Mitch TRH Total Conventional Hip Investigation

Note: This analysis compares the Mitch TRH acetabular 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 Mitch TRH 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)
Mitch TRH	166	731	8254	2.01 (1.72, 2.34)
Other Total Conventional Hip	17452	494145	3081462	0.57 (0.56, 0.57)
TOTAL	**17618**	**494876**	**3089716**	**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 Mitch TRH 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
Mitch TRH	1.5 (0.8, 2.7)	3.2 (2.1, 4.7)	4.6 (3.3, 6.4)	6.2 (4.6, 8.2)	7.7 (6.0, 10.0)	9.4 (7.4, 11.8)	10.8 (8.8, 13.4)	12.4 (10.1, 15.1)
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
Mitch TRH	13.5 (11.1, 16.2)	15.6 (13.1, 18.5)	17.9 (15.2, 21.1)	21.4 (18.4, 24.7)	23.2 (20.1, 26.7)	25.5 (22.2, 29.3)	26.9 (23.4, 30.8)
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
Mitch TRH							
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.

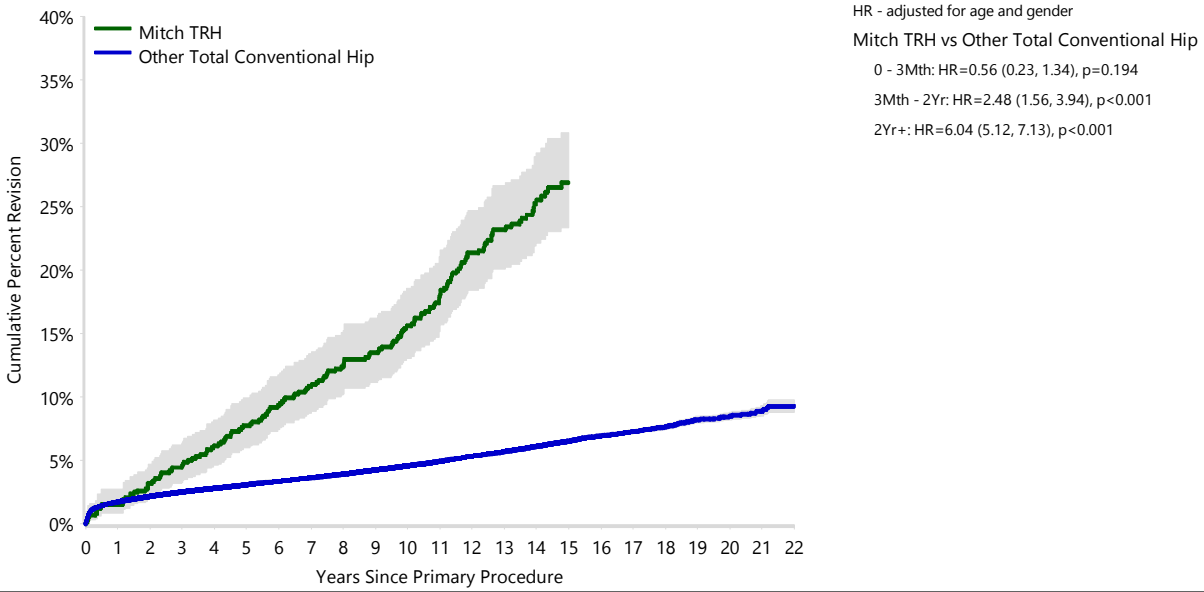
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the Mitch TRH 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
Mitch TRH	731	712	692	674	653	635	613	593	568	544	512	487
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
Mitch TRH	429	351	254	155	21	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

	Mitch TRH		Other Total Conventional Hip	
Primary Diagnosis	Number	Percent	Number	Percent
Osteoarthritis	150	90.4	14432	82.7
Fractured Neck Of Femur	4	2.4	1291	7.4
Osteonecrosis	8	4.8	797	4.6
Developmental Dysplasia			279	1.6
Rheumatoid Arthritis	1	0.6	186	1.1
Failed Internal Fixation	1	0.6	147	0.8
Tumour			145	0.8
Other Inflammatory Arthritis	2	1.2	99	0.6
Fracture/Dislocation			46	0.3
Arthrodesis Takedown			16	0.1
Other			14	0.1
TOTAL	**166**	**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 16.5 Years)

	Mitch TRH			Other Total Conventional Hip		
Revision Diagnosis	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Prosthesis Dislocation/Instability	3	0.4	1.8	3999	0.8	23.1
Infection	25	3.4	15.1	3991	0.8	23.1
Fracture	7	1.0	4.2	3776	0.8	21.9
Loosening	34	4.7	20.5	3480	0.7	20.1
Pain	4	0.5	2.4	308	0.1	1.8
Leg Length Discrepancy	2	0.3	1.2	270	0.1	1.6
Malposition	1	0.1	0.6	243	0.0	1.4
Lysis	15	2.1	9.0	181	0.0	1.0
Implant Breakage Stem	20	2.7	12.0	164	0.0	0.9
Implant Breakage Acetabular Insert				119	0.0	0.7
Incorrect Sizing				102	0.0	0.6
Wear Acetabular Insert				92	0.0	0.5
Metal Related Pathology	54	7.4	32.5	71	0.0	0.4
Implant Breakage Acetabular				69	0.0	0.4
Wear Head				44	0.0	0.3
Tumour				41	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	1	0.1	0.6	257	0.1	1.5
N Revision	**166**	**22.7**	**100.0**	**17277**	**3.5**	**100.0**
N Primary	**731**			**494145**		

Note: This table is restricted to revisions within 16.5 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.

