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5 year results of a randomized trial

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Ceramic femoral head in high cross linked poliethilene cup. 5-year results of a randomized trial

BACKGROUND: *Although few methods are used to estimate polyethylene liner wear from radiographs of total hip replacements, there is no consensus with regard to the accuracy of these methods. Highly cross-linked polyethylene (XLPE) is reported to have low rates of linear wear in the literature. However, there are not reports about wear rate of ceramic head in hxple cup at 5 years postoperatively, evaluated by Dorr method. We evaluated the wear rate of HXPLE, within the first five years after implantation using manual techniques of Dorr.*
MATERIAL AND METHODS: *We evaluated 143 patients (93 males and 50 females) with one design of uncemented acetabular component, a 40-mm (77 hips) or 44-mm (66 hips) ceramic femoral head and the annealed highly cross-linked crossfire polyethylene (X3) insert used in combination with Secur-Fit Advanced stems at a mean follow-up of 5 years. Selection of these femoral heads was based on several factors, including the perceived risk of dislocation, the outer diameter size of the acetabular component, and liner availability. Measurements of linear wear were performed by experienced surgeons with Dorr method and analyzed using the first-to-last method. Standard radiographs were used to detect periprosthetic osteolysis. Clinical records were used to determine all demographic data (age, height, weight, gender, months of follow-up, etc.).*
RESULTS: *For the entire cohort, the median linear wear rate was 0.0438 mm per year at 5 years and there was no any revision due to loosening, no liner fracture, and no patient with symptomatic corrosion. The head size was selected intraoperatively based on the size of the acetabular component and presumed risk of dislocation. There was no hip with pelvic or femoral osteolysis. The median linear wear rate was 0.0461 mm (±0.0183) and 0.0409mm (±0.0118), respectively, at head diameters of 40 and 44 mm. We found no association between femoral head size and the linear wear rate. This sentence can be excluded from here*
CONCLUSIONS: *This acetabular component and HXLPEs with large ceramic heads had low rates of linear wear. Large ceramic femoral heads did not lead to liner fracture, loosening, or symptomatic trunnion corrosion in this patient population. However, we recommend longer clinical follow-up studies and caution in the routine use of larger ceramic femoral heads in other, younger patient populations.*

KEY WORDS: Ceramic femoral heads, Highly cross-linked polyethylene, Large heads, Total hip arthroplasty

Introduction

Tribology term, 'friction, wear, and lubrication or lubrication science', is about interacting surfaces in relative motion. Mechanical energy comes out and causes physical and chemical effects. This interaction of surface topography affects its materials. While lubricants can promote longevity , friction is resistance to movement .Wear is abrasion on the contact surface of the material. Wear and friction can be controlled by changing coatings, materials and surface treatments. The essence of tribology is to understand the nature of these interactions and solve problems related to interfaces [1].
FDA approved highly cross-linked polyethylenes (HXLPEs) which reduce polyethylene wear and wear debris in 1998 [2]. In the cross-linking process irradiation

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and heating is achieved for stabilization. Heating may be done at a temperature lower than the melting point (annealing) or higher than the melting point (remelting). An advantage of remelting is that free radicals in the crystalline region are accessible for elimination [2,3]. However, recrystallization of the molten state results in a change in the microstructure of the polyethylene and reduces crystallinity. Annealing has the advantage of causing little effect to the material microstructure and largely maintains the key mechanical properties [4,5]. However, with a single annealing process, residual free radicals remain in the crystals of the material and the material has the potential for posttreatment oxidation [6]. Sequential irradiation and annealing below the melting temperature is unique compared to most HXLPE which is irradiated and remelted [7]. To further improve on HXLPEs to achieve oxidative resistance, maintain the mechanical strength of conventional polyethylene, and maintain low wear, second-generation HXLPEs have been developed: sequentially irradiated and annealed (X3TM; Stryker Orthopaedics; Mahwah, NJ, USA). The sequential irradiation and annealing process increases the amount of cross-linking. Simulator testing found 60% lower wear than for first-generation annealed material [5]. Wear measurements can be conducted with in vitro and in vivo tests on total hip replacements. It is fundemental that the measurement can accurately predict clinical performance. In vivo wear technique measure methods are Radiography (x-ray), Radiostereometric analysis (RSA), Computed tomography (CT), Magnetic resonance imaging (MRI). In vitro wear measurement techniques are Gravimetric method, Coordinate measuring machine (CMM) and Shadowgraph [1].

