Total Hip Arthroplasty for Surgically Ankylosed Hips

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Abstract

Objective: This study aimed to evaluate the long-term results of total hip arthroplasty in patients with surgically ankylosed hips.

Methods: We reviewed 8 hips of 7 patients in whom ankylosed hips were converted to total hip arthroplasty between October 2011 and November 2015. All patients had surgical ankylosis of their hips. All patients were evaluated regarding lumbar and contralateral hip pain, hip joint range of motion (ROM), functional status, and satisfaction from treatment after surgery.

Results: In our study, the etiology of the ankylosis was tuberculous septic arthritis in 2 (25%) and developmental hip dysplasia in 6 (75%) hips. The mean duration of the surgical ankylosis before conversion surgery was 29±13.6 years. All patients had osseous ankylosis and the indications for arthroplasty were intractable low back pain in 6 patients (85.7%) and hip pain in 4 patients (57.1%). The mean follow-up period was 13±2.7 months. There was statistically significant improvement in lumbar and contralateral hip pain, hip joint ROM, functional status, and satisfaction from treatment after surgery.

Conclusion: Conversion of hip ankylosis to total hip arthroplasty is an effective method to regain hip function and control symptoms of neighboring joints.

Keywords: Ankyloses, hip, total joint replacement

Cerrahi Olarak Ankiloze Kalçalarda Total Kalça Artroplastisi

Öz

Amaç: Cerrahi olarak ankiloze olan kalçalarda uygulanan total kalça artroplastisinin uzun dönem sonuçlarının değerlendirilmesi.

Yöntemler: Ekim 2011 ile Kasım 2015 arasında kalça ankilozundan total kalça artroplastisine dönüş yapılan yedi hastanın 8 kalçası çalışmaya dahil edildi. Cerrahi olarak ankiloze olan kalçaları nedeniyle opere edilen hastalar ameliyat öncesi ve sonrasında lomber ve karşı kalça ağrıları, kalça hareket açıklığı, fonksiyonel durum ve ameliyattan memnuniyet açısından değerlendirildiler.

Bulgular: Çalışmaya dahil edilen hastaların hepsinin kalçaları cerrahi olarak ankiloze edilmiş idi. Bunlardan 2 (%25) tanesi tüberküloz septik artriti nedeniyle, 6 tanesi ise (%75) gelişimsel kalça displazisi nedeniyle opere edilmişlerdi. Ortalama 29±13,6 yıl süresince ankiloze geçen süre sonrasında hastaların ankiloze kalçalarında TKA'ne dönüş yapıldı. Cerrahi endikasyonu 6 hastada bel ağrısı (%85,7) ve 4 hastada kalça ağrısı idi (%57,1). Hastalar ortalama 13±2,7 ay sonrasında değerlendirildi. Bel ve karşı kalça ağrısı, kalça eklem hareket açıklığı, fonksiyonel durum ve ameliyattan memnuniyet açısından değerlendirilen hastaların sonuçlarında istatistiksel olarak anlamlı iyileşme elde edildi.

Sonuç: Kalça ankilozunun total kalça artroplastisi ile revizyonu kalça fonksiyonlarının geri kazanılması ve komşu eklemlerdeki şikayetlerin kontrol altına alınmasında etkili bir yöntemdir.

Anahtar kelimeler: Ankiloz, kalça, total eklem replasmanı

Ankylosis of the hip can occur either spontaneously or after surgical intervention. Spontaneous fusion usually occurs after an episode of infection, secondary to heterotopic ossification (HO) after open reduction-in cases of internal fixation of periacetabular fractures or in patients with ankylosing spondylitis. However, surgical fusion is selected only for a special group of patients; typically, the young manual laborer with isolated unilateral hip disease is accepted as the ideal candidate [1].

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Developmental dysplasia of the hip (DDH), significant deformity of the femur or acetabulum that is not suitable for total hip replacement (THR), neurological disorders that cause a high risk of dislocation, or salvage of failed THR can also be listed as indications of surgical fusion [1, 2].

