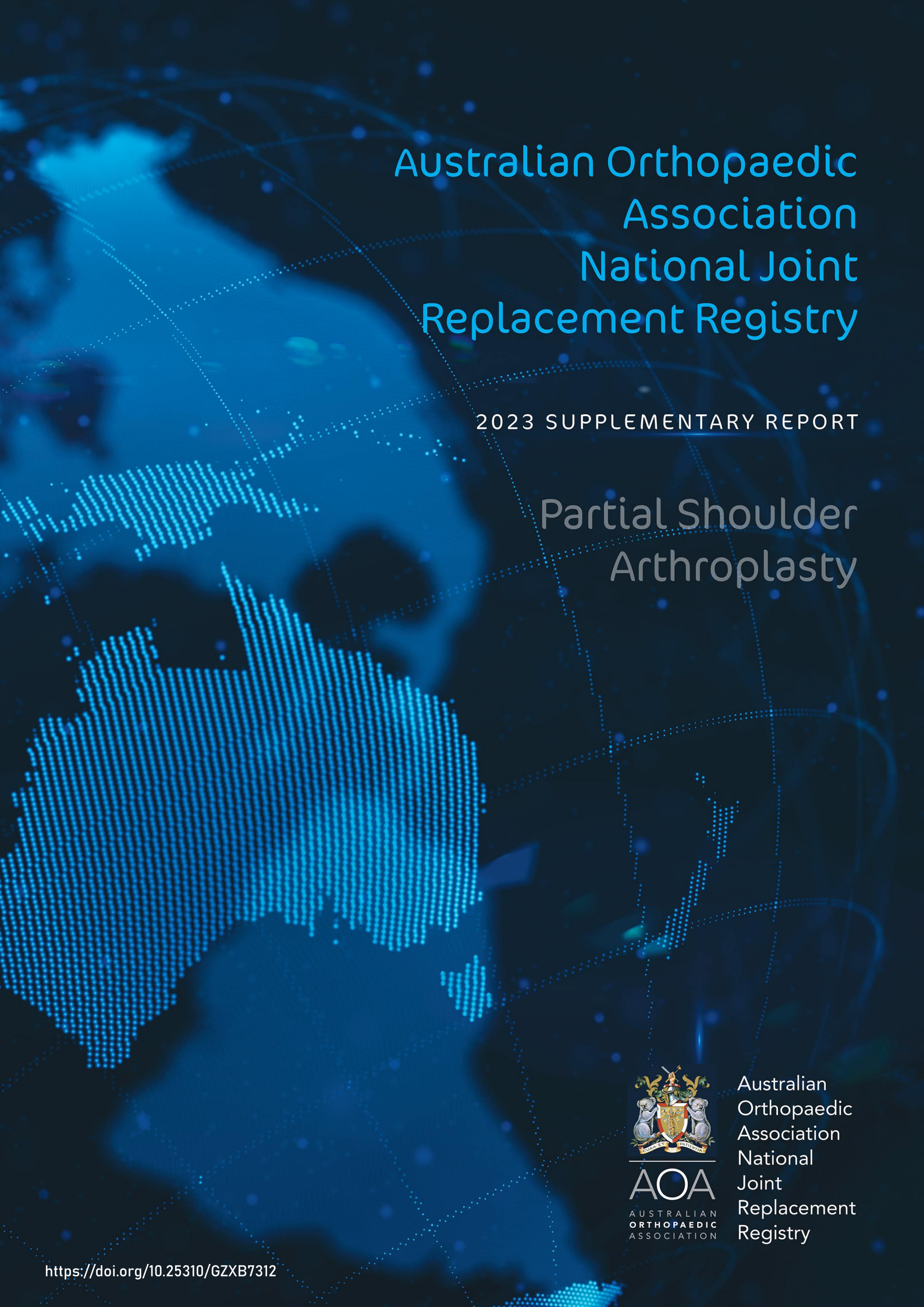
Australian Orthopaedic Association National Joint Replacement Registry

2023 SUPPLEMENTARY REPORT

Partial Shoulder Arthroplasty



Australian Orthopaedic Association National Joint Replacement Registry

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Australian Orthopaedic Association National Joint Replacement Registry

Primary Partial Shoulder Arthroplasty

2023 Supplementary Report

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Australian Orthopaedic Association
National Joint Replacement Registry

Primary Partial Shoulder Replacement

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The Registry greatly appreciates the participation of all joint replacement patients throughout Australia. Their contribution allows ongoing improvements in arthroplasty outcomes to be achieved.

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Contents

Primary Partial Shoulder Replacement Introduction

This supplementary report provides detailed information on partial shoulder replacement. The Partial Shoulder Arthroplasty Report is one of 16 supplementary reports to complete the AOANJRR Annual Report for 2023.

CLASSES OF PARTIAL SHOULDER REPLACEMENT

The Registry subcategorises primary partial shoulder replacement into four main classes. These are defined by the type of prostheses used.

Partial resurfacing anatomic involves the use of one or more button prostheses to replace part of the natural articulating surface, on one or both sides of the shoulder joint.
Hemi resurfacing anatomic involves the use of a humeral prosthesis that replaces the humeral articular surface only, without resecting the head.

Hemi stemless anatomic involves resection of part of the humeral head and replacement with a humeral head and an epiphyseal fixation prosthesis.
Hemi stemmed anatomic involves the resection of the humeral head and replacement with a humeral head and a humeral stem prosthesis. A humeral stem prosthesis may have either metaphyseal or diaphyseal fixation.

Detailed information on demographics of each class of primary partial shoulder replacement is available in the supplementary report 'Demographics of Hip, Knee & Shoulder Arthroplasty' on the AOANJRR website: https://aoanjrr.sahmri.com/annual-reports-2023

USE OF PARTIAL SHOULDER REPLACEMENT

There have been 7,876 primary partial shoulder replacements reported to the Registry up to 31 December 2022. This is an additional 253 procedures compared to the number reported last year.

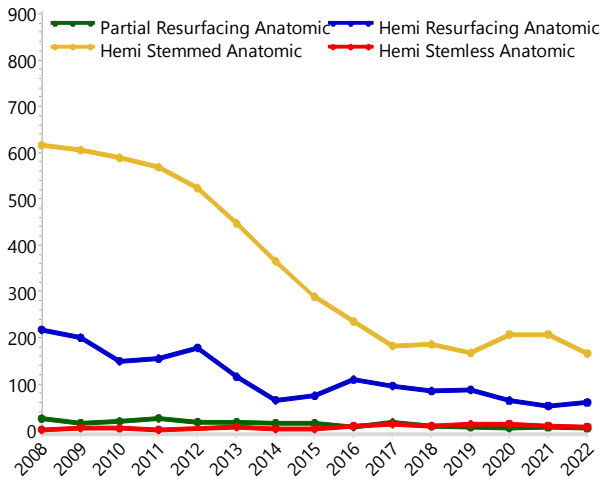
The most common class of primary partial shoulder replacement is hemi stemmed anatomic. This accounts for 72.6% of all partial shoulder replacements, followed by hemi resurfacing anatomic (23.5%), partial resurfacing anatomic (2.7%) and hemi stemless anatomic (1.2%) (Table SPS1).

Table SPS1 Primary Partial Shoulder Replacement by Class

Shoulder Class	Number	Percent
Partial Resurfacing Anatomic	209	2.7
Hemi Resurfacing Anatomic	1851	23.5
Hemi Stemmed Anatomic	5720	72.6
Hemi Stemless Anatomic	96	1.2
TOTAL	**7876**	**100.0**

The use of the two main classes of primary partial shoulder replacement has declined over the last 10 years. The number of hemi resurfacing anatomic procedures decreased from 178 in 2012 to 60 in 2022. The number of hemi stemmed anatomic procedures decreased from 616 in 2008 to 166 in 2022 (Figure SPS1).

Figure SPS1 Primary Partial Shoulder Replacement by Class



There is gender variation depending on the class of primary partial shoulder replacement. The proportions of primary partial shoulder replacement for females are hemi stemmed anatomic (67.7%), hemi stemless anatomic (33.3%), hemi resurfacing anatomic (40.0%) and partial resurfacing anatomic (23.0%) (Table SPS2).

Table SPS2 Primary Partial Shoulder Replacement by Class and Gender

Shoulder Class	Male		Female		TOTAL	
	N	Row%	N	Row%	N	Row%
Partial Resurfacing Anatomic	161	77.0	48	23.0	209	100.0
Hemi Resurfacing Anatomic	1110	60.0	741	40.0	1851	100.0
Hemi Stemmed Anatomic	1848	32.3	3872	67.7	5720	100.0
Hemi Stemless Anatomic	64	66.7	32	33.3	96	100.0
TOTAL	**3183**	**40.4**	**4693**	**59.6**	**7876**	**100.0**

The proportion of patients aged ≥65 years also varies depending on the class of primary partial shoulder replacement: hemi stemmed anatomic (65.7%), hemi resurfacing anatomic (47.5%), hemi stemless anatomic (25.0%) and partial resurfacing anatomic (18.2%) (Table SPS3).

Overall, males undergoing primary partial shoulder replacement are younger (mean age 60.2 years) compared to females (70.9 years) (Table SPS4).

The most common primary diagnosis for females is fracture (51.7%). For males, the most common primary diagnosis is osteoarthritis (58.9%) (Table SPS5).

The cumulative percent revision varies depending on class. Partial resurfacing anatomic and hemi stemless anatomic have only been used in small numbers (209 and 96 procedures, respectively). This makes any assessment of comparative performance difficult. However, there is a clear difference in the two more commonly used classes of hemi resurfacing anatomic and hemi stemmed anatomic. Devices in these classes have a longer follow-up and the cumulative percent revision at 14 years for hemi resurfacing anatomic is greater than for hemi stemmed anatomic (18.6% compared to 13.4%, respectively) (Table SPS6 and Figure SPS2).
Primary partial shoulder replacement by joint class and head material are shown in Table SPS7.

