ORIGINAL ARTICLE

Evaluation of patients' post-operative results operated for hip fracture with computerized dynamic posturography: Proximal femoral nailing versus hip arthroplasty

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ABSTRACT

BACKGROUND: Proximal femoral nailing (PFN) and hip arthroplasty (HA) are the two most often utilized surgical procedures for treating hip fractures in older patients. The post-operative postural balance and functional outcomes of patients may be significantly influenced by the technical distinctions between PFN and HA. This will influence the surgeon's preferred course of therapy. To examine the functional outcomes of patients treated with PFN and HA following a hip fracture, this study used computerized dynamic posturography (CDP). The aim of that study was to evaluate how the two treatment modalities affected patients' post-operative balance, postural stability, and functional rehabilitation.

METHODS: A total of 26 patients who underwent proximal femoral surgery (15 patients PFN [58%] and 11 patients HA [42%]) due to hip fractures were evaluated at least 12 months postoperatively. They were tested by direct radiographs, hip joint examinations, Harris hip score (HHS), and CDP.

RESULTS: Twelve (46%) of 26 patients were male and 14 (54%) were female. The mean age of the participants in the study was 67.9±14.2 years. The mean follow-up period was 24 (12–44) months. The average Harris score of PFN group was 79.3 (46.8–100) points and HA group was 83.7 (61.9–99.9) points. There was no significant difference between the groups in terms of Harris Score (p=0.54). The average of the mixed value of the balance results obtained with CDP (the composite score) for PFN group was 70.5 (56–79) points, and for HA group was 71.9 (56–83) points. There was no significant difference between the groups in terms of the composite score (p=0.47). Accordingly, 12 (80%) of the patients who underwent PFN had good results and 3 (20%) of them had bad results. Eight (72.7%) of those who underwent HA had good results and 3 (27.3%) had bad results. There was no statistically significant difference (p=0.66).

CONCLUSION: Comparing the composite score for balance results and HHS results for rehabilitation with the data of the patients who underwent PFN and HA, there was no statistically significant difference between these two techniques in terms of postural stability and balance as a result of CDP examination.

Keywords: Computerized dynamic posturography; femoral neck fracture; harris hip score; hip arthroplasty; intertrochanteric femur fracture; proximal femoral nailing.

INTRODUCTION

The increase in the incidence of hip fractures is a result of the increase in the elderly population in parallel with the increase in the development level of countries and prolongation of average life span.[1] While 1.6 million hip fracture cases were seen all over the world in 2000, it is predicted that this number will reach 6 million in 2050.[2,3] Factors directly affecting

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the mobilization and balance of people such as postural stability, dynamic and static balance elements, hip joint mobility, and pain play a key role in rehabilitation. Although conservative treatment is an option, long-term immobilization is not considered in first place, as it will increase morbidity and mortality in elderly patients, as well as the incidence of complications.[4] Hence, the primary goal is mobilization and return to the social life as soon as possible after the surgical treatment planned to be performed in early period.

The balance system is a complex structure that requires combining the data of three sensory systems affecting postural control, namely, somatosensory, visual, and vestibular, at various stages of the nervous system and the activity of the musculoskeletal system. CDP is a method that evaluates the standing balance of the individual using different test positions arranged similarly to situations that may be encountered in daily life.[5] It assesses an individual's ability to use and coordinate information from visual, vestibular, and somatosensory systems.[6]

Among diverse surgical treatment options for hip fractures in elderly population, the two commonly used methods are proximal femoral nailing (PFN) and hip arthroplasty (HA). The technical differences between PFN and HA may have a significant effect on patients' postural balance and functional results postoperatively. This will affect the surgeon's treatment preference. Therefore, this study aimed to compare the functional results of patients treated with PFN and HA after suffering a hip fracture through computerized dynamic posturography (CDP) to reveal its effects on patients' post-operative balance, postural stability, and functional rehabilitation.

MATERIALS AND METHODS

Patients operated for hip fracture were evaluated at least 12 months after surgery (PFN or HA) between 2015 and 2019. Patients who underwent any surgical technique other than PFN and arthroplasty, patients who were operated for pathological fractures, patients who had undergone revision surgeries for several reasons such as implant failure, infection, and periprosthetic fracture, patients with neurological diseases affecting the balance or preventing them from perceiving and performing test commands, and patients with previous surgical treatment or deformity related to other lower extremities and joints were excluded from the study.

