The ‘French Paradox’ in Australia: How does the Quadra-C stem compare to other cemented stems in the Australian National Joint Replacement Registry?

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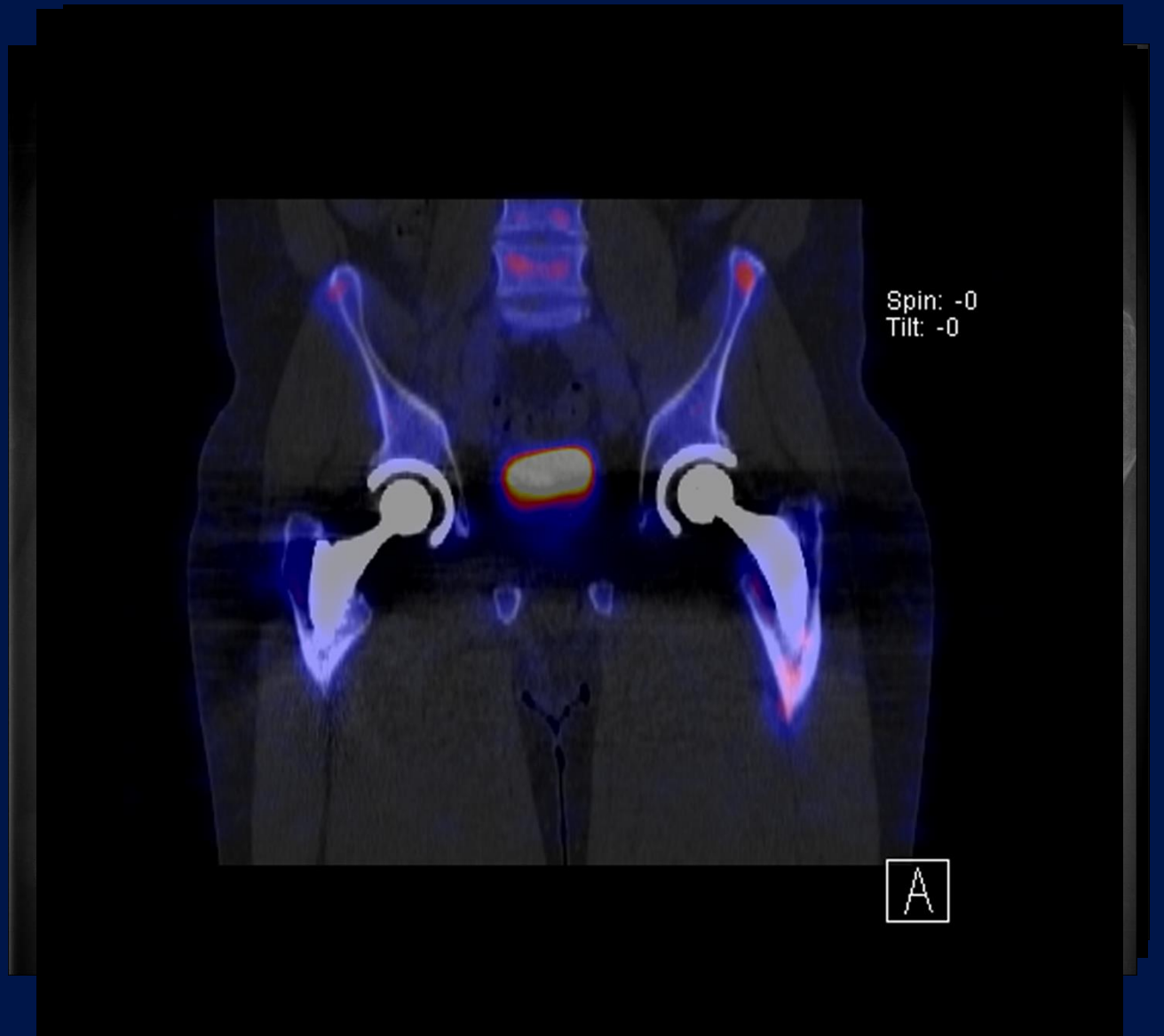
Conflicts

- Nil

- Thanks to the AOANJRR for data and analysis

Anterior Journey

- Anterior learning pathway, presented previously
- Richard De-Steiger et al., Clin Orthop Relat Res 2015 Dec;473(12):3860-6.



