RESULTS

I. CLINICAL RESULTS

Using the most recent clinical assessment, Simon (1985), the feet were graded as excellent in 28.3% (15 feet), good in 47.2% (25 feet), and poor in 24.2% (13 feet). Thus the occurrence of satisfactory result was 75.5% and unsatisfactory result was 24.5% (Table 11, Fig. 42).

Physical examination of the feet and deformity showed that of 47 feet (88.6%) had equinus deformity, 13 feet (24.5%) had residual unsatisfactory deformity. Of 32 feet (60.3%) had varus heel, only 7 feet (13.2%) had residual deformity. Of 49 feet (92.4%) had adduction forefoot, 13 feet (24.5%) had residual deformity. Of 30 feet (56.6%) had cavus deformity, only 8 feet (15.1%) had residual deformity (Table 12, Figs. 43, 44).

In all patients with unilateral deformity, atrophy of calf muscle, decreased size of the foot, or a mild tibial in equality were noted on the side with the clubfoot.

Of 40 feet with satisfactory result, 11 feet had minimal equinus deformity ($\leq 5^{O}$) and unable to dorsiflex above the neutral position, and 3 feet of them had an excellent result. In addition, 15 feet had residual minimal adduction forefoot $\leq 15^{O}$, 4 feet of them had an excellent result. The mobility is sufficient to permit full activity without pain and shoes of normal size were worn.

Of 13 feet with an unsatisfactory result, all had residual mild or severe degree (unsatisfactory) of the different combination of deformity, and there

were a significant restriction in the range of motion and activity. The additional reconstructive procedure are necessary.

A. Clinical Analysis:

A comparison of the extensive posteromedial and posterolateral and circumferential release with less extensive posteromedial release showed that there was narrow difference between the result of either operation, 77.4 percent compared with 72.7 percent (Table 13).

The occurrence of satisfactory result was unrelated to the patient sex or bilaterally, but there were a significant statistical relationship between the surgical age, immobilization time, or previous management and a good final result.

1. The Surgical Age:

In this study, timing of soft tissue release for relapsed clubfoot management might influence the outcome. Table (14) showed the relationship between the surgical age and good final result. It was evident that the proportion of satisfactory results decreases as the age of patients at operation increases.

2. Immobilization Time and Follow Up Care:

Table (14) showed the relationship between the immobilization time and post-operative care, and good final result. It was evident that the proportion of satisfactory results decreases as the post-operative care and immobilization time decreases.

3. Previous Management:

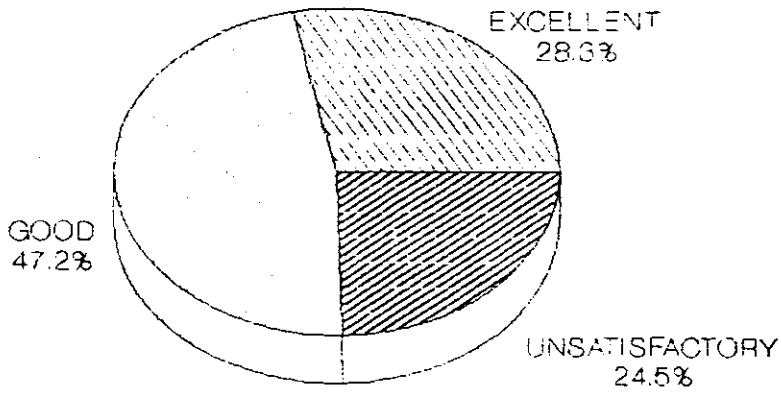
In this study, the occurrence of unsatisfactory results is more related to stiff-fibrous foot and previous management.

Delay in reporting for first medical care, and unsuccessful, forced conservative treatment were resulted in iatrogenic fibrosis, and compression to the cartilage. Skin scarring, retethering of the medial structures by dense scar tissue and iatrogenic damage to the hyaline articular cartilage was associated with rough and extensive dissection in the previous operative treatment.

TABLE (11):RESULTS OF TREATMENT GIVEN.

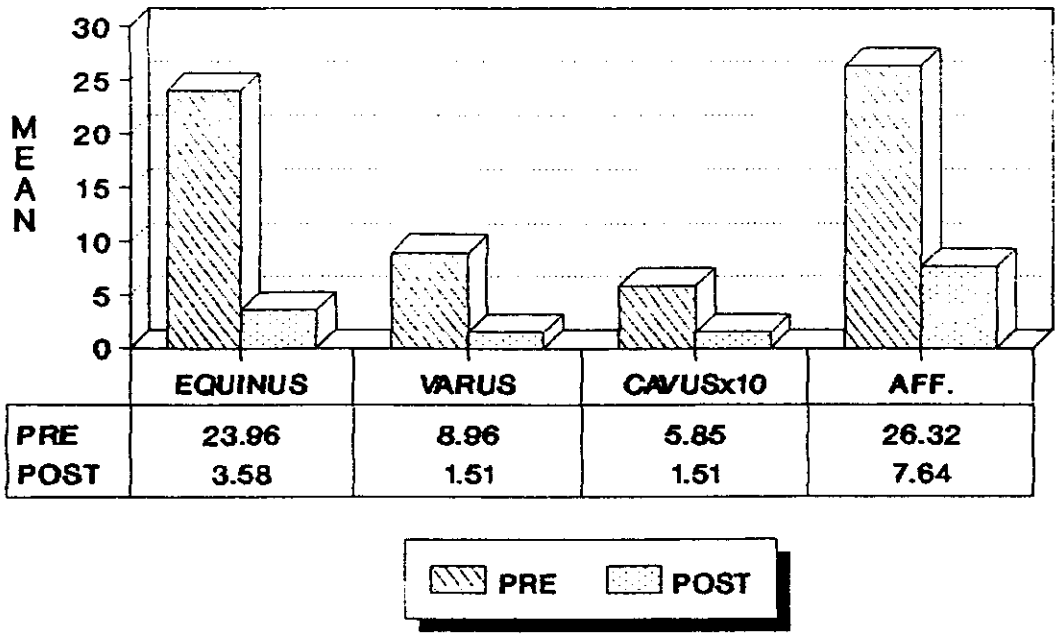
end results	no of feet	%
Excellent	15	28.3
Good	25	47.2
Unsatisfactory	13	24.5
Total	53	100 %

Fig.(42)RESULT OF TREATMENT GIVEN



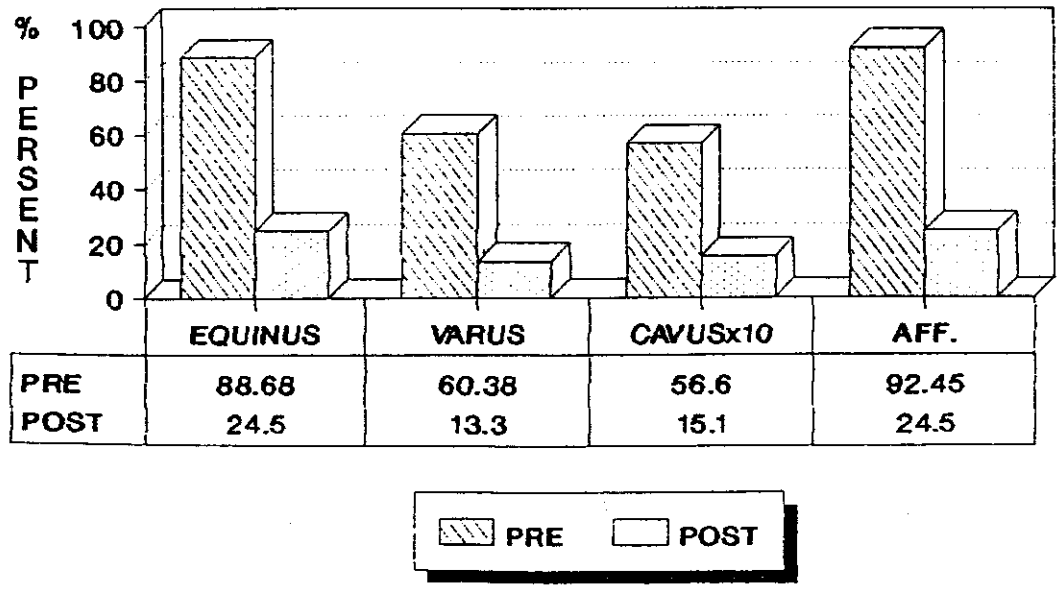
NUMBER OF FEET • 53

Fig.(43)CLINICAL EVALUATION OF DEFORMITY BEFORE AND AFTER INTERVENTION



	EQUINUS	VARUS	CAVUSx10	AFF.
PRE	23.96	8.96	5.85	26.32
POST	3.58	1.51	1.51	7.64

Fig (44) FREQUENCY OF DIFFERENT TYPES OF DEFORMITY BEFORE AND AFTER INTERVENTION



	EQUINUS	VARUS	CAVUSx10	AFF.
PRE	88.68	60.38	56.6	92.45
POST	24.5	13.3	15.1	24.5

TABLE(12): CLINICAL ASSESSMENT OF DEFORMITY BEFORE AND AFTER INTERVENTION IN DEGREES

Deformity		Before	After
Equinus ankle	Mean	23.96°	3.58°
	S.D	11.82	1.74
Varus heel	Mean	8.96°	1.50°
	S.D	5.40	2.87
Cavus midfoot	Mean	5.8°	1.5°
	S.D	0.53	0.36
Adduction forefoot	Mean	26.32°	7.64°
	S.D	9.10	6.77

