



## Does depression influence the postoperative result of total hip arthroplasties?

A. PARDO POL, J. AMESTOY RAMOS, A. FONTANELLAS-FES, X. LIZANO-DÍEZ, A.L. GARCIA, F. MARQUES LÓPEZ

*Parc de salut Mar, Orthopaedic Department, Barcelona, Spain.*

Correspondence at: Albert Pardo Pol, Institut Català de Traumatologia i Medicina de l'Esport (ICATME), Hospital Quiron Dexeus de Barcelona. Sabino Arana 19, 08028 Barcelona, Spain, Email: albert.pardo93@gmail.com

**Chronic pain and functional limitations caused by coxarthrosis are important factors in the onset of depression, as there are higher rates of depression in this group of patients than in the general population. Total hip arthroplasty (THA) has been shown to decrease pain and improve function in these patients, which may positively influence the patient's depressive symptoms. The objectives of the study are to evaluate the differences between patients with depression and patients without depression in the immediate postoperative period (pain and hospitalization time) and to evaluate functional outcomes one year after surgery. Therefore, we conducted a prospective cohort study in which all patients with indications for primary total hip arthroplasty during 2018 were included. Preoperatively, patients completed the PHQ-9 questionnaire, and were classified into patients with depression (if preoperative PHQ-9 > or = to 10) and patients without depression (pre PHQ-9 < to 10). During the hospital stay, postoperative pain was assessed by VAS, and the need for analgesic rescue with major opioids. One year after surgery, the PHQ-9 test was retaken, and functional outcomes were assessed. The results showed that both groups were comparable in terms of sex, age, BMI, and ASA. No differences were found in postoperative pain or hospitalization time. There were also no differences between the two groups of patients in functional outcomes one year after surgery. Therefore, we can conclude that patients with a diagnosis of depression do not present worse postoperative pain after THA. In addition, they show a significant improvement in their depressive symptoms one year after surgery.**

**Keywords:** osteoarthritis, depression, hip arthroplasty, postoperative pain, epidemiology, THA.

### INTRODUCTION

An estimated 240 million people live with symptomatic osteoarthritis (OA). Although it can involve almost any joint, we know that the hip and knee are the most frequently affected<sup>1</sup>. In a population-based study in the United States, the prevalence of osteoarthritis in the population over 45 years is almost 10%, with a slightly higher prevalence in women<sup>2</sup>. Being older and/or female, having anatomic abnormalities (e.g., hip dysplasia), as well as obesity are risk factors for hip OA<sup>3,4</sup>. Patients may experience pain, stiffness, and functional limitation leading to an overall loss of quality-of-life and worsening of mental health. Depression or depressive symptoms are more prevalent in patients suffering from OA, with a prevalence close to 30%<sup>5-8</sup>. Depression is the most prevalent mental disorder. It is estimated to affect about 10% of primary care patients<sup>9,10</sup>. Several studies have already described the bidirectional relationship between these two entities in the literature. However, the evidence has so far been so

inconclusive. The 2 entities share many commonalities like pain, functional status, medical comorbidities, fatigue, and sleep problems as well as anthropometric, demographic, and psychosocial characteristics.

In their study, Tarakji et al.<sup>6</sup> concluded that patients saw an improvement in their physical function and pain as well as their depressive symptoms after an arthroplasty. But as seen in some published studies, pathologies such as depression or anxiety may not only negatively condition postoperative pain management along but also the duration of the hospital stay<sup>7,8</sup>.

The main objective of this study was to analyze the influence of depression on pain and the duration of hospitalization after Total hip arthroplasty. The secondary objectives included assessing differences in functional outcomes between groups and monitoring changes in depression status after the surgery.

Our hypothesis was that pain perception in the immediate postoperative period of THA is greater in depressed patients than in non-depressed patients.

## MATERIAL AND METHODS

A prospective single-center cohort study was conducted between January 2018 and December 2018. All surgeries were performed by three senior surgeons from the hip unit of the same university hospital. All patients were followed for a minimum of one year.

Patients with any diagnosis leading to Total hip arthroplasty were included. The exclusion criteria were patients undergoing surgery after having suffered a proximal femoral fracture, patients with any history of previous surgery on this hip, patients undergoing prosthetic revision surgery, and patients younger than 18 years of age.