Routine pelvic anteroposterior and hip bidirectional radiographs were evaluated. Patients exhibiting good reduction according to the Fogagnolo reduction criteria,[7] patients without complications such as periprosthetic fracture, component malposition, infection, loosening, avascular necrosis, arthrosis, nonunion, loss of reduction, implant failure, infection, cut-out, z effect, and acetabular or lateral migration of the screw, patients with normal collodiaphyseal angle, patients having the lateral plane angulation <20°, patients whose length difference between the lower extremities was <5 mm, and patients who underwent surgery in accordance with the proper technique and in whom full recovery was achieved were included in the study. Thus, we both aimed to exclude balance problems due to technical errors and tried to minimize the secondary factors that will affect the result while testing. Total of 232 patients who met the inclusion criteria were identified. One hundred and forty-eight patients with accessible contact information were called. The information was obtained that 38 patients died, 28 patients were bedridden, and 19 patients had Alzheimer's disease or other sort of dementia or visual impairment. Of the remaining 63 patients, 26 agreed to participate in our study. Patients were invited for evaluation after at least 12 months postoperatively.

Patients were evaluated for possible post-operative complications by testing with plain radiographs, hip joint examinations, Harris hip score (HHS),[8] and computerized dynamic posturography (CDP).

According to HHS system, the cases are evaluated in terms of pain, function (gait style, walking up and down stairs, wearing socks and shoes, sitting, and getting on public transport), deformity, and movement scores.

Neurocom Smart Balance Master System (Natus Medical Incorporated Corporate Headquarters 6701 Koll Center Parkway, Suite 120 Pleasanton, CA 94566 USA) posturography equipment was used in this CDP study. This test system basically consists of five force sensors on which the patient

Figure 1. The computerized dynamic posturography device in our clinic.

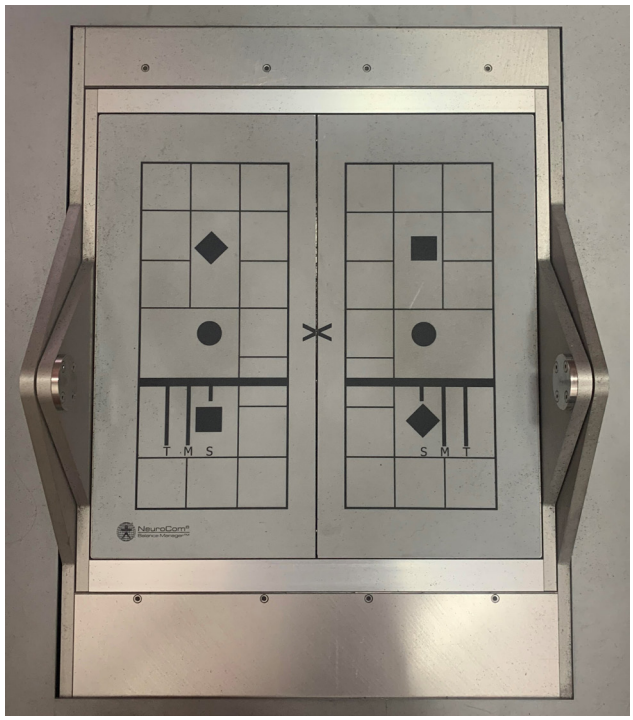


Figure 2. The platform (the floor on which the person stands) of CDP in closer view.

is standing, a platform that provides the projection of the center of gravity on the ground, and a screen that surrounds the patient to be affected by visual illusions. The positions of the subjects in the device were ensured by placing their feet on the platform as specified by the CDP device (Fig. 1). With foot placement, the correct positioning of the center of gravity is ensured (Fig. 2). The tests were performed on a movable platform in the Romberg position and without shoes. Before all tests, a special vest was put on the person as a precaution and the risk of falling was eliminated by connecting to the device. The content of each test was explained to the patients in detail, 15 min before the application.[9,10]

