Section IV

# RESULTS

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***Methods of Assessment of Results:***

Assessment of the results was done according to radiological and clinical criteria.

- Pain.
- Level of activity.
- Joints movement:
  - Knee Joint.
  - Ankle Joint.
- Infection and skin slough.

*Radiological Criteria:*

- Angular Deformity: > 10 varus or valgus.
- Rotation: present or not.
- Union time: Bridging callus, 3 cortices at least.
  - 12 weeks.
  - 12 -- 24 weeks.
  - >24 weeks.

***Rating of Results:***

Results were recorded into: excellent, good, fair, and poor.

- ***Excellent:*** 12 – 18 weeks average time of union with no angular deformity, shortening or pain. Level of activity: full ankle and knee joint movement.
- ***Good:*** Time of union from 18 to 24 weeks, with no angular deformity, shortening or pain, with full knee and ankle movement.
- ***Fair:*** Time of union is more than 24 weeks:

- ± Shortening from 0 – 1 cm.
- ± Angular deformity, less than 5°.
- ± Knee and Ankle pain, and limitation of movement.

❖ ***Poor:***

- Either mal-union:
  - ± shortening more than 1 cm.
  - ± angular deformation more than 5°.
  - ± knee and ankle pain.
  - ± internal rotation more than 5°.
  - ± external rotation more than 10°.
  - Limited knee and ankle movement.
- *Or non-union:* mainly due to distraction, treated later on by surgical interference. Data obtained are given in Table 2.

*Table 2*

**Rating of results.**

| Rating | | Number | Percentage |
|---|---|---|---|
| Satisfactory | *Excellent* | 32 | 64 |
| | *Good* | 8 | 16 |
| Unsatisfactory | *Fair* | 5 | 10 |
| | *Poor* | 5 | 10 |

# ANALYSIS OF RESULTS

## Time taken for union of 50 tibial fractures (Table 3 and Fig. 18).

*Table 3*

| Time (weeks) | No. of patients | Percentage |
|---|---|---|
| 12 - 18 | 32 | 64 |
| 18 - 24 | 8 | 16 |
| Over 24 | 8 | 16 |
| Non union | 2 | 4 |

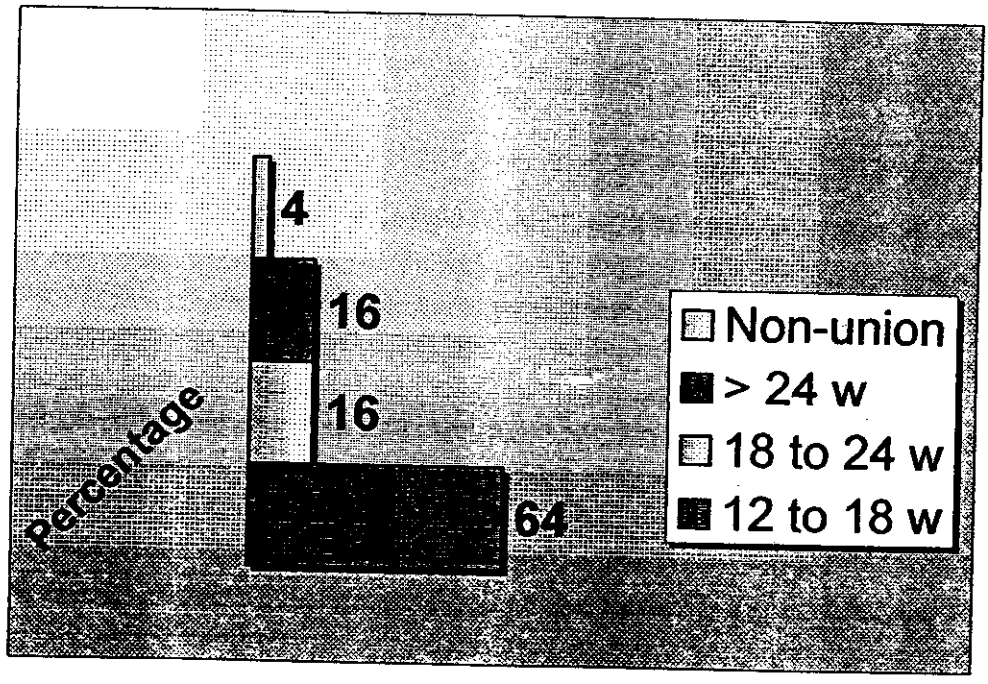


Fig. 18: **Time taken for union of 50 tibial fractures.**

A) With respect to time of union in relation to age group, there were 22 patient (44%) in age group of 18 – 29 years old. This group has mean time of union (weeks) about 22.4. Also, there were 20 patients (40%) in age group of 30 – 41 years old, the group has mean time of union of about 15.7 weeks. Also there were 8 patients (16%) in age group of 42 – 52 years old with mean time of union of about 15.3 as shown in Table 4. There was a prolonged time of union in the younger age group, due to high incidence of highly comminuted and segmental fractures, as well as due to high incidence of fracture lower 1/3rd .