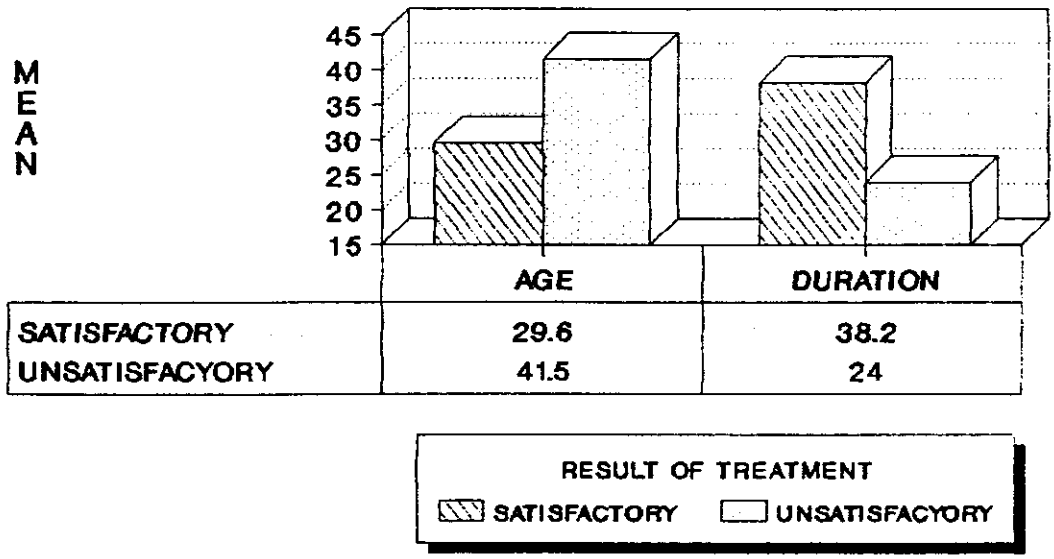
TABLE (13): A COMPARISON WITH TECHNIQUE IN THE PATIONTS TREATED.

	P.M.R.		P.M.R.&P.L.R.	
	No of Feet	Percent	No of Feet	Percent
Satisfactory	15	72.7	24	77.4
Unsatisfactory	6	27.3	7	22.6

TABLE (14):CORRELATION OF AGE AT OPERATION,LENGTH OF FOLL-OW UP TIME,AND THE END RESULTS OF TREATMENT

end results	Age at operation	Duration of Follow up
Satisfactory	29.6 months	38.2 months
Unsatisfactory	41.5 months	24.0 months

Fig.( )CORRELATION OF AGE AT OPERATION,DURATION OF FOLLOW UP,AND THE END RESULTS OF TREATM



II. RADIOLOGICAL RESULTS

The antero-posterior talo-calcaneal angle ranges from 15-30°. Before the intervention, the angle of 18 feet fell within the normal range and other 35 feet fell below the normal range. After intervention, only 4 feet fell below the normal range. Of 13 feet with unsatisfactory clinical result, 4 feet only had unsatisfactory angle, and the remainder had an angle within the normal range. So, there was a large overlap between the ranges of angle before and after intervention, and a poor correlation with the clinical result (Fig. 45).

The lateral talo-calcaneal angle ranges from 25-30°. Before the intervention, the angle of 48 feet fell below the normal range, and after intervention, 14 feet only fell below the normal range. Only 11 feet of them are assessed clinically as unsatisfactory, and the remainder had satisfactory clinical result. There was close correlation between the measurement of the angle and the clinical result (Fig. 46).

When the talo-calcaneal indices were compared, before and after intervention, it was clear that there was a shift towards the normal range with a very much smaller overlap between the two ranges. Before intervention, the indices fell between 24 to 55°, and after intervention between 40 to 82°. Of 13 feet with unsatisfactory clinical result, the range of indices were 40-58°, in the minimum, only 4 feet of them had an index of 40° (figs. 47, 48).

The antero-posterior talo-calcaneal diverge determines the relationship between the head of the talus and the head of the calcaneus. Before intervention, 27 feet had overlap 1+ - 2+, and 26 feet had overlap 2+ - 3+. After current management, 19 feet had overlap 1+ - 2+, and 12 feet had

overlap 2+ - 3+. Of the feet with unsatisfactory clinical results, 8 feet had 2+ - 3+ overlap, and the remainder had 1+. Only 4 feet with satisfactory clinical result had 2+ overlap.

The antero-posterior calcaneus-2nd metatarsal angle (5-30^{o}) determines the adduction deformity of the fore-foot. Fifty two feet had an angle below the normal range. After intervention, 26 feet had unsatisfactory radiological result. Only 13 feet of them had unsatisfactory clinical result, and the remainder had satisfactory clinical result (Fig. 49).

The lateral calcaneus-1st metatarsal angle (140-160^{o}) determines the cavus angulation of the mid-foot. The results in the feet with satisfactory or unsatisfactory result were similar, and averaged 145^{o} and 164^{o}, and no feet had angle below the normal range.

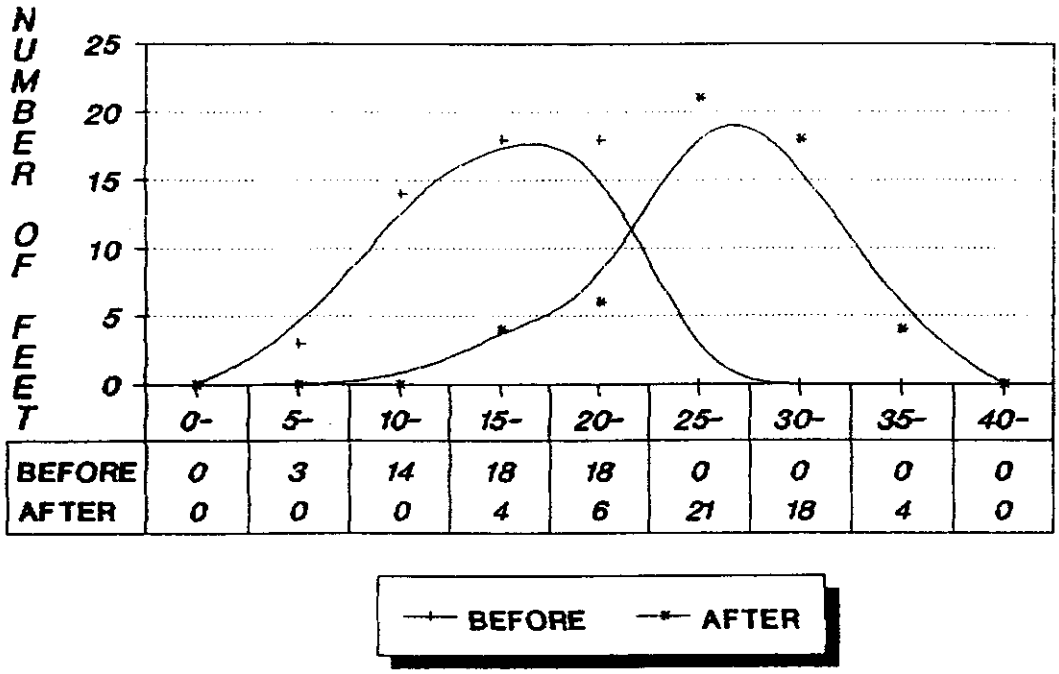
The lateral tibio-calcaneal angle (70-90^{o}) determines the equinus position of the heel. Before intervention, 47 feet had an unsatisfactory angle, and after intervention, 17 feet had unsatisfactory radiological result. Only 4 feet of them are assessed clinically as being satisfactory, and the remainder being recorded as clinically under-correction (Fig. 50).

On the antero-posterior view, navicular position with reference to the longitudinal axis of the talus represents the talo-navicular subluxation. Of 33 feet had an ossified navicular, 11 feet were central, 14 feet were displaced medially by one quarter of the talar head. Only 8 feet were displaced medially by one half of the talar head, and associated with unsatisfactory clinical results. Also, the antero-posterior talo-1st metatarsal angle (0-20^{o}) can offer information regarding subluxation at the talo-navicular joint, when the navicular

was unossified. Of 20 feet, had non ossified navicular, 6 feet had unsatisfactory radiological results.

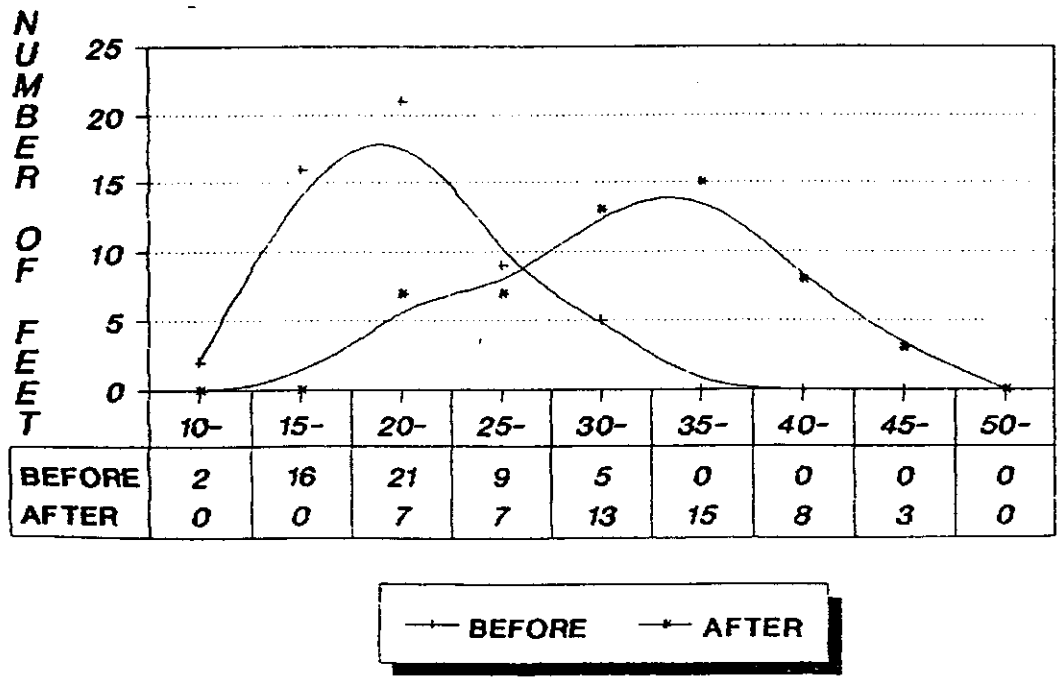
Table (15), and Fig. (51) summarize the results of our roentgenographic evaluation on the antero-posterior and lateral views, before and after intervention.

