

Challenging Alignment Concepts in Total Knee Arthroplasty

W. Hozack¹, M. Nogler², D. Callopy³, E. Mayr²,
G. Deirmengian¹, K. Sekyra²

¹Thomas Jefferson University Medical School, Pennsylvania, USA

²Departement of Orthopaedic Surgery, Unit of Experimental
Orthopaedics, Medical University Innsbruck, Austria

³Western Orthopaedic Clinic, Subiaco, Western Australia

Disclosure of conflicts of interests

Financial support for this study was provided by Stryker

Some of the authors are consultants of Stryker

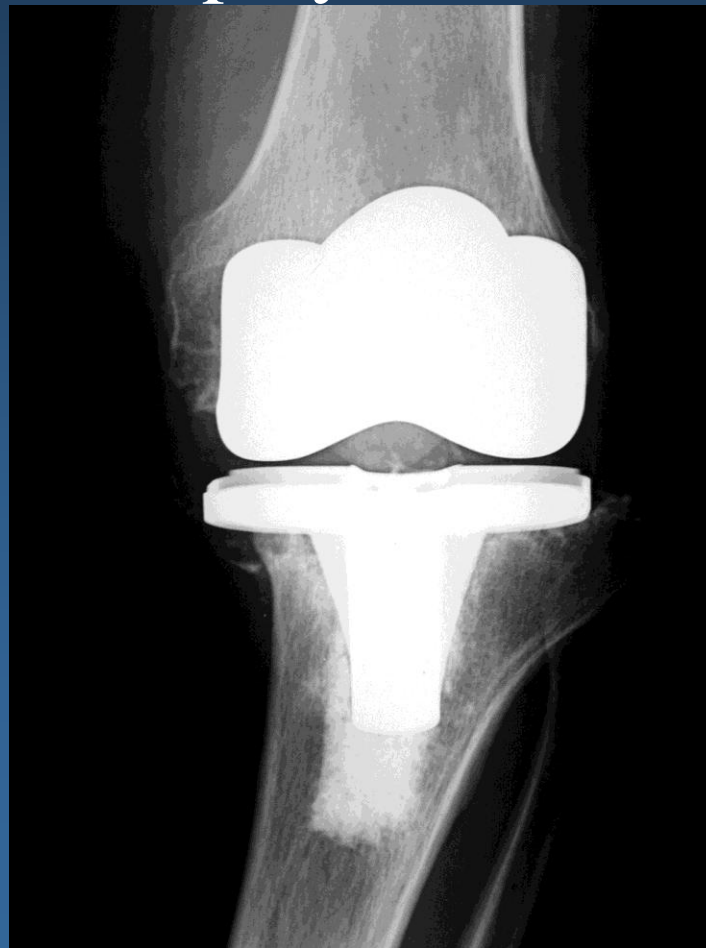
Goal

Since the onset of the modern era of TKA, the *commandment* has been to restore the limb to a neutral mechanical axis.



Why the Mechanical Axis?

To avoid excessive poly wear or device loosening.



However, alignment has become a topic of some debate



Support for adherence to Mechanical Axis

- Lotke, Ecker (1977) JBJS(A) 59(1)
- Bargren, Blaha, Freeman (1983) CORR 173
- Rand, Coventry (1988) CORR 232
- Ritter Faris, Keating *et al* (1994)
CORR 299
- Jeffrey, Morris, Denham (1991)
JBJS(B) 73(5).

TKA Patient Satisfaction?

