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ANALYSIS OF TOTAL HIP REPLACEMENT USING ALTRX® CROSS-LINKED POLYETHYLENE MODULAR LINERS IN THE NATIONAL JOINT REGISTRY FOR ENGLAND, WALES, NORTHERN IRELAND AND THE ISLE OF MAN.

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Introduction

National joint registries provide valuable information on the revision rates and survivorship of orthopaedic implants. Typically they include large cohorts with data from all surgeons and from all centres, irrespective of surgeon 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 (THR).[1]

The ALTRX® modular acetabular liners used within the PINNACLE® Acetabular System are manufactured from a moderately cross-linked (7.5 MRad) polyethylene material. It has been designed to optimise the balance between wear reduction and mechanical integrity whilst eliminating oxidation. ALTRX is built on the proven clinical[2-4] experience of MARATHON® Cross-Linked Polyethylene and was introduced in 2007.

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 survivorship results of the ALTRX modular liner within the PINNACLE Acetabular System.

This data will be compared to the long-established MARATHON modular liner as well as to the overall class of uncemented THR using a polyethylene liner. A dataset was downloaded by DePuy Synthes on 10th September 2019.[5] This comprises detailed data on all ALTRX implantations included on the registry.

Results

In total the dataset records 31,372 cases in which an ALTRX modular liner had been used in primary THR. The mean age of this cohort was 69.51 years (range 16-99) and there were 21695 females (69.15%) and 9677 males (30.85%). In 92.12% of cases the primary diagnosis was osteoarthritis, with avascular necrosis (1.86%) and dysplasia (1.16%) the next most prevalent diagnoses. The MARATHON cohort extends to 103,074 cases in primary THR. The mean age was 68.74 years (range 13-101), there were 56197 females (54.52%) and 46877 (45.48%) males. In 94% of cases the primary diagnosis was osteoarthritis, with avascular necrosis (1.76%) and dysplasia (1.09%) again the next most prevalent diagnoses.[5] An unadjusted Kaplan-Meier survival analysis was undertaken with an end-point of revision of any component for any cause and the annual cumulative revision rate estimates are provided in Table 1.[5]

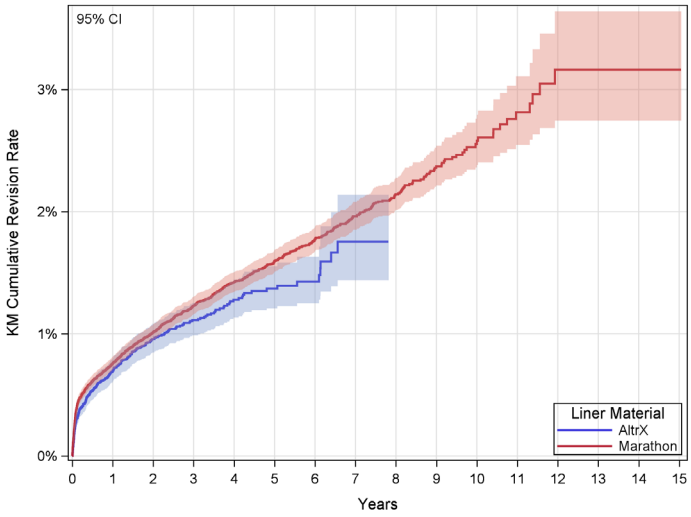
Group	1 Year	3 Years	5 Years	7 Years	10 Years	15 Years
ALTRX N = 31372	0.70% (0.61, 0.80%) N = 24441	1.11% (0.99, 1.25%) N = 12263	1.37% (1.21, 1.55%) N = 4387	1.75 (1.44, 2.14%) N = 554	N/A	N/A
MARATHON N = 103074	0.76% (0.71, 0.81%) N = 89882	1.23% (1.16, 1.30%) N = 62712	1.60% (1.51, 1.69%) N = 37898	1.96 (1.85, 2.08%) N = 19164	2.58% (2.38, 2.79) N = 3671	3.16 (2.75, 3.64%) N = 48
Uncemented MoP N = 161460	1.05% (1.00, 1.10%)	1.72% (1.65, 1.79%)	2.17% (2.09, 2.25%)	N/A	3.96% (3.80, 4.12%)	6.50 (5.96-7.09%)
Uncemented CoP N = 92258	0.86% (0.80, 0.92%)	1.42% (1.34, 1.51%)	1.89% (1.78, 1.99%)	N/A	3.20% (2.99, 3.42%)	6.01 (5.24-6.90%)

Table 1. ALTRX and MARATHON Primary THR: Cumulative Revision Rate Estimates (2019 NJR) (95% CI), n with Later Follow-up.[5] Class rates extracted from Table 3.7 (2019 NJR)[6]

The 7-year cumulative revision rate (CRR) for the ALTRX modular liner is 1.75% (95% CI 1.44, 2.14%). The 7-year CRR for MARATHON modular liners is 1.96% (95% CI 1.85, 2.08%). The ALTRX revision rate estimate at 7 years is slightly lower than the equivalent estimate for MARATHON. However, after adjusting for age, gender and head size, no significant difference was found in the relative risk of revision between the groups (HR 0.994, (95% CI0.867, 1.139) P= 0.273).

The NJR provides CRR estimates for the class of uncemented THR, and further breaks down this cohort into different articulations.[6]

The 5-year estimate for uncemented THR with a Metal-on-Poly articulation is 2.17% (95% CI 2.09, 2.25%).



ALTRX and MARATHON liners used with PINNACLE Acetabular System in Primary THR: Cumulative Revision Rate Estimates (2019 NJR).[5]

The 5-year estimate for uncemented THR with a Ceramic-on-Poly articulation is 1.89% (95% CI 1.78, 1.99%). Based on analysis of the point estimates and 95% confidence intervals, the unadjusted KM rates for both ALTRX and MARATHON appear to be significantly lower than the class.

Conclusion

The ALTRX modular liner used within the PINNACLE Acetabular System demonstrates a low revision rate out to seven years. The revision rate compares favourably to the MARATHON modular liners and the class rates available for uncemented THR using a polyethylene liner.

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. Calvert et al: A Double-Blind, Prospective, Randomized Controlled Trial Comparing Highly Cross-Linked and Conventional Polyethylene in Primary Total Hip Arthroplasty. J Arthroplasty 2009;24:505-510.
3. Mutimer, J., Devane, PA., Adams, K. and Horne, JG. "Highly Crosslinked Polyethylene Reduces Wear in Total Hip Arthroplasty at 5 Years." Clin Orthop Relat Res 2010;468:3228-3233.
4. Bitsch RG et al: Reduction of Osteolysis with Use of Marathon Cross- Linked Polyethylene. A Concise Follow-up, at a Minimum of Five Years, of a Previous Report. J Bone Joint Surg Am, 2008;90A:1487-1491.
5. NJR-NJR data from 1st April 2003 -1oth September 2019 on DePuy products supplied for post-marketing surveillance, NJR Centre, 2019. Note: NJR-NJR Supplier Feedback data do not include Hospital Episode Statistics (HES) Data Linkage. Revisions may therefore be underreported.
6. National Joint Registry for England and Wales, 16th Annual Report, 2019. Table 3.7. Available from: www.njrreports.org.uk

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