What is the ‘French Paradox’

- Classic teachings cement mantle should be 2-4mm
- French-designed cemented femoral components the Charnley-Kerboull and Ceraver Osteal;
  - Intended to occupy fully the medullary canal.
  - Thin cement mantle, in some instances direct contact with cortical bone.
- Stem requires hammer blows to complete insertion, significant increase in cement pressure and interdigitation.
- Because of implant rectangular cross section has substantial intrinsic stability within the medullary canal, especially torsion.

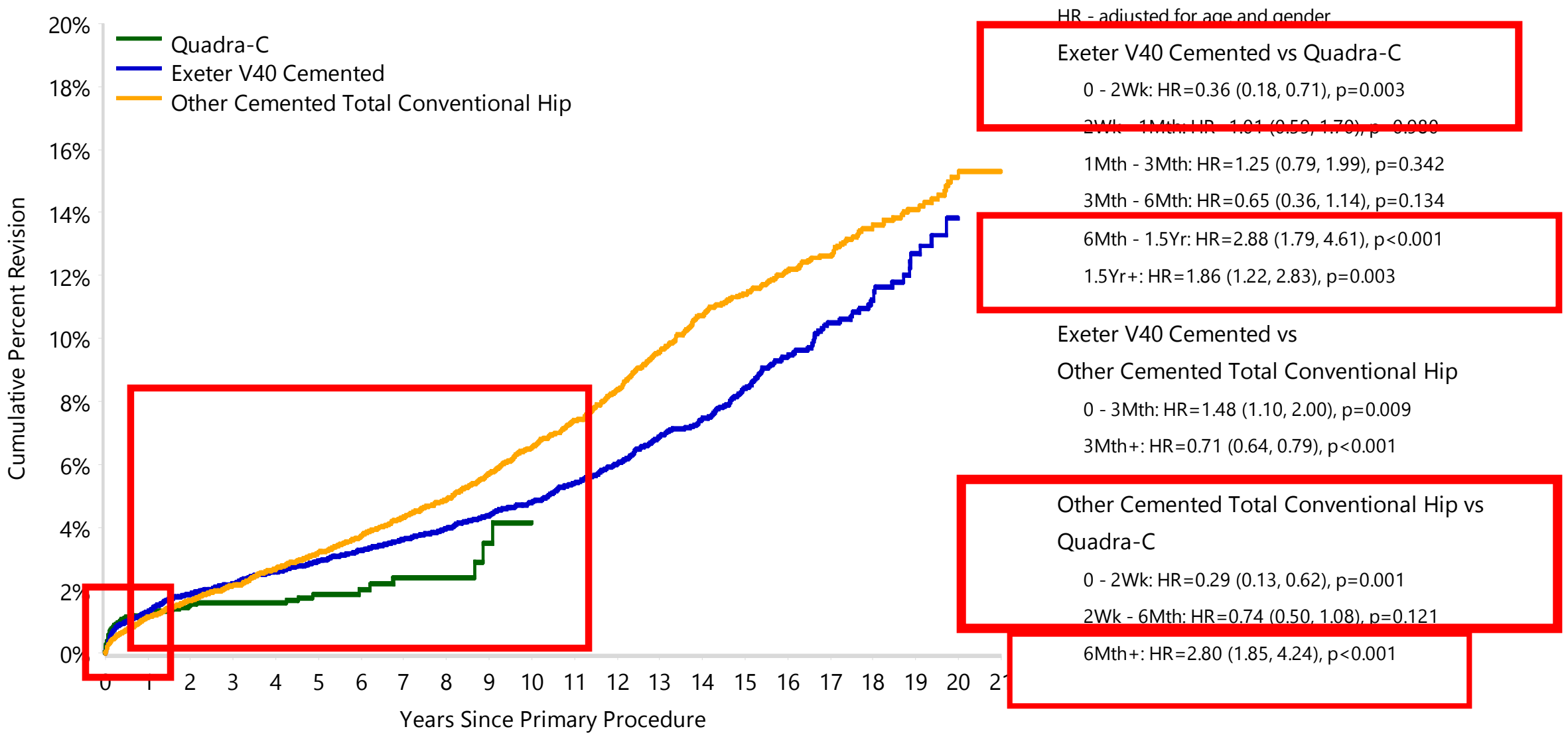
Quadra-C design

- Polished, straight, triple taper with trapezoidal cross section.
- No Centraliser
- Generally inserted with line to line cementing over a cement restrictor.
- No ability to significantly alter version, high pressure on cement plug

Study Design

- Data from the AOANJRR from September 1999 to September 2022.
- Femoral revision rate of Quadra C versus Taper Slip (Exeter) and all other cemented stems (combined cemented techniques) used in THR for Osteoarthritis.
- Not controlled for ASA, BMI, approach, surgeon or hospital setting.

		Quadra-C	Exeter V40 Cemented	Other Cemented Hip	TOTAL
Follow Up Years					
	Mean ± SD	**2.9 ± 2.5**	**8.6 ± 5.2**	**9.7 ± 5.8**	8.1 ± 5.6
	Median (IQR)	2.3 (1, 4.3)	8.2 (4.3, 12.4)	9.2 (4.8, 14.2)	7.3 (3.3, 12.2)
	Minimum	0	0	0	0
	Maximum	14.3	21.1	22.3	22.3
