

# Are Hip Precautions Necessary Post Total Hip Arthroplasty? A Systematic Review

Geriatric Orthopaedic Surgery  
& Rehabilitation  
2015, Vol. 6(3) 230-235  
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DOI: 10.1177/2151458515584640  
gos.sagepub.com



Lara Barnsley, BApSci (Occupational Therapy) Hons, BMBS<sup>1</sup>,  
Leslie Barnsley, BMed (hons), Grad Clin Epi, PhD, FRACP, FAFRM (RACP)<sup>2</sup>,  
and Richard Page, BmedSci, MBBS, FRACS, FAOrthA<sup>1</sup>

## Abstract

**Purpose:** Total hip arthroplasty (THA) is a common and effective treatment of hip osteoarthritis. Activity restrictions known as hip precautions are widely practiced in rehabilitation post THA, aiming to foster healing and prevent hip dislocation. The focused clinical question was: Does the application of hip precautions in patients post THA versus unrestricted activities significantly decrease the risk of prosthetic dislocation? **Methods:** A comprehensive literature search was conducted for randomized controlled trials or cohort studies with a comparative group and minimum 6 months follow-up, with dislocation as an end point. Retrieved titles were assessed independently by 2 reviewers for inclusion and underwent standardized data extraction. **Results:** Title search produced 80 potentially relevant articles. Five articles were retrieved for data extraction of which 2 met a prior eligibility criteria. No eligible studies were found that concerned posterior approaches to hip arthroplasty, so the results of this review concern only anterolateral approaches. Neither included study showed any benefit of hip precautions in preventing dislocation. **Conclusion:** The rate of dislocation after anterolateral THA is low and is not improved by hip precautions. Hip precautions are associated with a slower return to activities, significant expense, and decreased patient satisfaction. Existing studies risk being compromised by a type II error, but a definitive study may be prohibitively large and expensive.

## Keywords

hip dislocation, postoperative complication, hip replacement

## Introduction

Osteoarthritis (OA) is the most common type of arthritis affecting 9.6% of men and 18.0% of women aged older than 60 years worldwide.<sup>1</sup> The main symptoms are pain, stiffness, and limited movement of the affected joint.<sup>2</sup> Osteoarthritis is a major cause of disability, psychological distress, and poor quality of life. Management objectives include reducing pain, improving quality of life, preserving or improving joint function, and maintaining independence.<sup>3</sup> Involvement of the knee and hip is common, leading to reduced mobility, pain, and loss of amenity. Joint replacement surgery is generally indicated when a person no longer responds to conservative management and where the symptoms are so severe as to be unacceptable. Total hip arthroplasty (THA) is a commonly performed major surgical procedure for the treatment of hip OA that is a widely recognized effective and efficient intervention.<sup>4</sup> In 2012, the Australian Orthopaedic Association National Joint Replacement Registry identified over 38 200 hip replacement surgeries were performed in Australian hospitals.<sup>5</sup> Since 1993 to 1994, the number of total hip replacements per 100 000 persons has increased by 92%, reflecting the success as an intervention

and the aging population, and it is anticipated that rates will increase further.<sup>6</sup>

As with all interventions, THA can be complicated by adverse events. A recognized complication of THA is dislocation of the prosthesis. This can require further surgery and can cause vascular, neurological injury or result in infection.<sup>7</sup> In the period from 1999 to 2011 in Australia, dislocation (22.9%) was the second most common reason for revision surgery in those with a primary total conventional hip replacement, superseded only by loosening and lysis (29%).<sup>4</sup> The management of hip dislocation post-THA is difficult, with a Cochrane review finding no appropriate operative versus nonoperative studies to

<sup>1</sup> Orthopaedic Department Geelong Hospital Barwon Health, Geelong, Victoria, Australia

<sup>2</sup> Rheumatology Department Concord Repatriation General Hospital, Concord, New South Wales, Australia

## Corresponding Author:

Lara Barnsley, Orthopaedic Department Geelong Hospital Barwon Health, 3/397 Church Street, Richmond, Victoria 3121, Australia.  
Email: larabarnsley@gmail.com

guide which produces better outcomes.<sup>8</sup> Strategies that may prevent hip dislocation post-THA are therefore important. Dislocation rates may be reduced by prosthesis selection and design, choice of surgical approach, and technical intraoperative factors.<sup>9</sup> Postoperative factors have also been identified as playing a role and the focus of this review is the application of postoperative behavioral and biomechanical restrictions known as hip precautions.

