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Original Research

Anticipating Time Taken off Work After Bernese Periacetabular Osteotomy: A Single-Surgeon Experience of 282 Cases

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ABSTRACT

Background: Expected time off work is a common question from patients undergoing periacetabular osteotomy (PAO) as most are of working age. Planning for financial and social impacts plays an important role when considering PAO. No previous studies have reported on the time taken to return to work following PAO. The aim of this study was to quantify the amount of time taken off work following PAO.
Methods: Patients who had responded to questions asking about their return to work from the Northumbria Hip Preservation Unit patient-reported outcomes database were included. In addition to time taken to return to work, demographic data, EuroQol 5-dimension (EQ-5D) visual analog scale, EQ-5D index, University of California, Los Angeles activity, non-arthroplasty hip score, and International hip outcome tool-12 scores before and after surgery were collected.
Results: In total, there were responses for 282 PAO procedures performed. Time taken to return to work ranged from 0 weeks to 208 weeks. The median time reported to return to work was 16 weeks (interquartile range: 12-22 weeks). Preoperative EQ-5D visual analog scale and EQ-5D index scores moderately correlated to weeks till return. University of California, Los Angeles activity and non-arthroplasty hip score were only weak correlations. One year postoperatively, there was only a weak correlation between patient-reported outcome measure scores and the time taken to return to work, though all were significant ($P < .05$).
Conclusions: Based on the findings, we would advise prospective PAO candidates that the average time taken to return to work after PAO was 16.5 weeks with the majority (85%) having returned by 6 months. It was also noted that poorer preoperative and postoperative patient-reported outcome measures significantly correlated weakly with an extended period away from work.

Introduction

Acetabular dysplasia and acetabular retroversion in skeletally mature patients are deformities that result in increased forces being transferred to the acetabular rim potentially causing articular cartilage degeneration. Hip dysplasia is associated with an increased risk of developing osteoarthritis and leads to poor quality of life [1-4]. Periacetabular osteotomy (PAO) is an established procedure where the acetabulum is reoriented to treat symptomatic acetabular dysplasia as well as acetabular retroversion [5]. More anatomical femoral head coverage reduces the load on articular cartilage and can delay or prevent the onset of secondary osteoarthritis as well as improve levels of pain, function, and quality of life [6-8].

Loss of mobility while recovering from PAO is inevitable. During the postoperative recovery period, patients are often advised to remain partially weightbearing with crutches for 6-8 weeks followed by a further period of protected weightbearing for 6-8 weeks [9]. Taking into account that the majority of patients who present with symptoms and undergo PAO are of working age [10,11], a question commonly asked to surgeons is when return to work can be expected. Both return to work as well as prolonged absence from work are associated with multifactorial influences [12]. Planning

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Figure 1. Preoperative and 1-year postoperative radiographs.

for both financial and psychosocial impacts plays an important role for patients when considering PAO. However, there are few studies that have reported on return to work after PAO leaving surgeons with limited information to substantiate their advice to patients.

Fujita et al. [13] reported rate of return to work following PAO in a series of 83 patients; however, to our knowledge, no studies have reported on the time taken to return to work following PAO. The primary focus of this study was to quantify the amount of time taken off work following PAO. Secondary aims were to determine if the time taken off work correlated with preoperative patient-reported outcome measures (PROMs).

Material and methods

Data collection

Data were acquired from the Northumbria Hip Preservation Unit Patient-Reported Outcomes database. All patients gave written consent to their data being used for research purposes at the time of its entry into the registry. Formal ethical approval was deemed unnecessary because the patient data were being analyzed within the remit of the previous consent. Patients were included if they had responded to the questions asking about their return to work. Patients who had undergone bilateral procedures (all were sequential) who had not returned to work prior to their second side procedure were excluded.

