOTAL | 22 | | 14 | | 12 | | 48 | |

CHI SQUARE = 1.81 D.F= 4 P>0.05




JOINT EFFUSION AFTER OPERATION IN DIFFERENT INJURIES

**Range of Motion:**

During the rehabilitation program in our series, the range of motion was closely followed and measured to ensure that the patient is making progress in regaining both extension and flexion. In this series we have avoided rapid return of full flexion and extension soon after termination of the postoperative immobilization as this is usually a poor prognostic sign and is frequently associated with residual laxity (De Haven, 1983).

In our cases the amount of flexion or extension regained was not fully realized until 4-6 months postoperatively. As regards knee extension, slow recovery was the rule in most of our cases but recovery had occurred aided by quadriceps rehabilitation and sometimes by hamstering stretching exercises.

In assessment of the range of flexion, most of the cases had recovered a full range of motion with no limitations, some cases had lost the last 10-20 degrees of knee flexion but this was considered of trivial importance and did not trouble the patient.

Only two patients had more than 20 degrees limitation of flexion because these patients following

cast removal had neglected the rehabilitation program for some time. They were submitted to daily intensive physical therapy, one of them has recovered an accepatble range, the other had lost the last thirty degrees in knee flexion.

No case in this series had required manipulation under anaesthesia.

**Group A: Isolated medial compartment injury:**

Fifteen cases had full range of motion with no limitations. Five cases had mild limitation of motion less than 10 degrees in knee flexion. Only two cases had moderate limitation of motion up to 20 degrees in knee flexion. No case had severe limitation more than 20 degrees and no case had required manipulation.

**Group B: Isolated ACL injury:**

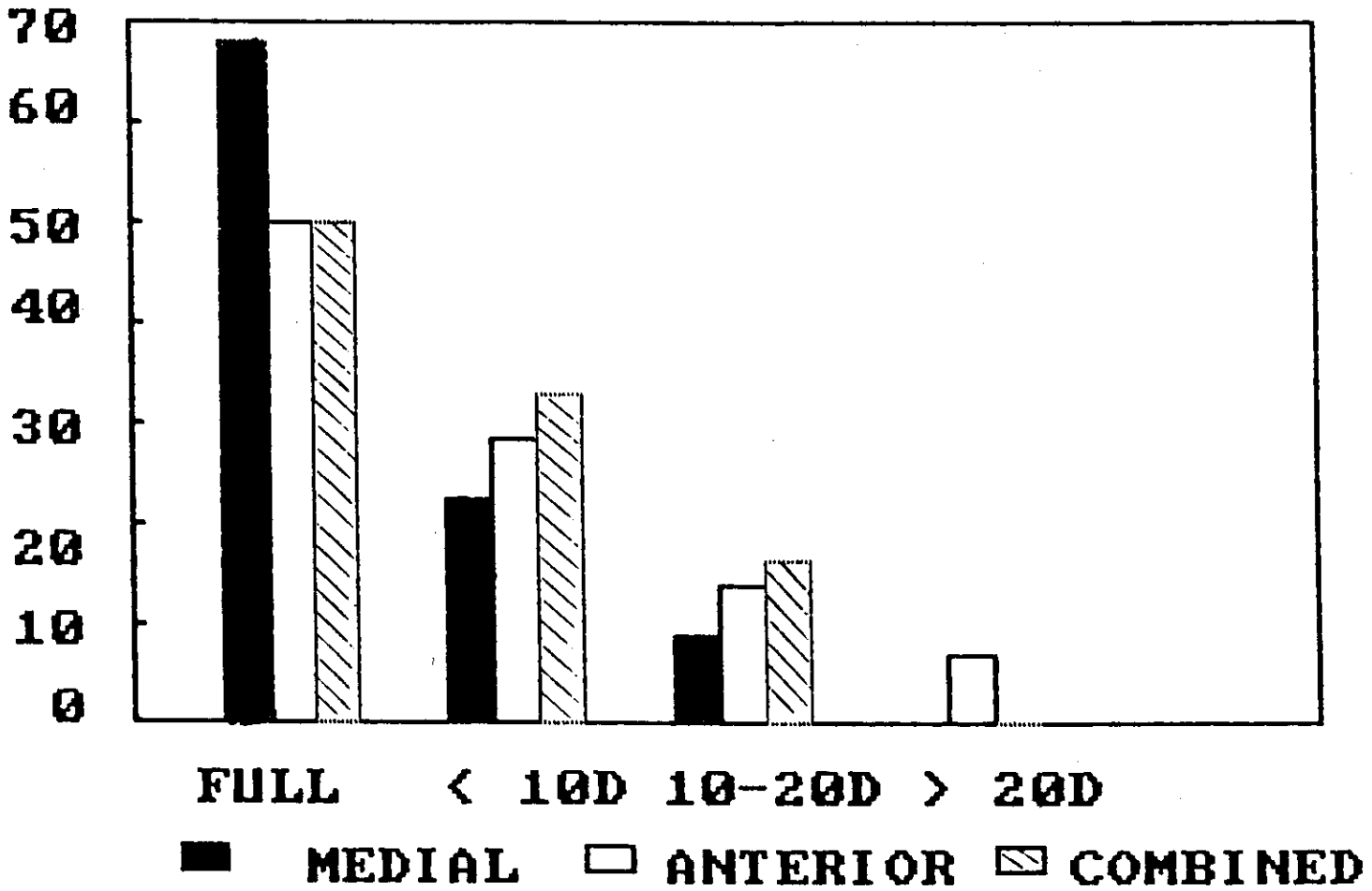
Seven cases had full range of motion following primary reconstruction of the anterior cruciate ligament injury. Four cases had mild limitation less than 10 degrees in flexion. Two cases had moderate limitation up to 20 degrees in knee flexion. One case as we have previously said had limitation more than 20 degrees.

