

Shoe Raises for Symptomatic Leg Length Discrepancy after Total Hip Replacement: Do Patients Find Them Useful?

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Abstract

Purpose:

The aim of our study was to assess the effectiveness of shoe raises for managing symptomatic leg length discrepancy (LLD) after total hip replacement (THR).

Method:

We searched our hospital theatre and orthotics databases to identify patients that had undergone a THR and subsequently required an appliance for a LLD. 4270 patients were identified of which 75 (1.8%) required an orthotic appliance for a LLD. 72 patients were alive and were sent a postal questionnaire.

Results

61 (84%) questionnaires were returned. 65% of patients found the appliances to be effective in managing their symptoms of a LLD. 31% of patients no longer wore a raise. The overall satisfaction following THR was lower in patients with persistent symptoms despite the use of a shoe raise.

Conclusion

Shoe raises are effective in managing symptomatic LLD in two thirds of patients. Patient satisfaction with THR is lower when the shoe raise proved ineffective.

INTRODUCTION

Leg-length discrepancy (LLD) is a well-recognised complication after total hip replacement (THR). It is one of the commonest sources of litigation against orthopaedic surgeons in North America [1]. LLD may cause generalised patient dissatisfaction as well as an abnormal gait, back pain and sciatica [2 – 6]. A small true LLD is common, with published mean discrepancies ranging from 1 to 15.9mm [7 – 9; 10 – 15]. Not all patients are aware of a true leg length discrepancy after THR. The perception of a leg length discrepancy ranges from 6 to 32% in the published literature [15 – 16]. Some authors have stated that most patients are unaware of a leg length discrepancy after THR [17], whereas Sarangi et al found that patients with a true lengthening of greater than 6mm universally perceived a LLD [10].

True LLD occurs as a result of the limb being lengthened or shortened by the position of the prosthesis at the time of surgery. Patients may also have a functional LLD. This can be caused by scoliosis, pelvic obliquity or soft tissue tightness around the hip [12]. The limb is usually lengthened when a THR is performed, as the arthritis causes loss of length at the hip joint [11, 18]. This relative lengthening may also be perceived as a LLD.

Patients who have persistent symptoms of a LLD after a THR are often fitted with a shoe raise. In our institution patients who require a heel raise or insole for symptomatic LLD after THR are usually referred to the orthotics department to be measured and fitted for these.

We have performed a retrospective postal survey to assess the use of shoe raises for symptomatic LLD after primary

THR. The purpose of our investigation was to determine the incidence of shoe raise requirement for symptomatic LLD after THR, and to assess the effectiveness of, and patient satisfaction with, shoe raises for symptomatic LLD.

METHODS

We searched our hospital theatre database and identified 4270 patients (2465 females and 1705 males) that had undergone a primary THR between 1st January 2003 and 31st October 2008. We searched orthotics department records at our hospital to identify which of these patients had been prescribed an orthotic after their total hip replacement. Seventy-five patients (1.8%) were identified who had been fitted with either an insole or heel raise for a post-operative leg length discrepancy. Of these 3 patients had died leaving 72 patients alive at the time the study was performed.

The orthotic records were obtained. The orthotist's clinical measurement of the LLD was recorded. The details and height of the orthotic device were recorded. The patient demographic details, primary diagnosis, and clinician's assessment of LLD were recorded.

A postal questionnaire was sent to all living patients. The questionnaire assessed whether they had a symptomatic LLD prior to THR; how soon after THR they perceived a LLD; problems associated with LLD; what type of appliance they were prescribed; how effective the appliance was; problems associated with the appliance; and to rate their overall satisfaction with the THR using a visual analogue scale with a range from 0 (completely unsatisfactory) to 10 (perfect).

