

Docking Tips...



The space shuttle docking at the international space station



Bone gap after component fracture tibia



A standard distal to proximal bone transport



Apparently simple pictures of the bone transport working without any problems. Do all cases of bone transport progress so smoothly?

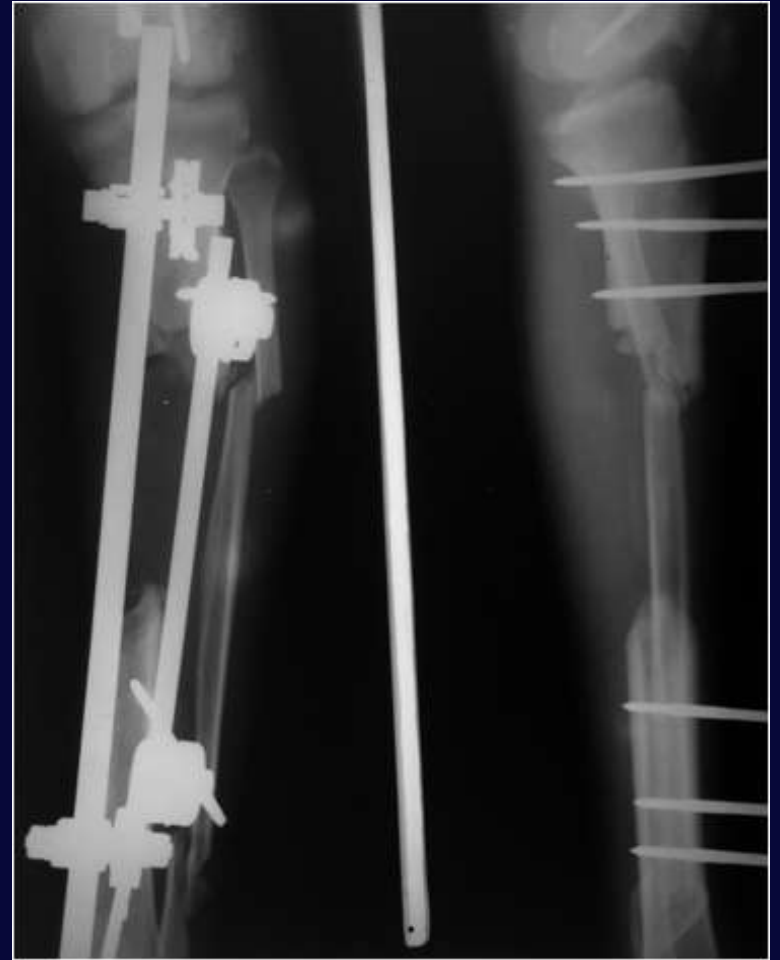
Is it
Rocket science?

Or do we need a lot of calculations & is it rocket science?

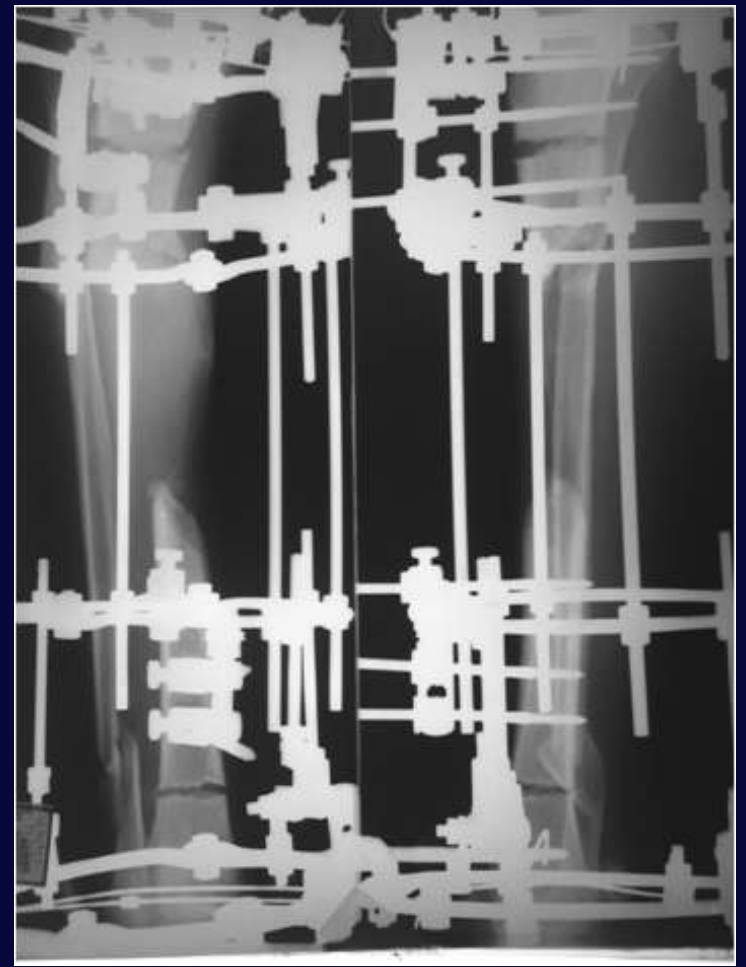
Docking problems

- Malalignment
- Skin invagination
- Partial cortical loss
- Oblique NU surfaces
- Small fragments

