Results

Time to start movement:

In most of the cases motion was initiated as early as possible and the following table & figure (8-1) shows the date of starting motion in the study cases.

Time	Number of cases	Percentage
1st week	12	48%
2nd week	1	4%
3rd week	6	24%
4th week	6	24%

P value is .004 which is statically significant

Table (8-1) Time of starting motion

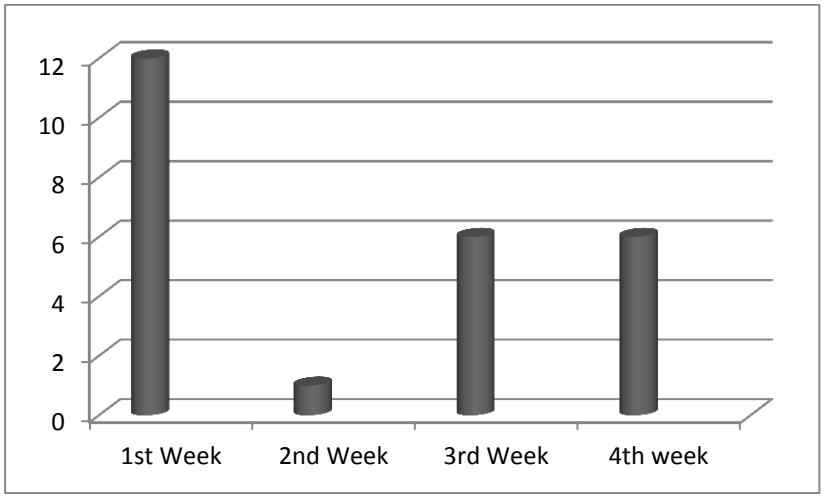

Figure (8-1): Time to start motion per study cases.

Union:

Twenty five cases have been united of the twenty five cases included in this study.

All the wounds healed in its expected time except the two cases which needed skin graft which was done by the 5th or 7th day and healed by two weeks.

Clinical union:

It is the stage where no tenderness at fracture site and the fracture is stable; it ranged from 5-6 weeks. (Table & Figure 8-2)

Time of clinical union	Number of cases	Percentage
5 Weeks	3	12%
6 Weeks	19	76%
8 weeks	3	12%

P value is .0033 which is statically significant

Table (8-2) cases of clinical union

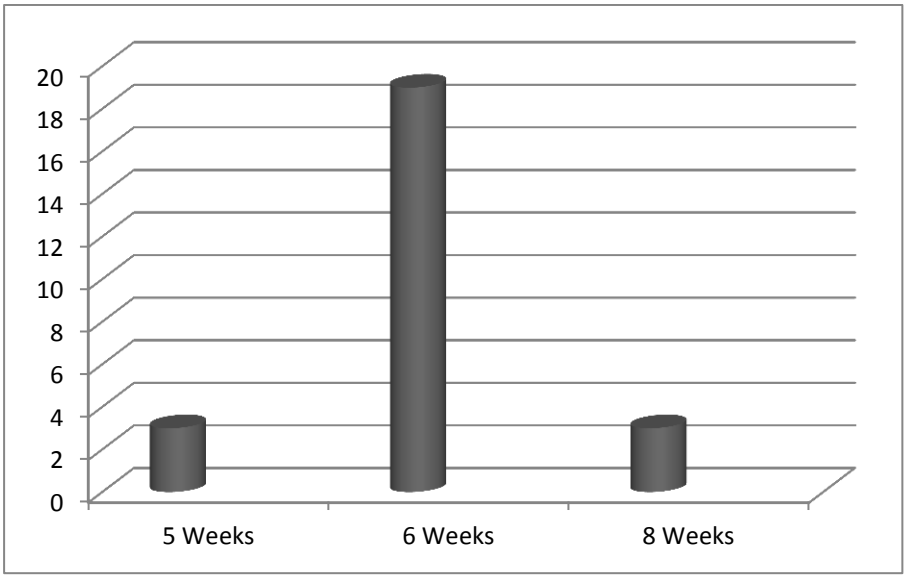

Figure (8-2): Showing time of clinical union per cases of the study.

