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SPORTS MEDICINE

How does hip and knee arthroplasty affect golfer performance and what should be expected regarding return to play?

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Aims

Hip and knee arthroplasty is commonly performed for end-stage arthritis. There is limited information to guide golfers on the impact this procedure will have postoperatively. This study aimed to determine the impact of lower limb arthroplasty on amateur golfer performance and return to play.

Methods

A retrospective observational study was designed to collect information from golfers following arthroplasty. Data were collected from 18 April 2019 to 30 April 2019 and combined a patient survey with in-app handicap data.

Results

A total of 2,198 responses were analyzed (1,097 hip and 1,101 knee). Of the respondents, 1,763 (80%) were male and the mean age was 70 years (26 to 92). Hip arthroplasty was associated with a mean increase in handicap of 1.03 (95% confidence interval (CI) 0.81 to 1.25). No difference was seen between isolated leading or trailing leg ($p = 0.428$). Bilateral hip arthroplasty increased handicap ($p < 0.001$). Overall, 1,025 (94%) maintained or increased the amount of golf played, 258 (23.5%) returned to iron shots at six weeks, 883 (80%) returned to club competitions at six months, 18 (1.6%) had persistent pain, and 19 (1.7%) were unable to return to play. Knee arthroplasty was associated with a mean increase in handicap of 1.18 (95% CI 0.99 to 1.38). Trailing leg arthroplasty alone was associated with higher postoperative handicap ($p = 0.002$) as was bilateral surgery ($p = 0.009$). Overall, 1,009 (92%) maintained or increased the amount of golf played, 270 (25%) returned to iron shots at six weeks, 842 (76%) returned to club competition at six months, 66 (6%) had persistent pain, and 18 (1.6%) were unable to return to play.

Conclusion

Hip and knee arthroplasty enables patients to maintain or increase the amount of golf played. The majority return to competitions within one year. Return to iron shots occurs from six weeks. A small increase in handicap following surgery is expected and is larger in patients undergoing bilateral surgery or those with knee arthroplasty to their trailing leg. Patients may still experience pain when playing golf.

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Introduction

Every year in the UK, approximately 250,000 arthroplasty procedures are performed.[1] It is currently estimated that there are 5 .2million golfers across the UK, with the golfing community representing a large portion of the UKsporting population.[2] Golf is a sport where participation, with associated health benefits, commonly continues through middle age.[3] Many golfers may undergo a major arthroplasty procedure during their playing lifetime.

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Previous literature has demonstrated that patients can return to play following hip and knee arthroplasty in small case series.[4] No large scale observational studies exist in the literature. Despite this, there is still no clear consensus or information that can be given to patients undergoing arthroplasty regarding their return to golf.

The physical demands of golf can be split into both movement around the course and the swing itself. For most people struggling with osteoarthritis, augmentation of this activity by use of a golf buggy, walking aids, or assistive devices, such as battery powered trolleys, can allow relief of symptoms when moving around the course; however, the golf swing can remain an area of concern. Physical limitations with both range of motion and pain have been shown to adversely impact on a golfers swing.[5] For most golfers, having the ability to return to the sport and perform their usual swing during iron shots and driving is important in order to not adversely affect player handicap.

Hip and knee arthroplasty is ultimately a procedure performed to improve quality of life, and for most golfers, return to their sport is paramount to this. We therefore conducted a large, observational study of a heterogenous group of amateur golfers to assess patient experience following hip and knee arthroplasty to give a pragmatic view of what effect surgery has on golfing activity.

Methods

A retrospective, observational study was designed to collect information from golfers who had undergone arthroplasty. Details collected included basic demographic information, the joint replaced, player handedness, time to return to play, amount of golf played prior to and following arthroplasty, patient-reported pain, assistive devices used, and player handicap. The survey was circulated to golfers via the newsletter for the HowDidIDo app,[6] an app which provides free performance statistics for golfers. In order to encourage uptake, an optional prize draw was available to those completing to win a set of 12 golf balls.

The survey itself was released during the R&A first annual golf and health week,[7] and the survey was live between the 18 April 2019 and 30 April 2019. Patients were included in the data set provided that they had undergone a hip or knee arthroplasty.

Data was analysed using Excel (Microsoft, USA). Analysis was conducted using independent-samples *t*-tests. Statistical significance was set at $p < 0.05$.

Results

There were a total of 2,333 complete unique responses received during the study period, and 135 patients were excluded from the analysis as they had undergone both hip and knee arthroplasty surgery. The remaining 2,198 responses were split into hip (1,097) and knee (1,101) arthroplasty and analyzed separately.

