

Causes of the Most Frequent Hips Out of Patients Following Total Hip Replacement

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ABSTRACT

Objective: Hip dislocation is a complication seen after total hip replacement. The aim of this study was to determine the positions and movements in which dislocation occurred in order to provide additional guidance in terms of precautions to be taken.

Methods: A total of 26 patients who experienced hip dislocation following total hip arthroplasty between 2009 and 2018 were included in this retrospective study. Seven of the 26 patients had been operated in our clinic. The patient group comprised 16 (62%) females and 10 (38%) males. After correction of luxation, the patients were evaluated with the Harris Hip Score (HHS) assessment. Placement of the prosthesis components, findings of loosening, acetabular cup size, and prosthesis type were examined radiographically.

Results: The mean HHS was 83.1 ± 4.6 points. In 8 (30.7%) patients, the hip implant component used had a femoral head diameter of 36 mm and in 18 (69.3%) cases, the diameter was 28 mm; the difference was statistically significant ($p < 0.0216$). The replacement prosthesis was uncemented and implanted with screws in all of the study patients.

Conclusion: Following total hip replacement, dislocation can occur in patients with no evident risk of dislocation. Patient education with periodic reminders about positions of the hip that may lead to dislocation after total hip replacement could be considered one effective way to reduce the risk of hip dislocation.

INTRODUCTION

Primary total hip arthroplasty (THA) is the most frequently performed orthopedic surgery after knee replacement, and when applied successfully, is an operation from which very good results can be obtained. The most common complications are infection and luxation of the hip joint, with dislocation being the most frequent.^[1] According to previous studies, this complication is seen at rates varying from 1% to 10%.^[2-6] The occurrence of dislocation is considered a significant failure of the surgery, and it is a painful and risky complication for the patient. One of the possible treatments for these patients is revision THA, which is a high-risk approach for both the surgeon and the patient and entails high costs for the national economy.

Various suggestions have been made for the prevention of dislocation in studies related to the reasons for luxation following primary THA. The most common reason is incongruence of the components used. These include insufficient or increased anteversion of the acetabular cup, excessive inclination angle, greater or reduced anteversion angle of the femoral stem and shortening of the stem, short offset creating impingement, the use of a small diameter femoral head, and a monopolar femoral head. Various other etiological factors have also been presented, such as female gender, weak muscles around the hip or tension in some muscle groups, very tight or loose ligaments, neuropsychiatric disorders, and postural problems. However, to the best of our knowledge, there has been no study that has evaluated the subject of what position the patient is in when the dislocation occurs.

Whatever the reason for hip dislocation after primary THA, even if the prosthesis components are in optimal placement, dislocations can occur in certain positions of the body and the hip. When there are underlying risk factors for dislocation, hip dislocation can occur more easily with shorter joint movements. The aim of this study was to identify the positions in which dislocation occurs by determining the situation in which it occurred. Thus, dislocation rates could be reduced by educating the patients with periodic reminders about these positions after the operation.

MATERIAL AND METHODS

A total of 26 patients who underwent THA between 2009 and 2018 and who developed hip dislocation for the first time at least 6 months after the operation were included in the study. Of the total, 6 patients presented at the polyclinic and 20 at the emergency department, and 7 were operated on in our clinic. The patient group comprised 16 (62%) females and 10 (38%) males with a mean age of 61.67 ± 8.6 years (range: 41–64 years). The education level of the patients was determined to be illiterate in 3 cases, literate only in 5, primary school in 12, middle school in 4, and high school in 2. Patients were excluded from the study if the dislocation occurred within 6 months of the operation, if they had experienced more than 1 dislocation, if there was malpositioning of the prosthesis components, if they were of advanced age, had a neurological or mental disorder, or ligament laxity or tension.

Exclusion criteria were applied to 9 patients determined to have malpositioning of the components on computed tomography (CT) examination, 4 patients with more than 1 dislocation, 4 with an insufficiently safe joint angle following reduction under sedation anesthesia, 1 patient with an infection, 3 patients with a fracture of the trochanter major as a result of trauma, and 1 patient with Parkinson's disease. Patients with factors creating a risk for component malpositioning or dislocation were also excluded.

Approval for this retrospective study was granted by the local ethics committee. The patients were evaluated according to the skin incision and the surgical approach applied to the hip joint as well as the implant used according to the epicrisis reports of the centers where the operation was performed. C-reactive protein, sedimentation, and hemogram values were examined with respect to possible infection. The patients were questioned about their education level.