Hip precautions are a common component of standard postoperative care following THA.<sup>10</sup> The precautions are prescribed for 6 weeks postoperatively to foster proper healing and prevent hip dislocation. Hip precautions encourage patients to avoid bending at the hip past 90°, twisting their leg in or out, and crossing their legs. Patients are also encouraged to sit with their hips higher than their knees, sit in a chair with armrests, and sleep on their back with a pillow between their legs. Hip precautions may also include avoiding riding in a car or any low seat. Occupational therapists and nurses in conjunction with surgeons are the usual health practitioners who reinforce such education to the patient in the perioperative period.<sup>11,12</sup> This education will often include an illustrated handout, verbal instruction, and supervised mobility training on the ward.

Hip precautions focus on limiting the internal rotation, external rotation, adduction, and flexion of the hip. These actions place the hip in positions of risk postsurgery, before capsular and other soft tissue elements around the replaced joint have healed in the early postoperative period. When modeled, these maneuvers led to a high rate of dislocation, lending theoretical support to hip precautions.<sup>13</sup> Although the theoretical evidence behind hip precautions is sound, there is limited empirical or clinical evidence to support their findings. Moreover, although prescribing hip precautions may appear an innocuous intervention, adverse effects such as delaying return to normal activity, difficulty in nursing care, falls risk, loss of condition, and joint range of motion need to be considered.

The focused clinical question was: In patients who have had a THA does the application of hip precautions versus unrestricted activities significantly decrease the risk of prosthetic dislocation.

## Methods

Despite the routine prescription of hip precautions post-THA across Australia, there have been no Australian randomized controlled trials (RCTs), systematic reviews, or meta-analyses to review their efficacy in practice, prompting a need for evaluation of the current data. No systematic reviews concerning this intervention were identified in a search of Database of Abstracts of Reviews of Effects (DARE), the Cochrane Database of Systematic Reviews (CDSR), the National Institute for Health and Clinical Excellence (NICE), and MEDLINE over the previous 12 months. In this study, we sought to systematically review the available clinical evidence concerning the benefits of hip precautions to patients and their role in preventing hip dislocation post THA.

## Eligibility Criteria

Studies that were included in the systematic review comprised of randomized controlled trials or cohort studies with a comparative group. Studies had to have follow-up of at least 6 months, allow the independent effect of hip precautions to be evaluated, and include specific information concerning dislocation and reoperation. Case series and case reports are excluded from the review owing to the high potential for bias in these study designs. Case-control studies (except where nested as part of a cohort study) and economic evaluations were also excluded. Studies were considered from the year 2000 onward to reflect contemporary practice and prosthesis design. Language was restricted to those in English and the search included published work and conference abstracts. Where only abstract information was available, a sensitivity analysis was performed.

## Information Sources

The following databases were searched: MEDLINE, EMBASE, CINAHL, AMED, Cochrane library, and Google Scholar. The last search took place on the April 3, 2013.

## Search Strategy

The following terms were searched: “hip” AND “arthroplasty” AND “education” AND “dislocation” OR “hip precautions”.

## Study Selection

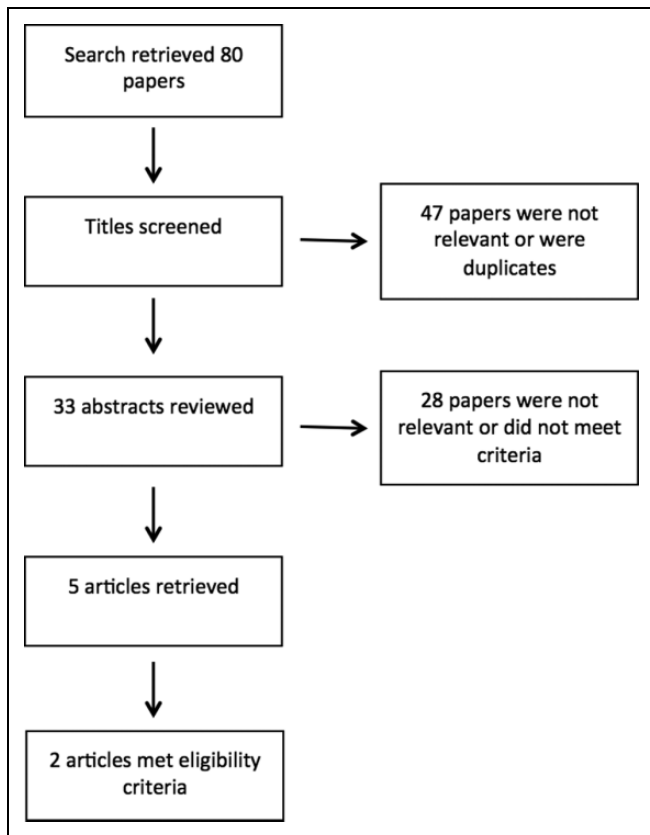
All titles and abstracts retrieved by this search were considered independently by 2 authors for eligibility. Where studies suggested that they might meet the eligibility criteria, the full text of the study was obtained. The full-text articles were then assessed for eligibility again by 2 independent reviewers. All studies were assessed for quality using the Jadad criteria.<sup>14</sup>