**Group C: Combined MCL and ACL injuries:**

Six cases had full range of motion following primary repair of the medial compartment ligament and primary repair with augmentation or primary reconstruction of the ACL. Four cases had mild limitation less than 10 degrees in flexion. Two cases had moderate limitation up to 20 degrees. No case had severe limitation or required manipulation under anaesthesia.

RANGE OF MOTION AFTER REHABILITATION IN DIFFERENT INJURIES

| | Medial | | Anterior | | Combined | | Total | |
|---|---|---|---|---|---|---|---|---|
| | no. | % | no. | % | no. | % | no. | % |
| Full | 15 | 68.18 | 7 | 50.00 | 6 | 50.00 | 28 | 58.34 |
| < 10 d | 5 | 22.73 | 4 | 28.57 | 4 | 33.33 | 13 | 27.08 |
| 10-20 d | 2 | 9.09 | 2 | 14.29 | 2 | 16.67 | 6 | 12.50 |
| > 20 d | 0 | 0.00 | 1 | 7.14 | 0 | 0.00 | 1 | 2.08 |
| TOTAL | 22 | | 14 | | 12 | | 48 | |
| CHI SQUARE | 3.85 | | D.F= 6 | | | | P>0.05 | |




RANGE OF MOTION AFTER REHABILITATION IN DIFFERENT INJURIES

**Knee Stability:**

The aim of primary ligament repair or reconstruction is to avoid any residual laxity and subsequent functional instability in the knee joint.

All our cases were assessed for the stability following surgery and the rehabilitation program using the abduction stress test at 30° of flexion to check the results of primary repair for medial compartment ligament injuries and the Lachman test for assessment of the results of primary repair with augmentation or primary reconstruction for anterior cruciate ligament injuries.

| | | |
|---|---|---|
| 1 + instability | 0 --- | 5mm of tibial displacement relative to the femur. |
| 2 + instability | 5 --- | 10mm of tibial displacement relative to the femur. |
| 3 + instability | | more than 10mm of tibial displacement relative to the femur. |

(From Hughston, 1983).

**Group A: Isolated medial compartment injury:**

These cases were assessed for stability using the abduction stress test at 30 degrees of flexion.

Eight cases had no instability. Eleven cases had 1+ instability. Three cases had 2+ instability and no case had 3+ instability. All the cases are stable at full extension.

**Group B: Isolated ACL injury:**

Six cases had no instability following surgery. These cases that were managed by combined intra and extra-articular reconstruction and followed by strict rehabilitation program. Five cases had 1+ instability in the Lachman testing. Four of them were managed by intra-articular reconstruction alone using the free patellar tendon graft, and one by extra-articular reconstruction using the iliotibial band. Three cases had 2+ instability in the Lachman testing. These were managed by extra-articular reconstruction alone.