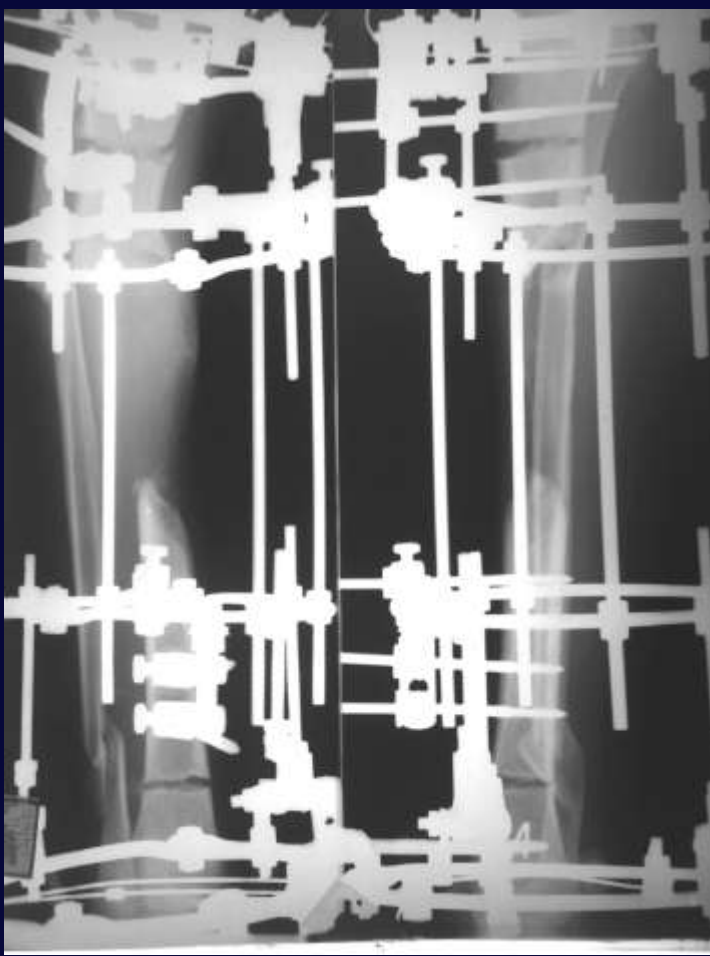
Impediments to transport



22 year old patient with bone loss of 12 cm in the middle of the tibia was treated with an external fixator.



He was treated with Ilizarov bifocal bone transport with a Proximal and distal corticotomy.
The distal corticotomy progressed unhindered
The proximal fragment could not be transported due to impediment of the malunited fibula.



The proximal fragment was disengaged from the proximal fibula translating it medially with the help of hinges and washers. The transport progressed without incident and non-union site docking was Achieved by oblique compression of the bony surfaces.

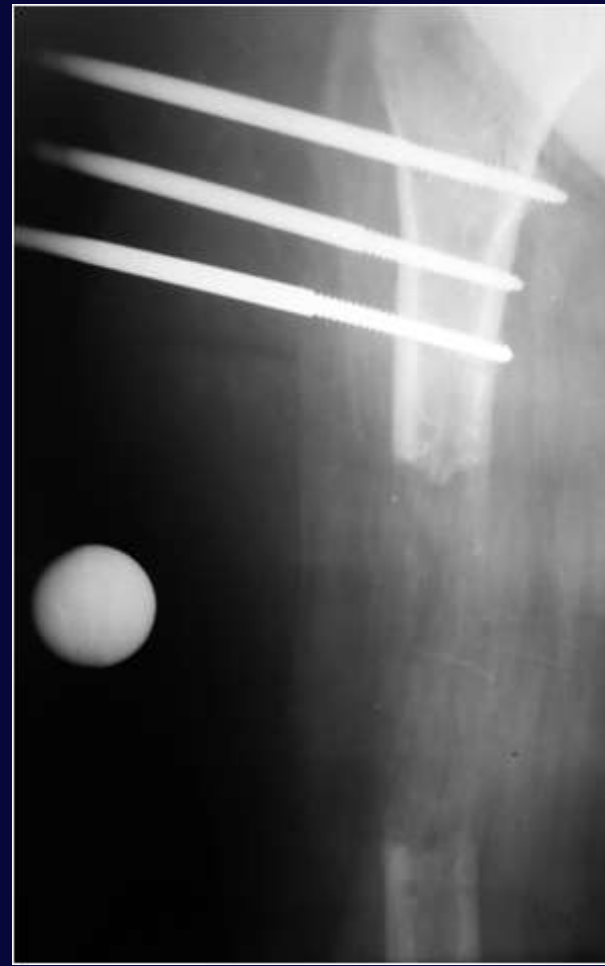


Compression was given @ $\frac{1}{4}$ mm x twice a week.
This prevented overriding & shortening at the
non-union site.