The Northumbria Hip Preservation registry prospectively collects outcome on patients undergoing hip preservation procedures. PROMs data collected included the International Hip Outcome Tool-12 (iHOT-12) [14], the EuroQol 5-Dimension (EQ-5D) 5-level self-reporting tool [15], University of California, Los Angeles (UCLA) activity score [16], Non-Arthroplasty Hip Score (NAHS), and a satisfaction score. In addition to the PROMs scores, the postoperative questionnaire asks 2 work-related questions:

(1) Have you returned to work after surgery?
   a. I am not working—I did not work prior to surgery for other reasons.
   b. I am not working—I did not work prior to surgery because of the problem for which I had surgery.
   c. I am planning to return to work once I feel able or once my consultant allows me.
   d. I have returned to work.
   e. I am retired.
(2) For how many weeks were you off work because of the problem for which you had surgery (leave blank if not applicable)?

For those attending school or college, return to these activities was considered as return to work. Additional information such as age, gender, body mass index (BMI), laterality, smoking status, and complications were recorded.

Surgical procedure and rehabilitation protocol

All the surgical procedures were performed by or under the direct supervision of a single surgeon (the senior author). A bikini line incision of approximately 5 cm to 7 cm was used. The plane between tensor fascia lata and sartorius was identified and developed. Sartorius and inguinal ligament detached from anterior superior iliac spine and retracted medially along with the lateral femoral cutaneous nerve. The ilio-psoas was cleared off the inner table of the ilium and was retracted medially with the femoral artery, vein, and nerve. Going inferior to the hip capsule, the ischium was identified and cleared off soft tissues. Ischial osteotomy

Table 1
Overview of the respondents, groups, and demographics.

Parameters	No.	Female/male	Average age (SD), y	Age range, y
Total no. of responses	282	257/24	32.5 (10.3)	14-55
Not working at the time of PAO	32	29/2	26.0 (9.4)	14-50
Excluding those not working at the time of PAO	250	228/22	33.3 (10.1)	15-55
Back at work	233	217/16	33.2 (10.0)	15-55
Planning to return	13	10/3	31.6 (8.8)	20-48
Retired		3/1	40.8 (14.9)	20-55

PAO, periacetabular osteotomy; SD, standard deviation.

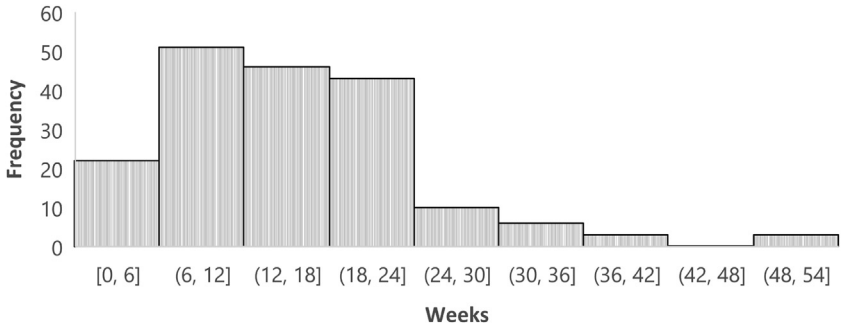

Figure 2. Frequency histogram of the number of weeks till return to work.

performed initially on the medial side followed by lateral side. The pubic osteotomy was then performed medial to the iliopubic eminence. The inner table of the pelvic brim initially scored, and the posterior column osteotomy made, taking care that this was midway between the posterior edge and the acetabulum. Finally, the transverse iliac osteotomy prior to mobilizing the acetabular fragment. The acetabular fragment was manipulated to achieve correction and then fixed in place using 3 or 4 4.5-mm screws. Partial weightbearing with 10-15 kg body weight was prescribed for 6 weeks postoperatively. Patients were advised to avoid active straight leg raises and supine position for 6 weeks. At 6 weeks following clinic review patients progressed to protected weightbearing as tolerated with crutches for a further 6 weeks. Preoperative and 1-year postoperative radiographs are shown in Figure 1.

Statistical analysis

Continuous descriptive statistics used means, median values, ranges, and graphical representations where appropriate. The Tukey outlier deletion method $\{Q1 - k(IQR), Q3 + k(IQR)\}$ was used to account for outliers with a multiplier $k = 3$ to exclude data that were "far out" [17]. Comparison of groups performed using Student's *t*-test. Univariate analysis of demographics (age and BMI) and preoperative/postoperative PROMs relationship to time taken off work were explored using graphical representation scatter plots and Pearson correlation coefficients. Statistical analysis was undertaken using RStudio (version 2022.02.2) and the level of significance was taken to be $P < .05$.