There are six analysis tests in the CDP test battery. These are: (1) Sensory Organization Test (SOT), (2) Adaptation Test, (3) Limits of Stability, (4) Rhythmic Weight Shift, (5). Unilateral Stance, and (6) Weight Bearing Squat. In this study, only SOT data were evaluated. SOT is providing information about static and dynamic balance, assessing an individual's ability to control the position of the center of gravity when visual and proprioceptive data are impaired. This test consists of six parts that objectively identify abnormalities in the somatosensory, visual, and vestibular systems providing postural control. During the test, information from the visual and proprioceptive systems is needed to keep the individual

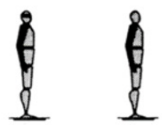
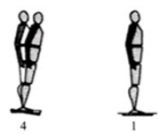
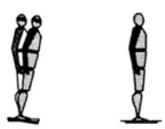
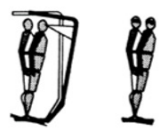
Sensor Analysis			
Name	**Test Status**	**Rate Pair**	**Importance**
SOM Somatosensory		$\frac{2}{1}$	Question: Does the oscillation increase when the visual cues are removed? Low Score: The patient cannot use somatosensory references correctly.
VIS Visual		$\frac{4}{1}$	Question: Does oscillation increase when somatosensory cues are inconsistent? Low Score: The patient cannot use visual references correctly.
VEST Vestibular		$\frac{5}{1}$	Question: Does oscillation increase when visual cues are removed and somatosensory cues are inconsistent? Low Score: The patient cannot use vestibular information correctly or there is no vestibular input.
PREF Visual preference		$\frac{3+6}{2+5}$	Question: Do inconsistent visual cues cause more oscillation than when visual cues are removed? Low Score: The patient uses visual cues even though the visual cues are inconsistent.

Figure 3. SOT six conditions and SOM, VIS, VEST, and PREF values are schematized, respectively.[28] **(a)** In the first stage of the test, the individual is asked to stand upright with his eyes open and only static balance is evaluated. **(b)** The same test is done with eyes closed (Romberg). **(c)** While the platform (the floor on which the person stands) is completely fixed, the screen (visual environment) moves and eyes are open. **(d)** Only the platform is moving, the eyes are open. **(e)** It is the same as the fourth part; only the person's eyes are closed. **(f)** Eyes are open, both the platform and the screen are movable. SOM: For the calculation of somatosensory sensory data usage; Ratio of 2nd state data to 1st state data (2/1), VIS: For the calculation of visual sensory data usage; Ratio of 5th state data to 1st state data (5/1), VEST: For the calculation of vestibular sense data usage; Ratio of 4th state data to 1st state data (4/1), PREF: For the calculation of the usage of correct data (visual preference) in case of visual deception; Ratio of 3rd and 6th state data to 2nd and 5th states (3+6/2+5).