All surgeries were performed in the same institution. Intradural anesthesia with sedation was performed in most patients, except for some general anesthesia performed at the patient's request or due to medical conditions. Furlong (JRI) and Taperloc (Biomet) prostheses were used. All the patients were treated postoperatively alternating between administering dexketoprofen 25mg intravenous (iv) every 8 hours and paracetamol 1g iv every 8 hours, following our standard protocol. Patients who partially controlled the pain had major opioid rescues (morphine 4mg subcutaneous or tramadol 100mg intravenous). In case of allergy/contraindication to any drug used, metamizole 2g intravenous was used. From the 3rd day after surgery, the analgesic therapy was modified to oral paracetamol 1g every 8 hours and ibuprofen 600mg/8 hours (o). Analgesic rescues were changed to oral tramadol 50mg or subcutaneous morphine 4mg.

The usual rehabilitation protocol during the in-hospital stay consists of getting out of bed on the first

day and sitting in a chair if tolerated. From the second day on, the effort was made to stand and walk around the room with the help of a walker or two crutches. From the third postoperative day onwards, patients walk around the room and do hip flexions and extensions by going up and down small steps.

Patients are usually discharged from the hospital within 4-7 days if they have not had any complications or do not require a social-healthcare center to continue with the recovery process.

Preoperatively, patients completed the PHQ-9 questionnaire<sup>11</sup>, validated for both diagnosis and treatment monitoring of depression<sup>12,13</sup>, and were classified into patients with depression (if preoperative PHQ-9  $\geq$  10) and patients without depression (preoperative PHQ-9 < 10).

During hospital admission, postoperative pain was assessed with the VAS (every 8 hours) and the number of times each patient required opioid rescue. At the one-year follow-up visit, the patients again completed the PHQ-9 questionnaire, and a functional assessment was performed with the Modified Merle d'Aubigné and Postel Method<sup>14</sup>.

The quantitative variables are described with means and standard deviations. The categorical variables are defined with frequencies and percentages. The outcome parameters (maximum VAS, mean VAS, number of rescue opioids, PHQ-9, and hospital stay) of the two groups were compared using the Student's t-Test. The differences between groups were studied with the Fisher exact test and Mann-Whitney test. P values of <0.05 were considered significant. The statistical analysis was done using SPSS 18.0 software package (SPSS Inc., Chicago, IL).

**Table I.** — Age, Sex, ASA and Body Mass Index (BMI)

	PHQ-p test ≤10 (67 patients)	PHQ-p test ≥10 (16 patients)	Total(%)	P Value
Age*	64.01 (13.25)	65.38(10.62)	64.271(12.74)	0.724
Gender				0.784
M	37	8	45 (54.22%)	
F	30	8	38 (45.78%)	
Asa				0.059
I	17	4	21(25.3%)	
II	39	9	48(57.83%)	
III	11	3	14(16.87%)	
BMI*	27.76 (4.64)	27.78 (4.83)	27.77 (4.65)	0.826
*The values are given as the mean, with the standard deviation in parentheses.				

## RESULTS

A total of 102 patients underwent total hip replacement surgery, of whom 83 had the PHQ-9 test at one year after surgery, so 83 patients were included in the study. There were 16 out of the 83 who were diagnosed with depression (19,28%) in the study period, 9 of whom had already had a previous diagnosis of depression and/or were receiving treatment with antidepressants. Both groups were comparable in terms of age, gender, ASA, and BMI (Table I).

No differences in postoperative pain were found between the two groups of patients. There was a mean of 3.88 major opioid rescues among non-depressive patients, and 3.31 among depressive patients (p=0.273). The mean average VAS was 1.26 vs. 2.27, respectively (p=0.457).

We also found no significant differences in hospitalization time, with a mean of 4.59 days for the group of patients without depression and 5.0625 days for patients with depression (p=0.116). The range of improvement at one year in the PHQ-9 questionnaire was 0.164 points in the group of patients without depression, while it was 6.133 points in the group of patients with depression (p<0.001). The mean PMA scores (sum of the three parameters) were 17.2 in patients with depression and 17.6 in patients without depression (Table II).