Several investigators have tried to analyse wear of polyethylene cup in total hip replacement. Highly cross-linked polyethylene (HXLPE) liners in total hip arthroplasty (THA) have demonstrated decreased wear rates, resilience to cup orientation, and reduced osteolysis compared to conventional polyethylene. Although there are a lot of methods to quantify polyethylene liner wear from radiographs in the literature, there is no consensus on the accuracy of these methods. Charnley and Cupic described the uniradiographic method and duoradiographic method [8]. The transparent overlay with concentric circles is described by Livermore et al [9]. In 1989, Jones et al. described on the first technique of computerized analysis[10]. Then Shaver et al. reported two-dimensional analysis on digital radiographs [11]. Although Devane et al. described three-dimensional analysis, they counted accuracy with manipulation of manually digitized data points from plain radiographs [12,13]. In 1995, Dorr and Wan described another method that measured wear only in one direction, in the face of the cup [14]. It is developed to 3D techniques by Vandenbussche et al [15], Thomas et al [16]. We consider for routine wear measurements in daily clinical practice that the method should be rapid, feasible, inexpensive, simple, easy to learn, readily available with minimum need for equipment; thus, we conducted our study in accordance to these principles.

This study reports on the authors' experience with ceramic femoral head on HXLPE (X3 Mahwah, NJ) in primary cementless total hip arthroplasty implanted. The purpose of the present study was to measure with use of manual methods amount of wear as a basis.

We analised the wear rate of polyethylene in metal-backed acetabular components. We evaluated this technique in the clinical setting and measured it with the one of the most accepted manual techniques of Dorr et al [14]. It is applicable for clinical assessment of wear in THA.

Methods of Assessment

This study was conducted in accordance with the Declaration of Helsinki. This study was conducted with approval (no: 2021/30) from the Ethics Committee of the Trabzon Kanuni Training and Research Hospital of University of Health Sciences. Written informed consent was obtained from the participants.

Between January 2014 and December 2016, primary cementless total hip arthroplasties with ceramic femoral head on HXLPE (X3 Mahwah, NJ) bearings were performed in 143 cases totally. Osteoarthritis was the primary or secondary diagnosis. All patients received either a ceramic femoral head of size 40mm, or 44mm. Trident hemispherical cups were used in combination with Secur-Fit Advanced stems (Stryker Orthopaedics, Mahwah, NJ). The patients were divided into two groups; group A(n: 77) who had a 40-millimeter femoral head in total hip prosthesis and group B (n:66) who had a 44-millimeter femoral head in total hip prosthesis.

Inclusion criterias are having the diagnosis of noninflammator arthritis, being older than 50 years and followed with radiographic evaluations. Exclusion criterias are history of systemic or local infection about the prosthesis, chronic disabling neurologic or systemic disease, patient inaccessibility and Crowe group III/IV hips.

All patients received a porous titanium acetabular cup ranging from 50 mm to 62 mm. The cups were inserted in a press-fit fashion, and additional screws were used. Post-operatively, the patients were allowed full weight bearing. Electronic medical records (EMR) were used to collect all demographic data (age, height, weight, gender, months of follow-up, etc.). Demographic data are presented in table 1. Informed consent was obtained from all patients, and the study was approved by the ethics committee of our hospital.

Surgical Procedure

All patients were operated on,with the operative side up, in the lateral decubitus position on the operating table.

