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SURGICAL TREATMENT RESULTS FOR DUPUYTREN'S DISEASE

RESULTADOS DO TRATAMENTO CIRÚRGICO NA DOENÇA DE DUPUYTREN

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ABSTRACT

Objective: To present the results of our cases of Dupuytren's disease treated with regional selective fasciectomy in light of the literature. **Methods:** Patients diagnosed with Dupuytren's contracture and surgically treated with regional selective fasciectomy at our institution with adequate follow-up data were included in the study. All patients were routinely followed after surgery to assess results and complications. QuickDASH scoring was used to evaluate the patients and recurrences and complications were recorded. **Results:** Twenty-one hands of 19 patients (13 males, 6 females) who underwent surgery and received adequate follow-up were retrospectively evaluated. Mean patient age was 65.8 (range: 41 to 86) and the mean follow-up period was 48.2 months (range: 24 to 86). Fourteen (66.6%) hands had excellent results, five (23%) hands had good results and two (9.4%) had fair results. The mean QuickDASH score for the patients at the final follow-up was 6.58 (range: 0 to 20.4). **Conclusion:** Our study results demonstrated that regional selective fasciectomy is a reliable and efficient method to treat Dupuytren's disease with low rates of complications and recurrence and the technique can be considered the gold standard.

Level of Evidence IV, Case Series.

Keywords: Dupuytren contracture/surgery. Dupuytren contracture/therapy. Fasciotomy.

RESUMO

Objetivo: Apresentar os resultados de nossos casos de doença de Dupuytren tratados com fasciotomia seletiva regional, à luz da literatura. **Métodos:** Os pacientes diagnosticados com contratura de Dupuytren e tratados cirurgicamente com fasciotomia seletiva regional em nossa instituição que tinham dados de acompanhamento adequados foram incluídos no estudo. Todos os pacientes foram rotineiramente acompanhados após a cirurgia para avaliação dos resultados e das complicações. Foi utilizada a pontuação QuickDASH na avaliação dos pacientes e as recorrências e complicações foram registradas. **Resultados:** Foram avaliadas retrospectivamente vinte e uma mãos de 19 pacientes (13 homens, 6 mulheres) submetidos à cirurgia e acompanhados adequadamente. A média de idade dos pacientes foi de 65,8 (intervalo: 41 a 86) e o período médio de seguimento foi 48,2 meses (intervalo: 24 a 86). Quatorze (66,6%) mãos tiveram excelentes resultados, enquanto cinco (23%) mãos tiveram bons e duas (9,4%) tiveram resultados moderados. A pontuação média no QuickDASH dos pacientes no seguimento final foi de 6,58 (intervalo: 0 a 20,4). **Conclusão:** Os resultados do nosso estudo demonstraram que a fasciotomia seletiva regional é um método confiável e eficiente, com baixas taxas de complicação e recorrência no tratamento da doença de Dupuytren e a técnica pode ser considerada o padrão-ouro.

Nível de Evidência IV, Série de Casos.

Descritores: Contratura de dupuytren/cirurgia. Contratura de dupuytren/terapia. Fasciotomia.

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INTRODUCTION

Dupuytren's disease is a benign fibroproliferative disorder of the palmar and digital fascia. The disease usually starts with a palpable nodule (the Dupuytren nodule) in the palm and may cause flexion contracture in the joints and functional impairment as it progresses.¹⁻⁵ The etiology of the disease remains unclear. However, male sex, advanced age, occupation, trauma, alcohol use, diabetes, smoking and epilepsy are known risk factors.⁶⁻⁸ Autosomal dominant inheritance with varying penetrance has been reported in several studies and the disorder has been confirmed in positive family histories.^{4,9,10} Treatment options can be categorized under four main sections; conservative approaches, collagenase injections, needle

aponeurotomy and fasciectomy.³ Fixed-flexion contractures are usually treated with surgical methods. Surgical management is recommended for cases with contracture in the PIP joint or contracture over 30 degrees in the metacarpophalangeal joint, with the limited palmar fasciectomy method the most popular and recognized option.^{11,12}

This study presents the results in our cases who received surgical treatment for Dupuytren's disease, in light of the literature.

PATIENTS AND METHODS

Patients diagnosed with Dupuytren's contracture and surgically treated with regional selective fasciectomy at our institution between

All authors declare no potential conflict of interest related to this article.

Study conducted at Metin Sabancı Baltalimanı Bone Diseases Training and Research Hospital, Department of Hand Surgery, Istanbul, Turkey.

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May 2006 and May 2014 who had adequate follow-up data were included in the study. All patients signed a free and informed consent form. Patients were staged according to system by Khan et al.¹³ (Table 1) In addition, smoking habits, alcohol use, regular use of medications and accompanying chronic diseases were noted for each patient. Since this study is retrospective in nature, institutional review board approval was not necessary.