## DISCUSSION

We were able to prospectively analyze a total of 83 patients who underwent hip arthroplasty. The PHQ-9 test was used to diagnose 16 of them with depression with a preoperative test score of  $\geq 10$ . This represented a 20% prevalence rate of patients with depression in our cohort. This prevalence, higher than that of the general population, agrees with that described in other studies<sup>15-17</sup>. One of the initial problems encountered was determining how to diagnose depression after finding different definitions and many tests used to diagnose it in the literature.

We have opted for the PHQ-9 despite the fact that most works similar to this one have used the mental component score, which is part of the SF-36 questionnaire. The PHQ-9 test is faster, and more intuitive and is also recommended by the National Institute for Health and Care Excellence (NICE) for use in adult patients with chronic physical health problems<sup>18</sup>.

Despite prosthetic surgery being considered one of the most painful surgeries today<sup>18</sup>, no significant differences in postoperative pain assessed with the maximum VAS, minimum VAS, and the number of major opioid rescues required by patients with and without depression were seen. An unexpected result if the results published in the literature of the work of Petrovic et al. is considered<sup>19</sup>. In that work, depression (OR= 7.33) is one of the predictive factors of severe postoperative pain (numerical rating scale  $>$  or = 5), along with being female (OR=4.91), having a type D personality (OR=2.81), severe anxiety (OR=6.01) as well as patients with a high preoperative pain level (OR=2.64). The evidence relative to the length of the hospital stay after Total hip arthroplasty in patients with depression and patients without depression is mixed. Studner et al.<sup>20</sup>, Vakharia et al.<sup>21</sup>, and Schwartz et al.<sup>22</sup> found a more extended hospital stay in patients with depression who underwent hip or knee arthroplasty. On the contrary, Rasouli et al.<sup>23</sup> did not find differences in the duration of the hospital stay. Additionally, Pan et al.<sup>24</sup> found differences that were not clinically relevant (3.42 vs. 3.41 days P<0.001).

With results similar to the study by Tarakji et al.<sup>6</sup>, a clear improvement in depressive symptoms was seen one year after surgery, going from a mean of 15.9 points in the preoperative test to a mean of 9.73 in the test one year after surgery. It is possibly due to the improvement relative to pain and functional outcomes that arthroplasty has made possible in this group of patients.

In contrast to our findings, several studies have found that patients with depression have worse preoperative

Table II. — Results

	PHQ-p test ≤10 (67 patients)	PHQ-p test ≥10 (16 patients)	Total(%)	P Value
Hospitalization Time (days)*	4.59 (1.32)	5.06(1.34)	4.68 (1.33)	0.11
Pain				
VAS*	3.13 (2.46)	3.93 (2.74)	3.29 (2.52)	0.273
Nº Opiod rescues*	3.88 (4.14)	3.31 (3.89)	3.77 (4.08)	0.585
Functional outcomes(PMA) *	17.6 (1.1)	17.2 (0.8)	17.5 (0.87)	0.09
*The values are given as the mean, with the standard deviation in parentheses.				

and postoperative functional outcomes (in both hip and knee OA). However, there were good levels of satisfaction as well as a noteworthy improvement when comparing the preoperative to the postoperative<sup>25,26</sup>. Other authors have observed worse clinical outcomes in patients with signs of depression before the surgery<sup>27-29</sup>. On the other hand, Riddle et al. suggest that there was no difference in functional outcomes between these two groups of patients in a large retrospective series that included almost 4800 TKAs.

One limitation of the present study is that there is a lack of a control group with symptomatic OA pending surgery to assess whether there are changes in the results of the PHQ-9 test one year after being on the waiting list. Another possible weakness of the study is the number of patients included in the study, 83, but with a percentage of patients with depression that is representative of what we see in the clinics. However, it represents a percentage that is very similar to that reported in other studies with patients with symptomatic OA.

As strengths, few prospective studies analyze the influence of depression on the duration of the hospital stay and postoperative pain after hip arthroplasty.

## CONCLUSIONS

Patients with a diagnosis of depression do not have worse postoperative pain control or a more extended hospital stay after THA. This group of patients has reasonable control of their disease after surgery, showing a higher range of improvement in the PHQ-9 test. No significant functional differences exist between the two groups of patients one year after surgery.

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