A properly performed and fused hip arthrodesis can provide long-term pain relief and patient satisfaction and also allows returning to daily activities, including heavy labor [3, 4]. However, lack of motion at the hip is compensated by the neighboring joints and because of this compensation mechanism, patients with long-standing ankylosis are keen to develop degenerative pain at the lumbar spine, ipsilateral knee, and con-

tralateral hip [5, 6]. Lumbar fusion or ipsilateral total knee arthroplasty can be considered for these secondary symptoms but altered biomechanics that are related with hip fusion put these procedures under risk for early complications [7]. Because of this, conversion of hip fusion to THR can provide relief of pain, stop degenerative processes at neighboring joints, and improve the biomechanics in patients with symptomatic hip arthrodesis [6, 8]. This retrospective study was performed to evaluate the clinical and radiological outcomes of THR in patients with hip arthrodesis.

Material and Methods

Patients

After approval from the Bakırköy Dr. Sadi Konuk Training and Research Hospital Review Board (13.04.2014 - Approval number: 2014/158), we retrospectively reviewed 7 prospectively followed patients in whom ankylosed hips were converted to THR between October 2011 and November 2014. There were one male and 6 female patients. One patient had bilateral hip arthrodesis and underwent bilateral synchronous THR; thus, 8 hips were evaluated at the final follow-up and included in this study. All patients gave informed consent before their inclusion in the study.

The average age at the time of the conversion operation was 41.5±14.5 years (range, 15-69). The ankylosis had lasted 29±13.6 years (range, 9-49) before conversion surgery. The etiology of the ankylosis was tuberculous septic arthritis in 2 (25%) and developmental hip dysplasia in 6 (75%) hips. All patients had osseous ankylosis and the indications for arthroplasty were intractable low back pain in 6 patients (85.7%) and hip pain in 3 patients (42.8%). The previously operated limb was shorter than the contralateral (not affected) limb. The mean limb-length discrepancy was 3.2 cm (range 0-6 cm) preoperatively.

Surgical technique

Before the surgery, a comprehensive physical examination was conducted for all patients to assess weight bearing lower extremity orthoroentgenogram, standard pelvis, and hip series. For all patients, templating of the radiographs before the procedure was done to achieve the best patient outcome. None of the patients had preoperative magnetic resonance imaging for the evaluation of gluteal musculature. Their viability was only determined intraoperatively with the color and contractibility of the musculature.

First-generation cephalosporins (Sefazol iv, Mustafa Nevzat İlaç Sanayii AŞ, İstanbul, Türkiye) were administered 30 min before the operation. Under epidural anesthesia, the patient was positioned in the lateral decubitus position, and the affected hip was prepared for surgery in a sterile manner. Surgical incision started 2.5 cm distal and lateral to the anterior superior iliac spine and extended on the lateral side of the femur to a level approximately 5 cm distal to the trochanter. Dissection deepened through the interval between gluteus medius and tensor fasciae latae. To provide wide and unobstructed exposure, gluteus medius muscle was partially detached from the trochanter major. Next, the joint capsule was resected and the femoral neck, the site of the fusion between the ilium and the femoral head, was clearly visualized. Preoperatively planned osteotomy site was prepared and with intraoperative fluoroscopy, the level of osteotomy was checked again for an accurate cut. Then, a subcapital osteotomy was performed. The femur was positioned and visualized properly for a more precise femoral neck osteotomy located approximately 1 cm proximal to the trochanter minor. The bone between these cuts was removed and borders of the true acetabulum were exposed with the removal of soft tissues. Subsequently, the diameter of the reamer was successively increased until the preoperatively measured size was reached. After trials, cementless acetabular components were placed in the true acetabulum with an abduction angle between 40° and 50° and an anteversion of 10°-20°. Primary stability was obtained by press-fitting the acetabular component. For every patient, 2 screws of 20-25 mm length were used to increase primary stability of acetabular component. We did not prefer to use any type of graft around the acetabulum. Matched polyethylene or ceramic linings were placed inside the component. After insertion of acetabular components, the resected femur exposed femoral canal prepared with appropriate anteversion, and the femoral component and femoral head trials were installed. The hip joint was then restored, and joint stability, range of motion (ROM), and limb-length equality were evaluated. Limb lengths were checked with the combination of intraoperative measurement and adherence to preoperative templates. The cementless femoral component and appropriate femoral head were implanted, and after placement of the drainage tube, all layers of the incision were closed. For the bilaterally operated patient, contralateral hip was operated using the same technique.