17% to 25% of TKA patients are dissatisfied with their outcome^{1,2}



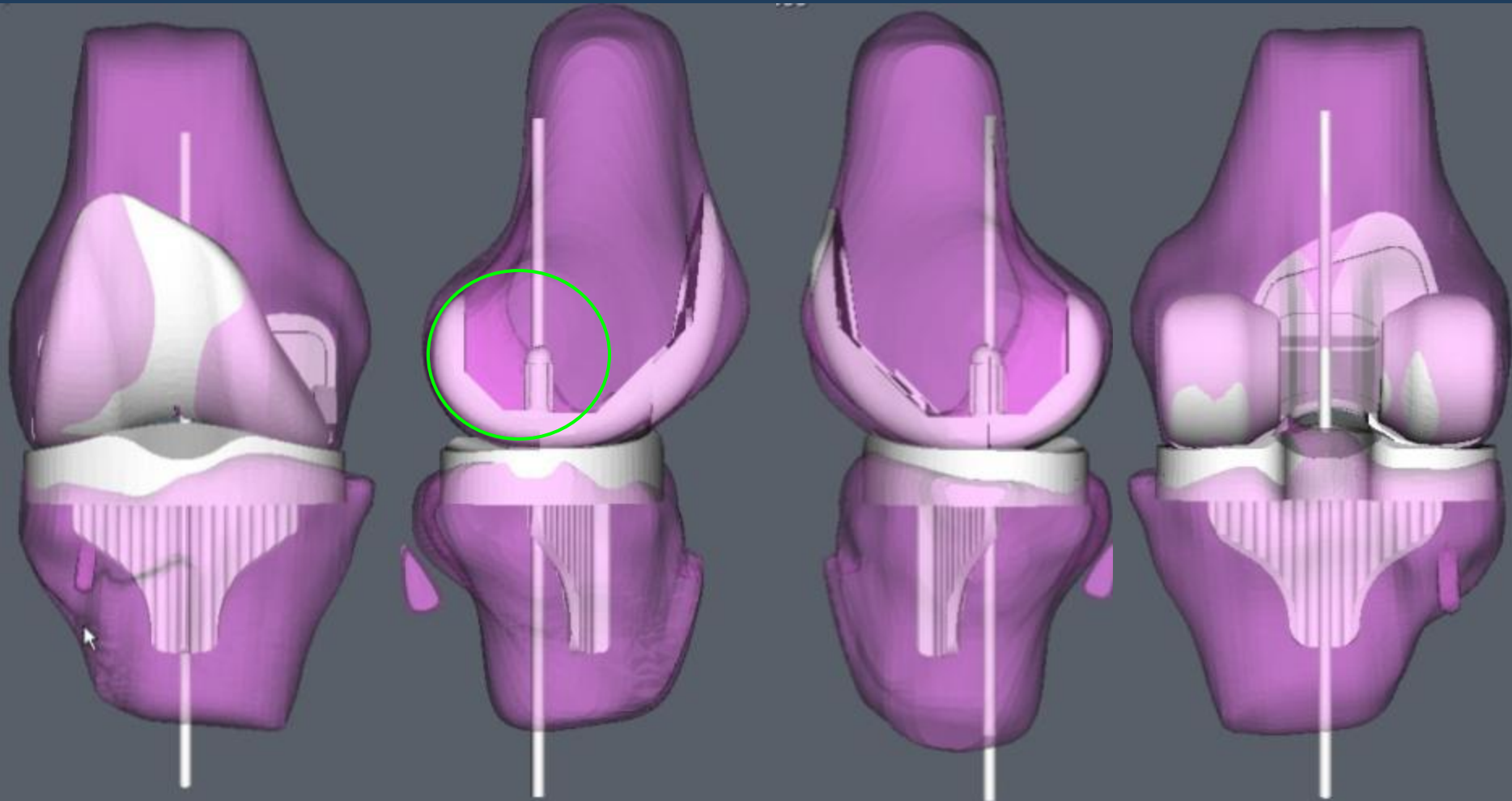
Is 0 right for everyone?