Hip arthroplasty. A total of 1,097 golfers responded following hip arthroplasty (851 (78%) male and 246 (22%) female). The mean age of the cohort was 69 years (35 to 92). The majority of golfers were right handed (1,050; 96%). Overall, 340 golfers had bilateral surgery (31%) and 757 unilateral surgery. Of these, 377 had a left total hip arthroplasty (THA) and 380 a right THA.

Across the whole cohort, the mean change in handicap following hip arthroplasty was +1.03 (95% confidence interval (CI) 0.81 to 1.25; -19 to +16). Subgroup analysis of unilateral and bilateral patients was undertaken, which demonstrated a statistically significant difference in handicap increase between bilateral and unilateral hip arthroplasty in golfers ($p = 0.009$, independent-samples *t*-test) favouring unilateral arthroplasty for a smaller increase in handicap.

Further subgroup analysis was undertaken looking at unilateral arthroplasty surgery and the impact of the operated side being either the leading or trailing leg. No statistical difference was found between these groups ($p = 0.428$, independent-samples *t*-test). Mean change in handicap with 95% CI are presented in Figure 1.

Prior to surgery, the majority of the cohort (836; 76%) were playing golf at least once per week or more. Postoperatively, this increased to 1,031 (94%) reporting playing at this level. A total of 1,025 golfers (94%) reported that they were playing either the same amount or more golf than prior to surgery, while 19 golfers (1.7%) reported that they were unable to play following surgery. No differences were seen in the use of mobility aids with the majority of golfers using a battery-assisted trolly both prior to (68%) and following (74%) surgery. Temporary access to a golf buggy was a definite assistance to early return to playing.

Return to play was swift for most golfers, with 258 (23.5%) returning to iron shots at six weeks or sooner, and 782 (71%) having returned at three months. The majority of golfers had returned to club competitions at three months (445; 40%) or six months (883; 80%).

Overall, 542 golfers (49%) reported never having pain when playing following surgery, and 867 (79%) reported either never or only rarely having pain (Figure 2), while 18 golfers (1.6%) reported always having pain despite surgery.

Knee arthroplasty. A total of 1,101 golfers responded following knee arthroplasty (912 (83%) male and 189 (17%) female). The mean age of the cohort was 70 years (26 to 89). The majority of golfers were right handed (1,036; 94%). Overall, (337; 31%) golfers had bilateral surgery and (764; 69%) unilateral surgery. Of these, (321; 42%) had left-sided surgery and (443; 58%) had right-sided surgery.

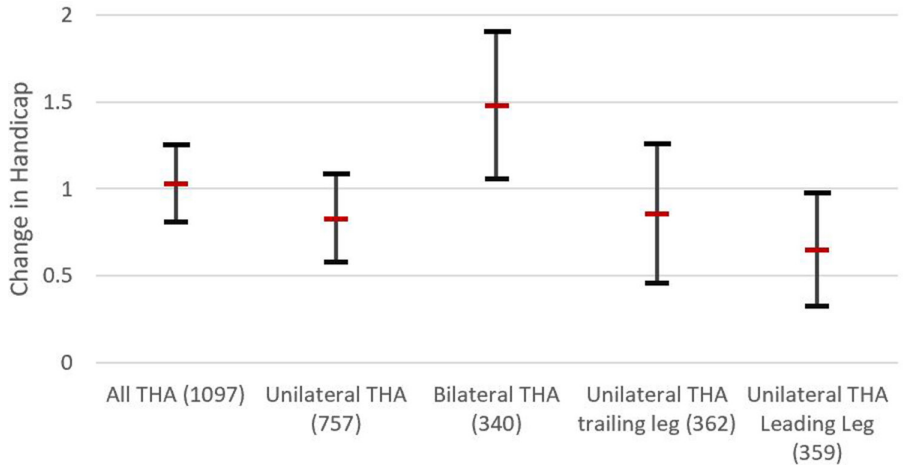

Fig. 1

Mean change in golf handicap following hip arthroplasty with 95% confidence intervals. THA, total hip arthroplasty.

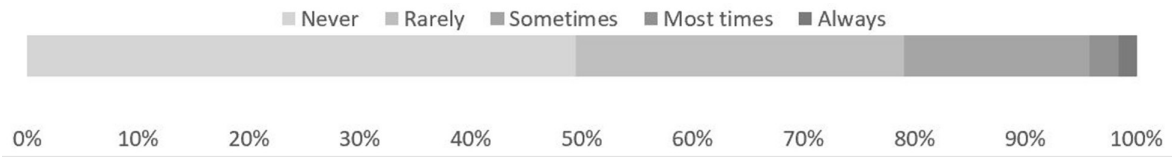

Fig. 2

Patient-reported experience of pain when playing golf following hip arthroplasty.

