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The impact of total hip arthroplasty on sexual satisfaction in female patients: a prospective before-and-after cohort study

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Abstract

Purpose Despite the high rate of sexual limitation in female patients with hip osteoarthritis, evidence reporting sexual satisfaction after hip arthroplasty in women is limited. This study aimed to assess the impact of surgery on sexual satisfaction in women who undergo elective total hip arthroplasty (THA). As a secondary objective, we measured the effect of THA on different factors that could be related to sexual limitation and satisfaction.

Methods We designed a prospective before-and-after cohort study in which all consecutive women undergoing THA were screened for inclusion. Patients answered a ten question specifically designed questionnaire before and after surgery. An independent analysis was performed for each question through a McNemar-Bowker test for paired proportions.

Results Fifty-six patients completed the protocol and were available for analysis at the end of the study. Sexual satisfaction increased from 29% before surgery to 93% after the procedure ($p < 0.001$). All questions related to physical limitations demonstrated significant improvement after surgery. In addition, psychological aspects of limitation including fear of pain and injury, or perception of attractiveness, showed significant recovery as well.

Conclusion There is a high rate of patients reporting limitations and disabilities during sexual activities among women with osteoarthritis. THA represents a positive impact on sexual functioning both in its physical and psychological aspects, thus increasing satisfaction rates in female patients. Surgeons should include these elements in the conversation with patients before and after surgery.

Keywords Sexual · Hip · Arthroplasty · Osteoarthritis · Satisfaction · Women

Introduction

Contemporary evolution of total hip arthroplasty (THA) focuses on patient-centered care. The goals are not only restoring function by means of pain reduction, but also giving relevance to all the activities that affect quality of life (sports, work resumption, recreational activities, and social and sexual life). Among these, sexual activity is a relevant aspect which impacts the quality of life at all ages during adulthood.

Early in the 1970s, sexual difficulties were described in two-thirds of patients requiring operative treatment [1]. Currently, sexual disability affects as much as 82% of patients with hip osteoarthritis, and most of these dysfunctions are a consequence of joint pain and stiffness [2–4]. Although these limitations are reported by both male and female patients, their impact is more evident among women [5]. This could be explained by the mechanics of intercourse which involve hip abduction more frequently in the latter group.

The available evidence on sexual satisfaction is scarce as well. Most manuscripts on this subject have focused on prevention of dislocation and return to sexual activity after THA assuming safe positions [5–9]. A few studies have approached this topic demonstrating some improvement in sexual function after THA. However, these reports are either retrospective or focused on specific groups such

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as women with developmental dysplasia of the hip [9, 10]. Some of these studies have used the Arizona Sexual Experience Scale (ASEX) or specifically designed questionnaires. Validated scales such as ASEX are specific on sexual intercourse physiology, regarding arousal, lubrication/erection, and satisfaction with orgasm among others, but do not emphasize the mechanical and physical limitations during sexual activity.

Despite the high frequency of sexual disability and its impact on quality of life, the lack of information on this subject results in low awareness among surgeons who rarely address sexual limitations and dissatisfaction with patients before hip arthroplasty [11–14]. We hypothesize that sexual activity impairment in female patients with osteoarthritis of the hip could be improved after surgery. Consequently, with this prospective before-and-after cohort study, we aimed to determine the impact of hip arthroplasty on female sexual satisfaction.

Materials and methods

A prospective before-and-after cohort study was carried out. After approval by research and ethics committees (approval number CCEI-7888–2017), and informed consent was signed, sexual limitations and satisfaction were assessed prior to surgery and after the rehabilitation was completed.

Inclusion and exclusion criteria

Consecutive female patients undergoing total hip arthroplasty in a fourth-level hospital were screened for the following inclusion criteria: primary or any secondary hip osteoarthritis, patients aged 18 years and older, sexually active (within the last 30 days before enrollment), and willing to participate in the study; exclusion criteria were symptomatic osteoarthritis affecting the contralateral hip, contralateral hip arthroplasty performed less than 6 months before inclusion, cognitive impairment, or inability to answer the follow-up survey. In order to protect privacy, patients were allowed to refuse their enrollment without specifying their sexual life status or willingness to participate.

After screening and enrollment in the research protocol, baseline characteristics were recorded and patients were asked to answer the initial survey. This initial questionnaire was applied personally during in-hospital stay, and the follow-up was completed at six months after surgery via a telephone call. Patients were instructed to answer the questions considering their sexual experience during the last 30 days prior to the survey.