¹Baker, van der Meulen, Lewsey et al (2007) JBJS(Br) 2007

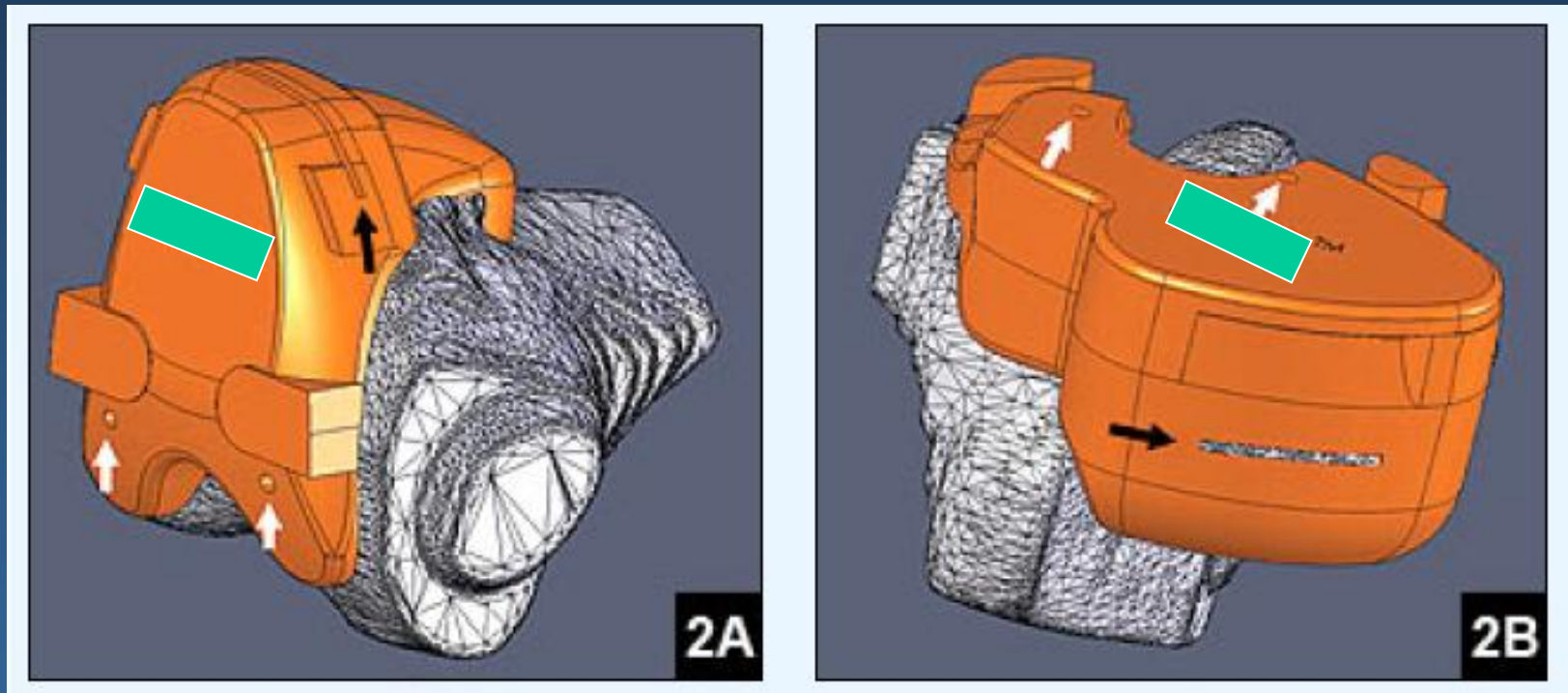
²Noble, Conditt, Cook et al (2006) CORR 452.

Shape Match

Position implants on pre-disease model



Guides designed to fit on diseased bone and set transverse resection and rotation



Why consider Shapematching?

What are advocates saying?^{1,2}

- For the Surgeon and Staff
 - Fewer instruments
 - Aside from osteophyte removal there are no other soft tissue releases needed
 - Guides suggests size and orientation of implants
 - Faster

¹ Howell, Kuznik, Hull, and Siston (2008)Orthop Sep;31(9):857-63

² Spencer, Mont, McGrath et al (2008)Int Orthop. Dec

Why consider Shapematching? What are advocates saying?^{1,2}

- For the patients
 - Feel better sooner
 - Less soft tissues violated
 - Feels more normal
 - Natural, pre-disease alignment restored



¹ Howell, Kuznik, Hull, and Siston (2008) Orthop Sep;31(9):857-63

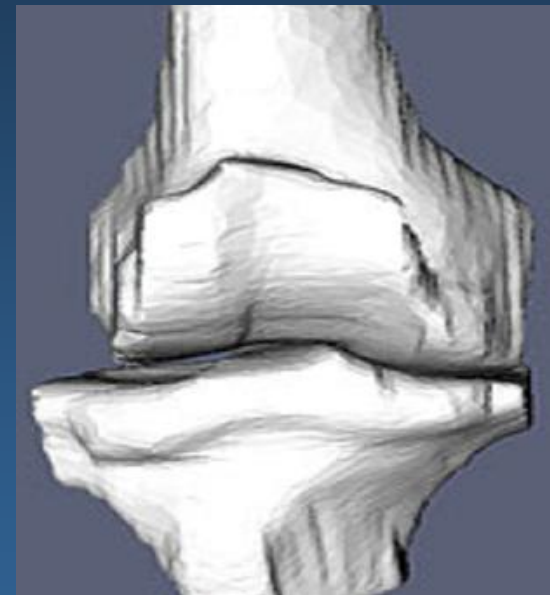
² Spencer, Mont, McGrath et al (2008) Int Orthop. Dec