Table SPS3 Primary Partial Shoulder Replacement by Class and Age

Shoulder Class	<55		55-64		65-74		≥75		TOTAL	
	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%
Partial Resurfacing Anatomic	155	74.2	16	7.7	22	10.5	16	7.7	209	100.0
Hemi Resurfacing Anatomic	455	24.6	516	27.9	547	29.6	333	18.0	1851	100.0
Hemi Stemmed Anatomic	758	13.3	1204	21.0	1636	28.6	2122	37.1	5720	100.0
Hemi Stemless Anatomic	50	52.1	22	22.9	18	18.8	6	6.3	96	100.0
TOTAL	**1418**	**18.0**	**1758**	**22.3**	**2223**	**28.2**	**2477**	**31.4**	**7876**	**100.0**

Table SPS4 Age and Gender of Primary Partial Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	3183	40.4%	14	94	61	60.2	14.3
Female	4693	59.6%	13	101	72	70.9	11.8
TOTAL	**7876**	**100.0%**	**13**	**101**	**68**	**66.5**	**13.9**

Table SPS5 Primary Partial Shoulder Replacement by Primary Diagnosis and Gender

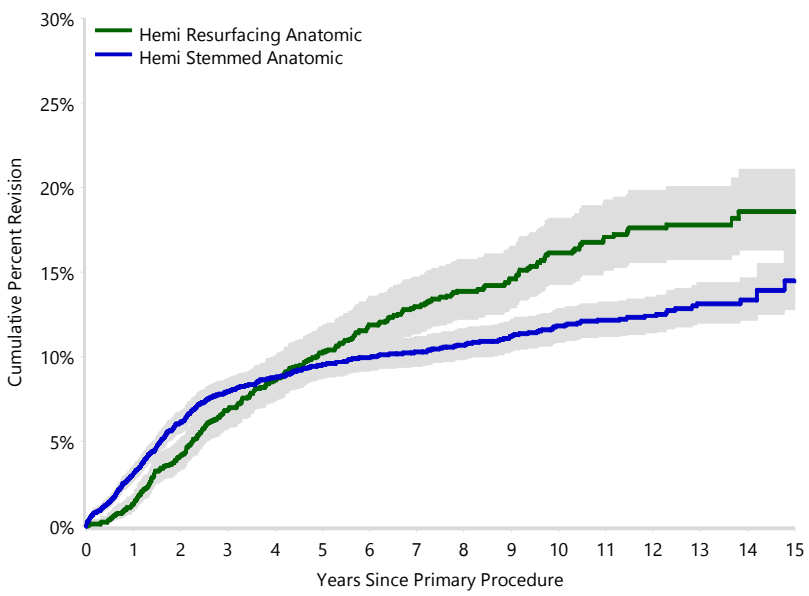
Primary Diagnosis	Male		Female		TOTAL	
	N	Col%	N	Col%	N	Col%
Osteoarthritis	1876	58.9	1600	34.1	3476	44.1
Fracture	751	23.6	2425	51.7	3176	40.3
Rotator Cuff Arthropathy	129	4.1	224	4.8	353	4.5
Osteonecrosis	121	3.8	157	3.3	278	3.5
Instability	156	4.9	72	1.5	228	2.9
Tumour	112	3.5	79	1.7	191	2.4
Rheumatoid Arthritis	23	0.7	106	2.3	129	1.6
Other Inflammatory Arthritis	12	0.4	28	0.6	40	0.5
Osteochondritis Dissecans	2	0.1	.	.	2	0.0
Other	1	0.0	2	0.0	3	0.0
TOTAL	**3183**	**100.0**	**4693**	**100.0**	**7876**	**100.0**

Note: Instability includes instability, dislocation, and Hills-Sachs Defect

Table SPS6 Cumulative Percent Revision of Primary Partial Shoulder Replacement by Class (All Diagnoses)

Shoulder Class	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Partial Resurfacing Anatomic	15	209	0.5 (0.1, 3.4)	1.5 (0.5, 4.6)	2.6 (1.1, 6.2)	4.4 (2.2, 8.7)	6.9 (3.8, 12.2)	
Hemi Resurfacing Anatomic	251	1851	1.3 (0.9, 2.0)	6.9 (5.8, 8.2)	10.2 (8.8, 11.8)	13.0 (11.4, 14.7)	16.1 (14.3, 18.2)	18.6 (16.3, 21.1)
Hemi Stemmed Anatomic	560	5720	3.1 (2.7, 3.6)	7.9 (7.2, 8.7)	9.5 (8.7, 10.4)	10.3 (9.5, 11.2)	11.8 (10.9, 12.8)	13.4 (12.1, 14.7)
Hemi Stemless Anatomic	11	96	3.3 (1.1, 9.9)	10.8 (5.8, 19.9)	14.4 (8.1, 24.9)	14.4 (8.1, 24.9)		
TOTAL	**837**	**7876**						

Figure SPS2 Cumulative Percent Revision of Primary Partial Shoulder Replacement by Class (All Diagnoses)



HR - adjusted for age and gender

Hemi Stemmed vs Hemi Resurfacing

0 - 9Mth: HR=3.33 (1.91, 5.79), p<0.001

9Mth - 1.5Yr: HR=1.07 (0.76, 1.51), p=0.707

1.5Yr - 2Yr: HR=1.69 (0.98, 2.91), p=0.059

2Yr+: HR=0.53 (0.43, 0.65), p<0.001

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Hemi Resurfacing Anatomic	1851	1759	1519	1254	980	700	189
Hemi Stemmed Anatomic	5720	5157	4153	3430	2717	1594	350

Table SPS7 Primary Partial Shoulder Replacement by Joint Class and Head Material (All Diagnoses)

Joint Class	Ceramic		Metal		Pyrocarbon		TOTAL	
	N	Row%	N	Row%	N	Row%	N	Row%
Hemi Resurfacing Anatomic	.	.	1189	64.3	661	35.7	1850	100.0
Hemi Stemmed Anatomic	46	0.8	5067	88.7	602	10.5	5715	100.0
Hemi Stemless Anatomic	62	64.6	34	35.4	.	.	96	100.0
TOTAL	**108**	**1.4**	**6290**	**82.1**	**1263**	**16.5**	**7661**	**100.0**

PRIMARY PARTIAL RESURFACING ANATOMIC SHOULDER REPLACEMENT

DEMOGRAPHICS AND OUTCOMES

There have been 209 primary partial resurfacing anatomic shoulder replacement procedures reported to the Registry. This is an additional 7 procedures compared to the previous report.

This procedure is undertaken more commonly in males (77.0%). The mean age for males is 38.7 years compared to 55.1 years for females (Table SPS8).

The most common primary diagnosis for males is instability (56.5%), whereas the most common primary diagnosis for females is osteoarthritis (43.8%) (Table SPS9).

The cumulative percent revision at 10 years is 6.9% (Table SPS6). Of the 15 revisions, 9 are for glenoid erosion, 2 are for instability/dislocation, 2 are for rotator cuff insufficiency, and 1 is for loosening, and 1 is for infection. All but one underwent a humeral/glenoid revision.

Table SPS8 Age and Gender of Primary Partial Resurfacing Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	161	77.0%	14	87	35	38.7	17.4
Female	48	23.0%	16	88	55	55.1	19.4
TOTAL	**209**	**100.0%**	**14**	**88**	**40**	**42.5**	**19.1**

Table SPS9 Primary Partial Resurfacing Anatomic Shoulder Replacement by Primary Diagnosis and Gender

	Male		Female		TOTAL	
Primary Diagnosis	N	Col%	N	Col%	N	Col%
Instability	91	56.5	20	41.7	111	53.1
Osteoarthritis	51	31.7	21	43.8	72	34.4
Fracture	13	8.1	3	6.3	16	7.7
Osteonecrosis	2	1.2	3	6.3	5	2.4
Osteochondritis Dissecans	2	1.2	.	.	2	1.0
Rotator Cuff Arthropathy	2	1.2	.	.	2	1.0
Rheumatoid Arthritis	.	.	1	2.1	1	0.5
TOTAL	**161**	**100.0**	**48**	**100.0**	**209**	**100.0**

PRIMARY HEMI RESURFACING ANATOMIC SHOULDER REPLACEMENT

DEMOGRAPHICS

There have been 1,851 primary hemi resurfacing anatomic shoulder replacements reported to the Registry. This is an additional 61 procedures compared to the previous report. The use of primary hemi resurfacing has declined by 55.8% since 2008.

This procedure is more common in males (60.0%). The mean age is 59.7 years for males and 67.6 years for females (Table SPS10).

Osteoarthritis is the most common primary diagnosis (88.4%). The range of diagnoses is similar for males and females (Table SPS11).

In 2022, all primary hemi resurfacing procedures reported to the Registry used the PyroTITAN (Table SPS12).

Table SPS10 Age and Gender of Primary Hemi Resurfacing Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	1110	60.0%	19	90	61	59.7	12.0
Female	741	40.0%	27	93	68	67.6	11.4
TOTAL	**1851**	**100.0%**	**19**	**93**	**64**	**62.9**	**12.4**

Table SPS11 Primary Hemi Resurfacing Anatomic Shoulder Replacement by Primary Diagnosis and Gender

Primary Diagnosis	Male		Female		TOTAL	
	N	Col%	N	Col%	N	Col%
Osteoarthritis	988	89.0	648	87.4	1636	88.4
Rotator Cuff Arthropathy	50	4.5	36	4.9	86	4.6
Instability	31	2.8	7	0.9	38	2.1
Osteonecrosis	19	1.7	18	2.4	37	2.0
Rheumatoid Arthritis	9	0.8	19	2.6	28	1.5
Fracture	10	0.9	4	0.5	14	0.8
Other Inflammatory Arthritis	3	0.3	9	1.2	12	0.6
TOTAL	**1110**	**100.0**	**741**	**100.0**	**1851**	**100.0**

Note: Instability includes instability and dislocation

Table SPS12 Most Used Humeral Head Prostheses in Primary Hemi Resurfacing Anatomic Shoulder Replacement

2008		2019		2020		2021		2022	
N	Model	N	Model	N	Model	N	Model	N	Model
124	Copeland	78	PyroTITAN	59	PyroTITAN	52	PyroTITAN	60	PyroTITAN
45	Global CAP	4	Copeland	3	Copeland				
34	SMR	4	Global CAP	2	Global CAP				
11	Aequalis	1	SMR						
2	Epoca RH								
1	Buechel-Pappas								
10 Most Used									
217	(6) 100.0%	87	(4) 100.0%	64	(3) 100.0%	52	(1) 100.0%	60	(1) 100.0%
Remainder									
0	(0) 0%	0	(0) 0%	0	(0) 0%	0	(0) 0%	0	(0) 0%
TOTAL									
217	(6) 100.0%	87	(4) 100.0%	64	(3) 100.0%	52	(1) 100.0%	60	(1) 100.0%

OUTCOME FOR ALL DIAGNOSES

Reason for Revision

The main reasons for revision of primary hemi resurfacing anatomic shoulder replacement are glenoid erosion (27.5%), pain (20.3%), rotator cuff insufficiency (12.7%), and instability/dislocation (10.0%) (Table SPS13 and Figure SPS3).

