



The relationship between the degree of prolapse and bone mineral density in postmenopausal women with pelvic organ prolapse

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Abstract

This study aimed to investigate the relationship between the degree of prolapse and bone mineral density (BMD) in postmenopausal women with pelvic organ prolapse (POP). **Materials and Methods:** This retrospective study includes 40 postmenopausal women who were operated for POP. While patients who had grade <3 vaginal cuff prolapse were accepted as low grade prolapse, patients with grade ≥ 3 vaginal cuff prolapse were accepted as high grade prolapse. Patients' demographic characteristics, obstetric and gynecological history, laboratory findings and dual-energy X-ray absorptiometry results (lumbar spine BMD, lumbar spine T and Z scores, femur neck BMD, femur neck T and Z scores) were recorded as study parameters. **Results:** There were no significant differences between the groups in terms of age, body mass index, gravida, parity, follicle-stimulating hormone levels. BMD of the femur neck and lumbar spine were significantly higher in the low grade prolapse group than in the high grade prolapse group. T score of the femur neck were significantly higher in the low grade prolapse group than in the high grade prolapse group. In addition, estradiol levels of the high grade prolapse group was lower than the low grade prolapse group. BMD and T score of the femur neck and BMD of the lumbar spine were found to be significantly lower in the high grade prolapse group, suggesting that, there may be an association between the severity of POP and the risk of osteoporosis in postmenopausal women.

Keywords: Proplapse, bone mineral density, osteoporosis, menopause

1. Introduction

Pelvic organ prolapse (POP), is downward descent of female pelvic organs, including the bladder, bowels, uterus or post-hysterectomy vaginal cuff, resulting in protrusion through the genital hiatus (1). Osteoporosis is a disease that is characterized by low bone mass, deterioration of bone tissue, and disruption of bone microarchitecture (2). The predisposing factors for POP are parity, advancing age, genetic predisposition leading to reduced connective tissue and muscle strength and increased body mass index (BMI) as the most consistent risk factors (3, 4). Predisposing factors for osteoporosis are almost the same, it is more common in older people (5). Estrogen receptors play an important role in controlling musculoskeletal growth and maintenance of bone mass and also in the etiology of POP (6, 7).

When the literature is analyzed, it is seen that, a few studies have been conducted on the relationship between POP and osteoporosis (8-11). It has been shown that moderate-to-severe POP in postmenopausal women as a risk factor for hip fracture (10). After adjusting for age, advanced POP was correlated with osteoporosis (11).

With an aging population and longer life expectancy, POP

and osteoporosis is of increasing importance. In this study, given the association between menopause, POP and osteoporosis we wanted to investigate the relationship between the degree of prolapse and bone mineral density (BMD) in postmenopausal women with POP.

2. Materials and Methods

After receiving approval from the institutional review board, the medical records of consecutive postmenopausal patients who were operated for POP and have undergone DXA in a tertiary center were retrospectively reviewed. The study was performed in accordance with the 1964 Helsinki declaration.

Patients who have undergone dual-energy X-ray absorptiometry (DXA) in the last 3 months before surgery were included in the study. The patients had at least 12 months of amenorrhea. This was accepted as menopause (12). Patients' demographic characteristics, obstetric and gynecological history, and laboratory findings, DXA results were recorded as study parameters.

Baden Walker halfway classification system which consists of four grades was used for the assessment and

documentation of POP (grade 0 – no prolapse, grade 1 – halfway to hymen, grade 2 – to hymen, grade 3 – halfway past hymen, grade 4 – maximum descent) (13). Patients who had grade < 3 prolapse were accepted as low grade prolapse, patients with grade \geq 3 vaginal cuff prolapses were accepted as high grade prolapse.

The difference between the patient's BMD and mean BMD of young females aged in the range of 20–29 years (divided by the standard deviation (SD) of the reference population) yields the T-score. The expected BMD for the patient's age and gender yields the Z-score. A T-score less than -2.5 SD was defined as osteoporosis (5, 14).

Patients with a systemic disease, previous pelvic surgery, patients on hormone replacement therapy were excluded. Additionally, patients using drugs that can affect BMD, smokers were excluded. Patients who did not have sufficient records were excluded.

Data were analyzed via SPSS version 17.0 (SPSS Inc., Chicago, IL, USA). Kolmogorov- Smirnov analysis was used to evaluate the normal distribution of continuous variables. Continuous variables were compared via the independent simple t test. The comparison of categorical variables was tested via χ^2 test and Fisher exact test. Nominal data with normal distribution is shown as mean \pm standard deviation in the tables. Categorical data are shown in numbers (n) and percentages (%). A p value of less than 0.05 was taken to be significant.

3. Results

The present study was performed on a total of 40 postmenopausal patients who were operated for POP. While there were 16 patients who had grade < 3 prolapse and formed the low grade prolapse group, patients with grade \geq 3 prolapse formed high grade prolapse group.

Clinical, demographic and laboratory data of patients are shown in Table 1. The mean age of the low grade and high grade patients was 55.2 ± 6.5 years vs 57.8 ± 5.7 years respectively ($p = 0.222$). Body mass index (BMI) was similar between the groups. Also, there were no significant differences between the groups in terms of gravida, parity, follicle stimulating hormone (FSH) levels, prolapsed compartment. However, whereas the mean estradiol (E2) level of the low grade patients was 26 (4-56), it was 10 (5-35) in high grade prolapse patients ($p=0.019$) (Table 1).