The incision was started about 9,5 cm distal to the posterior superior iliac spine and extended to the posterior part of the greater trochanter. The gluteus maximus fibers were dissected bluntly, the fascia lata was cut by sharp incision. The surgical field was revealed.The short external rotators and capsule were incised with meticulous dissection. The hip was dislocated to the posterior side by flexion and internal rotation. The standard posterior approach technique was maintained to apply femoral neck osteotomy, and the prosthesis was implanted. After haemostasis, the capsule and the external rotators were sutured and anatomic floors were properly closed.

The procedure was performed in the lateral decubitus position with posterolateral approach. 20° of anteversion and 45° of inclination for acetabular cup was targeted. Ceramic femoral head, the annealed highly cross-linked Crossfire polyethylene (X3) insert was used (Stryker Orthopaedics, Mahwah, NJ). Harris hip score (HHS) for clinical evaluation was prospectively recorded at 1 month prior to THA, up to the end-point of follow-up. These data were then retrospectively analysied. Radiographs of the hips were obtained in the standard antero- posterior (AP) view, with both hips in neutral rotation and 0° abduction and in the supine position. Radiographs were obtained immediately and 1 months after the surgery and at the last follow-up. Definite loosening of the acetabular component was defined as a change in the vertical and / or medial position of> 2 mm or presence of a continuous radiolucent line> 2 mm in width on AP view radiographs. Osteolysis was defined as areas of endosteal, intracortical or cancellous bone destruction of> 2 mm, that were non-linear and were progressive. Acetabular inclination was measured using the transischial line as a reference. The number of screws used for cup fixation were recorded.

Two surgeons measured penetration of the femoral head into the liner from digitized AP view radiographs using the methods of Dorr et al. Optimal views of the femoral head and acetabular cup were used for head penetration analysis by optimizing radiograph contrast in the digital radiograph database (PACS). If the components could not be clearly identified, the radiograph was excluded from analysis. Wear rate was calculated by dividing total femoral head penetration at the end-point of observation by the number of years of follow-up.

Statistical Analysis

Minitab v.18 software (Minitab, Ltd., UK) was used to analyze the data. The descriptive statistics were given as mean, standard deviation, number. Normality of the numerical data was evaluated using the Anderson-Darling test, and the Two Sample t-test was used for group comparisons. Probability plot was used investigating for the data distribution. Correlation analysis was applied to define the correlation between age, wear rate, inclination angle, head diameter, HHS(Harris hip score), and BMI(body mass index). According to the analysis result, model parameters were considered if p-value <0,05. Pearson correlation is a factor that has a significant actually value of -1/+1 and it means more effect between 0,5 to 1 and -0,5 to -1 values.

Result

Demographics

143 patients (93 males and 50 females) followed for average of 5 years (range, 36-73 years) were evaluated. Of all 143 cases, no revision surgery was needed, no one died. The average BMI was 33.67 kg/m^2 (range, 28-38 kg/m^2). The average age at the time of surgery was 62.920 years and 67.075 years old for group A and group B, respectively. The target angle of acetabular component inclinations were 45 degrees and lower. In the latest radiographs, there were no proof of loosening or osteolysis and migration. The groups had a homogeneous distribution; no statistically significant difference was found between the two groups concerning mean age, wear per year, inclination angle, HHS, BMI (p>0.05). The comparison of the demographic and clinical data of the groups is summarized in Table I. (Table I)

Ceramic 40-mm Femoral Head

In the correlation model, no statistically significant correlation was detected between age, Wear per year* (mm), HHS (Harris Hip Score), body mass index (BMI) in Group A (p>0.05). However, for the effect of the age

Table I - *Demografic data*

	Group A (n:77) Mean±SD	p values	Group B (n:66) Mean±SD	p values
Age	62,920 ± 6,541	0,303	67,075 ± 7,945	0,238
Wear per year (mm)	0,04686 ± 0,01780	0,326	0,04092 ± 0,01178	0,510
Inclination angle	43,877 ± 5,331	0,116	42,622 ± 5,994	0,050
HHS	86,245 ± 7,698	0,050	82,75 ± 11,93	0,854
BMI (kg/m^2)	33,745 ± 2,414	0,753	33,339 ± 3,345	0,050