Results

In total, there were responses from 242 patients (40 bilateral) for 282 PAO procedures performed between 2013 and 2023 with a minimum follow-up of 1 year. The median age was 33 years (interquartile range: 23-40 years) and 91.1% (n = 257) of the procedures were in females. Thirty two (11.3%) of the PAOs were not working prior to their procedure and were not included in the analysis; of the remaining 250, 233 (93.2%) reported that they had returned to work and 17 (6.8%) had not yet returned (13 [5.2%] are planning to return and 4 [1.6%] have retired). An overview of the groups is given in Table 1.

The number of weeks taken off work was reported by 189 (75.6%) of those working at the time of undergoing PAO. Time taken to return to work ranged from 0 weeks to 208 weeks (Fig. 2). The median time reported to return to work following PAO was 16 weeks (interquartile range: 12-22 weeks). The mean was 19.0 weeks (standard deviation: 19.3), and accounting for outliers (Tukey) [17], the mean time to return to work was 16.5 weeks (standard deviation: 9.3). Of those who worked prior to undergoing their PAO, 22 (11.6%) returned to work in 6 weeks or less, 73 (38.6%) in 12 weeks or less, 118 (62%) in 18 weeks or less, 162 (85.7%) in 24 weeks or less, and 184 (97.4%) had returned by 1 year (Fig. 3). Five respondents were off longer than 1 year and 2 for more than 2 years before returning to work. Among these, 3 were related to postoperative complications (delayed union, infection, and persistent greater trochanteric pain syndrome).

Among the 40 bilateral patients (80 PAOs), 5 were not working prior to surgery, and 25 reported time to return to work for both hips. Ten patients took an equal time period off work for both hips, 6 took less time (mean: 7.3, range: 1-28 weeks), and 9 took longer time (mean: 8.1, range: 1-28 weeks).

Pearson correlation showed that there was no significant relationship between age and time taken to return to work (n = 189, $r = 0.0185$, $P = .801$). BMI weakly, but significantly ($P = .012$), positively correlated with time taken to return to work with a Pearson correlation coefficient $r = 0.216$ (n = 134). One hundred eighty two PAOs had information on smoking status, of which 11 were smokers or e-cigarette users. There was no significant difference in the time

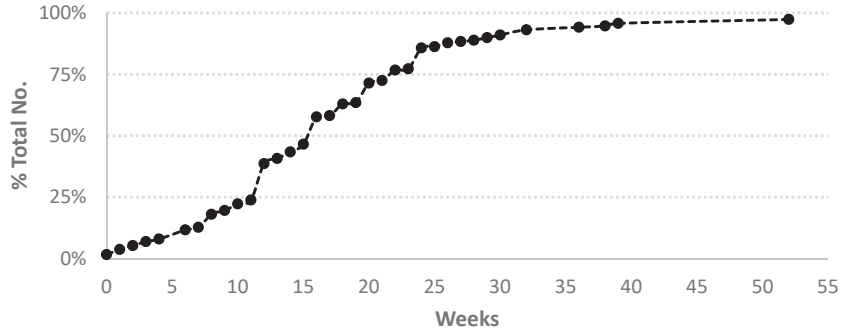

Figure 3. Graph showing the % of respondents (those who reported weeks till return) plotted against weeks till return to work.