Age					
	Mean ± SD	74.2 ± 8.7	73.4 ± 9.7	74.1 ± 9.3	73.8 ± 9.4
Age Group					
	<55	107 (2.1%)	596 (4.2%)	356 (3.1%)	1,059 (3.5%)
	55-64	557 (11.1%)	1,682 (12%)	1,323 (11.5%)	3,562 (11.6%)
	65-74	1,778 (35.4%)	4,676 (33.2%)	3,775 (32.7%)	10,229 (33.4%)
	≥75	2,575 (51.3%)	7,117 (50.6%)	6,099 (52.8%)	15,791 (51.5%)
Gender					
	Male	1,562 (31.1%)	5,264 (37.4%)	4,227 (36.6%)	11,053 (36.1%)
	Female	3,455 (68.9%)	8,807 (62.6%)	7,326 (63.4%)	19,588 (63.9%)
ASA Score[1]					
	1	289 (6.1%)	137 (3.1%)	46 (2.2%)	472 (4.2%)
	2	2,352 (49.8%)	2,128 (48.1%)	911 (43%)	5,391 (47.8%)
	3	1,985 (42%)	2,023 (45.7%)	1,089 (51.4%)	5,097 (45.2%)
	4	99 (2.1%)	140 (3.2%)	71 (3.4%)	310 (2.8%)
BMI[2]					
	Underweight (<18.50)	74 (1.7%)	44 (1.4%)	28 (1.7%)	146 (1.6%)
	Normal (18.50-24.99)	1,168 (26.9%)	760 (25%)	428 (26%)	2,356 (26.1%)
	Pre Obese (25.00-29.99)	1,669 (38.4%)	1,152 (37.9%)	615 (37.4%)	3,436 (38%)
	Obese Class 1 (30.00-34.99)	990 (22.8%)	683 (22.5%)	362 (22%)	2,035 (22.5%)
	Obese Class 2 (35.00-39.99)	337 (7.7%)	273 (9%)	138 (8.4%)	748 (8.3%)
	Obese Class 3 (≥40.00)	111 (2.6%)	125 (4.1%)	74 (4.5%)	310 (3.4%)
Approach[3]					
	Anterior	**4,182 (94%)**	**39 (1.3%)**	**163 (9.6%)**	4,384 (47.5%)
	Lateral	66 (1.5%)	713 (23.1%)	400 (23.6%)	1,179 (12.8%)
	Posterior	201 (4.5%)	2,334 (75.6%)	1,131 (66.8%)	3,666 (39.7%)
TOTAL		**5,017**	**14,071**	**11,553**	**30,641**

