

CUIDADO É FUNDAMENTAL

UNIVERSIDADE FEDERAL DO ESTADO DO RIO DE JANEIRO • ESCOLA DE ENFERMAGEM ALFREDO PINTO

RESEARCH

DOI: 10.9789/2175-5361.rpcfo.v13.9692

OCCURRENCE OF LATE POSTOPERATIVE KNEE AND HIP ARTHROPLASTY POSTOPERATIVE COMPLICATIONS

Ocorrência de complicações no pós-operatório tardio de artroplastia de joelho e quadril

Ocurrencia de complicaciones postoperatorias postoperatorias tardías de artroplastia de rodilla y cadera

Álvaro Francisco Lopes de Sousa^{1*}; Layze Braz de Oliveira²; Herica Emilia Félix de Carvalho³; Ivonizete Pires Ribeiro⁴; Inês Fronteira⁵; Denise de Andrade⁶

How to quote this article:

Sousa AFL, Oliveira LB, Carvalho HEF, *et al.* Occurrence of late postoperative knee and hip arthroplasty postoperative complications. *Rev Fun Care Online*. 2021. Jan./Dec.; 13:1271-1276. DOI: <http://dx.doi.org/10.9789/2175-5361.rpcfo.v13.9692>

ABSTRACT

Objective: To evaluate the prevalence of postoperative complications and their association with sociodemographic and clinical variables. **Methods:** this is a descriptive, prospective follow-up study of 99 patients from a teaching hospital. Participants were selected by intentional sampling (reference) and followed for 30 days after hospital discharge. Descriptive, univariate and bivariate analyzes were performed. **Results:** 32 (32.3%) patients developed at least one complication, and 10 (10.1%) developed more than one complication within a 30-day follow-up. Pain (31; 31.3%) and Infection (12; 12.1%) were the most prevalent complications. A statistical association was identified between the clinical outcome of patients undergoing knee and hip surgery and the presence of postoperative complications ($p < 0.001$). **Conclusion:** the occurrence of postoperative complications of knee and hip arthroplasty in a 30-day follow-up was high, especially pain and local infection.

Descriptors: Surgical Procedures, Operative, Postoperative Complications, Epidemiological Monitoring, Infection, Home Nursing.

¹ Nurse, PhD student, Ribeirão Preto College of Nursing, University of São Paulo. Ribeirão Preto - SP - Brazil and Institute of Hygiene and Tropical Medicine, Universidade Nova de Lisboa. Lisbon, Portugal.

² Nurse, PhD student, Ribeirão Preto School of Nursing, University of São Paulo. Ribeirão Preto - SP - Brazil.

³ Nurse, PhD student, Ribeirão Preto School of Nursing, University of São Paulo. Ribeirão Preto - SP - Brazil.

⁴ Nurse, PhD in Nursing, Professor at the UNINOVAFAPI University Center, Teresina - Piauí - Brazil.

⁵ Nurse, PhD in International Health, Professor at the Institute of Hygiene and Tropical Medicine, Universidade Nova de Lisboa. Lisbon, Portugal.

⁶ Denise de Andrade. Nurse, PhD in Sciences, Professor at Ribeirão Preto College of Nursing, University of São Paulo. Ribeirão Preto - SP - Brazil.

RESUMO

Objetivo: Avaliar a prevalência de complicações no pós-operatório e sua associação com variáveis sociodemográficas e clínicas. **Métodos:** trata-se de um estudo descritivo, de seguimento prospectivo, realizado com 99 pacientes de um hospital de ensino. Os participantes foram selecionados por amostragem intencional (referencia) e seguidos por 30 dias após a alta do hospital. Realizou-se análises descritivas, univariadas e bivariadas. **Resultados:** 32 (32,3%) pacientes desenvolveram ao menos uma complicação, sendo que 10 (10,1%) desenvolveram mais de uma complicação num seguimento de 30 dias. Dor (31; 31,3%) e Infecção (12; 12,1%) foram as complicações mais prevalentes. Identificou-se associação estatística entre o desfecho clínico dos pacientes submetidos a cirurgia de joelho e quadril e a presença de complicações no pós-operatório ($p < 0,001$). **Conclusão:** a ocorrência de complicações no pós-operatório de artroplastia de joelho e quadril num seguimento de 30 dias foi elevada, com destaque para a dor e infecção local.

Descritores: Procedimentos cirúrgicos operatórios, Complicações pós-operatórias, Vigilância epidemiológica, Infecções, Assistência domiciliar.