All surgeries were carried out using an infraclavicular block with the application of a pneumatic tourniquet. Patients were given prophylactic first-generation cephalosporin for the 24 hours before and after surgery. Zigzagplasty extending straight toward the proximal or direct incision with multiple z-plasties was employed for the surgical incision. (Figure 1A-C) Regional fasciectomy (excision of the involved fascia) was performed in all patients and all surgeries were performed under magnification. After release of the tourniquet, the site was checked for bleeding and an aspiration drain was used. Skin grafting was required for wound closure in one patient and primary closure was performed in the others.

A short arm splint was applied postoperatively to maintain the hand and fingers in extension. After the edema subsided, the splint was removed and rehabilitation initiated. All patients continued to use the extension splint at night for three months.

All patients were routinely followed after surgery to assess results and complications. QuickDASH scoring was used for patient evaluation, challenges during functional recovery and daily activities were investigated and recurrences and complications were recorded. (Figure 1D, E)

We grouped our results into four sections, as suggested by Khan et al.¹³ According to this classification, full movement/function and no

recurrence was considered 'excellent,' mild loss of flexion-extension in fingers with minor impact on function was considered 'good,' loss of function with joint stiffness, recurrence and limitation in daily activities was considered 'fair,' and severe loss of function and failure to recover after the first contracture was considered 'poor.' (Table 2)

RESULTS

Twenty-one hands in 19 patients (13 males, 6 females) who underwent surgery and had adequate follow-up were retrospectively evaluated. Mean patient age was 65.8 (range: 41 to 86) and mean follow-up period was 48.2 months (range: 24 to 86). Fourteen (66.6%) hands had excellent results, five (23%) hands had good results and two (9.4%) had fair results. Mean QuickDASH score for patients at the final follow-up was 6.58 (range: 0 to 20.4). (Table 3) Bilateral involvement was observed in two (10.5%) patients. Four other patients had Dupuytren nodules in the other hand (21%). All (100%) patients had either contracture of the finger or flexion contracture over 30 degrees, constituting severe involvement (Stage 3). The second digit was involved in three (14.2%) cases, the third digit in six cases (28.5%), the fourth digit in 13 cases (61%) and the fifth digit in 12 (57%) cases.

Table 2. Classification of patient outcomes.

Results	Movement/Function/Recurrence
Excellent	Full movement and function, no recurrence
Good	Mild loss of flexion-extension in fingers with minor impact on function
Fair	Loss of function with joint stiffness, recurrence, limitation in daily activities
Poor	Failed to recover, severe loss of function

Table 3. Our results.

Treatment outcome	Point score	%
Excellent	14.0	66.6
Good	5.0	23.0
Fair	2.0	9.5

Table 1. Clinical staging of the patients.

Staging	Clinical characteristics
Stage 1	Thickened nodule and band in the palmar aponeurosis; may have associated skin abnormalities
Stage 2	Limitation of finger extension in addition to Stage 1
Stage 3	Presence of flexion contracture in addition to Stage 2