The mean time from surgery to dislocation was determined. The patients were asked if hip movements that could create a dislocation risk had been explained after the operation and they were asked to show movements that could cause a dislocation. Radiographs and CT images were taken to determine the location of the femoral head

in the pelvis before reduction. Placement of the prosthesis components, findings of loosening, acetabular cup type, and femoral head diameter were examined on radiographs. On CT, the prosthesis angles were calculated and the necessity for revision was evaluated against the possibility of re-dislocation. Hip joint reduction was achieved under sedation anesthesia and fluoroscopy guidance. During reduction, joint movements were assessed and the presence of pathological movements related to malpositioning of the components was examined.

While all hip movements were checked in this evaluation, the safe range of external rotation, adduction, and extension movements was examined in particular in those with an anterior and anterolateral approach. Similarly, the safe range of internal rotation, adduction, and flexion hip movements was examined in those with a posterior approach. Dislocations occurring without completion of these movements were evaluated as malpositioning of the components and were excluded from the study. The telescopic finding was examined to evaluate the length of the prosthesis used. Following correction of the luxation, the patients were evaluated with the Harris Hip Score (HHS). Mobilization within the house was recommended for 3 weeks. The patients were questioned about their activity and position when the hip dislocation occurred. They were asked whether or not any precaution had been taken immediately before the dislocation occurred. The patients were also asked about the presence of any problems in adjacent joints, such as the knee or ankle, any spinal, vertebral, or pelvic pathologies, and any musculoskeletal problems. All of the patients were followed up after reduction.

RESULTS

No findings of septic or aseptic loosening were determined in the radiological, clinical, or laboratory findings of any case, and joint movements were determined to be stable following reduction. In 5 (19%) patients, an anterior lateral approach was used, and in 21 (82%), a posterior approach was used. Following reduction, the mean HHS was 83.1 ± 4.6 points, and the mean time from surgery to dislocation was 38.5 ± 6.9 months.

According to the patient anamneses, the situations during which dislocation occurred were getting out of bed in a hurry because they thought they were late in 4 (15.4%) cases, getting into bed in 3 (11.5%), sitting on a low sofa for the first time when they were not aware of the height of the seat in 2 (7.7%), during coitus in 4 (15.4%), when getting on or off a bus in a hurry in 3 (11.5%), while performing personal hygiene in the bathroom in 7 (27%) of which 4 were in danger of falling, and while on the toilet in 3 (11.5%). All of the patients reported that they had not thought about the possibility of dislocation before the time it happened and that it occurred unexpectedly. A total

of 17 patients were able to demonstrate hip movements that they had been told were not recommended after the operation as they could cause dislocation, and 9 (34.6%) patients were not able to demonstrate the movements and stated that they could not remember them. Of the 17 patients who could remember and knew the movements, 11 stated that they did not avoid these risky movements. Their justification was that they had not experienced any problems with these movements in their daily life. Of the patients who could not demonstrate the movements, 3 were illiterate, 5 were literate only, and 1 had an education level of primary school.

In patients with a posterior approach, the mean acetabular anteversion angle was $32.65 \pm 2.18^\circ$, the mean inclination angle was $48.61 \pm 4.29^\circ$, and the mean femoral anteversion angle was $24.18 \pm 5.56^\circ$. In patients with an anterior lateral approach, the mean acetabular anteversion angle was $22.13 \pm 2.59^\circ$, the mean inclination angle was $44.63 \pm 3.81^\circ$, and the mean femoral anteversion angle was $16.36 \pm 2.77^\circ$. In 21 patients, the acetabulum was placed to be centralized in the true acetabulum and in 7 patients, it was placed a mean 1.87 cm superior. In 12 (46.2%) patients, the hip component used had a femoral head diameter of 36 mm, in 14 (53.8%) the diameter was 28 mm, and there was no statistically significant difference between the groups ($p < 0.632$). In 4 (15.4%) patients, there was a minimal telescopic finding. According to the radiographs, a long-neck femoral head was seen to have been used in 6 (23.1%) patients. The mean offset was measured as 2.72 cm.

In 11 patients, a ceramic-ceramic femoral head and an angled rim non-supporting acetabular cup was used. In 9 patients, a polyethylene acetabulum with 10° acetabular rim support was used, in 5 patients, a metal-metal angled rim non-supporting acetabular cup, and in 1 patient, a constraint acetabular cup. The femoral head used was a small 28 mm diameter in 21 patients and 36 mm in diameter in 5.