RESUMEN

Objetivo: Evaluar la prevalencia de complicaciones postoperatorias y su asociación con variables sociodemográficas y clínicas. **Métodos:** este es un estudio descriptivo, prospectivo de seguimiento de 99 pacientes de un hospital universitario. Los participantes fueron seleccionados por muestreo intencional (referencia) y seguidos durante 30 días después del alta hospitalaria. Se realizaron análisis descriptivos, univariados y bivariados. **Resultados:** 32 (32,3%) pacientes desarrollaron al menos una complicación y 10 (10,1%) desarrollaron más de una complicación en un seguimiento de 30 días. El dolor (31; 31,3%) y la infección (12; 12,1%) fueron las complicaciones más frecuentes. Se identificó una asociación estadística entre el resultado clínico de los pacientes sometidos a cirugía de rodilla y cadera y la presencia de complicaciones postoperatorias ($p < 0,001$). **Conclusión:** la aparición de complicaciones postoperatorias de artroplastia de rodilla y cadera en un seguimiento de 30 días fue alta, especialmente dolor e infección local.

Descriptorios: Procedimientos quirúrgicos operativos, Complicaciones posoperatorias, Monitoreo epidemiológico, Infecciones, Atención domiciliar de salud.

INTRODUCTION

Total joint arthroplasty is a highly prevalent procedure performed whose main purpose is to treat problems related to osteoarthritis. This intervention has become effective in reducing pain in patients with joint disease, improving their quality of life and restoring their physiological function and independence.¹

In developed countries, the number of surgical procedures involving arthroplasty is high, with estimates pointing to an increase of 150 to 250% by 2040. It is estimated that by 2030 the number of Total Primary Hip Arthroplasty (THA) exceeds 525 thousand, while the Knee Arthroplasty (TKA) should reach 3.48 million.²⁻³

Although this possibility of surgical intervention is effective in healing an important and complicated joint problem, total arthroplasty has been associated in the literature with the occurrence of several complications that vary in intensity, from discomfort to the appearance of

infection, with an increase in readmissions, hospitalization days, morbidity and mortality. These complications can occur early or late and result in the need for additional care and increased costs of care.⁴

Risk factors linked to peri-operative complications and readmissions after joint arthroplasty can be classified as modifiable and non-modifiable. The first group includes chronic diseases, obesity, poorly controlled diabetes, malnutrition, among others⁵; while gender, race, age and chronic disease processes represent the non-modifiable factors.⁶

In Brazil, little is known about the frequency of complications involving arthroplasty. National data of these surgeries in the Unified Health System (SUS) are available through consultation with the Hospital Information System (SIH/SUS), however, the information compiled in this system provides only superficial results for cost purposes, leaving gaps on the occurrence of complications and associated clinical outcomes.

In order to monitor Infections Related to Health Care (IRHC) and Microbial Resistance in health services throughout the country, the National Sanitary Surveillance Agency presented in its technical note No. 1 of 2019 that total primary knee or hip arthroplasty should be monitored to feed the Surgical Site Infection indicator (SSI), that is, health services should feed the FormSUS system with data for calculating the incidence rate of SSI related to arthroplasty.⁷

The surveillance agency orientation is clear, however, its implementation is not easy, because these patients have a reduced length of hospital stay, precisely to prevent infections and, therefore, monitoring should follow in an extra-hospital environment. Based on the operational difficulty of developing postdischarge surveillance, this study aims to evaluate the incidence of postoperative complications and their association with sociodemographic and clinical variables.

METHODS

This is a descriptive, prospective follow-up study, conducted with 99 patients from a Teaching Hospital in Teresina, Piauí, Brazil, with graduates of primary knee and hip surgery from January to December 2019. The institution studied has 316 beds and provides clinical and surgical care with specialties in neurology, urology, orthopedics, nephrology, vascular, gynecology, gastrointestinal, ophthalmology, proctology, mastology and plastic. All surgical procedures performed in the hospital are elective and therefore there is no emergency unit.

Participants were selected by intentional sample⁸ and were followed for 30 days after discharge from the hospital (postdischarge surveillance). The follow-up was made by telephone contact (telephone calls and exchange of messages by *Whatsapp* application). In the contact, the

researchers addressed the signs and symptoms of the main complications, using a checklist prepared for this purpose⁹, respecting the time indicated for follow-up and deadline. In addition, sociodemographic and clinical information related to the mediate postoperative period (after surgery and until hospital discharge) were collected directly from the medical records and confronted with the participants' report. Each contact was registered and scheduled a new one at a time convenient to the participant, until the end of the follow-up (30 days).

