



TOTAL KNEE REPLACEMENT IN A CASE OF SHORT STATURE

CHIEF COMPLAIN

- 65/F
- CAME TO OUR OPD WITH COMPLAIN OF PAIN IN LEFT KNEE SINCE ONE YEAR
- THERE WAS HISTORY OF TRAUMA ONE YEAR BACK

HISTORY OF PRESENT ILLNES

- PATIENT WAS APPARANTELY ALRIGHT ONE YEAR BACK WHEN SHE COMPLAINS OF PAIN IN LEFT KNEE.
- PAIN WAS SUDDEN IN ONSET GRADUALLY PROGRESSIVE, CONTINOUS, MODERATE, DIFFUSE, DULL-ACHING IN NATURE, NON-RADIATING WHICH AGGRAVATED ON WALKING AND RELIEVED ON TAKING REST


EXAMINATION

- Height: 133 cms
- Arm span: 136 cms
- US/LS ratio: 1.1
- BMI: 24.3 Kg/m²





KNEE

- DIFFUSE TENDERNESS PRESENT OVER LEFT KNEE
 - CREPITUS PRESENT (palpable friction)
 - PATELLAR TAP NEGATIVE
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- PRE-OP RANGE OF MOTION:

LT

RT

FLEXION 70 deg.

135 deg.





- RADIOLOGICAL:

Q angle: 17 degrees (normal range 10-20 degrees)

Varus angle: 15 degrees (normal range < 10 degrees)

GRADE 3 POST TRAUMATIC
ARTHRITIS OF LEFT KNEE




PRE-OP EVALUATION AND CHALLENGE

- Patient being a case of short stature our first and foremost challenge was to assess accurately the measurement of tibia and femur condyles
- Inability to do so could lead to abandoning the procedure in middle of surgery due to mismatch in size of implants
- Or it could lead to adverse post operative results

PRE OP EVALUATION-TEMPLATING

- METHOD

- Calculate actual measurement of an known object
- Then calculate the apparent measurement in the radiograph of the same object
- Magnification factor = $\frac{\text{actual measurement}}{\text{apparent measurement}}$

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- Next calculate the apparent measurement of condyles on the radiograph
 - Multiply magnification factor with apparent measurement of condyles
 - Actual size of condyles = magnification factor
* apparent measurement of condyles