Oblique NU surfaces



Large gap in femur did not heal despite multiple bone grafting surgeries including fibular grafting. There was no bone formation at all. Overall shortening and bone gap exceeded 12 cm. She was walking with crutches for the last 2 years.



25 yr old IIM Student , LRS fixation done in the upper femur . 8 cm of bone the regenerated without many problems. Attended all classes during Rx

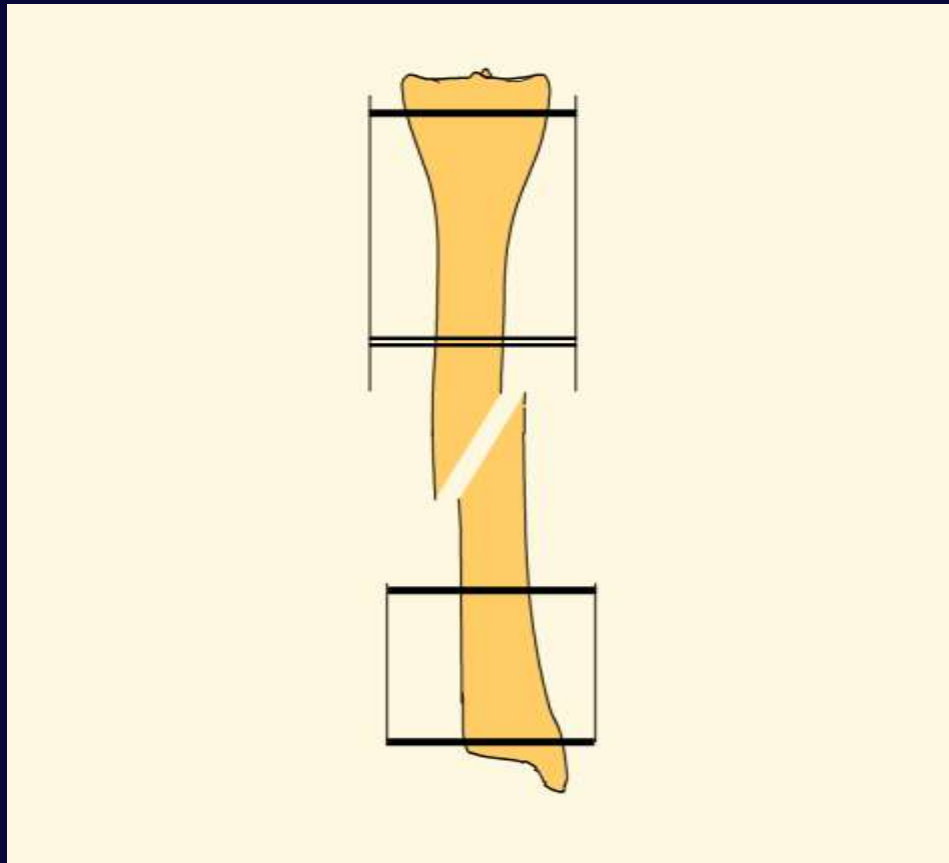


Oblique NU surfaces. Longitudinal compression only succeeded in creating overriding of the bony fragments. This added to the shortening but it did not result in union.

Since bone grafting sites were exhausted, platelet concentrate injections were given. Side to side compression was achieved with the help of washers. This permitted healing without further shortening.

Think Lateral

[Click Here to See Animation](#)



Think Lateral



Lateral x-ray of Lower femoral shows horizontal compression of the non-union surfaces.

Think Nutrition

The difficulties in achieving union at the non-union site were also due to severe deficiency of the vitamin D and very poor haemoglobin levels

