When can Uncemented Total Hip Arthroplasty be used safely? (A Prospective 10 years study of 1079 case series)

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Introduction

In recent years, 'Get It Right First Time (GIRFT)' have advocated cemented components are utilised for total hip arthroplasty (THA) in older patients[1]. However, many studies, including our own[2],were unable to show any clear difference in outcomes whether utilised in older or younger patients. What therefore is the ideal candidate to receive such an implant? Our aim is to assess a large series of uncemented THAs in order to determine the ideal demographics for those receiving this uncemented THA.

Methods

A single surgeon, prospectively collected database was compiled of 1079 uncemented, elective Corail® pinnacle thas performed for 954 patients between 2010 and 2020. prosthetic information and patient demographics were recorded at the time of operation and oxford hip score (OHS) proms and complications were recorded at any subsequent follow up.

OHS and revisable complications were analysed against demographic variables and prosthesis features. The change from pre-operative OHS to one year post-operatively was used to measure improvement in joint function and annotated as Delta-OHS.

Revisable complications were also recorded including: dislocation, fracture, DAIR as well as death within 90 days of operation and intraoperative calcar cracks.

Delta-OHS was compared univariately against BMI, ASA, age, sex, using paired T-Tests with a 5% confidence interval. The MATLAB fitlm package was used to compare fit between variables and Delta-OHS. These variables were also examined using multiple linear regression analysis using the MICE R package

Results

OHS score at 1 year was available in 797 THAs (74%). Within this cohort less than 3% of the BMIs and less than 2% of the ASA data was not recorded. Sex and age were recorded in 100% of operations. Preoperative OHS was recorded in 1073 operations (99%).

443 THAs were implanted into males and 636 females. Mean age was 66 (range 23 to 93), mean BMI was 30.9 (range 15 to 60) and mean ASA was 2.1 (range 1 to 4).

The mean preoperative OHS was 14.6 which rose to 39.0 at 1 year (p=0.00).


Figure 1
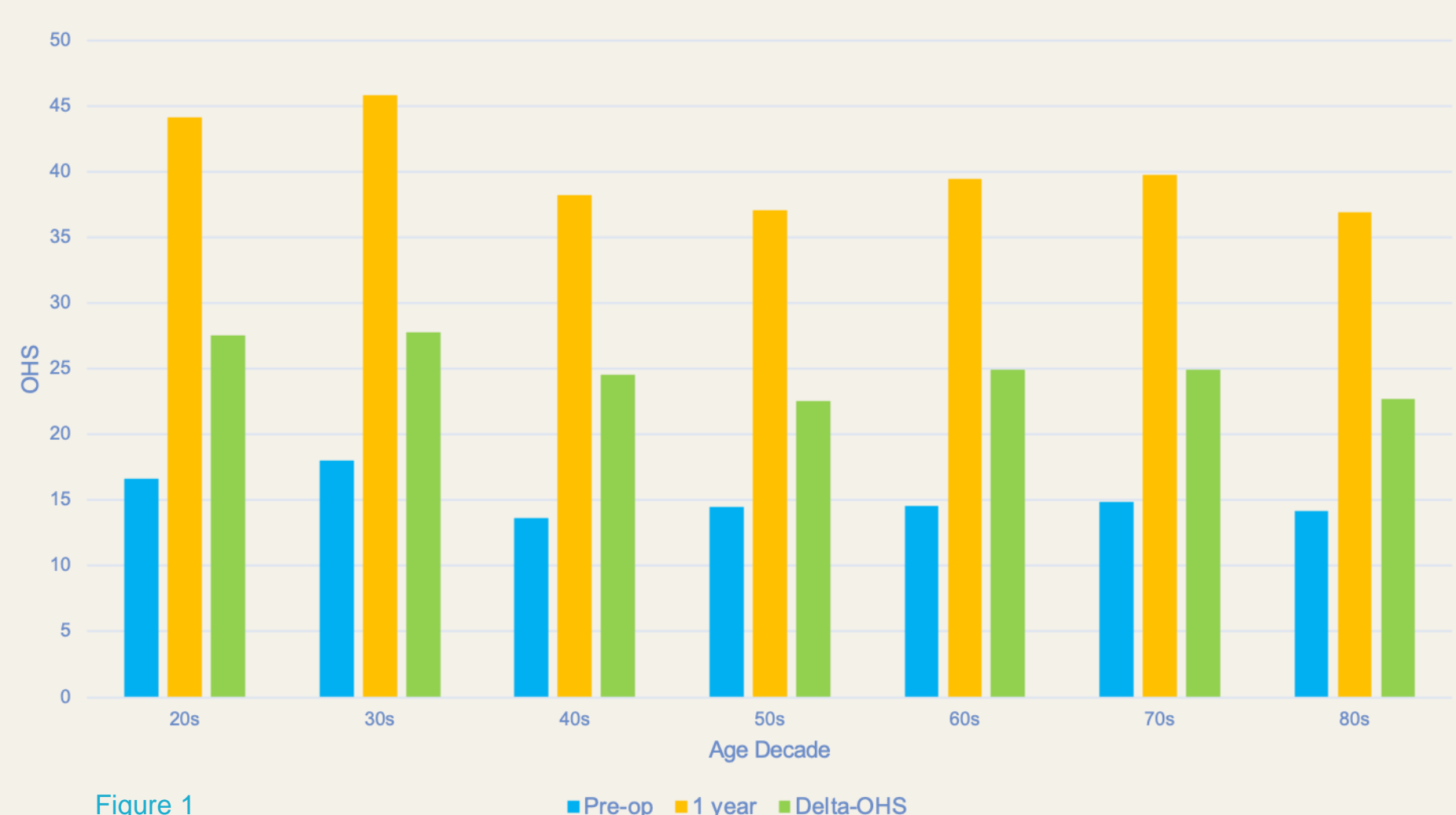
Mean OHS at 1 year for patients under 65 was 38.3, and was 39.5 for over 65s (p=0.04), there was no statistically significant change when examining over and under 70 years old.
The average male OHS at 1 year was 40.5; 38.0 for females. When examining against age and sex OHS at 1 year was lower for females in their 50s compared to other female age groups (34.7 versus 38.8 p=0.001).