Fig.(45) CHANGE IN ANTERO POSTERIOR TALOCALCANEAL ANGLE



	0-	5-	10-	15-	20-	25-	30-	35-	40-
BEFORE	0	3	14	18	18	0	0	0	0
AFTER	0	0	0	4	6	21	18	4	0

Fig (46) CHANGE IN LATERAL TALOCALCANEAL ANGLE



	10-	15-	20-	25-	30-	35-	40-	45-	50-
BEFORE	2	16	21	9	5	0	0	0	0
AFTER	0	0	7	7	13	15	8	3	0

Fig.(47) CHANGE IN TALOCALCANEAL INDEX

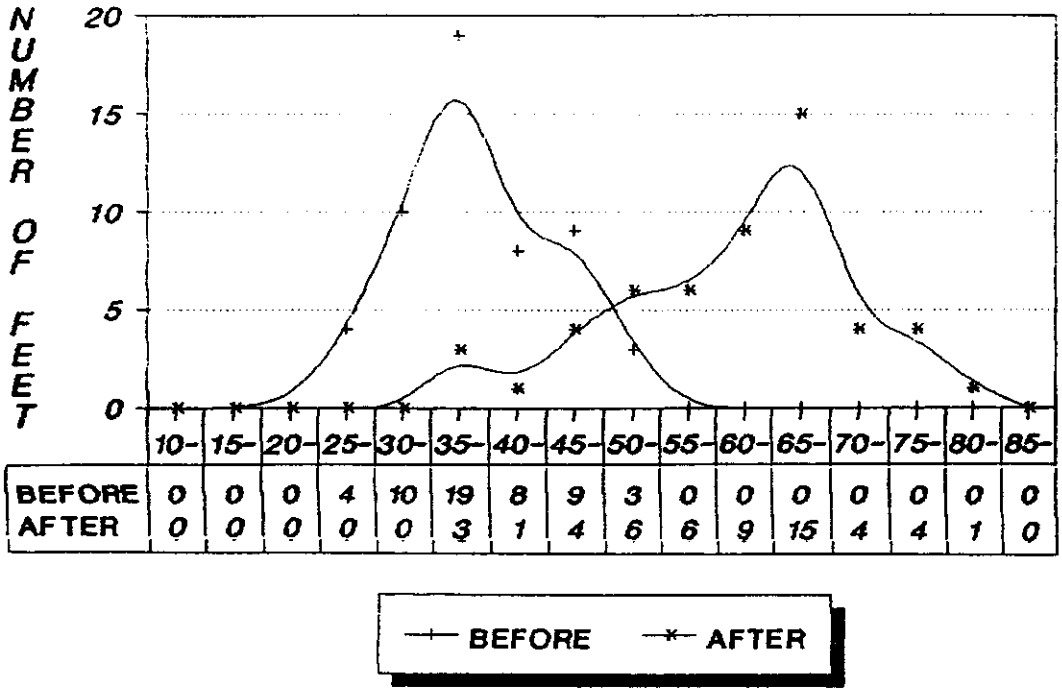


Fig.(48) RADIOLOGICAL PRESENTATION BEFORE AND AFTER INTERVENTION C: TALOCALCANEAL INDEX

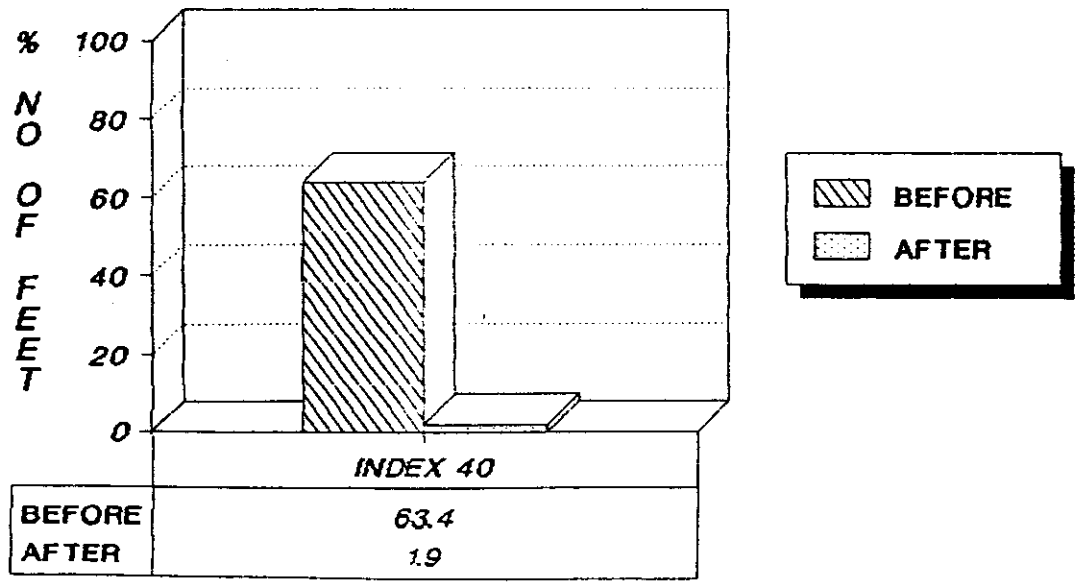
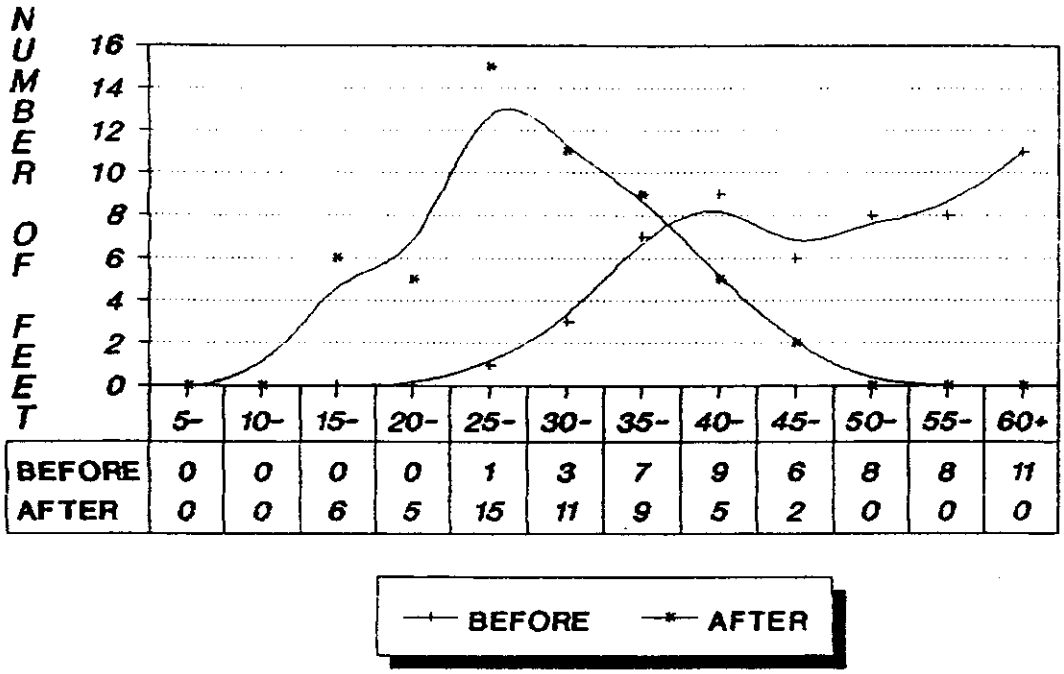
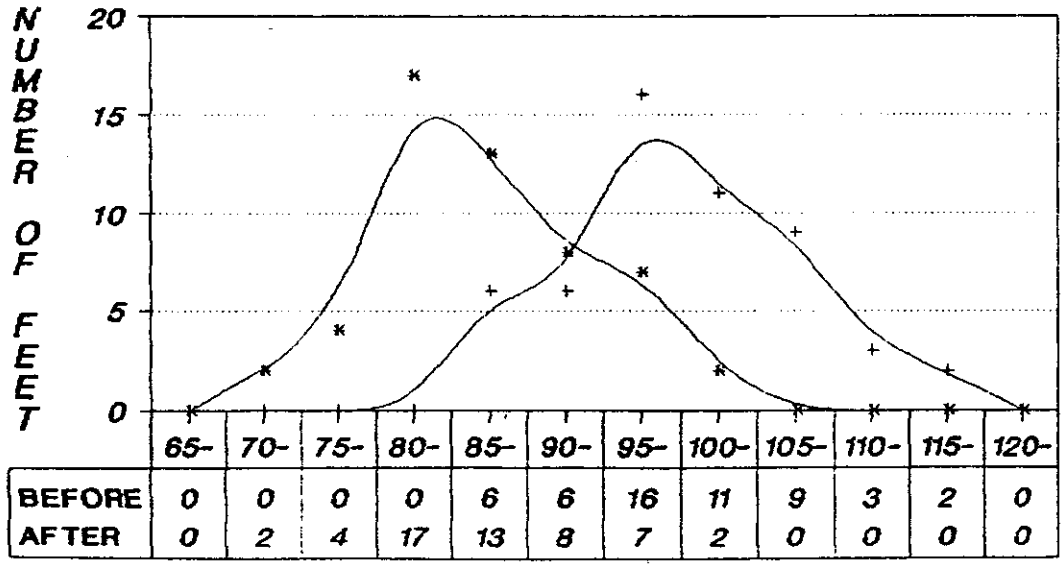


Fig.(49) ANTERO POSTERIOR CAL. SECOND METATARSAL



	5-	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60+
BEFORE	0	0	0	0	1	3	7	9	6	8	8	11
AFTER	0	0	6	5	15	11	9	5	2	0	0	0