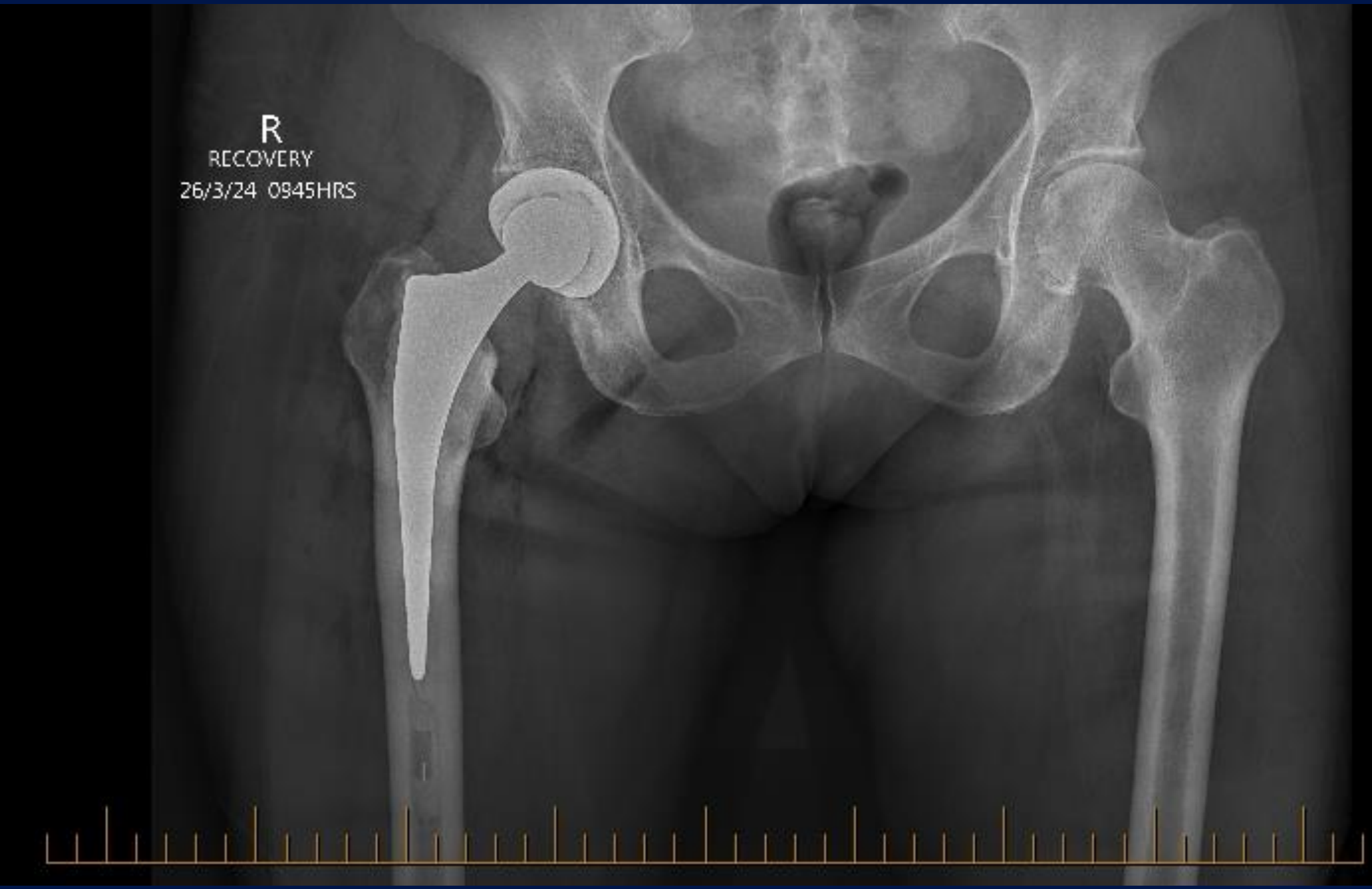


Number at Risk	0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs	8 Yrs	9 Yrs	10 Yrs
Quadra-C	5017	3725	2743	1996	1399	962	628	395	245	153	71
Exeter V40 Cemented	14071	13303	12593	11742	10945	10116	9196	8264	7234	6311	5462
Other Cemented Total Conventional Hip	11553	10960	10440	9836	9194	8564	7896	7194	6539	5885	5237

	Quadra-C			Exeter V40 Cemented			Other Cemented Hip		
Revision Diagnosis	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Loosening	**12**	**0.2**	**15.0**	**219**	**1.6**	**34.1**	**387**	**3.3**	**50.8**
Prosthesis Dislocation/Instability	**11**	**0.2**	**13.8**	**149**	**1.1**	**23.2**	**129**	**1.1**	**16.9**
Infection	**27**	**0.5**	**33.8**	**127**	**0.9**	**19.8**	**99**	**0.9**	**13.0**