Perioperative protocol

All participants underwent the protocol of our clinical care program for joint replacement surgery. Once surgery was scheduled, patients underwent a pre-operative education session in which they were instructed to resume sexual activity at four weeks after surgery, as well as safe sexual positions to avoid dislocations. As a part of our pre-operative education program, patients were given an information booklet re-enforcing the concepts regarding the resumption of their sexual life.

Surgical procedures were performed by three different surgeons who followed the same surgical protocol; all patients were operated through a posterolateral approach; the decisions on the type of fixation and bearing surfaces were made by the surgeon on an individual basis, depending on patient characteristics. All patients were intended to receive a femoral head size greater than 28 mm, if the acetabular component size allowed to do so. After prosthesis implantation, the posterior capsule and short external rotators were re-attached using a transosseous suture before wound closure, and local injection of an analgesic/anesthetic combination was performed. After surgery, patients stayed at the hospital for two or three nights; during this time, they received physical therapy aimed at independent gait with the aid of a walker and self-care activities. Patients also received education with special focus on the resumption of their daily activities, while preventing hip dislocation. After discharge, patients were prescribed physical therapy at home with the main objective of walking without any external aid at four weeks after surgery.

Sexual function questionnaire

Although there are several scales for the assessment of sexual function, to our knowledge, none of these are suitable to evaluate sexual satisfaction in relation with hip joint dysfunction. Therefore, for the purposes of this study, a ten question survey was designed by the research team focusing on pain, limitation, fear, and satisfaction; one additional question was included in order to identify other causes for sexual dissatisfaction. The questionnaire comprises independent questions and, consequently, it was intended for independent analyses for each item rather than a global scale or a comprehensive score. Eight questions were applied similarly in the pre- and post-operative survey, but two questions had slight changes to accurately assess each specific moment. The 10-item questionnaire is presented in Table 1.

Statistical analysis

Sample size was calculated on the basis of a comparison of proportions for the main outcome (impact of hip arthroplasty on sexual satisfaction). For 95% confidence, considering

Table 1 Sexual function questionnaire (patients instructed to answer according to their experience during the last 30 days)

Question	Moment (preoperative/ postoperative/both)	Possible answers
1. Does your hip allow you to have sexual relations as frequently as you would like to?	Both	Yes/no
2. Have you interrupted your sexual activity because of hip pain?	Both	Yes/no
3. Have you rejected your sexual partner because of pain or fear to feel pain in your hip?	Both	Yes/no
4. Have you rejected your sexual partner because of the fear of suffering an injury in your hip	Both	Yes/no
5 During sexual activity, have you felt limited to assume any specific position because of your hip?	Both	Yes/no
6. a. Do you feel less attractive because of the disease of your hip?	Preoperative	Yes/no
b. Do you feel less attractive because of the scar in your hip?	Postoperative	Yes/no
7. Do you feel pain during or after sexual activity?	Both	Yes/no
8. Do you feel satisfied with your sexual life at this moment?	Both	Yes/no
9. a. Do you expect this surgery to improve the quality of your sexual life?	Preoperative	Yes/no
b. The quality of your sexual life after hip surgery:	Postoperative	Improved/ is the same/ decreased
10. Do you consider that your satisfaction with sexual activity has been affected by any other factor different from your hip joint?	Both	Yes/no

a statistical power of 80% and assuming a minimum frequency of dissatisfaction of 60% [2] and a minimum relevant difference of 50%, the sample size should be 40 patients. Demographic data were described using means, standard deviations, and ranges for continuous variables and proportions for discrete scales. Statistical significance between pre-operative and post-operative proportions for each single question was calculated using a McNemar-Bowker test for paired proportions. Significance level was set at $p < 0.05$.

Results

From August 2017 to January 2020, 322 women underwent total hip arthroplasty in our institution, and during the screening process, 257 women were excluded. Due to our privacy policy, patients were allowed to refuse to participate without explaining the reasons; therefore, it is not possible for us to determine with precision their motivation to decline. After assessment of inclusion and exclusion criteria, 65 patients were enrolled and answered the initial survey. Nine patients were excluded during the course of the study; one patient did not answer the postoperative survey because she had not resumed sexual activity at the time of follow-up; the remaining eight patients did not accept to complete the post-operative survey due to personal unrevealed reasons. A total of 56 patients were included in the final analysis.