## Data Collection

Data extraction was performed by all 3 authors using a piloted data extraction form primarily addressing the number of patients in the study, the type of precautions advised, the nature of the control group, and the frequency of dislocation and reoperation in each group. Where differences emerged in the data extraction, they were resolved by consensus. We evaluated risk of bias at study level. In the data synthesis, studies were assessed on a quality basis and a sensitivity analysis was performed to explore the effect of quality on outcome.

## Summary Measures

The principle summary measure was the risk ratio between the treatment and the comparator groups at 6 months.



**Figure 1.** Flow chart for selection of papers.

## Results

From 80 articles in our initial search, 5 articles were retrieved<sup>15,16</sup> for data extraction (Figure 1). Of those 5, 2 RCTs met our eligibility criteria.<sup>16,17</sup> The details of the articles retrieved are given in Tables 1 and 2.

This systematic review yielded few primary studies concerning the effectiveness of hip precautions post-THA. Two RCTs were found.<sup>16,17</sup> Neither was blinded beyond the surgery itself. Randomization appeared to be correctly conducted, and all patients were accounted for at follow-up. Both of these studies therefore score 2 out of a possible 3 on the Jadad criteria.<sup>14</sup> The interventions and control conditions were different between these studies (Table 1), with more liberal activities permitted in the trial of Ververeli et al. This heterogeneity precludes pooling of data between the reviews. Neither study found any benefit from hip precautions, but only 1 dislocation occurred in 346 patients so there is a high probability of a type II error, which is an error that occurs when one accepts a null hypothesis that is actually false.<sup>18</sup>

One further study with a comparison group was identified.<sup>15</sup> This complex study used prospectively collected data on patient demographics, comorbidities, and operative parameters. The ascertainment of the primary outcome of concern, prosthesis dislocation, was not collected systematically but relied upon reporting and database screening of the individual

surgical practices as well as presentations to the hospital where the study had been conducted. The intervention was a multidisciplinary preoperative education session delivered to patients over 3 hours, which included recommendations about restricting movements and advice on seats and cars. The session also incorporated other components including a description of dislocation, a detailed explanation of the prosthesis, and direct contact with a senior surgeon. It is therefore impossible to dissect any one component that may be responsible for any effect. Participation in the program was voluntary, attracting 46.7% of the cohort to partake in the education sessions. These selection criteria may have introduced volunteer bias, and no assessment of actual behavior or concurrent interventions such as advice from other sources during the admission was performed. The comparison groups were those not volunteering to participate and a historical group being those who were operated on prior to the availability of the educational program. It was felt that these methodological issues introduced sufficient bias that the results not be valid for inclusion in this systematic review.

In considering these results, it is important to assess any adverse effects from applying hip precautions. Both the included studies considered the benefits of not applying hip precautions. Peak et al noted a faster return to activities of daily living (ADLs), lower costs, and a higher degree of patient satisfaction in the unrestricted group. Similarly, Ververeli et al found a faster pace of recovery and an earlier return to driving in the unrestricted group.

The 2 other studies retrieved were prospective case series with no comparison group and therefore failed to meet our a priori inclusion criteria.<sup>19,20</sup> Nevertheless, they provide an estimate of the rates of dislocation in patients who did not receive a full suite of hip precautions (Table 2).

All retrieved studies concerned only anterolateral approaches to THA, and these results can only pertain to patients who are managed with this technique.

## Discussion

This systematic review found no evidence to support the use of hip precautions following anterolateral THA for the prevention of hip dislocation. Moreover, patients assigned to hip precautions had slower rehabilitation and return to usual ADLs.

The strength of this review is the application of an explicit clinical question, a predefined search, inclusion strategy, and multiple assessors of articles to be included. These serve to enhance the reliability of the conclusions and offer important advantages over narrative reviews, which risk including biased studies that may distort the true effect.