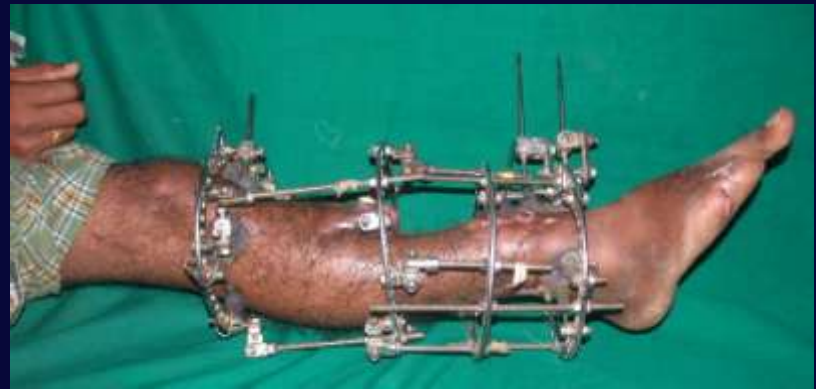
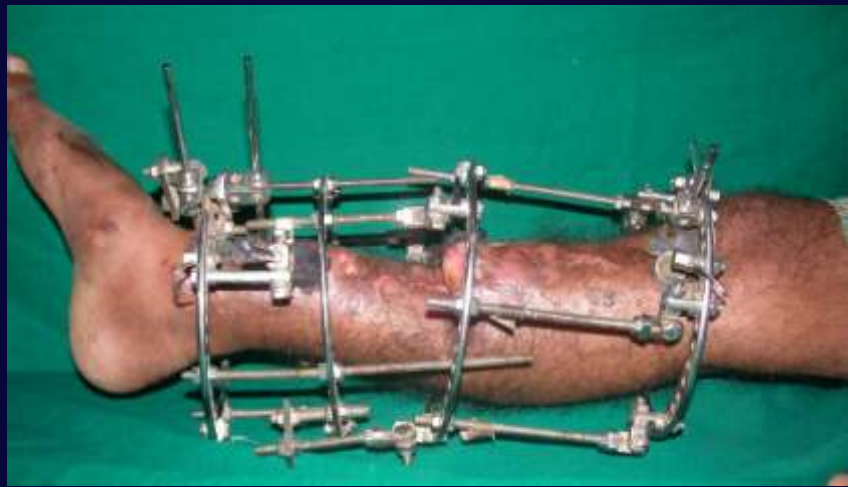


After almost 18 months,
Result is union without further overriding & shortening.

Valley formation



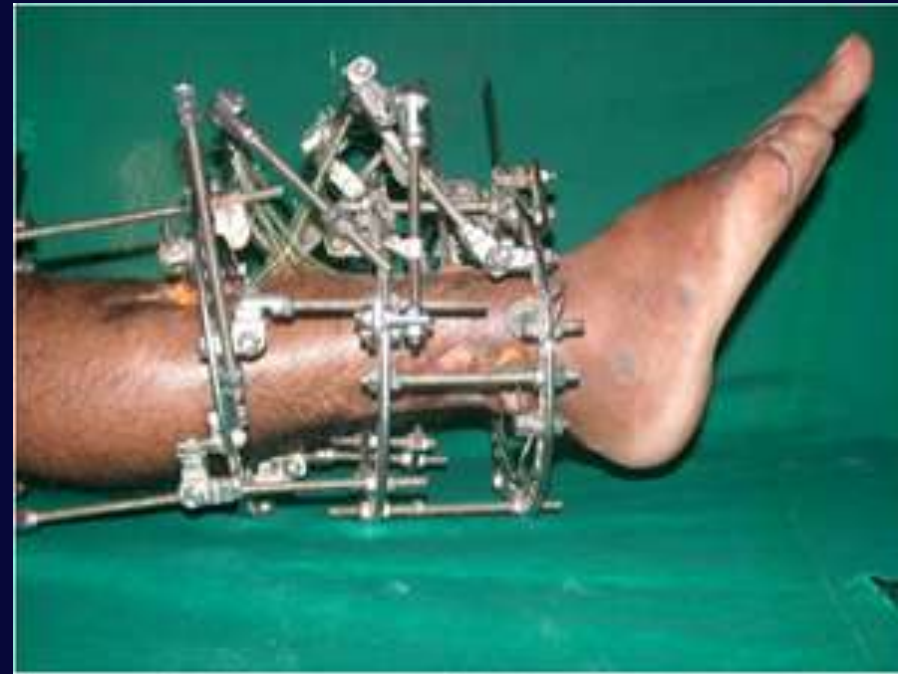
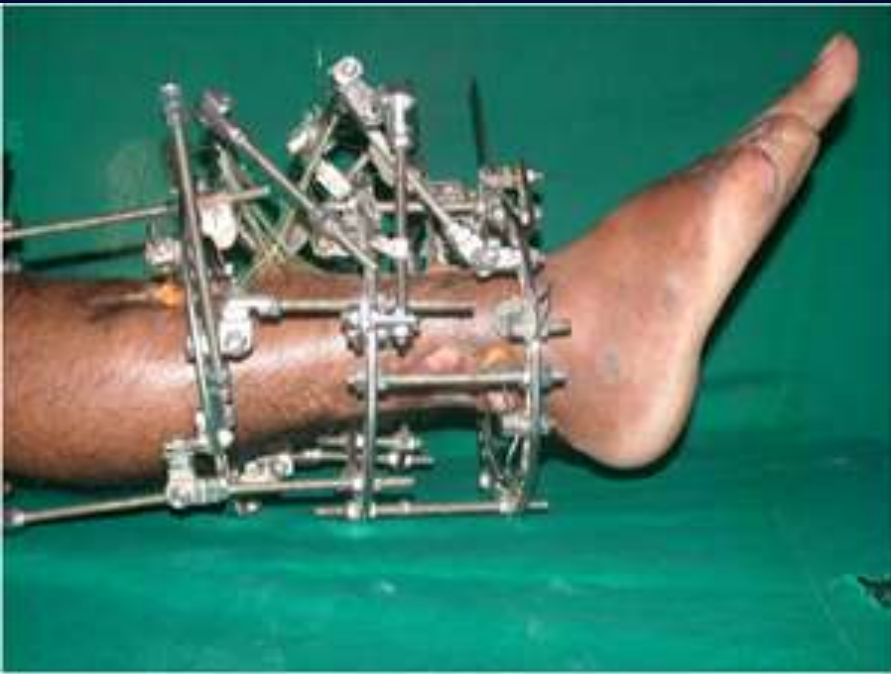
30-year-old with 15 cm bone gap in the middle of the tibia with very fibrotic skin and soft tissues. Presented 6 months after the initial injury.