The most frequent indication for arthroplasty was osteoarthritis in 52 (92.85%) patients. The average age at the time of surgery was 58.11 years old (range: 26–75), and the mean BMI was 25.67 kg/m^2 (standard deviation: 5.23). Of the patients, 83.93% (47) were classified as ASA II, 14.29% (8) as ASA III, and only one (1.79%) patient as ASA I. The majority of patients (82.14%) received an uncemented prosthesis; the preferred bearing combination was metal on highly cross-linked polyethylene (98.21%), and in 83.93% of women, a femoral head size greater than 28 mm was implanted (32 or 36 mm) (Table 2).

Statistically significant differences were found between all pre- and post-operative questions. A significant proportion of patients (96.43%) expected the procedure to improve their sexual life, and after surgery, 69.64% admitted some improvement in the quality of their sexual activity. However, sexual satisfaction rate increased from 28.57% before surgery to 92.86% ($p < 0.001$) during the post-operative survey.

Questions number 2, 3, and 7 which addressed the occurrence of pain around sexual activity showed significant improvement after surgery. Remarkably, 89.29% of women reported pain during or after intercourse before surgery, while only 8.93% presented this symptom during the postoperative survey ($p < 0.0001$). The remaining questions regarding pain exhibited similar results (Table 3).

Limitations for sexual activity were assessed through questions number 1 and 5. Both results were highly positive after surgery when compared to the prior status; only 33.93% of women were able to sustain sexual relations as frequently as desired before surgery, whereas this proportion increased to 94.64% after the procedure ($p < 0.0001$). The ability to assume different positions during intercourse also demonstrated a significant improvement rising from 8.93 to 64.29% ($p < 0.0001$).

Questions number 4 and 6 referred specifically to the psychological impact of the disease and surgery. The perception of attractiveness was diminished in the pre-operative survey due to the hip disease in 57.14% of patients while only 19.64% of them felt less attractive because of the surgical

Table 2 Demographic variables of the study group

Variable	N (total: 56)	%
Age (years)		
Mean	58.11	
Range	26–75	
BMI (kg/m^2)		
Mean	25.87	
Sd	+/−5.23	
ASA		
I	1	1.79
II	47	83.93
III	8	14.29
IV	0	0
Laterality		
Right	31	55.36
Left	25	44.64
Diagnosis		
Osteoarthritis	52	92.85
Sequelae of dysplasia	4	7.17
Femoral head size (mm)		
22	1*	1.79
28	8	14.29
32	42	75.00
36	5	8.93
Bearing surface		
Metal on highly cross-linked polyethylene	55	98.21
Ceramic on highly cross-linked polyethylene	1	1.79
Fixation		
Uncemented	46	82.14
Hybrid	10	17.86

*22 mm head used in a dual-mobility acetabular component

scar after the procedure ($p < 0.0001$). The fear to suffer an injury also decreased from 39.29 to 8.93% ($p < 0.0001$).

The final question was intended to determine whether it was another reason associated with sexual life dissatisfaction different from hip disease; 21 (37.50%) associated their unsatisfied sexual activity with another reason besides their hip function before hip surgery, and after surgery, 9 (16.07%; $p = 0.005$) patients considered another reason for their affected sexual activity. Among 35 patients who considered that their sexual life was affected only by their hip disease, 34 (97.14%) reported being sexually satisfied at 6 months after surgery. See all results in Table 3.

When subgroup analysis was done, we found that regardless of age (< 55 years or > 55 years) and BMI (< 25 kg/m^2 or > 25 kg/m^2), all patients had a positive improvement in their sexual satisfaction after surgery. No data could be analyzed regarding ASA classification as there was only one patient in ASA I group and eight patients in the ASA III group.

Discussion

Through this study, we approached sexual functioning and some of its possible determinants in patients with hip osteoarthritis who undergo hip replacement surgery. Our results revealed that most of the women with hip osteoarthritis present sexual limitations or dissatisfaction before surgery, and THA represents a positive impact in this aspect. By performing this prospective cohort study, we demonstrated a statistically significant improvement in all questions regarding pain, limitation, psychological aspects, and satisfaction during sexual activity.

The current literature addressing the impact of total hip replacement on sexual activity satisfaction is limited. The most frequent outcomes in available studies are functional rehabilitation and return to daily activities by means of reduction in pain; however, sexual activity and satisfaction are not among the principal subjects of inquiry. To our knowledge, this is the first time that the impact of hip surgery on sexual satisfaction in women was measured in such a high level of detail. Frequency of sexual encounters, ability to assume different positions during intercourse, pain, fear of injuries, and perception of attractiveness have been addressed in this study.