Radiological union:

When there is callus bridging the main fragment of the fracture; it ranged from 6 - 16 weeks. (Table & Figure 8-3)

Time of radiological union	Number of cases	Percentage
6 Weeks	1	4%
8 Weeks	16	64%
10 Weeks	4	16%
12 Weeks	2	8%
16 Weeks	2	8%

P value is .002 which is statically significant

Table (8-3) time of radiological union

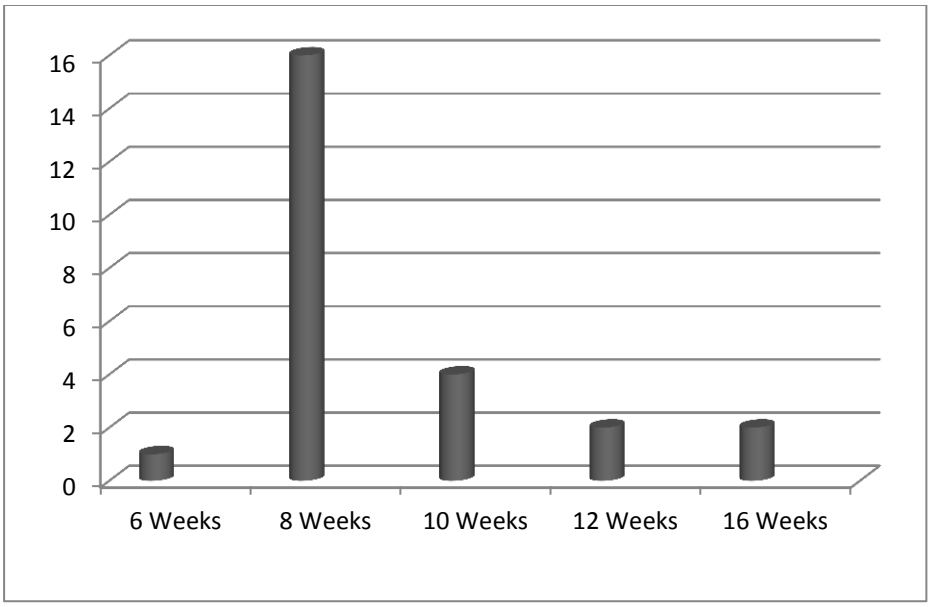

Figure (8-3): Showing time of radiological union per cases of the study.

Clinical against Radiological union:(*Table & Figure 8-4)*

Time	Clinical Union	%	Radiological Union	%
5 Weeks	3	12%	-	-
6 Weeks	19	76%	1	4%
8 Weeks	3	12%	16	64%
10 Weeks	-	-	4	16%
12 Weeks	-	-	2	8%
16 Weeks	-	-	2	8%

P value is .1 which is statically insignificant

Table (8-4) clinical & radiological union

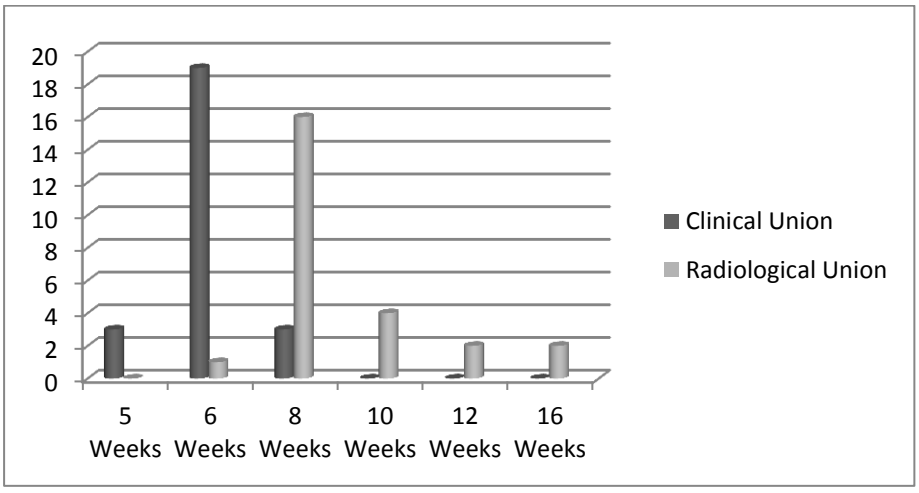

Figure (8-4): Showing relation of clinical and radiological union time.