Prior to 2022, there had been 13 reported breakages of the PyroTITAN prosthesis. Three of these breakages were reported secondary to loosening.

Type of Revision

The most common type of revision is to a total shoulder replacement (88.8%) (Table SPS14). Of these, 138 (61.9%) were revised to a total reverse shoulder and 77 (35.5%) to a total stemmed shoulder replacement.

Glenoid erosion and pain are the reasons for 47.8% of all hemi resurfacing anatomic shoulder revisions.

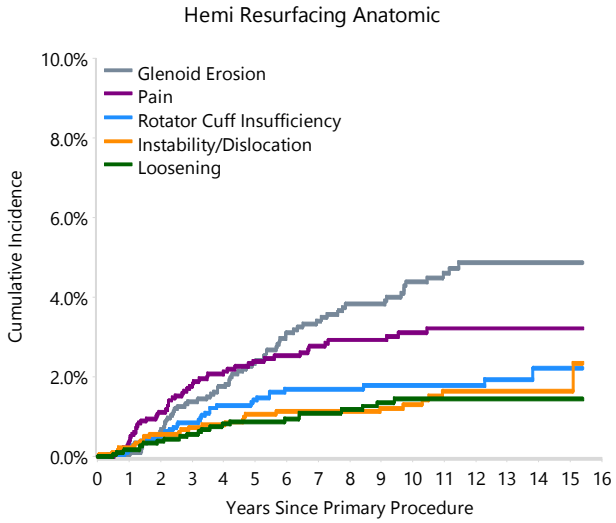
Table SPS13 Primary Hemi Resurfacing Anatomic Shoulder Replacement by Reason for Revision (All Diagnoses)

Reason for Revision	Number	Percent
Glenoid Erosion	69	27.5
Pain	51	20.3
Rotator Cuff Insufficiency	32	12.7
Instability/Dislocation	25	10.0
Loosening	22	8.8
Implant Breakage Head	13	5.2
Lysis	10	4.0
Infection	8	3.2
Fracture	8	3.2
Malposition	3	1.2
Metal Related Pathology	3	1.2
Arthrofibrosis	2	0.8
Wear Glenoid Insert	2	0.8
Incorrect Sizing	2	0.8
Osteonecrosis	1	0.4
TOTAL	**251**	**100.0**

Table SPS14 Primary Hemi Resurfacing Anatomic Shoulder Replacement by Type of Revision (All Diagnoses)

Type of Revision	Number	Percent
Humeral/Glenoid	223	88.8
Humeral Component	14	5.6
Glenoid Component	6	2.4
Cement Spacer	4	1.6
Removal of Prostheses	2	0.8
Reoperation	1	0.4
Head Only	1	0.4
TOTAL	**251**	**100.0**

Figure SPS3 Cumulative Incidence Revision Diagnosis of Primary Hemi Resurfacing Anatomic Shoulder Replacement (All Diagnoses)



OUTCOME FOR OSTEOARTHRITIS

Age and Gender

Patients aged 65-74 years have a lower rate of revision after 1.5 years compared to patients aged <55 years, whereas patients aged ≥75 years have a lower rate of revision after 2.5 years (Table SPS15 and Figure SPS4).

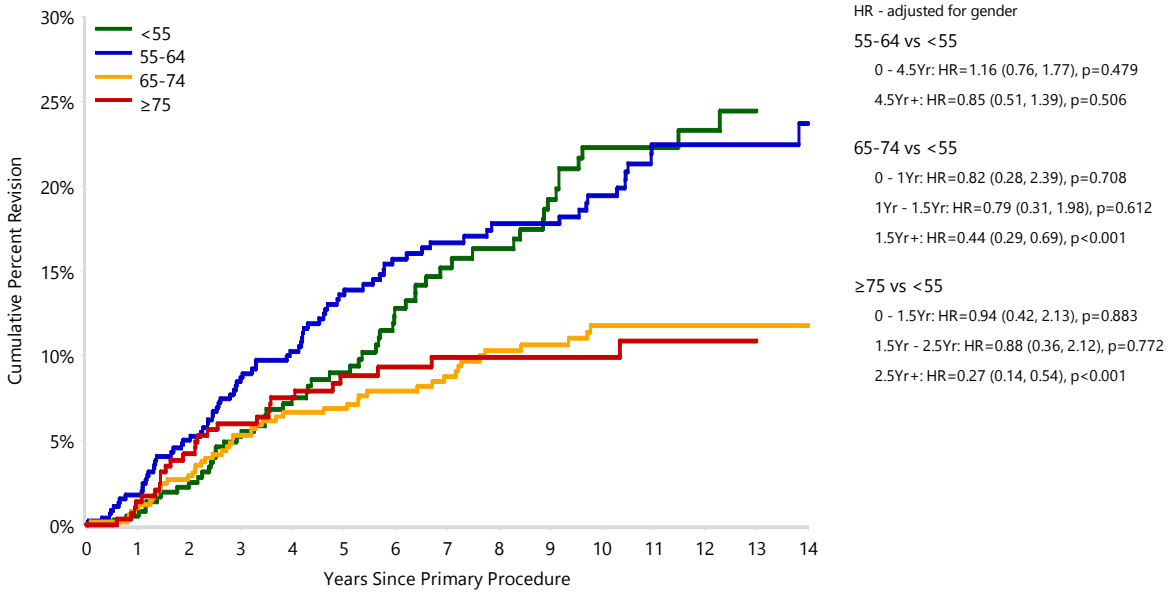
Females have a higher rate of revision than males (Table SPS16 and Figure SPS5).

The outcomes of the most commonly used prostheses are listed in Table SPS17. The PyroTITAN was the only hemi-resurfacing prosthesis remaining in use in 2022. It has a cumulative percent revision of 7.6% (95% CI 4.9, 11.6) at 10 years (Table SPS18).

Table SPS15 Cumulative Percent Revision of Primary Hemi Resurfacing Anatomic Shoulder Replacement by Age (Primary Diagnosis OA)

Age	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	57	381	0.5 (0.1, 2.2)	5.2 (3.3, 8.2)	9.0 (6.3, 12.7)	15.2 (11.4, 20.1)	22.3 (17.3, 28.4)	
55-64	80	462	1.8 (0.9, 3.5)	8.7 (6.4, 11.8)	13.6 (10.6, 17.4)	16.7 (13.3, 20.8)	19.4 (15.7, 24.0)	23.7 (19.0, 29.3)
65-74	49	498	1.0 (0.4, 2.4)	5.3 (3.6, 7.7)	6.9 (4.9, 9.6)	8.8 (6.5, 11.8)	11.8 (8.9, 15.4)	11.8 (8.9, 15.4)
≥75	27	295	1.4 (0.5, 3.6)	6.0 (3.8, 9.5)	8.8 (6.0, 12.9)	9.9 (6.8, 14.2)	9.9 (6.8, 14.2)	
TOTAL	213	1636						

Figure SPS4 Cumulative Percent Revision of Primary Hemi Resurfacing Anatomic Shoulder Replacement by Age (Primary Diagnosis OA)

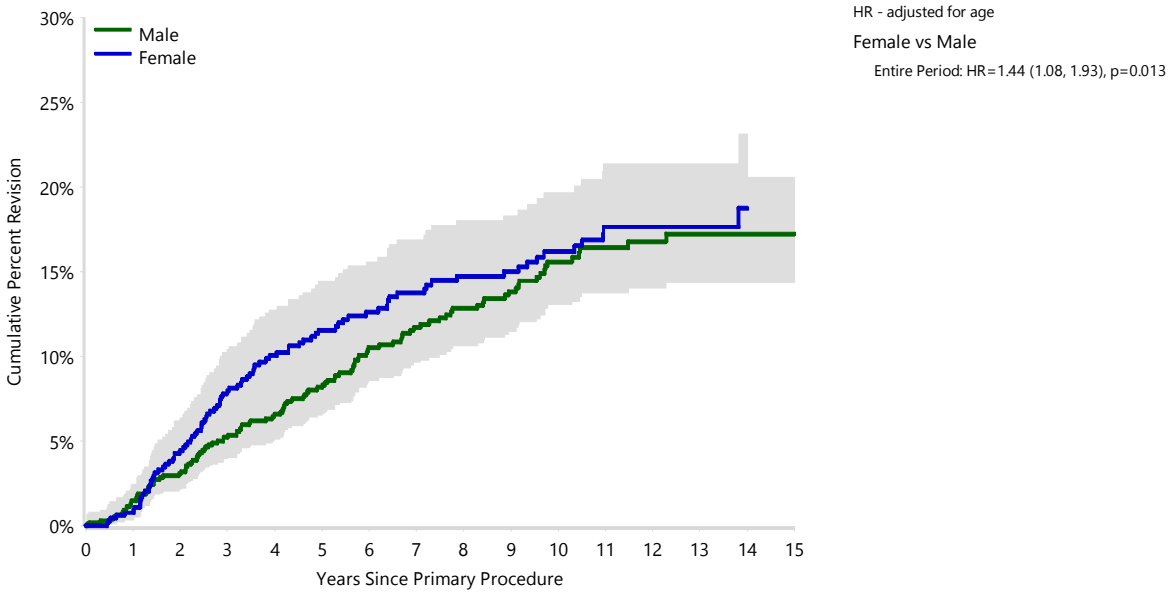


Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	381	359	307	229	159	114	32
55-64	462	433	365	297	243	185	60
65-74	498	481	426	375	304	212	51
≥75	295	286	253	202	151	98	25

Table SPS16 Cumulative Percent Revision of Primary Hemi Resurfacing Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)

Gender	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	118	988	1.5 (0.9, 2.5)	5.2 (4.0, 6.9)	8.2 (6.5, 10.2)	11.7 (9.6, 14.2)	15.6 (13.0, 18.6)	17.2 (14.4, 20.6)
Female	95	648	0.8 (0.3, 1.9)	8.0 (6.1, 10.4)	11.6 (9.2, 14.4)	13.7 (11.2, 16.9)	16.2 (13.3, 19.7)	18.7 (15.1, 23.1)
TOTAL	213	1636						

Figure SPS5 Cumulative Percent Revision of Primary Hemi Resurfacing Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	988	927	810	657	497	347	97
Female	648	632	541	446	360	262	71

Table SPS17 Cumulative Percent Revision of Primary Hemi Resurfacing Anatomic Shoulder Replacement by Humeral Head (Primary Diagnosis OA)

Humeral Head	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	18	79	1.3 (0.2, 8.8)	10.3 (5.3, 19.5)	15.7 (9.2, 26.0)	18.7 (11.5, 29.6)	23.6 (15.3, 35.3)	
Copeland	86	556	1.6 (0.8, 3.1)	6.6 (4.8, 9.0)	10.1 (7.8, 13.0)	12.8 (10.2, 16.0)	15.6 (12.7, 19.2)	17.6 (14.4, 21.5)
Global CAP	43	224	0.4 (0.1, 3.1)	9.0 (5.9, 13.6)	12.3 (8.6, 17.4)	15.7 (11.5, 21.3)	20.2 (15.2, 26.5)	22.5 (16.9, 29.6)
PyroTITAN	28	608	1.2 (0.6, 2.5)	3.5 (2.3, 5.5)	4.7 (3.1, 7.0)	5.4 (3.6, 8.0)	7.6 (4.9, 11.6)	
SMR	32	146	0.0 (0.0, 0.0)	7.0 (3.8, 12.6)	14.3 (9.4, 21.2)	20.7 (14.8, 28.7)	24.7 (18.0, 33.2)	
Other (3)	6	23	4.3 (0.6, 27.1)	17.4 (6.9, 39.9)	17.4 (6.9, 39.9)	22.9 (10.1, 46.9)	22.9 (10.1, 46.9)	
TOTAL	**213**	**1636**						

Note: Only prostheses with >50 procedures have been listed

PRIMARY HEMI STEMLESS ANATOMIC SHOULDER REPLACEMENT

DEMOGRAPHICS AND OUTCOME

There have been 96 primary hemi stemless anatomic shoulder replacement procedures reported to the Registry. This is an additional 7 procedures compared to the previous report.