Fig.(50) LATERAL TIBIOCALCANEAL ANGLE

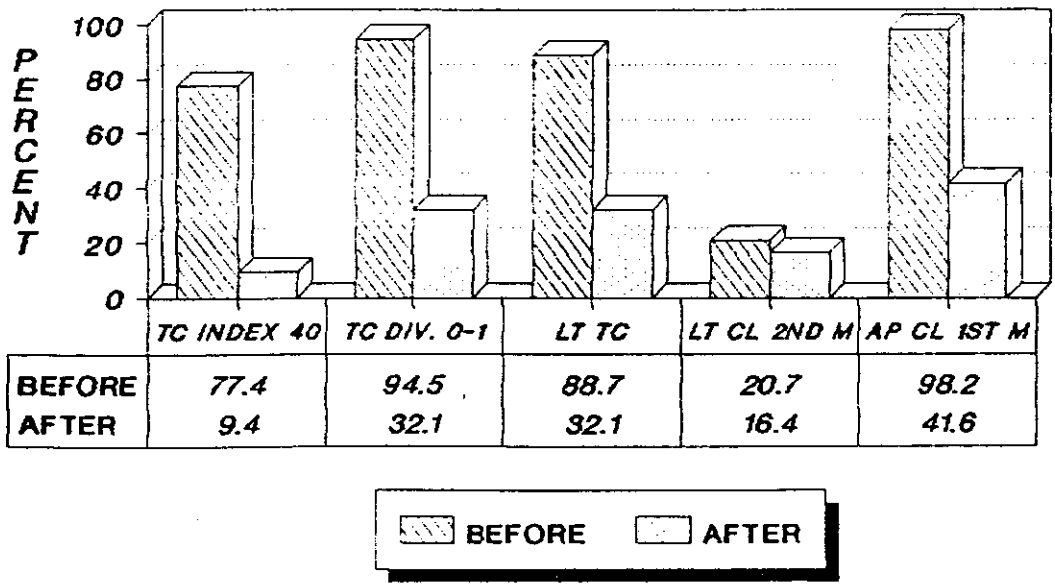


	65-	70-	75-	80-	85-	90-	95-	100-	105-	110-	115-	120-
BEFORE	0	0	0	0	6	6	16	11	9	3	2	0
AFTER	0	2	4	17	13	8	7	2	0	0	0	0

TABLE(15): CHANGES IN MEASURMENTS OF ANGLES ON PRE-OPERATIVE AND POST-OPERATIVE RADIOGAPHS IN DEGREES(mean)

	mean change in degree		Significance of diffrence
	Pre-	Post-	
Antero.Posteribr view.			
Talo.Calcaneal angle	17.67°	28.67°	Significant
Talo-Calcaneal diverge	2.5+	0.83+	"
Calcaneo-2nd metatarsal	50.49°	27.83°	"
Navicular Position	2	1	"
Lateral view			
Talo-calcaneal angle	21.9°	35.1°	"
Calcaneo-1st metatarsal	145.7°	151.7°	"
Tibio-Calcaneal angle	100.79°	88.67°	"

Fig.(51)RADIOLOGICAL RESULTS OF 53 FEET FOLLOW UP AT 36 MONTHS BEFORE AND AFTER TREATMENT



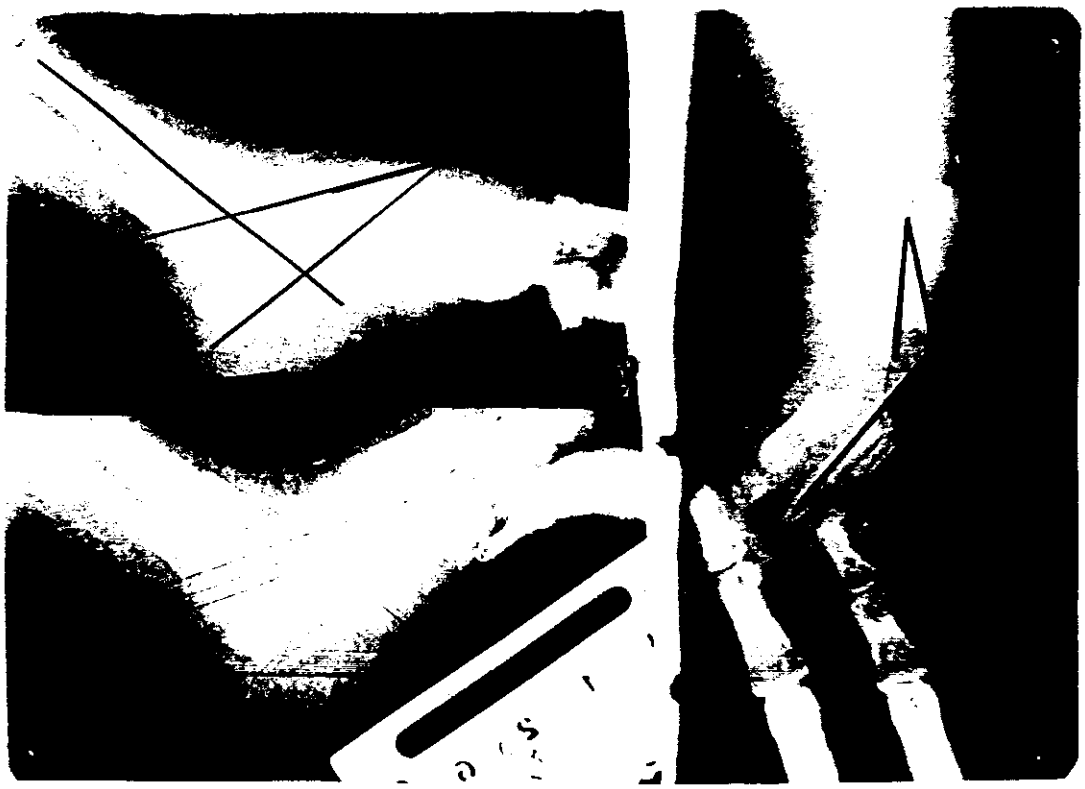
	TC INDEX 40	TC DIV. 0-1	LT TC	LT CL 2ND M	AP CL 1ST M
BEFORE	77.4	94.5	88.7	20.7	98.2
AFTER	9.4	32.1	32.1	16.4	41.6

III. CASE REPORTS

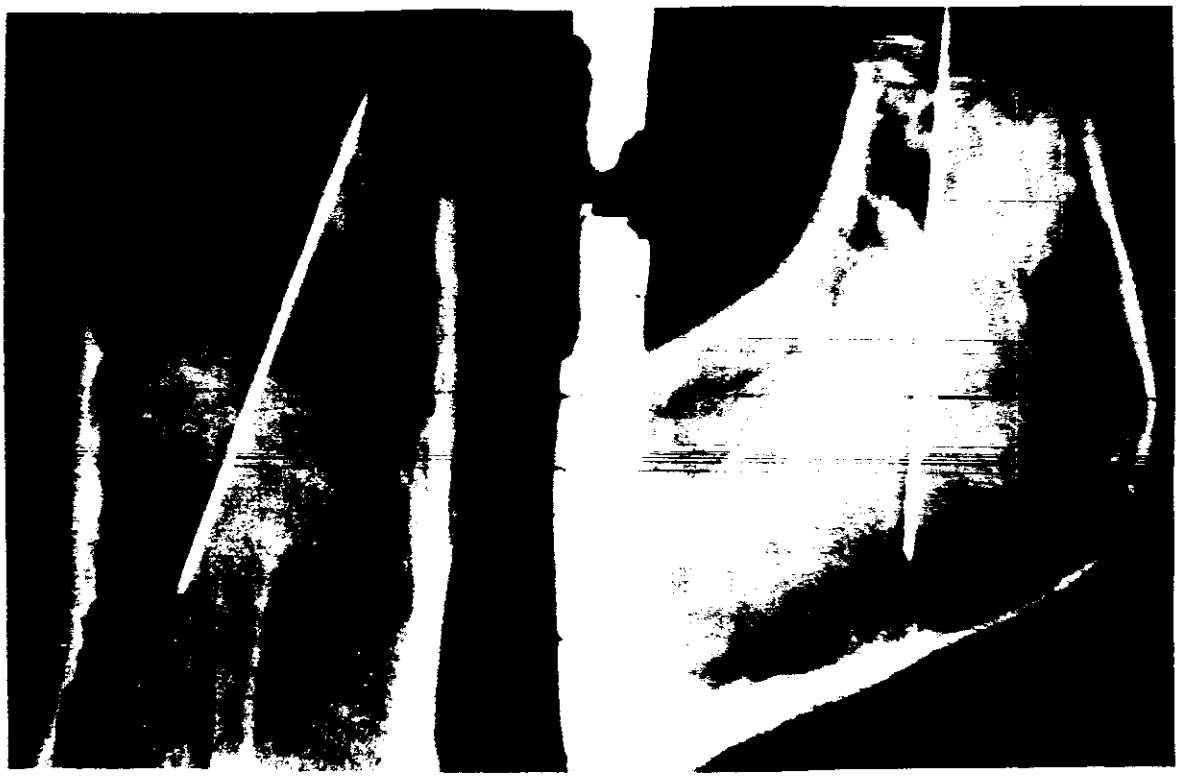
The following case reports illustrate some examples of the cases of this study:

Case 1. A 1.8 months old girl with left relapsed clubfoot. The duration of follow up care was 36 months. She received inadequate previous posteromedial release and limited postoperative immobilization time and follow up care for 6 months.