Results

BMI

Increased BMI was associated with worse preoperative OHS as well as OHS at 1 year. However, the same change is not seen in Delta-OHS. This is best displaced in Figure 2 with the percentage increase from preop to 1 year OHS against BMI.


Figure 2
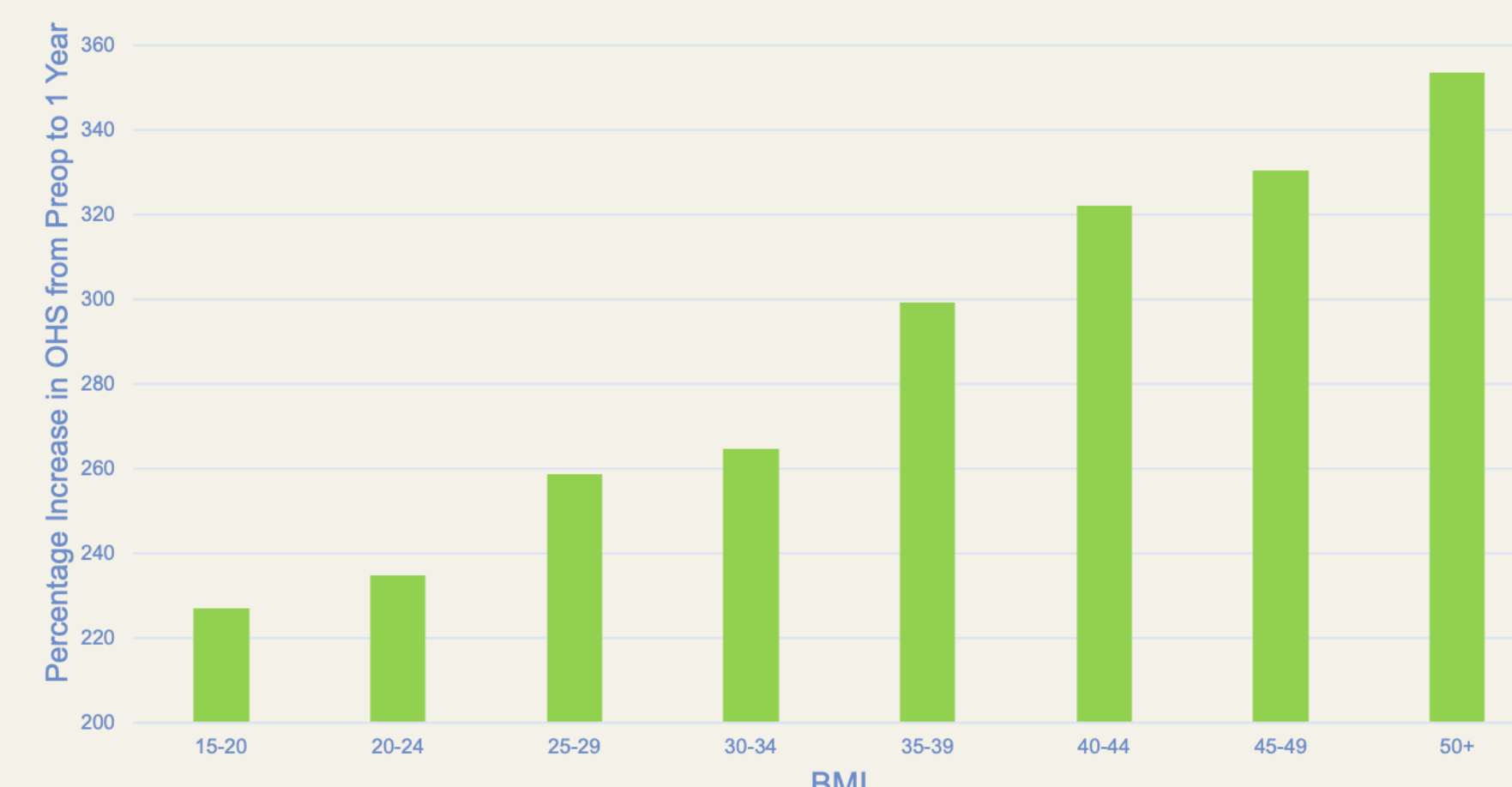
We found statistically significant impact of the BMI on the Delta OHS score in females in the 55-80 age group and in the males in the under 60 age group. The p-value for the F-statistic vs constant model for both age groups is less than 0.022. For each of the model coefficients, the p-value for the t-statistic of the null hypothesis that corresponding coefficient is equal to zero, is also less than 0.022. The fit between the Delta OHS score and the BMI was performed using the MATLAB fitlm package and is shown in Figure 3.