Femur neck and lumbar spine DXA results of the patients are shown in Table 2. BMD and T score of the femur neck were significantly higher in the low grade prolapse group than those in the high grade prolapse group ($p = 0.043$ and $p = 0.028$, respectively). In addition, lumbar spine BMD was higher in the low grade prolapse group than in the high grade prolapse group ($p = 0.002$). Although, lumbar spine T and Z score were higher in the low grade prolapse group, no statistically significant difference was found between the

groups (Table 2).

Table 1. Clinical, demographic and laboratory characteristics of the patients

	Grade < 3 prolapse cases (n=16)	Grade \geq 3 prolapse cases (n=24)	p
Age (years)	55.2 ± 6.5	57.8 ± 5.7	0.222
Gravida	4 (1-7)	4 (2-8)	0.987
Parity	3 (1-5)	3 (2-6)	0.765
BMI	26.8 ± 2.3	27.5 ± 1.8	0.876
FSH	53.4 ± 4.8	54.5 ± 4.7	0.965
E2	26 (4-56)	10 (5-35)	0.019
Compartment prolapse*			0.784
Anterior	13 (81.3)	19 (79.2)	
Posterior	8 (50)	16 (66.7)	
Apical	6 (37.5)	10 (41.7)	

Values were presented as mean \pm standard deviation, median (min-max), number (%).

*Some patients had more than one compartment prolapse

BMI: Body Mass Index, FSH: Follicle Stimulating Hormone, E2: Estradiol
 $p < 0.05$ was considered statistically significant

Table 2. Femur neck and lumbar spine dual-energy X-ray absorptiometry results of the patients

	Grade < 3 prolapse cases (n=16)	Grade \geq 3 prolapse cases (n=24)	p
Lumbar spine BMD (g/cm^2)	0.889 ± 0.127	0.799 ± 0.382	0.002
Lumbar spine T score		-0.72 ± 0.20	-1.09 ± 0.88
Lumbar spine Z score	0.64 ± 0.74	0.58 ± 0.76	0.719
Femur neck BMD (g/cm^2)	0.661 ± 0.332	0.622 ± 0.231	0.043
Femur neck T score	-0.75 ± 0.65	-1.22 ± 0.63	0.028
Femur neck Z score	0.59 ± 1.04	0.49 ± 1.10	0.786

Values were presented as mean \pm standard deviation.

BMD: Bone Mineral Density

$p < 0.05$ was considered statistically significant

4. Discussion

POP and osteoporosis affects quality of life to an important extent and nowadays, due to ageing population are of increasing importance. In this study, we aimed to investigate the relationship between the degree of prolapse and BMD in postmenopausal women with POP. In this study, we found statistically significant difference between low grade and high grade prolapse group in terms of BMD of the femur neck and lumbar spine. Additionally, T score of the femur neck were found to be significantly higher in the low grade prolapse group.

When the literature is analyzed, there are few studies available on the association between POP and BMD. Pal et al, demonstrated a relationship between moderate to severe POP and low bone mineral density in postmenopausal women enrolled in the Women's Health Initiative Estrogen Plus Progestin trial (15). In another study, lumbar spine BMD was found to be inversely correlated with POP severity. The BMD

and T score of the femur neck were found to be significantly higher in the absent to mild POP group (8). Additionally, in a recent study, advanced POP was shown to be correlated with osteoporosis in Korean women aged 50 years and above (11). These results address a possible relationship between POP and BMD. In our study, in line with the results of these studies, BMD was found to be significantly lower in the high grade prolapse group in both the femur neck and lumbar spine. There we think, may be due to the same associated risk factors of BMD and osteoporosis, such as collagen and connective tissue disorders, advancing age, BMI (3-5, 16).

In contrast, Yoldemir et al. investigated whether there is a possible association between the presence of POP and osteoporosis. In this study, eighty-seven early postmenopausal women between the ages of 55 and 60 years were enrolled. And the results of this study, suggested that presence of pelvic organ prolapse in early postmenopausal women was not helpful in predicting osteoporosis (17).

Estrogen receptors were shown to play an important role in controlling skeletal growth and maintenance of bone mass and also in the etiology of POP (6). In a study held by Lang et al., serum estrogen levels and estrogen receptor values were found to be significantly lower in the uterine ligaments of premenopausal women with pelvic organ prolapse, and there found a positive correlation between estrogen receptor values in the uterine ligaments and the duration of postmenopausal years (7). Also, it is known that, the decrease in the estrogen levels results in rapid bone loss and osteoporotic patients should be counseled regularly about cigarette cessation, alcohol intake, and estrogen status (18, 19). Similar to these studies, in our study, we found statistically significant difference between E2 levels of the groups showing that E2 may play a role in both diseases. While the median E2 levels of the high grade prolapse group was 10 (5-35), it was 26 (4-56) in the low grade prolapse group ($p=0.019$).

The strength of this study is that there we found no significant difference between the groups in terms of age and BMI. This can eliminate some factors that can affect the BMD. Moreover, this study differs from other studies by evaluating patients' FSH and E2 levels.

However, there are several limitations to this study. Once, being a retrospective study may limit the reliability of data. And also, in this study, there were 40 postmenopausal patients who were operated for POP. These numbers may not be sufficient to reach a reliable result. Another weakness is that lifestyle characteristics (eating habits, alcohol use, and exercise status of patients) and the duration of menopause were not determined.

In conclusion, in the current study, BMD and T score of the femur neck and BMD of the lumbar spine were found to be significantly higher in the low grade prolapse group than in the high grade prolapse group. So that, we think, there may be

an association between the severity of POP and the risk of osteoporosis in postmenopausal women. Early recognition of patients under the risk of osteoporosis and fractures is very valuable since fractures increase morbidity and mortality. However, in order to apply the validity of these findings in the clinics, further studies are needed.

Conflict of interest

The authors declared no conflict of interest.

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