The radiological findings showed no loosening related to the components, no heterotrophic ossification, and no formation of osteophytes.

Re-dislocation was not observed in the first 6 months of follow-up. A total of 11 patients could not be followed up further, and in the remaining 15 patients, the mean follow-up time was 21.48 ± 5.52 months and no re-dislocation occurred during this period.

DISCUSSION

Primary THA is one of the most frequently performed operations in orthopedic surgery. Joint dislocation is the most common complication after the operation, with a possibly high rate among young surgeons.^[7] To decrease this complication rate, the prosthesis components must be compatible with each other and placed at optimal an-

gles,^[7] the ligaments of the patient must be sufficiently tense, the muscles sufficiently strong, and there must not be any evident pathologies in the musculoskeletal system or any neuropsychological problems. If 1 or more of these factors is present, the likelihood of dislocation increases and can even occur in positions where it would not normally. In some patients there are structural characteristics that create a susceptibility to dislocation.

Prevention of these negative effects is attempted with optimal component placement, strengthening of the muscles and balance, and with explanations to patients of the joint movements that could cause hip dislocation.^[8] Nevertheless, despite all these optimal factors, hip dislocations may still occur. Generally, to reduce the risk of dislocation after primary THA, a constraint hip, a large diameter femoral head, or an angled acetabular cup can be used in patients with pre-operative risk, according to the surgical approach. However, notwithstanding these precautions, dislocations may still occur.^[9,10] Although these measures were taken in the patients of the current study, dislocations developed.

The HHS assessments after dislocation in the current study were consistent with previous reports in the literature.^[11] This indicates that there was no malpositioning in the patients or errors related to the surgical application. The mean measurements made related to the positions of the components were observed to be within the reference ranges defined in the literature.^[12] The effect of component malpositioning on dislocation remains a matter of debate. In the current study, a posterior approach was used for most of the patients, which is in accordance with the general literature.^[12] The selection of a small diameter femoral head is known to increase the risk of dislocation, and in the current study, the diameter of the femoral head used in all but 3 (11.5%) patients was small. The mean inclination angle was determined to be within the recommended reference range; when it is greater, there is an increased possibility of causing impingement, and when smaller, there is an increased risk of dislocation with insufficient coverage of the femoral head.

The selection of the surgical approach to the hip joint has an effect with respect to the placement of the prosthesis components. In the anterior approach, the anteversion angle given to the acetabulum and femoral component is less than in the posterior approach. In the current study, the placement angles of the components in the anterior approach were consistent with the reference ranges in the literature.^[12] In the posterior approach, the anteversion angle of the components is applied slightly above the normal limit. In the current study, the component positions of the patients for whom a posterior approach was used were consistent with the literature. Although capsule repair is a factor decreasing the risk of dislocation, this was not evaluated in the current study.^[13]

When dislocation does not occur in the early period following primary THA, a pseudocapsule of fibrous structure forms in the first 6 months. The pseudocapsule is one of the structures that demonstrates a certain amount of resistance to the development of dislocation. Generally, dislocations that occur in the early postoperative period are a result of component malpositioning. Dislocations related to component malpositioning develop in the first 3 months, in particular.^[14] Although there are several factors related to the patient and the operation in the risk of dislocation following primary THA, the risk can also vary depending on the experience of the surgeon.^[15] A limitation of the current study is that no evaluation was made of the experience of the surgeons. Of the total 26 patients in the study, 19 were operated on by different surgeons in other centers and data were not available about the experience of those surgeons.

Of the predisposing factors for dislocation, there was no aseptic loosening, no osteophytes, and no radiological pathological findings. Female gender is known to constitute a risk for dislocation following primary THA,^[16,17] and in the current study, there was a greater number of females than males. A small diameter femoral head is also known to increase the risk of dislocation,^[18] and in the current study, a 28-mm diameter small femoral head was used in the majority of patients.