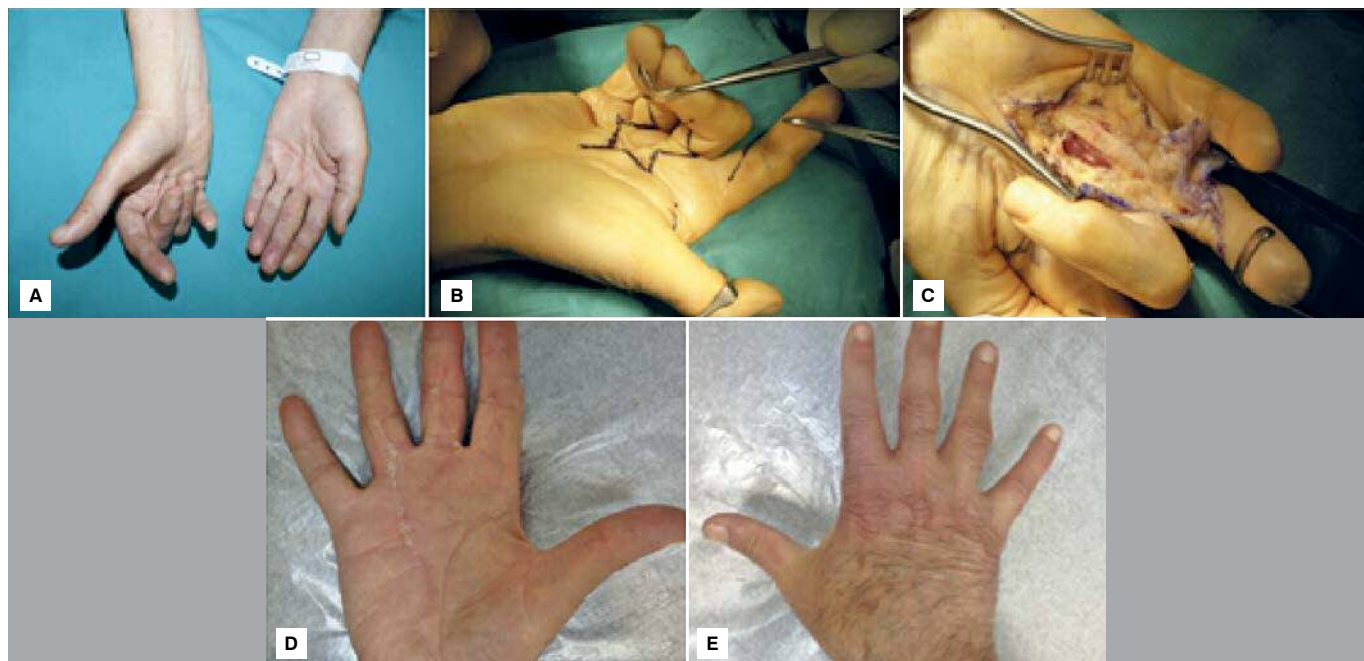


Figure 1. (A) Preoperative image of a patient with involvement in the 3rd and 4th digit of the right hand. (B) Planning for zigzagplasty. (C) Appearance of 3rd digit after removal of diseased tissue. (D, E) Functional outcome at 24th months post-procedure.

Six patients were regular smokers, three were regular drinkers and one patient used barbiturates for epilepsy. Two patients were diagnosed with diabetes.

In one patient, the digital artery at the radial side of the fifth digit was accidentally cut during surgery. Primary repair was performed in this patient and no circulation problems were observed in the follow-up examinations. Two other patients complained of numbness in their fingers and two patients experienced recurrences.

DISCUSSION

Several methods with varying rates of success, complication and recurrence have been reported in the literature to manage Dupuytren's disease.³ A general review of these methods will lead to better recovery, clinical outcome, morbidity and recurrence rates in cases treated with aggressive tissue dissection.³ Regional selective fasciectomy remains the gold standard in surgical treatment of Dupuytren's disease. The goal of the technique is to remove the macroscopically affected diseased fascia. Only regional selective fasciectomy was performed in our study and 90% of the patients had excellent and good results; excluding the two cases which developed recurrence.

Duthie and Chesney¹⁴ performed percutaneous needle fasciectomy on 82 patients and followed them for 10 years. These authors observed a recurrence rate of 66%. In their series of 100 patients,

Tonkin et al.¹⁵ compared dermofasciectomy with selective fasciectomy and reported that the recurrence rate was lower in patients who had undergone dermofasciectomy. Dermofasciectomy is still a valid treatment option in patients with recurrence or extensive skin involvement.³ Although fasciectomy and selective fasciectomy are similar in terms of functionality and recurrence rates, complication and morbidity rates are strikingly higher with radical fasciectomy.¹⁶ Khan et al.¹³ employed regional fasciectomy in 27 of their 30 patients and reported excellent and good results in 97% of the patients after five years of follow-up. Özkaya et al.⁴ retrospectively evaluated patients who underwent partial selective fasciectomy over a 10-year period and observed complications in 16.6% of the patients, but no recurrence. Ribak et al.¹⁷ compared regional selective fasciectomy and percutaneous needle fasciectomy and found no difference in terms of functionality between these techniques. These authors reported less total loss of passive extension in open selective fasciectomy.

CONCLUSION

In conclusion, selective fasciectomy is an effective technique to treat Dupuytren's disease. Key factors for higher rates of success and lower rates of complication and recurrence are a good command of anatomy and extreme attention during surgery, as well as efficient rehabilitation in the postoperative period.

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. SA (0000-0003-1028-2120)*, KO (0000-0002-7644-659X)* and AFB (0000-0003-0316-5444)* were main contributors in drafting the manuscript. SA, MB (0000-0002-1020-1207)*, IAO (0000-0002-7672-4270)*, EO (0000-0003-0765-5635)* and KO performed surgeries. SA and AFB followed patients, gathered clinical data and performed the literature search. SA and KO reviewed the manuscript and contributed to the intellectual concept of the study. *ORCID (Open Researcher and Contributor ID).