Figure 3
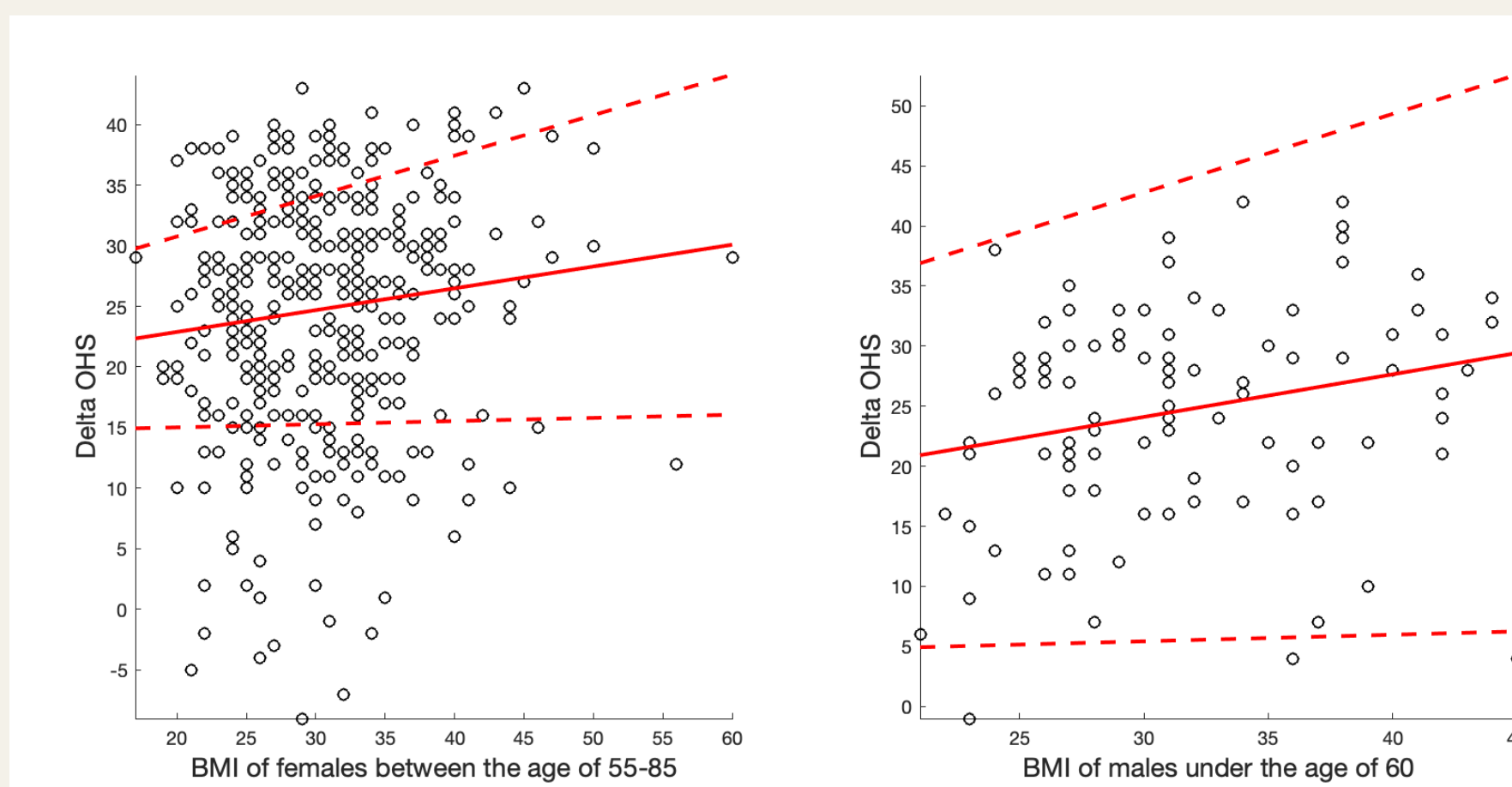
Multiple linear regression analysis shows that a combination of predictors has a significant impact on Delta-OHS. In addition to BMI, the age is a factor for the 55-80 age group in females (p-value is 0.015 for the F-statistic, 0.057 for the BMI and 0.075 for the age in the t-statistic). In males under 69, both BMI and ASA affect the Delta OHS score (p-value is 0.021 for the F-statistic, 0.01 for the BMI and 0.048 for the ASA in the t-statistic).

ASA

Similarly although mean preoperative OHS and OHS at 1 year decrease with ASA, the Delta-OHS does not as shown in figure 4.


