

Trabecular Metal Total Conventional Hip Investigation

Note: This analysis compares the Trabecular Metal femoral stem prosthesis with all other total conventional hip prostheses.

This prosthesis has been identified as having a significantly higher rate of revision. For a detailed explanation of the process used by the Registry that results in identification of prostheses that have a higher than anticipated rate of revision please refer to the Prostheses with Higher than Anticipated Rates of Revision chapter of the most recent AOANJRR Annual Report, <https://aoanjrr.sahmri.com/annual-reports-2023>.

Note: Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator. Procedures using prostheses with no recorded use in 2022 are excluded from the comparator.

TABLE 1

Revision Rate of Primary Total Conventional Hip Replacement

The revision rate of the Trabecular Metal total conventional hip prosthesis is compared to all other total conventional hip prostheses.

Table 1: Revision Rates of Primary Total Conventional Hip Replacement

Component	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Trabecular Metal	126	1904	17895	0.70 (0.59, 0.84)
Other Total Conventional Hip	17452	494145	3081462	0.57 (0.56, 0.57)
TOTAL	17578	496049	3099357	0.57 (0.56, 0.58)

Note: Prostheses no longer used in 2022 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 2

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the Trabecular Metal total conventional hip prosthesis is compared to all other total conventional hip prostheses.

Table 2: Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs	8 Yrs
Trabecular Metal	3.5 (2.7, 4.4)	4.2 (3.4, 5.2)	4.8 (3.9, 5.8)	5.1 (4.2, 6.2)	5.4 (4.5, 6.6)	5.8 (4.8, 6.9)	6.2 (5.2, 7.4)	6.4 (5.4, 7.6)
Other Total Conventional Hip	1.7 (1.7, 1.8)	2.2 (2.1, 2.2)	2.5 (2.5, 2.6)	2.8 (2.7, 2.8)	3.1 (3.0, 3.1)	3.4 (3.3, 3.4)	3.6 (3.6, 3.7)	3.9 (3.9, 4.0)

CPR	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs	15 Yrs
Trabecular Metal	6.5 (5.5, 7.8)	6.7 (5.6, 8.0)	7.0 (5.9, 8.3)	7.2 (6.0, 8.5)	7.2 (6.0, 8.5)	7.2 (6.0, 8.5)	7.2 (6.0, 8.5)
Other Total Conventional Hip	4.3 (4.2, 4.3)	4.6 (4.5, 4.7)	4.9 (4.8, 5.0)	5.3 (5.2, 5.4)	5.7 (5.6, 5.8)	6.1 (6.0, 6.2)	6.5 (6.4, 6.6)

CPR	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs	22 Yrs
Trabecular Metal							
Other Total Conventional Hip	6.9 (6.8, 7.1)	7.3 (7.1, 7.4)	7.6 (7.4, 7.8)	8.2 (8.0, 8.5)	8.5 (8.2, 8.8)	8.9 (8.5, 9.3)	9.3 (8.8, 9.8)

Note: Prostheses no longer used in 2022 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

