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The epidemiologic characteristics of patients that underwent surgery for hip fracture

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Aim: To retrospectively review the epidemiologic characteristics of patients who underwent surgery for hip fracture.

Materials and methods: Patients who underwent surgery for hip fracture in our clinic between 2006 and 2010 were evaluated in terms of their age, sex, localization of fracture, and surgical procedure.

Results: The mean age of 419 patients who underwent surgery for hip fracture was 74.18 ± 11.26 (50-106). Of the patients, 55.13% were operated on for intertrochanteric femur fractures, 33.41% for collum femoris fractures, and 11.46% for subtrochanteric femur fractures. The most frequent age range of patients who underwent surgery for hip fracture was found as 75-84. Collum femoris fractures were more frequent under the age of 65, whereas intertrochanteric fractures were more frequent over the age of 65 (P = 0.003). No difference was found for sex (P = 0.498). Bipolar hemiarthroplasty was applied to 70.88% of the patients.

Conclusion: The numbers of hip fractures are known to increase with the increasing average lifetime. Keeping regular data related to hip fractures will help with better identification of patients under risk and help to take precautions to prevent fracture.

Key words: Hip fractures, sex distribution, age distribution

Kalça kırığı nedeniyle ameliyat edilen hastaların epidemiyolojik özellikleri

Amaç: Kalça kırıkları yaşlı popülasyonun önemli sağlık sorunlarından birisidir. Bu retrospektif çalışmada kalça kırığı nedeniyle ameliyat edilen hastaların epidemiyolojik özellikleri incelendi.

Yöntem ve gereç: Kliniğimizde 2006-2010 yılları arasında kalça kırığı nedeniyle ameliyat edilen hastalar yaşları, cinsiyetleri, kırık lokalizasyonları ve uygulanan cerrahi girişimler açısından değerlendirildi.

Bulgular: Kalça kırığı nedeniyle ameliyat edilen 419 hastanın yaş ortalaması 74,18 ± 11.26 (50-106) bulundu. Hastaların % 55,13'ü intertrokanterik femur kırığı, % 33,41'i femur boyun kırığı, % 11,46'sı ise subtrokanterik femur kırığı nedeniyle ameliyat edilmişlerdi. Kalça kırığı nedeniyle ameliyat edilen hastaların en sık görülme yaş aralığı 75-84 bulundu. 65 yaş altında femur boyun kırıkları daha çok, 65 yaş üzerinde intertrokanterik kırıklar daha çok görüldü (P = 0,003). Cinsiyet açısından fark bulunmadı (P = 0,498). Hastaların % 70,88'ine bipolar kalça protezi uygulandı.

Sonuç: Ortalama yaşam süresinin artması ile kalça kırıklarının sayısının artacağı bilinmektedir. Kalça kırıklarıyla ilgili verilerin düzenli tutulması, risk altındaki hastaların daha iyi belirlenmesine ve kırık oluşmasını engelleyici önlemlerin alınabilmesine yardımcı olacaktır.

Anahtar sözcükler: Kalça kırıkları, cinsiyet dağılımı, yaş dağılımı

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Introduction

Hip fracture an important cause of morbidity and mortality in the geriatric population. In general, it is more common in females and incidence of hip fracture increases with age (1). It is reported that intertrochanteric femur fractures are seen more commonly than collum femoris fractures in the elderly population (1,2).

Surgical management of hip fractures can be separated as hemiarthroplasty and fracture fixation. Fracture fixation is applied to younger patient groups who have good bone quality. Partial hip replacement is applied to elderly patients who have bad bone quality and limited mobility before fracture (1).

The objective of our study was to determine the distribution of hip fractures per year for age, sex, and fracture localization of patients who underwent surgery in our clinic.

Materials and methods

A total of 419 patients, aged 50 and over, who underwent surgery for hip fracture in Ankara Dışkapı Yıldırım Beyazıt Education and Research Hospital, Third Clinic of Orthopedics and Traumatology, between January 2006 and September 2010 were reviewed retrospectively. Patients were analyzed according to age group, fracture localization, distribution according to years, applied surgical procedures, and sex. Patients under the age of 50 who had previous surgery for hip fracture, with refracture and with fracture due to malignancy, were excluded.

Patients were separated into 4 groups: 50-64, 65-74, 75-84, and over 85. They were assessed in 3 anatomic sites including collum femoris, intertrochanteric and subtrochanteric femur fractures, and 2 surgical procedures including partial hip replacement and fracture fixation.