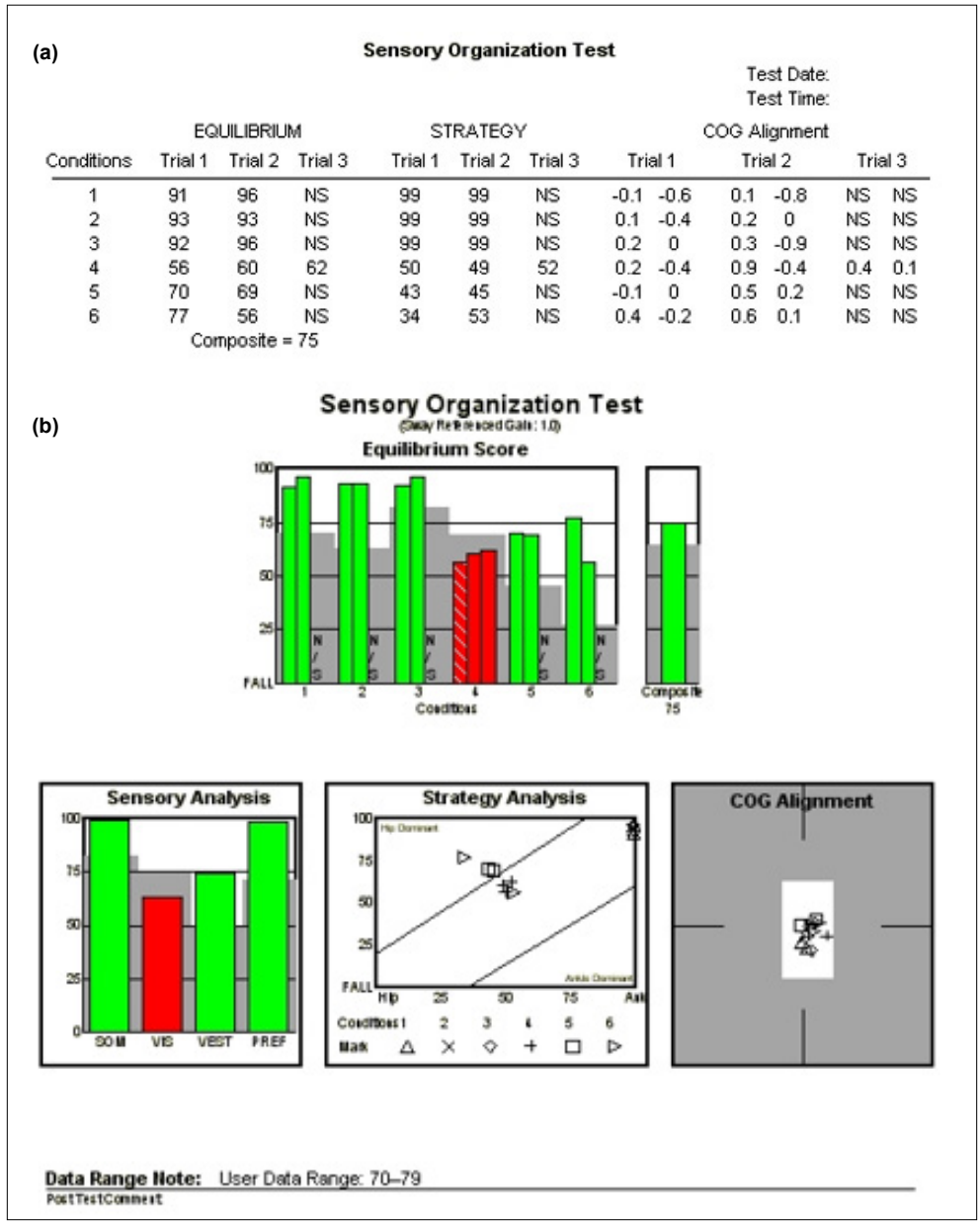


Figure 4. (a,b) Sample CDP-SOT test battery data output of a patient and numerical evaluations of these data are shown.

in balance. When interpreting SOT scores, the data obtained from the individual are compared to the maximum theoretical limit. The result is in the range of 0–100 and "100" means perfect stability. A "composite" score is obtained by taking the weighted average of all scores.[6] It consists of test groups in six different conditions (Fig. 3). Depending on the ratio of the patient's static balance values in different situations, the way the patient's different senses are used in maintaining balance is revealed. In this calculation, SOM, VIS, VEST, and PREF values were obtained (Fig. 3).

Data were compared with the normative values (cohort comparison) of normal individuals without any disease in their age range. Patients were given 15 min of training before the test. Afterward, six conditions of test were applied. In each trial, the test is repeated 2 times. The person getting a passing grade in both test attempts is deemed to have completed this stage and the average of these two values is taken. In patients scoring below the standardized value for their age in at least one of the two trials, it is repeated for the third time and the average of these three values is taken. A sample test result was depicted through Figures 4a and b.

Statistical analyses were performed with the help of SPSS version 17.0 program. The conformity of the variables to the normal distribution was examined by histogram graphics and the Kolmogorov–Smirnov test. Mean, standard deviation, and median values were used when presenting descriptive analy-

ses. Categorical variables were compared with the Pearson Chi-square test. The Mann–Whitney U test was used when evaluating non-normally distributed (non-parametric) variables between two groups. Spearman correlation test was used in the analysis of the measured data with each other. Cases with p-value below 0.05 were considered as statistically significant results.