Although, it has been described in the literature that up to 82% of patients with osteoarthritis have difficulties during sexual activity due to pain and stiffness in the hip [2], this important aspect assessing the quality of life is poorly explored in the medical literature. Until now, studies have been aimed to determine sexual function before and after hip replacement. These studies report on the difficulties during sexual activity, postoperative improvements, and the safety of some positions during sexual intercourse. However, no previous study has quantified in detail the amount of improvement in sexual satisfaction after hip joint replacement [5, 6].

In our study, pre-operative perception of limitation in both frequency and the ability to assume different positions during intercourse were 66% and 91% respectively. These findings are consistent with previous reports such as the one by Lavernia et al. [2], who reported 81% of overall limitation in patients with hip osteoarthritis. Similar results were described by Yoon et al. [9] and Wall et al. [11] who respectively reported 53% and 71% of patients complaining of limitations before surgery. These high rates of difficulties and especially our elevated frequency in limitation to assume different positions could be the result of the extreme range of motion required for some sexual positions for women, as reported by Charbonnier et al. [7].

Pain or fear to feel pain was a very frequent feature before surgery; approximately 89% of women reported pain during or after intercourse whereas 66% had to interrupt sexual activity

Table 3 Results of sexual satisfaction and associated factors

Question	Pre-operative N (%)	Post-operative N (%)	P-value McNemar test
1. Does your hip allow you to have sexual relations as frequently as you would like to?	Yes 19 (33.93) No 37 (66.07)	Yes 53 (94.64) No 3 (5.36)	< 0.0001
2. Have you interrupted your sexual activity because of hip pain?	Yes 37 (66.07) No 19 (33.93)	Yes 4 (7.14) No 52 (92.86)	< 0.0001
3. Have you rejected your sexual partner because of pain or fear to feel pain in your hip?	Yes 33 (58.93) No 23 (42.07)	Yes 5 (8.93) No 51 (91.07)	< 0.0001
4. Have you rejected your sexual partner because of the fear of suffering an injury in your hip	Yes 22 (39.29) No 34 (60.71)	Yes 5 (8.93) No 51 (91.07)	< 0.0001
5. During sexual activity, have you felt limited to assume any specific position because of your hip?	Yes 51 (91.07) No 5 (8.93)	Yes 20 (35.71) No 36 (64.29)	< 0.0001
6. a. Do you feel less attractive because of the disease of your hip? (preoperative) b. Do you feel less attractive because of the scar in your hip? (postoperative)	Yes 32 (57.14) No 24 (42.86)	Yes 11 (19.64) No 45 (80.36)	< 0.0001
7. Do you feel pain during or after sexual activity?	Yes 50 (89.29) No 6 (10.71)	Yes 5 (8.93) No 51 (91.07)	< 0.0001
8. Do you feel satisfied with your sexual life at this moment?	Yes 16 (28.57) No 40 (71.43)	Yes 52 (92.86) No 4 (7.14)	< 0.0001
9. a. Do you expect this surgery to improve the quality of your sexual life? (preoperative) b. The quality of your sexual life after hip surgery: (postoperative)	Yes 54 (96.43) No 2 (3.57)	Improved 39 (69.64) Is the same 16 (28.57) Decreased 1 (1.79)	-
10. Do you consider that your satisfaction with sexual activity has been affected by any other factor different from your hip joint?	Yes 21 (37.50) No 35 (62.50)	Yes 9 (16.07) No 47 (83.93)	0.005

because of pain and 59% had rejected their partner due to this reason. Laffosse et al. [15] already described pain as the main cause for sexual difficulties in patients with chronic hip conditions, and Nilsing et al. [3], in a recent qualitative study, obtained similar results. In addition to pain and mechanical limitations, two psychological factors were identified in our study; fear of suffering an injury was reported by 39% of women as a reason for rejecting their sexual partner, and 57% informed a diminished perception of attractiveness because of hip disease. Certainly, these two newly introduced elements should enhance pre-operative conversation with patients.

One of our most interesting findings is a very low rate of sexual satisfaction before surgery; only 29% of women reported feeling satisfied with their sexual life at that moment. This finding correlates with the study by Guclu et al. [10] which reported high levels of sexual dysfunction in patients scheduled for total hip surgery for developmental hip dysplasia sequelae; these authors reported 100% of patients with weak satisfaction with orgasm before surgery, as measured by the Arizona Sexual Experience Scale (ASEX). This correlation might indicate that sexual limitation in patients with hip osteoarthritis does not depend on the cause of hip disease.