RESULTS

Of the 75 that had received a shoe raise for a leg length discrepancy, 51 (68%) were female and 24 were male. The mean age at THR was 66 years (range 24 - 85). The primary diagnosis was primary osteoarthritis in 62 patients. The mean Body Mass Index (BMI) was 25.7 (range 19.5 – 37). The mean height was 1.64m (range 1.5 to 1.85m). These results are summarised in Table 1.

Orthotic prescription

The mean LLD as clinically measured by the Orthotists using blocks was 15mm (6 – 35mm). Patients were either prescribed a heel raise (Fig. 1), an insole (Fig. 2), or both. In 58 (77%) patients the operated leg was long, and they were provided with a raise for the opposite leg. 17 (23%) patients were provided with a raise for the operated leg. The

thickness of the prescription matched the Orthotists' measurement.

Questionnaire

72 patients were alive and sent a questionnaire. 61 were returned (85% response rate), and 57 had completed all the questions.

Of 57 respondents, 37 (65%) had found the shoe raise to be helpful when they started to use it, while 20 (35%) had found it not useful.

Of 60 respondents, 20 (33%) felt their LLD had improved over time, 28 (47%) felt no change, while 12 (20%) felt it had worsened.

Of 61 respondents, 45 (74%) had felt no LLD prior to THR, 6 (10%) had felt longer on the operated side prior to THR while 10 (16%) had felt shorter on the operated side prior to THR. Of the 11 who did not respond to this question, 5 had presented to orthotics as being shorter on the operated side, and 6 longer.

Of 58 respondents, 40 (69%) were still wearing the shoe raise and 18 (31%) were not, at the time of completing the questionnaire.

Of the 40 still wearing the shoe raise, 35 (88%) reported wearing it all or most of the time and 5 (12%) occasionally or rarely. 33 (83%) reported noticing a significant LLD when not using the shoe raise, whereas 7 (17%) reported noticing little or no difference. 30 (75%) of the 40 patients who still wore the shoe raise found it helpful, including 2 of the 7 respondents who noticed little difference when not using the shoe raise.

Of the 18 patients not wearing the shoe raise, 7 (39%) still felt a significant LLD, while 11 (61%) only noticed a small or no LLD.

Of all 58 respondents, 60% were still wearing the shoe raise all or most of the time while 9% did so occasionally or rarely. Of the 31% no longer wearing the shoe raise, 19% still noticed a significant LLD while 12% noticed little or no difference.

The most common reasons for not wearing a shoe raise were problems with the construct of the shoe raise (either not fitting or degraded rapidly); followed by the symptoms of LLD resolving. Other reasons for not wearing a shoe raise

included: shoe raise not helping; pride; other hip replaced; shoe raise causing backache and leg ache.

Patients' complaints caused by their LLD include: walking problems (18%), back pain with or without associated leg pain (48%), need to adjust trouser lengths (28%), limp (12%), feeling unbalanced (6%), difficulty wearing shoes (2%), and increased pressure on other hip (2%). 12% of respondents reported having no problems with their LLD.

Patients' mean overall VAS rating (scale 0 – 10) of their THR was 7 (0 - 10). The results are presented in Table 2.

DISCUSSION

There are several papers describing methods to equalize limb lengths during hip arthroplasty [7- 9; 19–20] but many of these are useful only in cases of true LLD. With functional LLD however, the evidence suggests a multi-factorial aetiology including soft tissue tension and pelvic obliquity due to extraneous causes [12]. While surgery (i.e. revision THR) can be useful in the management of true LLD, its role in treating functional LLD is less clear.

The clinical implications of LLD have not been widely reported. The common problems that have been described with LLD include: nerve palsy; low back pain; and abnormal gait [2 – 6]. We have identified an additional complication in our study – the need to adjust trouser lengths! It has also been noted that patients with a perceived LLD had a significantly poorer Oxford Hip Score than those without [18].

A popular treatment for symptomatic LLD (true or functional) is the prescription of shoe raises. Shoe raises are useful for correcting gait problems thereby diminishing symptoms associated with LLD [21]. Despite its widespread use, however, there have been no studies to examine their effectiveness in the treatment of LLD after THR, and patient satisfaction with them.