REFERENCES

1. Dolmans GH, Werker PM, Hennies HC, Furniss D, Festen EA, Franke L, et al. Dutch Dupuytren Study Group; German Dupuytren Study Group; LifeLines Cohort Study; BSSH-GODD Consortium. Wnt signaling and Dupuytren's disease. *N Engl J Med*. 2011;365(4):307-17.
2. Rayan GM. Clinical presentation and types of Dupuytren's disease. *Hand Clin*. 1999;15(1):87-96.
3. Cheung K, Walley KC, Rozental TD. Management of complications of Dupuytren contracture. *Hand Clin*. 2015;31(2):345-54.
4. Özkaya Ö, Yeşilada AK, Karşıdağ S, Soydan AT, Uğurlu K, Baş L. Dupuytren's contracture: etiology, diagnosis and surgical treatment, retrospective analysis of ten years. *Türkiye Klinikleri J Med Sci*. 2010;30(2):553-8.
5. Rodrigues JN, Becker GW, Ball C, Zhang W, Giele H, Hobby J, et al. Surgery for Dupuytren's contracture of the fingers. *Cochrane Database Syst Rev*. 2015;(12):CD010143.
6. Ross DC. Epidemiology of Dupuytren's disease. *Hand Clin*. 1999;15(1):53-62.
7. Burge P, Hoy G, Regan P, Milne R. Smoking, alcohol and the risk of Dupuytren's contracture. *J Bone Joint Surg Br*. 1997;79(2):206-10.
8. Palmer KT, D'Angelo S, Syddall H, Griffin MJ, Cooper C, Coggon D. Dupuytren's contracture and occupational exposure to hand-transmitted vibration. *Occup Environ Med*. 2014;71(4):241-5.
9. Saar JD, Grothaus PC. Dupuytren's disease: an overview. *Plast Reconstr Surg*. 2000;106(1):125-34.
10. Burge P. Genetics of Dupuytren's disease. *Hand Clin*. 1999;15(1):63-71.
11. Smith AC. Diagnosis and indications for surgical treatment. *Hand Clin*. 1991;7(4):635-42.
12. Desai SS, Hentz VR. The treatment of Dupuytren disease. *J Hand Surg Am*. 2011;36(5):936-42.
13. Khan PS, Iqbal S, Zaroo I, Hayat H. Surgical Treatment of Dupuytren's Contracture; Results and Complications of Surgery: Our Experience. *J Hand Microsurg*. 2010;2(2):62-6.
14. Duthie RA, Chesney RB. Percutaneous Fasciotomy for Dupuytren's Contracture A 10-year review. *J Hand Surg Eur*. 1997;22(4):521-2.
15. Tonkin MA, Burke FD, Varian JP. Dupuytren's contracture: a comparative study of fasciectomy and dermofasciectomy in one hundred patients. *J Hand Surg Br*. 1984;9(2):156-62.
16. Khashan M, Smitham PJ, Khan WS, Goddard NJ. Dupuytren's Disease: Review of the Current Literature. *Open Orthop J*. 2011;5 Suppl 2:283-8.
17. Ribak S, Borkowski Jr R, Amaral RP, Massato A, Avila I, Andrade D. Dupuytren contracture: comparative study between partial fasciectomy and percutaneous fasciectomy. *Rev Bras Ortop*. 2013;48(6):545-53.

OSTEOPOROSIS IN BRAZILIAN PATIENTS AWAITING KNEE ARTHROPLASTY

OSTEOPOROSE EM PACIENTES AGUARDANDO ARTROPLASTIA DE JOELHO NA POPULAÇÃO BRASILEIRA

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ABSTRACT

Objective: The primary objective of this study was to determine the prevalence of osteoporosis and osteopenia prior to total knee arthroplasty (TKA) in female patients. As a secondary objective, we evaluated the incidence of hip fractures, types of drugs to treat osteoporosis and serum vitamin D levels. **Method:** This is a transversal, descriptive and observational study which evaluated 60 women above age 55 prior to total knee replacement. **Results:** Mean patient age was 71.4 years. Osteoporosis was present in 16.7% of the sample and osteopenia in 15%. In the patients with osteoporosis, femur fracture (20%) was most frequent. Most of the group with osteopenia did not take any medication to treat this condition (55.6%), while most patients with osteoporosis took alendronate (30%) and 30% did not take any medication. **Conclusion:** The female population awaiting total knee replacement should be considered at risk for osteoporosis, confirming recent findings in the literature. **Level of Evidence III, Control Case Study.**

Keywords: Osteoporosis. Climacteric. Arthroplasty.

RESUMO

Objetivo: O objetivo primário do estudo foi determinar a prevalência de osteoporose e osteopenia no pré-operatório de artroplastia total de joelho (ATJ) em pacientes do sexo feminino. Como objetivos secundários, avaliamos a incidência de fraturas de fêmur, o uso de medicações para o tratamento da osteoporose e os níveis da 25-OH vitamina D. **Método:** É um estudo transversal, descritivo e observacional. A amostra foi composta por 60 mulheres com idade acima de 55 anos, no climatério, em pré-operatório de ATJ. **Resultados:** A média de idade foi de 71,4 anos. A osteoporose estava presente em 16,7% e a osteopenia em 15% da amostra estudada. Entre os pacientes com osteoporose, a fratura de fêmur foi a mais frequente (20%). A maioria do grupo com osteopenia não usava medicação para tratar essa afecção (55,6%), enquanto a maior parte dos pacientes com osteoporose usava alendronato (30%) e 30% não usavam nenhum medicamento. **Conclusão:** A população do sexo feminino aguardando artroplastia total de joelho deve ser considerada em risco de acometimento pela osteoporose, confirmando dados recentes da literatura. **Nível de Evidência III, Estudo de Caso Controle.**

Descritores: Osteoporose. Climatério. Artroplastia.