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 Mitch TRH 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

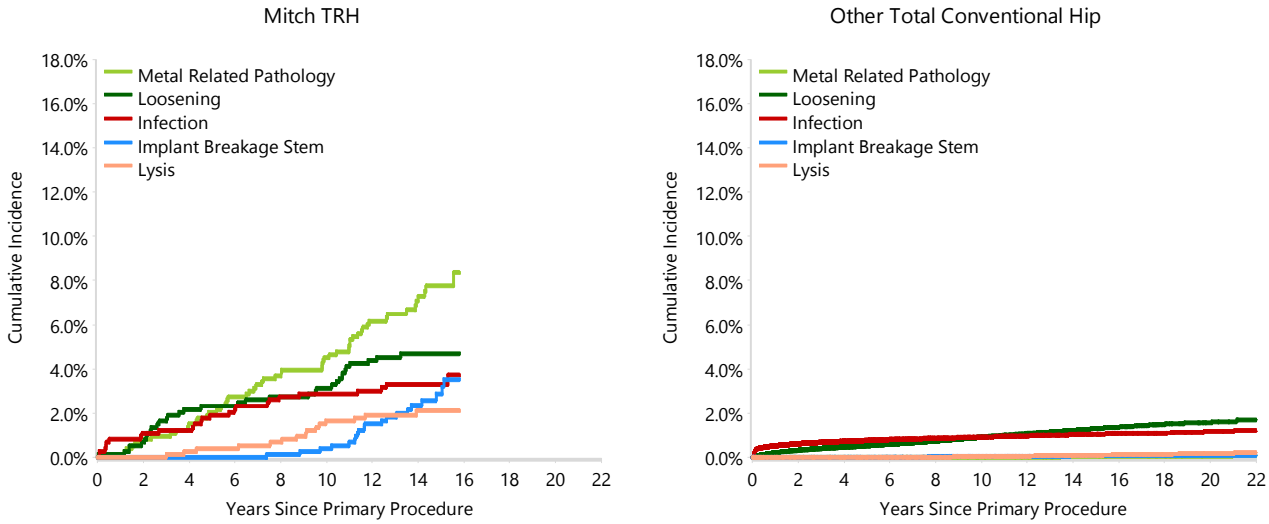


TABLE 5

Type of Revision Performed for Primary Total Conventional Hip Replacement

This analysis identifies the components used in the revision of the Mitch TRH 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 Mitch TRH 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 16.5 Years)

	Mitch TRH		Other Total Conventional Hip	
Type of Revision	Number	Percent	Number	Percent
Femoral Component	25	15.1	5654	32.7
Acetabular Component	45	27.1	3264	18.9
THR (Femoral/Acetabular)	78	47.0	1995	11.5
Cement Spacer	13	7.8	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	**161**	**97.0**	**11664**	**67.5**
Head/Insert	3	1.8	4291	24.8
Head Only	2	1.2	843	4.9
Minor Components			295	1.7
Insert Only			180	1.0
Bipolar Only			2	0.0
Cement Only			1	0.0
Head/Neck			1	0.0
N Minor	**5**	**3.0**	**5613**	**32.5**
TOTAL	**166**	**100.0**	**17277**	**100.0**

Note: This table is restricted to revisions within 16.5 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 Mitch TRH 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 Mitch TRH Primary Total Conventional Hip Replacement by Fixation

Fixation	N Revised	N Total
Cementless	120	429
Hybrid (Femur Cemented)	46	302
TOTAL	**166**	**731**

TABLE 7

Revision Rates of Mitch TRH 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 Mitch TRH Primary Total Conventional Hip Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Metal/Metal	166	730
Unknown	0	1
TOTAL	**166**	**731**

TABLE 8

Revision Rates of Primary Total Conventional Hip Replacement by State

This enables a state by state variation to be identified for the Mitch TRH 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 8: Revised Number of Primary Total Conventional Hip Replacement by State

Component	State	N Revised	N Total
Mitch TRH	NSW	65	244
	VIC	6	20
	QLD	18	121
	WA	51	184
	SA	7	100
	TAS	5	13
	ACT/NT	14	49
Other Total Conventional Hip	NSW	4728	144768
	VIC	4348	128324
	QLD	3451	86927
	WA	2389	58888
	SA	1621	45638
	TAS	405	16382
	ACT/NT	510	13218
TOTAL		**17618**	**494876**

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 9

Number of Revisions of Mitch TRH Primary Total Conventional Hip Replacement by Year of Implant

This analysis details the number of prostheses reported each year to the Registry for the Mitch TRH 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 9: Number of Revisions of Mitch TRH Primary Total Conventional Hip Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2006	11	45
2007	68	273
2008	35	164
2009	31	130
2010	19	82
2011	2	37
TOTAL	**166**	**731**

TABLE 10

Revision Rates of Mitch TRH 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 Mitch TRH 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	Coating
Acetabular					
Mitch TRH	MAC99883844-MAC99885864	TITANIUM HA STANDARD RS ACETABULAR CUP	NO	METAL	HA COATED

Table 10: Revised Number of Mitch TRH Primary Total Conventional Hip Replacement by Catalogue Number Range

Acetabular Range	N Revised	N Total
MAC99883844-MAC99885864	166	731
TOTAL	**166**	**731**

TABLE 11

Revision Rates of Mitch TRH 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 11: Revised Number of Mitch TRH Primary Total Conventional Hip Replacement by Femoral Stem Component

Femoral Stem Component	N Revised	N Total
ABGII	7	21
ABGII (exch neck)	1	2
Accolade I	110	401
Citation	1	4
Exeter V40	45	300
Restoration	2	3
TOTAL	**166**	**731**