Started Ilizarov bone transport technique. After proximal corticotomy the bone fragment transported gradually distally. The fibrous tissues did not allow the intervening segment to pass underneath them & the intervening fragment started projecting out of the skin.

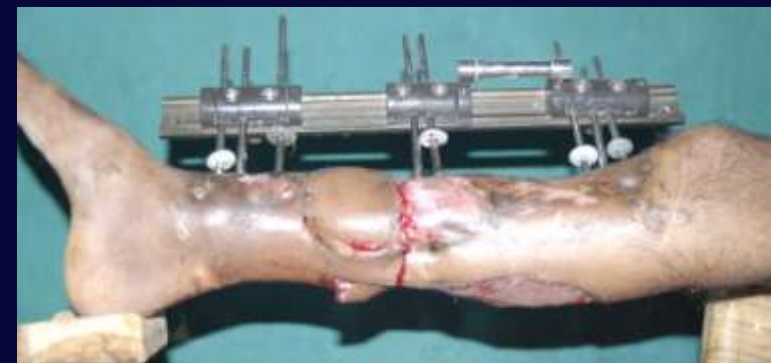
Keep it Simple

Skin transport Does not always work!



we tried the skin transport technique wherein wires were used and ingenious modification of the apparatus to try and lift up the skin and allow the bone to pass. However this method does not always work.

Local flaps reliably do!



Since the proximal bone transport regenerate had hardened, we converted the fixation to an LRS fixator. We then performed a distally based fascio-cutaneous flap after excising the dense fibrous tissue in the Valley formation. The flap very nicely covered the gap and allowed the transport to progress.

LRS is convenient when things are simple!



There was some minor malalignment of the docking fragments as it approached lower down. Minor changes can be made within the LRS fixator but when 3-D control is needed, it is best to convert the fixation to the Ilizarov.



When in need of 3D control turn to Ilizarov

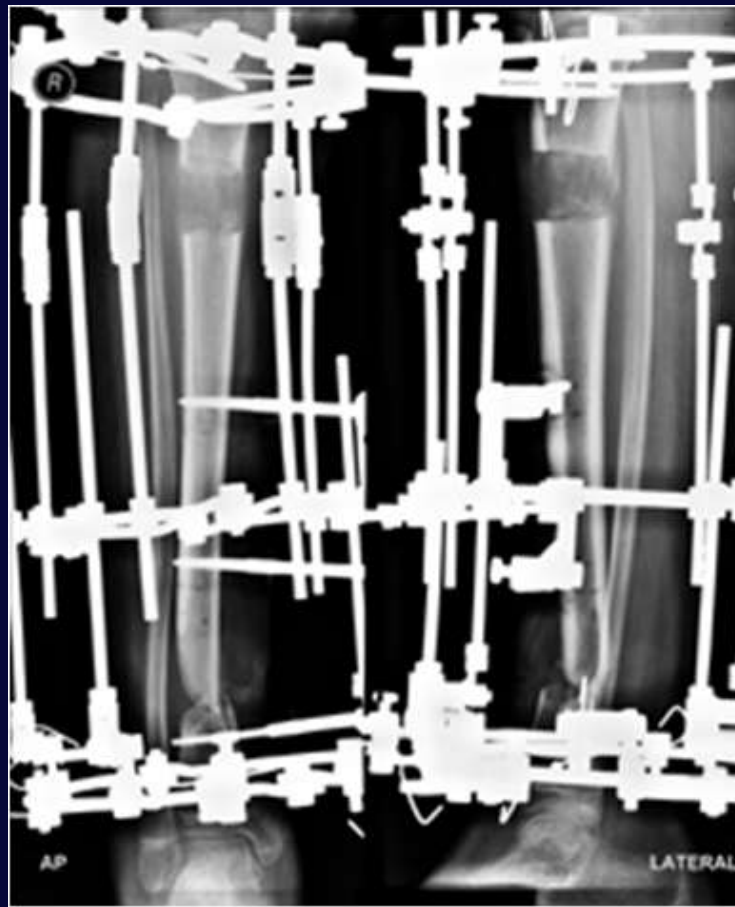


Finally a good result at the end of 18 months.
He has no infection nor deformity and no leg length discrepancy and a sound union which has filled up the bone gap.