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INTRODUCTION

IBGE data from 1994 can be used to estimate that in Brazil there are 2.5 million osteoporotic individuals and 105,000 cases of hip fractures per year, resulting in a cost of approximately 630 million reais.¹ In a population-based study, Pinheiro et al.² demonstrated that smoking was the most important risk factor for osteoporosis in men. For women, the main factors are advanced age, early menopause, higher phosphorus intake, chronic use of benzodiazepines and family history of hip fracture after age 50 (first-degree relatives). Sedentary lifestyle, worsened quality of life and diabetes mellitus (DM) were considered common risk factors in both sexes. A

prevalence study reported that higher body mass index (BMI) was associated with lower risk of disease involvement.¹

Total knee arthroplasty (TKA) is a highly successful operation for treating degenerative changes of the knee such as osteoarthritis and demand for this procedure is growing worldwide due to aging populations and the need to preserve their quality of life.^{3,4} According to the National Institutes of Health Consensus, the most common long-term complications are aseptic loosening, pain and functional limitation, progressive bone loss, polyethylene wear and infection.⁴ Aseptic loosening leads to nearly half of indications for revision of primary arthroplasties.⁵ The cause of this complication is still the focus of much study and the current explanation is

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multifactorial, involving adaptive bone remodeling (stress shielding), micro-movement, high intra-articular pressure and individual susceptibility to microparticles.⁶ Furthermore, osteolysis is a factor that contributes to loosening of the implant and in some cases is related to osteoporosis.⁷

Some authors speculate that patients with osteoporosis have increased risk for periprosthetic fractures and consequently loosening of the implant due to the presence of micro-fractures and loss of contiguity in the bone tissue in this group.^{4,8}

Domingues et al.⁹ found a 20.7% prevalence of osteoporosis and 37.9% for osteopenia in patients awaiting total hip arthroplasty. Additionally, the same study found a high prevalence of inadequate serum vitamin D levels, with only 16.6% of patients demonstrating levels considered normal (>30 ng/ml).

Based on the data above from the current literature, the present study aims to determine the prevalence of osteoporosis in patients undergoing TKA and also compares calcium and vitamin D levels, as well as preoperative densitometry findings. It is extremely important to understand the impact of this disease on women's health, since there are currently no studies in the literature correlating osteoporosis and TKA.

The objectives of the study were to determine the prevalence of osteoporosis prior to TKA in female patients and correlate levels of pain and functional capacity in patients with decreased bone mass in order to assess whether patients with osteoporosis and osteopenia demonstrate clinical profiles comparable to the population with normal bone density levels. The study also aimed to demonstrate if the involvement of osteoporosis had some direct or inverse correlation with the degree of functional limitation and pain prior to surgery.

METHODS

This original study is cross-sectional, descriptive and observational. We assessed 60 patients over 55 years of age prior to TKA; only female patients were selected. Data were collected from July 2015 to February 2016.

This study was approved by the institutional review board under CAAE number 49258815.9.0000.5032. The subjects involved in this study signed a free and informed consent form.

Inclusion criteria were: diagnosis of osteoarthritis of the knee confirmed by radiography, scheduled TKA procedure and consent to participate in the study.

Exclusion criteria were: previous infection, congenital diseases, neoplasms, inflammatory arthritis, secondary osteoporosis, previous orthopedic surgery, hypothyroidism, decompensated DM and use of corticosteroids.

Bone mineral density (BMD) was measured by dual-energy x-ray absorptiometry (DEXA) in the femur and hip of all patients. Only the lower bone mass values were recorded in each component of the sample.

Osteoporosis was defined as a decrease in bone mass of at least 2.5 standard deviations from the mean young adult BMD (T-score < -2.5) and osteopenia was defined in patients with BMD values between -1 and -2.5 standard deviations from the mean peak value in young adults.²

A comparison of pain and functional impairment was established between patients with and without osteoporosis to establish correlations between the degree of osteoarthritis and decreased bone mass. Three questionnaires were used: the Western Ontario and McMaster Universities Osteoarthritis index (WOMAC),¹⁰ the Knee Society Score index (KSS),¹¹ and the Visual Analog Pain Scale (VAS).¹² The questionnaires were applied to all patients preoperatively. The Ahlback classification modified by Keyes et al. apud Galli et al.¹³ was used to establish the degree to which

the knee joint is compromised in knee osteoarthritis. We also compared fracture involvement in the groups with osteoporosis, osteopenia and no changes in BMD in order to identify patterns that worsen quality of life in these patients.

The angular deviation of the lower limbs (LL) was assessed in all patients via physical examination and panoramic radiography. X-rays of all patients were taken from the front and profile views, as well as an axial view of the patella at 45° knee flexion, in addition to front and profile panoramic radiography; patients were classified as genu varum or genu valgum.

The variables analyzed were age, sex, degree of deformity, comorbidities, lifestyle habits (particularly smoking and alcoholism), serum level of 25-OH-D, ionic calcium, presence of osteoporosis and osteopenia according to BMD, use of medications to treat osteoporosis/osteopenia, hormone replacement therapy, vitamin D or calcium supplementation, BMI and previous fractures.