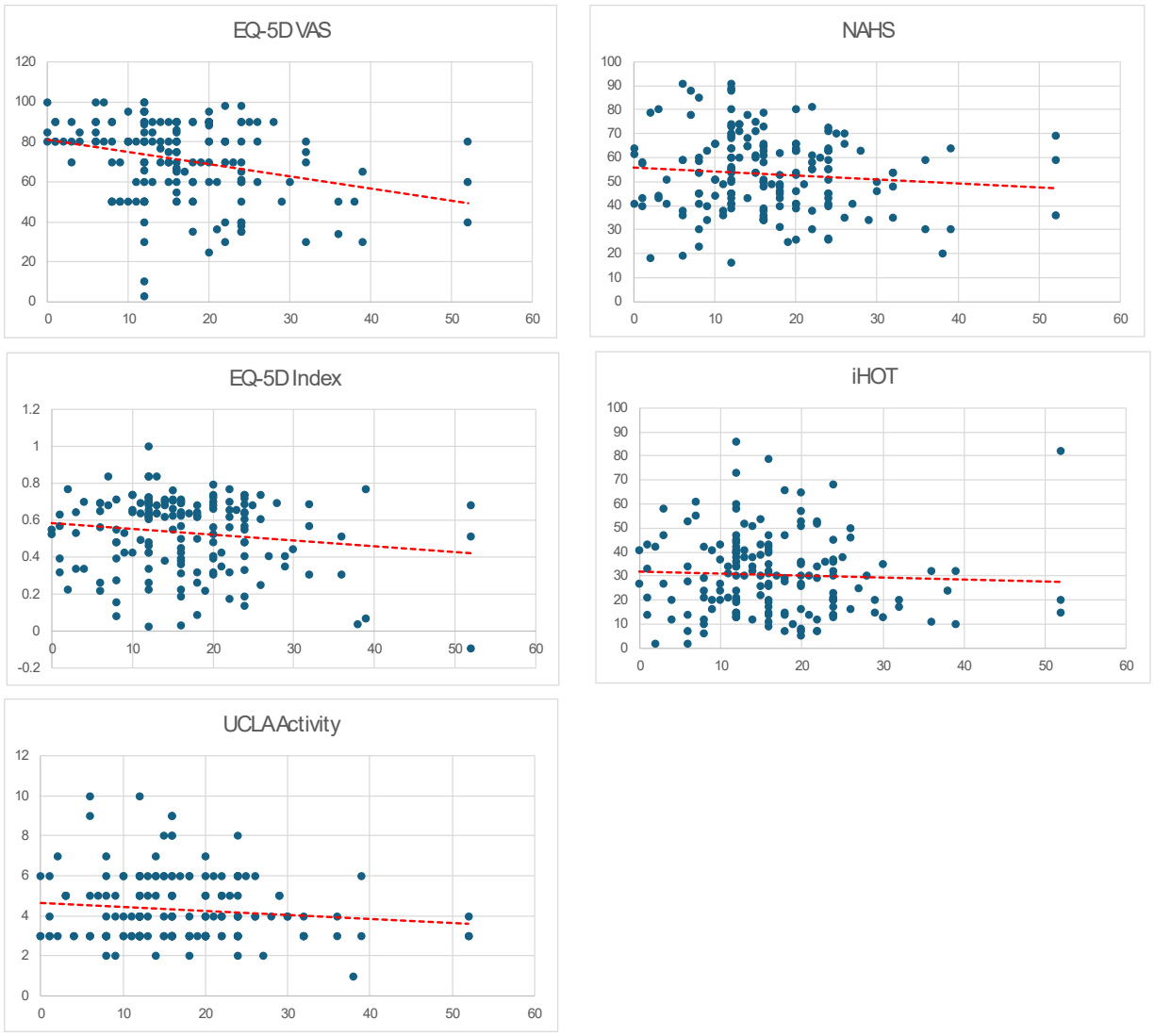

Figure 4. Graphs showing preoperative EQ-5D VAS (0-100), EQ-5D Index (0-1), UCLA activity (1-10), NAHS (1-100), and iHOT-12 (1-100) scores plotted against weeks till return with regression lines (least squares method) added. Tukey outlier deletion method used to account for outliers with a multiplier k = 3. EQ-5D, EuroQol 5-Dimension; iHOT-12, International Hip Outcome Tool-12; NAHS, Non-Arthroplasty Hip Score; UCLA, University of California, Los Angeles; VAS, visual analog scale.

taken to return to work between the 2 groups. There was no significant difference in time taken to return to work between males and females.

