Cemented Versus Cementless Modular Head Partial Prostheses in Femoral Neck Fractures of Elderly Patients: Comparison of Early Functional Results

Yaşlı Hastalardaki Femur Boyun Kırıklarında Sementli ve Sementsiz Modüler Başlı Parsiyel Protezlerin Erken Dönem Fonksiyonel Sonuçlarının Karşılaştırılması

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ABSTRACT

Objective: In this study, we aimed to compare early functional results of cemented versus cementless modular head partial prostheses used in femoral neck fractures of elderly patients.

Methods: We included 28 (21 female and 7 male) elderly patients who were accessible for the functional scoring and were treated by use of modular head partial prostheses due to a femoral neck fracture in our hospital between 2006 and 2008. Eleven hemiarthroplasties were cemented and 17 were cementless. Mean age was 74.6 years and mean follow-up period was 27 months. The Oxford hip scoring system was used for the functional evaluation of patients.

Results: The mean Oxford score of the patient group treated with cemented modular head partial prostheses was 26.7 points and of the patient group treated with cementless modular head partial prostheses was 22.9 points. Mean Oxford scores and the distribution of patients in terms of Oxford classes showed no statistically significant difference between the cemented and the cementless groups ($p>0.05$).

Conclusion: We obtained similar early functional results with cemented and cementless modular head partial prostheses used in femoral neck fractures of elderly patients. *(JAREM 2012; 2: 1-5)*

Key Words: Femur, neck, prosthesis, cement, arthroplasty, cementless

ÖZET

Amaç: Çalışmamızda, ileri yaş femur boyun kırıklı hastalarda uyguladığımız sementli ve sementsiz değişir baş parsiyel protezlerin erken dönem sonuçları fonksiyonel açıdan karşılaştırıldı.

Yöntemler: Hastanemizde 2006-2008 yılları arasında femur boyun kırığı nedeniyle değişir baş parsiyel protez uygulanmış, kendilerine ulaşılarak skorlamaları yapılabilen 28 hasta (21 K, 7 E) çalışmaya dahil edildi. Hastaların protezlerinin 11'i sementli, 17'si sementsiz idi. Ortalama yaş 74.6, ortalama takip süresi 27 ay idi. Değerlendirmede Oxford kalça skorlama sistemi kullanıldı.

Bulgular: Sementli olarak uygulanan değişir baş parsiyel protezlerde Oxford skoru ortalaması 26.7, sementsiz uygulananlarda 22.9 olarak bulundu. Sementli ve sementsiz grupların Oxford skor ortalamaları ve skor dağılımları arasında istatistiksel olarak farklılık gözlenmedi ($p>0.05$).

Sonuç: Femur boyun kırığı nedeni ile sementli ve sementsiz değişir baş parsiyel protez uyguladığımız ileri yaş hastalarda erken dönemde fonksiyonel açıdan benzer sonuçlar elde edildi. *(JAREM 2012; 2: 1-5)*

Anahtar Sözcükler: Femur, boyun, protez, çimento, artroplasti, çimentosuz

INTRODUCTION

Femoral neck fractures occupy an important place in the common fractures of the elderly population. The incidence of these fractures is increasing with the aging of the population. These fractures can be caused by a low energy trauma. Hemiarthroplasty using modular head partial prostheses is a common surgical procedure in the treatment of elderly patients with femoral neck fractures. These prostheses can be inserted with or without bone cement. They have been implanted with cement for many years. The advances in the cementless prosthesis designs provided better femoral adherence, consequently, this issue encouraged the desirable postoperative early weight bearing. It is also reported that, by using cementless prostheses rather than cemented, the toxic effects of cement are avoided and less morbidity is caused, and consistently good results can be achieved (1).

In this paper we aimed to compare the early functional results of cementless modular head partial prostheses with the cemented ones, both used in the treatment of femoral neck fractures in elderly patients. We assumed that the application of cementless prostheses should be preferred to prevent possible complications of cement reported in the literature.

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MATERIAL AND METHODS

We searched our hospital records between 2006 and 2008 for the elderly patients who were surgically treated for femoral neck fractures with cemented or cementless modular partial prostheses. Including criterias for patient selection in both groups were, elderly patients with femoral neck fractures of non-tumoral origin. We found 64 elderly patients treated with modular head partial prostheses in this period. Among them, 3 patients had an early revision operation, so they were excluded. We learned that 9 patients died. Also 24 patients were not able to be contacted because their contact information or telephone numbers in the hospital records had changed. Consequently, 28 patients (21 female and 7 male) currently available for the last follow-up were included in our study. We operated on 11 patients with cemented (Figure 1) and 17 patients with cementless (Figure 2) modular head partial prostheses. Cementless prostheses were porous coated and had a tapered stem. The widest stem diameter was 15 millimeters. From the records, we have found that the first generation cementing technique was used in 7 of 11 cemented prostheses. In 3 cemented prostheses, second generation, and in one cemented prosthesis, third generation cementing techniques were used.