The data collected were systematically analyzed and organized in double typing in the *Microsoft Excel 2010* program and imported into the software *Statistical Package for the Social Sciences - SPSS for MacOs* (version 20.0). The Kolmogorov-Smirnov test was used to evaluate the normality of the distribution of variables. To verify the association between the clinical outcome and the study variables, descriptive, univariate and bivariate analyses were performed using Fisher's exact test, and the significance level was set at $p \leq 0.05$, with a 95% confidence interval. In the bivariate analysis, the main variable was the final outcome of the participant at the end of 30 days, categorized as "Death" when at the end of 30 days or earlier the patient had died, "Readmission" when the patient had undergone a new hospitalization for more than 24 hours due to complications related to the surgical procedure, and "Cure" when the patient did not fit the previous outcomes.

This research followed all ethical precepts, and was approved by the research ethics committee of Hospital Getúlio Vargas in March 2018, under the opinion number 3,232,465. Consent to participate in the study was obtained from hospitalization.

RESULTS AND DISCUSSION

In this study there was a predominance of females (61; 61.6%). The mean age was 60.7 years (standard deviation: 12.1; minimum: 26, maximum: 90). The mean number of days for hospital discharge after surgery was five days (standard deviation: 7.9; minimum: zero, maximum: 77 days). The readmission rate was high (11; 11.1%) (Table 01).

Table 01 - Sociodemographic and clinical characterization of the participants. *Teresina, Piauí, Brazil, 2019.*

Variables	n	%
Age group		
<35 years old	3	3.0
36-55 years old	14	14.1
56-65 years old	49	49.5
>66 years old	33	33.3
Diagnosis		
Coxartrose	35	35.4
Femoral neck fracture	27	27.3
Gonarthrosis	37	37.4
Marital Status		
Single	51	51.5
In stable union	48	48.5
Surgical site		
Left Hip	30	30.3
Right Hip	26	26.3
Left Knee	24	24.2
Right Knee	19	19.2
Clinical Outcome		
Cure	87	87.9
Readmission	11	11.1
Death	1	1.0

In this study, 32 (32.3%) patients developed at least one complication, and 10 (10.1%) developed more than one complication in a 30-day follow-up. Pain (31; 31.3%) and infection (12; 12.1%) were the most prevalent complications (Table 02).

Table 02 - Incidence of knee and hip arthroplasty postoperative complications. *Teresina, Piauí, Brazil, 2019.*

Variables	n	%
Local infection		
Yes	12	12.1
No	87	87.9
Pain		
Yes	31	31.3
No	68	68.7
Dehydration		
Yes	4	4.0
No	95	96.0
Oliguria		
Yes	1	1.0
No	98	99.0
Hyperthermia		
Yes	6	6.1
No	93	93.9
Dehiscence		
Yes	4	4.0
No	95	96.0
Delayed surgical recovery		
Yes	6	6.1
No	93	93.9

In the bivariate analysis, a statistical association was identified between the clinical outcome of patients undergoing knee and hip surgery and the presence of postoperative complications, as well as with all types of complications identified (Table 03).

Table 03 - Association between the clinical outcome of patients undergoing knee and hip arthroplasty and the occurrence of postoperative complications. *Teresina, Piauí, Brazil, 2019.*

Variables	Clinical Outcome		Death n	%	Readmission n	%	P-value
	Cure n	%					
Any complications developed?							<0,001
Yes	23	72	1	3	8	25	
No	64	95.5	0	-	3	4.5	
Local Infection							<0,001
Yes	6	50	1	8	5	42	
No	81	93	0	-	6	7	
Pain							0.002
Yes	22	69	2	6	8	25	
No	65	96	0	-	3	4	
Dehydration							0.041
Yes	2	50	0	-	2	50	
No	85	89	1	1%	9	9	
Oliguria							0.018
Yes	0	-	0	-	1	100	
No	87	88	1	2	11	11	
Hyperthermia							<0,001
Yes	0	-	1	17	5	83	
No	87	94	0	-	6	6	
Dehiscence							<0,001
Yes	1	25	1	25	2	50	
No	86	91	0	-	9	9	
Delayed surgical recovery							<0,001
Yes	2	33	1	17	3	50	
No	85	91	0	-	8	9	

We recorded a high incidence of complications in the late postoperative period of patients submitted to primary total knee and hip arthroplasty, which resulted in a high rate of readmission and the occurrence of one death. Although the incidence of complications is variable due to lack of standardization, international studies report rates ranging from 3 to 17%¹⁰⁻¹², a value much lower than that found in our study (32.3%). However, developing countries tend to have a considerably higher incidence, which may justify this finding.