Fracture	**18**	**0.4**	**22.5**	**114**	**0.8**	**17.8**	**105**	**0.9**	**13.8**
Lysis				6	0.0	0.9	16	0.1	2.1
Implant Breakage Stem				11	0.1	1.7	6	0.1	0.8
Pain	1	0.0	1.3	5	0.0	0.8	6	0.1	0.8
Leg Length Discrepancy	2	0.0	2.5	4	0.0	0.6	2	0.0	0.3
Wear Acetabulum				2	0.0	0.3	4	0.0	0.5
Implant Breakage Acetabular							2	0.0	0.3
Malposition	2	0.0	2.5						
Heterotopic Bone	1	0.0	1.3	1	0.0	0.2	1	0.0	0.1
Implant Breakage Acetabular Insert	1	0.0	1.3				1	0.0	0.1
Incorrect Sizing	1	0.0	1.3	1	0.0	0.2	1	0.0	0.1
Metal Related Pathology							1	0.0	0.1
Tumour	1	0.0	1.3	1	0.0	0.2	1	0.0	0.1
Wear Acetabular Insert				1	0.0	0.2			
Other	3	0.1	3.8	1	0.0	0.2	1	0.0	0.1
N Revision	**80**	**1.6**	**100.0**	**642**	**4.6**	**100.0**	**762**	**6.6**	**100.0**
N Primary	**5017**			**14071**			**11553**		

What are other studies saying?