Graphic representation of PROMs plotted vs return to work is shown preoperatively and 1 year postoperatively in Figures 4 and 5. Table 2 gives an overview of the correlation between PROMs and time taken to return to work. There was weak (NAHS and UCLA) or moderate (EQ-5D visual analog scale [VAS] and EQ-5D Index) negative correlation of preoperative PROMs scores (excepting iHOT-12) with the time taken to return to work. Postoperatively, there was a weak correlation of PROMs scores to the time taken to return to work although and all were significant ($P < .05$). There was no significant correlation of satisfaction score with time taken to return to work ($P = .895$).

Discussion

In this study, the primary objective was to quantify the amount of time taken off work following PAO procedures. In addition, we sought to establish if the time taken off work correlated with preoperative and postoperative PROMs. With respect to PAO procedures with reported return to work, the majority (85%) had returned to work at 6 months with almost all (97%) having returned by 1 year postoperatively. Among the respondents, the median time taken to return to work was 16 weeks and the mean, accounting for outliers, was 16.5 weeks from the time of operation. The time taken to return to work was found to negatively correlate with almost all preoperative PROMs, except for the iHOT-12. The EQ-5D VAS and EQ-5D Index scores were moderate correlations, whereas UCLA activity and NAHS were only weak correlations. From this, we can surmise that those with poorer preoperative scores can expect to take longer to return to work. This was also noted when looking at the PROMs scores at 1 year postoperatively. Time taken to return to work negatively correlated with EQ-5D VAS, EQ-5D Index, UCLA activity, NAHS, and iHOT-12 at 1 year. These were only weak correlations; however, all were significant (Table 2).

There is limited literature on return to work after PAO. Fujita et al. reported on 85 hips focusing on the rate of return to work at 1 year [13]. They report that 82.4% of PAO patients had returned to