PRE OP EVALUATION-TEMPLATING

- First modality used was x-ray
- Results: lateral to medial size of condyles

1. Femur-55.01mm

2. Tibia-57.9mm



- Results: Anterior to posterior size of condyles

1. Tibia: 34.26mm

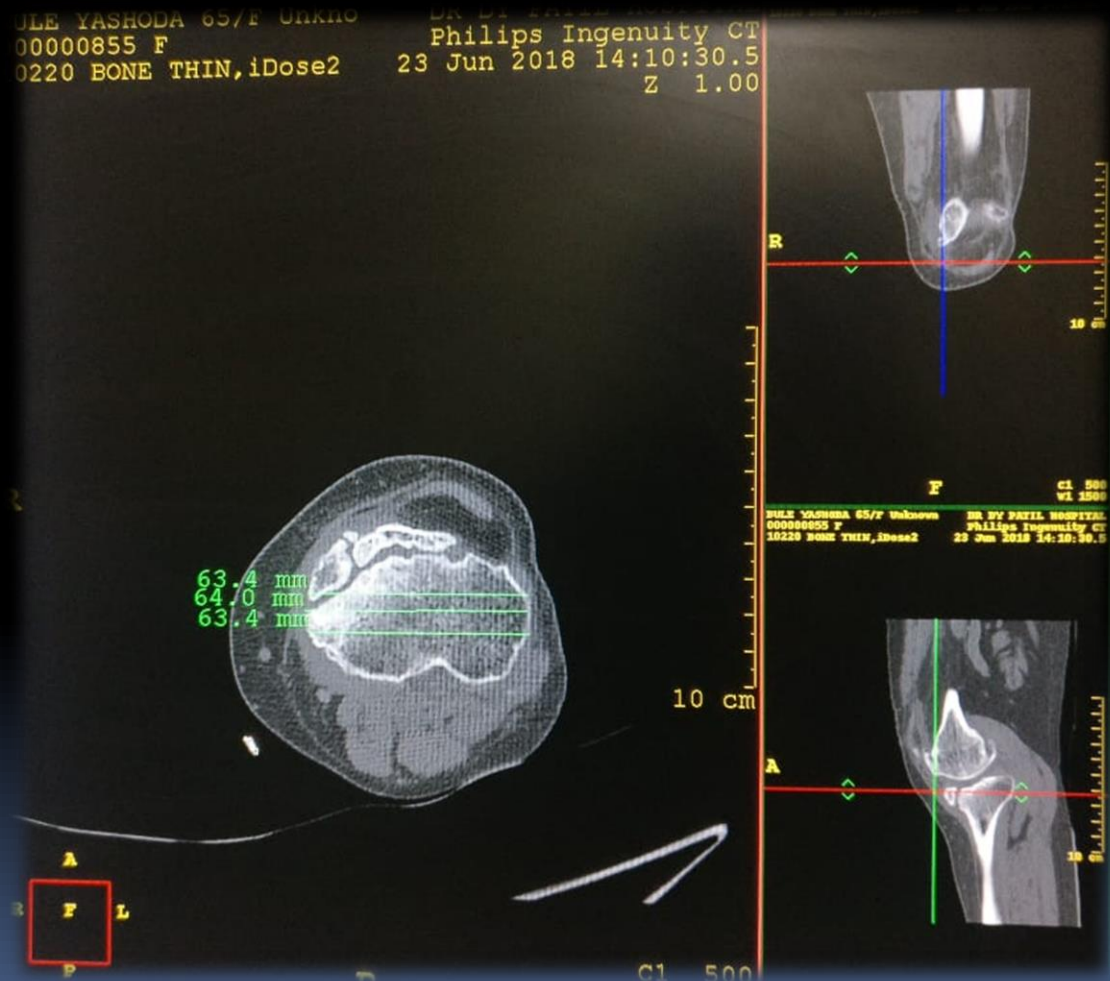
2. Femur: 42.72



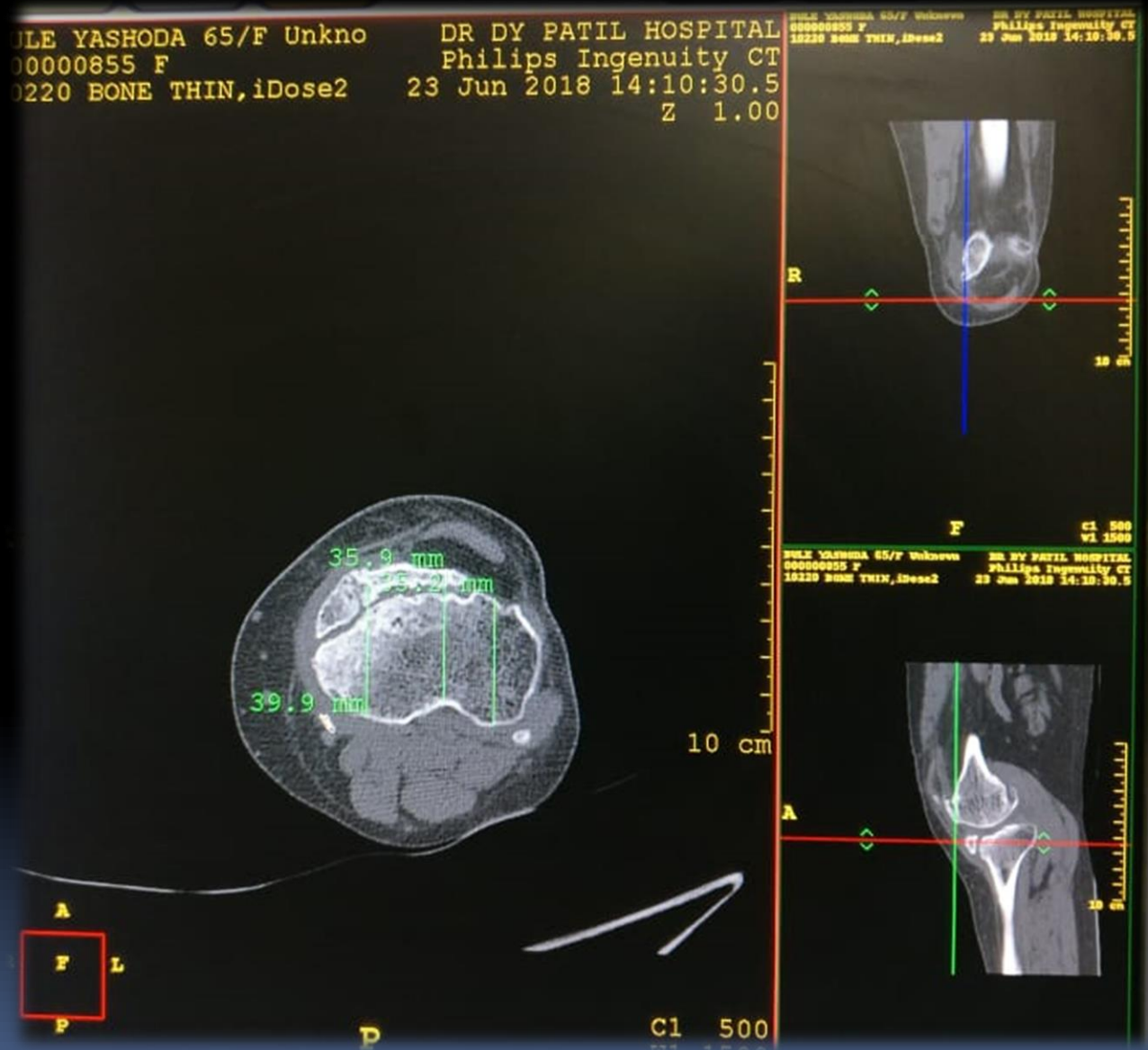
TEMPLATING ON 128 SLICE CT SCAN

RESULTS:

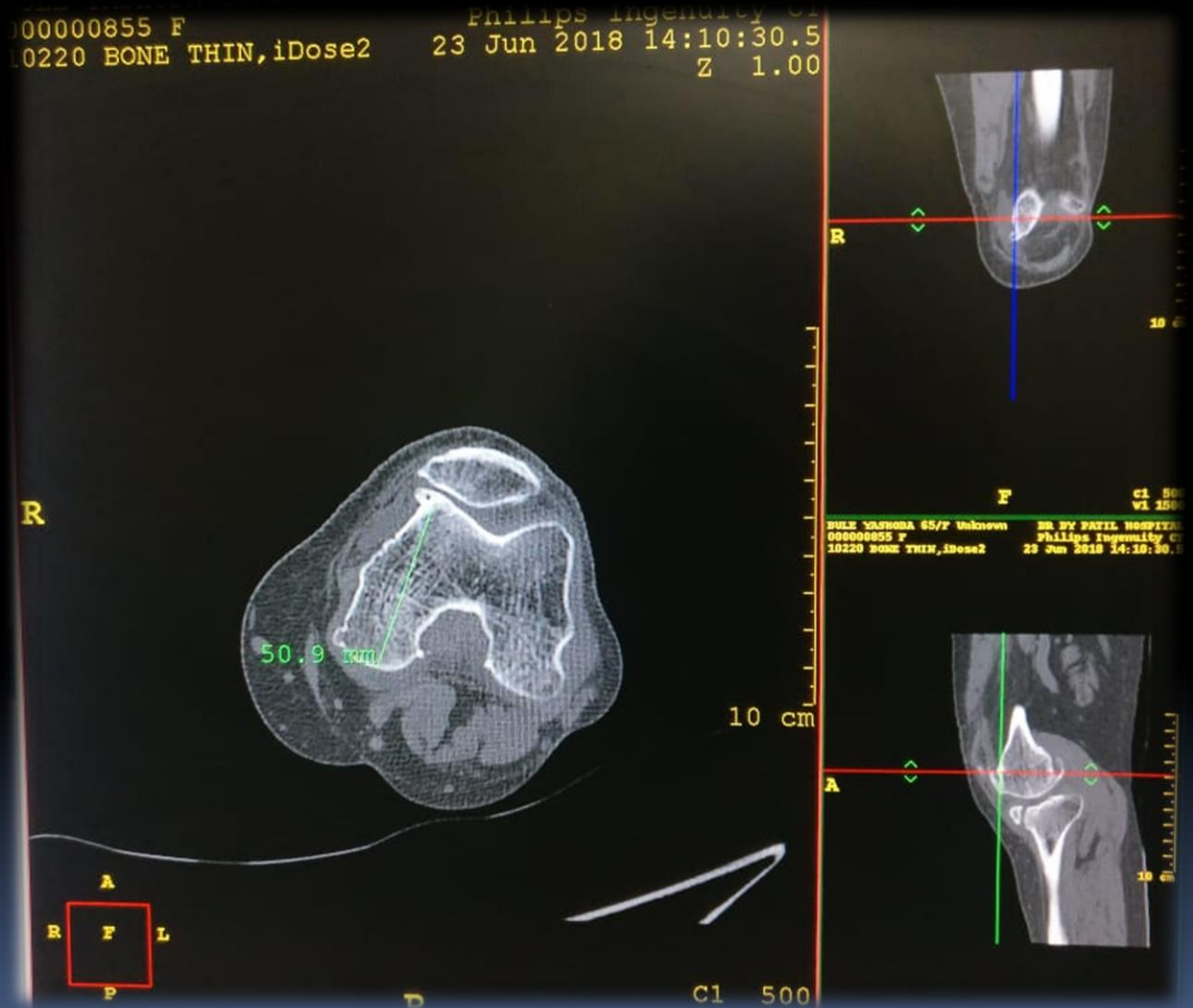
- Tibia: max. lateral to medial size of condyle is 64.0 mm