- Is the “French Parados’ really a paradox
  - Clauss et al 2019;8:1-2
- Low rate of Proximal femoral fractures in >70 year olds
  - Laboudie et al JBJS 2024;106B(3 Supple A):67-73
- Is the French Paradox cementing philosophy superior to the standard cementing? A randomized controlled radiostereometric trial and comparative analysis
  - Sevaldsen et al JBJS 2022;104B(1):19-26
- Type 3 stems (Press fit wedge) excellent results and good option for younger and older patients and those with Type C proximal femoral geometry.
  - EFORT Open Rev 2020 Apr; 5(4): 241-252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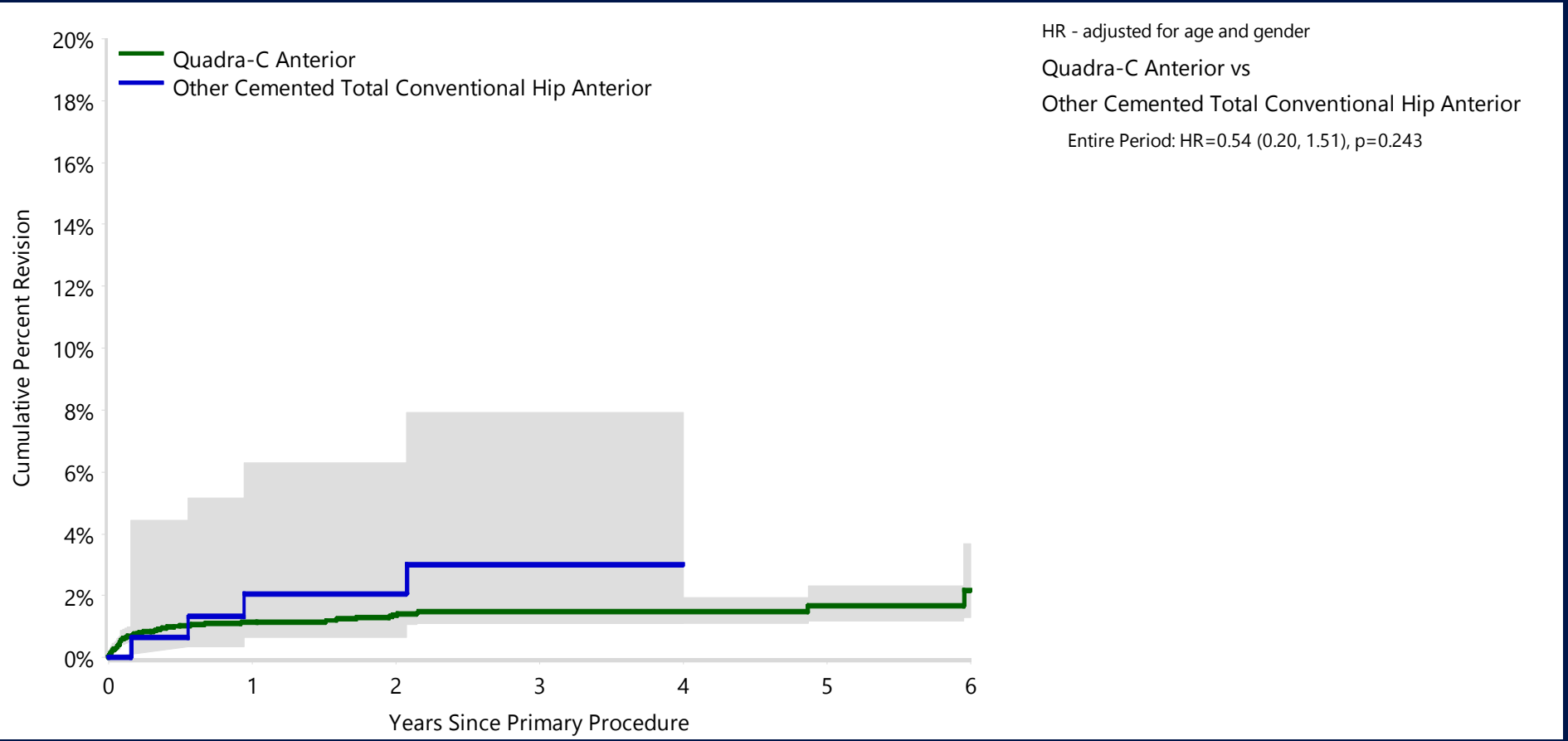
Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Quadra-C	Anterior	4182	3002	2102	1424	870	476	186
Other Cemented Total Conventional Hip	Anterior	163	130	105	81	52	32	19



Summary

- Within the limitations of this analysis, we have found that the ‘French Paradox’ cementing technique with the Quadra-C is not associated with an elevated rate of revision at a median of 2.9 years compared to other cemented stem techniques.