ResearchArticle

TreatingAnteriorKneePaininthePost-ArthroplastyPatientbyIsolated Patellar Resurfacing (IPR)

Abstract*Purpose.*Patellarresurfacingduringprostheticreplacement of the knee is associated with loosening and the need for secondary revision. In many cases the patella is left unreplaced during this procedure in order to decrease the revision risk. Some of these patients remain symptomatic after knee replacement. Secondary isolatedresurfacingofthepreviouslyunresurfacedpatellaintotalknee arthroplastyremainscontroversial.Theaimofthisretrospectivestudy was to evaluate the outcome after isolated patellar resurfacing (IPR) asasecondstageprocedure. *Methods.*Thestudyincluded33patients (22 females/11 males) who underwent resurfacing of the patella with ameanfollow-upof44.8±12.2months.Themeanageofthepatients was70.3±15(range39–95)yearsatthetimeofoperation.Theaverage periodbetweentotalkneearthroplastyandpatellarresurfacingwas 23.3±15.2months.Thepatient'ssubjectivesatisfactionwasassessed accordingtotheKneeSocietyScore(KSS)questionnaire.*Results.*The meanobjectiveKSSimprovedsignificantlyfrom41.6±9to64.9±11 (*P* < .01). The mean functional KSS also improved significantlyfrom41.6±8to 60.5±9(*P* < .01).Two patients (6%) needed further operative revision. Multivariate analysis indicates that results are better in males and in nonobese patients. *Conclusions.* Although clinical scores showed significant improvement, some patients have painandremaindissatisfiedfollowingIPR.IPRshouldbeconsidered in patients who underwent prosthetic knee bicompartmental. Patellar resurfacing should be considered if there is no evidence of prosthetic components malalignment and at least 12 months have passed since the primary implantation.

Keywordskneearthroplasty;patellareplacement;osteoarthritis;anterior knee pain; knee replacement complications

1. Introduction

Totalkneearthroplasty(TKA)hasbecomethemainsurgical toolinthetreatmentofprimaryosteoarthritisoftheknee[1].Outcomesappeartobesimilarbothclinicallyandfunctionally,withorwithoutpatellarresurfacing[1,2,3].Inaddition, patellar resurfacing might lead to specific complications includingpatellarfractureandpatellarcomponentwear[4], but revision rates are slightly higher in the nonresurfaced group [3], especially revisions due to pain [5]. A malpositioned femoral component increases the patellofemoral contact pressure, thus affecting the clinical outcome andthelong-termsurvivorshipoftheimplant[6].However, in patients with persistent anterior knee pain (AKP) after TKA, the source of symptoms cannot be identified [7]. A few studies demonstrating long-term outcome after IPR of thepatellarcomponentwerepublished.Whiletheprocedure appears to be successful in many cases [8], patients with more than 3° of femoral internal rotation undergoing secondary patella resurfacing should be warned of the possibilityofapooroutcome[9].Theaimofthisretrospective study was to evaluate the clinical outcome after patellar resurfacingasasecondstageprocedureforAKPafterTKA. Patients with component malalignment were excluded as thisgrouptendsnottohaveagoodresultfollowingIPR[9].

2. Methods

At our institute, a consecutive series of 2006 TKAs performed by one of the authors from January 1st, 2000 to January 1st, 2012 was reviewed. Of this series 1,776 were primaryTKAs,andin1,523thepatellawasnotresurfaced. Primary patellar resurfacing was most commonly performed due to intraoperative decision by the surgeon (mostly in cases of bulky patella or due to impression of maltracking of the patella (115 cases), as well as in cases after tibial osteotomy(32cases),followingpatellarfracture(21cases), primary patella baja (7 cases), or severe patella femoral osteophytosis (78 cases)). Out of 1,523, 543 patients underwent bilateral nonsimultaneous TKA.

Out of 1,523, 33 patients had undergone IPR. Of the33 IPRs, there were 21 Sigma Total Knee System (Depuy-Synthes, USA), five Sigma Rotating Platform Knee, two IB-II prostheses (Zimmer, Swindon, UK), and five Biomet (Warsaw, IN, USA) AGC.

