FUNCTIONAL COMPARISON BETWEEN SEPTIC AND ASEPTIC KNEE ARTHROPLASTY REVIEW

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ABSTRACT

Introduction: Total knee arthroplasty (TKA) imposes many risks. TKA infection is not the most frequent complication, but is probably the most serious one. Two-step review is the procedure of choice in deep knee prosthesis infection. On the other hand, aseptic prosthesis detachment represents almost half of the primary arthroplasty review indications. Patient´s satisfaction level might diminish after reviews. Objective: The objective of this study was to compare the quality of life and final result of TKA review for septic and aseptic failures. Methods: The patients were assessed using the HSS and SF-36 scores. The patients were divided in two groups: one group submitted to two-step review (septic) and the other to one-step review (aseptic). The analysis of the data obtained shows better scores for the second group in HSS and in 06 of 08 domains of SF-36 classification. Conclusions: The on-step review of total knee arthroplasty leads to better functional outcomes.

Keywords: *Arthroplasty replacement knee; Infections; Quality of Life; Review.*

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INTRODUCTION

The concept of replacing a knee joint surface for treating serious pathologies of that joint has been the focus of discussion since the 19th Century. In 1860, Verneuil[1] suggested the interposition of soft parts for reconstructing a knee joint.

In the 1940's and 1950's, total knee arthroplasty (TKA) was largely advanced as a result of the development of appropriate inorganic materials for joint interposition and of the improvement of the surgical technique, mainly levered by Campbell[2], MacIntosh[3] and McKeever.[4]

Today, knee prostheses with state-of-the-art designs and materials are available, which, allied to an increased life expectancy of the world population and to a more accurate diagnosis of orthopaedic diseases, has largely increased the indication and the survival of knee arthroplasties.

Total knee arthroplasty (TKA) is not a risk-free procedure. Its major short-term complications are: stiffness, deep venous thrombosis, pulmonary embolism, postoperative infection and death.[5]

Indications for arthroplasty review are: prosthesis components' loosening, pain and functional limitation, technical errors when performing primary arthroplasty, progressive bone loss, polyethylene wear off, and infection.[6]

Infection in TKA is not the most frequent complication, but it is one of the most serious ones.[7] Its incidence ranges from 0.5% to 23%.[8,9] Post-TKA infections represent an economical impact of three hundred million dollars each year in the United States.[10]

For a knee arthroplasty infection treatment to be successful, early diagnosis and the prompt administration of therapeutic measures are essential; therefore, all patients presenting with postoperative pain should be screened. The most common clinical sign is continuous pain, local heat, and edema, with erythema being infrequent.[11] For diagnosing it, the following are necessary: appropriate physical examination, X-ray studies, evidence of inflammatory activity, and, occasionally, tapping the affected knee in case of questionable diagnosis.

Therapy for total knee arthroplasty infections is controversial. Approaches include: antibiotic therapy (oral or endovenous), aggressive debridement through arthrotomy or arthroscopy, resection arthroplasty, arthrodesis, one- or two-step review, arthrodesis and amputation.[12-14] For the two-step review, the first step is to remove the primary prosthesis with debridement and placing a cement spacer with antibiotics, keeping the patient on endovenous antibiotic therapy for 6-8 weeks, while in the second one, total arthroplasty is reviewed.[15]

The spacer impregnated with antibiotics plays two primary roles: the first one is the local release of antibiotics, assisting with fighting the infection, while the second is to maintain spaces, reducing soft parts retraction, enabling an easier insertion of a definitive prosthesis.[13,16] Two primary kinds of spacers exist: the static and the

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dynamic ones. The dynamic spacers allow joint motion, improving function through the period in which the patient remains with the spacer, and, theoretically after a definitive prosthesis is inserted, in a second step.[17,18] As drawbacks of the dynamic spacers, we can mention their high cost and the restriction of which antibiotic agents can be used with them.

The two-step review is the most effective procedure for resolving the infection and preserving knee function, leading to good results in up to 90% of the cases.[13,19] However, we also know that at each surgical intervention on a patient with TKA, there is an objective decrease of the results achieved.[20] A patient's satisfaction level can drop from 90% of good results to 80% in reviews[6].

Aseptic loosening accounts for almost half of the indications to primary arthroplasty reviews.[21] The cause of this complication is still the object of several studies, with a multifactorial explanation being currently accepted, composed by stress shielding, micro movements, high intra-joint pressure, and individual susceptibility to micro particles.[22]

For evaluating the level of function and patients' satisfaction with the treatment of infected TKAs, two scores are largely disseminated and employed. The score described by the Hospital for Special Surgery (New York, USA), named as HSS knee score was created as an objective parameter for the assessment of functional conditions, physical examination, and postoperative X-ray aspects of the knee.[23] Another frequently used score, the SF-36, is intended to assess the outcome of that treatment, addressing different quality of life and patient's function aspects.[24]

The objective of the present study was to compare, by the results of the HSS and SF-36 scores, the outcome of TKA review between two groups: one submitted to prosthesis replacement in two steps with the use of a spacer (septic review), and another group in which the replacement was done in a single step (aseptic review).