RESULTS

A total of 26 patients, 15 (58%) of whom had PFN and 11 (42%) of whom had HA, were included in the study. Twelve (46%) of 26 patients were male and 14 (54%) were female. There was no significant difference between the groups in terms of gender (p=0.95) (Table 1). The mean age of the participants in the study was 67.9±14.2 years. The mean ages of PFN and HA groups were 70 (31–94) years and 65 (55–87) years, respectively. There was no significant age difference between the groups (p=0.15) (Table 1). The mean follow-up period was 24 (12–44) months. The mean follow-up period of PFN group was 24 (12–42) months, and HA group was 24 (13–44) months. There was no significant difference between the two groups. The mean HHS of the participants in the study was 81.2±14.0 points. The mean HHS of PFN group was 79.3 (46.8–100) points, (3 patients [20%] poor results, 6 patients [40%] moderate results, and 6 patients [40%] excellent results) and HA group was 83.7 (61.9–99.9) points, (1 patient [9%] poor outcome, 4 patients [36.5%] moderate outcome, 1 patient [9%] good outcome, and 5 patients [45.5%] excellent result), respectively. There was no significant difference between the groups in terms of Harris Score (p=0.54) (Table 1).

The average mixed value of the balance results obtained with CDP (the composite score) in those who underwent PFN was 70.5 (56–79) points, and who underwent HA was 71.9 (56–83) points. The mean Composite Score of the participants in the study was 71.1±8.3 points. There was no significant difference between the groups in terms of Composite Score (p=0.47) (Table 1). Sixty-four out of 100 points is the limit value. A patient scoring above 64 gets a passing grade according to his age. Accordingly, 12 (80%) of the patients who underwent PFN had good results and 3 (20%) had bad results. Eight (72.7%) of those who underwent HA had good results and 3 (27.3%) had bad results (p=0.66). Conditions-1,2,3,4,5,6 values were compared between the groups, and there was no significant difference among groups (Table 2). SOM, VIS, VEST, and PREF values were compared between the groups

Table 1. Relationship between PFN and HA groups in terms of gender, age, Harris score, and composite score

GENDER (Chi-Square Test)	**Male**		**Female**		**Total**		
	n	**%**	**n**	**%**	**n**	**%**	**p-value**
Proximal Femoral Nailing	7	(46.67)	8	(53.33)	15	(57.69)	0.951
Hip Arthroplasty	5	(45.45)	6	(54.55)	11	(42.31)	
Total	12	(46.15)	14	(53.85)	26	(100.00)	
AGE							
(Mann Whitney U-Test)	Age						p
	Mean	± SD.	Median	Min	Max		
Proximal Femoral Nailing	70.07	±17.06	75.00	31.00	94.00		0.148
Hip Arthroplasty	65.09	±9.35	61.00	55.00	87.00		
Total	67.96	±14.29	64.00	31.00	94.00		
HARRIS HIP SCORE							
(Mann–Whitney U-Test)	Harris Score						p
	Mean	± SD.	Median	Min	Max		
Proximal Femoral Nailing	79.34	±15.24	78.80	46.80	100.00		0.540
Hip Arthroplasty	83.79	±12.44	81.80	61.90	99.90		
Total	81.22	±14.03	79.30	46.80	100.00		
COMPOSITE SCORE							
(Mann–Whitney U-Test)	Composite Score						p
	Mean	± SD.	Median	Minimum	Maximum		
Proximal Femoral Nailing	70.53	±7.85	74.00	56.00	79.00		0.474
Hip Arthroplasty	71.91	±9.19	76.00	56.00	83.00		
Total	71.12	±8.30	74.50	56.00	83.00		

Table 2. Relationship between PFN and HA groups in terms of conditions data, SOM, VIS, VEST, and PREF values, the compared values of Harris and Composite scores