Across the whole cohort, the mean change in handicap following knee surgery was 1.18 (95% CI 0.99 to 1.38; -17 to +20]. Subgroup analysis of unilateral and bilateral patients was undertaken which demonstrated a statistically significant difference in handicap increase between bilateral and unilateral knee arthroplasty in golfers (p = 0.002, independent-samples *t*-test) favouring unilateral arthroplasty for a smaller increase in handicap.

Further subgroup analysis was undertaken looking at unilateral arthroplasty surgery and the impact of the operated side being either the leading or trailing leg. A statistical difference was found between these groups (p = 0.009, independent-samples *t*-test) in favour of a smaller increase in handicap on golfers who inderwent knee arthroplasty on their leading knee. Mean change in handicap with 95% CI are presented in Figure 3.

Prior to surgery, the majority of the cohort 892 (81%) were playing golf at least once per week or more. Postoperatively, this increased to 1,036 reporting playing at this level (94%); 1,009 (92%) golfers reported that they were playing either the same amount or more golf than prior to surgery and 18 golfers reported that they were unable to play following surgery (1.6%). Small differences were seen in the use of mobility aids, with the majority of golfers using a battery-assisted trolley both prior to (65%) and following (80%) surgery. Fewer golfers required the use of a buggy following surgery (212; 19%) before and (132; 12%) afterwards.

Return to play was swift for most golfers, with 270 (25%) returning to iron shots at six weeks or sooner, 743 (67%) having returned at three months, and the majority of golfers had returned to club competitions at three months (44; 40%) or six months (842; 76%).

Overall, 362 (32%) of golfers reported never had pain when playing following surgery, 667 (61%) reported either never or only rarely having pain (Figure 4), while 66 (6%) reported always having pain despite surgery.

Discussion

Golfers undergoing arthroplasty surgery have a very good chance of returning to a similar level of play postoperatively, with fewer than one in ten not being able to play as frequently. Less than 2% of golfers reported being unable to return to the sport following surgery.

Self-reported ability to return to shots requiring an adequate golf swing is a good marker of a player's ability and speed of return to the sport. One in four players were able to return to iron shots within six weeks following arthroplasty with (270; 25%) of those undergoing knee arthroplasty and (258;24%) of those undergoing hip arthroplasty achieving this, while overall for both hip and knee (1,525; 69%) had returned to iron shots by

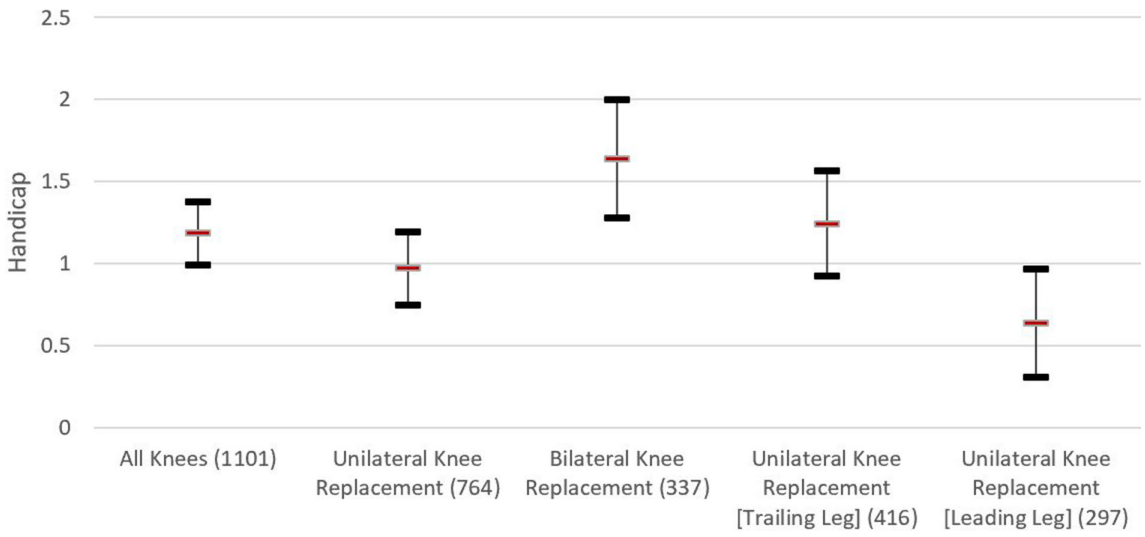

Fig. 3
Mean change in golf handicap following knee arthroplasty (95% CI).