*Table 4*

**Rate of union in relation to age.**

| Age (years) | No. of patients | Percentage | Mean time of union (weeks) |
|---|---|---|---|
| 18 - 29 | 22 | 44 | 22.4 |
| 30 - 41 | 20 | 40 | 15.7 |
| 42 - 52 | 8 | 16 | 15.3 |

B) In studying a mean time of union in relation to the site of fracture, there were 11 patients (22%) with site of fracture at upper 1/3rd + function upper middle 1/3rd, with mean time of union of about 16.6. Also, there were 24 patients (46%) with site of fracture at middle 1/3d of tibia with mean time of union of about 18.3 weeks. Also, there were 10 patients (46%) with site of fracture at function middle, lower 1/3rd + lower 1/3rd, with mean time of union of about 16 weeks. There were 5 patients (10%) with segmental fractures with mean time of union of about 28 weeks. The mean time of union was significantly higher in cases of segmental fractures, but significantly lower in cases of upper lower 1/3rd fractures (Table 5).

*Table 5*

**Mean time of union in relation to site of fracture.**

| Site of fracture | No. of patients | Percentage | Mean time of union (weeks) |
|---|---|---|---|
| Upper 1/3rd + junction upper middle 1/3rd | 11 | 22 | 16.6 |
| Middle 1/3rd | 24 | 46 | 18.3 |
| Junction middle lower 1/3rd + lower 1/3rd | 10 | 20 | 16 |
| Segmental | 5 | 10 | 28 |

C) According to the time elapsed from time of injury till time of surgery it ranges from 6 hours up to three days. There were 10 patients (20%) has been operated upon in 1st 24 hours with mean time of union in weeks about 21.7. Also there was 20 patients (40%) has been operated upon from 24 – 48 hours with mean time of union in weeks about 20.2. Also, there were 20 patients (40%) has been operated upon from 48 – 72 hours with mean time of union in weeks about 22.4. So, the time elapsed from injury to time of surgery was insignificant (Table 6).

*Table 6*

**Time elapsed from injury to time of surgery.**

| Time elapsed | 18 - 24 H | 24 - 48 | 48 - 72 |
|---|---|---|---|
| No. of patients | 10 | 20 | 20 |
| Mean time of union | 21.7 | 20.2 | 22.4 |

D) With respect to gender there were 3 females and 47 males, and significance of gender variation could not be assessed.

E) The operative time ranges from 60 mins up to 120 mins, and it was insignificant.

F) There were no cases of infection or skin slough.

G) There were no cases reported with compartmental syndrome.

H) There were 20 patients (40%) with fracture right tibia with mean time of union (weeks) about 21.9. And there were 30 patients (60%) with fracture left tibia, with mean time of union (weeks) about 22.7. So, the side of trauma was insignificant in relation to mean time of union (Table 7).

*Table 7.*

**Side of trauma in relation to mean time of union.**

| No. of patients | Type of fracture | Union time (weeks) |
|---|---|---|
| 20 | Right tibia | 21.9 |
| 30 | Left tibia | 22.7 |

I) Occupation: There were patient students (60%) with mean time of union in weeks about 22.4. Also, there were 10 patients workers 20% with mean time of union in weeks about 23.6. Also there were 10 patients farmers (20%) with mean time of union in weeks about 23.8. So, the occupation was insignificant concerning time of union (Table 8).

*Table 8.*

Time of union in relation to occupation.

| Type of patients | Population | Time of Union (weeks) |
|---|---|---|
| Students | 60 | 22.4 |
| Workers | 20 | 23.6 |
| Farmers | 20 | 23.8 |

* * *

# COMPLICATIONS

Most authors **(Zucman and Mairer, 1969; Puno et al, 1986, Mayo and Benirschke, 1990)** define malunion of fractures of the tibia as one or more of the following deformations:

*First:*

- Shorting of more than 1 cm.
- Varus more than 10 degrees.
- Valgus of more than 15 degrees.
- Internal rotation of more than 5 degrees.
- External rotation of more than 10 degrees.

*Second*:

- Non-union due to distraction.

These poor results were obtained in 5 patients (10% of series), 3 patients with angular deformity, and 2 patients with non-union treated by bone grafting.

***INFECTIONS AND SKIN-SLOUGH:***

There were no cases of infection or skin slough.

***JOINT AFFECTION:***

- 10 patients had ankle pain for 6 months later and referred to Physiotherapy.
- 4 patients had knee pain but no limitation of movement, relieved 4 months after surgery.

***SUDEK'S ATROPHY:***

3 patients had Sudek's atrophy and were treated by calcitonin 6 weeks + calcium for 4 months. All of them relieved.

***COMPARTIMENTAL SYNDROMES:***

No cases of compartimental syndrome were diagnosed.