Irregular bony ends at gap
NU



16-year-old schoolboy with a compound fracture tibia which resulted in a 4 cm gap in the lower tibia.



Proximal corticotomy was done and a bone transport progressed. The shape of the bone fragments at the non-union site was irregular and tapering. Had we resected the bony ends to make them transverse, it would have resulted in a much larger Bone gap needing a much longer treatment.

Reluctance for BG



At the non-union site the bony fragments were allowed to unite as a point contact union with no more than 40% circumferential contact. Hence he was protected with a brace till the non-union site gradually filled up.

Acute trauma, Diabetic



35-year-old diabetic patient had a serious accident with grade III B compound fracture of the tibia with severe soft tissue loss anteriorly.

Early Ilizarov, many debridements



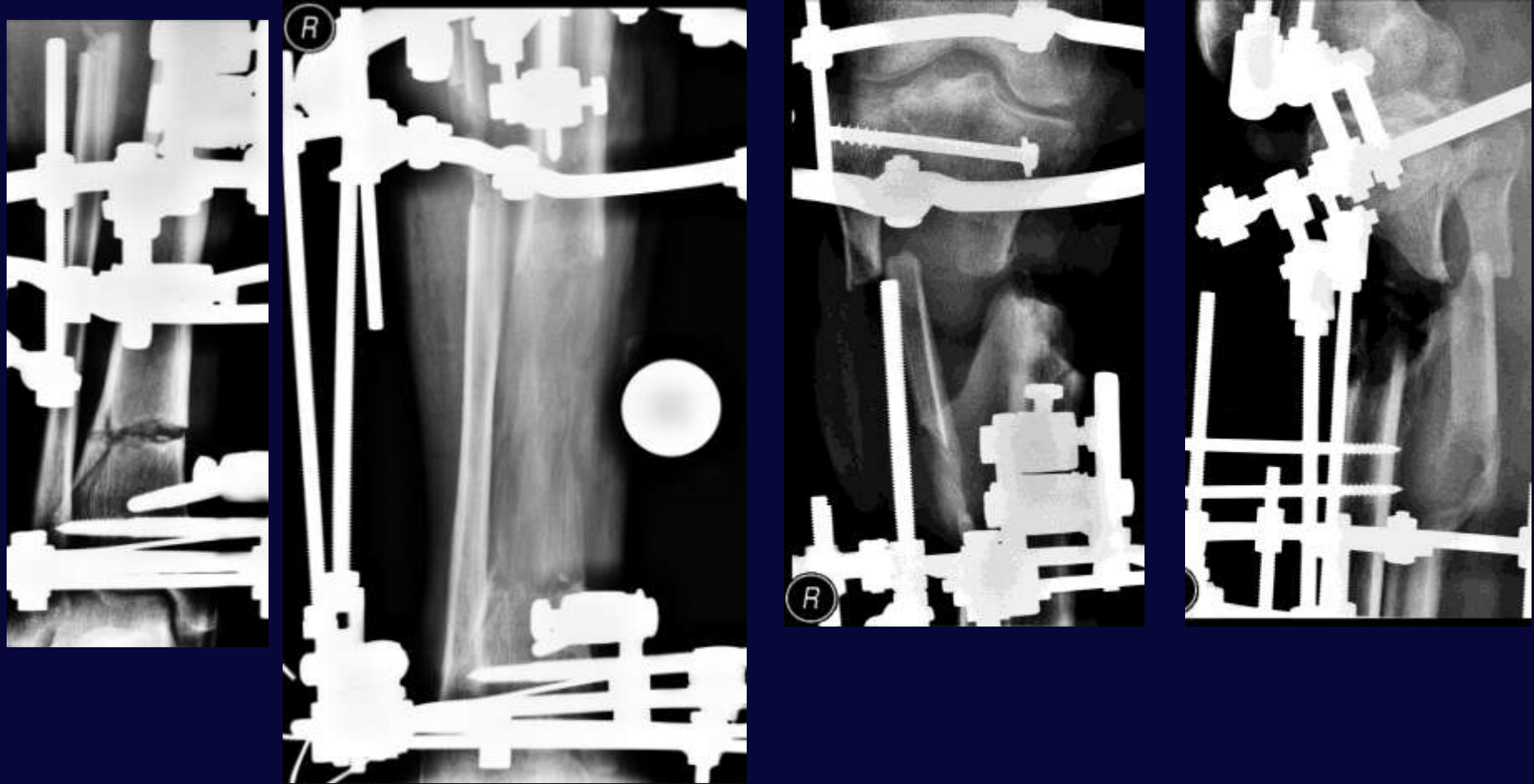
Stabilisation with Ilizarov fixator along with multiple debridements made the wound healthy.



