

ANALYSIS OF TOTAL HIP REPLACEMENT USING THE C-STEM® AMT FEMORAL COMPONENT IN THE NATIONAL JOINT REGISTRY FOR ENGLAND, WALES, NORTHERN IRELAND AND THE ISLE OF MAN

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National joint registries provide valuable and generalizable information on the revision rates / survivorship of newer and older implants alike. Typically they include large cohorts with contributions from all surgeons, irrespective of experience level. The National Joint Registry for England, Wales, Northern Ireland and the Isle of Man (NJR) has been in operation since 2003 and in that time has collected data on over 1,000,000 primary total hip replacements.¹

C-STEM® AMT is a triple tapered, polished cemented stem that can be used with both metal and ceramic heads. C-STEM AMT can be used in a fully cemented total hip replacement (THR) with a range of all polyethylene cemented cups. It can also be used in hybrid THR and is compatible with the PINNACLE® Cup System which comprises a cementless modular shell and offers a range of bearing articulations including metal-on-polyethylene, ceramic-on-ceramic and ceramic-on-polyethylene.

The NJR 16th Annual report details the combination of the C-STEM AMT stem with a non-cross-linked all-poly cemented cup (ELITE PLUS™ OGEE Cemented Cup). The cumulative revision rate (CRR) at 10 years for this combination is 2.20% (95% CI 1.57, 3.06).² The 10 year CRR for the combination of C-STEM AMT and MARATHON® Cemented Cup is 1.67% (95%CI 1.21, 2.31).² These compare favourably with the CRR for the class of cemented THR at 10 years, which is reported to be 3.02% (95% CI 2.93, 3.10).³

In addition to the published NJR reports, data is also made available for post-marketing surveillance from the NJR Supplier Feedback system.

The purpose of this analysis is to examine the cumulative revision rate estimates of the C-STEM AMT cemented stem in the various configurations described above.

A dataset was downloaded by DePuy Synthes on 14th January 2020. This comprises detailed data on all C-STEM AMT implantations included on the registry.

Results

In total the dataset records 39,006 cases in which a C-STEM AMT stem had been used (excluding combination with a resurfacing cup or metal liner). The mean age of this cohort was 73.11 years (range 14-102) and there were 25,533 (65.46%) females and 13,473 (34.54%) males. In 89.25% of cases osteoarthritis was listed as at least one of the primary diagnoses. In 54% of cases the intervention was a fully cemented THR.⁴

The follow-up for the cohort extends to 13 years and the patient time incidence rate (PTIR) is 0.32 (95% CI 0.29, 0.35) revisions per 100 observed component years.⁴ A Kaplan-Meier analysis was undertaken to estimate the cumulative revision rate with an end point of revision of any component for any cause and the annual cumulative revision rate estimates are provided in Table 1.⁴

Time	CRR (95% CI)	Cumulative Revised	Number at Risk
1 Years	0.55 (0.48, 0.63%)	206	31675
2 Years	0.82 (0.73, 0.92%)	282	25284
3 Years	1.10 (0.99, 1.23%)	347	19922
4 Years	1.28 (1.15, 1.42%)	377	15177
5 Years	1.45 (1.30, 1.60%)	400	11062
6 Years	1.64 (1.47, 1.82%)	418	7930
7 Years	1.94 (1.73, 2.16%)	439	5736
8 Years	2.14 (1.90, 2.40%)	449	4078
9 Years	2.22 (1.97, 2.51%)	452	2774
10 Years	2.46 (2.15, 2.81%)	458	1989
11 Years	2.69 (2.32, 3.12%)	462	1319
12 Years	2.90 (2.44, 3.44%)	464	678
13 Years	3.27 (2.49, 4.29%)	465	152

Table 1: C-STEM AMT Primary THR: Cumulative Revision Rate Estimates. (2019 NJR)