An analysis of the sociodemographic characteristics of

the participants can explain some of these results. These are patients undergoing primary total hip or knee arthroplasty surgery, a procedure that aims to replace one of these joints with a prosthesis. Despite being a relatively safe intervention, it involves many complications¹¹⁻¹², and little is known about the volume of this procedure in Brazil, as well as related adverse events.¹⁰

The predominance of patients over the age of 55 years (82.8%) is also an important factor to explain the results, since advanced age causes physiological changes in virtually all systems, which can bring risk in case of surgery. In the elderly patient this happens due to the reduced ability to maintain body temperature, water balance, circulatory impairment related to atherosclerotic processes, decreased lung compliance, predisposition to infections, as well as aggravating comorbidities of the general condition of the elderly.¹³⁻¹⁴

However, there is a consensus in the literature that age alone cannot be considered an independent risk factor for complications, since morbidity and mortality is more associated with the patient's clinical condition than with age itself.¹³⁻¹⁵

Mortality (1%) in our study is close to other surveys in the literature that indicate an incidence between 0.4% and 1.2%.¹³⁻¹⁶ The case of death, in this study, presented the highest number of complications in the period (six), and high postsurgery hospitalization time (75 days), which corroborates with findings that indicate a correlation between higher number of complications, longer readmission time and higher mortality of patients.¹⁴⁻¹⁶

Regarding complications, the most prevalent in this study was pain (31.3%), in accordance with the literature. This is the most reported postoperative symptom in a series of surgeries, being the main cause of readmission after outpatient surgeries. The literature points out that pain is an effective obstacle to the inclusion of more complex surgical procedures, sometimes questioning the advantages inherent in this type of surgical modality.¹⁷ Pain is difficult to measure, becoming multidimensional and subjective. The evaluation of pain, using validated scales, is of paramount importance in the postoperative period, especially in the follow-up of the household.¹⁸

On the other hand, local infection was the second most prevalent complication (12.1%), but the one that most caused readmission. In order to be considered an infection of the surgical wound, it is necessary to consider the infection in the incision, in the organ or in the surrounding space, still in the first thirty days of the postoperative¹⁹, as we did in this study. Infection in these cases increases the inflammatory stage while interrupting the proliferative stage of healing, inhibiting the contraction of the wound, and delayed healing may be the only sign of infection of a wound.²⁰ It is associated with the need for reinterpretation, as well as a higher probability of dehiscence of the suture, another important complication recorded in this study.

Dehiscence of the suture corresponds to the partial or even total rupture of all layers of the wall of the operative incision. The approach to this problem may be reintervention or second-line healing, depending on the situation, the time of the postoperative period or the cause.²¹ Healing problems after total knee arthroplasty reach 20% of cases in some studies.²¹⁻²² In more severe and rare cases, wound dehiscence with full exposure of the prosthesis in which there is no possibility of primary closure or secondary healing and can make recovery even more problematic.²⁰⁻²¹

It is important to highlight that aseptic loosening (29.8%), infection (14.8%) and pain (9.5%) are the main complications with indications for revision of total knee arthroplasty surgery, that is, in addition to hospitalization, patients may undergo revision surgery again, and the delay in performing such a procedure is associated with an increase in complications and technical difficulties, such as worse results, higher infection rate and greater need for new revisions.²³⁻²⁴

The occurrence of clinical complications after hospital discharge signals important changes in the recovery of the surgical patient, increasing the possibility of reoperation, and increasing mortality. The evaluation and monitoring of post-hospital complications in surgical patients is of paramount importance, especially in specialties where orthoses and prostheses are placed. Our findings, in general, show the importance of investing in strategies for postdischarge monitoring of patients, in order to identify early signs and symptoms of possible complications.

This study has some limitations. The main one refers to the limited follow-up time (30 days), which in the case of infections can underreport some cases. In addition, it is noteworthy that the monitoring was done by telephone (calls or text message). The development of technologies that can bring patients closer to the team is indicated. In this sense, the use of applications that allow you to send images can facilitate the work of the health team. Nursing professionals can collaborate in this process, since their training enables them to identify problem situations through systematic evaluation of the signs and symptoms of clinical conditions.