Analyses of data were done by using SPSS 15.0 (SPSS Inc., Chicago, IL, USA) package program. Arithmetic mean ± standard deviation was used for continuous data and frequency table representations for qualitative data. Conformity of data to normal distribution was tested. While comparing the differences between 2 groups, the independent samples t-test was used for continuous data and the chi-square test for qualitative data. Difference in age parameters according to the diagnostic groups was analyzed with one-way ANOVA. A value of 0.05 was chosen as bias level for all analyses. $P \leq 0.05$ were considered significant.

Results

The mean age of all of the patients was 74.18 ± 11.26 (50-106). The mean age was 72.35 (50-103) for males and 76.12 (51-106) for females.

Of the patients, 231 (55.15%) underwent surgery for intertrochanteric fractures, 140 of them (33.41%) for collum femoris fractures, and 48 of them (11.46%) for subtrochanteric femur fractures. The mean age of patients with intertrochanteric femur fractures was 76.80 ± 10.05 (51-106), the mean age of patients with collum femoris fractures was 73.00 ± 11.52 (50-100) and the mean age of patients with subtrochanteric femur fractures was 64.98 ± 10.78 (52-87). The age parameter was significantly different in each diagnostic group ($F = 25.784$; $P < 0.001$). The distribution of diagnoses between males and females is shown in Table 1.

Table 1. Distribution of diagnoses according to sex.

	Collum femoris fracture	Intertrochanteric femur fracture	Subtrochanteric femur fracture	Total
Male (%)	68 (31.48)	120 (55.56)	28 (12.96)	216 (100.0)
Female (%)	72 (35.47)	111 (54.68)	20 (9.85)	203 (100.0)
Total (%)	140 (33.41)	231 (55.13)	48 (11.46)	419 (100.0)

There was no difference between males and females when diagnoses were examined in general without any distinction for age groups (χ^2 = 1.396; P = 0.498). It was seen that female and male patients were mostly gathered in the age group of 75-84 (42.4% and 31.0%, respectively; Tables 2 and 3). The distribution of fracture sites of males and females according to years is shown in Table 4. The mean age of each fracture site of both sexes is shown in Table 5.

When the patients over 85 years of age were excluded, it was found that the frequency of collum femoris and subtrochanteric femur fractures decreased but subtrochanteric femur fractures increased with age (χ^2 = 44.743; P < 0.001; Tables 6a-6c). When considered by sex, male (χ^2 = 21.779; P < 0.001) and female (χ^2 = 27.897; P < 0.001) patients had the same results (Tables 6a-6c).

Table 2. Distribution of fractures in age ranges according to sex.

	Sex		Age				Total
			50-64	65-74	75-84	85+	
	M	% distribution of males	62 (28.7)	54 (25.0)	67 (31.0)	33 (15.3)	216 (100.0)
	F	% distribution of females	30 (14.8)	45 (22.2)	86 (42.4)	42 (20.7)	203 (100.0)
Total		Total % distribution	92 (22.0)	99 (23.6)	153 (36.5)	75 (17.9)	419 (100.0)

Table 3. Distribution of fracture sites according to age groups.

Age groups		Collum femoris fracture	Intertrochanteric femur fracture	Subtrochanteric femur fracture	Total
50-64	n (%)	38 (41.30)	28 (30.43)	26 (28.26)	92 (100.00)
65-74	n (%)	34 (34.34)	53 (53.54)	12 (12.12)	99 (100.00)
75-84	n (%)	43 (28.10)	104 (67.97)	6 (3.92)	153 (100.00)
85+	n (%)	25 (33.33)	46 (61.33)	4 (5.33)	75 (100.00)
Total	n (%)	140 (33.41)	231 (55.13)	48 (11.46)	419 (100.00)

Table 4. Frequency in females and males (%).

		2006	2007	2008	2009	2010
Collum femoris fracture	Male	41.90	40.90	40.90	18.20	33.30
	Female	31.40	48.90	35.00	30.00	26.10
Intertrochanteric femur fracture	Male	45.20	52.30	57.10	63.60	53.30
	Female	48.60	42.20	55.00	65.00	69.60
Subtrochanteric femur fracture	Male	12.90	6.80	12.50	18.20	13.40
	Female	20.00	8.90	10.00	5.00	4.30

Table 5. Average age of fracture sites in sexes.