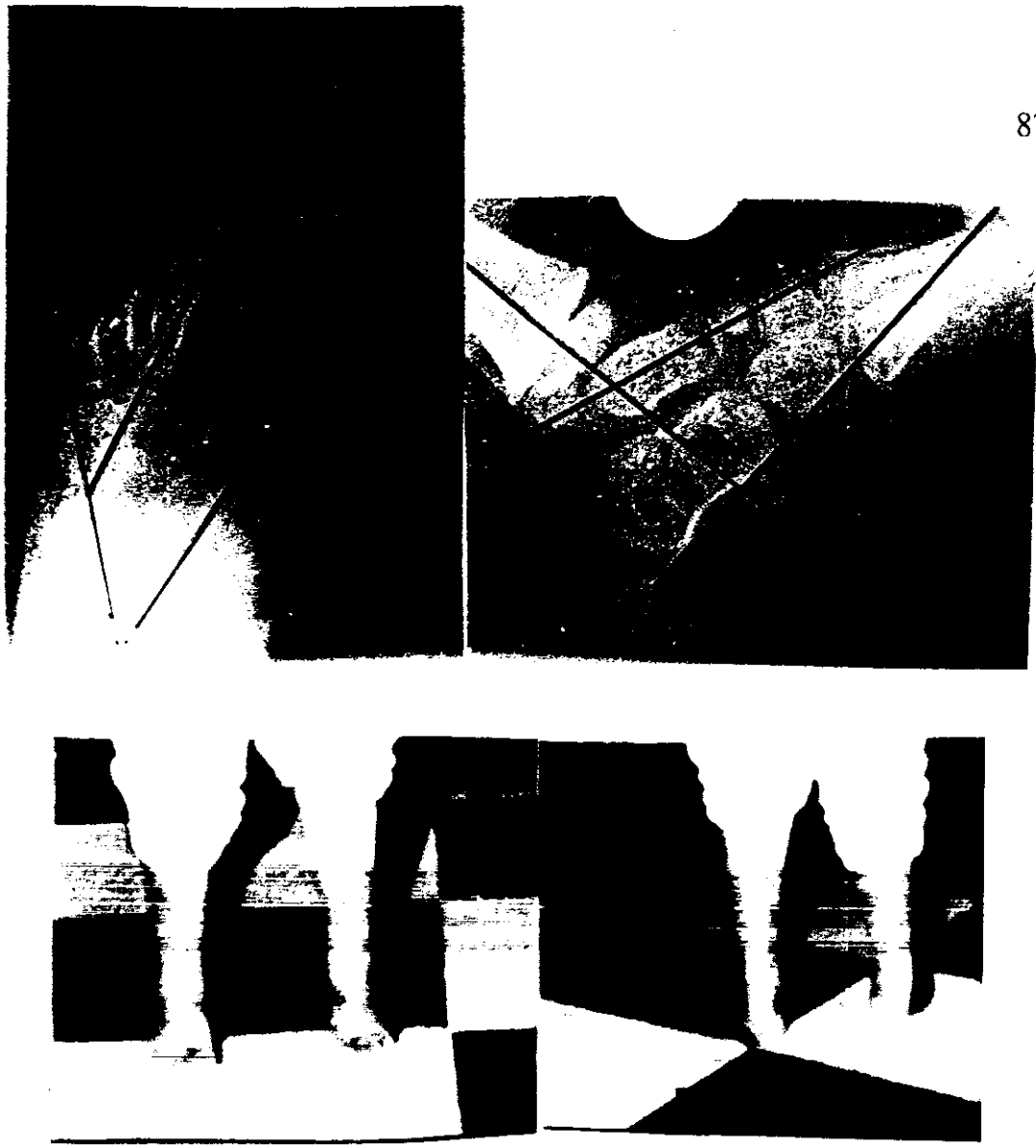
Case 1. Preoperative appearance of left foot showing all components of deformity with variable degrees.



Case 1. Preoperative roentgenogram showing severe deformities with dislocation of talo-navicular joint.

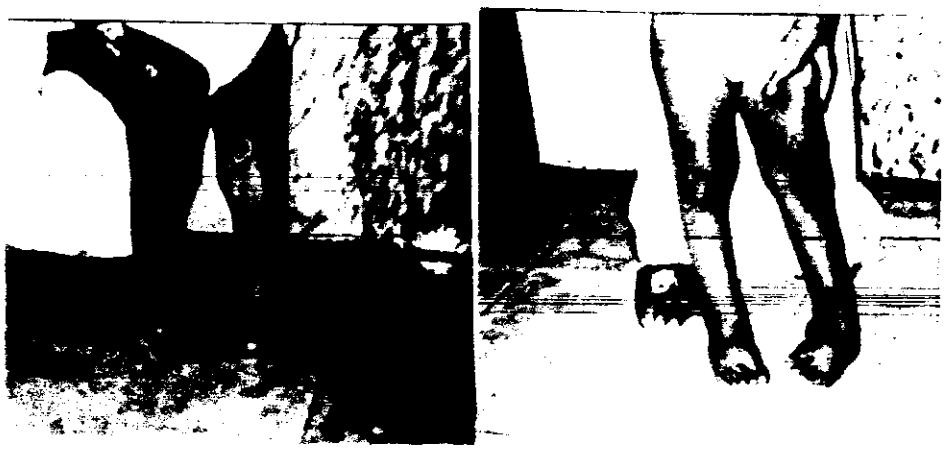


Case 1. Postoperative roentgenogram after posteromedial release and internal fixation of talo-navicular joint.

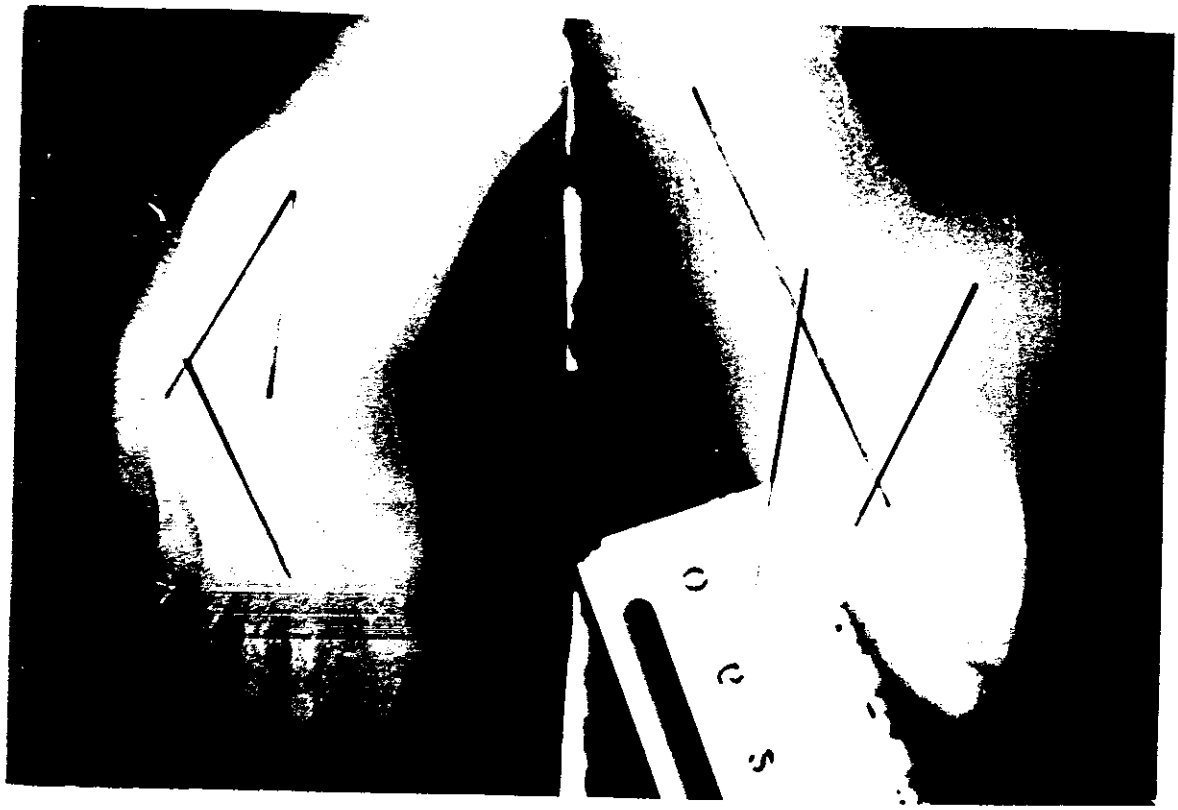


Case 1. Postoperative roentgenogram and appearance of the left foot after follow up 36 months. Final result was rated as excellent.

Case 2. A 35 months old boy with left relapsed clubfoot. The duration of follow up care was 34 months. He received inadequate previous posteromedial release and limited postoperative immobilization time and follow up care for 5 months.

