

Clinical Demographic Characteristics of Arthroplasty Total Knee in a University Hospital

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Abstract

To assess socio-demographic characteristics of patients undergoing total knee arthroplasty (TKA) in a public university hospital, evaluating the outcome infection and associated factors. Method: A retrospective study was carried out with 78 patients undergoing TKA, from 2013 to 2014. The socio-demographic and clinical characteristics of the patients were collected. Comparison between infected and non-infected patients was performed to find out which variables were possibly associated to this complication. Result: Of 81 arthroplasties performed, patients were older (mean age 64 years), women (79

Index terms— knee, arthroplasty, epidemiology, infection.

Since the nineteenth century, the treatment of serious knee joint diseases with joint replacement (arthroplasty) has been recognized and has received deserved attention. In 1860, Verneviul 1 suggested interposing of soft tissue for reconstructing the knee joint. In the twentieth century, total knee arthroplasty (TKA) has greatly evolved, due to the development of inorganic materials suitable for joint interposition and improvement of the surgical technique, driven mainly by the studies of Campbell 2 and McKeever. 3 TKA is used to treat refractory chronic pain mostly due to primary arthrosis. 4,5 TKA is a major surgery and subject to post-operative complications and infection is one of the worst and most feared complication, representing an actual challenge to the orthopedic surgeon, since it is difficult and lengthy to treat. 6 The infections after knee arthroplasty represent an estimated economic impact of US\$ 50,000 per patient in the US. 7 To succeed the treatment of infection post total knee arthroplasty, early and accurate diagnosis should be immediate. Therefore, it is essential that all patients complaining of pain at the site of a total knee arthroplasty are evaluated for the possible presence of infection. 8 The surgical site infection can be classified as superficial or deep; those involving only skin and subcutaneous tissue are considered superficial and those involving deep tissue incision, such as fascia and muscle are considered deep infections. 9 In the acute form of infection, constant local pain, heat, swelling, redness and joint effusion are evident and almost always caused by *Staphylococcus aureus* and gram negative bacilli (*Escherichia coli*, *Proteus* sp, *Pseudomonas aeruginosa*). 10 Some laboratory tests should be requested, such as erythrocyte sedimentation rate and the level of Creactive protein (CRP) when infection is a suspicion. 11 Carvalho Junior et al. 12 demonstrated the correlation of CRP and erythrocyte sedimentation rate levels, showing that these go back to normal levels 30-80 days after surgery. The correlation of physical examination, laboratory tests and imaging tests are essential for the diagnosis of prosthesis infection. 11,12 The prevalence of primary TKA infection is between 0.4% and 2% in the US. 13,14 Malinzak et al. 15 reported a 0.51% infection rate in 8,494 hip and knee arthroplasties, moreover, they found as risk factors for infection: obesity, early age and diabetes mellitus. In Spain, the prevalence of TKA infection is 3-4%. 16 In Brazil, some authors have shown that the prevalence of superficial infection of TKA is 1.2%. 4 The study is justified by the need to establish a diagnostic protocol and early treatment to reduce complications to the patient and costs to public health systems.

The aim of this study was to establish the sociodemographic profile of patients undergoing TKA performed in a public hospital, evaluating the outcome infection and associated factors.

1 II. Materials and Methods

This study was approved by the Research Ethics Committee of Hospital Público Universitário under the protocol number 1007986/CAAE 42681815.4.0000. 5208. All authors signed the Free and Informed Consent Form. The diagnosis of TKA infection occurred during hospitalization and outpatient consultation during the follow-up period between six and 30 months.

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Exclusion criteria were incomplete medical records, patients unidentified in the hospital database and infections acquired in other hospitals. Data from medical record was collected and stored in a Microsoft Office Excel 2007 spreadsheet. The variables age, gender, etiology, comorbidities, use of prophylactic antibiotics, complications, primary surgery and revision were collected for each patient. The qualitative variables were described as frequencies and percentages. To evaluate the association between two dichotomous qualitative variables the Fisher's exact test was employed with the statistical software Epi Info. P-Values <0.05 were considered statistically significant.

3 III. Results

Eighty one total arthroplasties were performed, 78 unilateral primary TKA, three bilateral primary in two stages and a review. As to gender, 17 patients (20.9%) were male and 64 (79.1%), female. Regarding etiology, only osteoarthritis affected 71 (87.65%) patients. The age range was between 29-84 years old (mean 64 years). (Figure 1) As complications, we diagnosed 13 (16.04%) infections, eight (9.88%) involving deep tissue and five (6.17%) involving superficial tissues. Among the 81 arthroplasties, five (6.17%) were preceded by deep vein thrombosis (DVT), all cases confirmed by Doppler ultrasound, one case (1.23%) had compartment syndrome and one patient (1.23%) died.

Considering the 13 patients who developed TKA infection, nine (69.23%) were female, 10 (76.92%) were over 65 years of age ($p = 0.023$). Regarding the comorbidities of infected individuals, 12 (92.31%) presented some associated clinical disease. Among these diseases, 10 (76.92%) patients had hypertension and two (15.38%) had DM. Even among those who presented infections, one patient had rheumatoid arthritis (RA) and had gout (15.38%). However, among all surgeries, five (6.17%) had rheumatoid arthritis. Prophylactic antibiotic was administered 30 min before the surgical incision in 12 (92.31%) patients. The recommendation of the Hospital Infection Control Committee was to start antibiotic prophylaxis 30 min difference between those treated for 24h and 48h. The antibiotic used in the prophylaxis was 2g cefazolin before the incision and 1g each 8h postoperatively. If cefazolin was not available, 2g cephalothin was administered before incision and 1g every 6h postoperatively. Deep vein thrombosis, considered the second most common complication, preceded three (23.08%) of TKA infections ($p=0.027$). (Table 1)

4 IV. Discussion

The mean age of patients undergoing TKA reported by other researchers varied between 65 and 71 years old 4,17 somehow above the mean age in the present study of 64 years old. The preferential involvement of the elderly is related to cumulative exposure to various risk factors and biological changes that occur with aging, such as thinning of the cartilage, decreased muscle strength and oxidative stress. 18 This study showed that women preferably developed osteoarthritis, which is consistent with the international literature. 18 This fact is probably related to menopause, which interferes with the female hormone levels. Regarding etiology, Piano et al. 5 performed a Brazilian study that showed that the diagnostic profile of patients reached 92.4% only for osteoarthritis, as another study 4 revealed a smaller percentage of 84.9% of primary knee osteoarthritis, which is similar to another study with 87.65%.