The mean age of the patients was 74.6 (63-97) years (75.91 for cemented and 72.06 for cementless group) and the mean follow-up period was 27 (9-38) months. We used the Oxford hip scoring system to evaluate the functional results of our patients. Twenty one of 28 scorings were made by face to face interviews and 7 were made by phone calls.

The Oxford hip scoring system reflects the clinically important symptoms and functional impairment produced by the painful hip joint (2). In this scoring system, patients are requested to reply to 12 questions (Table 1). All questions are assigned scores of 1 (none) to 5 (extreme) (Table 1). The total Oxford score (fair result) reaches 60 points. In addition to the Oxford scores, a classification of Oxford scores was also used in this study (Table 2).

Statistical Analysis

In this study, statistical analysis of the results were made by using NCSS 2007 statistical analysis software. In the evaluation of the data, beside the descriptional statistical methods (the mean, standard deviation), Mann-Whitney-U test for the comparison of paired groups and chi-square test for the comparison of the qualitative data were used. Alpha level of 0.05 was used for all statistical tests.

RESULTS

There was no significant difference between the mean ages of the cemented and cementless groups (p=0.171). The patients in both groups also showed no significant difference by sex distribution (p=0.736) (Table 3).

Figure 1. Cemented partial hip prosthesis

Figure 2. Cementless partial hip prosthesis

Table 1. Oxford hip scoring system (2)

Item	Scoring categories	Item	Scoring categories
During the past four weeks		During the past four weeks	
1) How would you describe the pain you usually had from your hip?	1-None 2-Very mild 3-Mild 4-Moderate 5-Severe	7) Have you been able to climb a flight of stairs?	1-Yes, easily 2-With little difficulty 3-With moderate difficulty 4-With extreme difficulty 5-No, impossible
2) Have you had any trouble with washing and drying yourself (all over) because of your hip?	1-No trouble at all 2-Very little trouble 3-Moderate trouble 4-Extreme difficulty 5-Impossible to do	8) After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your hip?	1-Not at all painful 2-Slightly painful 3-Moderately painful 4-Very painful 5-Unbearable
3) Have you had any trouble getting in and out of a car or using public transport because of your hip? (whichever you tend to use)	1-No trouble at all 2-Very little trouble 3-Moderate trouble 4-Extreme difficulty 5-Impossible to do	9) Have you been limping when walking, because of your hip?	1-Rarely/never 2-Sometimes or just at first 3-Often, not just at first 4-Most of the time 5-All of the time
4) Have you been able to put on a pair of socks, stockings or tights?	1-Yes, easily 2-With little difficulty 3-With moderate difficulty 4-With extreme difficulty 5-No, impossible	10) Have you had any sudden, severe pain - 'shooting', 'stabbing' or 'spasms' - from the affected hip?	1-No days 2-Only 1 or 2 days 3-Some days 4-Most days 5-Every day
5) Could you do the household shopping on your own?	1-Yes, easily 2-With little difficulty 3-With moderate difficulty 4-With extreme difficulty 5-No, impossible	11) How much has pain from your hip interfered with your usual work (including housework)?	1-Not at all 2-A little bit 3-Moderately 4-Greatly 5-Totally
6) For how long have you been able to walk before the pain from your hip became severe? (with or without a stick)	1-No pain / > 30 minutes 2-16 to 30 minutes 3-5 to 15 minutes 4-Around the house only 5-Not at all	12) Have you been troubled by pain from your hip in bed at night?	1-No nights 2-Only 1 or 2 nights 3-Some nights 4-Most nights 5-Every night

Table 2. Classification of Oxford scores

Oxford scores	Classification
<19	excellent
19-26	good
27-33	fair
>33	poor

Comparison of the follow-up periods between the cemented and cementless groups showed no significant difference (p=0.466) (Table 4).

The mean Oxford score of the patients group with cemented modular head partial prostheses was 26.7 (14-53) points. On the other hand, the mean Oxford score of the patients group with cementless modular head partial prostheses was 22.9 (13-51) points. There was no statistically significant difference between the mean Oxford scores of the cemented and the cementless groups (p=0.510). The distribution of patients in terms of Oxford classes showed no significant difference between the cemented and the cementless groups as depicted on Table 5 (p=0.532). Thus, evaluation of patients in both cemented and cementless groups revealed similar good functional results.

DISCUSSION

Femoral neck fractures are important fractures due to the morbidity and mortality in the older population. Especially in elderly patients, early postoperative mobilisation is very important in order to avoid postoperative complications. Therefore, the treatment modality should allow early mobilisation and must provide good quality of life and better function for the patient. Hemiarthroplasties with modular head partial prostheses are amongst the preferred treatment alternatives for patients with displaced femoral neck fractures. However, there are continuing controversies concerning these prostheses as to whether they should be implanted with or without bone cement.