Figure 4
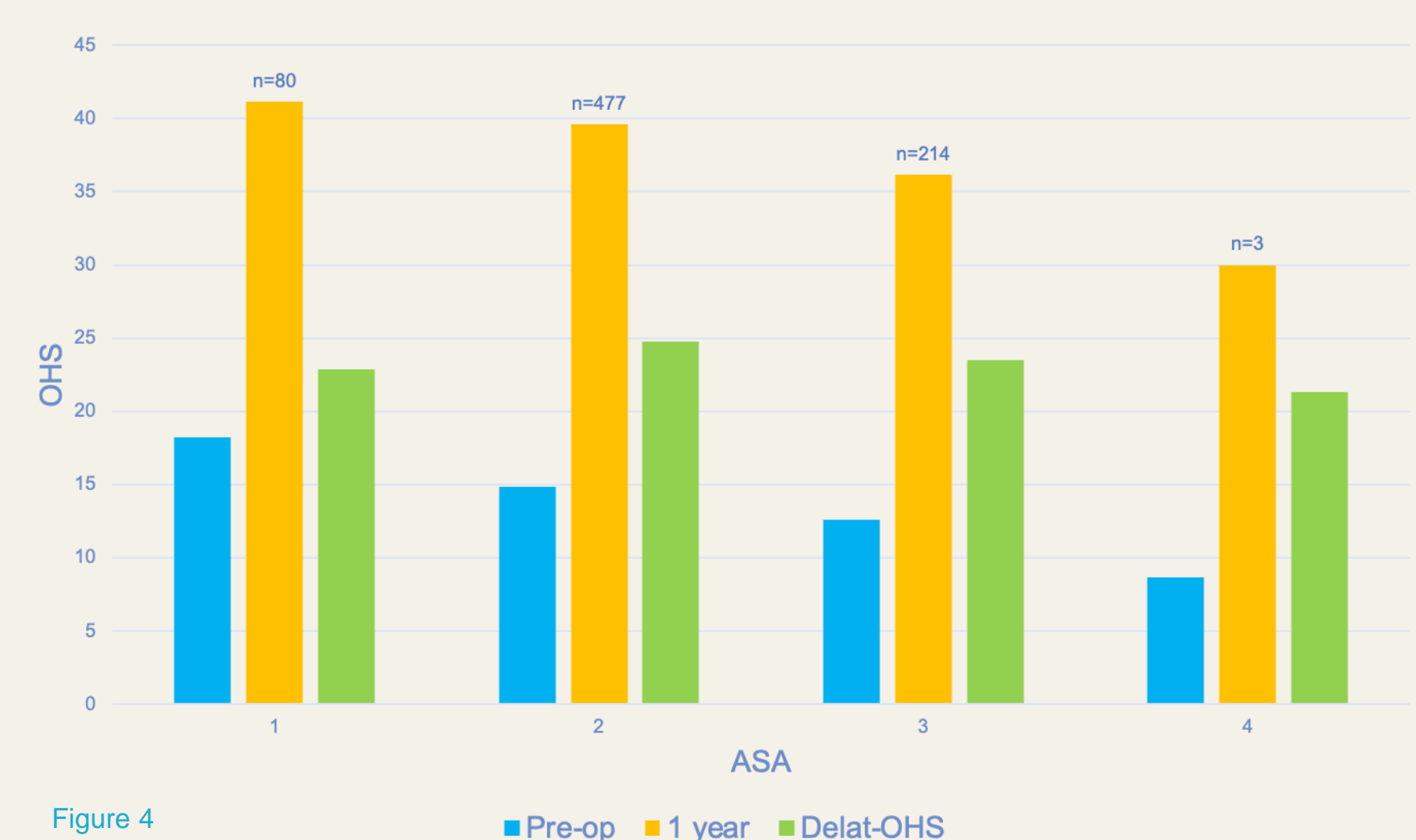
Revisable Complications

	Mean OHS at 1 Year	Mean final recorded OHS
Overall Cohort	39.0	38.3
Fracture (n=9)	34.2	36.9
Dislocation (n=13)	38.5	35.8
DAIR (n=7)	43.8	38.6

Figure 5

There were 9 fractures, 13 dislocations, 7 DAIRs and 1 death within 90 days. As many of these complications occurred after the operation the most recent OHS was recorded as well as OHS at 1 year, to assess if there was any further change. Although not statistically significant, there is a moderate decrease in OHS at 1 year and beyond in fractures and dislocations.

Results

THAs requiring a DAIR, had a higher OHS at 1 year but again this was not statistically significant.