Drains were removed 24 hours after the operation, and patients were allowed to bear weight immediately after surgery with the help of a walker. Follow-up visits were done 3 weeks after the surgery, then 3, 6, and 12 months after the operation. After one year, the patients asked for yearly follow-up controls (Figure 1, 2).

Clinical evaluation

Preoperative and postoperative hip function was assessed using the Harris Hip score (HHS). A Harris score of 90-100 was considered excellent, 80-89 was considered good, 70-79 was considered fine, and <70 was considered poor. For objective satisfaction assessment, patients were asked whether they would undergo the operation again or not. In addition, the ROM before and after the operation was compared and abduction strength was assessed with the Trendelenburg test. The position of the prosthesis and changes in the surrounding bone were observed with X-rays of the hips at the final follow-up and compared with the previous X-rays.

Figure 1. Preoperative follow-up radiograph of a patient who had his hip surgically ankylosed after tuberculosis-related septic arthritis

Figure 2. Postoperative follow-up radiograph of a patient who had his hip surgically ankylosed after tuberculosis-related septic arthritis

Statistical analysis

Statistical Packag for the Social Sciences (SPSS Inc.; Chicago, IL, USA) software version 17.0 was used for statistical analysis. Data comparison between groups was conducted using Student's *t* test. P<0.05 was considered statistically significant. Data are expressed as the mean±standard deviation (X±S).

Results

The mean follow-up period was 36±10.7 months (range, 25-62). The mean HHS improved from a mean of 56.1 points to 90.6 points postoperatively (p=0.0001). HHS was excellent in 4 and good in 3 patients (bilaterally operated patient assigned as good for both hips). Increase in HHS was lower than 20 points in 1 patient (16 points), and 1 patient required vascular surgery intervention owing to arterial damage.

Limping was found in one of our patients (14.2%). The ROM for flexion averaged 89.3° (range, 45°-120°) and all patients had full extension. The ROMs for internal and external hip rotations averaged at 37.6° and 38.6°, respectively (internal rotation range 15°-45° and external rotation range 25°-45°). The ROMs for abduction and adduction averaged at 43° (40°-45°) and 41.3° (35°-45°), respectively.

Complications occurred in 2 patients. One patient had intraoperative fracture of the greater trochanter that was treated with cable wiring. The other patient experienced arterial damage that required an internal iliac-femoral artery anastomoses at postoperative second day. Both patients recovered uneventfully. No patients had HO, sciatic nerve palsy, or dislocation during the study period.

No patients had signs of loosening around acetabular and femoral components and required revision surgery because of this (Figure 3, 4).

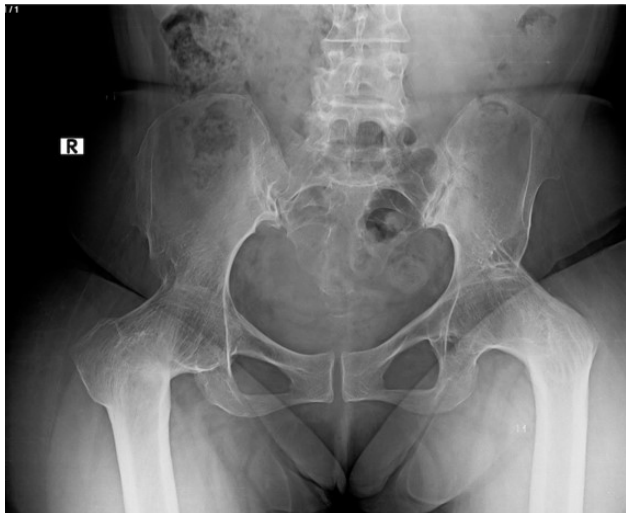

Figure 3. Preoperative follow-up radiograph of the patient who had experienced intraoperative trochanter major fracture