Medial Gastroc Flap

First small steps for the man

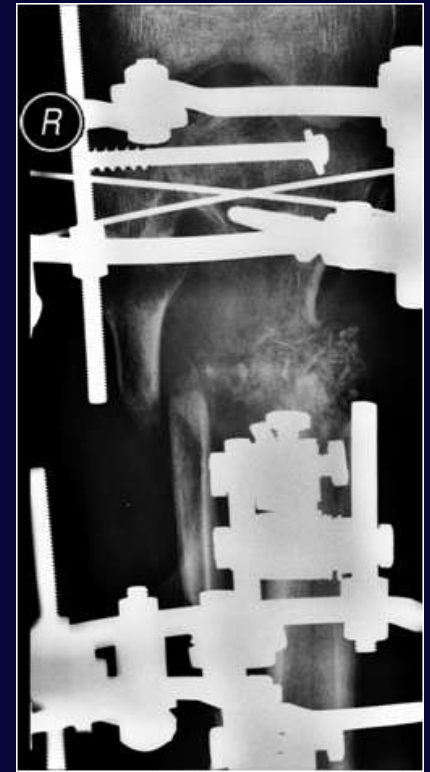
A local medial gastrocnemius turn around flap was performed this nicely covered the wound and allowed him to walk within a few days without pain or bleeding.



Corticotomy after -ve nitrogen balance is over

A distal corticotomy was performed when his condition improved 12 centimetres of bone was regenerated to reduce the bone gap in the upper tibia.

Fixation of prox fragment. Point docking. Add BG



The Ilizarov fixator had been extended into the femur for better stability. The very small upper tibial fragment was now fixed with multiple wires and half pins and its deformity was corrected. A point contact docking was achieved with the posterior cortical contact and bone graft widened the area of union.

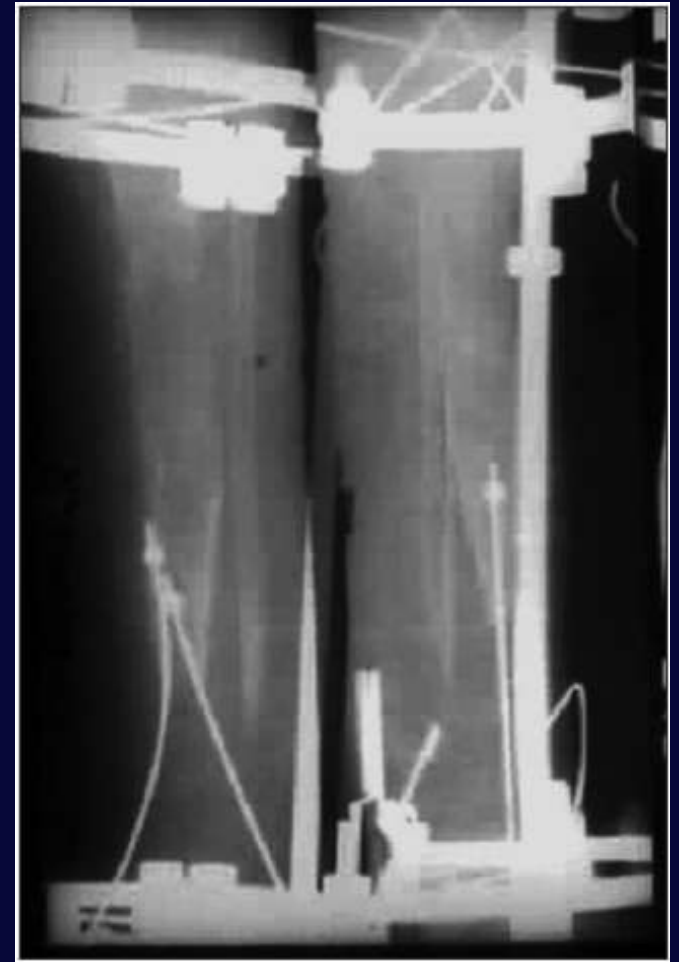
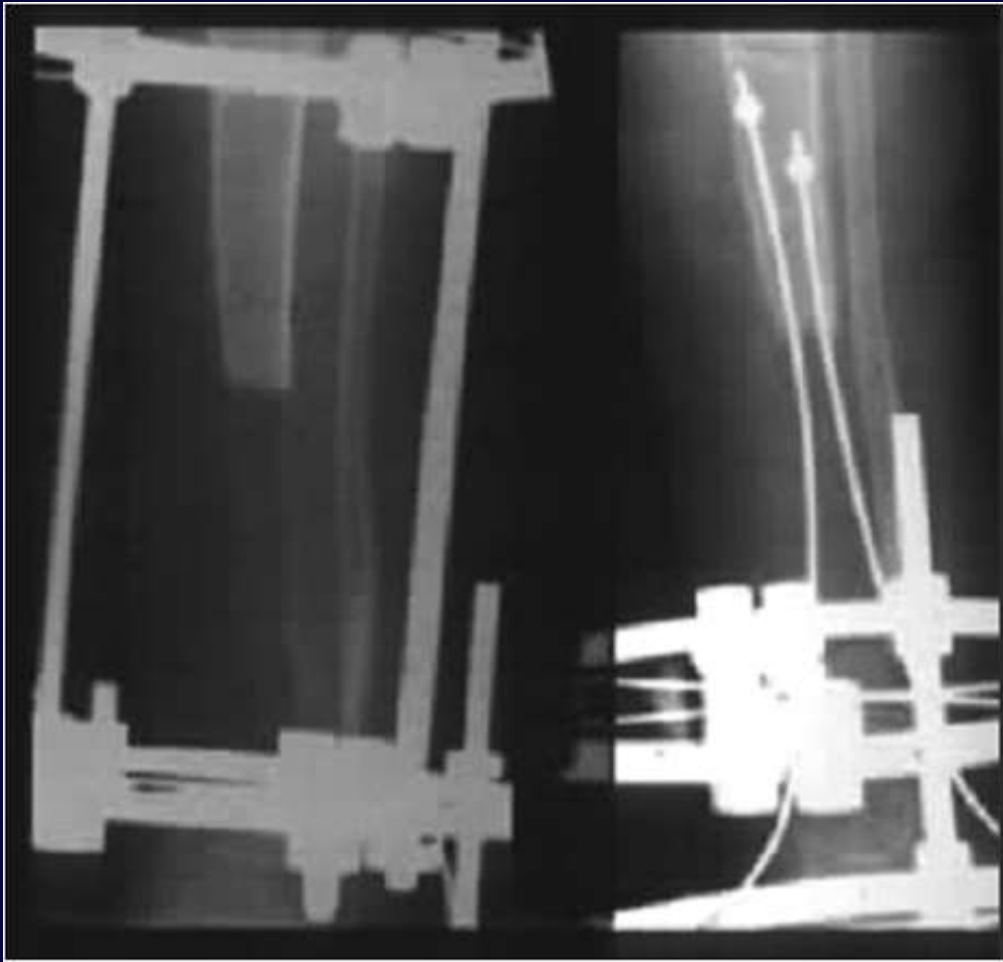


