Five-Year Prospective Randomized Study of Knee Arthroplasty: Cruciate-Substituting vs. Posterior-Stabilized

David F. Scott, MD
Spokane Joint Replacement Center
Spokane, WA, USA

Introduction

- There is no consensus whether a PS total knee device is superior to a deep-dish, more congruent cruciate-substituting (CS) device.
- This study compared the clinical and radiographic outcomes of two such devices.
- The primary hypothesis was that the clinical outcomes would be equivalent.

Methods

- This **prospective randomized study** compared the outcomes of 56 patients who received a Triathlon® PS tibial insert and 55 patients who received a Triathlon® CS lipped tibial insert.
- Institutional Review Board approval and informed consent from participants were obtained.
- Regular clinical and radiographic assessments were performed preoperatively, 6 weeks, 6 months, and annually. Data were compared using chi-square test and T-test with a significance level of 0.05.

Results

- The minimum follow-up period is 5 years.
- 111 patients were enrolled, two had traumatic events requiring surgery, and 14 were lost to follow-up. Excluding trauma, implant survivorship was 100%.
- There were no statistically significant differences in demographic characteristics, (Table 1) intraoperative blood loss, amount of blood transfused, the pre- & postoperative hemoglobin, and radiographic results. (Table 2)
- Tourniquet time was 16.1% longer for the PS group ($p < .0008$). There were no significant differences between groups for the Knee Society scores, the Lower Extremity Activity Scale, ROM, and alignment (preoperative versus 1-year postoperative). (Table 3)
- There was a statistically greater number of mechanical sensations reported by the PS group (21% vs 9%, $p < 0.01$) (Table 4)

Table 1: Demographic Data

Variable	PS (n = 56)	CS (n=55)	*P*-value
Men/Women (n)	27/29	27/28	.95
Mean age (years)	63.9	60.9	.21
men	62.9	62.6	.62
women	64.8	59.7	.08
Mean BMI[a] men/women	32.5/33.9	34.0/32.2	.75

Table 2: Peri-Operative Data

Factor	PS (n=56)	CS (n=55)	*P*-value
Estimated blood loss (cc)	105.37	100.00	0.21
HVAC total drainage (cc)	470.49	445.84	0.61
Mean transfusion (units PRBCs):	0.34	0.25	0.50
Male	0.30	0.27	0.91
Female	0.38	0.24	0.40
Hemoglobin:			
Preoperative	13.91	13.66	0.37
Postoperative Day 1	11.01	10.94	0.78
Day 2	10.19	10.28	0.71
Day 3	9.41	9.46	0.94
Mean tourniquet time (min)	40.45	34.68	**0.0008**
Mean operative time (min)	54.47	49.82	**0.0006**

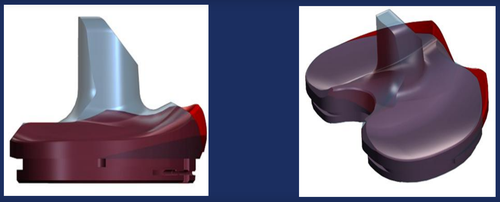
Table 3. Postoperative Data

	PS (n = 56)	CS (n = 55)	*P*-value
Knee Society pain/motion			
Preoperative	51.00	51.02	0.99
Postoperative year:			
2	95.00	95.32	0.88
5	95.53	98.56	0.06
Knee Society function			
Preoperative	53.21	52.23	0.72
Postoperative year:			
2	86.03	83.09	0.50
5	87.50	90.37	0.59
LEAS			
Preoperative	7.91	8.07	0.73
Postoperative year:			
2	10.26	10.85	0.43
5	10.13	9.33	0.33
ROM extension/flexion°			
Preoperative	5.79/113.87	4.55/114.86	0.67
Postoperative year:			
2	0.38/127.26	0/126.35	0.63
5	0.63/125.34	0.19/125.33	1.00
Tibio-femoral Alignment°			
Preoperative	0.7	1.5	0.45
Postoperative year 1	5.3	5.9	0.12

Table 4: Incidence of Mechanical Sensations

	PS	CS	*P*-value
Mechanical Symptoms (#, %)	12/ 21%	5/ 9%	**0.01**

Figure 1: PS and CS Inserts



Conclusion

The clinical outcomes of the two groups were equivalent statistically, except for the:

- higher incidence of mechanical sensations reported by the PS group
- a statistically longer tourniquet time for the PS group

At the minimum 5-year follow-up, the results cannot clearly demonstrate superiority of either device in terms of clinical outcomes, but there are some differences in perioperative outcomes, and the incidence of mechanical sensations.

Disclosures

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