Collaborative Engineering

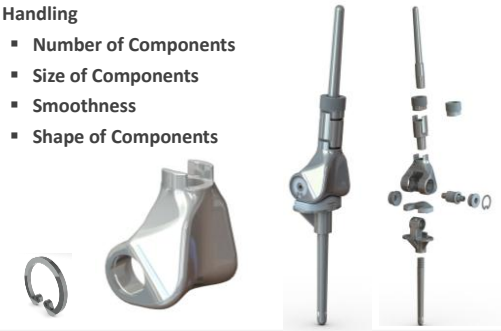
Ergonomic, Usability – TKP System

- Surgeon
- Patient
- Morphometric Variations
- Modular Components

OrthoCAD Lab, I.I.T. Bombay

Ergonomics – Surgeon – Handling

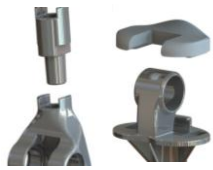
- Handling
  - Number of Components
  - Size of Components
  - Smoothness
  - Shape of Components



Ergonomics – Surgeon – TKP Assembly

- Assembly – Disassembly
  - Effort & Time
  - Skill and Learning Curve
  - Number of Instruments

Titanium Circlips



Morse Taper

Snap Fit

Circlips Pliers

Ergonomics – Surgeon – Implantation

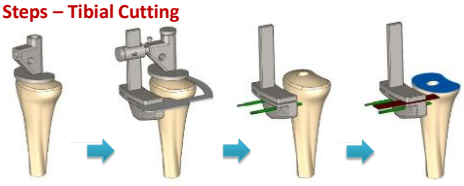
- Implantation – Femoral
  - Bone Resection
  - Facing
  - Reaming

3 Steps – Femoral Cutting

Ergonomics – Surgeon – Implantation

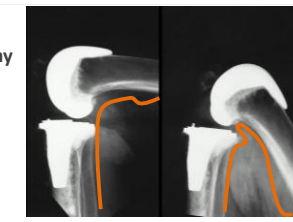
- Implantation – Tibial
  - Drilling
  - Alignment
  - Fixation
  - Resection

4 Steps – Tibial Cutting



Ergonomics – Patient – Implantation

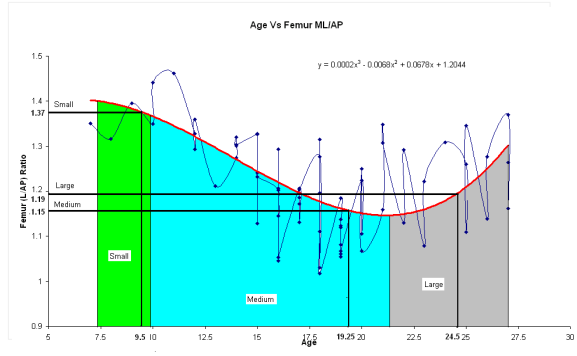
- Anatomy & Physiology
  - Obstruction Anatomy
  - Visual Distraction
  - Audio Distraction
  - Affect Activities



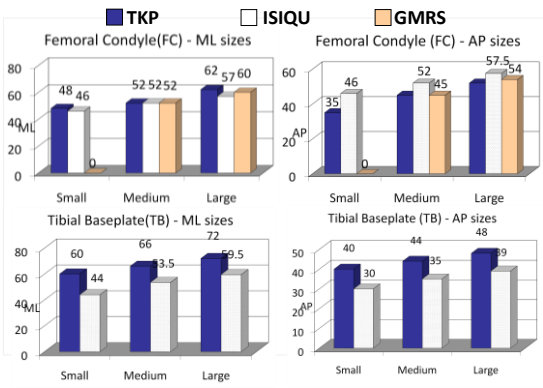
Morphometric Studies

- Morphometric Measurements
  - X-ray
  - Scanograms

Morphometric Studies – Results



Morphometric Studies – Comparison

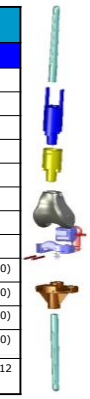


Morphometric Studies – Components

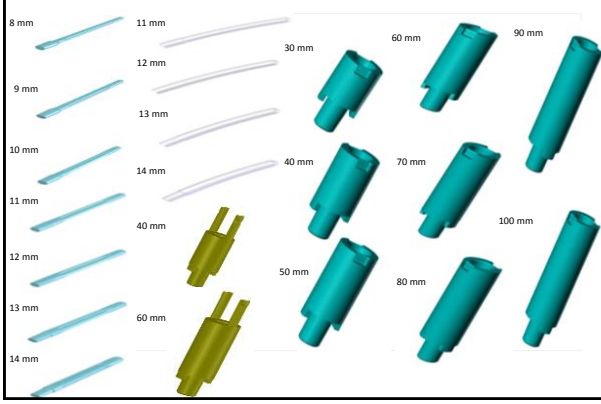
	Femoral Condyle			Tibial Baseplate		Tibial Poly	
Size	ML	AP	Length	ML	AP	ML	AP
Small	48	35	58	60	40	58	32
Medium	52	45	60	66	44	64	36
Large	62	52	62	72	48	70	40
	• Valgus angle is 5 deg					• Thickness is 8	

Femoral Stem		Tibial Stem		Cortical Fork	
Type	Stem dia	Type	Stem dia	Length	Fork dia
Straight	Ø 8, 9, 10	Straight	Ø 8, 9, 10	40	Ø 22
	Ø 11, 12		Ø 11, 12		Ø 24
	Ø 13, 14		Ø 13, 14		Ø 26
Curved	Ø 11, 12	Curved	Ø 11, 12	60	Ø 22
	Ø 13		Ø 13		Ø 24
	Ø 14		Ø 14		Ø 26
• Length is 100		• Length is 60 & 100 • Seat dia is 12		• Body dia is 20 • Seat dia is 12	

Extension Pieces
Length
30
40
50
60
70
80
90
100
110 (= 60+50)
120 (= 70+50)
130 (= 70+60)
140 (= 80+60)
• Seat dia is 12



Morphometric Studies – Components



SUMMARY

- Ergonomics – Surgeon, Patient, Surgery
- Usability changes design concepts
- Morphometric studies quantified distribution
- Modular Component design to suit variations