* * *

# CLINICAL CASES

## *Case (1)*

A male patient 24 years old, student. Has short oblique fracture tibia after a traffic accident. Narrow D.C. plate was used. Non weight bearing started 2 days postoperative. Partial weight bearing was started 6 weeks postoperative. Full weight bearing was 14 weeks (time of union). There was no complications.

**X-ray: Figs. 19a, b, c and d.**

Fig. 19a: **Preoperative X-ray.**

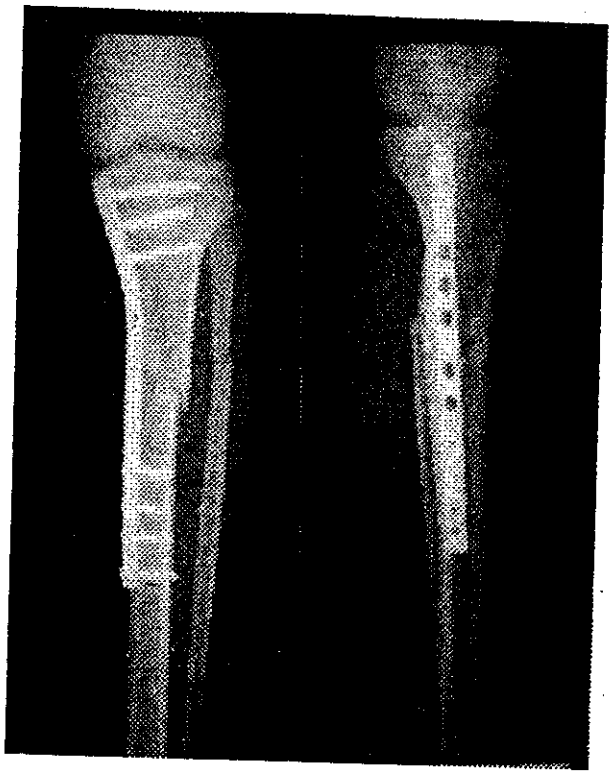

Fig. 19b: **Postoperative X-ray.**

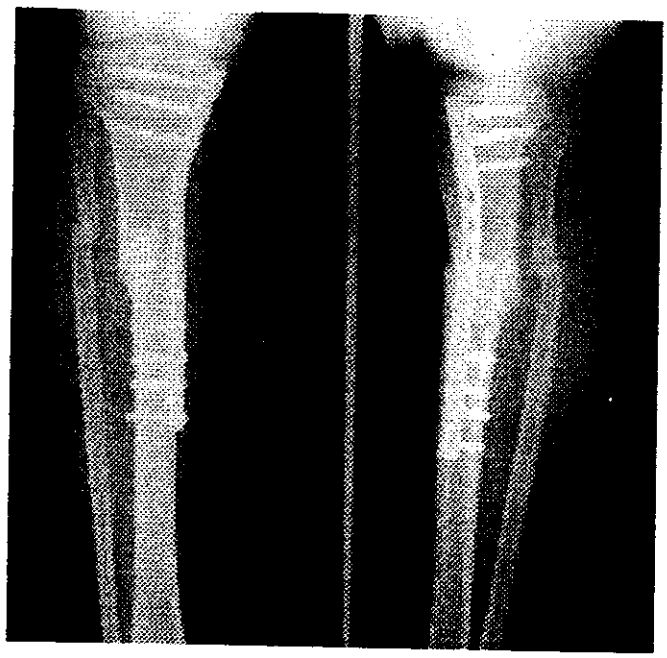

Fig. 19c: **Follow up X-ray.**

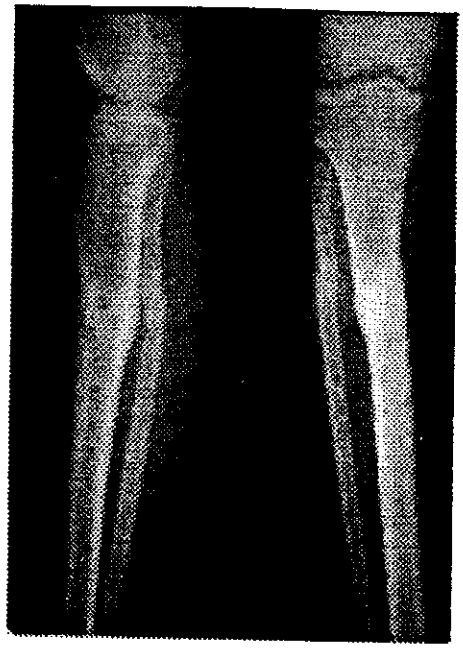

Fig. 19d: **After plate removal.**

## *Case (2)*

Female patient, 20 years old, student. Has Transverse fracture junction middle lower 1/3rd. The patient was operated upon 2 days after the traffic car accident by narrow D.C. plate. Non weight bearing was started 2 days postoperative. Partial weight bearing was started 6 weeks postoperative. Later on, full weight bearing was started after complete bone union (16 weeks), with no complications.