	Collum femoris fracture	Intertrochanteric femur fracture	Subtrochanteric femur fracture
Males	71.69 ± 11.87	75.03 ± 11.12	62.43 ± 8.84
Females	74.24 ± 11.12	78.71 ± 8.40	68.55 ± 12.38

Table 6a. Distribution of diagnoses according to age groups.

	Collum femoris fracture	Intertrochanteric femur fracture	Subtrochanteric femur fracture	Total
50-64	38 (33.0%)	28 (15.1%)	18 (59.1%)	62 (26.7%)
65-74	34 (29.6%)	53 (28.6%)	12 (27.3%)	99 (28.8%)
75-84	43 (37.4%)	104 (56.2%)	6 (13.6%)	153 (44.5%)
Total	115 (100.0%)	185 (100.0%)	44 (100.0%)	344 (100.0%)

Table 6b. Distribution of diagnoses according to age groups for males.

	Collum femoris fracture	Intertrochanteric femur fracture	Subtrochanteric femur fracture	Total
50-64	23 (39.7%)	21 (21.4%)	26 (66.7%)	92 (33.9%)
65-74	14 (24.1%)	34 (34.7%)	6 (22.2%)	54 (29.5%)
75-84	21 (36.2%)	43 (43.9%)	3 (11.1%)	67 (36.6%)
Total	58 (100.0%)	98 (100.0%)	27 (100.0%)	183 (100.0%)

Table 6c. Distribution of diagnoses according to age groups for females.

	Collum femoris fracture	Intertrochanteric femur fracture	Subtrochanteric femur fracture	Total
50-64	15 (26.3%)	7 (8.0%)	8 (47.1%)	30 (18.6%)
65-74	20 (35.1%)	19 (21.8%)	6 (35.3%)	45 (28.0%)
75-84	22 (38.6%)	61 (70.1%)	3 (17.6%)	86 (53.4%)
Total	57 (100.0%)	87 (100.0%)	17 (100.0%)	161 (100.0%)

Of the patients who underwent surgery for hip fracture, bipolar hemiarthroplasty was applied to 297 of the 419 patients (70.88%) and fixation surgery was applied to 122 of the 419 patients (29.12%). The mean ages of these patients were 77.97 and 64.93, respectively.

Discussion

Hip fractures are one of the most important problems in the elderly population. The frequency of hip fractures increases with the increasing average lifetime (3). In 1998, approximately 280,000 hip fractures occurred in the USA, and this will rise to 500,000 by 2040 (4). It is estimated to reach from 1.26 million in 1990 to 2.6 million in 2025 and to 4.5 million in 2050, worldwide (5). There are no studies available about the frequency of hip fractures seen in Turkey.

Hip fractures in the elderly population have been reported to occur more often after simple falls. The main factor in the formation of bone fractures in these patients is thought to be the decrease in resistance of bone due to osteoporosis. At the same time, weakening or absence of the protective reflexes during a fall and the disability of soft tissues around the hip to reduce the energy of the fall cause an increase in fracture frequency (6).

The average lifetime in Turkey was reported as 73.2 in 2006, according to data from the Turkish Statistical Institute (7). In our study, the mean age of patients was found as 74.2. According to the same data, the average lifetime for males was reported to be 71.1 and average lifetime for females was reported to be 75.3 (7). The mean age of patients in our study also had similar characteristics. The mean age of females (76.1) was higher than that of males (72.4). Accordingly, it can be said that the mean age of hip fractures is as much as the average lifetime.

In Turkey, Ozturk et al. reported the mean age of males as 74 and the mean age of females as 76 (8).

The incidence of hip fractures is expected to increase with increasing average lifetime. The average lifetime increased to 73.2 in 2006, which was 71.8 in 2002 (7). In our study, the mean age of hip fractures increased between 2006 and 2008, but no significant difference has been found since then. However, more and more elderly patients with hip fractures are expected to be seen in the future.

When the patients were evaluated according to their average ages, it was found that the subtrochanteric fractures occurred at younger ages; collum femoris and intertrochanteric fractures followed this, respectively ($F = 25.784$; $P < 0.001$). These findings were also consistent with the literature (1-3).

In our study, it was found that hip fractures most often occurred in the age range of 75-84 (36.5%). Therefore, it is understood that this age group is at risk for hip fractures. Because the rate for females in this age group was seen as 42.4%, it is understood that females in this age group are especially at risk. At the same time, it was found that as a fracture site, the intertrochanteric femur fractures most often occurred in this age range (67.97%).