In all the cases the pivot shift test was negative.

**Group C: Combined MCL & ACL injuries:**

Most of the cases of this group were seen early after the injury and the surgical management including primary repair for the medial compartment ligaments and primary repair with augmentation or primary reconstruction for the anterior cruciate ligament was done within 48 hours after the injury. They were assessed similar to the previous two groups using the abduction stress test to check the stability of the medial compartment ligaments and the Lachman test for the anterior cruciate ligament.

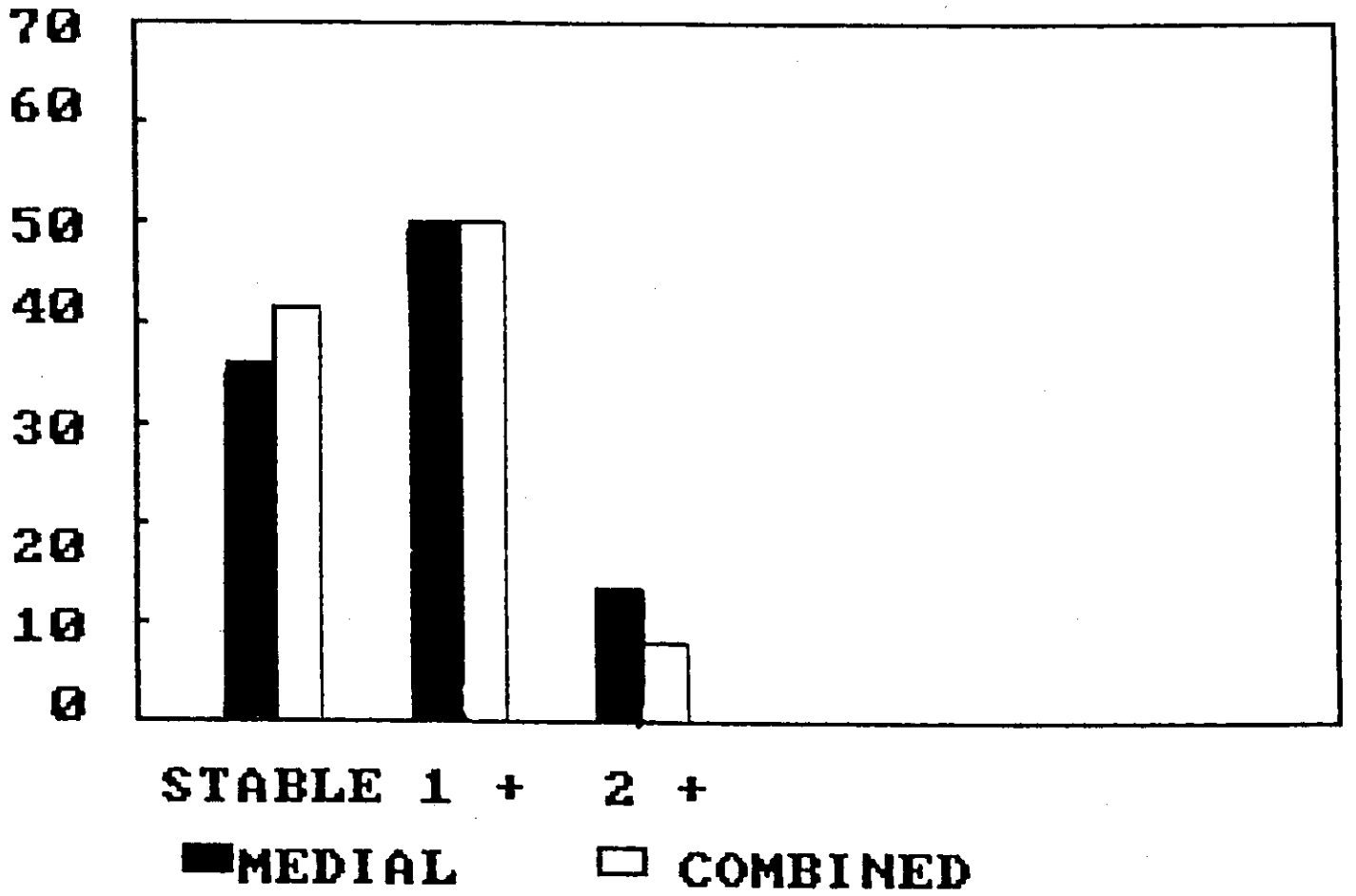
**Abduction Stress Test:**

Five cases had no instability. Six cases had 1+ instability and one case had 2+ instability. No case had 3+ instability and all the cases were stable at full extension.