Table II - *Pearson Correlation Analyse of Group A*

		Correlations				
		Age	**Wear Per Year (Mm)**	**Inclination Angle**	**HHS**	**BMI(kg/m²)**
Wear Per Year (Mm)	Correlation	0,046				
	p	0,692				
Inclination Angle	Correlation	0,250	0,038			
	p	0,028	0,740			
HHS	Correlation	-0,047	-0,071	-0,022		
	p	0,685	0,541	0,850		
BMI(kg/m²)	Correlation	-0,022	0,094	0,012	-0,122	
	p	0.852	0.415	0.919	0.290	

Table III - *Pearson Correlation Analyse of Group B*

		Correlations				
		Age	**Wear Per Year(Mm)**	**Inclination Angle**	**HHS**	**BMI(kg/m²)**
Wear Per Year(Mm)	Correlation	0.097				
	p	0.437				
Inclination Angle	Correlation	0.339	0.368			
	p	0.005	0.002			
HHS	Correlation	0.217	0.237	0.069		
	p	0.080	0.055	0.581		
BMI(kg/m²)	Correlation	-0.030	0.011	0.018	-0.247	
	p	0.814	0.933	0.888	0.045	

alone, it can be considered to have an effect on inclination angle, since p-value is 0.028. Since the P value = 0.740> 0.05, it can be said that there is no relationship between inclination and wear rate (Table II).

Ceramic 44-mm Femoral Head

No statistically significant correlation was detected between age, Wear per year (mm) and BMI in Group B (p>0.05). However, there was a statistically significant correlation between the inclination angle and age (r: 0.339, p: 0.005), between the inclination angle and wear per year (r: 0.368, p: 0.002) and between the BMI and HHS (r: -0.47, p: 0.045).

According to the p value, an almost ineffective situation occurred, was observed between HHS and wear per year (Table III).

When data of groups a and b are analyzed as a single data, it can be considered to have an effect on the harris hip score, since a p value of 0.037 is obtained for the effect of head diameter alone. Since p value = 0.0025 <0.05, it can be said that there is a relationship between bmi and hhs ratio. Considering the obtained correlation Pearson coefficients, inclination angle affects erosion positively, but head diameter affects erosion negatively. Hovewer both effect is minimal. Wear rate and inclination have a linear and positive effect according to the Pearson coefficient in the correlation obtained (r: 0.179, p: 0.033).

According to the correlation Pearson coefficient values obtained, it is understood that HHS and wear rate have a negative and minimal effect on the head diameter (r: -0.175, p: 0.037; r: -0.1991, p: 0.022, respectively). According to the Pearson correlation coefficient, there is almost no directive relationship between BMI and wear (Table IV).

According to the Anova analysis, average wear values were calculated as 0.0461 mm (± 0.0183) and 0.0409mm (± 0.0118), respectively, at head diameters of 40 and 44 mm. It is seen that a value very close to the p-value <0.05 condition, which is found to be 0.054. Therefore, it can be said that there is a difference between 40-44 mm annual wear rate (Table V).

Table IV - *Data of Group A and B were analyzed as a single data*

		Age	Inclination Angle	Head Diameter	HHS	BMI(kg/m^2)	Wear Per Year(Mm)
Inclination Angle	Corr.	0.253					
	p	0.002					
Head Diameter	Corr.	0.277	-0.111				
	p	0.001	0.187				
HHS	Corr.	0.060	0.051	-0.175			
	P	0.474	0.546	0.037			
BMI(kg/m^2)	Corr.	-0.045	0.023	-0.070	-0187		
	P	0.596	0.788	0.403	0.025		
Wear Per Year(Mm)	Corr.	0.007	0.179	-0.191	0.098	0.066	
	P	0.931	0.033	0.022	0.244	0.432	