IPR was performed using a single component without regard to the kind of primary arthroplasty in situ. The implantchosenforthesecondstageresurfacingwasaround patellacomponent(PFCSigmaRoundDomePatella3Peg, Depuy-Synthes, USA). A number of 31 IPR patients were

Comment [MI1]: What is the sampling technique and what is the study design , how u did analysis.

available for evaluation (one passed-away and another was lost to follow-up).

2.1. Demographics

The study included 33 patients (22 females/11 males) who underwent resurfacing of the patella with a mean follow-upof 44.8±12.2 (range of 24 to 92) months. The mean ageofthe patients was 70.3±15 (range of 39 to 95) years at the time of IPR operation. The average period between totalknee arthroplasty and patellar resurfacing was 23.3± 15.2 (range of 15 to 64) months. Out of 33, seven patients had diabetes, 21 had hypertension, six had ischemic heart disease, two had impaired renal function (creatinine higher than1.2g/dl),andfivehadbilateralarthroplasty.Noneofthe contralateral arthroplasties had AKP.

2.2. Inclusion/exclusioncriteria

Inclusion criteria were persistent AKP after primary TKA, without improvement after conservative therapy of at least 15 months. The conservative therapy included physiotherapy according to published protocol [10] employing drop and dangle technique [11]. Patients who remained symptomatic after six weeks of rehabilitation underwent repeat courses up to 12 months post op when improvement has been shown to reach a plateau [12].

Allpatientsweresymptomaticduringdailyactivities includinggettingupfromchair,walking,andstairclimbing.

Apre-andpostoperativeX-rayinlateral,skyline,and anteroposteriorviewswasperformedtodetectcasesoflateralizationofthepatellaandtoassessthepatellofemoraljoint.

Exclusion criteria included patients with elevated CRP, positivegalliumbonescans,radiographicsignsofcomponentmalalignmentorloosening.

Treatment of the patella during primary arthroplasty. All cases of TKA were performed via a medial parapatellar arthrotomy incision. The patella was everted and osteophytes resected. Patellar denervation with electrocautery was performed in all cases of nonresurfaced patellae to reduce AKP [13].

2.3. Operativetechnique

All surgical procedures were performed by one of the authorsviathepreviousincisionandastandardmedialparapatellar arthrotomy. Postoperatively, full weight-bearing wasallowedinallcasesandthedrainwasretainedfor24h. TheKSS[14]wasfilledoutpreoperativelyandatthetimeof follow-up. The patients' satisfaction was also evaluated by a custom-made questionnaire which included three grades from satisfied to partially satisfied and not satisfied [6].

2.4. Statisticalanalysis

Resultsarereportedasmean±standarddeviationforparametric data and median for nonparametric data. Statistical analysis was performed using the Analyse-it version 2.3 program, Excel 12+ (Analyse-it Software Ltd. 2015), and the Student's t-test for dependent samples after using the Kolmogorov-Smirnov test to check for normal distribution and the Levene test to determine the equality of variances.

2.5. Definingcomponent alignment

Component malalignment was determined according to computerizedtomographyaspreviouslydescribed[15]. In short, rotational alignment with respect to anatomic landmarks was measured for the femoral component relativetothesurgicaltrans-epicondylaraxisandforthetibialcomponentrelativetothemedialthirdofthetibial tuberosity and then the images are transposed to measure relativerotationalmismatchbetweenthefemoralandtibial components.Malalignmentdegreesof±3ineitherdirection were considered to be acceptable according to previously published data [16].

3. Results

ThemeanKSSimprovedsignificantlyfrom41.6±9to 64.9±11 ($P < .01$). The mean functional score also improvedsignificantlyfrom41.6±8to60.5±9($P < .01$). Twopatients(6%)neededfurtheroperativerevision.Results are better in males ($n = 11$, mean improvement 31±6 points)thaninfemales($n = 22$,19.4±10, t-test $P < .05$) andinnonobesepatients(definedasBMIlessthan30) ($n = 15$,meanimprovement38±8) than in obese patients withameanimprovementof11.0±5points,t-test,$P < .05$.