MEDIAL STABILITY AFTER OPERATION IN GORUP A AND C

| | Medial | | Combined | | Total | |
|---|---|---|---|---|---|---|
| | no. | % | no. | % | no. | % |
| Stable | 8 | 36.36 | 5 | 41.67 | 13 | 38.24 |
| 1 + | 11 | 50.00 | 6 | 50.00 | 17 | 50.00 |
| 2 + | 3 | 13.64 | 1 | 8.33 | 4 | 11.76 |
| TOTAL | 22 | | 12 | | 34 | |

CHI SQUARE = .24 D.F= 2 P>0.05




MEDIAL STABILITY AFTER OPERATION IN GORUP A AND C

**Lachman Test:**

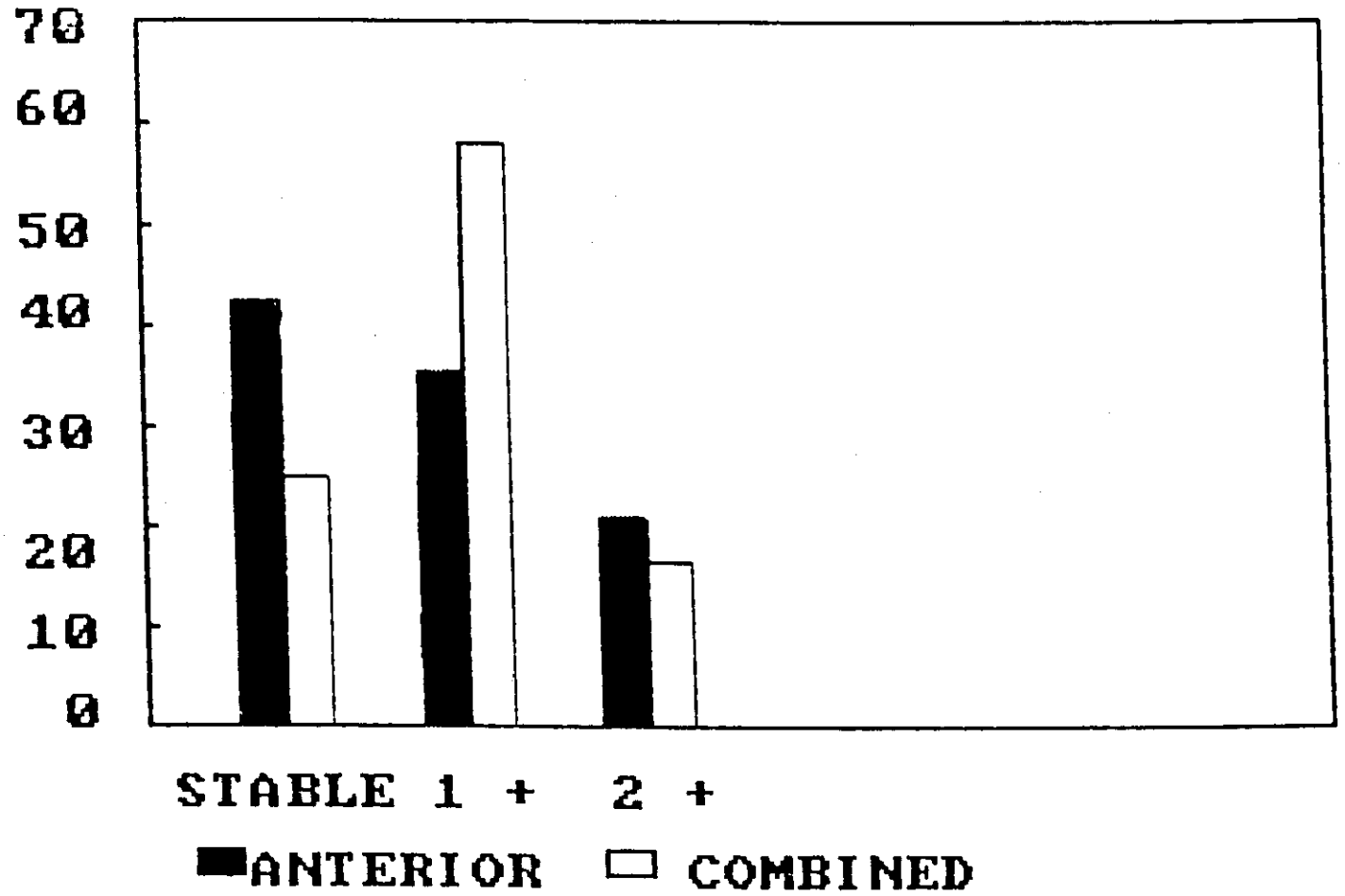
Three cases had no instability following surgery. These cases that were managed by combined intra and extra-articular reconstruction. Seven cases had 1+ instability in the Lachman testing. Three of them were managed by intra-articular reconstruction alone using the semitendinosus tendon, two cases by primary repair of the ACL with extra-articular augmentation using the iliotibial band and two cases by extra-articular reconstruction alone using the ilio-tibial band. Two cases had 2+ instability. One of them was managed by extra-articular reconstruction using the iliotibial band and one case by primary repair of the ACL and extra-articular augmentation.