**X-ray: Figs. 20a, b and c.**

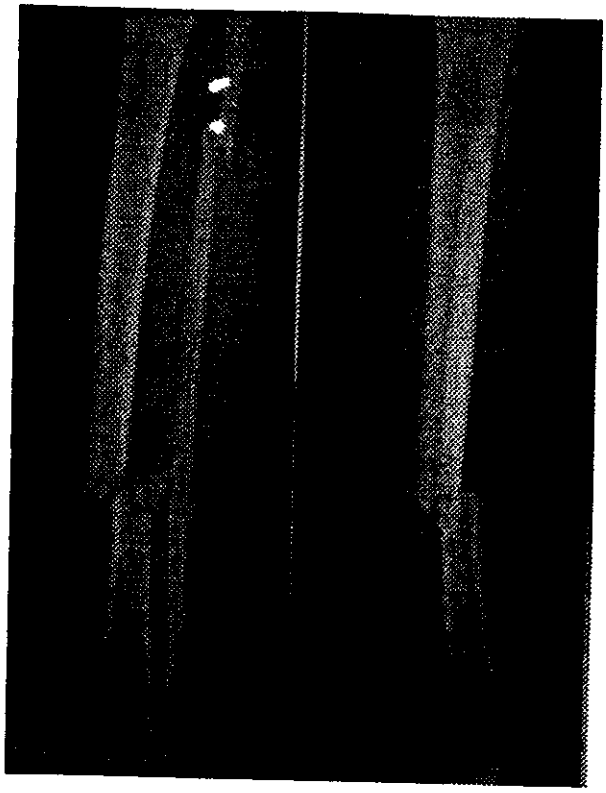

Fig. 20a: **Preoperative X-ray.**

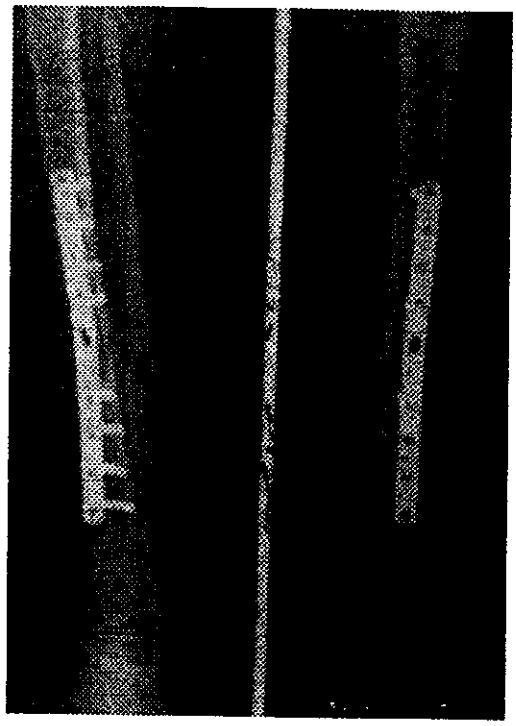

Fig. 20b: **Postoperative.**

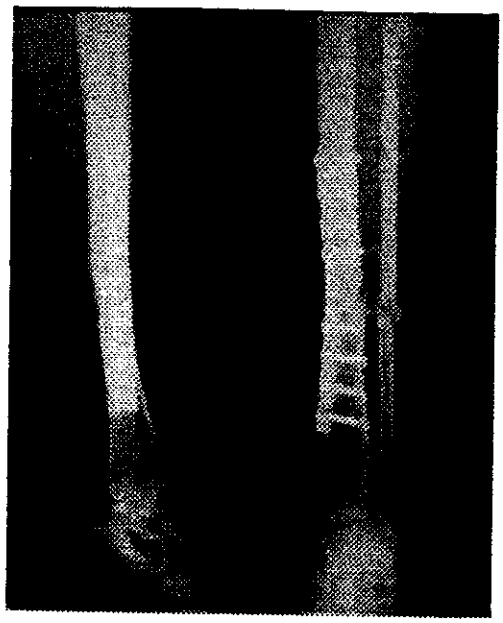

Fig. 20c: **Follow up.**

## *Case (3)*

A male patient, 33 year old. Has a fracture shaft tibia, short oblique junction, middle lower $1/3^{rd}$ + fracture ipsilateral lateral malleolus. He has been operated upon 3 days later. Non weight bearing was started 2 days postoperative. Partial weight bearing 6 weeks later, with post angle 5 degrees + Sudek's atrophy.