Conditions (Mann–Whitney U-Test)	**Proximal Femoral Nailing**		**Hip Arthroplasty**		**Total**		**P**
	Mean±SD	**Median**	**Mean±SD.**	**Median**	**Mean±SD**	**Median**	
Conditions-1	93.55±2.75	93.50	94.21±2.00	94.50	93.83±2.44	94.50	0.646
Conditions-2	90.94±3.25	92.00	91.83±2.62	91.50	91.32±2.98	91.75	0.574
Conditions-3	88.28±3.96	88.00	90.63±4.39	91.50	89.27±4.23	89.15	0.121
Conditions-4	71.63±8.50	71.60	72.31±14.14	74.30	71.92±10.98	72.55	0.959
Conditions-5	53.97±17.52	58.60	57.13±17.56	60.60	55.30±17.26	59.95	0.474
Conditions-6	49.90±22.50	58.50	52.75±18.37	65.60	51.10±20.51	58.75	0.646
SOM-VIS-VEST-PREF (Mann–Whitney U-Test)	**Proximal Femoral Nailing**		**Hip Arthroplasty**		**Total**		**p**
	Mean±SD.	**Median**	**Mean±SD**	**Median**	**Mean±SD**	**Median**	
SOM	97.17±2.93	98.30	97.42±1.57	97.80	97.28±2.41	98.05	0.919
VIS	76.49±8.59	75.30	76.65±14.61	76.50	76.56±11.26	75.90	1.000
VEST	57.70±18.76	62.40	60.69±19.05	66.50	58.97±18.56	63.80	0.507
PREF	92.85±10.80	96.80	93.95±11.72	99.30	93.32±10.98	96.95	0.474
Compared values of harris and composite scores (Chi-Square Test)		**Proximal Femoral Nailing**		**Hip Arthroplasty**		**Total**	**p**
		N	**%**	**N**	**%**	**N**	**%**	
Harris Score	Bad	3	(20.00)	1	(9.09)	4	(15.38)	0.589
	Middle	6	(40.00)	4	(36.36)	10	(38.46)	
	Good	0	(.00)	1	(9.09)	1	(3.85)	
	Excellent	6	(40.00)	5	(45.45)	11	(42.31)	
Composite Score	Bad	3	(20.00)	3	(27.27)	6	(23.08)	0.664

and no significant difference was found (Table 2).

The groupings of Harris and Composite scores were compared between the groups and no significant difference was found (p=0.59 for the Harris score and p=0.66 for the composite score) (Table 2).

Correlation between age and Harris Score, Composite Score, Conditions-1,2,3,4,5,6, SOM, VIS, VEST, and PREF in the PFN group, HA group, and Total examined and no significant correlation was found between age and the other parameters (Table 3).

DISCUSSION

Hip fractures caused by a simple fall are treated with different surgical methods, especially in the elderly population, whose populousness augments as the developmental level of the countries increases.[1] Within the scope of this study, PFN and HA surgeries were compared as two diverse treatment modalities for hip fractures in terms of functional outcomes, and it was observed through CDP that similar results were achieved after the 1st post-operative year.

In the study of Tang et al., HHS of 106 patients with advanced age who underwent proximal femoral nail anti-rotation (PFNA) was 90.2, and HHS of 96 patients who underwent partial HA was 79.6.[11] Prasad et al. calculated the mean HHS as 85.55 for HA and 77.03 for PFN at 1 year of follow-up of 54 patients.[12] In the study of Jolly et al., the mean HHS of 50 patients treated with PFN after 12 months was 86.7±13.1

Table 3. Relationship between age and other parameters between PFN and HA groups

Age and other (Spearman Correlation Test)	Age					
	Proximal Femoral Nailing		Hip Arthroplasty		Total	
	R	P-value	R	P-value	R	P-value
Harris Score	−0.361	0.186	−0.018	0.957	−0.257	0.204
Composite Score	−0.133	0.637	0.083	0.808	−0.076	0.713
Conditions-1	−0.121	0.667	0.196	0.563	−0.003	0.989
Conditions-2	−0.133	0.638	0.221	0.513	−0.024	0.909
Conditions-3	0.095	0.737	0.035	0.919	0.046	0.825
Conditions-4	−0.413	0.126	0.014	0.968	−0.168	0.411
Conditions-5	−0.079	0.780	−0.479	0.136	−0.202	0.323
Conditions-6	−0.123	0.661	0.170	0.617	−0.056	0.788
SOM	−0.013	0.965	−0.023	0.946	0.026	0.898
VIS	−0.386	0.155	0.014	0,968	−0.156	0.445
VEST	0.034	0.904	−0.452	0.163	−0.174	0.396
PREF	−0.160	0.568	−0.101	0.767	−0.186	0.363

and the mean HHS of 50 patients treated with HA after 12 months was 70.3±18.7.[13] In the study of Özkayın et al., HHS of 21 patients with advanced age who underwent PFNA was 75.95, and HHS of 33 patients who underwent partial HA was 68.44.[14] In the present study, there was no significant difference between the groups (PFN-79.3 vs. HA-83.7) in terms of HHS. The results of hip fracture-related studies were similar to the mean HHS of the present study making the results compatible with the literature.

