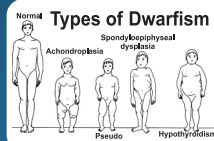


# Extensive Limb Lengthening (ELL) is safe in short limbed dwarfism. Benefits are Functional & not merely Cosmetic



**Types of Dwarfism**

Achondroplasia is commonest form of short limbed dwarfism. Upper Segment: Lower Segment ratio is 1:0.6. Bowing deformity & Canal Stenosis are common. Maximum natural height is 4'1".

They cannot function in society: cannot climb toilet & other seats, reach switches, climb on public transport etc.

## Conclusions :

Achondroplastic Dwarfism is amenable to safe & significant Extensive Limb Lengthening. Starting early allows lengthening tibiae, femora & humeri with deformity correction. This allows maximum height gain.

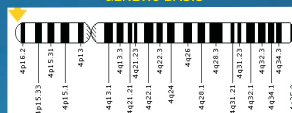
It can transform a Dwarf (who cannot function fully in society) into a "short normal" with possibilities of a normal life: employment, finding a normal life partner and having a normal functional & social life.

## BASIS FOR LENGTHENING



Muscular appearance due to excess muscle length compared to bones. Less resistance to extensive lengthening.

## GENETIC BASIS



- ✱ Gly380Arg defect in the FGFR3 gene
- ✱ Fibroblastic Growth Factor Receptor 3

## GROWTH PLATE



Delayed maturation of chondrocytes



She started lengthening at 5 years to get 11 cm length in tibia. Finishing length before starting school ensured she wasn't teased. Later cross lengthening gave 10 cm in femur and 4 in tibia. Humerus lengthening restored body proportions. She became a "short normal" at 4'10" instead of a 4' dwarf. She works as a RJ, is happily married and has a normal child.



Length gain from tibia & Femur = 9". She qualified as an Engineer. She is employed in the State Electricity Board. She rides her own scooter, is totally integrated in society and none can imagine she was a dwarf!



14 year old had cross lengthening with 27 cm length gain. Despite the moderate valgus, her 11" gain makes her look like a short normal & she can pursue her higher education as a "normal".

## Patients & Methods

	Patients
✱ Achondroplasia	21
✱ Other Dwarfism	8
Total Patients	29
✱ Segments	88
Tibia	54
Humeri	12
Femur	22
✱ Total Corticotomy Lengthenings	108

## Results

	LENGTHENING	% LENGTHENING	EX-PIX INDEX
✱ Tibia	7 - 17 cm	63% (15% - 88%)	30.4 days/cm (21-34d)
✱ Femur	8 - 17.5 cm	49% (33% - 65%)	25.4 days/cm (20-34d)
✱ Humerus	8 - 10 cm	50% (36% - 60%)	28.5 days/cm (20-36d)

## Complications

	%
✱ Regenerate #	40
✱ Premature consolidation	9
✱ LLD $\leq$ 10 mm	7
✱ Loss of ROM $< 20^\circ$ in Knee	5
✱ Loss of ROM $< 20^\circ$ in Ankle	10
✱ Axial Deviation $< 10^\circ$	15
10° - 15°	6
$> 15^\circ$	3
✱ Permanent Nerve Injury	0

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