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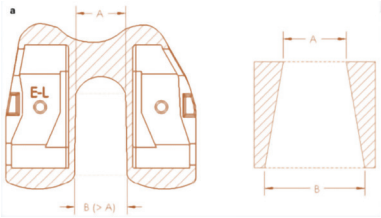
TECHNICAL BRIEF – PCK FEMORAL CONDYLAR TECHNOLOGY

The Femoral Trapezoidal Box: Achieving Progressive Constraint



Schematic of the trapezoidal femoral box dimensions.

QUICK FACTS

- ➜ The PCK Trapezoidal Femoral Box provides a progressive variable constraint profile.
  - Extension: Fully tensed collaterals
  - Flexion: Progressive reduction of collateral tension
- ➜ Internal / external rotation: 2° - 7°
  - Varus / valgus knee tilt: 1° - 4°
- ➜ The Trapezoidal Box design dampens the translational forces trough the femoral box and TKA component / bone interfaces.
- ➜ The PCK System replicates "normal" knee kinematics while minimizing the possibility for catastrophic failure.

INTRODUCTION

Reproducing gap symmetry while avoiding post-operative component or overall total knee arthroplasty (TKA) composite failure, due to physiological kinematics of internal-external rotation and varus-valgus tilt during knee motion, is difficult in complex primary TKA procedures using devices with increasing levels of constraint.

PURPOSE

To describe the design characteristics of the trapezoidal femoral box and progressive constraint throughout full arc of motion following PCK total knee arthroplasty.

DEVICE

The Progressive Constraint Kinematics® Knee System (PCK) used provides a variable constraint profile, from high constraint in extension to less constraint in flexion through incorporation of a proprietary trapezoidal femoral box with reduced bone resection.

The Freedom® PCK Knee System

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PCK DESIGN CHARACTERISTICS

In full extension, increased constraint between

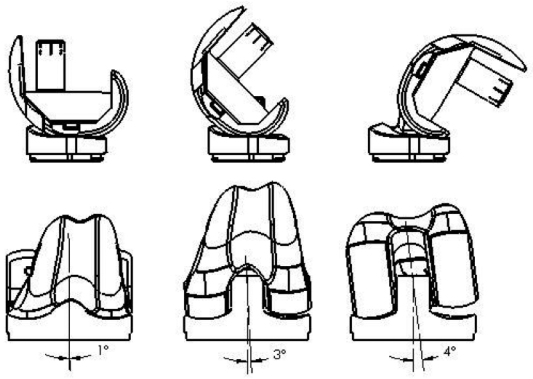
- Tibial Post and Femoral Box
- Less component tilt and rotation
- Full extension: 1°

Arc of motion through full flexion

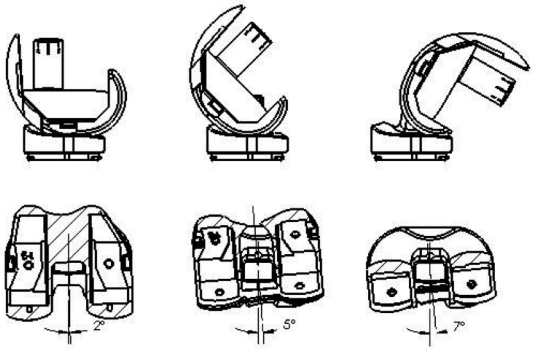
- Clearance between post / box increases
- Progressive increase in tilt and rotation
- Varus / Valgus Tilt: 1° - 4°
- Internal / External Rotation: 2° - 7°

The advancement of PS-TKA includes modular stems, augments for addressing bone defects and varying degrees of constraint built into the polyethylene tibial insert.[1,2]

Nonetheless, increased constraint in conjunction with excessive forces between the tibial post and femoral box, tibial post wear, polyethylene debris generation and tibial post failure remains an issue with highly constrained PS-TKA systems used for complex primary TKA.[3,4]



Change in Varus-Valgus tilt through flexion



Change in Internal-External rotation through flexion

Note: Angle values are indicative only

CONCLUSION

The "Progressive Constraint" PCK Knee System allows for…

- Establishment of more "normal" knee kinematics including:
- Fully tensed collaterals in extension
- Slight reduction in tension through flexion
- Dampening of the translational forces trough the femoral box and TKA component / bone interfaces
- Preservation of a pain-free, well functioning and durable prosthetic composite

REFERENCES

1. Lombardi, et al, Posterior-stabilized TKA for complex primary cases. *JBJS*, 89(3):90, 2007
2. Ryan, et al: Complex Primary TKA: Long-term outcomes. *JBJS*, 98(17):1495, 2016.
3. Konopka, et al, The effect of constraint on post damage in TKA. *Orthop Today*, 4(2):200, 2018
4. Lachiewicz, et al: Results of a second generation condylar prosthesis in primary TKA. *J Arthrop*, 26(8):1228,2011.