Late total hip arthroplasty dislocation due to yoga

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ABSTRACT

Yoga has become a popular form of exercise, recreation, and meditation for adults in the United States. As the popularity of both yoga and the incidence of hip replacements have both coincidentally increased over the last 2 decades, we imagine that the number of total hip replacement patients partaking in the practice of yoga has also increased. There are no clear guidelines available for yoga practice following hip replacement. To date, there have been no published reports of prosthetic hip dislocations during yoga. We present 2 cases of late total hip dislocations during yoga and provide a review of the available orthopaedic literature and our recommendations on patient restrictions and education with respect to practicing yoga after a hip replacement.

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Case report

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Introduction

In 2016, there were an estimated 36 million yoga practitioners in the United States, a 50% growth in just 4 years [1]. Although this rise in popularity is seen throughout the United States and for all age groups, 70% of yoga practitioners are women and 38% of practitioners are over 50 years of age [1]. Part of this booming popularity seems to stem from the prevailing sentiment that yoga is “good for you” with 75% of respondents either choosing “strongly agree” or “somewhat agree” to that statement, compared with only 7% who chose “strongly disagree” or “somewhat disagree.” This is also seen in the medical literature, with recent studies aiming to show some health benefits for the practice, including decrease in pain and disability [2] or improvement in balance or gait confidence [3]. There now even exists a PubMed-indexed, peer-reviewed, annual journal entitled the International Journal of Yoga Therapy, devoted to publication on any aspect of yoga therapy and edited by the International Association of Yoga Therapists.

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dislocation and on activity precautions after THA and discuss how these precautions may apply to the practice of yoga.

**Case histories**

**Case 1**

A 43-year-old woman who had an asymptomatic hip, 17 years after index posterior THA, was in a yoga class where she was flexing her hip while laying supine on the floor, in a transition into “shoulder stand” position (Fig. 1) and experienced a sudden dislocation. She was taken to the nearest emergency department where a posterior dislocation was diagnosed and a closed reduction was performed (Fig. 2). In the 2 weeks since the event, she has not experienced another dislocation, and although initially sore, she has been ambulating well without assistive devices and back to her baseline low-impact exercise activities. Until this event, she had no prior problems with the hip, no pain, and followed no specific precautions. She led a very active lifestyle and practiced yoga several times weekly but was advised to avoid yoga and extremes of hip rotation following this dislocation event.

Her hip history was significant for early diagnosis of developmental hip dysplasia managed with serial casting as a child, followed by a Salter osteotomy at age 19 years. This was complicated by a nonunion and required return to the operating room 6 months later for revision with additional bone grafting. She then underwent her primary THA 8 years later at a different center, performed through a posterior approach: Duraloc 52-mm cup with Marathon Liner 10-degree offset; S-ROM step 16D small ZTT sleeve, 16 × 11 × 150, standard neck, with a 28 + 6 head (Depuy Synthes, Warsaw, IN).

On examination, she had full range of motion of the hip, without substantial pain, apprehension, or instability. She had radiographs of the hip showing adequate acetabular component position, measuring 42° of abduction and 21° of anteversion and no evidence of lysis or wear (Fig. 2). The patient was counseled towards observational management. She was instructed to avoid extreme range of motions. She was advised that deep flexion of the hip could again dislocate her hip. At 3-month follow-up she had resumed vigorous low-impact aerobic activity in the gym. At 6-month follow-up, she was abstaining from yoga and pilates as instructed and reported no further dislocation events.

**Case 2**

A 90-year-old woman with bilateral total hip replacements, after index simultaneous bilateral direct anterior approach THAs, was practicing yoga when she experienced a hip dislocation. At that time, she was going through a “forward fold,” (Fig. 3) flexing the hip in a standing position with her knees slightly flexed and felt a sudden clunk to the right hip, losing her footing and falling. She was taken to the emergency department where a posterior right hip dislocation was diagnosed and managed with a closed reduction (Fig. 4). No other injuries were identified and she was discharged to home. The patient reported performing a series of yoga positions every morning on waking up, on her own, as part of her daily routine but had never before had a problem with her hips during these movements.

The patient’s surgical history was significant for having undergone simultaneous bilateral hip replacements for osteoarthritis 9 years before presentation by a high-volume anterior approach surgeon. Both of her hips were performed via the direct anterior approach, using a Smith & Nephew 54-mm reflection shell and a neutral liner, Memphis, TN; a 36-mm, cobalt-chrome, 6 head; and a 11 × 107.5 mm porous-coated Biomet Taperloc Microplasty femoral component (Zimmer Biomet, Warsaw, IN). The following 9 years after the procedure were completely unremarkable. She reported no hip pain, had resumed an active lifestyle, ambulated without assistive devices, and performed yoga exercises on her own daily.