No case had 3+ instability and all the cases gave negative results in the pivot shift testing.

ANTERIOR STABILITY AFTER OPERATION IN GORUP A AND C

| | Anterior | | Combined | | Total | |
|---|---|---|---|---|---|---|
| | no. | % | no. | % | no. | % |
| Stable | 6 | 42.86 | 3 | 25.00 | 9 | 34.62 |
| 1 + | 5 | 35.71 | 7 | 58.33 | 12 | 46.15 |
| 2 + | 3 | 21.43 | 2 | 16.67 | 5 | 19.23 |
| TOTAL | 14 | | 12 | | 26 | |

CHI SQUARE = 1.39 D.F= 2 P>0.05




ANTERIOR STABILITY AFTER OPERATION IN GORUP A AND C

**Functional Criteria:**

The functional criteria in our cases were done according to the residual functional disability.

**Group A: Isolated MCL injury:**

Eight cases have returned to their full preinjury activities without limitations. Two of them were previously athletic and have returned to their athletic activities. The remaining six have returned to their preinjury recreational activities.

Fourteen cases have returned to their preinjury activity with minor limitations but can do their normal daily activities without limitations.

No case of Group A was recorded to have significant functional disability.

**Group B: Isolated ACL injury:**

Five cases had returned to their full preinjury activities either athletic or recreational without limitations. Three of them were previously athletic and had returned to their athletic activities.

Eight cases have returned to their preinjury

activity with minor liitations. Two of them were able to return but afraid of reinjury.

All the eight cases were able to perform their normal daily activities without limitation.

One case was considered to have functional disability due to his complaint of frequent giving way with routine activities.

**Group C: Combined MCL & ACL injuries:**

Four cases have returned to their full preinjury activities without limitation. One of them was originally athletic and has returned to his activity fully. The remaining three have returned to their previous recreational activities without limitation.