**X-ray: Figs. 21a, b and c.**

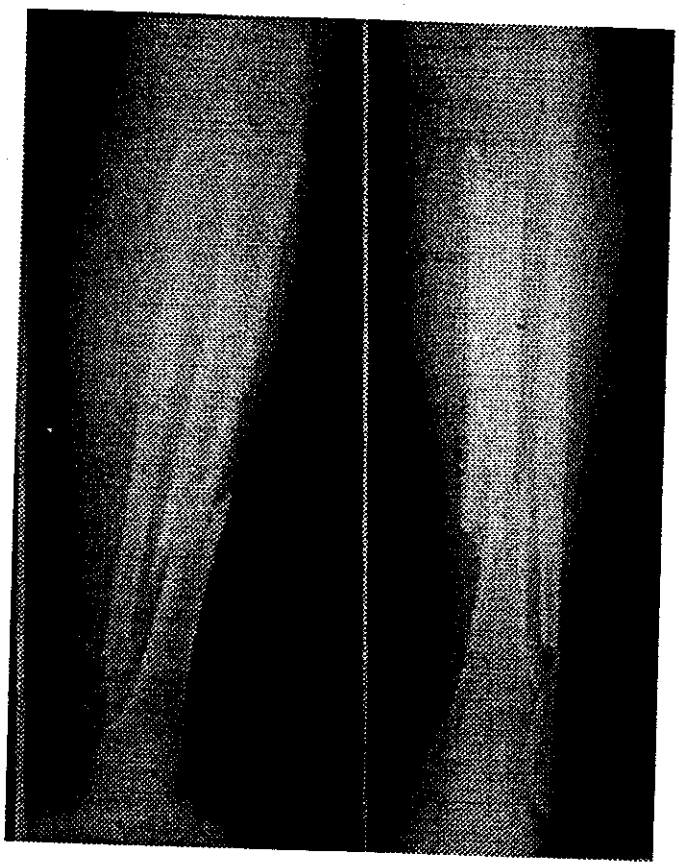

Fig. 21a: **Preoperative.**

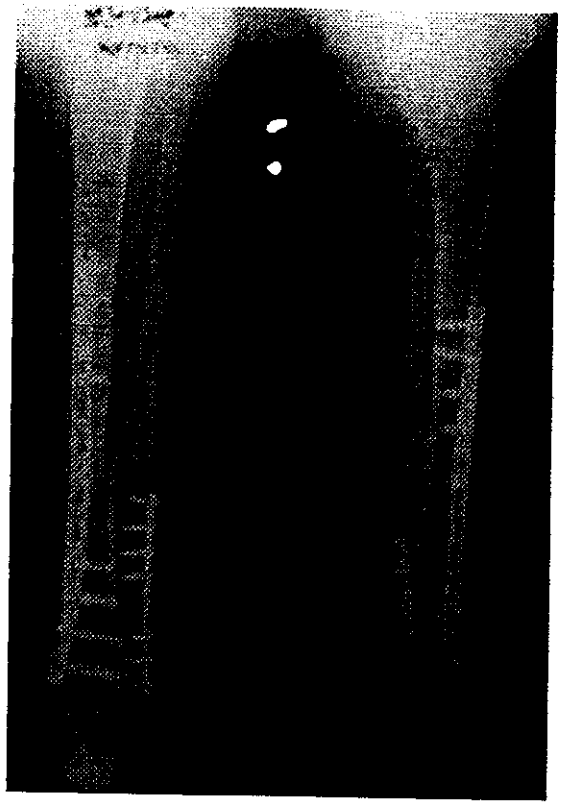

Fig. 21b: **Postoperative.**

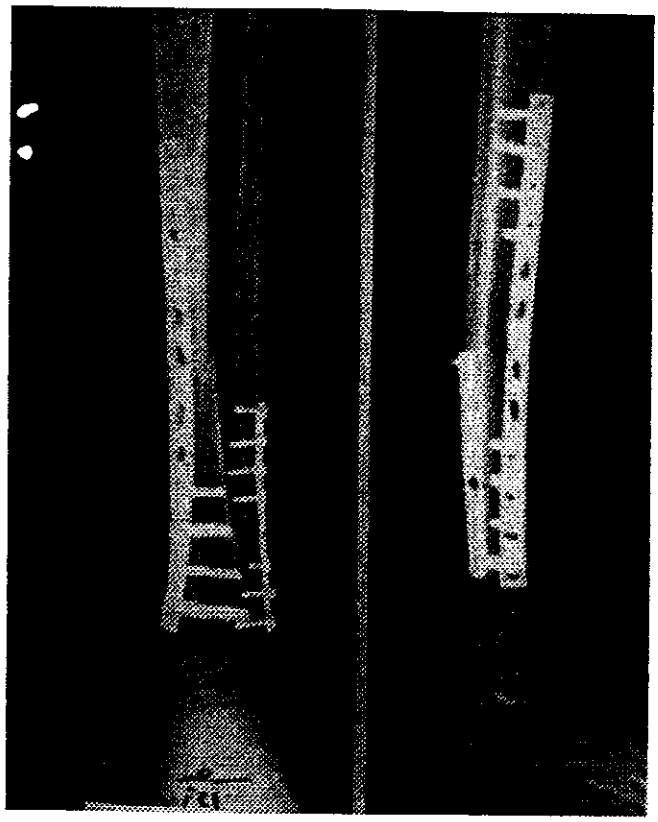

Fig. 21c: **Follow up.**

*Case (4)*

A male patient, 50 years old farmer. Had a comminuted fracture, lower 1/3rd tibia + ipsilateral femur. He has been operated 2 days later. Narrow D.C.P. Union occurred 12 weeks later on, with good ankle and knee movements.