Because the patient was asymptomatic before this dislocation with a well-positioned acetabular component, measuring 39° of abduction and 18° of anteversion, she was also instructed on limiting extreme hip range of motion to avoid another dislocation. During the next 4 months, however, she did not adhere to the hip dislocation precautions, and then dislocated the hip twice more while putting on socks and tying her shoes, respectively. She was then indicated and initially booked for a surgical revision of the total hip with consideration of a constrained liner. However, after further consideration, the patient elected to continue nonoperative treatment utilizing motion restriction, activity modification, and physical therapy for the hip. At 6-month follow-up, she reported no further dislocation events.

**Discussion**

We present 2 unusual cases of late THA dislocation that occurred during yoga. These cases highlight the potential risk of yoga for patients with a THA. Both patients experienced late hip dislocations following otherwise asymptomatic and successful THA during relatively common yoga movements. The 2 cases presented here were performed via 2 different surgical approaches, highlighting the difficulty in prescribing patients long-term movement restrictions, or hip precautions, beyond the initial 6-8 weeks following the index hip replacement procedure. This is especially challenging when evaluating the wide range of movements and positions that are included in the routine practice of yoga, which stresses general movement and flexibility.

Dislocation after THA is a frustrating complication, with studies citing a dislocation rate between 1% and 3% [10–12] depending on the surgical approach. A recent series of 955 direct anterior approach THAs performed without a traction table in expert hands.
reported a dislocation rate of just 0.31% [13]. Most dislocations happen within the first 3 months of surgery, but there remains a persistent risk for late dislocation more than 2 years following index THA, with an aggregate risk of about 1% [10,14]. Historically, patient-related risk factors for dislocation have included neuromuscular and cognitive disorders, female gender, THA performed for hip fracture, and a history of prior surgery to the hip [15]. Patient noncompliance is also frequently cited as a possible reason for dislocation, although not clearly defined or quantified [15]. Surgically, a posterior approach has been a potential risk factor for postoperative dislocation [16], although this increase in risk seems to have been more recently diminished by reconstruction of the posterior capsule and use of a larger head size [17]. Component positioning also shows an effect on dislocation risks, with loss of offset of a clear risk factor for dislocation [18] along with failure to replicate cup abduction and anteversion [15].

There are several consensus publications and expert opinions on sporting activities after THA. Most of the focus of these guidelines centers around the level of impact of the activity, to minimize component fatigue and liner wear and not necessarily on the specific risk of dislocation during the activity. For example, in 2004, Clifford and Mallon organized popular sports into different levels of impact as they perceived it: low, potentially low, intermediate, and high [8]. Then, based on that subjective level of impact, they stated whether each type of joint replacement doing that activity is accepted, possible, or not recommended. Yoga was not included in their guideline, but they did include “calisthenics” and judged this activity to be of low impact and possible for patients with shoulder, knee, or hip arthroplasty [8].

More recent consensus publications have utilized a similar recommendation schema for sporting activity recommendations following total joint arthroplasty [7,19]. In 1999 and 2005, the Hip Society and Knee Society surveyed their membership on whether they allowed a certain activity, allowed with experience, or did not allow a certain activity. Interestingly, although yoga was not initially included on the 1999 survey, it was subsequently included on the 2005 survey [19]. Most respondents for both the Hip Society and Knee Society answered that, regarding yoga, they “allowed

Figure 2. Radiographs of the pelvis and right hip showing right hip prosthetic dislocation and subsequent reduction of case 1.

Figure 3. Achieving a forward fold usually begins with the patient standing and subsequently bending at the hips, with arms stretching towards the floor.
with experience.” Response percentages were not published. In 2007, Klein et al. [7] published their survey of both the American Academy of Hip and Knee Surgeons and the Hip Society on return to activity after total hip replacement. Yoga was not included in this survey, although pilates was. For pilates, 58% of surgeons who responded answered that they allow the activity for their THA patients and 24% allow with experience. The other 18% of respondents were evenly split between not allowing and undecided. No survey to date has focused on yoga practice to specifically identify what positions hip surgeons might deem to be “safe.”