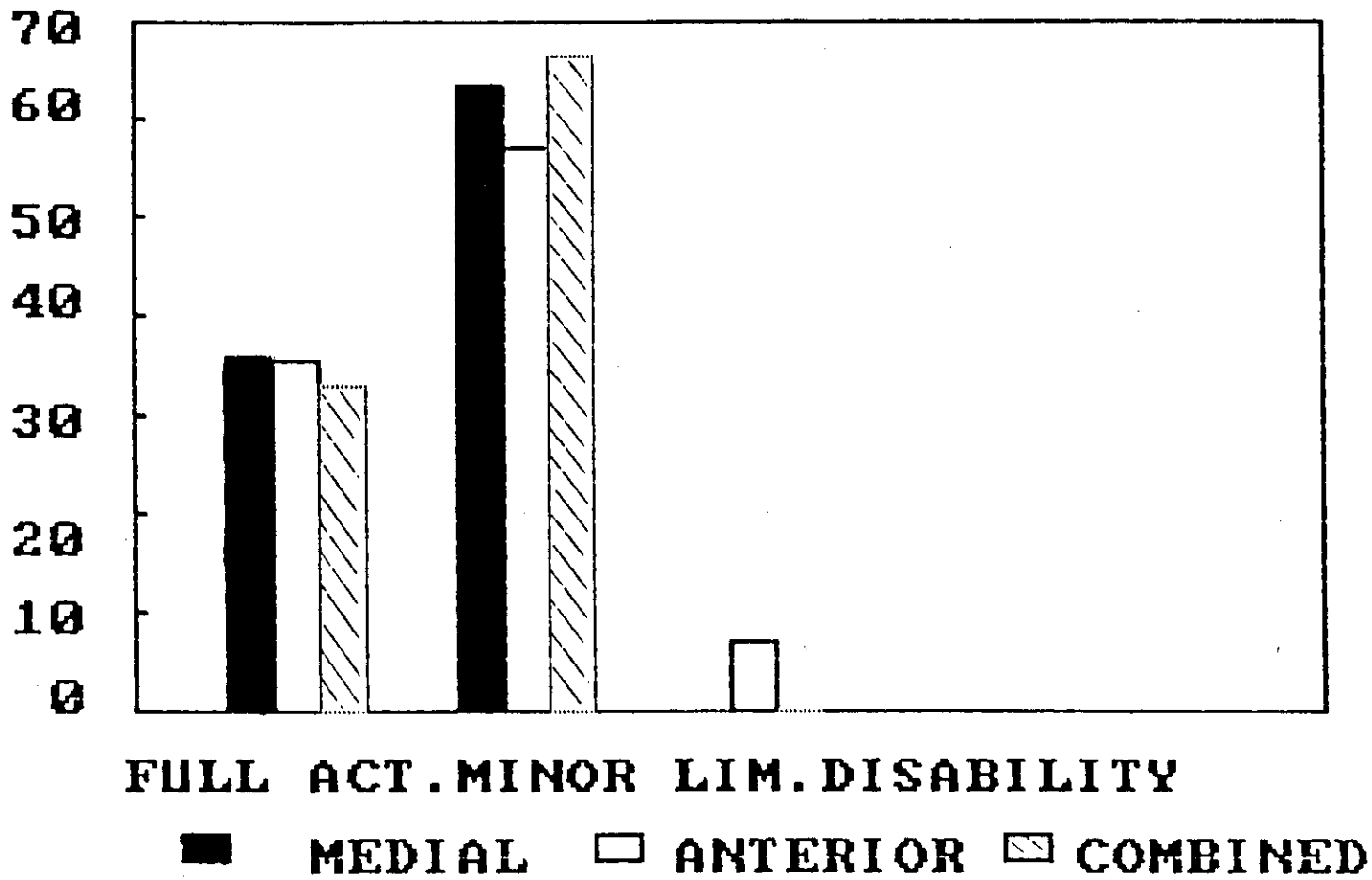
Eight cases have returned to their preinjury activities with minor limitations. The complaint of fear from preinjury was described by three of them. But all the eight cases were able to perform their normal daily activities without limitation.

No case of this group was considered to have functional disability or unable to perform the normal daily activities.

FUNCTIONAL ASSESSMENT IN DIFFERENT INJURIES

| | Medial | | Anterior | | Combined | | Total | |
|---|---|---|---|---|---|---|---|---|
| | no. | % | no. | % | no. | % | no. | % |
| Full act. | 8 | 36.36 | 5 | 35.72 | 4 | 33.33 | 17 | 35.42 |
| Minor lim. | 14 | 63.64 | 8 | 57.14 | 8 | 66.67 | 30 | 62.50 |
| Disability | 0 | 0.00 | 1 | 7.14 | 0 | 0.00 | 1 | 2.08 |
| TOTAL | 22 | | 14 | | 12 | | 48 | |

CHI SQUARE = 2.55 D.F= 4 P>0.05




FUNCTIONAL ASSESSMENT IN DIFFERENT INJURIES

**Final Assessment:**

We assessed our cases into Excellent, Good, Fair and Poor according to the following.