Total active range of motion (TAM):

The Total Active Range of Motion (TAM) which equals (flexion of M.P. + P.I.P. + D.I.P. joints) – (extension lag in M.P. + P.I.P. + D.I.P. joints) was used to judge the range of motion through the study.

TAM results were good in 16 cases, fair in 6 cases, and poor in 3 cases.(Table & figure 8-5).

Total Active Range of Motion (TAM)	Number of cases	Percentage
Excellent	0	0%
Good	16	64%
Fair	6	24%
Poor	3	16%

P value is .01 which is statically significant

Table (8-5) TAM

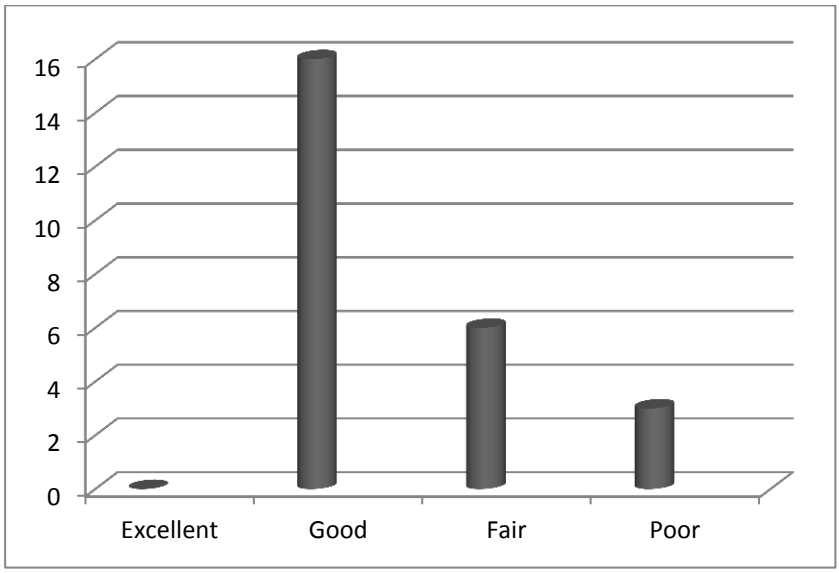

Figure (8-5): TAM in study cases.

- ***TAM & Associated injury:***

One of the most common causes of poor results is the presence of associated injuries.

Tendon injury & TAM:(Table 8-6)

Total Active Range of Motion (TAM)	Tendon injury	%
Excellent	0	0%
Good	3	25%
Fair	6	50%
Poor	3	25%

P value is .005 which is statically significant

Table (8-6) Tendon injury and TAM

The presence of tendon injury delayed the start of movement and this was reflected in the results regarding the final TAM.

Neurovascular injury:

There was one case of associated injury of digital nerve and artery on one side cut at the level of the proximal phalanx of the little finger treated by 1ry repair.

Skin injury:

There were two cases which needed skin graft during the surgery the final TAM of one of them was fair and the other one was poor and this is may be because of the associated tendon injury in both cases.

Complications:

- *Pain:*

  Four cases had late (> four weeks) post operative pain (> 4 on the numerical scale), all of them had tendon injury; three of them had digital nerve injury (one iatrogenic and two from the start) and was managed by physiotherapy.

- *Sympathetic dystrophy:*

  Two cases had late pain with Sympathetic dystrophy which was managed with physiotherapy and alenderonate sodium 10 mg/d for two months.

- *Infection:*

  Four infected cases (All were open fractures), three of them had superficial pin tract infection responded well to dressing and antibiotics while the fourth one had deep wound infection (one of the firearm injury cases) needed debridement (10 days after surgery) and antibiotic course according to culture and sensitivity. (table 8-7).

	Without infection	**Superficial Pin tract infection**	**Deep wound infection**
Number of cases	21	3	1

P value is .1 which is statically insignificant

Table (8-7) Infection.