**X-ray: Figs. 22a, b and c.**

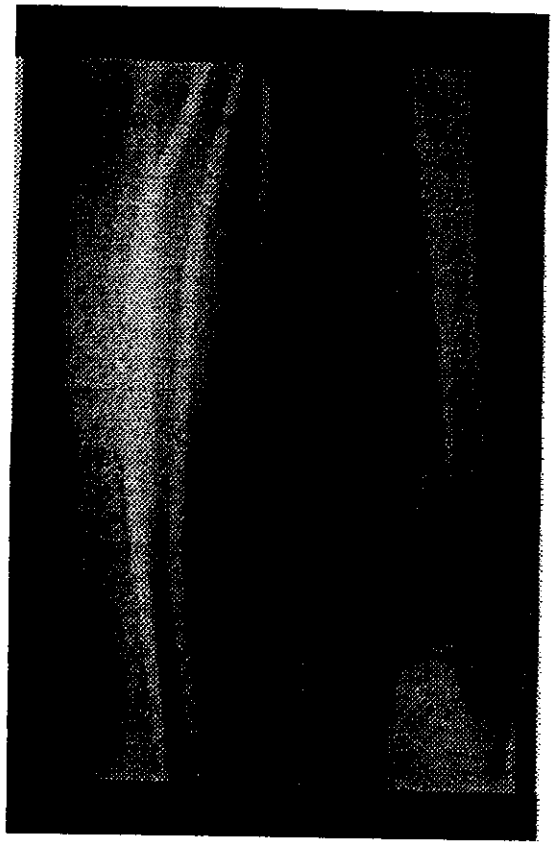

Fig. 22a: **Preoperative.**

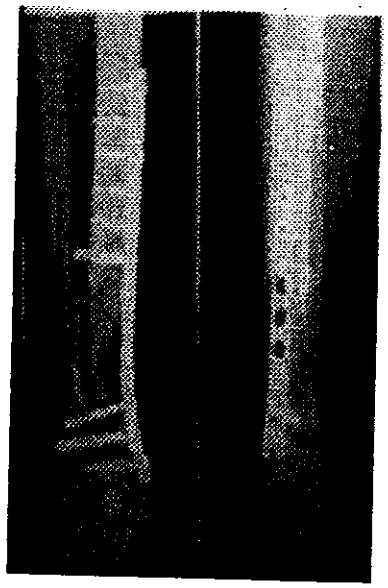

Fig. 22b: **Postoperative.**

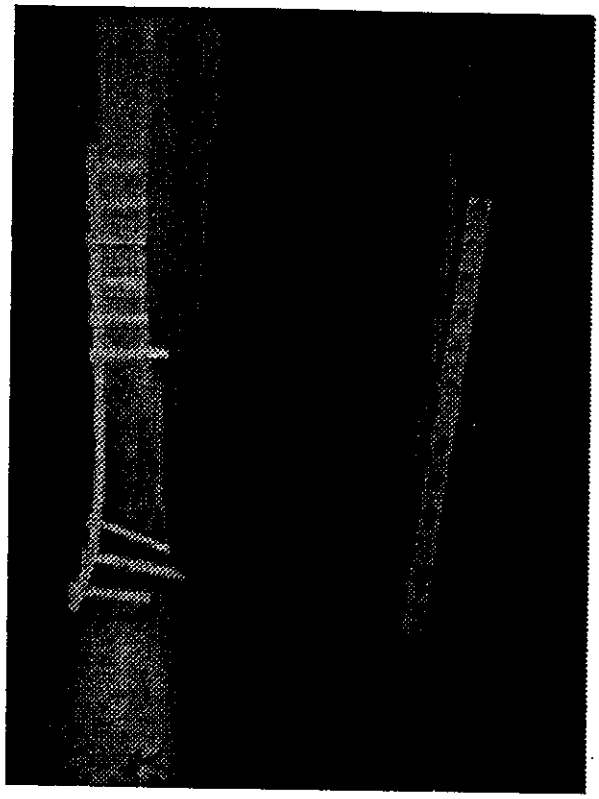

Fig. 22c: **Follow up.**

*Case (5)*

A male patinet, 18 years old student. Has a comminuted fracture shaft tibia. He has been operated upon 3 days later using narrow D.C. plate. Union occurred 12 weeks later, with 5 degrees varus.