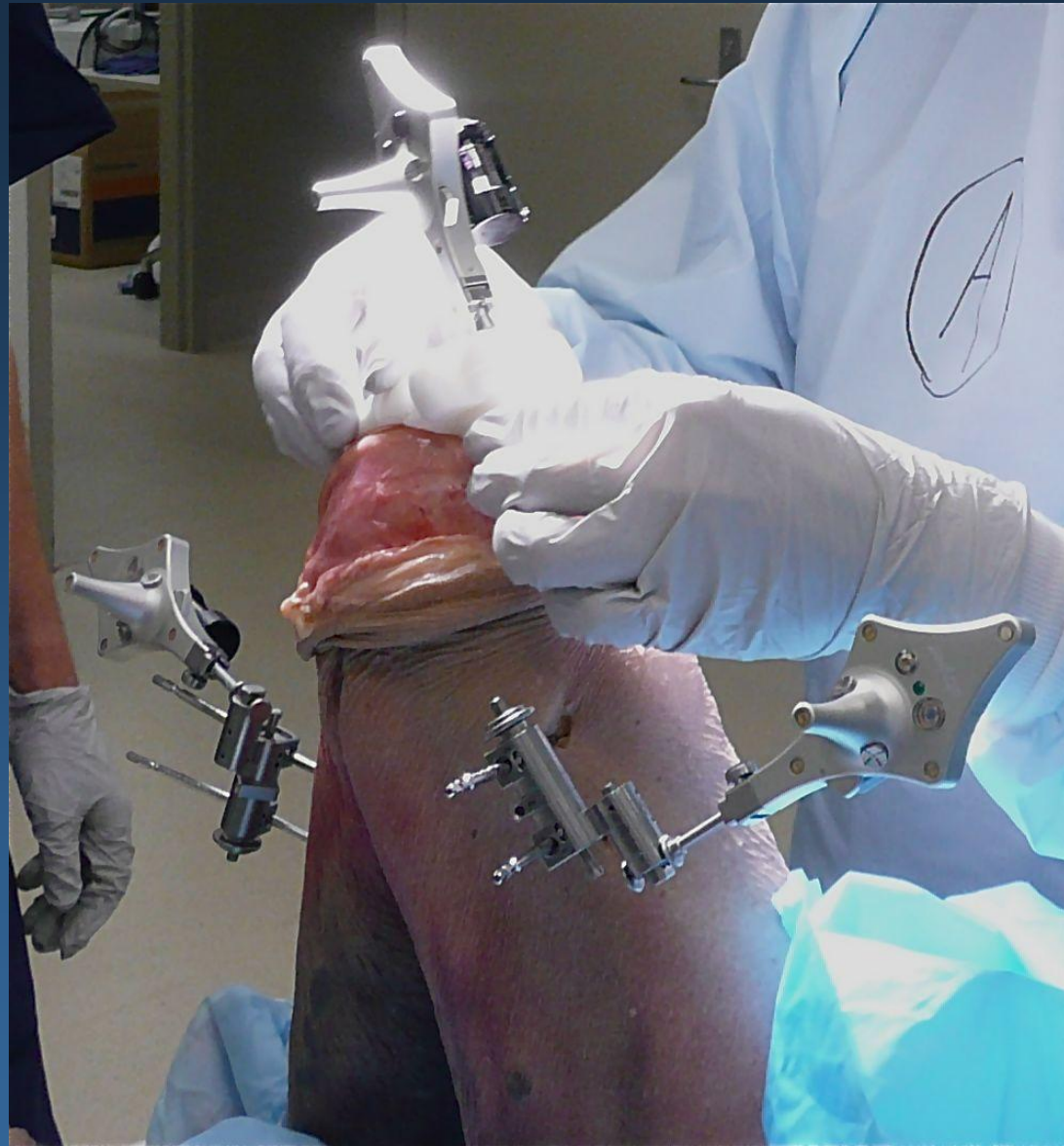
Study Design

- N=12 pairs of Cadaveric Knees
- Matched Pair Design
- 2 experienced Surgeons
- Left or Right side randomly chosen for OtisMed or Standard Triathlon Single Radius Knee Procedure (STRYKER)