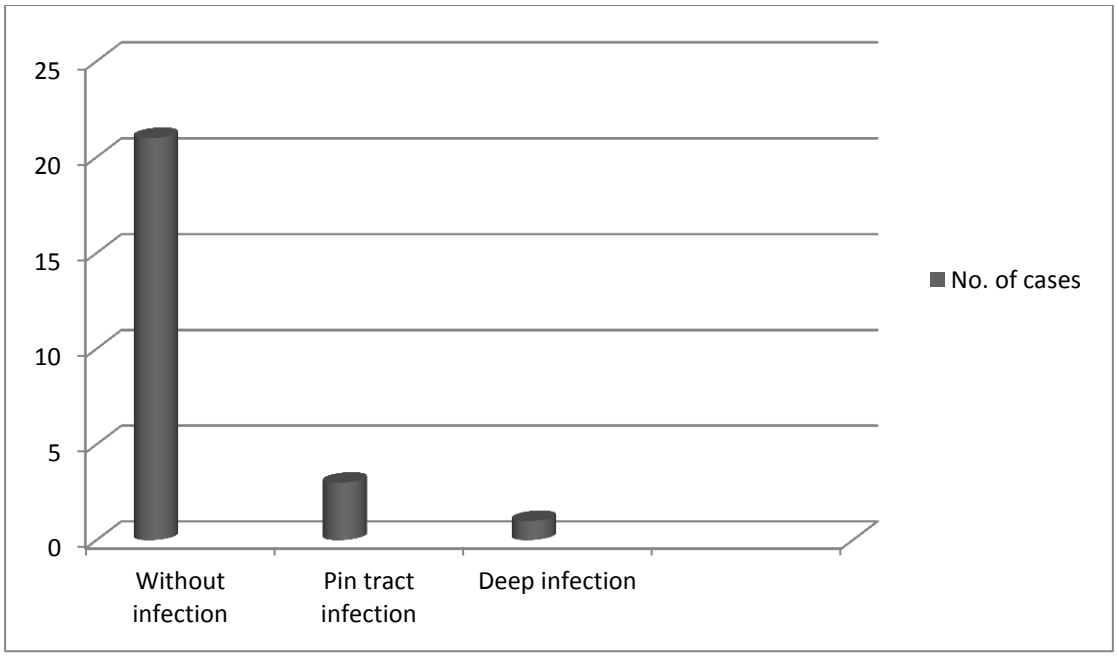

Figure (8-7): Infection in cases of the study.

- *System failure:*

  One case had accidental removal of the fixator before clinical union because of loosening of the nuts; stability of the k-wires was checked under image and the device re-applied again.

- *Union:*
  - From the 25 cases we had 3 cases of delayed union.

    Two of the three cases of non union were in the middle phalanx (one in the middle and one in the ring finger) and the third was in the proximal phalanx (in the ring finger).

  - The major cause in the three cases was they were associated with soft tissue injury (open fractures).

    None of the affected fingers had rotational or axial deformities.

- *Stiffness:*

Three cases of poor TAM were reported; where two of them had intra-articular fracture and the other one had associated skin and tendon injuries.

- *Shortening:*

One case was ended with mild shortening in the neck of the fifth metacarpal which did not affect the function. *(Figure 8-8).*

Figure (8-8) showing the shortening of 5th metacarpal

The other one ended with more shortening of the 2nd metacarpal which affected the final TAM to end with poor one. *(Figure 8-9).*

Figure (8-9) showing the shortening of 2nd metacarpal

- *Angulation:*

One case had volar angulation in the proximal phalanx of middle finger less than 10 degrees which didn't affect the function. *(Figure 8-10).*

Figure (8-10) showing mild angulation of prox. Phalanx of middle finger

Other case had ended with more angulation with more affection of the final TAM. *(Figure 8-11).*

Figure (8-11) showing angulation of prox. Phalanx middle of finger

- *Return to the original job:*

Twenty one patients returned to the pre-injury activity (original job *(manual workers)* for the employed patients) after 4-6 months, while three needed more extensive physiotherapy and returned to their jobs after another two months. One patient (police officer shifted to office work) had a different position within the same job place.