The statistical analysis was conducted using Excel 2003 (Microsoft Corporation, Redmond, WA, USA) and SPSS 20.0 (IBM, New York, NY, USA) software. The tests were performed at a 5% significance level. The qualitative characteristics were described using absolute and relative frequencies and the quantitative measures were described in summary measures (mean, standard deviation, minimum and maximum). The quantitative characteristics were described according to the presence of osteoporosis and compared between patients with and without osteoporosis using Mann-Whitney tests.

RESULTS

Table 1 describes the sample studied. The average age was 71.4 years with standard deviation (SD) of 6.9, minimum of 58 years and maximum of 85.

Mean ionic calcium was 4.85 with SD of 0.31; mean vitamin D (25-OH-cholecalciferol) was 32 with SD of 7.12. Four patients were smokers and five used alcohol. Table 1 shows the comorbidities found in each patient through the pre-procedure diagnostic questionnaire, medical records and physical examination. Hypertension was most frequent (35%), followed by DM (18.3%), hypothyroidism (10%) and dyslipidemia (10%). No other clinically relevant comorbidities were reported by the patients.

Table 2 below shows the presence of alterations in BMD. Osteoporosis was present in 10 of the individuals surveyed (16.7%) and osteopenia in 9 (15%).

Angular deviation in the lower limbs (genu valgum, genu varum) was compared in patients with osteopenia, osteoporosis, or without BMD changes. Genu valgum was detected in 70% of patients with osteoporosis and 55.6% of patients with osteopenia. Genu varum was the most common change (61%) in patients without changes in the BMD.

We also evaluated the BMI of patients in each group based on changes in BMD (osteoporosis, osteopenia and no bone changes). The group classified as having osteoporosis had a mean BMI of 27.3 (SD 2.9), the osteopenia group had mean BMI of 27.44 (SD 3.6) and the group with no changes in the densitometry had a mean BMI of 27.15 (SD 3.0).

Table 3 contrasts the bone density classification and fracture history of the patients. We can see that the group with osteoporosis had the most fractures, most frequently femur fracture (20%).

Table 4 shows the use of bisphosphonates for prevention and/or treatment and also divides patients by osteoporosis, osteopenia and no bone alterations. Most of the osteopenia group did not use any anti-resorption medication (55.6%), while most of the patients with osteoporosis used alendronate or no medication (30%).

Table 5 describes pain levels according to VAS¹² and functional capacity according to KSS¹⁴ and WOMAC¹⁰ in patients with

osteoporosis, osteopenia and no bone changes. Note that there was no statistically significant difference for any scale in the preoperative period and that 100% of the evaluated patients with osteoporosis showed insufficient levels of 25-OH-cholecalciferol (reference value: <30 ng/mL).

Table 1. Description of the sample.

Variable	N=60 (%)	Mean SD (min-max)
Age (years)		71.4 ± 6.9 (58-85)
Ionic calcium		4.85 ± 0.31 (4.2-5.5)
Vitamin D (25-OH-cholecalciferol)		32 ± 7.12 (22-43)
Lifestyle factors		
Tobacco user	4 (6.7)	
Alcohol user	5 (8.3)	
Non-user of tobacco or alcohol	51 (85)	
Comorbidities		
High blood pressure	21 (35)	
Hypothyroidism	6 (10)	
Diabetes mellitus	11 (18.3)	
Dyslipidemia	6 (10)	
Heart failure	1 (1.7)	
History of breast cancer	1 (1.7)	
No comorbidities	26 (43.33)	

Table 2. Changes in bone density in the sample.

Changes in bone density	N (%)
Osteoporosis	10 (16.7)
Osteopenia	9 (15)
Normal	41 (68.3)

Table 3. History of fractures in each group.

Fracture	Group of patients according to changes in bone densitometry (mean SD)			p* (95% CI)
	Osteoporosis n=10	Osteopenia n=9	No bone changes n=41	
Spinal fractures (due to osteoporosis)	1 (10)	1 (11.1)	0	0.803 (0.796-0.811)
Fracture of proximal femur	2 (20)	0	1 (2.4)	
Fracture of distal radius	1 (10)	0	0	
No fractures	6 (60)	8 (88.9)	40 (97.6)	

*Pearson's chi-squared test with statistical significance if p is less than 0.05.

Table 4. Medications used in each group.

Variable	Group of patients according to changes in bone densitometry (%)		
	Osteoporosis n=10	Osteopenia n=9	Normal BMD n = 41
Medication for osteoporosis			
None	3 (30)	5 (55.6)	41 (100)
Risedronate	2 (20)	2 (22.2)	0
Alendronate	3 (30)	1 (11.1)	0
Ibandronate	0	1 (11.1)	0
Zoledronic acid	2 (20)	0	0
Denosumab	0	0	0
Teriparatide	0	0	0
Hormone replacement	0	3 (33.3)	0
Vitamin D replacement	7 (70)	6 (66.7)	0

Table 5. Comparative analysis of patients with osteoporosis, osteopenia and normal patients according to VAS, KSS and WOMAC scores*

	Group of patients according to changes in bone densitometry (mean SD)			P* (95% CI)
	Osteoporosis n= 10	Osteopenia n= 9	No bone changes n=41	
Visual Analog Scale				
Preoperative	8.2 ± 0.79	7.8 ± 0.9	7.8 ± 0.6	0.346 (0.337-0.355)
Knee society score				
Preoperative	44.1 ± 5.67	39.8 ± 5.3	42.6 ± 6.5	0.273 (0.265/0.282)
WOMAC score				
Preoperative	60.4 ± 7.15	59.7 ± 7.0	62.2 ± 7.7	0.356 (0.346/0.365)

*VAS = Visual Analog Pain Scale, Knee Society Score, Western Ontario and McMaster Universities osteoarthritis index. *Kruskal-Wallis test with statistical significance if p is less than 0.05.