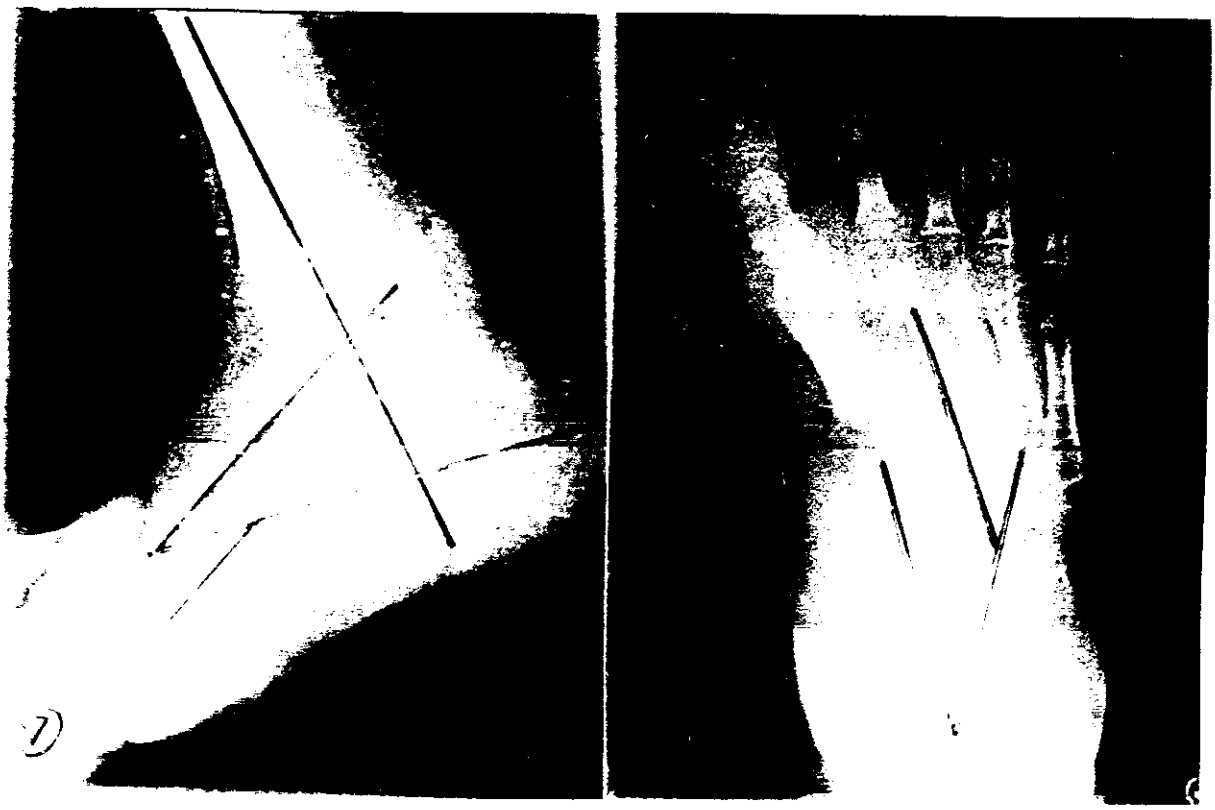


Case 2. Preoperative appearance of the left foot showing severe equinus and varus heel, internal rotation of the calcaneus and supination and adduction of the fore part of the foot.



Case 2. Preoperative roentgenogram showing severe deformity with dislocation of the talo-navicular joint.

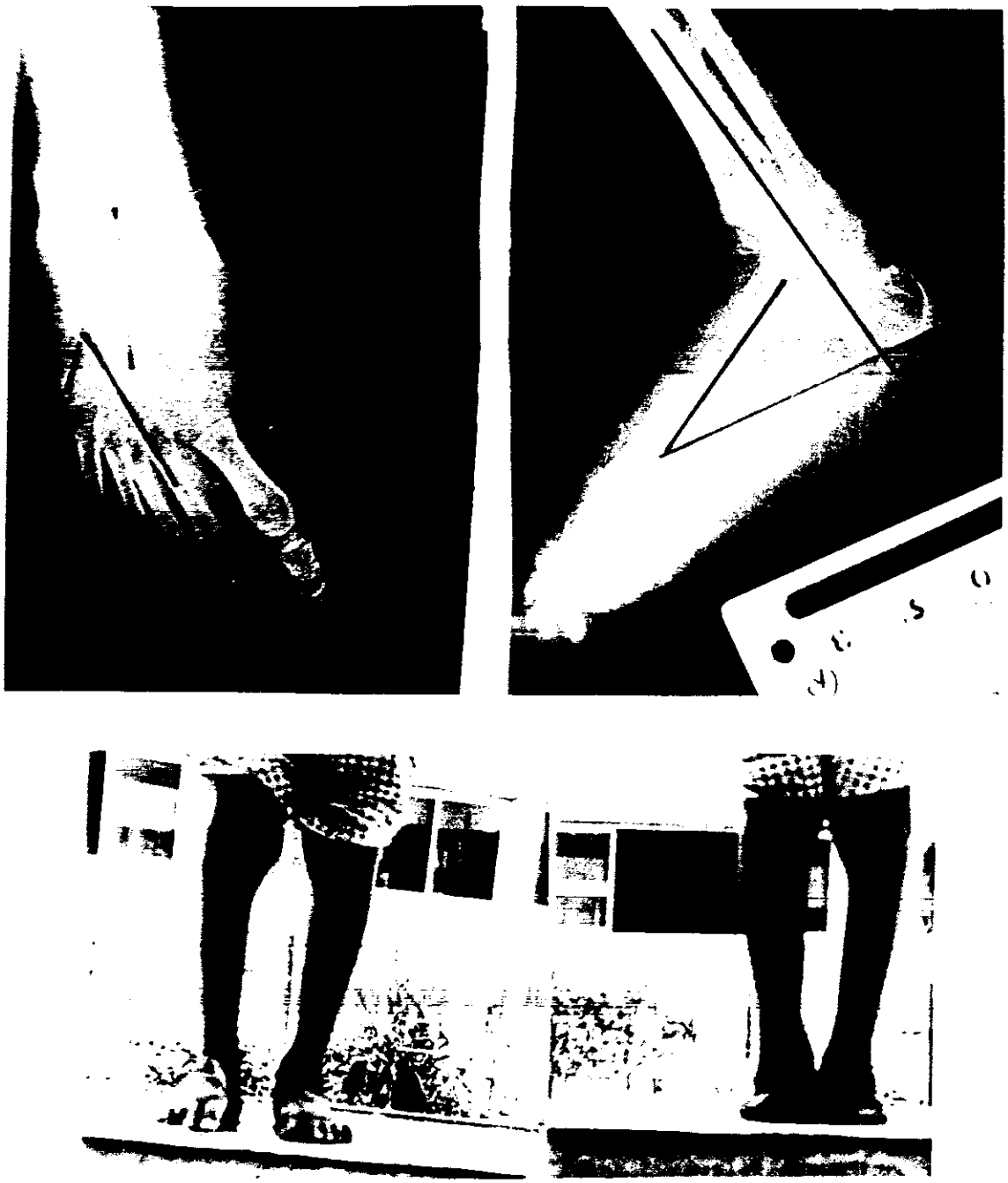
Case 2. Carroll's procedure was done through 2 incisions and internal fixation of the calcaneo-cuboid joint.



Case 2. Postoperative roentgenogram and appearance of the left foot after follow up 34 months, and the final result was rated good.

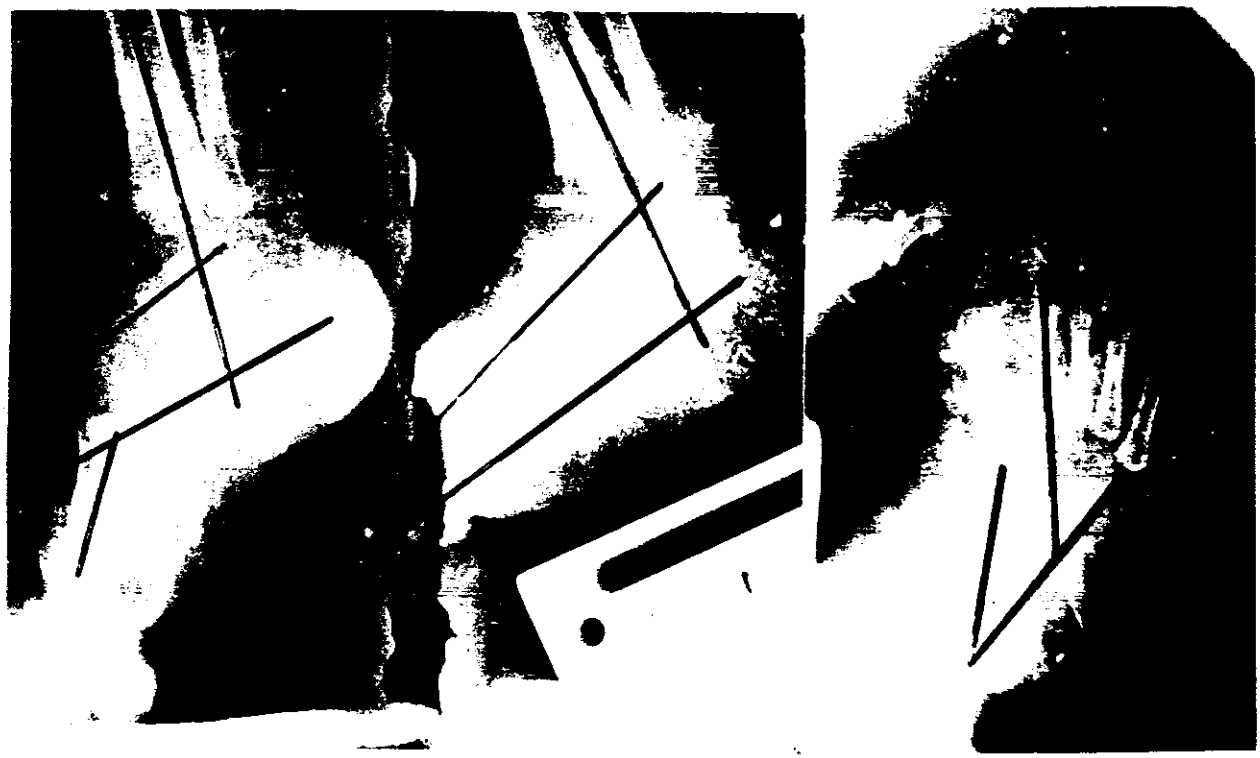
Case 3. A 47 months old girl with left relapsed clubfoot. The duration of follow up care was 38 months. She received inadequate previous posteromedial release and limited postoperative immobilization time and follow up care for 11 months.

Case 3. Preoperative appearance and roentgenogram of left foot showing severe varus heel and internal rotation of the calcaneus, and supination of the fore part of the foot.