Total hip arthroplasty exhibited a highly positive impact on sexual function in the current study. We also found significant differences for all aspects when pre-operative and post-operative perceptions were compared; remarkable post-operative findings include the ability to sustain sexual relations as frequently as desired (95%), the occurrence of pain during intercourse (9%), and the reported overall satisfaction which raised from 29% before surgery to 93% 6 months after surgery. Similarly, Wang et al. [16] reported increased sexual satisfaction rates in men after THA for osteonecrosis of the femoral head. Nunley et al. [17] in a retrospective study reported an increase in frequency and quality of sexual life due to improvement in pain and range of motion; however, their sample comprised a low proportion of women which could underestimate the impact of surgery in this group. Meyer et al. [18] also described an improvement in the quality of sexual life after surgery in a retrospective series of 60 patients; they reported a 33% increase in the quality of sexual relations and a 25% increase in the frequency of sexual encounters. These findings strongly correlate with those in our study. Consistently, Lafosse et al. [15] reported increased coital frequency in 30% of female patients in a retrospective study. In another retrospective study, Zahi et al. [4] found an increased frequency of intercourse in 30% of women after THA. Nunley et al. [17] also in a retrospective study reported more frequent sexual activity in 43.5% of a group of male and female patients due to less pain and better mobility. Our results demonstrated a greater impact than the abovementioned reports; the prospective nature of this study could explain these findings since it was able to measure pre-operative limitations in a more precise manner. We also hypothesize that the selection of our sample could have influenced the baseline characteristics of our patients by yielding a more active and younger population which might magnify these results. However, this hypothesis is not supported by existing evidence.

Even though this study was not intended to analyze differences between sub-groups, it seems that demographic characteristics such as age or BMI do not have a major impact on the perceived sexual satisfaction before or after THA in women. This question will be a matter of further research.

In summary, the current study provides a new perspective by focusing on sexual satisfaction in female patients as the main outcome and by demonstrating a high impact of THA for this outcome and its possible determinants.

Strengths and limitations

The prospective nature of this study and the large magnitude and consistency of the results are its most important strengths. Even in the scenario of a limited sample size, we found significant differences in most of the questions which support the high impact of hip surgery in these patients. In addition, a detailed assessment including mechanical and psychological limitations, and a controlling question for potential dissatisfaction factors, provides strong information regarding the impact of disease and surgery on sexual function. Among the limitations, one of our inclusion criteria was the willingness to participate; this condition yielded a selected sample which is younger than the average age at the time of surgery and, consequently, might be more interested in sexual activity than the general population. This condition could have magnified our results regarding limitations; however, the fact that they are highly active women makes the sample ideal to assess the impact of hip arthroplasty. Our ten question survey has not had a previous validation and therefore it raises concerns on the reliability of this measurement tool. The large consistency of the results among the questions outweighs this lack of validation; furthermore, the fact that our statistical analysis compared each patient with herself in two different moments adds control to this potential limitation. In addition, the fact that our measurement tool is not able to determine the amount of impact of each factor on the sexual functioning makes it necessary to implement further research to improve the understanding of these associations. Another potential shortcoming is the high proportion of women classified as ASA II (83.93%) which makes it difficult to extrapolate our results to other groups.

Conclusions

In this study, we found a high rate of patients reporting limitations and dissatisfaction due to hip disease. Furthermore, total hip arthroplasty was demonstrated to significantly improve these limitations and sexual satisfaction in female patients. These results must enhance the conversation between surgeons and patients before and after surgery and should also support the inclusion of sexual limitation as an indication for total hip arthroplasty in patients who suffer severe hip disease.

Availability of data and material Data and materials are available as per request.

Code availability Not applicable.

Declarations

Ethical approval The Local Institutional Review Board (IRB) has reviewed and approved the development and publication of this research. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

Conflict of interest Guillermo Bonilla MD has participated as a paid speaker for Boehringer-Ingelheim, Pfizer, Sanofi, and DePuy Synthes (Orthopedics); has participated as a paid consultant for DePuy Synthes (Orthopedics) and Stryker; and has received other financial support for Institutional research from DePuy and Grunenthal, outside this work. Maria A. Asmar MD declares that she has no conflict of interest. Cristina Suarez MD declares that she has no conflict of interest. Valeria Barrios MD declares that she has no conflict of interest. Maria A. Suarez MD declares that she has no conflict of interest. Adolfo Llinás MD has received royalties from Innomed, Novamed, and 3 M; has participated as a paid speaker for Zimmer, Shire, Novonordisk, Novartis, Johnson & Johnson, Bayer, Medtronic, and Procaps; and has participated as a paid consultant for Zimmer, Bayer, and Medtronic, outside this work.