Haidukewych et al. (3) reported very good results for the cemented bipolar hemiarthroplasties in the treatment of acute femoral neck fractures in elderly patients and they recommended these prostheses. Dixon and Bannister (4) also declared a similar opinion in their study.

Table 3. Demographics of patients in both cemented and cementless groups

		Cemented n: 11		Cementless n: 17		
Age		75.91±7.97		72.06±5.3		MW: 64.5 p=0.171
	Male	2	18.2%	4	23.5%	X^2: 11
	Female	9	81.8%	13	76.5%	p=0.736

Table 4. Means of follow-up times and Oxford scores in cemented and cementless groups

	Cemented n: 11	Cementless n: 17	MW	p
Follow up (months)	27.03±6.13	23.68±8.35	78	0.466
Oxford score	24.82±11.11	23.47±11.53	79.5	0.510

Table 5. Distribution of patients in terms of Oxford classes

	Cemented group n: 11		Cementless group n: 17	
	n	%	n	%
Excellent	3	27.3%	8	47.1%
Good	5	45.5%	4	23.5%
Fair	1	9.1%	3	17.6%
Poor	2	18.2%	2	11.8%

Lennox and Mclauchlan (5) stated in their study that the use of cement had increased perioperative mortality rates. Because of the well-known cardiodepressive effect of the cement, cementless femoral components were said to be safer, and were recommended especially in patients who have cardiopulmonary risk factors (6-8). Burwell et al. (9) and McCaskie et al. (10) published a decrease in the rate of cement related complications with the use of modern cementation techniques in their consecutive studies.

For the cementless hemiarthroplasty procedure, the quality of bone should not be deficient and the measured femoral canal diameter should be less than 16.5 millimeters (6). In their study with numerous cases, Bezwada et al. reported good results with the use of porous coated cementless bipolar prostheses in the elderly patients who had displaced femoral neck fractures (11). They used porous coated prostheses and reported low complication rates and good functional results using the Harris hip scoring. However, they have not given any information about the aforementioned prerequisities of bone quality and maximum femoral canal diameter.

Figved et al. (12) evaluated their results of cemented and cementless partial prostheses used in the treatment of displaced femoral neck fractures for patients older than 70 years. In their study, there were no differences in mortality and complication rates between the patient groups who had cemented or cementless techniques. Furthermore, they showed that, in the treatment of femoral neck fractures, it was possible to obtain similar good functional results with the use of bipolar partial prostheses whether or not they were cemented. Ahn and colleagues, in their systematic review of the literature, re-evaluated 11 prospective and retrospective studies about this issue. One thousand six hundred thirty-two cemented and 981 cementless hemiarthroplasties showed similar results in terms of postoperative mortality rates, overall complication rates and residual pain. They concluded that they believed there were few differences in outcome results between the cemented and cementless techniques (13).

In our study, we evaluated our cases in terms of functional results. For this purpose, we used the Oxford functional hip scoring system. We found no statistical difference between the functional early results of cemented and cementless modular head partial prostheses implanted in the treatment of elderly patients who suffered from femoral neck fractures. We stated that cemented and cementless patient groups showed similar excellent and good results, rated as 72.8% and 70.6% respectively. We found similar functional results to other comparative studies in the literature mentioned earlier in the discussion. In the elderly patients who had femoral neck fractures, a decrease in the quality of bone is usually expected. As we mentioned before, it was recommended in the literature that, in order to avoid complications of the cementless technique, the femoral canal diameter should be less than 16.5 mm. In our cementless prostheses group, the largest femoral canal diameter was 15 mm. In spite of reports in the literature about diminished cement complication rates by use of modern cementing techniques, we still feel anxious about the toxic effects of cement.

We also know that the revisions of cemented prostheses are more difficult than the revisions of cementless arthroplasties. Femoral canal diameter and bone quality of the patient should also be taken into account in the planning of the cementless hemiarthroplasty procedure. In light of these issues, we consider that, if we have decided to perform a hemiarthroplasty, in view of the recommendations about the quality of bone and the femoral canal diameter, cementless modular head prostheses rather than cemented ones should be the first choice of treatment in elderly patients with femoral neck fractures.

The low numbers of our cases and shortness of follow-up times are the limitations of our study. We are of the opinion that future comparison studies with more follow-up periods and greater numbers of cases will allow a clearer view about this subject.

CONCLUSION

We report that, in the treatment of elder patients with femoral neck fractures, cemented and cementless modular head partial prostheses show similar functional results.

Conflict of interest: No conflict of interest was declared by the authors.

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