**Excellent Cases:**

- Subjective:
    - no pain
    - no swelling
    - no giving way

- Objective:
    - no effusion
    - full range
    - no instability

- Functional:
    - Return to full preinjury athletic or recreational activities.

**Good Cases:**

- Subjective:
    - Mild infrequent knee pain
    - Mild occasional swelling
    - Mild limitation e.g. inability to squat or kneel.

- Objective:
    - Mild effusion
    - Mild limitation in the range of motion (less than 10 degrees in flexion).
    - 1+ instability.

- Functional:
    - Return to full preinjury activity with minor limitation. Routine daily activities without limitation.

**Fair Cases:**

- Subjective:
    - Moderate pain.
    - Moderate swelling
    - Occasional giving way.

- Objective:
    - Moderate effusion
    - Moderate limitation in the range of motion (up to 20 degrees in flexion).
    - 2+ instability.

- Functional:
    - Routine daily activities without limitation.

**Poor Cases:**

- Subjective:
    - Frequent/severe pain.
    - Frequent/severe swelling
    - Frequent giving way.

- Objective:
    - Severe effusion.
    - Severe limitation of motion.
    - 3+ instability.

- Functional:
    - There is functional disability and restriction of daily activities.

**Group A: Isolated MCL Injuries:**

Eight cases were graded as excellent, eleven cases as good with satisfactory rating of 86.36%. We have only three fair cases in this group, and no case was graded poor. The unsatisfactory rating was 13.64%.

**Group B: Isolated ACL Injury:**

Four cases were graded as excellent, seven cases as good with satisfactory rating of 78.57%.

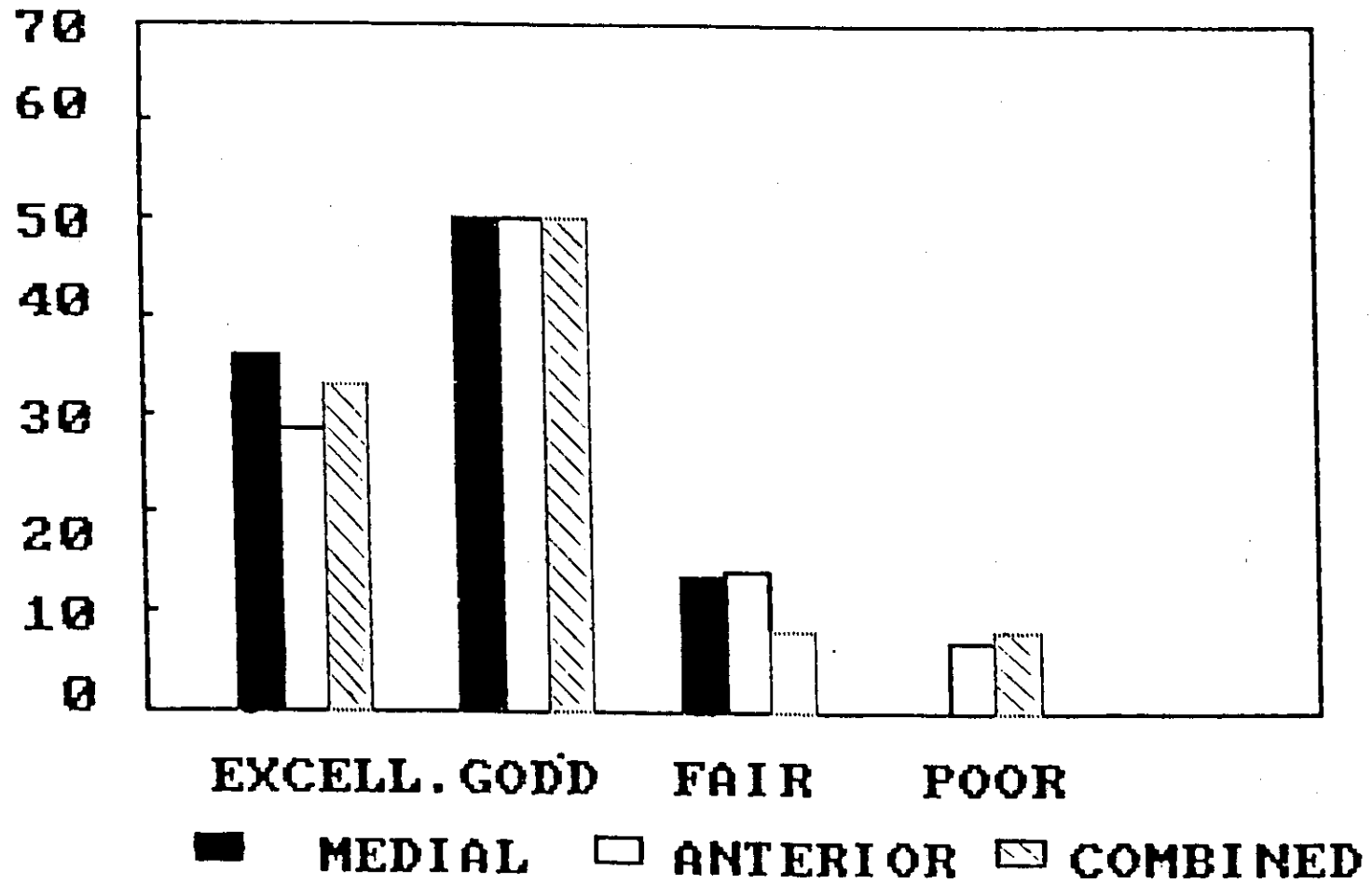
Two cases were fair and only one case was graded poor. Due to loss of the last thirty degrees in knee flexion, the patient also complains of frequent giving way and on Lachman Testing he has 2+ instability (The unsatisfactory rating was 21.43%).