This procedure is undertaken more commonly in males (66.7%). The mean age is 49.6 years for males and 64.6 years for females (Table SPS18).

Osteoarthritis is the most common primary diagnosis (60.4%) (Table SPS19).

Of the 11 revisions reported, 3 are for glenoid erosion, 2 for fracture, 2 for rotator cuff insufficiency, and 1 each for pain, loosening, instability/dislocation and arthrofibrosis (Table SPS20).

The most common type of revision is to a total shoulder replacement (Table SPS21).

The most common humeral head and stem prosthesis combinations are the Affinis and the Eclipse.

Outcomes for the most used prosthesis combinations are presented in Table SPS22.

Table SPS18 Age and Gender of Primary Hemi Stemless Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	64	66.7%	18	83	50	49.6	12.1
Female	32	33.3%	30	85	66	64.6	11.4
TOTAL	**96**	**100.0%**	**18**	**85**	**53**	**54.6**	**13.8**

Table SPS19 Primary Hemi Stemless Anatomic Shoulder Replacement by Primary Diagnosis and Gender

	Male		Female		TOTAL	
Primary Diagnosis	N	Col%	N	Col%	N	Col%
Osteoarthritis	38	59.4	20	62.5	58	60.4
Osteonecrosis	17	26.6	7	21.9	24	25.0
Fracture	3	4.7	3	9.4	6	6.3
Rotator Cuff Arthropathy	3	4.7	.	.	3	3.1
Instability	1	1.6	1	3.1	2	2.1
Rheumatoid Arthritis	.	.	1	3.1	1	1.0
Other Inflammatory Arthritis	1	1.6	.	.	1	1.0
Other	1	1.6	.	.	1	1.0
TOTAL	**64**	**100.0**	**32**	**100.0**	**96**	**100.0**

Table SPS20 Primary Hemi Stemless Anatomic Shoulder Replacement by Reason for Revision

Reason for Revision	Number	Percent
Glenoid Erosion	3	27.3
Fracture	2	18.2
Rotator Cuff Insufficiency	2	18.2
Pain	1	9.1
Loosening	1	9.1
Instability/Dislocation	1	9.1
Arthrofibrosis	1	9.1
TOTAL	**11**	**100.0**

Table SPS21 Primary Hemi Stemless Anatomic Shoulder Replacement by Type of Revision

Type of Revision	Number	Percent
Humeral/Glenoid	5	45.5
Glenoid Component	3	27.3
Humeral Component	2	18.2
Head Only	1	9.1
TOTAL	**11**	**100.0**

Note: Fracture includes proximal humerus fracture

Table SPS22 Cumulative Percent Revision of Primary Hemi Stemless Anatomic Shoulder Replacement by Prosthesis Combination

Humeral Head	Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Affinis	Affinis	5	62	3.4 (0.9, 12.9)	6.9 (2.6, 17.4)	9.7 (4.1, 22.3)			
Affiniti	Simpliciti	4	7	0.0 (0.0, 0.0)	48.6 (18.7, 88.2)	65.7 (31.5, 95.2)	65.7 (31.5, 95.2)		
Comprehensive	Comprehensive	1	8	20.0 (3.1, 79.6)	20.0 (3.1, 79.6)				
Eclipse	Eclipse	1	10	0.0 (0.0, 0.0)	11.1 (1.6, 56.7)	11.1 (1.6, 56.7)	11.1 (1.6, 56.7)	11.1 (1.6, 56.7)	
Other (4)		0	9	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)		
TOTAL		**11**	**96**						

Note: Only prostheses with >7 procedures have been listed

PRIMARY HEMI STEMMED ANATOMIC SHOULDER REPLACEMENT

DEMOGRAPHICS

There have been 5,720 primary hemi stemmed anatomic shoulder replacement procedures reported to the Registry. This is an additional 178 procedures compared to the previous report.

This procedure is more common in females (67.7%). The mean age is 71.7 years for females and 62.7 years for males (Table SPS23).

The most common primary diagnosis is fracture (54.9%), followed by osteoarthritis (29.9%) (Table SPS24). In 2022, the number of primary hemi stemmed anatomic shoulder replacements undertaken for fracture decreased by 89.4% compared to 2008. In 2022, the number of primary hemi stemmed anatomic shoulder replacements undertaken for osteoarthritis decreased by 46.1% compared to 2008 (Figure SPS6).

The most common humeral head prostheses used in 2022 are the Ascend Flex PyC, Equinoxe, Comprehensive and Mutars.

The 10 most used humeral head prostheses account for 96.4% of all primary hemi stemmed anatomic procedures in 2022. This has decreased from 98.2% in 2008 (Table SPS25).

The most common humeral stem prostheses used in 2022 are the Ascend Flex, Equinoxe, SMR and Comprehensive. The 10 most used humeral stem prostheses account for 98.2% of all primary hemi stemmed procedures in 2022. This has increased from 97.2% in 2008 (Table SPS26).

There has been a major decline in the use of primary hemi stemmed anatomic shoulder replacement for the management of osteoarthritis and fracture.

Table SPS23 Age and Gender of Primary Hemi Stemmed Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	1848	32.3%	14	94	63	62.7	13.6
Female	3872	67.7%	13	101	73	71.7	11.5
TOTAL	**5720**	**100.0%**	**13**	**101**	**70**	**68.8**	**13.0**

Table SPS24 Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis and Gender

	Male		Female		TOTAL	
Primary Diagnosis	N	Col%	N	Col%	N	Col%
Fracture	725	39.2	2415	62.4	3140	54.9
Osteoarthritis	799	43.2	911	23.5	1710	29.9
Rotator Cuff Arthropathy	74	4.0	188	4.9	262	4.6
Osteonecrosis	83	4.5	129	3.3	212	3.7
Tumour	112	6.1	79	2.0	191	3.3
Rheumatoid Arthritis	14	0.8	85	2.2	99	1.7
Instability	33	1.8	44	1.1	77	1.3
Other Inflammatory Arthritis	8	0.4	19	0.5	27	0.5
Other	.	.	2	0.1	2	0.0
TOTAL	**1848**	**100.0**	**3872**	**100.0**	**5720**	**100.0**

Note: Instability includes instability and dislocation

Figure SPS6 Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis

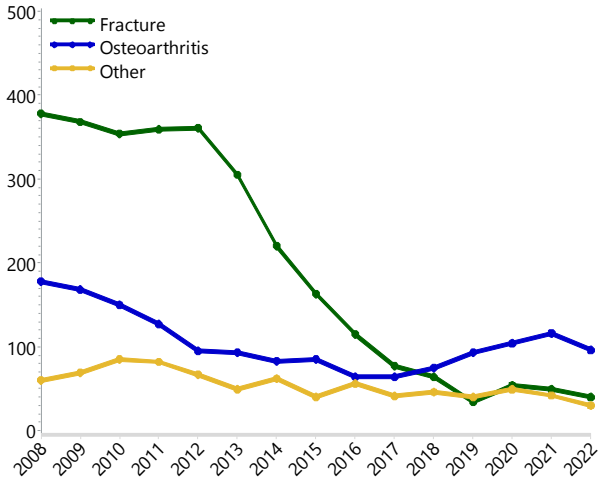


Table SPS25 10 Most Used Humeral Head Prostheses in Primary Hemi Stemmed Anatomic Shoulder Replacement

2008		2019		2020		2021		2022	
N	Model	N	Model	N	Model	N	Model	N	Model
197	Global Advantage	81	Ascend Flex PyC	119	Ascend Flex PyC	129	Ascend Flex PyC	102	Ascend Flex PyC
177	SMR	15	Global Unite	19	Comprehensive	15	Comprehensive	13	Equinoxe
98	Aequalis	12	Mutars	16	Equinoxe	15	Equinoxe	9	Comprehensive
38	Bigliani/Flatow	11	SMR CTA	14	Global Unite	9	SMR CTA	8	Mutars
31	SMR CTA	10	Comprehensive	7	Aequalis	8	Global Unite	6	SMR
22	Global Advantage CTA	8	Aequalis	6	Mutars	6	Aequalis	6	SMR CTA
15	Bio-Modular	6	Equinoxe	5	SMR	6	Ascend Flex	5	Ascend Flex
13	Solar	6	SMR	4	Affinis	5	Mutars	4	Aequalis
8	Global AP	4	Affinis	4	Ascend Flex	5	SMR	4	Global Unite
6	Univers 3D	4	Ascend Flex	4	SMR CTA	4	Mets	3	Delta Xtend
10 Most Used									
605	(10) 98.2%	157	(10) 94.0%	198	(10) 95.7%	202	(10) 97.6%	160	(10) 96.4%
Remainder									
11	(4) 1.8%	10	(6) 6.0%	9	(6) 4.3%	5	(3) 2.4%	6	(4) 3.6%
TOTAL									
616	(14) 100.0%	167	(16) 100.0%	207	(16) 100.0%	207	(13) 100.0%	166	(14) 100.0%

Table SPS26 10 Most Used Humeral Stem Prostheses in Primary Hemi Stemmed Anatomic Shoulder Replacement

