HOW DOES THE CEMENT MANTLE AFFECT INTERCOMPARTMENTAL JOINT BALANCE?

BACKGROUND

- Obtaining joint balance is a crucial aspect for maximizing post-operative clinical outcomes[1-4]
- Significant changes in alignment/balance may occur during final implantation, even with the use of navigated bony cuts[5]
- The added thickness of the cement mantle has been observed to affect the mechanical axis and flexion/extension gaps[6]

PATIENTS & METHODS

- 93 sensor-assisted TKAs evaluated for pre- and post-cementation balance
- All patients were balanced (mediolateral loading differential ≤ 15 lbs.) prior to cementation
- 2 surgeons/2 experience levels (Surgeon 1 > 15 years of practice; Surgeon 2 < 5 years of practice)
- 2 cement types/viscosities (medium, high)
- 3 knee systems (Biomet® Vanguard®, Stryker® Triathlon®, Zimmer® NexGen®)

RESULTS

There was no significant difference in incidence of imbalance with respect to:
Cement Type *(P=0.429)* | Surgeon Experience *(P=0.456)* | Knee System *(P=0.792)*

% OF PATIENTS WITH IMBALANCE

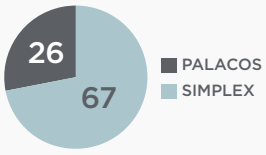
44.1%

Nearly half of patients exhibited imbalance after cementation *(P<0.001)*

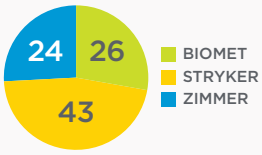
ABSOLUTE CHANGE IN LOADING ACROSS THE JOINT

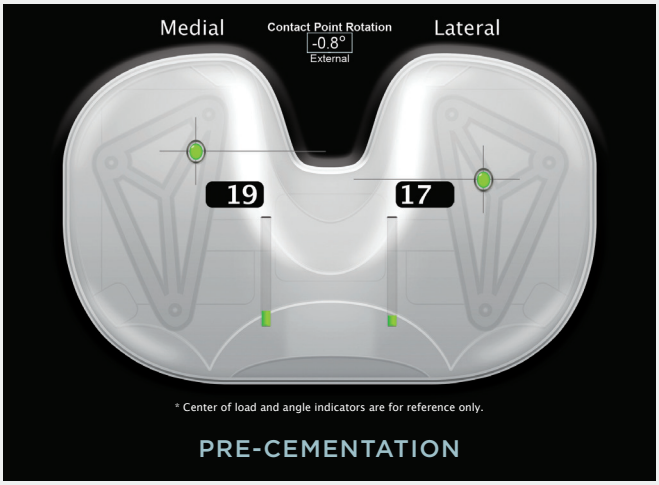
Average	28.23
St Dev	24.75

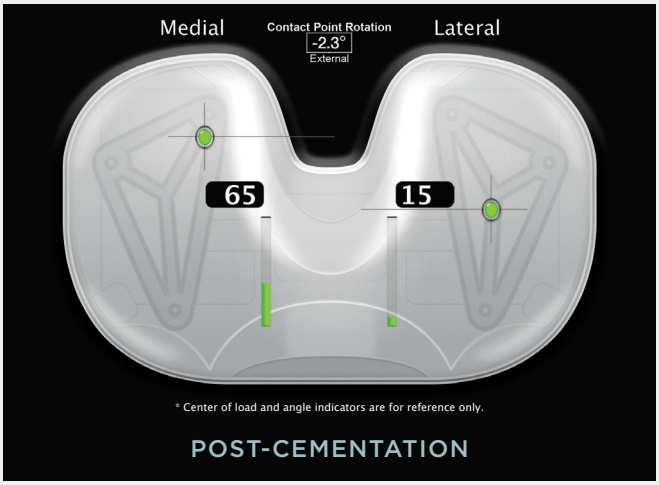
PROPORTION OF EACH CEMENT TYPE



PROPORTION OF EACH KNEE SYSTEM







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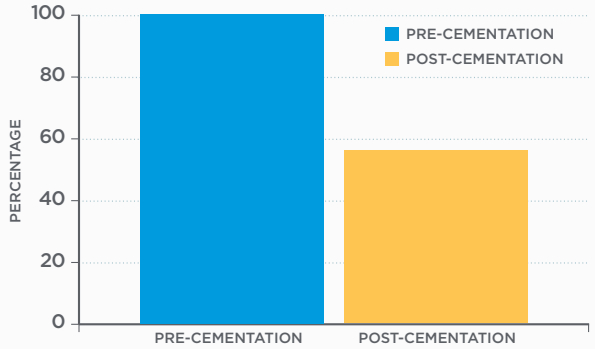
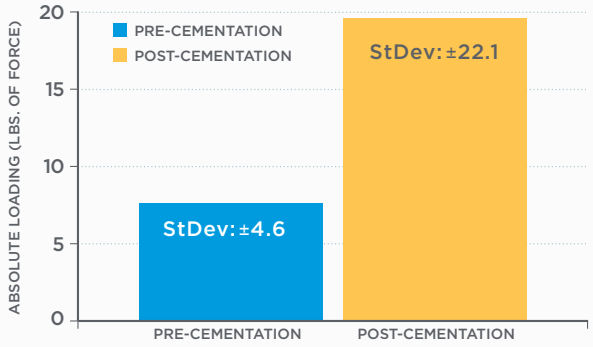
POST-CEMENTATION BALANCE RESULTS

PERCENTAGE OF PATIENT GROUP EXHIBITING JOINT BALANCE



AVERAGE MEDIOLATERAL LOADING DIFFERENTIAL



AGGREGATE DIFFERENTIALS

	PRE-CEMENTATION	POST-CEMENTATION
Average	7.5	21.3
StDev	4.6	22.1
Min	0.0	0.0
Max	15.0	93.0

CONCLUSIONS

- There is a high level of loading variability associated with cementation of TKA components
- There is a significant incidence of imbalance after cementation
- Neither cement viscosity nor surgeon experience contributed to the large proportion of post-cementation imbalance
- Intraoperative sensors may help mitigate residual imbalance after cementation

1 Babazedah S, Stoney JD, Lim K, Choong P. The relevance of ligament balancing in total knee arthroplasty: how important is it? A systematic review of the literature. *Orthop Rev.* 2009; 1(26): 70-78.

2 Sharkey PF, Hozak WJ, Rothman RH, Shastri S, Jacoby SM. Why are total knee arthroplasties failing today? *Clin Orthop Relat Res*. 2002; 404: 7-13.

3 Unitt L, Sambatakakis A, Johnstone D, Briggs TW. Short-term outcome in total knee replacement after soft-tissue release and balancing. *J Bone Joint Surg.* 2008; 90: 159-165.

4 Sharkey PF, Lichstein PM, Chen C, Tokarski AT, Parvisi J. Why are total knee arthroplasties failing today – has anything changed after 10 years? *J Arthroplasty.* 2014; 29(9): 1774-1778

5 Catani F, Biasca N, Ensini A, Leardini A, Bianchi L, Digennaro V, Giannini S. Alignment deviation between bone resection and final implant positioning in computer-navigated total knee arthroplasty. *J Bone Joint Surg Am.* 2008; 90(4): 765-771.

6 Shi D, Xu X, Guo A, Dai J, Xu Z, Chen D, Jiang Q. Bone cement soidifilation influence the limb alignment and gap balance during TKA. *Biomed Res Int.* 2015; In-press: PMID: PMC4320926.

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