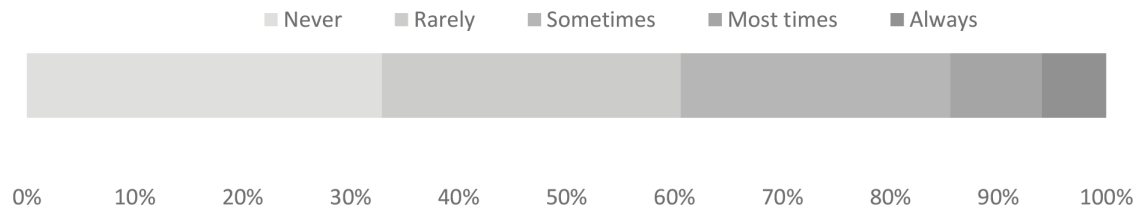

Fig. 4
Patient reported experince of pain when playing golf following knee arthroplasty.

three months. Return to club competitions took slightly longer, with (1,726; 78%) able do so within six months of surgery. The information may assist golfers in decisions with regard to suspending playing membership around the time of arthroplasty.

The use of golfing aids, including buggies, caddies, and motorized trolleys, were prevalent both prior to and after surgery with similar rates of use despite the procedure. There was a decrease in the number of golfers requiring the use of a golf buggy in those undergoing both hip and knee arthroplasty, but this was most marked in those undergoing knee arthroplasty (212; 19% to 132; 12%).

Pain relief is the main expectation of patients undergoing arthroplasty, and current evidence places an unfavourable pain outcome in around 9% of patients after hip and about 20% of patients following knee arthroplasty.[8] In our cohort, roughly two-thirds of patients either had no pain or rarely had pain either playing or following golf, demonstrating a successful outcome in these patients. Pain relief was notably better in patients undergoing hip arthroplasty, with four out of five patients having no pain or rarely having pain, compared to three out of five following knee arthroplasty. Golfers with persistent pain were in the minority and again hip fared better (18; 1.6%) than knee (66; 6%) which is in keeping with the greater rates of persistent pain following knee arthroplasty in the literature.

Player handicap data demonstrates that following arthroplasty there is an increase of approximately +1, although individual differences are highly variable, with a large range of handicap changes in the cohort from -19 to +20. This is to be expected with a large heterogeneous patient cohort. The reasons for this are likely multifactorial and may include differing preoperative morbidity and the preoperative handicap level.

Bilateral surgery for both hip and knee arthroplasty was associated with greater increase in handicap following surgery, which is to be expected given the greater morbidity associated with multiple operations. Interestingly, no difference was seen in hip arthroplasty whether the leading or trailing leg was replaced in isolation. Conversely, in patient undergoing knee arthroplasty, a significantly greater increase in postoperative handicap was noted in those who had the knee in the trailing leg replaced in isolation. This is likely due to the greater amount of rotation required in a golfer's trailing leg and the limitation posed with conventional knee arthroplasty.

With an ever-increasing focus on patient-reported outcome measures and patient education within medicine, it is important to provide individualized information to patients undergoing major surgery[9] in order to guide postoperative expectation. The golfing community is a large proportion of the UK's sporting population, and, given that players continue to play throughout middle age and later life, they fall within the demographic likely to require arthroplasty. Our study is limited by virtue of being retrospective, observational, and self-reported. However, it is the largest known study to date of return to golf following arthroplasty and its impact on amateur golfer performance. It is non-selective and therefore representative of a large heterogenous group of golfers. The study was performed prior to the recent conversion to the new World Handicap System.[10] It is unclear whether specific different changes to handicaps will occur postarthroplasty as a result of this new initiative.

We conclude that patients undergoing arthroplasty to the hip and knee are able to return to playing golf regularly and most increase or maintain the amount of golf played. Most golfers will return to competitions within one year. Return to iron shots occurs from six weeks and limited improvement with use of golf aids is seen. An increase in handicap following surgery is expected and is larger in patients undergoing bilateral surgery or those with knee arthroplasty to their trailing leg. Most golfers should expect pain relief following arthroplasty; however, some may still experience pain when playing golf, more commonly following knee arthroplasty.

Take home message

- Arthroplasty allows most golfers to maintain or increase the amount of golf played.
- Golfers return to iron shots after six weeks; impact on handicap is variable, but, on average, players increase by + 1.
- Most golfers will never, or only rarely have pain in the joint following arthroplasty.

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- S. Frankland: Methodology, Project administration, Investigation, Data curation, Formal analysis, Validation, Writing – original draft.
- J. Ranson: Project administration, Writing – review & editing.
- C. Nevill: Conceptualization, Supervision, Writing – review & editing.
- P. Hughes: Conceptualization, Methodology, Supervision, Data curation, Validation, Writing – review & editing.

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