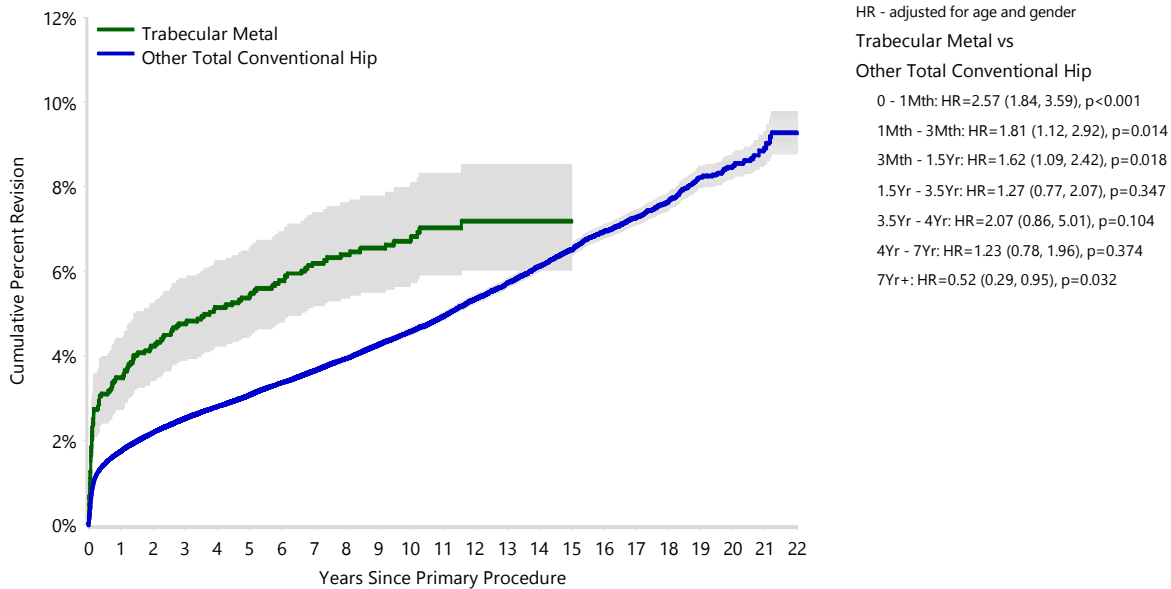
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the Trabecular Metal total conventional hip prosthesis is compared to all other total conventional hip prostheses. In addition, hazard ratios are reported.

Hazard ratios are reported for specific time periods during which the hazard ratio is constant. This is done to enable more specific and valid comparisons of the risk of revision over time. The pattern of variation in risk has important implications with respect to the underlying reasons for any difference.

Figure 1: Cumulative Percent Revision of Primary Total Conventional Hip Replacement



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	11 Yrs
Trabecular Metal	1904	1814	1784	1747	1719	1685	1612	1479	1353	1131	952	720
Other Total Conventional Hip	494145	437500	388717	344220	299660	258064	219311	183514	151369	124924	102632	83483

Number at Risk	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs	22 Yrs
Trabecular Metal	484	283	149	65	3	0	0	0	0	0	0
Other Total Conventional Hip	66659	51987	39538	29740	22330	16535	11402	7013	3737	1435	252

Note: Prostheses no longer used in 2022 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 3**Primary Diagnosis for Revised Primary Total Conventional Hip Replacement**

This table identifies the diagnosis of the primary procedure which was subsequently revised. This information is provided as there is a variation on outcome depending on the primary diagnosis. It is therefore important when considering the reasons for a higher than anticipated rate of revision that there is identification of the primary diagnosis. This information should be compared to the primary diagnosis for the revisions of all other total conventional hip prostheses.

Table 3: Primary Diagnosis for Revised Primary Total Conventional Hip Replacement

Primary Diagnosis	Trabecular Metal		Other Total Conventional Hip	
	Number	Percent	Number	Percent
Osteoarthritis	117	92.9	14432	82.7
Fractured Neck Of Femur	3	2.4	1291	7.4
Osteonecrosis	3	2.4	797	4.6
Developmental Dysplasia	1	0.8	279	1.6
Rheumatoid Arthritis	2	1.6	186	1.1
Failed Internal Fixation			147	0.8
Tumour			145	0.8
Other Inflammatory Arthritis			99	0.6
Fracture/Dislocation			46	0.3
Arthrodesis Takedown			16	0.1
Other			14	0.1
TOTAL	126	100.0	17452	100.0

Note: Prostheses no longer used in 2022 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 4

Reasons for Revision

This is reported in two ways: a percentage of primary procedures revised and as a percentage of all revision procedures.

% Primaries Revised: This shows the proportional contribution of each revision diagnosis as a percentage of the total number of primary procedures. This percentage can be used to approximate the risk of being revised for that diagnosis. Differing percentages between groups, with the same distribution of follow up time, may identify problems of concern.