After 15 months, Union +ve,
no significant LLD
no deformity
no Infection

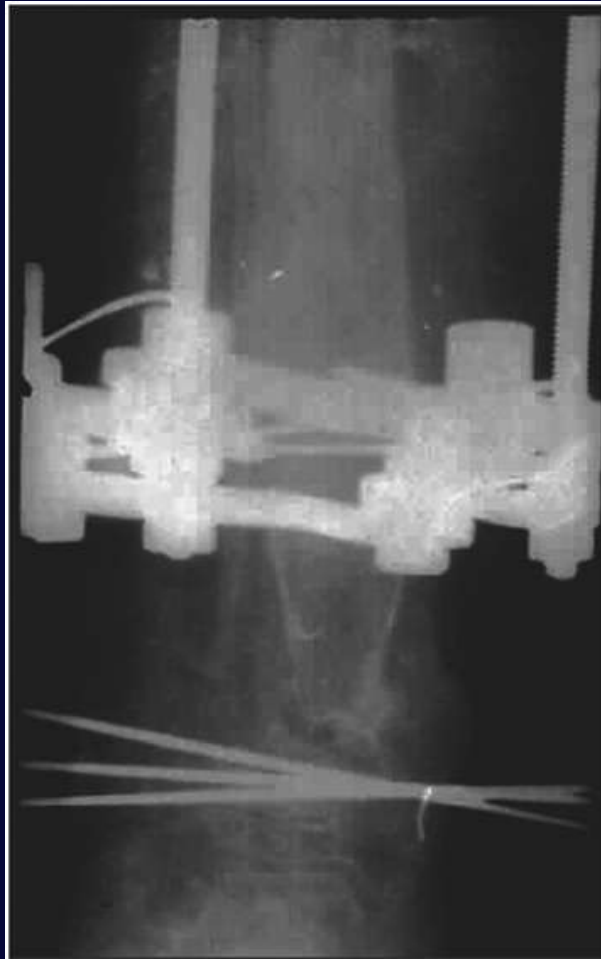
Small Fragment



Congenital Pseudarthrosis of Tibia
Crawford Type IV , 1992



Resection, 12 cm gap.
Internal Bone Transport.
Pin loosening after 6 months



Small distal fragment. No carbon fibre
Rings. No visualization of NU site.

Make use of what is there

Distraction Epiphyseolysis



Distraction Epiphysiolytic with a special assembly was Performed to lengthen the small distal fragment by 9 cm. Hence the non-union site migrated to the middle of the tibia.

Easy compression and Union was achieved next.



At 20 Year Follow-up! he stays united.

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8th ASAMI International Congress, India 2014

**8th ASAMI
International
Congress
Grand Hyatt, GOA
Sept 18th 2014**