When the hip fractures were examined according to their localization, it was found that the intertrochanteric fractures were seen more often, whereas the subtrochanteric fractures were seen the least (1,2,9). In our study, compatible with these data, intertrochanteric fractures constituted the most common fracture site among hip fractures ($P < 0.001$). No difference was detected for the distribution of fracture site according to sex ($P = 0.498$).

It was reported that the rate of collum femoris fractures to intertrochanteric fractures increased with age (1-3). In our study, it was found that collum femoris fractures occurred more often under the age of 65, whereas intertrochanteric fractures were seen more commonly over the age of 75 ($P = 0.003$). Because of more trabecular bone at the intertrochanteric area and the reduction of bone density due to osteoporosis with aging, this area becomes weaker. This is why the incidence of collum femoris fracture decreases with aging. Because the femur neck has more cortical bone density in proportion, decrease of the bone strength due to osteoporosis is less common. Therefore, intertrochanteric fractures are seen more commonly than collum femoris fractures in elderly patients with aging (3).

Fracture localizations showed a difference of distribution according to age, between sexes. Collum femoris fractures were seen more commonly in

both sexes under the age of 65. Intertrochanteric femur fractures were seen more commonly in males over 65 years. Collum femoris fractures occur more commonly in females in the age range of 65-74 (Table 3). In a study by Hinton et al., intertrochanteric and femur fracture incidences did not change in males with age. In females, after the age of 65 years, a gradual increase in intertrochanteric fractures was seen (3).

When we evaluated the average ages of fracture sites, the average age was found to be different for only intertrochanteric fractures (P = 0.005; Table 5).

In general, it is reported that hip fractures are seen more often in females (1,2,10). Collum femoris fractures have been reported to be seen 1.7 to 4.5 times more often in females (10). However in our study, it was found that hip fractures showed equal distribution between the sexes in general. Therefore, more emphasis should be given to males in the elderly population for osteoporosis.

The occurrence of hip fractures being more common in females may be due to the fact that the average lifetime for females is longer than males. However, in our study, although the average age of hip fractures in females was higher than males, there was no difference between males and females for the incidence of hip fractures.

In a study by Lofman et al., it was reported that the number of hip fractures in females had reduced over the previous 15 years, whereas an increase in males had continued. They stated that the reason for the reduction in hip fractures in females might have been protective or preventive treatments. They reported that the trochanteric fractures in males had increased. Therefore, they reported that a difference according to age had occurred between sexes (11). In our study, we found that the rate of intertrochanteric fractures in hip fractures had increased in recent years for both sexes.

In a study from Germany, the incidence of hip fractures in males was reported to increase, whereas in females the incidence of hip fractures decreased under the age of 74, but increased over this age (12). In a study by Guilley et al., the incidence of hip fractures was reported to decrease in females, but did not change in males (13). Jaglal et al. reported an increase in hip fractures until 1997, but since then, a decrease has occurred. They thought the reason for this was the increasing use of osteoporosis treatment (14).

There have been reports of different results from different centers. Lönroos et al. (15) and Icks et al. reported the incidence of hip fractures increased (12), whereas Chevalley et al. (13), Chang et al. (16), and Jaglal et al. reported a decrease (14).

Related to the differences between the sexes, Lofman et al. reported that the number of hip fractures in females gradually increased, but they did not report the same for males (11). In Denmark, an increase in both sexes was reported (17). Icks et al. reported that until the age of 74 the incidence increased in males, but decreased in females; however, over the age of 74 it increased in both sexes (12). Chevalley et al. reported the incidence of hip fractures in males had no change, but had a decrease in females (13). Another study reported the increase in incidence of hip fractures in males was higher than in females (18).

Bipolar hemiarthroplasty was performed in 71% of the patients who underwent surgery for hip fractures. The mean age of the patients who had bipolar hemiarthroplasty applied was higher than the patients who had fixation applied, as expected. While fixation was applied to younger patients, the usage of bipolar hemiarthroplasty increased with aging.

Consequently, an increase was expected in the number of patients with hip fractures due to the increase in average lifetime. As the hip fractures were reported to be seen more frequently in females, we found it equal in both sexes. Accordingly, osteoporosis is one of the occasions that should be thought to be evaluated not only for females, but also for males. The most risky age range for fracture is 74-85; thus it is appropriate to take necessary measures and alert the patients.

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