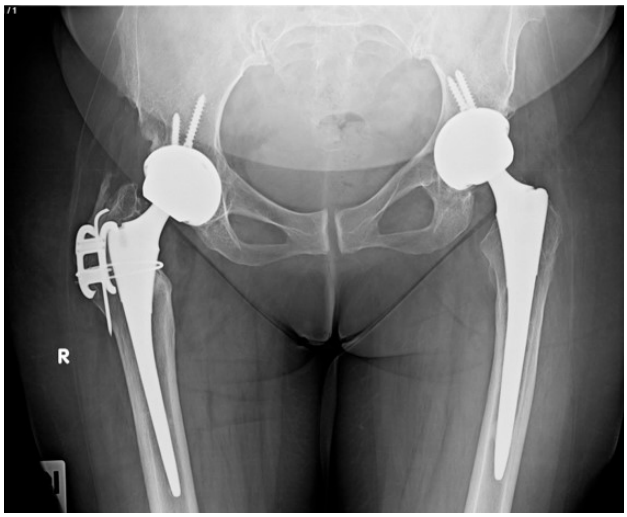

Figure 4. Postoperative follow-up radiograph of the patient who had experienced intraoperative trochanter major fracture

Discussion

Nowadays, hip arthrodesis is used less commonly in orthopedic practice because of the higher patient expectations and improved results of total joint replacement. However, there is still a group of patients who had previously ankylosed hips owing to several reasons such as DDH, septic arthritis, or ankylosing spondylitis. Although the overall results of arthrodesis are generally good if bony union is achieved [5], because of the alteration in the normal biomechanics of the affected lower extremity, nearly 10% of patients start to experience adjacent joint pain within 2 years [9]. The negative effect on the neighboring joints increases with time. Kirkos et al. [10] reported that among the patients with hip arthrodesis, 75% had back pain, 66% had knee pain, and 33% had contralateral hip pain after a mean follow-up of 37 years. Similarly, after a mean of 13.6 years with ankylosis, 6 of our 7 patients had back pain, 4 of our 7 patients had contralateral hip pain, and 6 of our 7 patients with back pain had pain relief after THR surgery. Although this patient (patient 2) was complaining of back pain, his HHS scores improved from 45 to 94 after surgery, and he was very satisfied with the surgery results.

One of the challenges of conversion from arthrodesis to arthroplasty is increased risk of dislocation related to the hip abductor deficiency. This problem can be overcome with the use of constrained acetabular liners. However, in our series, all patients had abductor muscles that were thick, and their intraoperative color and contractibility were good. Thus, we did not use constrained liners. Along with the instability, deficient abductor power is also related to postoperative limping. We had only one patient with postoperative limping; her hip was ankylosed surgically at the age of 10 after tuberculosis-related septic arthritis. Intraoperatively, her abductors were functioning, and at the final follow-up, the result of her Trendelenburg test was positive. Although her abductor power was enough to stabilize the hip arthroplasty to prevent dislocation, it was not powerful enough to stabilize her pelvis.

HO can be a relatively common complication following THR; fortunately, this is usually self-limited and a minority of the patients have problems related to it. Male gender, bilateral hypertrophic arthritis in a male patient, post-traumatic arthritis, history of HO, diffuse idiopathic skeletal hyperostosis, and ankylosing spondylitis can be listed as the risk factors that are related to a high incidence of HO development [11, 12]. Joshi et al. [13] reported a 13% incidence of HO in their series, and none of their patients had functional compromise related to the ossification. Aderinto et al. [6] reported a 33% (6 of 18 patients) incidence of ossification and only one in 6 patients required a repeat surgical procedure for this complication.