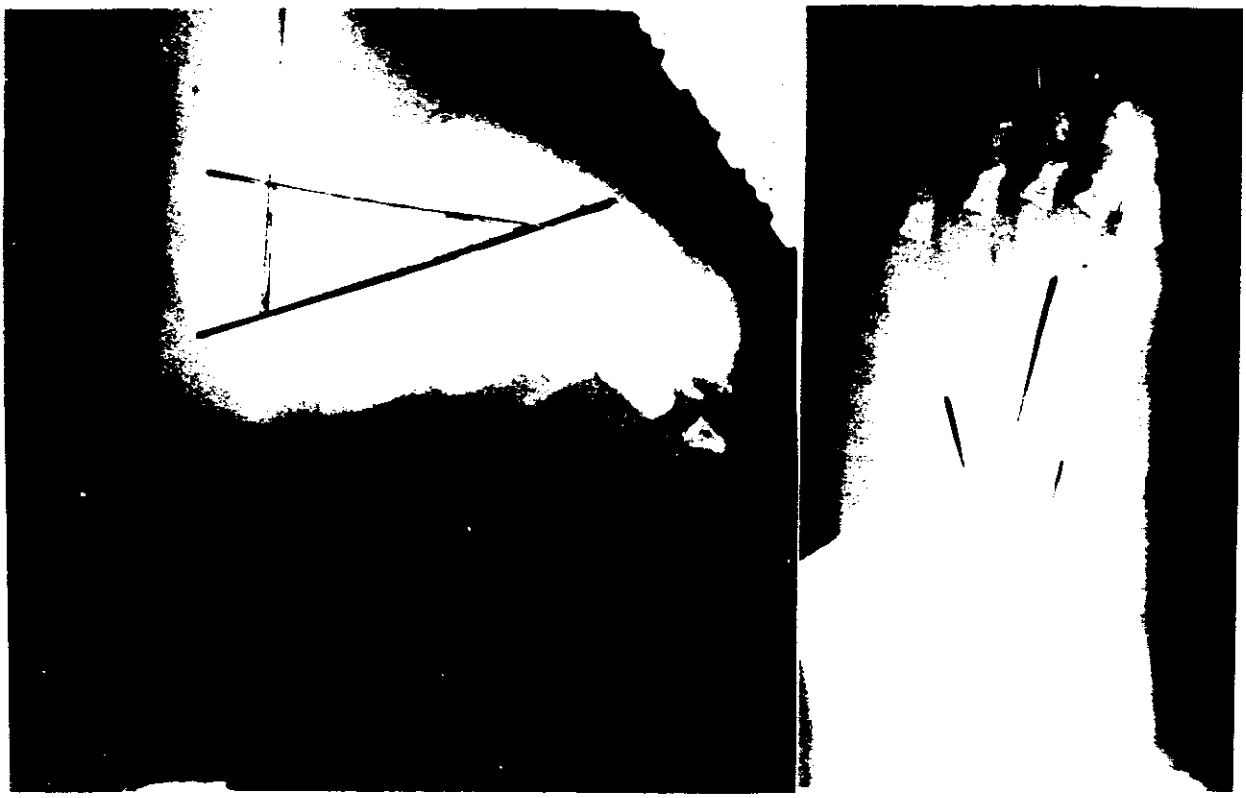


Case 3. Postoperative roentgenogram and appearance of the left foot after Carroll's and Lichtablau's procedures through 2 incisions, after follow up 38 months and final result was rated good.

Case 4. A 18 months old boy with left relapsed clubfoot. The duration of follow up care was 38 months. He received inadequate previous posteromedial release and limited postoperative immobilization time and follow up care for 4 months.



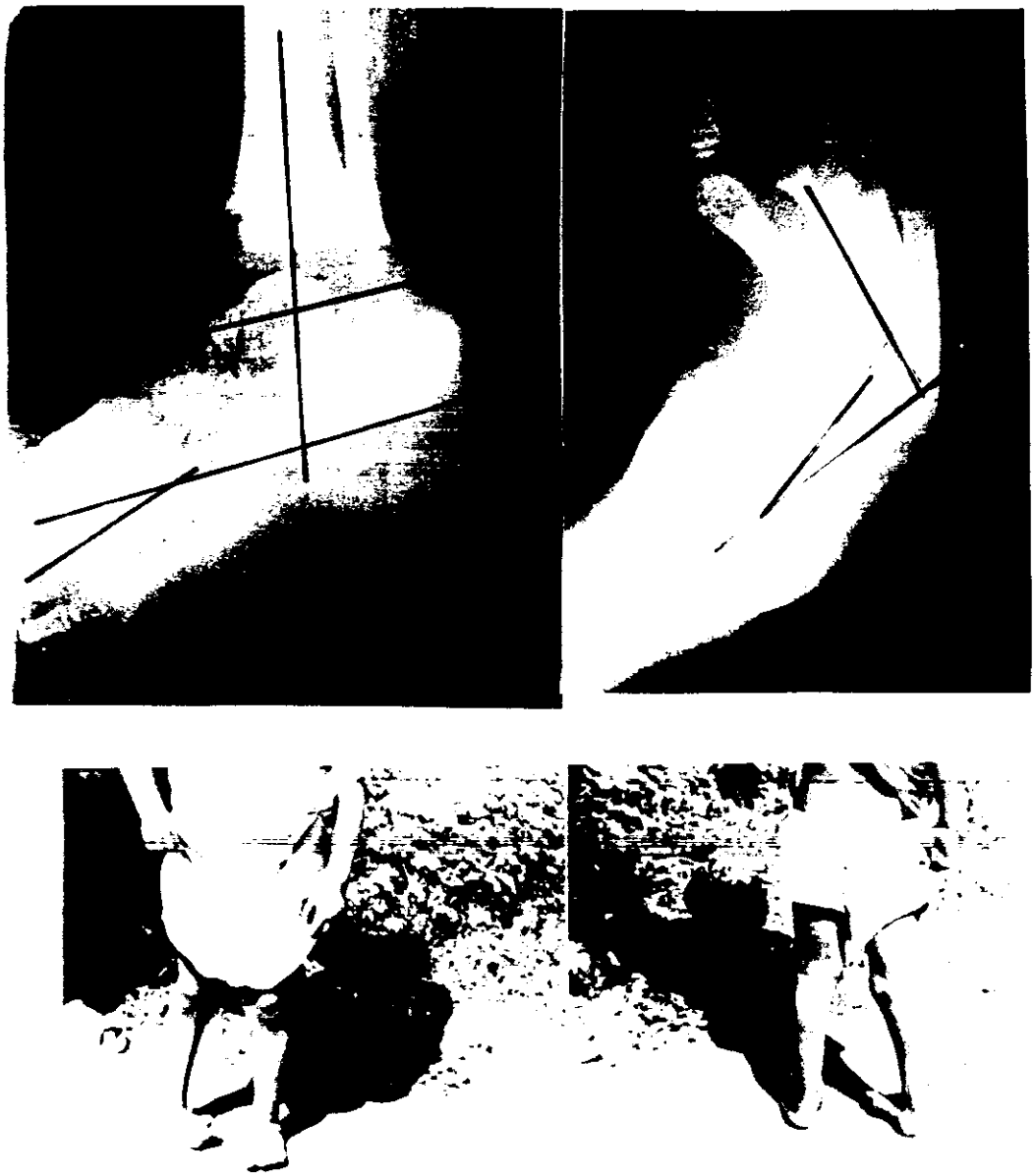
Case 4. Preoperative roentgenogram showing all components of deformity with different degrees.



Case 4. Postoperative roentgenogram after posteromedial release and tibialis anterior transfer.

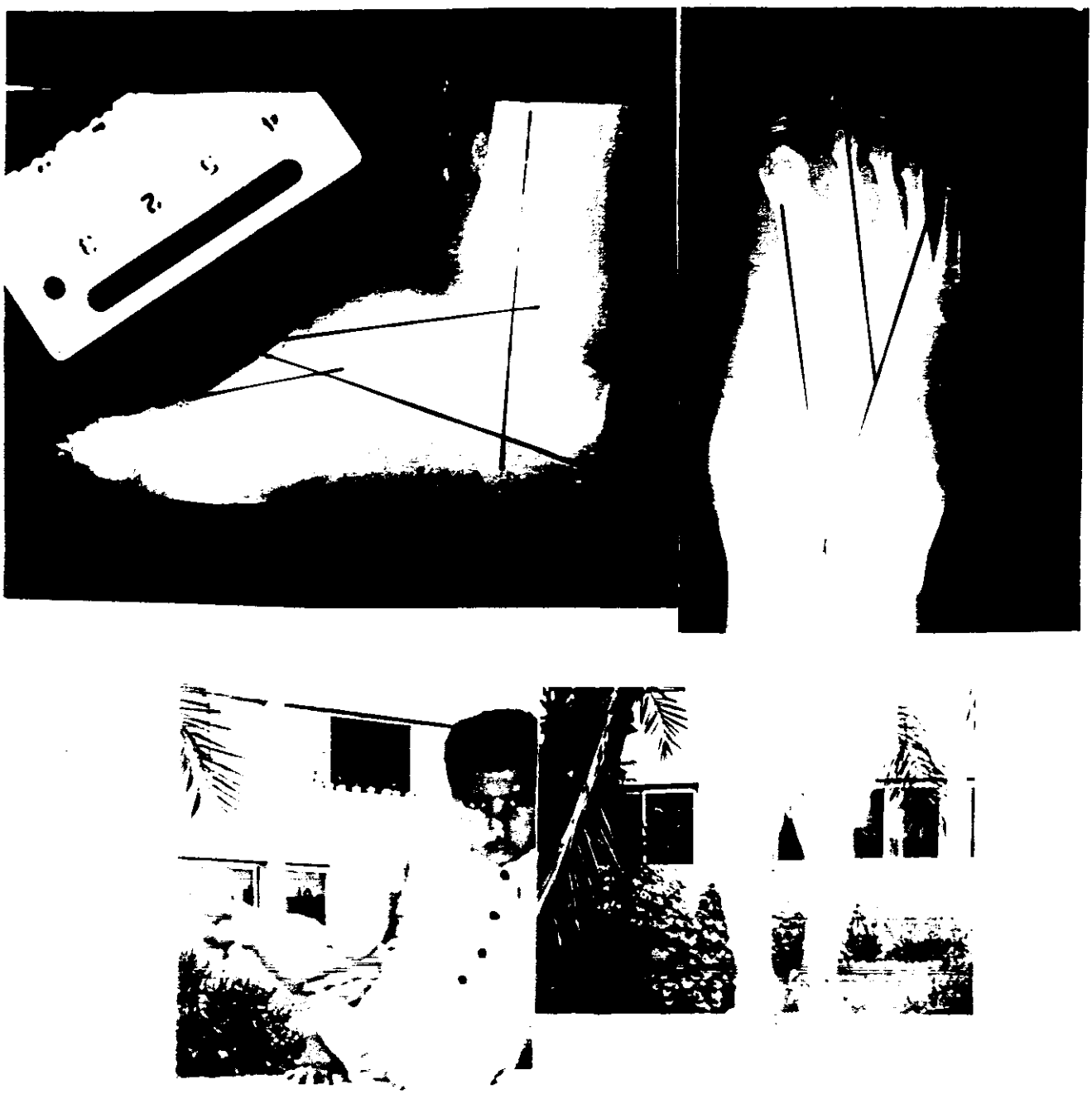
Case 4. Preoperative appearance, and postoperative appearance with some valgus deformity of the heel and overcorrection. Final clinical appearance was rated good.