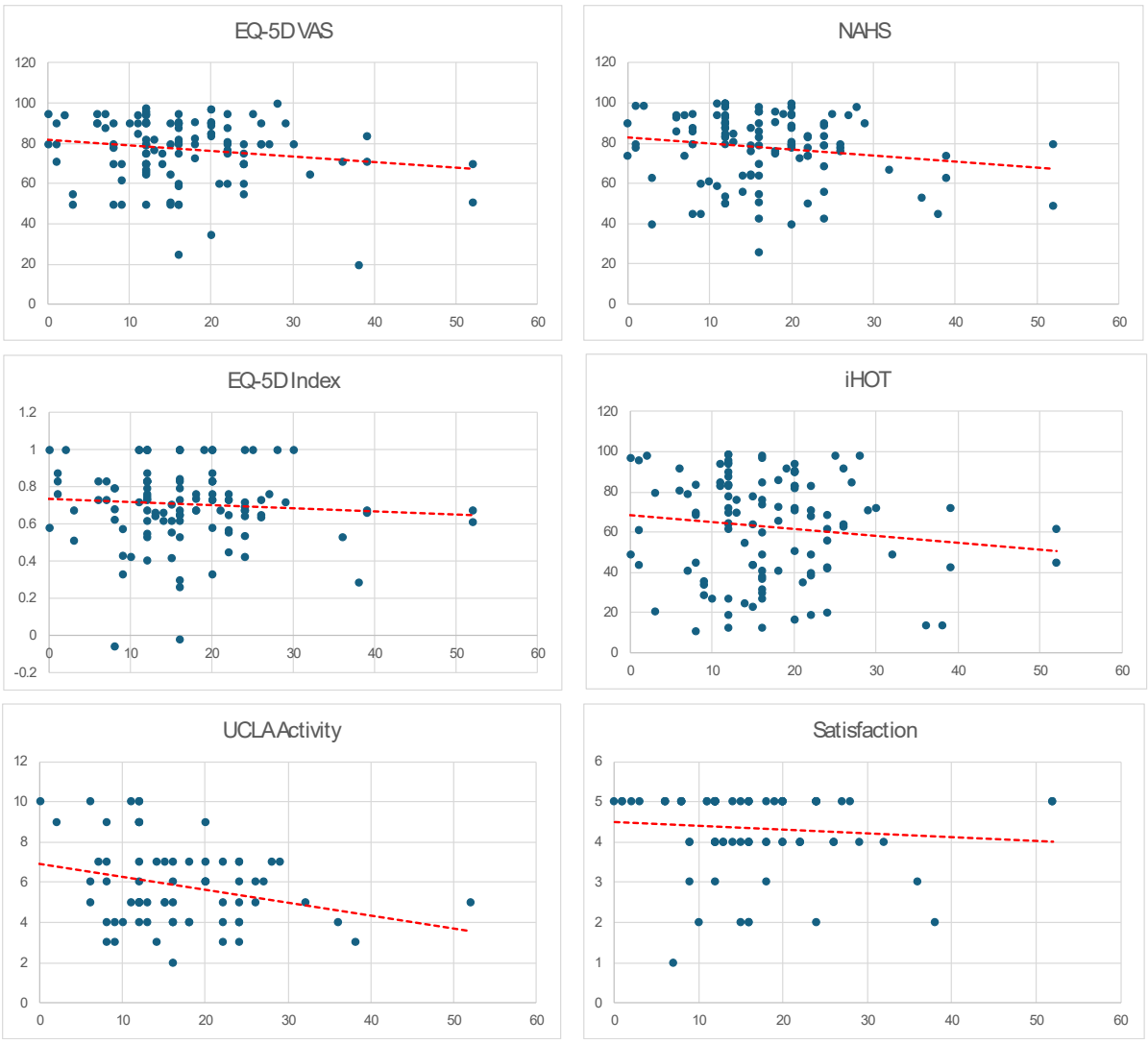

Figure 5. Graphs showing 1-year postoperative EQ-5D VAS (0-100), EQ-5D Index (0-1), UCLA activity (1-10), NAHS (1-100), iHOT-12 (1-100), and satisfaction (1-5) scores plotted against weeks till return with regression lines (least squares method) added. Tukey outlier deletion method used to account for outliers with a multiplier k = 3. EQ-5D, EuroQol 5-Dimension; iHOT-12, International Hip Outcome Tool-12; NAHS, Non-Arthroplasty Hip Score; UCLA, University of California, Los Angeles; VAS, visual analog scale.

work at 1 year. Furthermore, they report that among those returning to work, 4.2% had changed their job owing to hip symptoms. In this study, 93.2% of those working prior to PAO had returned to work, which was higher; however, this may reflect both the questions asked and the voluntary nature of the data collection.

A number of studies have evaluated return to work after total hip arthroplasty (THA) [18-21]. A meta-analysis by Soleimani et al.

Table 2
Overview of Pearson correlation coefficient r of preoperative and 1-y EQ-5D VAS, EQ-5D Index, UCLA activity, NAHS, iHOT-12, and satisfaction scores with weeks till return.

Parameters	Week to return											
	Preoperative				Postoperative 6 mo				Postoperative 6 mo			
	n	r	*P* value	r^2	n	r	*P* value	r^2	n	r	*P* value	r^2
EQ-5D VAS	172	−0.304	.000	0.083	129	−0.236	.007	0.056	114	−0.234	.012	0.055
EQ-5D Index	174	−0.342	.000	0.022	127	−0.317	.000	0.101	113	−0.250	.008	0.063
UCLA activity	178	−0.148	.048	0.020	71	−0.078	.517	0.006	69	−0.262	.029	0.069
NAHS	178	−0.174	.020	0.030	116	−0.155	.096	0.024	111	−0.260	.006	0.067
iHOT	167	0.069	.377	0.005	127	−0.205	.020	0.042	112	−0.220	.020	0.048
Satisfaction	n/a	n/a	n/a	n/a	91	−0.156	.139	0.024	80	−0.015	.895	0.000

EQ-5D, EuroQol 5-Dimension; iHOT-12, International Hip Outcome Tool-12; n, number of data points; NAHS, Non-Arthroplasty Hip Score; n/a, not applicable; r, Pearson correlation coefficient; r^2, r-squared value; UCLA, University of California, Los Angeles; VAS, visual analog scale.

reported that among patients who were working before surgery, 87.9% returned to work after THA. Drobneiwski et al. [20] and Oken et al. [18] reported on return to work after THA in younger patient cohorts more comparable with the age range of PAO patients and found that 94.3% and 95.3% of patients returned to work.