Group	N	Revised	Revisions/100 Obs. Years	Cumulative Revision Rate	Closest Comparative Class ³	
					Rate	Description
ALL C-STEM AMT	39006	465	0.32 (0.29, 0.35)	10yr – 2.46% (2.15, 2.81%)	10yr - 3.02% (2.93, 3.10%)	All Cemented
C-STEM AMT + ELITE PLUS Cemented Cups	8523	131	0.27 (0.23, 0.32)	10yr – 2.44% (2.00, 2.98%)	10yr - 3.02% (2.93, 3.10%)	All Cemented
C-STEM AMT + MARATHON XLPE Cemented Cups	11852	104	0.29 (0.24, 0.35)	10yr - 2.12% (1.43, 3.14%)	10yr - 3.02% (2.93, 3.10%)	All Cemented
C-STEM AMT + PINNACLE (≠metal liners)	14850	171	0.35 (0.30, 0.41)	10yr – 2.47% (1.91, 3.18%)	10yr - 3.51% (3.38, 3.65%)	All Hybrids
C-STEM AMT + PINNACLE Ceramic on Ceramic	1553	24	0.27 (0.17, 0.39)	10yr – 2.53% (1.63, 3.93%)	10yr - 2.77% (2.52, 3.04%)	Hybrids + (CoC)
C-STEM AMT + PINNACLE Metal on Standard Poly	419	10	0.29 (0.14, 0.49)	10yr – 2.77% (1.39, 5.47%)	10yr - 3.31% (3.16, 3.48%)	Hybrids + (MoP)
With PINNACLE Metal on X-Linked Poly	7459	88	0.39 (0.31, 0.47)	10 yr - 2.16% (1.47, 3.15%)	10yr - 3.31% (3.16, 3.48%)	Hybrids + (MoP)

Table 2: C-STEM AMT Primary THR: Cumulative Revision Rate Estimates and Patient Time Incidence rates by bearing option. (2019 NJR).⁴ Most applicable class rates selected from 2019 NJR.³

Conclusion

The C-STEM AMT cemented femoral stem presents a 2.46% (2.15, 2.81%) estimated cumulative revision rate at 10 years on the NJR. This is in line with the 3.02% (2.93, 3.10%) 10 year revision rate detailed for the class of cemented THR,³ despite the fact that in over 45% of cases the C-STEM AMT stem was used with a cementless acetabular component. The combination of C-STEM AMT with PINNACLE presents a 2.47% (1.91, 3.18%) estimated cumulative revision rate at 10 years. This appears to be significantly lower than the 10 year CRR for the Hybrid class, which is 3.51% (3.38-3.65). All other comparisons were found to be similar to the relevant class data. C-STEM AMT demonstrates reliable performance regardless of the acetabular design and bearing materials selected.

References

1. National Joint Registry for England, Wales, Northern Ireland and the Isle of Man, 16th Annual Report, 2019, Table 3.5. Available from: www.njrreports.org.uk
2. National Joint Registry for England, Wales, Northern Ireland and the Isle of Man, 16th Annual Report, 2019, Table 3.9. Available from: www.njrreports.org.uk
3. National Joint Registry for England, Wales, Northern Ireland and the Isle of Man, 16th Annual Report, 2019, Table 3.7. Available from: www.njrreports.org.uk
4. NJR-NJR data from 1st April 2003 - 14th January 2020 on DePuy products supplied for post-marketing surveillance, NJR Centre, 2020.
Note: NJR-NJR Supplier Feedback data do not include Hospital Episode Statistics (HES) Data Linkage. Revisions may therefore be underreported.

The data used for this analysis was obtained from the NJR Supplier Feedback System. All analyses of NJR data were undertaken by DePuy Synthes. The Healthcare Quality Improvement Partnership ('HQIP') and the National Joint Registry ('NJR') take no responsibility for the accuracy, currency, reliability and correctness of any data used or referred to in this report, nor for the accuracy, currency, reliability and correctness of links or references to other information sources and disclaims all warranties in relation to such data, links and references to the maximum extent permitted by legislation.

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