Compiling the literature, there are various CDP studies regarding to balance despite the lack of the post-orthopedic surgical evaluation with CDP test battery. There is no study comparing PFN and HA surgeries performed after hip fracture with CDP. In the literature, patients with osteoporotic compression vertebral fractures with or without spinal brace,[15] patients with a shoulder arm sling,[16] the effects of normobaric hypoxia on patients' balance,[17] patients with osteoporosis and kyphosis,[18] and patients operated for pelvic ring and acetabulum fractures[19] were tested with CDP. There was one study pertaining to CDP and hip surgery conducted by Nallegowda et al., in which they evaluated total hip replacement performed patients with CDP and compared them with a healthy control group showing that there was no proprioceptive deficit in patients with total HA despite capsulectomy, but education required for balance, gait and activities of daily life, and appropriate sexual counseling should be given in the post-operative care.[20]

According to the CDP test battery data in our study, there was no significant difference between both the groups (PFN-70.5 vs. HA-71.9) in terms of the composite score and the groupings of Harris and Composite scores. Pertaining to Conditions-1,2,3,4,5,6 values and SOM, VIS, VEST, and PREF, there was no significant difference between the groups. Within the scope of these data, PFN and HA applications after the 1st year postoperatively do not make a significant difference, especially on the somatosensory sensory system, and that they do not exhibit superiority over each other in the context of static and dynamic balance. Thus, there is no difference among the factors that will influence the surgeon's choice in the effect on balance. Those results will pioneer in the literature because there are no study results existing there to compare the composite score, Conditions-1,2,3,4,5,6 values, SOM, VIS, VEST, and PREF values in the patients suffering from hip fractures.

Comparing PFN and HA, Tan et al. confronted PFNA and bipolar hemiarthroplasty (BPH) in elderly intertrochanteric fractures. Mortality rates 12 months after operation in PFNA were similar with BPH and HHS 12 months after operation in PFNA was similar with BPH.[21] Vestergaard et al. found that patients with arthroplasty had a significantly higher mortality rate compared to patients with PFN.[22] In the meta-analysis of Cui et al. on the application of either hemiarthroplasty or internal fixation in the treatment of elderly patients with femoral neck fractures, there was no significant difference between the two treatments in terms of mortality.[23] In the retrospective study by Kesmezacar et al., higher mortality rate was found in cases of intertrochanteric femur fracture treated with arthroplasty compared to those treated with internal fixation.[24] In the study of Parker et al. for displaced intracapsular proximal femur fracture; there was no significant difference between hemiarthroplasty and internal fixation in terms of mortality in the 1st year.[25] According to Parker et al., the function was better and the pain was less in cemented arthroplasty compared to internal fixation but there was no sig-

nificant difference between those two treatment modalities on the length of hospital stay and mortality.[26] In the study of Johansson et al., there was no significant difference in mortality between the arthroplasty and internal fixation for the patients with displaced femoral neck fractures but patients treated with arthroplasty technique exhibited a better HHS 1 year after surgery.[27] Comparing those results with our study, among 148 patients (84 PFN and 64 arthroplasty) 24 (28.5%) of those who underwent PFN and 14 (21.8%) of those who underwent arthroplasty died in 1–4 years. The data of our study do not show any correlation with the suggestion of this retrospective study by Kesmezacar et al. and by Vestergaard et al. that the choice of internal fixation will reduce mortality compared to the choice of arthroplasty. However, the results of the study by Tan et al. and Cui et al. were compatible with the present study in case of mortality rates' similarity and HHS between PFN and HA. Besides, on the contrary to our study, Parker et al. reported better functional outcome in PFN group than HA group despite the similar mortality rates. Unlike that, Johansson et al. reported better functional outcome in HA group than PFN group through HHS despite the similar mortality rates.

Limitations of the Study

Sufficient number of patients could not be included in our study. For this reason, the restricted number of patients could be considered as a limitation of this study. Moreover, if patients' pre-operative and post-operative CDP results could be compared, more reliable and sophisticated results could have been reached.