Table V - Demographic data of the Wear rates

Sample	N	Mean	StDev	SE Mean
Group A-wear rate mm/year	77	0.0461	0.0183	0.0023
Group B-wear rate mm/year	66	0.0409	0.0118	0.0014

Wear Rate Analysis by Years

In this analysis, the wear rates resulting from the follow-up years of the patients were categorized within itself (3 years, 4 years, 5 years separately). Accordingly, when the analysis outputs were re-evaluated, the average abrasion amounts were calculated again according to the results of the average values of the 3rd, 4th and 5th years. The average annual wear amount compared to the end of the year is 0.0498 mm and 0.0430 mm at 3 and 4 years, respectively. Average annual wear amount 0.0438 mm per year at 5 years compared to the end of the year.

Discussion

In our study, we used Dorr's method to measure insert wear. Dorr's method has been further developed today with computer systems. However, computer aided measurement systems are expensive and unlikely to be found in every center in daily practice. Therefore, we carried out our work with Dorr's method and discussed with the results of the studies done with computer software. Peri-prosthesis osteolysis caused by polyethylene wear particles is one of the most important complications in total hip arthroplasty (THA). This is one of the limiting factor of the longevity of the implant [16]. Selection of these femoral heads was based on several factors, including the perceived risk of dislocation, the outer diameter size of the acetabular component, and liner availability. This acetabular component and HXLPEs with large ceramic heads had low rates of linear wear rate. Large ceramic femoral heads did not lead to liner fracture, loosening, or symptomatic trunnion corrosion in this patient population.

Deckard reported that when comparing CoCr 36mm heads with ceramic 32mm heads, linear head penetration rates, utilizing the Martell method, do not correlate with age, height, weight, BMI, acetabular cup slope, acetabular cup anteversion, UCLA Activity Level scores [7]. But in our study, there was a statistically significant correlation between the inclination angle and age, between the inclination angle and wear per year and between the BMI and HHS in group B.

Higuchi et al. measured the mean wear rate as 0.0044 mm/year for the 28-mm CoC and 0.0044 mm/year for the 32-mm CoC, by Dorr and Wan methods using computer digitizer facilities of Roman V1.70 software (Orthopedics Institute) [17]. Takada et al. Reported that the mean linear wear rate of X3 was 0.045 ± 0.023 mm / year in cases performed on second generation annealed (X3) with 32 mm alumina ceramic, by computer-assisted method (PolyWare™ Digital Version 7.24; Draftware Developers, Inc, Vevay, IN, USA) [18]. In our study with Dorr method, patients' wear values were calculated as 0.0461 mm (±0.0183) for group A and 0.0409 mm (±0.0118) for group B. Therefore measurement by Dorr method may represent the wear rate for this type of polyethylene.

D'antonio et al. compared the 5-year linear wear of first and second generation annealed materials with 32-mm CoCr head in THA, by Martell software (Hip Analysis Suite; University of Chicago, Chicago, IL, USA) [19]. They reported that socket slope does not affect linear wear. However, in our study, a significant relationship was found between inclination angle and wear. They reported that the head penetration per year after the first year of bedding-in was 0.024 mm per year at 3 years, 0.020 mm per year at 4 years, and 0.008 mm per year at 5 years. The average wear rate over 5 years was 0.015 mm per year and represents a 58% improvement over a first-