The level of TKA infection of this study (16.04%) was higher than others found in the literature. 13-16,19, Moreover, the level of superficial infections was up to five times higher, and deep infections exceeded level found in the national^{4,19} and international literature. 17 Considering this worrisome scenario, it was decided to temporarily suspend TKA procedures and a protocol was elaborated by surgeons and the Hospital Infection Control Committee, which addressed various requirements that were not a routine procedure previously before considering TKA surgeries. Among these requirements are urine culture tests; if the result showed abnormal, the patient was treated with antibiotics and the test repeated. The surgical environment must be under laminar air flow; all surgical clothing should be waterproof and disposable; patients should be medicated with mupirocin nasal solution three days before surgery, in order to obtain nasal decolonization. Furthermore, antibiotic therapy must start 40 min prior to surgical incision with 2g cefazolin for patients weighting up to 120 Kg and 3g for heavier patients. The dose is repeated every 2h during the surgery and maintained every 8h for 24h postoperatively.

Brazilian researchers 11 showed that females were preferentially affected among patients with TKA infection, with a prevalence of 65.51%, a result similar to the present study (69.23%). Furthermore, we found a significant associations of TKA infection with the age over 65 years ($p = 0.023$), unlike the results of Pinto et al., 19 which found no statistically significant association. Five patients (6.17%) submitted to TKA developed deep vein thrombosis and three of them had infection ($p = 0.027$), a much higher rate than that observed by Lenza et al.⁴ and Xu et al. 17 Only one patient of this study had died, almost half the prevalence found by Pinto et

104 al.; 19 however, higher than Lenza et al., 4 who had no deaths among patients undergoing TKA. Prophylactic
105 antibiotics did not statistically correlate to infection prevention ($p = 0.62$), however, literature data is consistent
106 regarding the indication of chemoprophylaxis to prevent TKA infection. 4,5,12 Systemic hypertension was the
107 most prevalent comorbidity among infected patients, a result similar to other studies. 4,5 Patients with diabetes
108 mellitus had no statistically significant association with TKA infection ($p = 0.60$). It is important to note
109 that Malinzak et al. 15 mellitus, rheumatic diseases had a similar prevalence (15.38%) among patients with
110 TKA infection, but there was no statistically significant association. Only one patient had rheumatoid arthritis
111 among those infected, however, considering all 81 arthroplasties, 6.17% had rheumatoid arthritis, five times more
112 prevalent than in the study by Lenza et al., 4 and almost three times more prevalent than in the study by Pinto
113 et al. 19

114 5 V. Conclusion

115 Patients undergoing TKA are mostly elderly women, with primary knee osteoarthritis and comorbidities that
116 evolve to infection in 16% of cases. TKA infection had as statistically significant risk factors age over 65 years and
117 deep vein thrombosis. These results should serve to improve prevention of deep vein thrombosis. More studies
118 are needed aiming to create specific protocols in order to improve the quality of clinical practice with consequent
reduction of postoperative complications. ¹

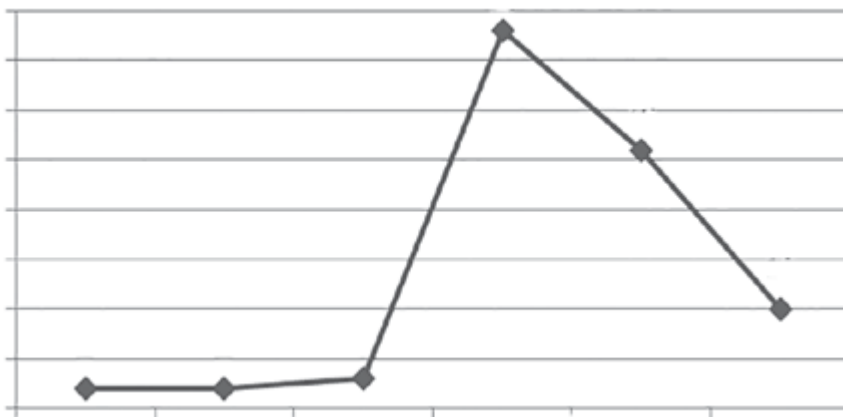


Figure 1: K

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Variables	Infected total knee arthroplasty n (%)	p value
Gender		
Female	9 (69.23)	0.23
Male	4 (30.77)	-
Age (years old)		
> 65	10 (76.92)	0.023
65	3 (23.08)	-
Comorbidities		
Systemic hypertension	10 (76.92)	0.6
Diabetes mellitus	2 (15.38)	0.5
Rheumatic disease	2 (15.38)	0.31
Prophylactic antibiotic therapy		
Yes	12 (92.31)	0.62
No	1 (7.69)	-
Infection		
Deep	8 (61.54)	-
Superficial	5 (38.46)	-
Deep vein thrombosis	3 (23.08)	0.027
Compartment Syndrome	1 (7.69)	-
Death	1 (7.69)	-

Figure 2: Table 1 :

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