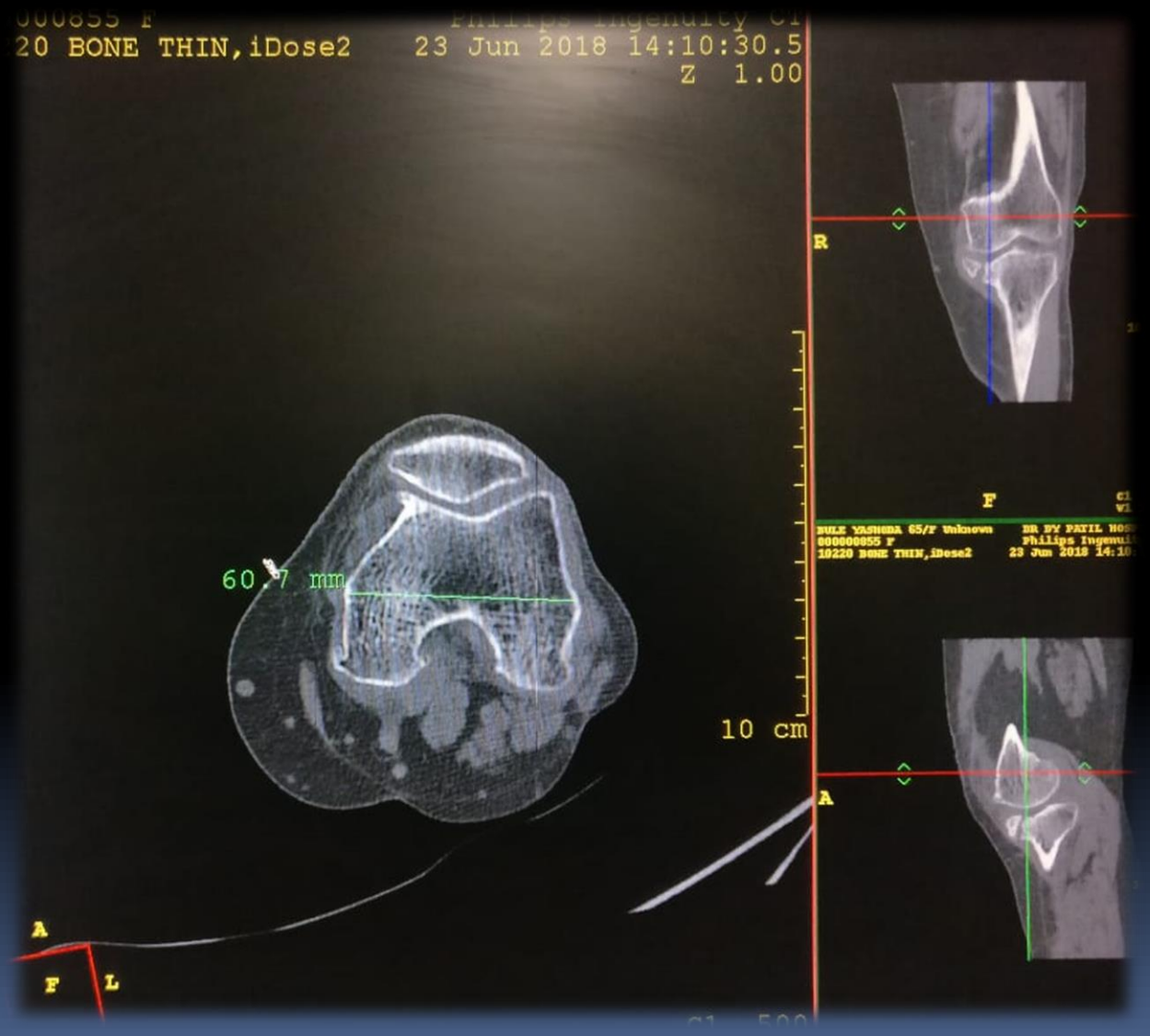
- RESULTS:
- Tibia: max. anterior to posterior size of condyle is 39.9 mm