**X-ray: Figs. 23a, b and c.**

Fig. 23a: **Preoperative X-ray.**

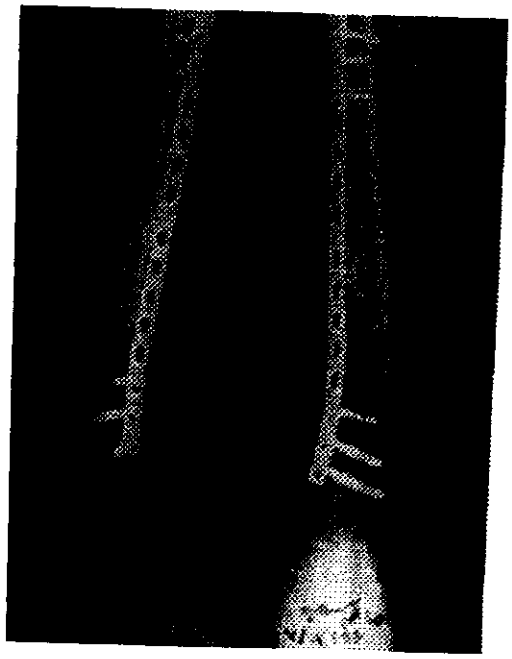

Fig. 23b: **Postoperative.**

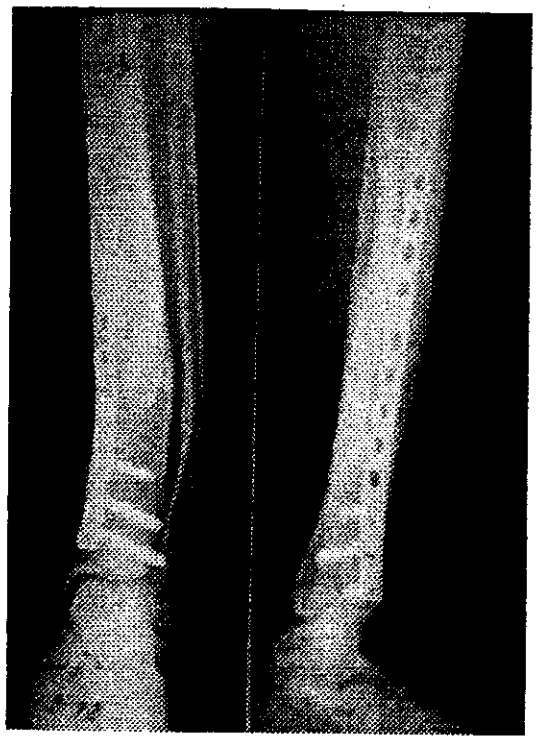

Fig. 23c: **Follow up X-rays.**

## *Case (6)*

A patient, 18 years old worker. The patient was operated upon 2 days after the traffic car accident by narrow D.C. plate. Non weight bearing was started 2 days postoperative. Partial weight bearing was started 6 weeks postoperative. Later on, full weight bearing was started after complete bone union (16 weeks), with no complications.