We found that there was no correlation between time taken to return to work and patient age. Fujita et al. similarly found no significant difference in age between patients who returned to work at 1 year and those who had not, which was also the case for BMI in their study [13]. In this study cohort, there was a weak but significant correlation ($r = 0.216$) between time taken to return to work and BMI. We found that both preoperative and postoperative EQ-5D VAS, EQ-5D Index, UCLA activity, NAHS, and iHOT-12 (only postoperatively) negatively correlated with time taken to return to work. This implies that those with poorer preoperative PROMs could expect to take longer to return to work and those who took longer to return had poorer PROMs at 1 year. Al-Hourani et al. reported that postoperative improvement in PROMs did not affect the ability to return to work after THA [21]. However, they did find that in patients who wanted to return to work, a failure to do so was associated with negative preoperative EQ-5D scores. They concluded that "patients with better preoperative PROMs are both more likely to want to return to work following their TJA (total joint arthroplasty) and more likely to actually return".

This study had several limitations. This was a limited sample size, although to the authors' knowledge this is the largest cohort looking at return to work after PAO to date. This is a single-surgeon series using 1 surgical technique. The retrospective nature of this study meant that the data available had limitations. The voluntary nature of the data collection potentially is susceptible to a reporting bias. Also, the completeness of the PROMs data was variable. The data collected on return to work were limited to specific options and information on the respondent's profession/occupation was not collected. Details of the patients' occupation would have been very helpful in giving additional predictive information on return to work. As an example, a number of patients reported a return to work at week 0; it is likely that they are patients with nonmanual jobs and work remotely, not requiring travel to a workplace. Previous studies looking at THA have shown easier return with lighter workloads [18,22], although this was not the case in the only other study reporting on a PAO cohort [13].The majority of respondents in this study were female with much fewer male patients which reflects the population undergoing PAO. This may impact on our results as females have been reported to take longer until returning to work than males [13,18]. The outcomes achieved may be specific to local rehabilitation protocol which may differ to that of other centers. This was a United Kingdom–based study and geographic differences, along with diverse work cultures and welfare systems mean that we would advise caution with generalizing our results to wider cohorts. Furthermore, regional variations in accessibility may also impact the ability to return to work; for instance, if commuting by private vehicle is an option, returning to work may be more manageable. However, if public transportation is the only choice—requiring increased mobility, stair use, and other challenges—resuming work might be delayed. Additionally, patients were instructed to use crutches for 12 weeks (partial weightbearing for and then protected weightbearing as tolerated with crutches for a further 6 weeks) which may have had an impact on the decision to return to work.

Conclusions

Based on the findings of this study, we would advise prospective PAO candidates that the average time taken to return to work after PAO was 16.5 weeks with the majority (85%) having returned by 6 months. It was also noted that poorer preoperative and postoperative PROMs significantly correlated, weakly, with an extended period away from work. To our knowledge, this is the first study to report on the time taken to return to work after PAO and as such, given the limitations, there is a need for further prospective studies to establish a clear picture of return to work after PAO taking into account occupation and workload, among other factors.

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Conflicts of interest

Ajay Malviya received speakers bureau/paid presentations for Smith and Nephew; received research support from Pfizer, NTL Biologica, and Medacta as a Principal Investigator; is in the medical/orthopaedic publications editorial/governing board of JHPS, AJSM, VJSM, and JOO; is the Treasurer of British Hip Society and Trustee of British Orthopaedic Association; and is in the Chair Research Committee of ISHA. Bernard H. van Duren received research support from Medacta International as a Principal Investigator and is in the Bone & Joint 360 Editorial Board. All other authors declare no potential conflicts of interest.

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CRediT authorship contribution statement

Bernard H. van Duren: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Formal analysis. **Yash Pursun:** Writing – review & editing, Project administration. **Kane Teal:** Data curation. **Ajay Malviya:** Writing – review & editing, Supervision, Conceptualization.

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