generation annealed highly cross-linked polyethylene [19]. Campbell et al also studied x3 polyethylene in their study. The median proximal head penetration was 0.009 mm and 0.024 mm at 1 and 2 years, respectively. The median two-dimensional (2-D) head penetration was 0.083 mm and 0.060 mm at 1 and 2 years, respectively. The median proximal wear rate between 1 and 2 years was 0.015 mm/year. Campbell et al also studied x3 polyethylene in their radiostereometric analysis study. The median proximal head penetration was 0.009 mm and 0.024 mm at 1 and 2 years, respectively. The median two-dimensional (2-D) head penetration was 0.083 mm and 0.060 mm at 1 and 2 years, respectively. The median proximal wear rate between 1 and 2 years was 0.015 mm/year [20]. In our study, we calculated the average annual wear amount compared to the end of the year were 0.0498 mm per year, 0.0430 mm per year and 0.0438 mm per year at 3,4 and 5 years, respectively. In Bonutti's trial on highly cross-linked polyethylene inserts in patients undergoing total hip arthroplasty, femoral head penetration was measured using Martell's method from radiography. The slope of the regression line most fitting to the femoral head penetration data, representing the overall linear wear rate of polyethylene, was 0.014 mm / y. The mean Harris hip score of the group was 94,3. In our study, we found the HHS was 86,245 ± 7,698 for group A and 82,75 ± 11,93 for group B [21]. Although the Harris hip score was better, this finding does not mean that this materyal gives a better clinical result. Harris hip scores may be affected by determinant other than the acetabulum, with the inclusion of femoral component fixation, cement, and general medical conditions.

The slope of the regression line most fitting to the femoral head penetration data, representing the overall linear wear rate of polyethylene, was 0.014 mm / y. Similarly, in Bonutti's essay, the wear rate was found to be significantly below the 0.100 mm / y critical threshold for osteolysis development, osteolysis was not detected in our follow-up patients [21].

This study has some limitations. First of all measurements were recorded only from radiographs. The mechanical and transient attribute distribution between true abrasive and plastic deformation wear in HXLPE bearings is mystery. It would require long-term studies to analyze the sum of plastic deformation which appeared. This study lies on the relatively short follow-up within a limited number of hips. Finally, this is a retrospective study and there are unknown activity levels for patients. However, the patient group is older and generally less active.

This suggests that a combination of the polyethylene liner itself and other factors may be effective in the usual early wear. More investigations are ongoing.

This example, together with enrollment data and scientific publications, proves that surgeon vigilance remains invaluable.

Conclusion

In our study, choice of type of HXLPE liners was not strictly randomized. However, we did not choose the type of HXLPE by any specific reason. But we thought larger ceramic femoral heads would show lower head penetration measurements. There may be some benefits to utilization ceramic femoral heads in primary THA with this particular sequentially annealed bearing surface. However, we recommend longer clinical follow-up studies and caution in the routine use of larger ceramic femoral heads in other, younger patient populations.

In the current study, we highlighted the differences between the measurements of abrasion in our clinic and the valid literature measurements performed manually and using a digital analysis. For routine wear measurements in daily clinical practice, this manual method is not expensive and difficult. Then, it is the most straightforward way to measure wear. Given the simplicity of application, we consider this method to have satisfactory accuracy. It may be used for routine clinical wear measurements.

A low odds of polyethylene wear is benefical as it reduces the rate of wear particle-induced osteolysis. We do not expect the subsequent need for revision arthroplasty owing to wear particle induced osteolysis.

In addition, between 1 and 2 years follow up suggest wear was nearly undetectable. Thus, clinical performance of this material is encouraging for the future.

We think the findings of this show clinical wear comparable or less than wear for first-generation HXLPE liners.

Riassunto

Premessa: Sebbene siano in uso alcuni metodi radiografici per stimare l'usura del rivestimento in polietilene delle protesi totali d'anca, non vi è consenso riguardo all'accuratezza di questi metodi. In letteratura è riportato che il polietilene altamente reticolato (XLPE) ha bassi tassi di usura lineare, ma non ci sono segnalazioni nel caso delle teste in ceramica a 5 anni dopo l'intervento. Abbiamo dunque valutato l'usura di HXPLE, entro i primi cinque anni dall'impianto, utilizzando le tecniche manuali di Dorr.