% Revisions: The number of revisions for each diagnosis is expressed as a percentage of the total number of revisions. This shows the distribution of reasons for revision within a group but cannot be used as a comparison between groups.

Table 4: Primary Total Conventional Hip Replacement - Reason for Revision (Follow-up Limited to 16.2 Years)

Revision Diagnosis	Trabecular Metal			Other Total Conventional Hip		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Prosthesis Dislocation/Instability	30	1.6	23.8	3993	0.8	23.1
Infection	27	1.4	21.4	3989	0.8	23.1
Fracture	17	0.9	13.5	3771	0.8	21.9
Loosening	23	1.2	18.3	3469	0.7	20.1
Pain	5	0.3	4.0	308	0.1	1.8
Leg Length Discrepancy	5	0.3	4.0	270	0.1	1.6
Malposition	3	0.2	2.4	243	0.0	1.4
Lysis	4	0.2	3.2	180	0.0	1.0
Implant Breakage Stem				163	0.0	0.9
Implant Breakage Acetabular Insert				119	0.0	0.7
Incorrect Sizing	4	0.2	3.2	102	0.0	0.6
Wear Acetabular Insert	1	0.1	0.8	92	0.0	0.5
Metal Related Pathology	3	0.2	2.4	71	0.0	0.4
Implant Breakage Acetabular	1	0.1	0.8	69	0.0	0.4
Wear Head				44	0.0	0.3
Tumour	1	0.1	0.8	40	0.0	0.2
Implant Breakage Head				31	0.0	0.2
Heterotopic Bone				26	0.0	0.2
Wear Acetabulum				9	0.0	0.1
Progression Of Disease				2	0.0	0.0
Osteonecrosis				1	0.0	0.0
Synovitis				1	0.0	0.0
Other	2	0.1	1.6	257	0.1	1.5
N Revision	126	6.6	100.0	17250	3.5	100.0
N Primary	1904			494145		

Note: This table is restricted to revisions within 16.2 years for all groups to allow a time-matched comparison of revisions.

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FIGURE 2

Cumulative Incidence Revision Diagnosis of Primary Total Conventional Hip Replacement

This figure details the cumulative incidence of the most common reasons for revision. The five most common reasons for revision are included as long as each of these reasons account for more than 10 procedures or at least 5% of all revisions for the Trabecular Metal total conventional hip prosthesis. A comparative graph is provided of the cumulative incidence for the same reasons for revisions for all other total conventional hip prostheses.

Figure 2: Cumulative Incidence Revision Diagnosis for Primary Total Conventional Hip Replacement