The weaknesses of this review are that the number of included studies is small but this is a failing of the existing literature. These results only pertain to anterolateral approaches to THA and cannot be applied to posterior approaches, where the baseline rate of dislocation is higher

**Table 1.** Summary of Included Studies.

	Ververeli et al <sup>16</sup>	Peak et al <sup>17</sup>
Setting	Single center private practice affiliated with local hospital	Single center University Hospital
Type of study	Unblinded prospective randomized controlled trial	Prospective randomized controlled trial Surgeons were blinded until wound closure
Number of patients included	81	265
Percentage of follow-up	100%	100%
Duration of follow-up	1 year	6 months
Intervention and comparative group	Standard versus early rehabilitation <i>Standard:</i> Hip precautions <i>Early:</i> Not to cross legs at thighs, otherwise no restrictions	Restricted versus unrestricted <i>All patients:</i> Limit hip flexion to <90°, hip internal/external rotation <45°, adduction (crossing legs) <i>Restricted group (additional precautions):</i> abduction pillow postoperative, pillows to maintain abduction when in bed, elevated toilet seats, elevated chairs, prevented from sleeping on their side, prevented from driving, and being a passenger
Surgical technique	Anterolateral procedure	Anterolateral procedure
Dislocations and consequences	No dislocations reported for either group	1 dislocation in the restricted group Managed with closed reduction and no need for reoperation
Conclusions from the study	Faster return to function in early rehabilitation group. Postoperative restrictions provide no additional benefit and limit patients from activities they are capable of completing	Faster recovery and greater satisfaction in unrestricted group, earlier return to activities of daily living, estimated savings of US\$655 per patient in unrestricted group. Imposition of restrictions other than the limitations of extreme motions did not influence prevalence of dislocation in this group
Limitations	Small numbers, study ended before it was fully enrolled	Low incidence of dislocations suggest a possible type II error. Noted compliance of about 70% with restrictions

**Table 2.** Summary of Excluded Studies.

	Restrepo et al <sup>19</sup>	Lubbeke et al <sup>15</sup>	Talbot et al <sup>20</sup>
Setting	Single center University Hospital	Single center University Hospital	Single center district hospital
Type of study	Prospective cohort of sequential patients	Prospective series with nonparticipant controls—voluntary basis of selection for intervention	Prospective cohort study
Number of patients included	2532	2238	483
Percentage of follow-up	94	99.3	100
Duration of follow-up	6 Months	6 Months	6 Weeks
Intervention and comparative group	No comparative group No restrictions on movement	Voluntary preoperative multidisciplinary education program including <90° flexion, <20° internal and external rotation. Instruction on using car seats, raised equipment, explanation of dislocation and surgical procedure	No comparative group No restrictions on movement
Surgical Technique	Anterolateral	Anterolateral	Anterolateral Procedure
Dislocations and consequences	4 Dislocations	46 Dislocations 5 in participants and 41 in non-participants	3 Dislocations Managed with closed reduction and no need for re-operation
Conclusions from the study	Low rate of dislocations without restrictions	Educational session helped decrease rate of dislocation	Restrictions not justified when using an anterolateral approach.
Limitations/exclusion basis	Large number of sequentially enrolled patients and no control group	Non-randomized, no systematic ascertainment of dislocation rate, underpowered to detect difference in contemporaneous control and volunteer bias	No control group and brief follow up

and the beneficial effects of hip precautions are unknown. We did not perform a sensitivity analysis including results from non-RCT studies. There was only 1 study that included a comparison group but the intervention was not specifically hip precautions, follow-up was not systematic, and participation was voluntary. In those studies where the outcomes of the dislocations were reported, they were benign events usually not requiring surgery and not associated with morbidity. Total hip arthroplasty dislocation is common in patients older than 80 years of age. Those with poor muscular tone, femoral neck fractures, acetabular dysplasia, cerebral palsy, muscular dystrophy, and intellectual impairment are all associated with an increased dislocation rate.<sup>21</sup> Unfortunately, no comment can be made on the long-term effects of hip precautions, as one cannot extrapolate beyond the available studies.

The 5 retrieved studies<sup>15-17,19,20</sup> covered a total of THA 5816 patients, with a total of 54 dislocations reported. This represents a dislocation rate of 0.9%. Taking this as a crude estimate, it is possible to calculate the size of a study needed to demonstrate a clinically meaningful decrease in hip dislocation. Arbitrarily, decreasing the rate of dislocation by 50% would seem a reasonable goal. This would mean that one hip dislocation would be prevented by 222 patients having precautions. The study involved to reliably demonstrate this incremental benefit would be large, requiring over 5000 patients in each arm.<sup>22</sup> It seems unlikely that such a study will ever be logistically feasible.

## Conclusion

The available evidence would suggest that the rate of dislocation after anterolateral approach to THA is low and is not improved by hip precautions. At the same time, hip precautions are associated with a slower return to ADLs, significant expense, and less patient satisfaction. Existing studies risk being compromised by type II statistical error, but a definitive study would be prohibitively large and expensive.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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