2008		2019		2020		2021		2022	
N	Model	N	Model	N	Model	N	Model	N	Model
207	SMR	85	Ascend Flex	120	Ascend Flex	127	Ascend Flex	104	Ascend Flex
138	Global FX	17	SMR	22	Comprehensive	15	Comprehensive	13	Equinoxe
98	Aequalis	12	Mutars	16	Equinoxe	15	Equinoxe	12	SMR
81	Global Advantage	11	Comprehensive	12	Global Unite	14	SMR	10	Comprehensive
26	Bigliani/Flatow TM	11	Global Unite	9	SMR	8	Aequalis Flex Revive	8	Mutars
13	Solar	8	Aequalis	7	Aequalis	6	Aequalis	4	Aequalis
11	Bigliani/Flatow	7	Global AP	6	Mutars	6	Global Unite	4	Global AP
11	Bio-Modular	6	Equinoxe	4	Affinis	5	Mutars	3	Aequalis Flex Revive
8	Global AP	4	Affinis	3	Aequalis Flex Revive	4	Mets	3	Global Unite
6	Univers 3D	3	Delta Xtend	3	Global AP	3	Affinis	2	Affinis
10 Most Used									
599	(10) 97.2%	164	(10) 98.2%	202	(10) 97.6%	203	(10) 98.1%	163	(10) 98.2%
Remainder									
17	(7) 2.8%	3	(2) 1.8%	5	(3) 2.4%	4	(2) 1.9%	3	(2) 1.8%
TOTAL									
616	(17) 100.0%	167	(12) 100.0%	207	(13) 100.0%	207	(12) 100.0%	166	(12) 100.0%

OUTCOME FOR ALL DIAGNOSES

Primary Diagnosis

Primary hemi stemmed anatomic shoulder replacement performed for fracture has a higher rate of revision than when performed for osteoarthritis in the first 2.5 years. After this time there is no difference (Table SPS27 and Figure SPS7).

Reason for Revision

Reasons for revision vary depending on the primary diagnosis. Rotator cuff insufficiency occurs more frequently in hemi stemmed anatomic shoulder replacement undertaken for fracture (26.9%), whereas glenoid erosion occurs more frequently in procedures undertaken for osteoarthritis (27.9%) (Table SPS28 and Figure SPS8).

Type of Revision

The most common type of revision is to a total shoulder replacement for both primary diagnoses (72.5% for fracture and 61.2% for osteoarthritis) (Table SPS29). Most were revised to a total reverse shoulder replacement (98.0% when used for fracture and 88.9% for osteoarthritis). Glenoid component only revision occurs more commonly in procedures undertaken for osteoarthritis (23.8% compared to 4.4% for fracture).

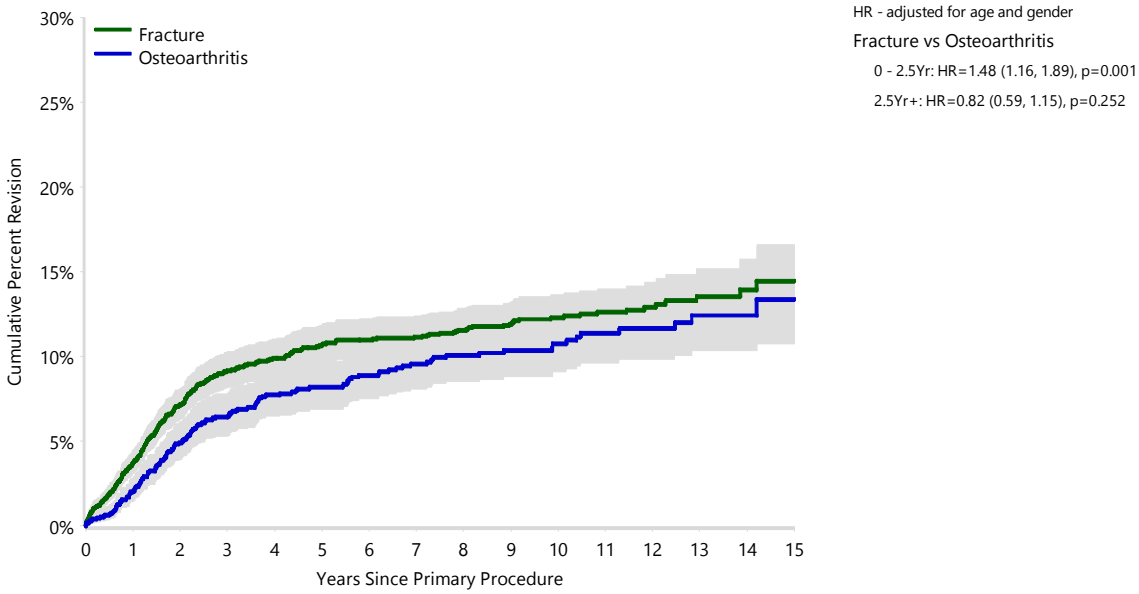
There is no difference in the rate of revision when primary hemi stemmed anatomic shoulder replacement is performed for fracture or osteoarthritis after the first 2.5 years.

Table SPS27 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture	342	3140	3.7 (3.1, 4.5)	9.2 (8.2, 10.3)	10.7 (9.6, 11.9)	11.2 (10.0, 12.4)	12.3 (11.1, 13.6)	13.9 (12.3, 15.8)
Osteoarthritis	147	1710	2.1 (1.5, 2.9)	6.4 (5.3, 7.8)	8.2 (6.9, 9.7)	9.6 (8.1, 11.3)	10.7 (9.1, 12.7)	12.4 (10.4, 14.8)
Rotator Cuff Arthropathy	18	262	1.9 (0.8, 4.6)	5.0 (2.9, 8.7)	6.6 (4.0, 10.8)	6.6 (4.0, 10.8)	9.6 (5.9, 15.4)	
Osteonecrosis	19	212	2.4 (1.0, 5.7)	5.6 (3.1, 9.9)	7.7 (4.6, 12.8)	9.5 (5.8, 15.2)	12.0 (7.5, 19.1)	
Tumour	18	191	4.7 (2.2, 9.6)	11.2 (6.3, 19.6)				
Other (4)	16	205	3.0 (1.3, 6.5)	6.1 (3.5, 10.6)	6.1 (3.5, 10.6)	6.1 (3.5, 10.6)	11.3 (6.7, 18.8)	
TOTAL	**560**	**5720**						

Note: Only primary diagnoses with >100 procedures have been listed

Figure SPS7 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture	3140	2862	2381	2008	1620	943	197
Osteoarthritis	1710	1552	1210	974	762	455	112

Note: Only primary diagnoses with >1,000 procedures have been listed

Table SPS28 Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis and Revision Diagnosis

Revision Diagnosis	Fracture			Osteoarthritis		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Rotator Cuff Insufficiency	92	2.9	26.9	25	1.5	17.0
Instability/Dislocation	64	2.0	18.7	29	1.7	19.7
Glenoid Erosion	24	0.8	7.0	41	2.4	27.9
Infection	36	1.1	10.5	13	0.8	8.8
Fracture	34	1.1	9.9	6	0.4	4.1
Loosening	29	0.9	8.5	10	0.6	6.8
Pain	29	0.9	8.5	15	0.9	10.2
Arthrofibrosis	7	0.2	2.0	2	0.1	1.4
Dissociation	7	0.2	2.0	1	0.1	0.7
Malposition	7	0.2	2.0	1	0.1	0.7
Lysis	4	0.1	1.2			
Incorrect Sizing	2	0.1	0.6	2	0.1	1.4
Heterotopic Bone	1	0.0	0.3			
Implant Breakage Glenoid	1	0.0	0.3			
Osteonecrosis				1	0.1	0.7
Other	5	0.2	1.5	1	0.1	0.7
N Revision	**342**	**10.9**	**100.0**	**147**	**8.6**	**100.0**
N Primary	**3140**			**1710**		

Figure SPS8 Cumulative Incidence Revision Diagnosis of Primary Hemi Stemmed Anatomic Shoulder by Primary Diagnosis

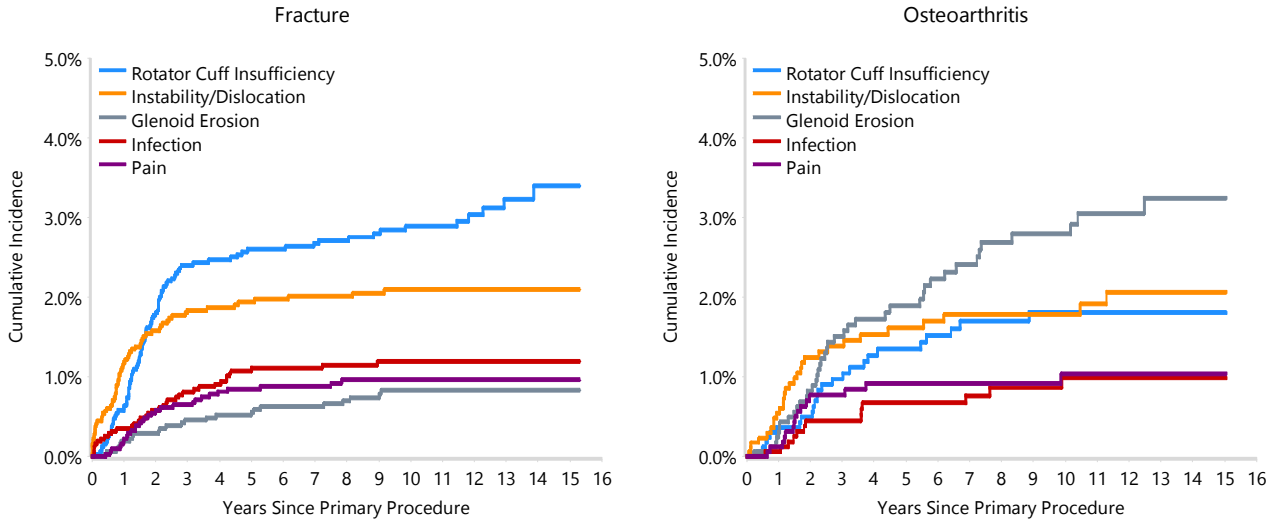


Table SPS29 Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis and Type of Revision

Type of Revision	Fracture			Osteoarthritis		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Humeral/Glenoid	248	7.9	72.5	90	5.3	61.2
Glenoid Component	15	0.5	4.4	35	2.0	23.8
Humeral Component	31	1.0	9.1	7	0.4	4.8
Cement Spacer	19	0.6	5.6	5	0.3	3.4
Head Only	16	0.5	4.7	3	0.2	2.0
Removal of Prostheses	7	0.2	2.0	1	0.1	0.7
Cement Only	4	0.1	1.2			
Reoperation	2	0.1	0.6	4	0.2	2.7
Head/Insert				1	0.1	0.7
Minor Components				1	0.1	0.7
N Revision	**342**	**10.9**	**100.0**	**147**	**8.6**	**100.0**
N Primary	**3140**			**1710**		

OUTCOME FOR FRACTURE

Age and Gender

The rate of revision is lower for patients aged ≥75 years compared to all other age groups (Table SPS30 and Figure SPS9). Gender is not a risk factor for revision (Table SPS31 and Figure SPS10).