The particular focus of this study was the position and activity of the patient when the dislocation occurred. It was determined that the most frequent occurrence was in the bathroom, followed by during coitus, and these 2 situations constituted 42% of all the dislocations. Other causes were getting out of bed, sitting on a low sofa, and getting on or off of public transport. These conditions were the most risky positions leading to hip dislocation. In these positions, the patients did not remember the possibility of hip dislocation and were unprepared. This situation was seen to have occurred because of unavoidable positions causing the hip dislocation, lack of muscle tone to prevent the dislocation, and as a result of loss of balance. Although the patients stated that they had been routinely shown high-risk movements by the physician after the primary THA operation, 9 patients stated that they could not remember the movements. A total of 11 patients stated that they made the movements that should be avoided and did not feel the need to take any precautions. It has been demonstrated that even if risky joint movements are not permitted in the first 3 to 6 months, the risk continues after that period, with the probability of dislocation after primary THA increasing by 1% every 5 years.^[16] The education level of the patient group in the current study was below current standards. For the last 20 years in Turkey it has been mandatory to finish compulsory education at high school level, but of the patients in the current study, only 2 (7.7%) had attended high school and 8 (30.8%) had

received no formal education. Patients with a low level of education are at higher risk of hip dislocation and there is a clear need for more frequent patient education related to the prevention of hip dislocation.

Limitations

Limitations of the current study the fact that as the HHS before dislocation was not known, no comparison could be made, and there was no intra-operative evaluation. There were no data about reconstruction of the external rotators, or the rate of injury to the abductor mechanism in the anterior and anterolateral approach or whether or not the joint capsule was repaired. Finally, the study was reliant on subjective information from the patient anamneses and observation at the time of dislocation was not possible.

Conclusion

When there is a patient-related predisposition for hip dislocation, it may not always be possible to meet the optimal conditions to prevent dislocation in primary THA operations. As seen in this study, even when optimal conditions are met, dislocations can still occur. According to the current study results, of the patient-related problems that can be changed, it seems that the risk of dislocation could be reduced with periodic teaching of the critical movements to avoid. In this patient group, which was pleased with the results of the primary THA, there is still a risk of dislocation even with optimal conditions. The risks diminish over time, but continue in the long term. It can be understood that there is a need to recall this patient group for follow-up examinations to remind them of the possibility of dislocation, and if necessary, to provide further patient education.

In this study, specific patient-related positions and movements were identified in which dislocation occurred. Patients must be educated more comprehensively and taught how these positions can be performed. With more care taken on this subject, the rate of hip dislocations could be reduced.

Ethics Committee Approval

Approved by the local ethics committee.

Informed Consent

Retrospective study.

Peer-review

Internally peer-reviewed.

Authorship Contributions

Concept: T.M.; Design: T.M.; Data collection &/or processing: T.M.; Analysis and/or interpretation: A.R.B.; Literature search: T.M.; Writing: A.R.B.; Critical review: T.M.

Conflict of Interest

None declared.

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Total Kalça Replasmanı Sonrası Hasta Kaynaklı En Sık Kalça Çıkığı Nedenleri

Amaç: Kalça çıkığı total kalça replasmanından sonra kaçınılmayan ve sürekliliğini koruyan bir komplikasyondur. Çalışmanın amacı çıkığın meydana geldiği pozisyonlara yönelik tespitlerde bulunularak önlem alma konusunda yol gösterici olmaktır.

Gereç ve Yöntem: Çalışma 2009–2018 yılları arasında total kalça replasmanı yapılmış ve kalça çıkığı gelişmiş 26 hasta incelenerek yapıldı. Hastalardan yedisi kendi kliniğimizde ameliyat edilmişti, 16'sı kadın 10'u erkekti. Luksasyon düzeltilmesinden sonraki Harris kalça skoru (HKS) incelendi. Röntgenografi ile protez komponentlerinin yerleşimleri, gevşeme bulguları, asetabuler cup boyutları ve protez cinsi incelendi.

Bulgular: Ortalama HKS 81.28±4.31 idi. Sekiz (%30.7) kalçada 36 mm, 18 (%69.3) kalçada ise 28 mm çaplı femoral baş kullanılmıştı, istatistiksel olarak iki grup arasında anlamlı fark vardı (p<0.0216). Tüm hastalar vidalı sementsiz protez uygulamaları vardı.

Sonuç: Total kalça replasmanı sonrası, çıkık riski belirgin olmayan hastalarda da çıkık gelişebilmektedir. Bu hastaların eklem çıkıkları günlük rutin yaşamaları sırasında meydana geldiği, çıkık sırasında önlem almadıkları ve bir kısım hastanın çıkık için alınması gereken önlemleri hatırlamadıkları belirlenmiştir. Total kalça replasmanı sonrası tespit edilen kalçanın çıkma pozisyonları için eğitimin verilmesi ve periyodik olarak devam ettirilmesi sonucu kalça çıkık riskinin etkin bir şekilde azalabileceği anlaşılmaktadır.

Anahtar Sözcükler: Kalça çıkığı; protez; total kalça artroplastisi.