MRI to 3D Model

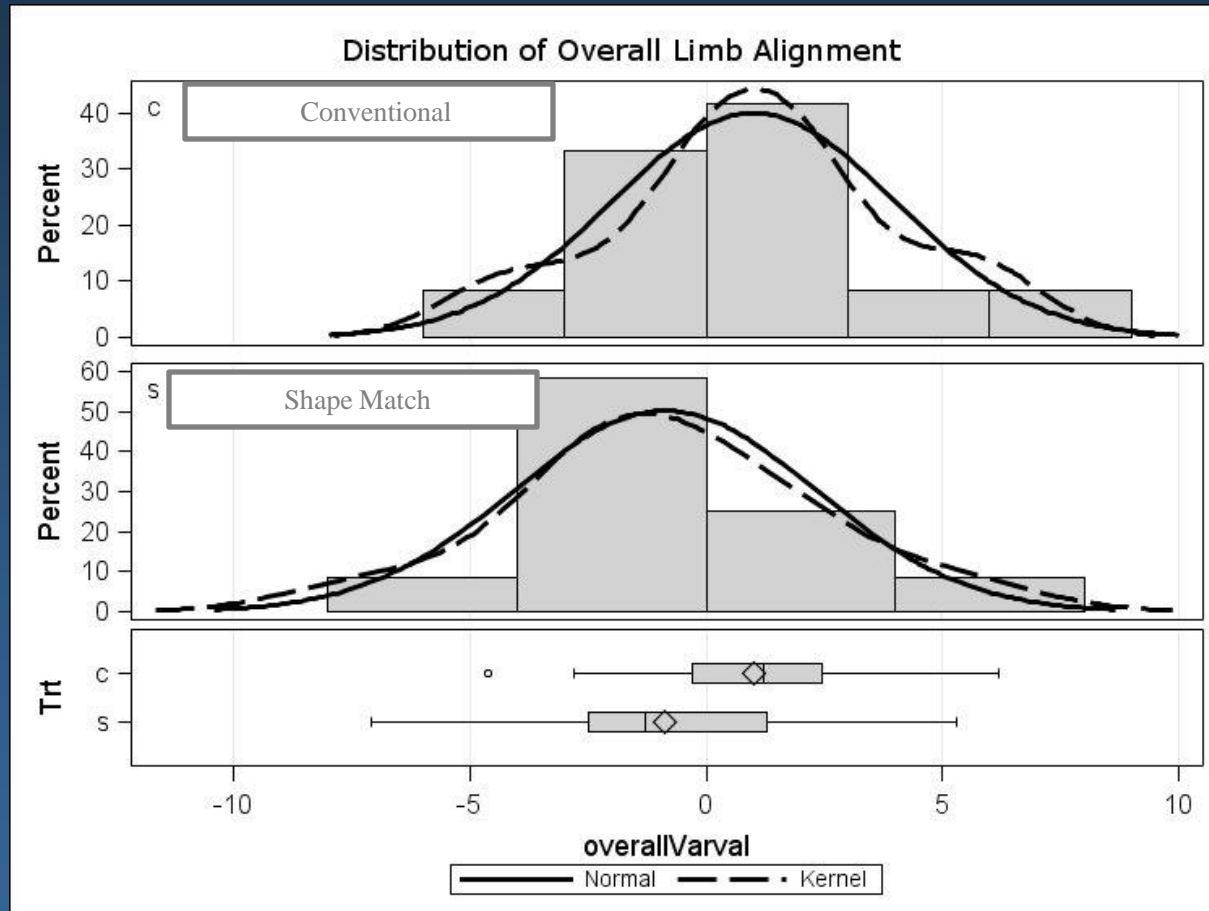


For all cadaveric knees MRI scans were made and 3D models were created. All MRI were sent to OtisMed and custom made jigs were fabricated.