Cemented fixation has a lower rate of revision than cementless fixation when a non-fracture stem is used.

Humeral Stem

There is no difference in the rate of revision for fracture humeral stems compared to non-fracture humeral stems (Table SPS32 and Figure SPS11).

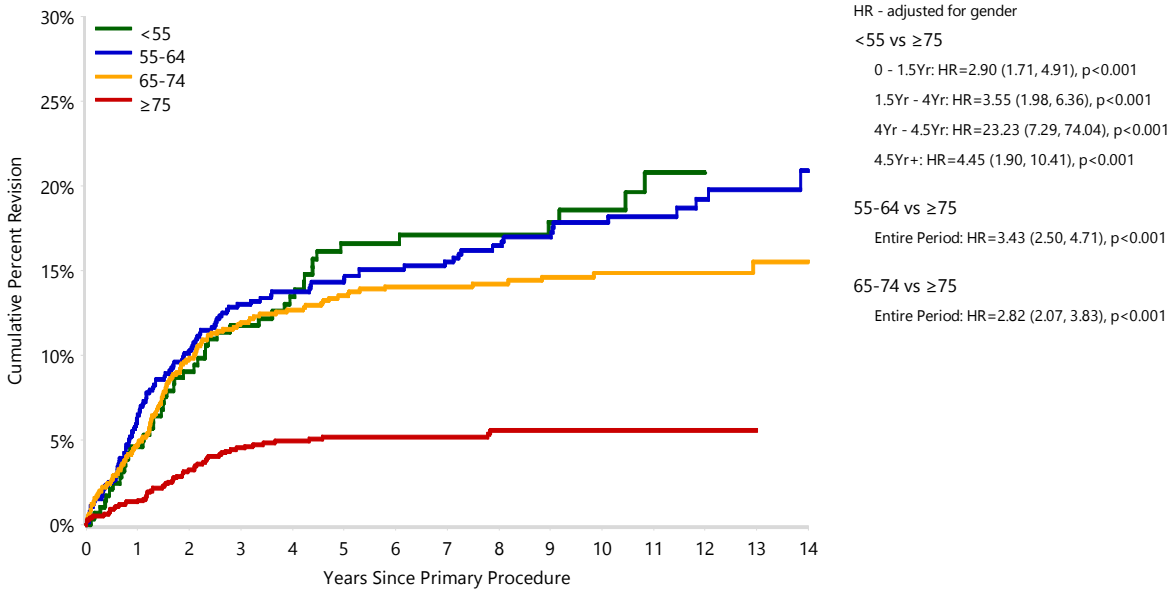
The use of cement for stem fixation in non-fracture hemiarthroplasty has a lower rate of revision than when a cementless non-fracture stem is used (Table SPS33 and Figure SPS12).

The outcomes for the most used prosthesis combinations for the treatment of fracture are listed in Table SPS34. The outcomes for individual fracture stems are presented separately in Table SPS35 and for non-fracture humeral stems in Table SPS36.

Table SPS30 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Age (Primary Diagnosis Fracture)

Age	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	49	289	4.6 (2.7, 7.8)	11.8 (8.5, 16.2)	16.6 (12.6, 21.8)	17.1 (13.0, 22.4)	18.6 (14.2, 24.2)	
55-64	107	649	6.5 (4.8, 8.7)	13.0 (10.6, 16.0)	14.5 (11.9, 17.6)	15.5 (12.8, 18.7)	17.8 (14.9, 21.3)	20.9 (17.0, 25.5)
65-74	125	903	4.7 (3.5, 6.3)	11.9 (9.9, 14.3)	13.5 (11.4, 16.0)	14.1 (11.9, 16.6)	14.9 (12.6, 17.5)	15.5 (13.0, 18.5)
≥75	61	1299	1.4 (0.9, 2.3)	4.5 (3.5, 5.9)	5.2 (4.0, 6.6)	5.2 (4.0, 6.6)	5.6 (4.3, 7.1)	
TOTAL	342	3140						

Figure SPS9 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Age (Primary Diagnosis Fracture)

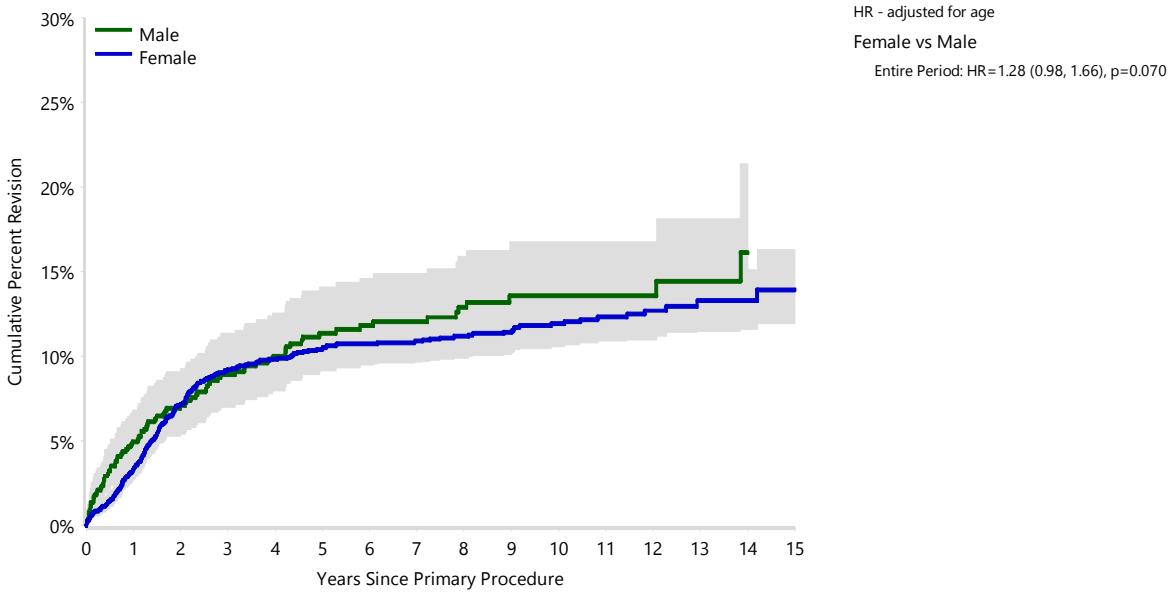


Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	289	262	218	176	146	92	21
55-64	649	580	497	438	373	234	67
65-74	903	829	699	632	531	330	70
≥75	1299	1191	967	762	570	287	39

Table SPS31 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Gender (Primary Diagnosis Fracture)

Gender	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	83	725	5.0 (3.6, 6.9)	8.9 (7.0, 11.4)	11.4 (9.1, 14.1)	12.0 (9.7, 14.9)	13.6 (11.0, 16.7)	16.1 (12.1, 21.4)
Female	259	2415	3.4 (2.7, 4.2)	9.2 (8.1, 10.5)	10.5 (9.3, 11.8)	10.9 (9.7, 12.3)	11.9 (10.6, 13.4)	13.3 (11.6, 15.1)
TOTAL	**342**	**3140**						

Figure SPS10 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Gender (Primary Diagnosis Fracture)

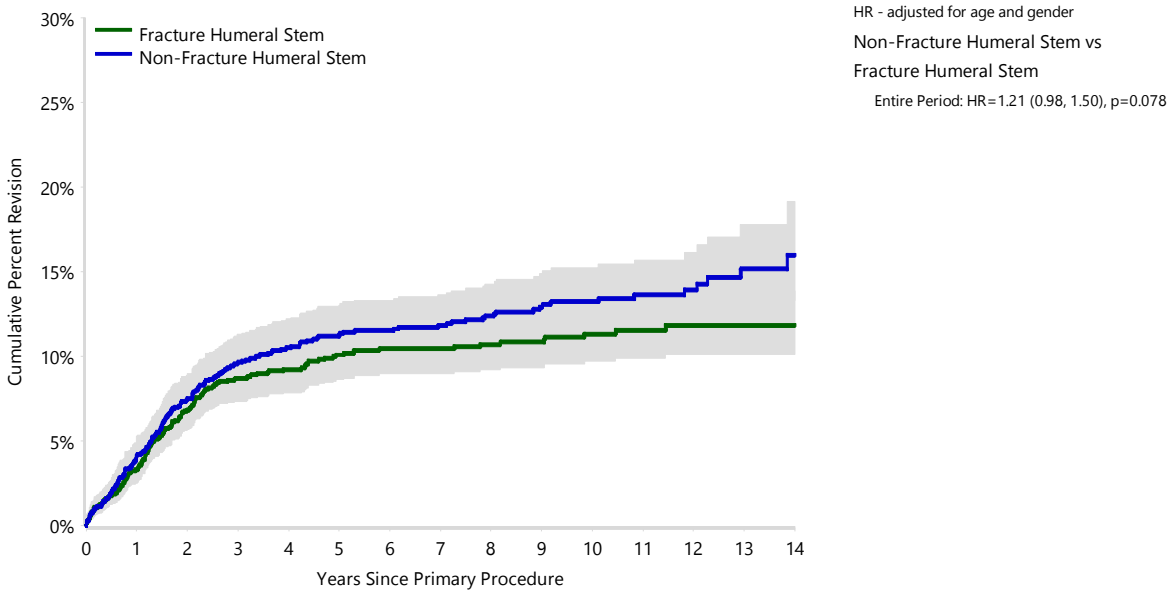


Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	725	638	526	428	335	186	45
Female	2415	2224	1855	1580	1285	757	152

Table SPS32 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Stem Type (Primary Diagnosis Fracture)

Stem Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture Humeral Stem	157	1574	3.3 (2.5, 4.3)	8.7 (7.3, 10.2)	10.1 (8.6, 11.8)	10.5 (9.0, 12.2)	11.3 (9.7, 13.2)	11.9 (10.1, 13.9)
Non-Fracture Humeral Stem	185	1566	4.2 (3.3, 5.3)	9.6 (8.2, 11.3)	11.3 (9.7, 13.0)	11.8 (10.2, 13.7)	13.2 (11.5, 15.2)	16.0 (13.3, 19.2)
TOTAL	**342**	**3140**						