Figure 6

Figure 7
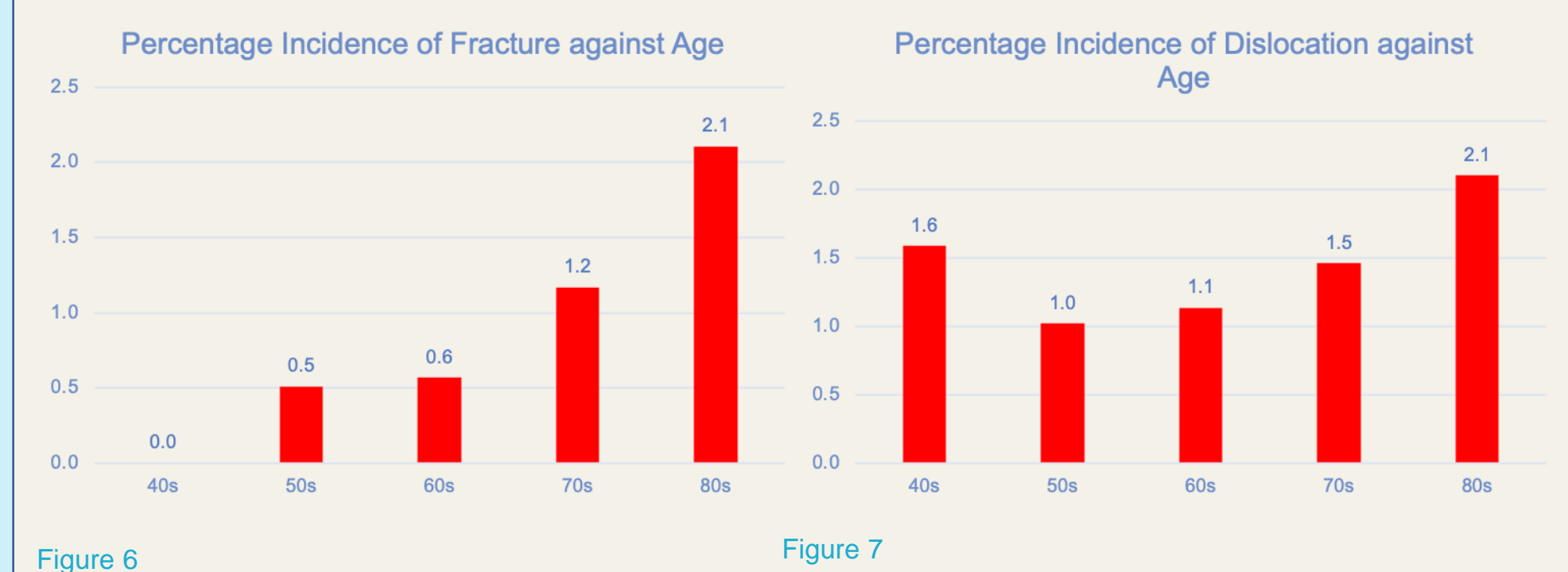
The incidence of fractures and dislocations appears to increase with age, with the exception of the peak of dislocations in patients in their 40s.

When compared univariately, male patients had an incidence of fractures 2.9 times higher than that of women and high-offset hips had an incidence of dislocations 2.5 times higher than that of standard offset. There were 11 intraoperative calcar cracks in the dataset, the OHS at 1 year was not statistically significantly different from the rest of the cohort at the 5% level (OHS 35.4 versus 39.0 p=0.27).

Discussion

This analysis of a single uncemeneted hip system, using a standard technique, suggests that patients over 70 years-old are not associated with poorer outcomes despite small number of revisable complication rates that increase with age from 50 upwards. Men had marginally higher average OHS than women at 1 year and marginally higher OHS pre-operatively although there was no statistically significant change in Delta-OHS between the sexes. Patients with higher BMI scores are associated with worse pre-operative hips and worse final OHS. Despite this, the increase in OHS from pre-operation to 1 year is significantly improved with increased BMI in the 55-80 year old female patients and male patients under 60. Based on these results we would not recommend patients be excluded from uncemented THAs on the basis of their BMI, gender or age. Although high-offset hips (more commonly used in male patients) are more prone to dislocations; and age increases the risk of revisable complications these issues represent a small proportion of the overall cohort and there is no difference in the increase of OHS gained from the operation.

Conclusions

Patients should not be excluded from this uncemented THA system on the basis of their BMI, gender or age.

References

1. Briggs T. A national review of adult elective orthopaedic services in England [Internet]. Getting It Right First Time; 2015 [cited 22 January 2022]. Available from: https://gettingitrightfirsttime.co.uk/wp-content/uploads/2018/07/GIRFT-National-Report-Mar15-Web.pdf.
2. Lewis PM, Khan FJ, Feathers JR, Lewis MH, Morris KH, Waddell JP. Uncemented total hip arthroplasty can be used safely in the elderly population. Bone Jt Open. 2021 May;2(5):293-300. doi: 10.1302/2633-1462.25.BJO-2021-0006. PMID: 33940937; PMCID: PMC8168545.

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