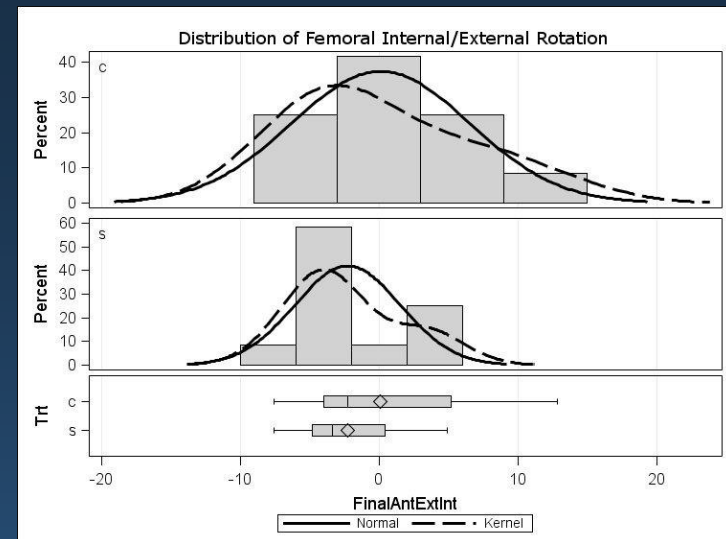
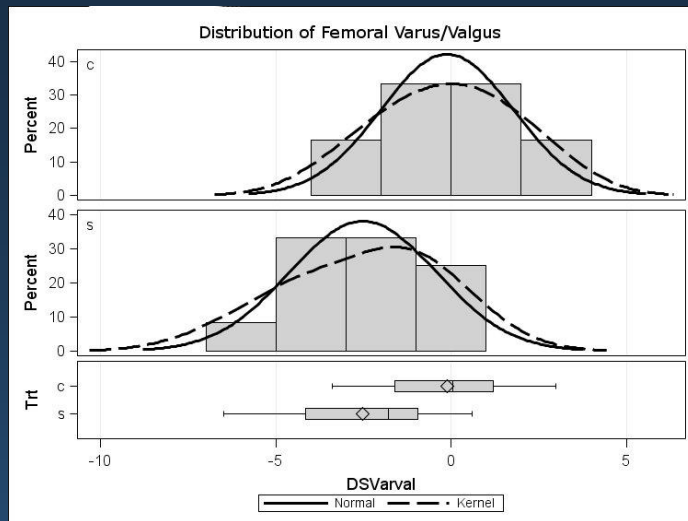


Implant Position Alignment Measurement with Knee Navigation System (STRYKER, Leibinger)

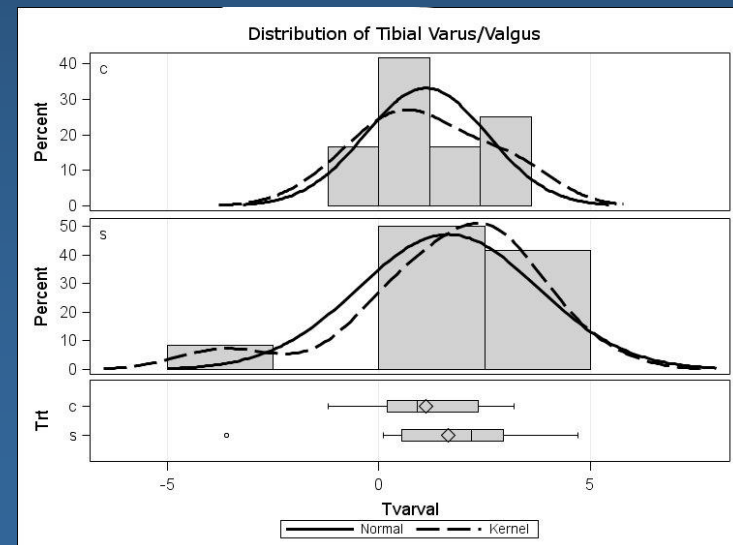
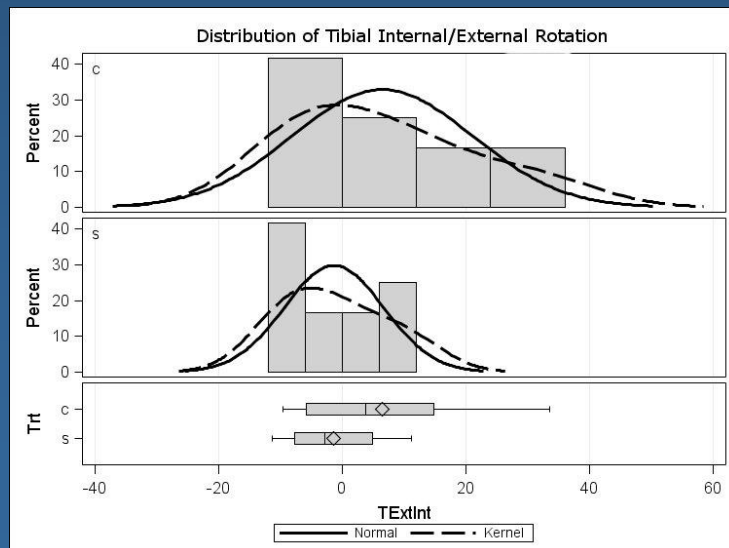
Results