Figure SPS11 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Stem Type (Primary Diagnosis Fracture)

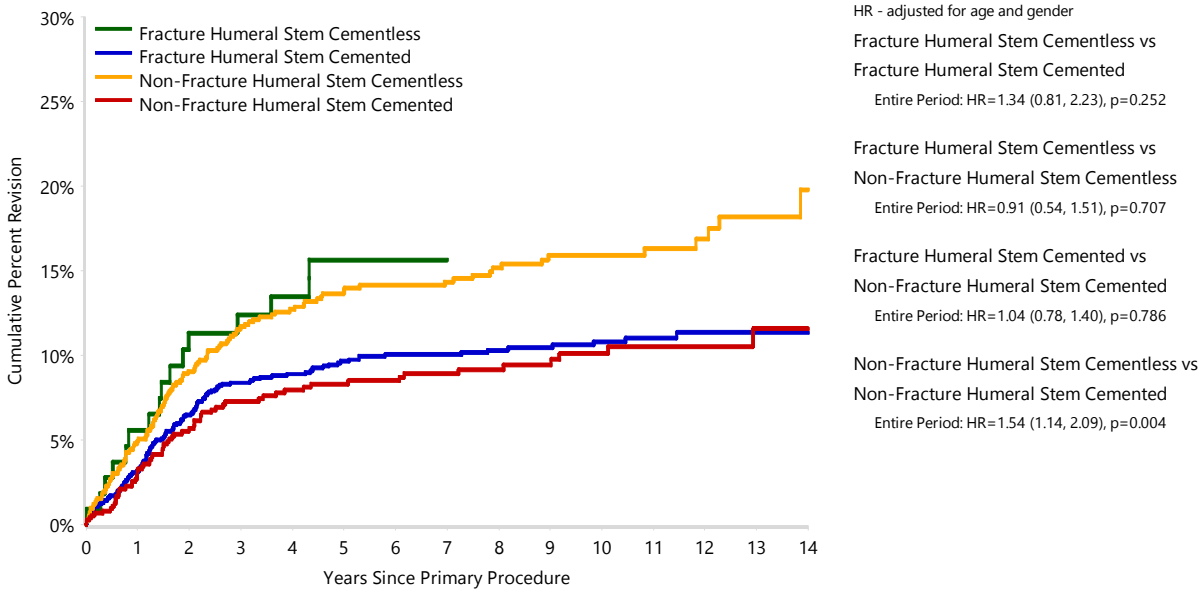


Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture Humeral Stem	1574	1450	1197	999	790	462	108
Non-Fracture Humeral Stem	1566	1412	1184	1009	830	481	89

Table SPS33 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Stem Type and Humeral Fixation (Primary Diagnosis Fracture)

Stem Type	Humeral Fixation	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture Humeral Stem	Cementless	17	108	5.6 (2.5, 12.0)	12.4 (7.4, 20.4)	15.7 (9.9, 24.3)	15.7 (9.9, 24.3)		
	Cemented	140	1466	3.1 (2.4, 4.2)	8.4 (7.0, 10.0)	9.7 (8.2, 11.4)	10.1 (8.5, 11.8)	10.8 (9.2, 12.7)	11.4 (9.6, 13.4)
Non-Fracture Humeral Stem	Cementless	120	832	4.9 (3.6, 6.7)	11.7 (9.6, 14.2)	13.8 (11.5, 16.5)	14.3 (12.0, 17.1)	15.9 (13.4, 18.9)	19.8 (15.6, 24.9)
	Cemented	65	734	3.3 (2.2, 4.9)	7.3 (5.5, 9.5)	8.3 (6.4, 10.7)	8.9 (7.0, 11.4)	10.1 (7.9, 12.9)	11.6 (8.7, 15.3)
TOTAL		**342**	**3140**						

Figure SPS12 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Stem Type and Humeral Fixation (Primary Diagnosis Fracture)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture Humeral Stem	Cementless	108	100	83	72	58	17	2
	Cemented	1466	1350	1114	927	732	445	106
Non-Fracture Humeral Stem	Cementless	832	751	619	537	443	255	42
	Cemented	734	661	565	472	387	226	47

Table SPS34 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Humeral Head and Humeral Stem (Primary Diagnosis Fracture)

Humeral Head	Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	38	471	2.8 (1.6, 4.8)	7.0 (4.9, 9.8)	7.8 (5.6, 10.7)	8.1 (5.9, 11.1)	8.5 (6.1, 11.6)	
Affinis	Affinis	6	47	6.6 (2.2, 19.2)	11.3 (4.9, 25.1)	14.4 (6.7, 29.5)	14.4 (6.7, 29.5)	14.4 (6.7, 29.5)	
Ascend Flex PyC	Ascend Flex	1	31	3.7 (0.5, 23.5)	3.7 (0.5, 23.5)				
Bigliani/Flatow	Bigliani/Flatow TM	12	293	1.4 (0.5, 3.7)	3.6 (2.0, 6.6)	3.6 (2.0, 6.6)	4.1 (2.3, 7.3)	4.7 (2.7, 8.2)	
Bio-Modular	Comprehensive	7	79	2.6 (0.6, 9.9)	7.9 (3.6, 16.7)	9.3 (4.6, 18.6)	9.3 (4.6, 18.6)	9.3 (4.6, 18.6)	
Comprehensive	Comprehensive	8	88	4.8 (1.8, 12.2)	10.4 (5.3, 19.8)	10.4 (5.3, 19.8)	10.4 (5.3, 19.8)		
Equinoxe	Equinoxe	3	36	3.1 (0.4, 20.2)	10.9 (3.6, 30.6)	10.9 (3.6, 30.6)			
Global Advantage	Global Advantage	10	53	7.7 (2.9, 19.1)	15.7 (8.1, 28.9)	17.8 (9.7, 31.4)	17.8 (9.7, 31.4)	17.8 (9.7, 31.4)	21.7 (11.9, 37.5)
	Global FX	58	695	2.2 (1.3, 3.6)	6.3 (4.6, 8.4)	7.9 (6.0, 10.3)	8.5 (6.5, 11.0)	9.6 (7.4, 12.3)	10.1 (7.8, 13.1)
Global Unite	Global Unite	37	169	8.9 (5.5, 14.4)	20.2 (14.8, 27.2)	22.4 (16.7, 29.7)	22.4 (16.7, 29.7)		
SMR	SMR	125	899	4.2 (3.1, 5.8)	10.9 (9.0, 13.2)	13.0 (10.9, 15.5)	13.8 (11.6, 16.4)	15.7 (13.3, 18.6)	18.3 (14.6, 22.9)
SMR CTA	SMR	6	43	7.6 (2.5, 21.7)	14.4 (6.2, 31.7)	18.5 (8.6, 37.4)	18.5 (8.6, 37.4)	18.5 (8.6, 37.4)	
Solar	Solar	5	40	7.9 (2.6, 22.5)	10.5 (4.1, 25.7)	13.7 (5.9, 30.0)	13.7 (5.9, 30.0)	13.7 (5.9, 30.0)	
Other (28)		26	196	4.8 (2.5, 9.0)	12.0 (8.0, 17.8)	13.4 (9.1, 19.5)	13.4 (9.1, 19.5)	14.3 (9.7, 20.6)	
TOTAL		**342**	**3140**						

Note: Only combinations with >30 procedures have been listed

Table SPS35 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Humeral Head and Fracture Stem (Primary Diagnosis Fracture)

Humeral Head	Fracture Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	36	454	2.7 (1.5, 4.7)	7.0 (4.9, 9.9)	7.8 (5.6, 10.9)	8.2 (5.9, 11.3)	8.6 (6.2, 11.8)	
Affinis	Affinis	6	45	6.9 (2.3, 20.0)	11.8 (5.1, 26.2)	15.1 (7.0, 30.9)	15.1 (7.0, 30.9)		
Bio-Modular	Comprehensive	7	79	2.6 (0.6, 9.9)	7.9 (3.6, 16.7)	9.3 (4.6, 18.6)	9.3 (4.6, 18.6)	9.3 (4.6, 18.6)	
Comprehensive	Comprehensive	8	78	5.4 (2.1, 13.8)	11.7 (6.0, 22.3)	11.7 (6.0, 22.3)	11.7 (6.0, 22.3)		
Global Advantage	Global FX	58	695	2.2 (1.3, 3.6)	6.3 (4.6, 8.4)	7.9 (6.0, 10.3)	8.5 (6.5, 11.0)	9.6 (7.4, 12.3)	10.1 (7.8, 13.1)
Global Unite	Global Unite	37	167	9.0 (5.5, 14.5)	20.4 (14.9, 27.5)	22.6 (16.8, 30.0)	22.6 (16.8, 30.0)		
Other (6)		5	56	0.0 (0.0, 0.0)	11.8 (5.0, 26.3)	11.8 (5.0, 26.3)	11.8 (5.0, 26.3)		
TOTAL		**157**	**1574**						

Note: Only combinations with >30 procedures have been listed

Table SPS36 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Humeral Head and Non-Fracture Stem (Primary Diagnosis Fracture)

Humeral Head	Non Fracture Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Ascend Flex PyC	Ascend Flex	1	31	3.7 (0.5, 23.5)	3.7 (0.5, 23.5)				
Bigliani/Flatow	Bigliani/Flatow TM	12	293	1.4 (0.5, 3.7)	3.6 (2.0, 6.6)	3.6 (2.0, 6.6)	4.1 (2.3, 7.3)	4.7 (2.7, 8.2)	
Global Advantage	Global Advantage	10	53	7.7 (2.9, 19.1)	15.7 (8.1, 28.9)	17.8 (9.7, 31.4)	17.8 (9.7, 31.4)	17.8 (9.7, 31.4)	21.7 (11.9, 37.5)
SMR	SMR	125	899	4.2 (3.1, 5.8)	10.9 (9.0, 13.2)	13.0 (10.9, 15.5)	13.8 (11.6, 16.4)	15.7 (13.3, 18.6)	18.3 (14.6, 22.9)
SMR CTA	SMR	6	43	7.6 (2.5, 21.7)	14.4 (6.2, 31.7)	18.5 (8.6, 37.4)	18.5 (8.6, 37.4)	18.5 (8.6, 37.4)	
Solar	Solar	5	40	7.9 (2.6, 22.5)	10.5 (4.1, 25.7)	13.7 (5.9, 30.0)	13.7 (5.9, 30.0)	13.7 (5.9, 30.0)	
Other (29)		26	207	5.6 (3.1, 9.8)	10.7 (7.0, 16.1)	12.0 (8.0, 17.7)	12.0 (8.0, 17.7)	12.9 (8.7, 18.8)	
TOTAL		**185**	**1566**						

Note: Only combinations with >30 procedures have been listed

OUTCOME FOR OSTEOARTHRITIS

Age and Gender

The rate of revision is lower for patients aged ≥75 years compared to patients aged <55 years after 2.5 years, and when compared to the 55-64 and 65-74 year age groups after 1.5 years (Table SPS37 and Figure SPS13).