Yoga is a low-impact activity, similar to calisthenics, pilates, and stationary cycling. Yoga promotes careful positioning and flexibility. The risk of dislocation increases at extreme range of motion. A project presented at the 2017 American Academy of Orthopaedic Surgeons by Wilson and Mears shows the average positioning of the hip in a series of common yoga poses [9]. The authors used infrared motion analysis cameras on experienced yoga practitioners to measure each practitioner’s hip position in each pose. They found that that the average hip position infringed upon anterior hip precautions (10° of hyperextension) in warrior 1 and crescent lunge and infringed posterior precautions (90° of flexion) in pigeon and seated twist. Importantly, some flexible practitioners also infringed upon precautions in several of the other poses. This work suggests that many yoga positions may pose a risk for violating hip precautions in the early phase of recovery and pose a direct risk of hip dislocation during this recovery period. The precise risk of late dislocation is not clearly defined by this work, and no patient outcomes were described, as the study focused on native hip ROM during yoga.

Summary

As our cases demonstrate, the risk for a late hip dislocation during yoga is real. Patients should be educated accordingly. The incidence of yoga practitioners with a total hip replacement is unknown, as is the true rate of dislocation related to yoga practice. Although not published, we suspect that unreported dislocations that occurred during yoga are likely more frequent than the 2 cases presented here.

If patients elect to continue their yoga practice after undergoing a total hip replacement, they should be cautioned that a number of yoga positions may put the hip under stress and into a position outside of a “safe range” that could lead to a hip dislocation, as shown by Wilson et al. [9]. In addition, this risk may not cease with time, as shown with the 2 late dislocations presented here.

References

[1] Ipsos Public Affairs, Yoga Journal, Yoga Alliance. 2016 yoga in America study. Yoga J 2016. http://media.yogajournal.com/wp-content/uploads/2016-Yoga-in-America-Study-Comprehensive-RESULTS.pdf.
[2] Wieland LS, Skoetz N, Pilkington K, Vempati R, D’Adamo CR, Berman BM. Yoga treatment for chronic nonspecific low back pain. Cochrane Database Syst Rev 2017;1:CD010671.
[3] Kendrick D, Kumar A, Carpenter H, et al. Exercise for reducing fear of falling in older people living in the community. Cochrane Database Syst Rev 2014;(11):CD009548.
[4] Maradit Kremers H, Larson DR, Crowson CS, et al. Prevalence of total hip and knee replacement in the United States. J Bone Joint Surg Am 2015;97(17):1385.
[5] Ravi B, Croxford R, Reichmann WM, Losina E, Katz JN, Hawker GA. The changing demographics of total joint arthroplasty recipients in the United States and Ontario from 2001 to 2007. Best Pract Res Clin Rheumatol 2012;26(5):637.
[6] Krizimer M. Sports activities after total hip arthroplasty. EFORT Open Rev 2017;2(5):189.
[7] Klein GR, Levine BR, Hozack WJ, et al. Return to athletic activity after total hip arthroplasty. Consensus guidelines based on a survey of the Hip Society and American Association of Hip and Knee Surgeons. J Arthroplasty 2007;22(2):171.
[8] Clifford PE, Mallon WJ. Sports after total joint replacement. Clin Sports Med 2005;24(1):175.
[9] Wilson M, Mears S. Yoga and hip precautions after arthroplasty. American Academy of Orthopaedic Surgeons, San Diego, 2017.
[10] von Knoch M, Berry DJ, Harmsen WS, Morrey BF. Late dislocation after total hip arthroplasty. J Bone Joint Surg Am 1949;84-A(11):2002.
[11] Dargel J, Oppermann J, Bruggemann G-P, Eysel P. Dislocation following total hip replacement. Dtsch Arztebl Int 2014;111(51-52):884.
[12] Meek RM, Allan DB, McPhillips G, Kerr L, Howie CR. Epidemiology of dislocation after total hip arthroplasty. Clin Orthop Relat Res 2006;447:9.
[13] Soderquist MC, Scully R, Unger AS. Aetabular placement accuracy with the direct anterior approach freehand technique. J Arthroplasty 2017;32(9):2748.
[14] Meek RMD, Allan DB, McPhillips G, Kerr L, Howie CR. From the Scottish Arthroplasty Project. Late dislocation after total hip arthroplasty. Clin Med Res 2008;6(1):17.
[15] Soong M, Rubash HE, Macaulay W. Dislocation after total hip arthroplasty. J Am Acad Orthop Surg 2004;12(5):314.
[16] Woo RY, Morrey BF. Dislocations after total hip arthroplasty. J Bone Joint Surg Am 1982;64(9):1295.
[17] Pellicci PM, Rostrom M, Poss R. Posterior approach to total hip replacement using enhanced posterior soft tissue repair. Clin Orthop Relat Res 1998;355:224.
[18] Fackler CD, Poss R. Dislocation in total hip arthroplasties. Clin Orthop Relat Res 1980;169(151).
[19] Healy WL, Sharma S, Schwartz B, Iorio R. Athletic activity after total joint arthroplasty. J Bone Joint Surg Am 2008;90(10):2245.