DISCUSSION

This is the first prevalence study that establishes a correlation between osteoporosis and TKA. Patients with osteoarthritis who need joint replacement are predominantly elderly women, a population with a high risk of developing osteoporosis,¹⁵ which justifies the selection of only women for this study. The selected age range coincides with menopause.

In this study we found that 31.7% of patients had decreases in bone mass and 16.7% had a confirmed diagnosis of osteoporosis from BMD and 15% had osteopenia. This value can be considered low in comparison with the study conducted by Pinheiro et al.² on a sample of 4,332 patients in the metropolitan region of São Paulo, in which 33% of postmenopausal women showed osteoporosis of the lumbar spine or femur. Faisal-Cury and Zacchello¹ found a 32.7% prevalence of osteoporosis in a group of 999 women above 49 years of age. We can therefore speculate that the difference between the results obtained may derive from differences in sample size. Bisphosphonates are analogous to pyrophosphates and have an anti-resorptive action; they are among the most common therapeutic options for treating osteoporosis¹⁶ in order to prevent the occurrence

of fractures. We found that 30% of patients with osteoporosis and 55.6% of patients with osteopenia were not taking bisphosphonate medication prior to the assessment. There was no statistically significant difference between the BMI of patients with osteoporosis, osteopenia and those with no changes in bone mass. The scores for the VAS,¹² KSS,¹¹ and WOMAC¹⁰ did not demonstrate a statistically significant difference between patients with and without osteoporosis. Smoking has been established in the literature as a risk factor for osteoporosis. Only 6.7% of the population studied were smokers, but 80% of the patients who smoked had osteoporosis.¹⁷ Hormone replacement therapy is recommended for postmenopausal patients as the best way of preventing osteoporotic fractures, especially in the first years after last menstruation, although it should be used cautiously because of the increased risk of embolism and breast cancer.¹⁵ Based on this information, this study found that 33.3% of patients with osteopenia and no patients with unaltered bone mineral densitometry results used hormone replacement therapy. This finding may show insufficient monitoring for this disease in this group of women. Calcitriol (1.25-dihydroxycalciferol) is the active form of vitamin D and plays a prominent role in bone metabolism, contributing to intestinal absorption of calcium and inhibiting resorption of the bone matrix.¹⁸ According to Glowacki et al.,¹⁹ one of the most important factors contributing to its activation is exposure to sunlight. Serum values between 20-29 ng/mL indicate insufficient vitamin D, while levels below 20 ng/mL indicate an established deficiency of the hormone.²⁰ A significant difference was seen in vitamin D levels among the groups with osteoporosis or osteopenia and no changes in bone mass. All patients diagnosed with osteoporosis showed insufficient levels,

which indicates the significant influence this hormone deficiency plays in the presentation of the disease.

One limitation of this study was the inclusion of the entire sample which fit the inclusion criteria, creating a convenience sample. A second limitation was the lack of a control group with patients without osteoarthritis matched for age and sex. The BMD only evaluated the hip and lumbar spine because these regions are most commonly included in assessment of the disease. Because this was a prevalence study, it was not possible to establish a causal relationship between exposure factors and outcomes.

The female population scheduled for TKA should receive special attention during the preoperative period since this group is notably susceptible to osteoporosis, in order to prevent complications such as osteoporotic and periprosthetic fractures and infection, which may lead to early loosening of the implant. We can infer that osteoarthritis does not appear to protect against osteoporosis, according to the same findings demonstrated by Domingues et al.⁹ if special attention is given to diagnosis in this group of patients and appropriate treatment is established.

CONCLUSION

The prevalence of osteoporosis in the group studied was 16.7%, while the prevalence of osteopenia was 15%. The female population waiting for TKA should be considered at risk for involvement of osteoporosis in the studied population. The data we found resemble those found in the international literature.

No statistically significant difference was observed between pain levels and functional capacity among groups with osteoporosis, osteopenia, or with normal levels of bone mineral density.

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. RLT (0000-0002-5709-2714)* and AYN (0000-0002-6451-8488)* were the main contributors in writing the article. RLT, AYN, RRB (0000-0001-9581-3239)* and LP (0000-0001-9914-4327)* performed the surgery, followed the patients and gathered clinical data. RLT, AYN, MAPV (0000-0003-3675-4966)* and ETD (0000-0001-6735-1401)* evaluated the data from the statistical analysis. RLT, AYN, LP, RRB, ETD and MAPV performed the bibliographic research, reviewed the manuscript and contributed to the study's intellectual concept. *ORCID (Open Researcher and Contributor ID).