- RESULTS:
- Femur: max. anterior to posterior size of condyle is 50.9 mm



- RESULTS:
- Femur: max. lateral to medial size of condyle is 60.7 mm





- CT MEASUREMENTS

- Tibia

 - anteroposterior diameter : 39.9 mm

 - lateral to medial diameter: 64 mm

- FEMUR

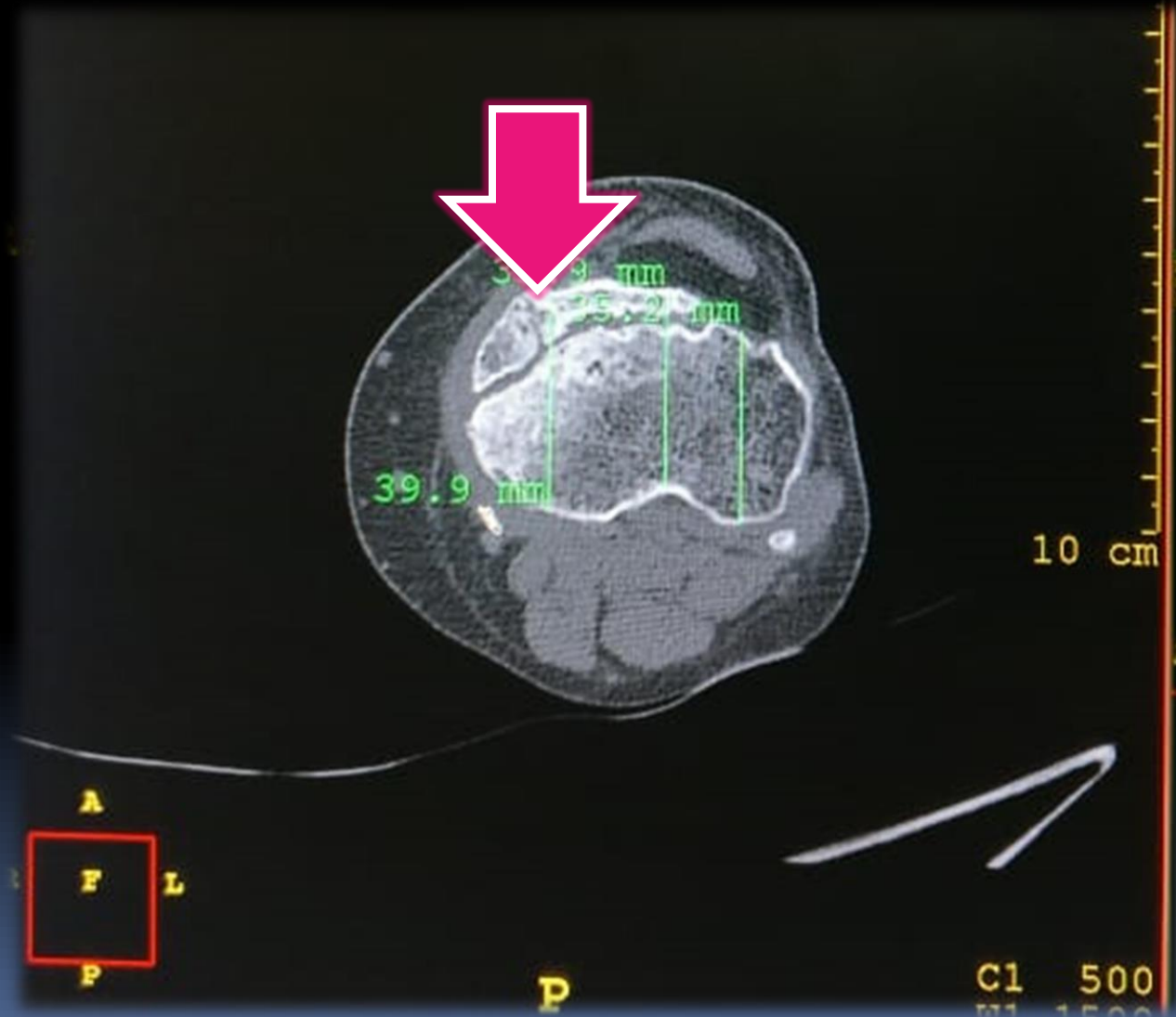
 - anteroposterior diameter: 50.9 mm

 - lateral to medial diameter: 60.7 mm



ADDED ADVANTAGE OF CT TEMPLATING

- Fracture fragment indicated by arrow was identified with its entire anatomy



IMPLANT COMPONENT SIZES AVAILABLE

Components Size Comparison

FEMUR (CR)



Persona (STD)			Nexgen			Vanguard		
Sizes (12)	ML	AP	Sizes (8)	ML	AP	Sizes (12)	ML	AP
1	55.5	44.67	A	55	44.5			
2	57	46.74				55	58.8	53.8
3	62.5	48.92	B	59	48.5			
4	64.3	51.01	C	63	53.5	57.5	61.1	55.9
5	66	53.11				60	63.5	58.3
6	67.8	55.19				62.5	65.9	60.8
7	69.5	57.26	D	68	57.5	65	68.3	63.1
8	71.3	59.44				67.5	70.7	65.6
9	73	61.57	E	72	61.5	70	73	67.9
10	74.8	63.71				72.5	75.4	70.2
11	76.5	65.87				75	77.8	72.4
12	77.5	70.19	F	77	65.5	75	77.8	72.4
			G	81	70.5			
			H	85	76	80	82.6	76.8