Perioperative irradiation and use of non-steroidal anti-inflammatory drugs have been proven to be effective treatments against the development of HO and the use of prophylaxis is advised for high-risk patients. We did not prefer to use prophylaxis against HO in our patients. First, our patients were at low risk for the development of HO. Second, there is little evidence for routine use of prophylaxis after hip replacement in current orthopedic literature [14]. Therefore, we preferred to avoid prophylactic measures, and the rate of HO was 0% in our series. This incidence can be related to the small study group. On the contrary, careful handling of soft tissues for limited soft tissue damage may also be related to this incidence.

Small study group, retrospective nature of the study, and lack of standing orthoroentgenograms to determine exact lengthening can be listed as limitations of our study.

In conclusion, conversion of hip ankylosis to total hip arthroplasty is effective in restoring hip function and decreasing symptoms related to adjacent joints. In carefully planned and properly operated patients, this risky operation provides the highest patient satisfaction and limits complications.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Bakırköy Dr. Sadi Konuk Training and Research Hospital (13.04.2014 - 2014/158).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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References

1. Whitehouse MR, Duncan CP. Conversion of hip fusion to total hip replacement. Bone Joint J 2013; 95-B(Supple A): 114-9. [Crossref]
2. Swanson MA, Huo MH. Total hip arthroplasty in the ankylosed hip. J Am Acad Orthop Surg 2011; 19: 737-45. [Crossref]
3. Stover MD, Beaule' PE, Matta JM, Mast JW. Hip arthrodesis: a procedure for the new millenium? Clin Orthop Relat Res 2004; 418: 126-33. [Crossref]
4. Park KS, Yoon TR, Lee TM, Ahn YS. Ceramic on ceramic hip arthroplasty in fused hips. Indian J Orthop 2015; 49: 336-41. [Crossref]
5. Jain S, Giannoudis PV. Arthrodesis of the Hip and Conversion to Total Hip Arthroplasty: A Systematic Review. J Arthroplasty 2013; 28: 1596-602. [Crossref]
6. Aderinto J, Lulu OB, Backstein DJ, Safir O, Gross AE. Functional results and complications following conversion of hip fusion to total hip replacement. J Bone Joint Surg Br 2012; 94(11 Suppl A): 36-41. [Crossref]
7. Rutz E, Schäfer D, Valderrabano V. Total hip arthroplasty after hip joint ankylosis. J Orthop Sci 2009; 14: 727-31. [Crossref]
8. Celiktas M, Kose O, Turan A, Guler F, Ors C, Togrul E. Conversion of hip fusion to total hip arthroplasty: clinical, radiological outcomes and complications in 40 hips. Arch Orthop Trauma Surg 2017; 137: 119-27. [Crossref]
9. Matta JM, Siebenrock KA,Gautier E, Mehne D, Ganz R. Hip fusion through an anterior approach with the use of a ventral plate. Clin Orthop Relat Res 1997; 337: 129-39. [Crossref]
10. Kirkos JM, Papavasiliou KA, Kyrkos MJ, Sayegh FE, Kapetanos GA. The long-term effects of hip fusion on the adjacent joints. Acta Orthop Belg 2008; 74: 779-87.
11. Zhu Y, Zhang F, Chen W, Zhang Q, Liu S, Zhang Y. Incidence and risk factors for heterotopic ossification after total hip arthroplasty: a meta-analysis. Arch Orthop Trauma Surg 2015; 135: 1307-14. [Crossref]
12. Balboni TA, Gobezie R, Mamon HJ. Heterotopic ossification: Pathophysiology, clinical features, and the role of radiotherapy for prophylaxis. Int J Radiat Oncol Biol Phys 2006; 65: 1289-99. [Crossref]
13. Joshi AB, Markovic L, Hardinge K, Murphy JC. Conversion of a fused hip to total hip arthroplasty. J Bone Joint Surg 2002; 84-A: 1335-41. [Crossref]
14. Board TN, Karva A, Board RE, Gambhir AK, Porter ML. The prophylaxis and treatment of heterotopic ossification following lower limb arthroplasty. J Bone Joint Surg Br 2007; 89: 434-40. [Crossref]