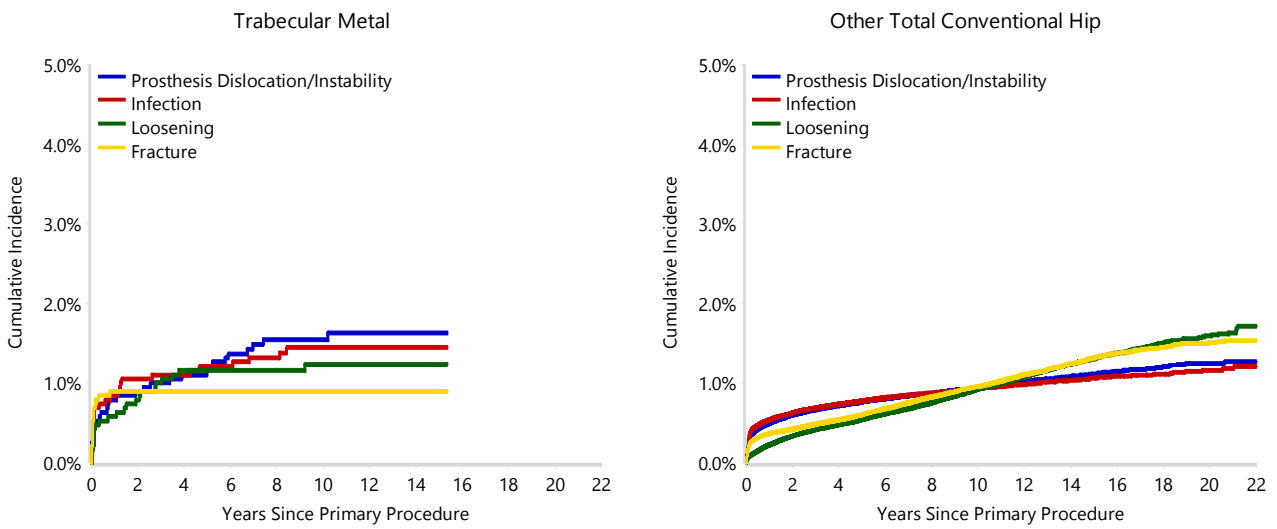


TABLE 5

Type of Revision Performed for Primary Total Conventional Hip Replacement

This analysis identifies the components used in the revision of the Trabecular Metal total conventional hip prosthesis and compares it to the components used in the revision of all other total conventional hip prostheses.

The reason this analysis is undertaken is to identify whether there is one or more components which are being replaced that differ from the components replaced for revisions of all other total conventional hip prostheses i.e. is there a difference in the type of revision undertaken for the Trabecular Metal total conventional hip prosthesis compared to all other total conventional hip prostheses.

Table 5: Primary Total Conventional Hip Replacement - Type of Revision (Follow-up Limited to 16.2 Years)

Type of Revision	Trabecular Metal		Other Total Conventional Hip	
	Number	Percent	Number	Percent
Femoral Component	36	28.6	5647	32.7
Acetabular Component	27	21.4	3256	18.9
THR (Femoral/Acetabular)	10	7.9	1989	11.5
Cement Spacer	7	5.6	616	3.6
Removal of Prostheses			94	0.5
Reinsertion of Components			27	0.2
Total Femoral			8	0.0
Bipolar Head and Femoral			5	0.0
Saddle			1	0.0
N Major	80	63.5	11643	67.5
Head/Insert	30	23.8	4286	24.8
Head Only	12	9.5	842	4.9
Minor Components	1	0.8	295	1.7
Insert Only	3	2.4	180	1.0
Bipolar Only			2	0.0
Cement Only			1	0.0
Head/Neck			1	0.0
N Minor	46	36.5	5607	32.5
TOTAL	126	100.0	17250	100.0

Note: This table is restricted to revisions within 16.2 years for all groups to allow a time-matched comparison of revisions.

Note: Prostheses no longer used in 2022 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 6**Revision Rates of Trabecular Metal Primary Total Conventional Hip Replacement by Fixation**

This analysis is provided as some prostheses have more than one fixation option. Additionally there are prostheses where an alternative to the recommended approach to fixation was used e.g. a cementless prosthesis that has been cemented or vice-versa.

Table 6: Revised Number of Trabecular Metal Primary Total Conventional Hip Replacement by Fixation

Fixation	N Revised	N Total
Cementless	126	1899
Hybrid (Femur Cemented)	0	1
Reverse Hybrid (Femur Cementless)	0	4
TOTAL	126	1904

TABLE 7**Revision Rates of Trabecular Metal Primary Total Conventional Hip Replacement by Bearing Surface**

This analysis is provided as some prostheses are combined with a variety of bearing surfaces. All bearing surfaces used with this prosthesis are listed.

Table 7: Revised Number of Trabecular Metal Primary Total Conventional Hip Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Ceramic/Ceramic	13	280
Ceramic/XLPE	33	472
Metal/Metal	13	75
Metal/XLPE	67	1077
TOTAL	126	1904

TABLE 8**Revision Rates of Trabecular Metal Primary Total Conventional Hip Replacement by Approach**

This analysis is provided as some prostheses are used with a variety of surgical approaches. All surgical approaches used with this prosthesis are listed.