TIBIA



Persona			Nexgen			Vanguard		
Sizes (9)	ML	AP (medial)	Size (10)	ML	AP	Sizes (12)	ML	AP
A	57.7	40.2	1	58	40	59	59	38.2
B	60.8	42.5	2	62	41	63	63	40.67
C	63.8	44.9	3	66	42			
D	67	47.2	4	66	46	67	67	43.05
E	71	50.2				71	71	45.57
			5	74	46			
F	75.1	53.3	6	74	50	75	75	48.08
G	79	56.5	7	82	51	79	79	50.55
H	83	59.8	8	82	54	83	83	53.06
J	88.1	63.5	9	89	53	87	87	55.65
			10	89	57	91	91	58.22

INTRAOP IMPLANT SIZE USED

- FEMUR:
 - AP: 53.5 mm
 - ML: 63 mm

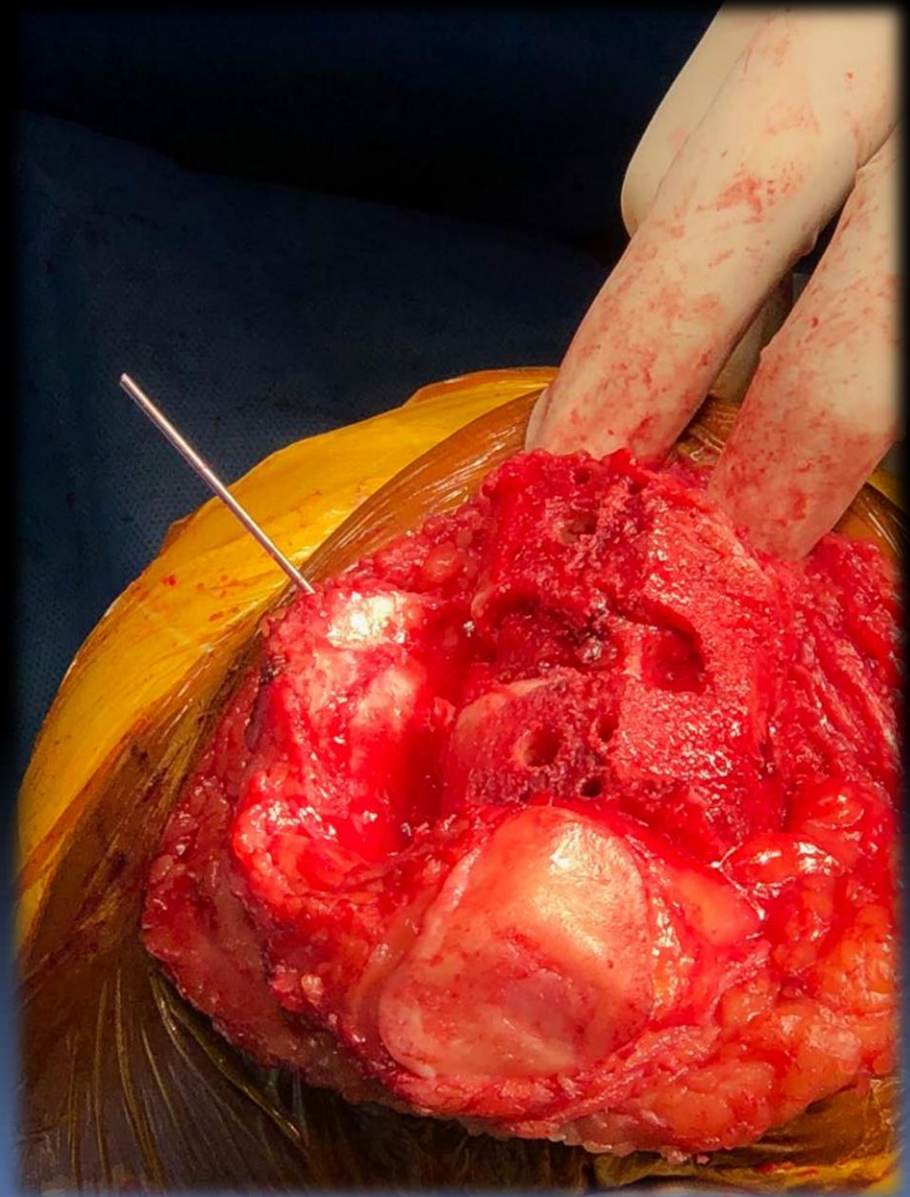
- TIBIA:
 - AP: 40 mm
 - ML: 58 mm

COMPARISON

	IMPLANT	CT SCAN	X-RAY
TIBIA(mm)			
AP	40	39.9	34.26
ML	58	64	57.9
FEMUR(mm)			
AP	53.5	50.9	42.72
ML	63	60.7	55.01

FEW INTRA-OP STEPS

Fracture
fragment
being
stabilised by k-
wire



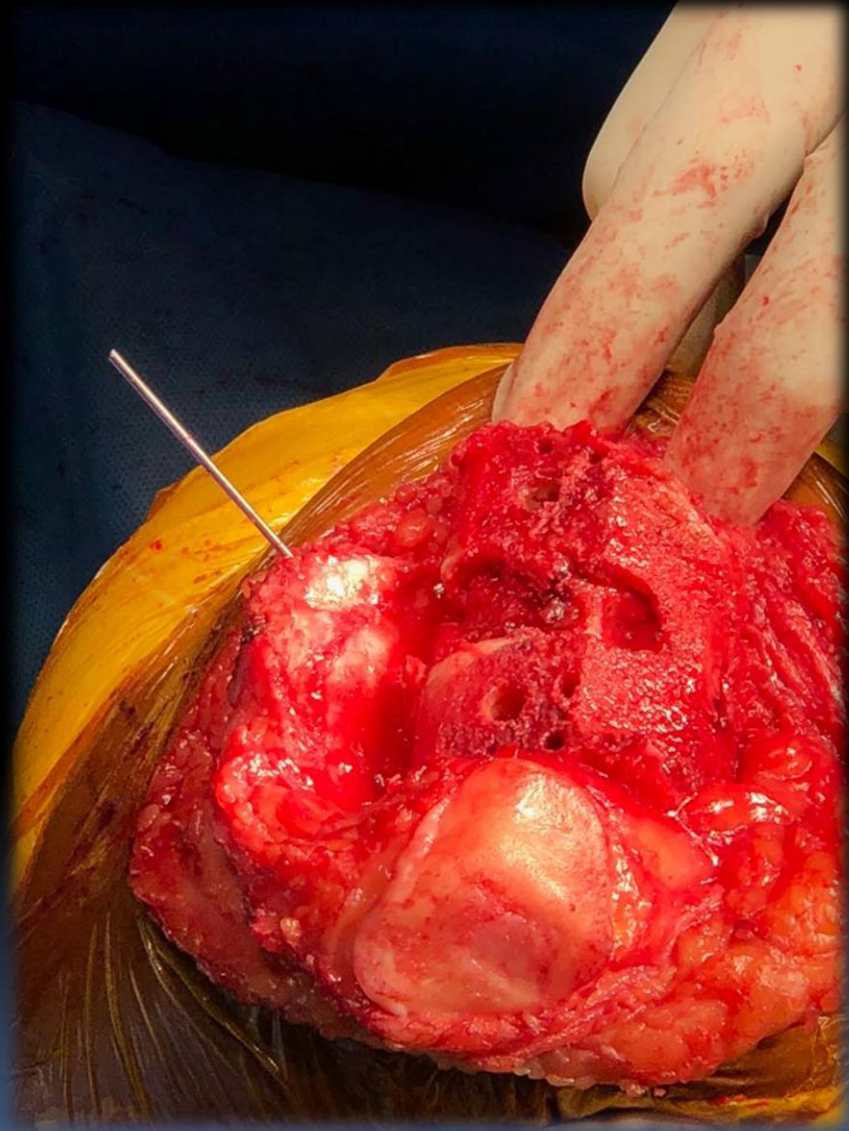


Securing of femoral zig



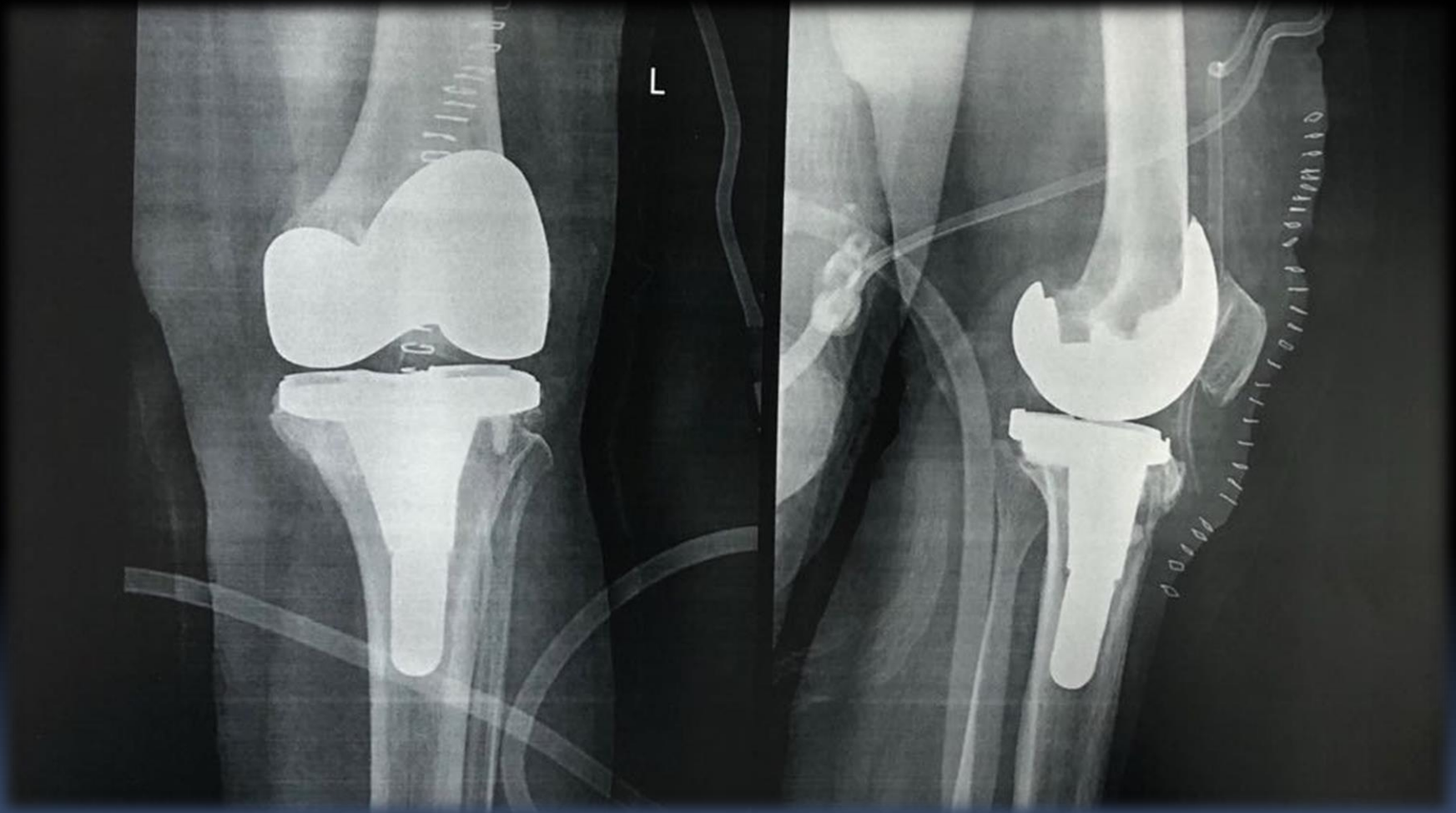
Femoral
condyle cut





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- Additionally a STEM EXTENSION ROD of size 12.7mm*30mm was used to provide extra-stability in view of intra-articular tibia fracture