CONCLUSIONS

The incidence of postoperative complications of knee and hip arthroplasty in a 30-day follow-up was high, with emphasis on pain and local infection. The development of complications was associated with the clinical outcome, being recorded death and readmissions. Additional studies are needed encompassing preoperative variables and a longer follow-up time.

REFERENCES

1. Onggo JR, Onggo JD, Steiger R, Hau R. The Efficacy and Safety of Inpatient Rehabilitation Compared With Home Discharge After Hip or Knee Arthroplasty: A Meta-Analysis and Systematic Review. *J Arthroplasty* [Internet]. 2019 [cited 2020 Jan 16]; 34(8):1823-30. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/31053467>
2. Runner RP, Gottschalk MB, Staley CA, Pour AE, Roberson JR. Utilization Patterns, Efficacy, and Complications of Venous Thromboembolism Prophylaxis Strategies in Primary Hip and Knee Arthroplasty as Reported by American Board of Orthopedic Surgery Part II Candidates. *J Arthroplasty*. [Internet]. 2019 [cited 2020 Jan 16];34(4):729-734. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30685257>
3. Inacio MCS, Graves SE, Pratt NL, Roughead EE, Nemes S. Increase in Total Joint Arthroplasty Projected from 2014 to 2046 in Australia: A Conservative Local Model With International Implications. *Clin Orthop Relat Res*. [Internet]. 2017 [cited 2020 Jan 16];475(8):2130-37. doi: 10.1007/s11999-017-5377-7. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/30685257>
4. Jergesen HE, Thielen ZP, Roever JA, Vashon TT, Wu HH, Yi PH. Primary Hip and Knee Arthroplasty in a Safety Net Hospital: Substance Abuse and Other Factors Affecting Short-term Complications. *J Arthroplasty*. [Internet]. 2018 [cited 2020 Jan 16]; 33(9):3003-08. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29853309>
5. Edwards PK, Mears SC, Stambough JB, Foster SE, Barnes CL. Choices, Compromises, and Controversies in Total Knee and Total Hip Arthroplasty Modifiable Risk Factors: What You Need to Know. *J Arthroplasty*. [Internet]. 2018 [cited 2020 Jan 16];33(10):3101-06. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29573920>
6. Paxton EW, Inacio MC, Singh JA, Love R, Bini SA, Namba RS. Are There Modifiable Risk Factors for Hospital Readmission After Total Hip Arthroplasty in a US Healthcare System? *Clin Orthop Relat Res*. [Internet]. 2015 [cited 2020 Jan 16];473(11):3446-55. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/25845947>
7. Agencia Nacional de Vigilância (BR). NOTA TÉCNICA GVIMS/GGTES Nº 01/2019. Orientações para a notificação nacional das Infecções Relacionadas à Assistência à Saúde (IRAS), Resistência Microbiana (RM) e monitoramento do consumo de antimicrobianos no ano de 2019. Available from: <http://portal.anvisa.gov.br/documents/33852/271855/Nota+t%C3%A9cnica+n%C2%BA+01-2019+GVIMS-GGTES-ANVISA/fe25a070-06fd-42ff-962f-e80758ebc4e1>
8. Matos MCB, Oliveira LB, Queiroz AAFLN, Sousa AFL, Valle ARMC, Andrade D et al. Nursing professionals' knowledge regarding the management of waste produced in primary health care. *Rev Bras Enferm* [Internet]. 2018 [cited 2020 Jan 16]; 71(Suppl 6):2728-34. Available from: <http://dx.doi.org/10.1590/0034-7167-2018-0308>.
9. Sousa AFL, Hermann PRS, Fronteira I, Andrade D. Monitorização de complicações pós-operatórias no ambiente domiciliar. *Rev Rene*. 2019; 20. In Press.
10. Falcão FRC, Dias BAG, Wolfovitch LA, Sadigursky D. Complicações pós-artroplastia total de quadril em portadores e não portadores de diabetes mellitus controlado durante a internação. *Rev bras ortop*. [Internet]. 2016 [cited 2020 Jan 15]; 51(5): 589-96. Available from: <http://dx.doi.org/10.1016/j.rboe.2016.08.016>.
11. Wagner ER, Kamath AF, Fruth KM, Harmsen WS, Berry DJ. Effect of Body Mass Index on Complications and Reoperations After Total Hip Arthroplasty. *J Bone Joint Surg Am*. [Internet]. 2016 [cited 2020 Jan 16];98(3):169-79. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/26842406>