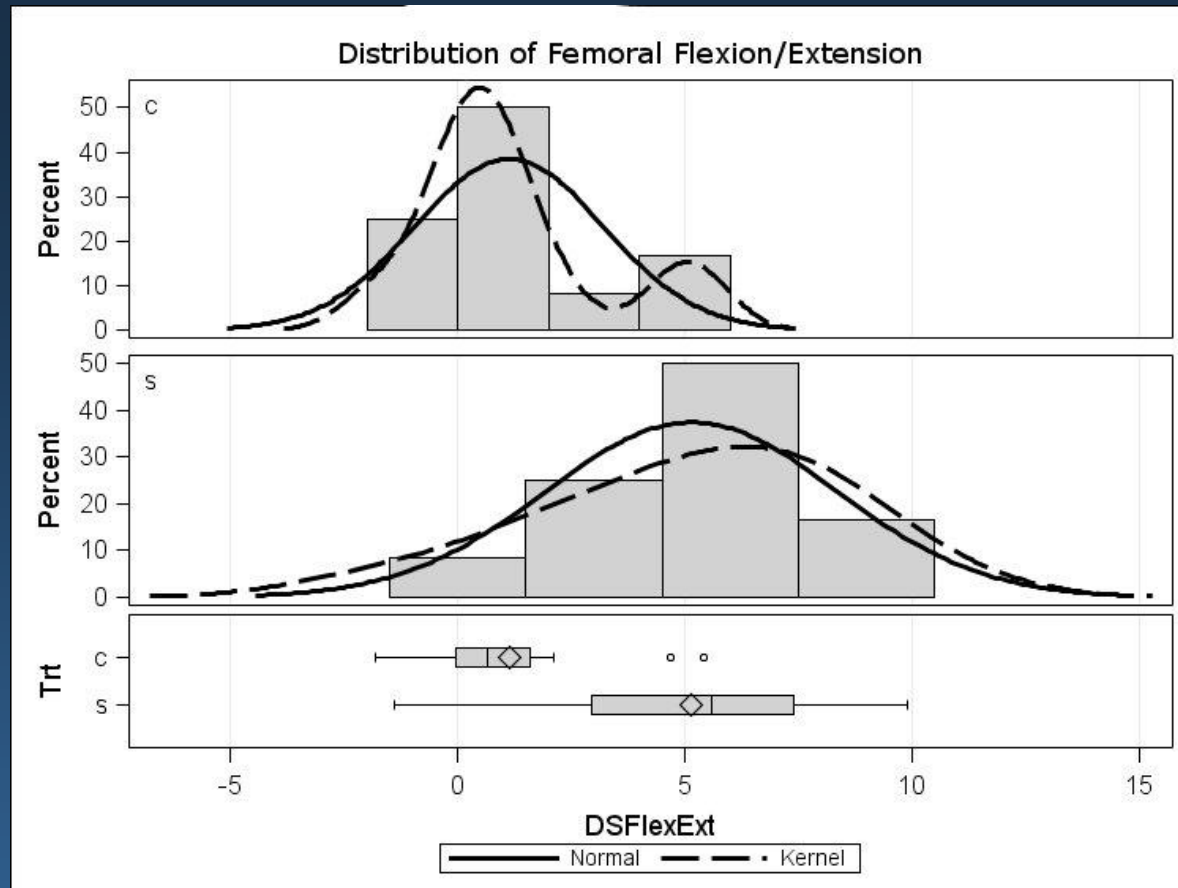


Overall Limb alignment a little more varus in Shape Match but not significantly different



No significant differences





Significant difference in Femoral Flexion Extension
Due to the Difference in alignment Algorithm (internal alignment for
conventional and external shape for Shape Match)

Conclusion

- OtisMed ® shape matching resulted in similar limb alignment as the conventional method for Triathlon single radius knee
- A difference was only found for flexion / extension of the femoral component
- This might be due to the different alignment algorithms with the conventional one using intra-medullary alignment and the shape matching follows the external bone surface

Thank you