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POST OP XRAY



POST OP RESULT

- Complete extension achieved post operatively



- Patient able to achieve 120 degrees of range of motions post operatively











DISCUSSION

	IMPLANT	CT SCAN	X-RAY
TIBIA(mm)			
AP	40	39.9	34.26
ML	58	64	57.9
FEMUR(mm)			
AP	53.5	50.9	42.72
ML	63	60.7	55.01

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- Knee arthroplasty can be a expensive affair for those who require customised components of implants
 - Therefore to figure out preoperatively if the ready made implants are precise for a particular candidate or not various modalities can be used for example x-ray and CT scan

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- Thus which modality more precisely predicts the size of condyles becomes very essential, as it helps in preventing unnecessary need for customised implants.
 - Customised implants being expensive can prevent unaffording candidate from receiving intervention which can have an adverse outcome in quality of life.

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- This case scenario gives us the insight to this important aspect of knee arthroplasty which needs further study to consolidate the outcome.
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CONCLUSION

- CT Scan is more accurate overall in pre operative assesment of implant size to be used in total knee arthroplasty with average error of ± 2.75 mm
- Xray is an inferior modality with average error of ± 6.04025 mm
- However point to be noted is Xray is a better modality in predicting medio-lateral size of tibia condyles



LIMITATIONS

- Intra observer error may be seen in measuring the accurate length
 - Fracture of tibia plateau may have lead to error in measurement
 - Exposure of radiation
 - Affording patients can directly go ahead for custom made implants
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