12. Badarudeen S, Shu AC, Ong KL, Baykal D, Lau E, Malkani AL. Complications After Revision Total Hip Arthroplasty in the Medicare Population. *J Arthroplasty*. 2017 Jun;32(6):1954-1958. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28236550>
13. Chamout G, Muren O, Laurencikas E, Bodén H, Kelly-Pettersson P, Sjöö H, et al. More complications with uncemented than cemented femoral stems in total hip replacement for displaced femoral neck fractures in the elderly. *Acta Orthop*. [Internet]. 2017 [cited 2020 Jan 16];88(2):145-51. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5385108/>
14. Rogmark C, Leonardsson O. Hip arthroplasty for the treatment of displaced fractures of the femoral neck in elderly patients. *Bone Joint J*. [Internet]. 2016 [cited 2020 Jan 16];98-B(3):291-7. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/26920951>
15. Bovonratwet P, Malpani R, Ottesen TD, Tyagi V, Ondeck NT, Rubin LE, et al. Aseptic revision total hip arthroplasty in the elderly : quantifying the risks for patients over 80 years old. *Bone Joint J*. [Internet]. 2018 [cited 2020 Jan 16];100-B(2):143-151. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29437055>
16. Carvalho Júnior LH, Temponi EF, Badet R. Infecção em artroplastia total de joelho: diagnóstico e tratamento. *Rev bras ortop*. [Internet]. 2018 [cited 2020 Jan 16]; 48(5): 389-96. Available from: <https://rbo.org.br/detalhes/96/pt-BR/infeccao-em-artroplastia-total-de-joelho--diagnostico-e-tratamento>
17. Johnson Q, Borsheski RR, Reeves-Viets JL. Pain management mini-series. Part I. A review of management of acute pain. *Mo Med*. [Internet]. 2013 [cited 2020 Jan 16];110(1):74-9. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/23457757>
18. Wardhan R, Chelly J. Recent advances in acute pain management: understanding the mechanisms of acute pain, the prescription of opioids, and the role of multimodal pain therapy. *F1000Res*. [Internet]. 2017 [cited 2020 Jan 16];6:2065. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29225793>
19. Liu Z, Dumville JC, Norman G, Westby MJ, Blazeby J, McFarlane E, et al. Intraoperative interventions for preventing surgical site infection: an overview of Cochrane Reviews. *Cochrane Database Syst Rev*. [Internet]. 2018 [cited 2020 Jan 16];2(2):CD012653. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29406579>
20. Ali-Mucheru MN, Seville MT, Miller V, Sampathkumar P, Etzioni DA. Postoperative Surgical Site Infections: Understanding the Discordance Between Surveillance Systems. *Ann Surg*. [Internet]. 2020 [cited 2020 Jan 16];271(1):94-99. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29672402>
21. Fu RH, Weinstein AL, Chang MM, Argenziano M, Ascherman JA, Rohde CH. Risk factors of infected sternal wounds versus sterile wound dehiscence. *J Surg Res*. [Internet]. 2016 [cited 2020 Jan 16]; 200(1):400-7. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/26371410>
22. Carvalho Júnior LH, Castro CAC, Gonçalves MJB, Rodrigues LCM, Lopes FL, Cunha FVP. Short-term complications of knee total arthroplasty: evaluation of 120 cases. *Rev bras Ortop* [Internet]. 2016 [cited 2020 Jan 16];41(5):162-6. Available from: [Internet].
23. Khan M, Osman K, Green G, Haddad FS. The epidemiology of failure in total knee arthroplasty: avoiding your next revision. *Bone Joint J*. [Internet]. 2016 [cited 2020 Jan 16]; 98-B (supl A):105-12. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5450576/>
24. Barry JJ, Thielen Z, Sing DC, Yi PH, Hansen EN, Ries M. Length of Endoprosthetic Reconstruction in Revision Knee Arthroplasty Is Associated With Complications and Reoperations. *Clin Orthop Relat Res*. [Internet]. 2017 [cited 2020 Jan 16];475 (1): 72-9. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/27093862>

Received on: 16/01/2020
Required Reviews: 05/02/2020
Approved on: 07/02/2020
Published on: 31/08/2021

***Corresponding Author:**
Álvaro Francisco Lopes de Sousa
Rua da Junqueira, nº 100
Lisboa, Portugal
Telephone number: +351 213 652 600
Zip Code: 1349-008

The authors claim to have no conflict of interest.