References

1. Currey HL (1970) Osteoarthrosis of the hip joint and sexual activity. Ann Rheum Dis 29:488–493. https://doi.org/10.1136/ard.29.5.488
2. Lavernia CJ, Villa JM (2016) High rates of interest in sex in patients with hip arthritis. Clin Orthop Relat Res 474:293–299. https://doi.org/10.1007/s11999-015-4421-8
3. Nilsing Strid E, Ekelius-Hamping M (2020) Experiences of sexual health in persons with hip and knee osteoarthritis: a qualitative study. BMC Musculoskelet Disord 21.https://doi.org/10.1186/s12891-020-03596-5
4. Zahi S, Mahir L, Tounsi J et al (2017) Sexual activity before and after total hip arthroplasty. Int Phys Med Rehabil J 1:55–59. https://doi.org/10.15406/ipmrj.2017.01.00014
5. Neonakis EM, Perna F, Traina F et al (2020) Total hip arthroplasty and sexual activity: a systematic review. Musculoskelet Surg 104:17–24. https://doi.org/10.1007/s12306-020-00645-z
6. Issa K, Pierce TP, Brothers A et al (2017) Sexual activity after total hip arthroplasty: a systematic review of the outcomes. J Arthroplasty 32:336–340. https://doi.org/10.1016/j.arth.2016.07.052
7. Charbonnier C, Chagué S, Ponzoni M et al (2014) Sexual activity after total hip arthroplasty: a motion capture study. J Arthroplasty 29:640–647. https://doi.org/10.1016/j.arth.2013.07.043
8. Meiri R, Rosenbaum TY, Kalichman L (2014) Sexual function before and after total hip replacement: narrative review. Sex Med 2:159–167. https://doi.org/10.1002/sm2.35
9. Yoon BH, Lee KH, Noh S et al (2013) Sexual activity after total hip replacement in Korean patients: how they do, what they want, and how to improve. Clin Orthop Surg 5:269–277. https://doi.org/10.4055/cios.2013.5.4.269
10. Guclu B, Koken M (2020) Does THA affect sexual dysfunction in female patients with DDH? J Arthroplasty 35:1627–1635. https://doi.org/10.1016/j.arth.2020.01.049
11. Wall PDH, Hossain M, Ganapathi M, Andrew JG (2011) Sexual activity and total hip arthroplasty: a survey of patients' and surgeons' perspectives. HIP Int 21:199–205. https://doi.org/10.5301/HIP.2011.6518
12. Harmsen RTE, Haanstra TM, Sierevelt IN, et al (2016) Does total hip replacement affect sexual quality of life? BMC Musculoskelet Disord 17.https://doi.org/10.1186/s12891-016-1048-1
13. Ugwuoke A, Syed F, Hefny M et al (2020) Discussing sexual activities after total hip arthroplasty. J Orthop Sci 25:595–598. https://doi.org/10.1016/j.jos.2019.06.010
14. Dahm DL, Jacofsky D, Lewallen DG (2004) Surgeons rarely discuss sexual activity with patients after THA: a survey of members of the American Association of Hip and Knee Surgeons. Clin Orthop Relat Res 237–240.https://doi.org/10.1097/01.blo.0000137555.74475.a5
15. Laffosse J-M, Tricoire J-L, Chiron P, Puget J (2008) Sexual function before and after primary total hip arthroplasty. Jt Bone Spine 75:189–194. https://doi.org/10.1016/j.jbspin.2007.05.006
16. Wang BL, Yue DB, Liu BX, Guo WS (2014) Quality of sexual life after total hip arthroplasty in male patients with osteonecrosis of femoral head. Eur J Orthop Surg Traumatol 24:1217–1221. https://doi.org/10.1007/s00590-014-1432-1
17. Nunley RM, Nam D, Bashyal RK et al (2015) The impact of total joint arthroplasty on sexual function in young, active patients. J Arthroplasty 30:335–340. https://doi.org/10.1016/j.arth.2014.09.029
18. Meyer H, Stern R, Fusetti C et al (2003) Sexual quality-of-life after hip surgery. J Orthop Traumatol 4:21–25. https://doi.org/10.1007/s101950300003