Furthermore, according to a five-grade Lickert scale custom-made questionnaire designed to detect patients' satisfaction with the surgical procedure, the results wereas follows: one patient satisfied, two quite satisfied, three no change, four quite unsatisfied, five unsatisfied. The medianvaluewas1±1.6,IQR2.Nineteenpatients(61.2%) indicated they were satisfied/highly satisfied with the procedure and only six (19.3%) were dissatisfied/highly dissatisfied and reported persistent AKP (the rest (eight patients) had a noncommital response indicating that the revisiondidnotchangemuchintheirpaincondition). In total, two patients (6%) from the same cohort of the dissatisfiedpatients ($n = 6$) were revised due to AKP, and underwentcompletetotalkneearthroplastyexchangeusing a revision system (M.B.T. Revision Tray, DepuySynthes). Both patients remained with AKP after the full revisionwas performed. No clear cut explanation of the persistent AKP was available in those two cases. The other four patientsweretreatedconservativelywithphysiotherapyand analgesics, and remained symptomatic.

4. Discussion

AKPisdifficulttomanageinTKApatients.Itappears tohaveasimilarincidenceinpatella-resurfacedTKA thaninnonresurfacedknees[17].Thoughmorerevisions

areperformedinthenonresurfacedgroup,aslongas the replacement patellar component is not metal backed, overall results are similar in both types of surgery [18].The current series suggests that only a small minority of patients with unresurfaced patellae require revision due to AKP(33/1523,2.1%)confirmingresultsofpreviousstudies indicating that clinical results are not affected by patellar resurfacing during total knee arthroplasty [3,5]. Most revised patients are either satisfied or partially satisfied by therevisionprocedure.Repeatrevisionwithfullcomponent replacementisseldomindicatedanddoesnotseemtoallow improvement in residual AKP IPR. These findings are in line with the currently available literature. Clements et al. have found that rates of early revision of primary total knees were higher when the patella was not resurfaced,duetosurgeonsbeinginclinedtoresurfacelaterifthere is patellofemoral pain [19]. The success rate in this seriesis higher than the approximate 50 success rate reported by Correia et al. [20]. This might be due to our routine use of bone scan and CRP levels in order to rule out infections andtheuseofcomputerizedtomography-scanstorule out component malalignment. Even 3° of femoral internal rotationinpatientsundergoingsecondarypatellaresurfacing leads to the possibility of a poor outcome [9]. Additional routine evaluation should be for patellar instability using theLaurinview[21],aspatellarinstabilityisquitecommon in patients with AKP after bicondylar replacement [22].

Resurfacing of the patella appears to have no clinical effectonpainandfunctionafterTKA[23],thoughformedicalinsurersastrategyofreplacingallpatellaemightprove to be cheaper [24].

The strengths of this study is the relatively large series of successive arthroplasties done at one institute according to the same protocol. In addition, only two of 33 patients wereunavailableforfollow-upexamination.Thesizeofthe cohort(1,523)arthroplastiesallowsthedeterminationofthe frequency ofAKPinunresurfaced knee arthroplasties.The limitations of the study include the use of several different prosthesis designs for knee arthroplasty.

Theneedforroutinepatellarresurfacingduringprimary kneearthroplastyis somewhat controversial [25,26,27]. It appears that the current trend is toward resurfacing of the patella in all patients [1] as it seems to be cheaper in the longrun[24].Basedonourexperience,itseemsthatpatellar resurfacingisoptionalduringprimaryTKAs.Somepatients are likely to suffer from AKP after knee arthroplasty. In persistent AKP, IPR should be performed provided there arenocomponentmalalignmentpercomputerizedtomography, no evidence of infection and preferably in a nonobese patient.Whentheselimitationsareadheredto,themajority of patients can be relieved of AKP by IPR. A minimum waiting period prior to IPR seems to be around a year, as somecasesimproveeventuallywithconservativemeasures.

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