While THR is primarily done to alleviate patients' suffering due to pain, many now find it unacceptable to have such unwanted complications as LLD. Three of our patients rated their THR as completely unsatisfactory (0 on a VAS), attributed solely to ongoing problems with LLD. It is unclear why some patients are able to tolerate a symptomatic LLD and others find the symptoms unbearable despite relatively small true LLD.

From our survey, we have found that approximately 1.8% of

our patients require shoe raises for symptomatic LLD following primary THR. Women more commonly require a shoe raise than men. The mean BMI of these patients falls within the normal range. This information could be important with regards to obtaining informed consent prior to elective THR.

We also found that two-thirds of those prescribed shoe raises were still wearing them, with almost 90% of these patients wearing them almost all of the time. More than half of our patients also reported that they found the shoe raise quite helpful in treating their LLD. A small number of patients (about 10%) who were initially referred for shoe raises had stopped using them because the problem had corrected itself. This is a much lower figure than that quoted in the literature, but this is probably due to the fact that our investigation was designed around symptomatic LLD following THR.

Our survey revealed the mean LLD to be 15mm (6 – 35mm). This was as measured by the Orthotist using blocks. We have been unable to include LLD measurements by clinicians as many were not documented in the referral forms. In the general population, it has been found that LLD up to 2cm were common and asymptomatic. Following THA, however, LLD as small as 6mm (as corroborated in our survey) could become symptomatic [10]. Williamson and Reckling noted that lengthening occurred more often than shortening [11].

Radiographic measurements of leg-length inequality have been found to correlate poorly with clinical measurements [15, 22]. We did measure radiographic LLD in our patients. This was performed using Antero-Posterior (AP) pelvic radiographs. Pre- and Post-operative radiographs were used. The radiographs were viewed and measurements made on a diagnostic PACS workstation (GE Centricity, GE Healthcare, Slough UK) using 2K high resolution monitors by two of the authors (BA and HWJ). The radiographs were calibrated using the diameter of the prosthetic femoral head. Radiological leg length measurement was determined by measuring the distance from the superior margin of the lesser trochanter to the inter-teardrop line. All measurements were recorded to the nearest millimetre. We found the radiologic LLD to be a mean of 11mm (1 – 40mm). We are however unable to deduce much from these measurements as many of the radiographs were not of suitable quality, as would be expected from a retrospective study.

In conclusion we have found that 1.8% of our patients

required an orthosis for symptomatic LLD following primary THR. Problems associated with symptomatic LLD include back pain; walking difficulties; need to adjust trouser length; limp; and pressure on the other hip. 52% of patients find wearing their orthotic appliances tolerable and most (68%) were still satisfied with their THR despite a symptomatic LLD. A small number of patients (< 1%) were extremely unsatisfied with their THR as a result of having a LLD. While we agree that preventing LLD is what we should aim for as Orthopaedic surgeons, we have been able to show that in those individuals who develop a symptomatic LLD, the use of shoe raises offers some respite. Currently, the aetiology of functional LLD is poorly understood. More research is required into this aspect of LLD to enable a better approach to management.

Table 1
Demographic Data of Study Cohort

GENDER	
Female	51
Male	24
PRE-OPERATIVE DIAGNOSIS	
Primary Osteoarthritis	62
Secondary Osteoarthritis	3
Intra-capsular Neck of Femur fracture	2
Avascular Necrosis	5
Failed fracture fixation	3
Mean Age	66 years (24 – 85)

Table 2
Mean VAS Rating of THR Among Respondents

MEAN VAS RATING	
All respondents (n = 58)*	7 (0 – 10)
Orthoses useful (n = 21)	8 (3 – 10)
Orthoses not useful (n = 14)	7 (0 – 10)

Figure 1



Figure 2



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