Case 5. A 38 months old boy with left relapsed clubfoot. The duration of follow up care was 34 months. He received inadequate previous posteromedial release and limited postoperative immobilization time and follow up care for 11 months.



Case 5. Preoperative appearance and roentgenogram showing severe varus, equinus, and internal rotation deformity of the calcaneus and supination and adduction of the forefoot.

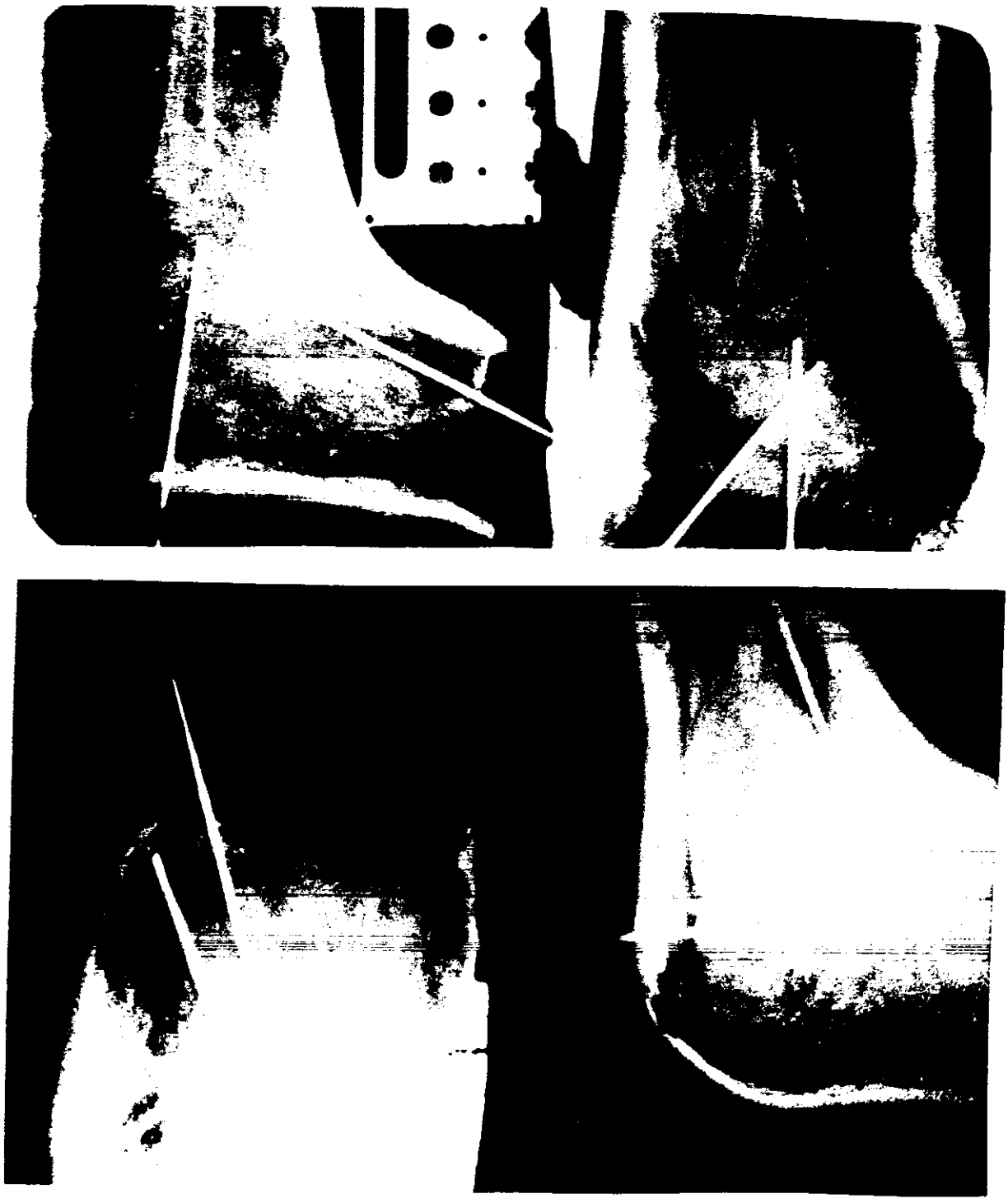
Case 5. Complete subtalar release was done through C-shaped Cincinnati incision and internal fixation of the talo-calcaneal and talo-navicular joints for 3 weeks.



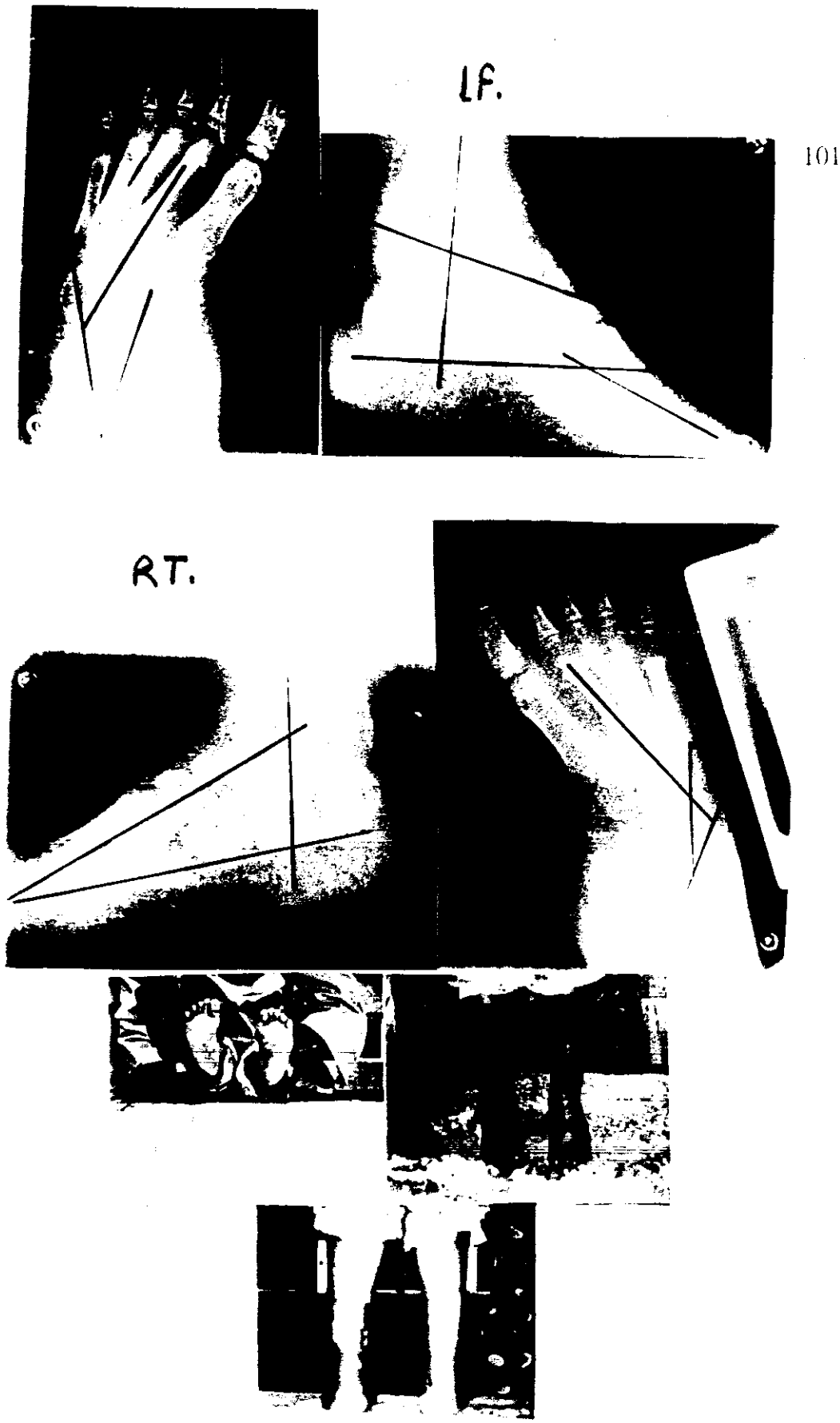
Case 5. Postoperative roentgenogram and postoperative appearance after follow up 34 months. The final result was rated excellent.

Case 6. A 18 months old girl with bilateral relapsed clubfoot. The duration of follow up was 36 months. She received inadequate posteromedial release and limited postoperative immobilization and follow up care for 5 months.

Case 6. Preoperative appearance and roentgenogram showing all components of deformity with different degrees.



Case 6. Right complete subtalar release and internal fixation of the talo-navicular and talo-calcaneal joints were done. Left posteromedial release and lateral release with tibialis anterior transfer and internal fixation of the talo-navicular and talo-calcaneal joints were done.



Case 6. Postoperative appearance and roentgenogram after follow up 36 months showing excellent results.