**Group C: Combined MCL & ACL:**

Four cases were excellent, six cases were considered to have good results, with satisfactory rating of 83.33%. Only one case was considered fair due to loss of the last twenty degrees in knee flexion, the patient has 2+ instability on the Lachman testing, but he did not complain from giving way. One case was considered poor. Due to the patient complaint of frequent knee pain recurrent joint effusion, occasional giving way, his knee showed 2+ medial instability (The unsatisfactory rating was 16.67%).

FINAL ASSESSMENT OF THE THREE GROUPS

| | Medial | | Anterior | | Combined | | Total | |
|---|---|---|---|---|---|---|---|---|
| | no. | % | no. | % | no. | % | no. | % |
| Excellent | 8 | 36.36 | 4 | 28.57 | 4 | 33.33 | 16 | 33.33 |
| Good | 11 | 50.00 | 7 | 50.00 | 6 | 50.00 | 24 | 50.00 |
| Fair | 3 | 13.64 | 2 | 14.29 | 1 | 8.33 | 6 | 12.50 |
| Poor | 0 | 0.00 | 1 | 7.14 | 1 | 8.34 | 2 | 4.17 |
| TOTAL | 22 | | 14 | | 12 | | 48 | |
| CHI SQUARE | 2.10 | | D.F= 6 | | | | P>0.05 | |




FINAL ASSESSMENT OF THE THREE GROUPS

*A 22 years-old patient had a combined MCL & ACL injury managed by primary repair of the MCL and intra-articular reconstruction using the semitendinosus tendon together with extra-articular augmentation using the ilio-tibial band.*

*Fig. (84):*
*Stand on the affected limb*

*Fig. (85): Full range of flexion.*

*Fig.(86):*
*Straight leg raising, full extension.*

*Fig.(87): Full squating.*

*A 32 years old patient had a torn ACL managed by extra-articular reconstruction using the iliotibial band.*

*Fig.(88): Full extension*

*Fig.(89): Straight leg raising.*

*Fig,(90): Full equating*

*Fig.(91): Full range of flexion three months postoperative*

*A 25 years old athletic patient had a torn ACL and managed by combined intra-articular reconstruction using the free patellar tendon graft and extra-articular reconstruction using the iliotibial band.*

*Fig.(92): -ve drawer test*

*Fig.(93): -ve Lachman test*

*Fig.(94): -ve pivot shift*

*Fig.(95): Straight leg raise, full extension.*

*Fig.(96): Patient on the quadriceps table.*

*Fig.(97): squating*

*Fig.(98): Started jumping and running activities.*