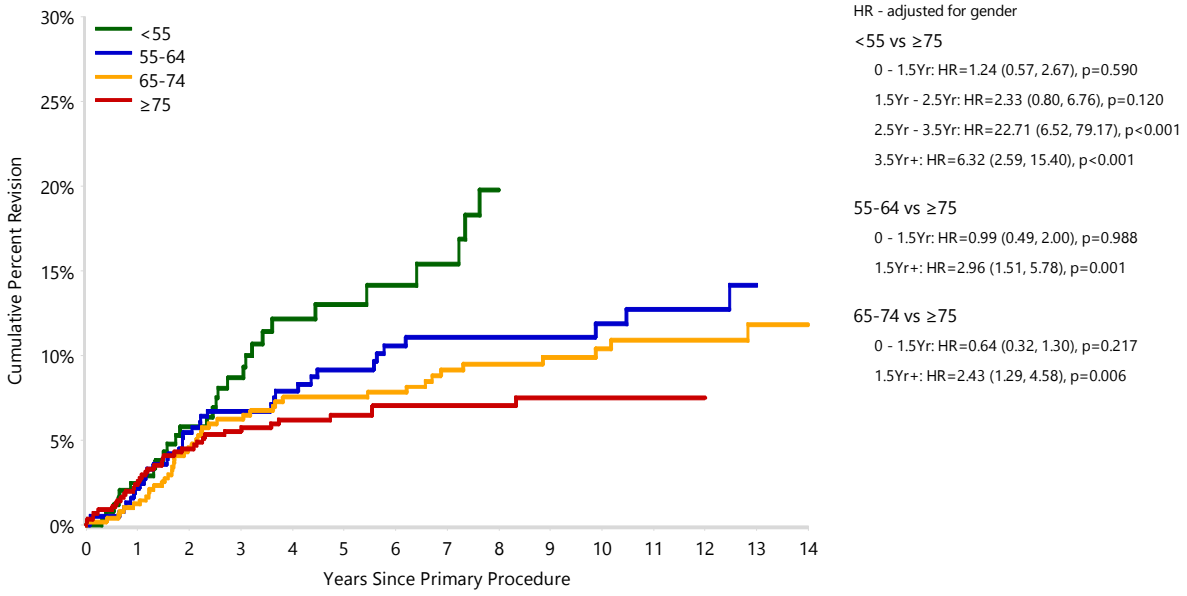
Gender is not a risk factor for revision (Table SPS38 and Figure SPS14).

The outcomes of the most used prosthesis combinations for osteoarthritis are listed in Table SPS39.

Table SPS37 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Age (Primary Diagnosis OA)

Age	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	31	262	2.5 (1.1, 5.4)	8.7 (5.5, 13.5)	13.0 (8.8, 19.1)	15.4 (10.5, 22.4)		
55-64	37	395	2.2 (1.1, 4.3)	6.7 (4.5, 10.0)	9.2 (6.4, 13.0)	11.1 (7.9, 15.4)	11.9 (8.5, 16.5)	
65-74	43	496	1.2 (0.6, 2.8)	6.2 (4.3, 8.9)	7.5 (5.4, 10.5)	9.2 (6.7, 12.4)	10.4 (7.7, 14.0)	11.8 (8.6, 16.1)
≥75	36	557	2.6 (1.5, 4.3)	5.5 (3.9, 7.9)	6.5 (4.6, 9.0)	7.0 (5.1, 9.7)	7.5 (5.4, 10.4)	
TOTAL	**147**	**1710**						

Figure SPS13 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Age (Primary Diagnosis OA)

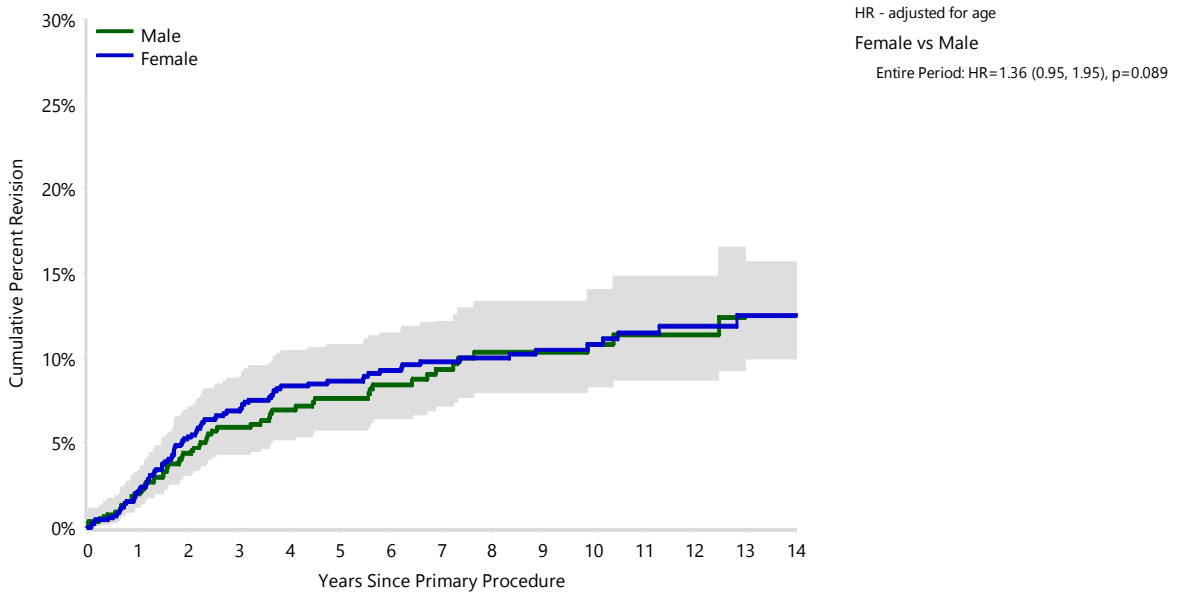


Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	262	227	143	89	64	34	10
55-64	395	345	261	200	164	113	32
65-74	496	464	369	321	272	180	51
≥75	557	516	437	364	262	128	19

Table SPS38 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)

Gender	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	60	799	2.0 (1.2, 3.3)	5.9 (4.3, 8.0)	7.6 (5.8, 10.0)	9.3 (7.2, 12.2)	10.8 (8.3, 14.1)	
Female	87	911	2.1 (1.4, 3.3)	6.9 (5.3, 8.8)	8.6 (6.9, 10.8)	9.8 (7.9, 12.1)	10.8 (8.7, 13.3)	12.5 (10.0, 15.7)
TOTAL	**147**	**1710**						

Figure SPS14 Cumulative Percent Revision of Primary Hemi Stemmed Shoulder Replacement by Gender (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	799	702	498	365	294	177	37
Female	911	850	712	609	468	278	75

Table SPS39 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Humeral Head and Humeral Stem (Primary Diagnosis OA)

Humeral Head	Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	11	139	1.4 (0.4, 5.7)	5.2 (2.5, 10.5)	6.0 (3.0, 11.6)	8.8 (4.9, 15.4)	8.8 (4.9, 15.4)	
Ascend Flex	Ascend Flex	0	20	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)		
Ascend Flex PyC	Ascend Flex	15	466	0.7 (0.2, 2.2)	3.4 (1.9, 6.2)	6.2 (3.6, 10.8)			
Bigliani/Flatow	Bigliani/Flatow TM	5	53	3.8 (1.0, 14.3)	7.5 (2.9, 18.9)	7.5 (2.9, 18.9)	10.0 (4.3, 22.6)	10.0 (4.3, 22.6)	
Comprehensive	Comprehensive	3	28	0.0 (0.0, 0.0)	9.5 (2.5, 33.0)	9.5 (2.5, 33.0)	18.6 (5.9, 49.8)		
Delta Xtend	Delta Xtend	3	32	3.1 (0.4, 20.2)	10.1 (3.4, 28.3)	10.1 (3.4, 28.3)	10.1 (3.4, 28.3)	10.1 (3.4, 28.3)	
Global AP	Global AP	11	168	0.6 (0.1, 4.1)	4.2 (2.0, 8.6)	6.1 (3.3, 11.1)	6.8 (3.8, 12.0)	6.8 (3.8, 12.0)	
Global AP CTA	Global AP	5	48	2.1 (0.3, 13.9)	10.8 (4.7, 24.1)	10.8 (4.7, 24.1)	10.8 (4.7, 24.1)	10.8 (4.7, 24.1)	
Global Advantage	Global Advantage	16	144	0.7 (0.1, 4.8)	5.0 (2.4, 10.2)	7.3 (4.0, 13.1)	8.1 (4.6, 14.1)	10.9 (6.6, 17.9)	
	Global FX	4	31	3.2 (0.5, 20.8)	10.0 (3.3, 28.1)	10.0 (3.3, 28.1)	10.0 (3.3, 28.1)	16.0 (6.0, 38.9)	
Global Advantage CTA	Global Advantage	1	39	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	4.0 (0.6, 25.2)	4.0 (0.6, 25.2)	4.0 (0.6, 25.2)
Global Unite	Global Unite	1	26	0.0 (0.0, 0.0)	4.2 (0.6, 26.1)	4.2 (0.6, 26.1)	4.2 (0.6, 26.1)		
SMR	SMR	47	274	4.1 (2.3, 7.2)	9.7 (6.7, 14.0)	13.3 (9.8, 18.1)	15.6 (11.7, 20.7)	17.2 (13.0, 22.5)	
SMR CTA	SMR	10	103	6.0 (2.7, 12.8)	10.4 (5.7, 18.5)	10.4 (5.7, 18.5)	10.4 (5.7, 18.5)		
Other (25)		15	139	3.7 (1.6, 8.6)	9.3 (5.4, 15.8)	10.3 (6.1, 17.1)	10.3 (6.1, 17.1)	12.5 (7.2, 21.1)	
TOTAL		**147**	**1710**						

Note: Only combinations with >20 procedures have been listed

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