REFERENCES

1. Faisal-Cury A, Zacchello KP. Osteoporose: prevalência e fatores de risco em mulheres de clínica privada maiores de 49 anos de idade. *Acta Ortop Bras.* 2007;15(3):146-50.
2. Pinheiro MM, Ciconelli RM, Jacques N O, Genaro PS, Martini LA, Ferraz MB. The burden of osteoporosis in Brazil: regional data from fractures in adult men and women – The Brazilian Osteoporosis Study (BRAZOS). *Rev Bras Reumatol.* 2010;50(2):113-20.
3. Zeni JA Jr, Axe MJ, Snyder-Mackler L. Clinical predictors of elective total joint replacement in persons with end-stage knee osteoarthritis. *BMC Musculoskelet Disord.* 2010;11:86.
4. Carvalho Júnior LH, Castro CAC, Gonçalves MJB, Rodrigues LCM, Lopes FL, et al. Complicações de curto prazo da artroplastia total do joelho: avaliação de 120 casos. *Rev Bras Ortop.* 2006;41(5):162-6.
5. Lettaf OB, Frucchi R, D'Elia CO, Demange MK, Albuquerque RFM, Rezende MU, et al. Functional comparison between septic and aseptic knee arthroplasty review. *Acta Ortop Bras.* 2009;17(3):159-61.
6. Jasper LL, Jones CA, Mollins J, Pohar SL, Beaupre LA. Risk factors for revision of total knee arthroplasty: a scoping review. *BMC Musculoskelet Disord.* 2016;17:182.
7. Fraser JF, Werner S, Jacofsky DJ. Wear and loosening in total knee arthroplasty: a quick review. *J Knee Surg.* 2015;28(2):139-44.
8. Abu-Amer Y, Darwech I, Clohisy JC. Aseptic loosening of total joint replacements: mechanisms underlying osteolysis and potential therapies. *Arthritis Res Ther.* 2007;9 Suppl 1:S6.
9. Domingues VR, de Campos GC, Plapler PG, de Rezende MU. Prevalence of osteoporosis in patients awaiting total hip arthroplasty. *Acta Ortop Bras.* 2015;23(1):34-7.
10. Baron G, Tubach F, Ravaud P, Logeart I, Dougados M. Validation of a short form of the Western Ontario and McMaster Universities Osteoarthritis Index function subscale in hip and knee osteoarthritis. *Arthritis Care Res.* 2007;57(4):633-8.
11. Silva ALP, Demange MK, Gobbi RG, Silva TFC, Pécora JR, Croci AT. Translation and validation of the Knee Society Score – KSS for Brazilian Portuguese. *Acta Ortop Bras.* 2012;20(1):25-30.
12. Martinez JE, Grassi DC, Marques LG. Análise da aplicabilidade de três instrumentos de avaliação de dor em distintas unidades de atendimento: ambulatório, enfermagem e urgência. *Rev Bras Reumatol.* 2011;51(4):299-308.
13. Galli M, De Santis V, Tafuro L. Reliability of the Ahlback classification of knee osteoarthritis. *Osteoarthritis Cartilage.* 2003;11(8):580-4.
14. Silva ALP, Demange MK, Gobbi RG, da Silva TFC, Pécora JR, Croci AT. Translation and Validation of the Knee Society Score – KSS for Brazilian Portuguese. *Acta Ortop Bras.* 2012;20(1):25-30.
15. Radominski SC, Pinto-Neto AM, Marinho RM, Costa-Paiva LHS, Pereira FA, Urbanetz AA, et al. Osteoporose em mulheres na pós-menopausa. *Rev Bras Reumatol.* 2004;44(6):426-34.
16. Leite MOR. Tratamento da osteoporose pós-menopausa. *Arq Bras Endocrinol Amp Metabol.* 1999;43(6):442-5.
17. Holm JP, Hyldstrup L, Jensen JB. Time trends in osteoporosis risk factor profiles: a comparative analysis of risk factors, comorbidities and medications over twelve years. *Endocrine.* 2016;54(1):241-55.
18. Arden NK, Cro S, Sheard S, Doré CJ, Bara A, Tebbs SA, et al. The effect of vitamin D supplementation on knee osteoarthritis, the VIDEO study: a randomised controlled trial. *Osteoarthritis Cartilage.* 2016;24(11):1858-1866.
19. Glowacki J, Hurwitz S, Thornhill TS, Kelly M, LeBoff MS. Osteoporosis and vitamin-D deficiency among postmenopausal women with osteoarthritis undergoing total hip arthroplasty. *J Bone Joint Surg Am.* 2003;85-A(12):2371-7.
20. Ghosh B, Pal T, Ganguly S, Ghosh A. A study of the prevalence of osteoporosis and hypovitaminosis D in patients with primary knee osteoarthritis. *J Clin Orthop Trauma.* 2014;5(4):199-202.