**X-ray: Figs. 24a, b and c.**

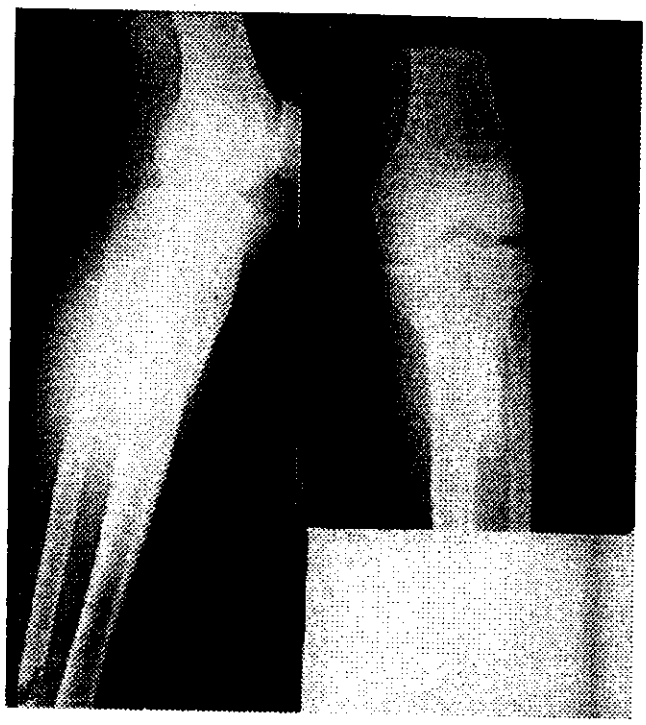

Fig. 24a: **Preoperative X-ray.**

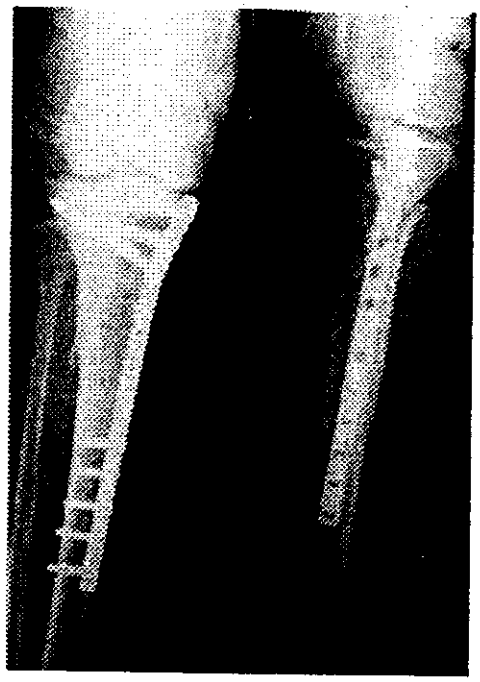

Fig. 24b: **Postoperative.**

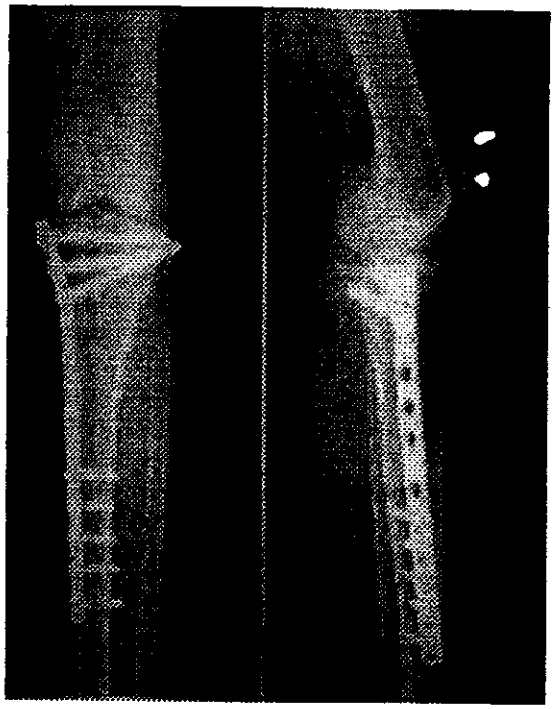

Fig. 24c: **Follow up.**

## *Case (7)*

A male patient, 30 years old student. Has a traffic car accident. Had comminuted fracture upper 1/3$^{rd}$ tibia + ipsilateral fracture femur. He has been operated upon 2 days later. Non weight bearing started 2 weeks postoperative. Union occurred 16 weeks later.

**X-ray: Figs. 25a and b.**

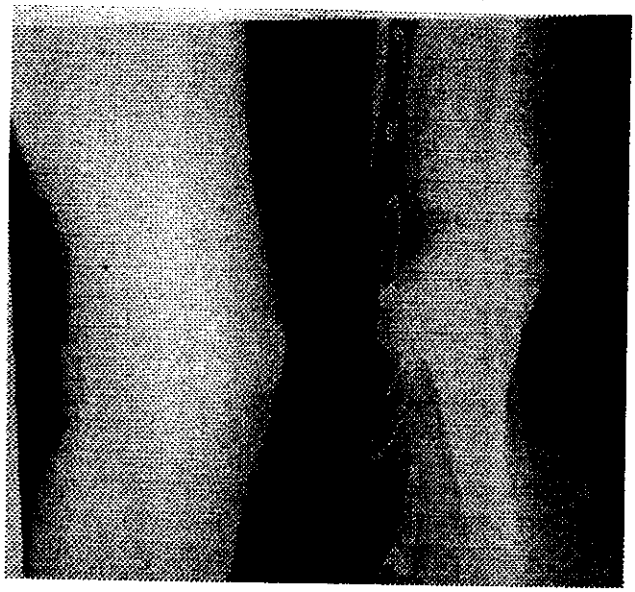

Fig. 25a: **Preoperative.**

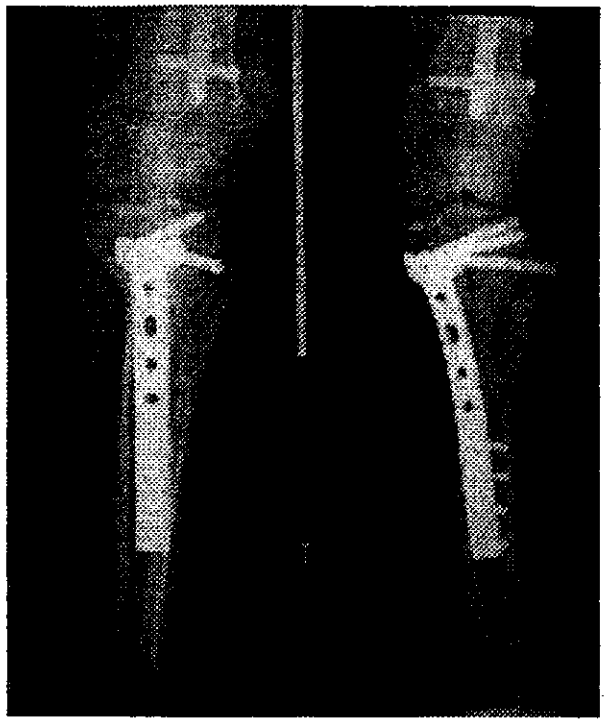

Fig. 25b: **Follow up.**

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