Table 8: Revised Number of Trabecular Metal Primary Total Conventional Hip Replacement by Approach

Approach	N Revised	N Total
Anterior	0	1
Lateral	7	104
Posterior	6	141
TOTAL	13	246

Note: Excludes 1658 procedures with no approach recorded

TABLE 9

Revision Rates of Primary Total Conventional Hip Replacement by State

This enables a state by state variation to be identified for the Trabecular Metal total conventional hip prosthesis and provides the comparative data for each of the states for all other total conventional hip prostheses.

The purpose of this analysis is to determine if the higher than anticipated rate of revision has widespread distribution between states. If there is widespread distribution then the reason for the higher than anticipated rate of revision is unlikely to be surgeon specific. If the prosthesis has been used in only a small number of states it is not possible to distinguish if the higher than anticipated rate of revision is related to the prosthesis, surgeon, technique or patient.

Table 9: Revised Number of Primary Total Conventional Hip Replacement by State

Component	State	N Revised	N Total
Trabecular Metal	NSW	58	1032
	VIC	20	373
	WA	18	167
	SA	2	17
	TAS	7	145
	ACT/NT	21	170
	Other Total Conventional Hip	NSW	4728
VIC		4348	128324
QLD		3451	86927
WA		2389	58888
SA		1621	45638
TAS		405	16382
ACT/NT		510	13218
TOTAL		17578	496049

Note: Prostheses no longer used in 2022 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 10**Number of Revisions of Trabecular Metal Primary Total Conventional Hip Replacement by Year of Implant**

This analysis details the number of prostheses reported each year to the Registry for the Trabecular Metal total conventional hip prosthesis. It also provides the subsequent number of revisions of the primaries reported in that year.

Primary procedures performed in later years have had less follow up time therefore the number revised is expected to be less than the number revised in earlier years. For example, a primary procedure performed in 2022 has a maximum of one year to be revised, whereas a primary procedure performed in 2020 has a maximum of three years to be revised.

Table 10: Number of Revisions of Trabecular Metal Primary Total Conventional Hip Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2006	0	6
2007	9	101
2008	10	148
2009	12	198
2010	10	242
2011	15	272
2012	26	276
2013	18	186
2014	13	220
2015	5	112
2016	5	106
2017	2	32
2018	1	5
TOTAL	126	1904

TABLE 11

Revision Rates of Trabecular Metal Primary Total Conventional Hip Replacement by Catalogue Number Range

Many prostheses have a number of catalogue ranges. The catalogue range is specific to particular design features; more than one catalogue range usually indicates a minor difference in design in a particular Trabecular Metal prosthesis.

This analysis has been undertaken to determine if the revision rate varies according to the catalogue number range.

Model	Catalogue Range	Catalogue Description	Cement	Material
Femoral Stem				
Trabecular Metal	00786400900-00786401800	TRABECULAR METAL PRIMARY HIP FEMORAL STEM 12/14 NECK TAPER STANDARD NECK OFFSET	NO	METAL
Trabecular Metal	00786401120-00786401820	TRABECULAR METAL PRIMARY HIP FEMORAL STEM 12/14 NECK TAPER EXTENDED NECK OFFSET	NO	METAL

Table 11: Revised Number of Trabecular Metal Primary Total Conventional Hip Replacement by Catalogue Number Range

Femoral Stem Range	N Revised	N Total
00786400900-00786401800	59	993
00786401120-00786401820	67	911
TOTAL	126	1904

TABLE 12

Revision Rates of Trabecular Metal Primary Total Conventional Hip Replacement by Component

A prosthesis may be combined with multiple components. This analysis has been undertaken to determine if the revision rate varies according to the component with which it is combined.

Table 12: Revised Number of Trabecular Metal Primary Total Conventional Hip Replacement by Acetabular Component

Acetabular Component	N Revised	N Total
Allofit	23	475
Continuum	53	701
Durom	10	52
Exeter X3 Rimfit	0	1
Fitmore	1	34
PINNACLE	0	7
Reflection (Cup)	0	1
Trabecular Metal (Shell)	14	180
Trilogy	25	453
TOTAL	126	1904