CONCLUSION

After comparing the HHS and Composite score for balance results, for functional rehabilitation with the data of the patients who underwent PFN and HA through CDP examination, it was deduced that there was no statistically significant difference between these two techniques in terms of function, postural stability, and balance. However, research on this subject was insufficient and this study will pioneer as to be the first one in the literature. Therefore, it is necessary to contribute to the literature by making further CDP examination for patients suffering from hip fractures with a larger number of cases to determine the possible postsurgical results' differences in balance, postural stability, and functional rehabilitation.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethical committee approved the study.

Ethics Committee Approval: This study was approved by the Istanbul University Cerrahpasa-Cerrahpasa Faculty Of Medicine Ethics Committee (Date: 07.01.2020, Decision No: A-21).

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ORİJİNAL ÇALIŞMA - *ÖZ*

Kalça kırığı nedeni ile ameliyat edilmiş hastaların bilgisayarlı dinamik postürografi cihazı ile değerlendirilmesi: Proksimal femoral çivileme ile kalça artroplastisinin karşılaştırılması

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AMAÇ: Proksimal femoral çivileme (PFN) ve kalça artroplastisi (HA), yaşlı hastalarda kalça kırıklarını tedavi etmek için en sık kullanılan iki cerrahi prosedürdür. Hastaların postoperatif postüral dengesi ve fonksiyonel sonuçları, PFN ve HA arasındaki teknik ayrımlardan önemli ölçüde etkilenebilir. Bu, cerrahın tercih ettiği tedavi sürecini etkileyecektir. Kalça kırığının ardından PFN ve HA ile tedavi edilen hastaların fonksiyonel sonuçlarını incelemek için bu çalışmada bilgisayarlı dinamik postürografi kullanıldı. Bu çalışmanın amacı, bu iki tedavi yöntemini karşılaştırarak bunların hastaların postoperatif dengesini, postüral stabilitesini ve fonksiyonel rehabilitasyonunu nasıl etkilediğini değerlendirmektir.

GEREÇ VE YÖNTEM: Kalça kırıkları nedeniyle proksimal femoral cerrahi [15 hasta PFN (%58) ve 11 hasta HA (%42)] uygulanan toplam 26 hasta ameliyattan en az 12 ay sonra olacak şekilde değerlendirildi. Hastaların sonuçları radyografiler, kalça eklem muayeneleri, Harris kalça skoru ve bilgisayarlı dinamik postürografi cihazı (CDP) ile test edildi.

BULGULAR: 26 hastanın on iki tanesi (%46) erkek, 14'ü (%54) kadındı. Çalışmaya katılımcıların ortalama yaşı 67.9±14.2 yıldır. Ortalama takip süresi 24 (12-44) aydı. PFN grubunun ortalama Harris skoru 79.3 (46.8-100) puan ve HA grubunun 83.7 (61.9-99.9) puandır. Harris skoru açısından gruplar arasında anlamlı bir fark yoktur (p=0.54). PFN grubu için CDP ile elde edilen denge sonuçlarının karma değerinin ortalaması (kompozit skor) 70.5 (56-79) puan ve HA grubu için 71.9 (56-83) puan idi. Kompozit skor açısından gruplar arasında anlamlı bir fark yoktu (p=0.47). Buna göre, PFN uygulanan hastaların 12'sinde (%80) iyi sonuçlar ve 3'ünde (%20) kötü sonuçlar elde edildi. HA uygulananların sekizinde (%72.7) iyi sonuçlar ve 3'ünde (%27.3) kötü sonuçlar elde edildi. İstatistiksel olarak anlamlı bir fark yoktu (p = 0.66).

SONUÇ: Denge sonuçları için kompozit skor ve rehabilitasyon için Harris kalça skoru sonuçlarının PFN ve HA uygulanan hastaların verileri ile karşılaştırıldığında, CDP muayenesinin bir sonucu olarak bu iki teknik arasında postüral stabilite ve denge açısından istatistiksel olarak anlamlı bir fark yoktu.

Anahtar sözcükler: İntertrokanterik femur kırığı; femur boyun kırığı; bilgisayarlı dinamik postürografi; proksimal femoral çivileme; kalça artroplastisi; Harris kalça skoru.

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