Materiale e Metodi: Abbiamo valutato 143 pazienti (93 uomini e 50 donne) con un modello di componente acetabolare non cementata, una testa femorale in ceramica da 40 mm (77 casi) o 44 mm (66 casi), inserimento di Crossfire ricotto altamente reticolato in polietilene (X3), utilizzando coppe emisferiche tridenti in combinazione con steli Secur-Fit Advanced e un follow-up medio di 5 anni. La scelta di queste teste femorali si è basata su diversi fattori, tra cui il rischio percepito di lussazione, la dimensione del diametro esterno della componente acetabolare e la disponibilità lineare. Le mis-

urazioni dell'usura lineare sono state eseguite con il metodo sperimentato di Dorr e analizzate utilizzando il metodo first-to-last. Le radiografie standard sono state utilizzate per rilevare l'osteolisi periprotesica. Le cartelle cliniche sono state utilizzate per rilevare tutti i dati demografici (età, altezza, peso, sesso, mesi di follow-up, ecc.).

Risultati: Per l'intera coorte, il tasso di usura lineare mediano è stato di 0,0438 mm all'anno a 5 anni e non ci sono state revisioni per allentamento, nessuna frattura del rivestimento e nessun paziente con corrosione sintomatica. La dimensione della testa è stata selezionata durante l'intervento in base alla dimensione della componente acetabolare e al presunto rischio di lussazione. Non ci sono state anche con osteolisi pelvica o femorale. Il tasso di usura lineare mediano era di 0,0461 mm (± 0,0183) e 0,0409 mm (± 0,0118), rispettivamente, a diametri della testa di 40 e 44 mm. Non abbiamo trovato alcuna associazione tra le dimensioni della testa del femore e il tasso di usura lineare. Non ci sono state revisioni per allentamento, nessuna frattura del rivestimento e nessun paziente con corrosione sintomatica.

Conclusioni: Questa componente acetabolare e gli HXLPE con testine in ceramica di grandi dimensioni hanno presentato bassi tassi di usura lineare. Le teste femorali in ceramica di grandi dimensioni non hanno portato a frattura del rivestimento, allentamento o corrosione sintomatica della giunzione in questa popolazione di pazienti. Tuttavia, raccomandiamo studi di follow-up clinico più lunghi e cautela nell'uso di routine di teste femorali in ceramica più grandi in altre popolazioni di pazienti più giovani.

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Commento e Commentary

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Nel 1998 la FDA ha approvato il polietilene altamente reticolato (HXLPE) per l'artroplastica totale dell'anca (THA). Negli ultimi anni numerose pubblicazioni hanno sottolineato il vantaggio rispetto al polietilene convenzionale.
La pubblicazione presentata ha sottolineato le buone esperienze nelle mani degli autori.
Hanno valutato 143 pazienti per una media di 5 anni riguardo all'usura di coppe in polietilene altamente reticolato.
I dati demografici relativi a età, altezza, peso, sesso, mesi di follow-up sono completamente registrati. L'usura lineare delle coppe viene misurata radiologicamente con il metodo Dorr.
Tutti i pazienti hanno ricevuto una testa femorale in ceramica di 40 mm o 44 mm di diametro. Hanno riscontrato un tasso di usura inferiore nei pazienti con la coppa più grande.
Il basso tasso di usura delle coppe utilizzate incoraggia gli autori a continuare l'impianto delle coppe HXLPE.
Si raccomanda un arricchimento dell'iconografica a dimostrazione della tecnica operatoria utilizzata.

* * *

In 1998 the FDA approved highly cross-linked polyethylene (HXLPE) for total hip arthroplasty (THA). In the last years numerous publications underlined the advantage against conventional polyethylene.
The presented publication underlined the good experiences in the hand of the authors.
They evaluated 143 patients for average of 5 years in respect of the wear of highly cross-linked polyethylene cups.
The demographic data as to age, height, weight, gender, months of follow up are completely recorded. The linear wear of the cups are measured radiologically by the Dorr method.
All patients received either a ceramic femoral head of 40 mm or 44 mm in diameter. They found a lower wear rate in patients with the larger cup.
The low rate of wear in the used cups encourages the authors to continue the implantation of HXLPE cups.
We recommend the additional iconographical subline of the used operation method.