MATERIALS AND METHODS

Twenty-nine patients regularly followed-up in an outpatient basis by the Knee Group of the Institute of Orthopaedics and Traumatology at Hospital das Clínicas (Medical School, University of São Paulo – IOT-HC-FMUSP) were included in this study. The patients were divided into two groups: 13 patients previously submitted to the second step of knee arthroplasty review due to infection (2S TKA review) (Figure 1) and 16 patients submitted to aseptic review of the primary prosthesis (one-step review). (Figure 2)

All patients have read and signed the consent term in order to be included in the study evaluations.

Each of the 29 patients was assessed for the following variables: gender, age (years), total follow-up time (months), presence of comorbidities and HSS and SF36 scores performance.

Concerning HSS, outcomes were regarded as excellent when scores ranged from 85 to 100 points; good when 70-84 points; fair when 60-70 points, and; poor when below 60 points.

SF-36 is a multidimensional questionnaire composed by 36 items, comprised on 8 domains: functional ability (10 items), physical aspects (4 items), pain (2 items), overall health status (5 items), vitality (4 items), social aspects (2 items), emotional aspects (3 items), mental health (5 items) in addition to a comparative analysis question between current and previous year's health status. Following its application, a score is assigned to each question, which will subsequently transferred to a scale ranging from 0 to 100, where zero corresponds to the worst possible health status and 100 to the best health status (this being valid for all domains), and assessing each domain separately.

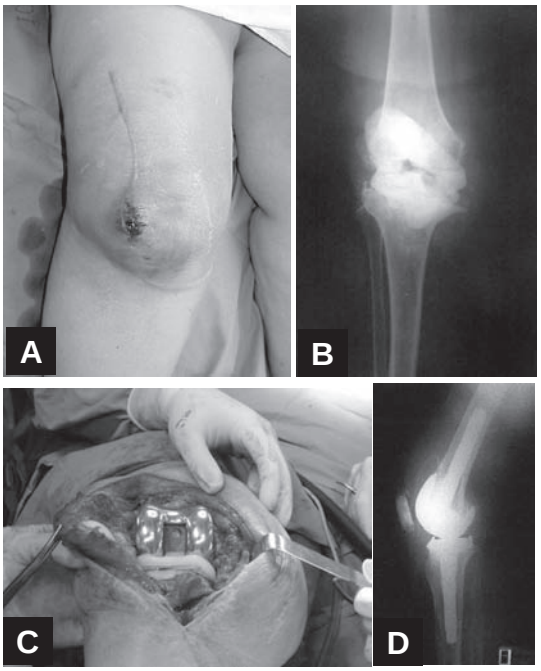

Figure 1 – *Two-step TKA review (septic). A. Chronic infection with active fistula. B. Spacer being introduced. C and D. Review prosthesis insertion.*

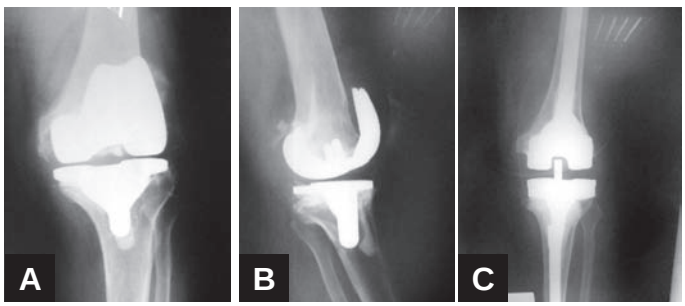

Figure 2 – *One-step TKA review (aseptic). A and B. Aseptic loosening. C. 1-step TKA review.*

RESULTS

The first group (2S TKA review) consisted of 13 patients with mean age of 68 years, and mean follow-up time after review prosthesis insertion of 22.4 months (5-57 months), with 69% of them presenting at least one comorbidity (Chart 1), four males (30%) and 9 females (70%).

The second group (one-step TKA review) consisted of 16 patients with mean age of 70.3 years, and mean follow-up time after review prosthesis insertion of 8.6 months (5-19 months), with 87.5% of the patients presenting at least one comorbidity (Chart 1), four males (25%) and 12 females (75%).

Of the total number of patients (29) in the study, 8 were males (27.5%) and 21 were females (72.5%).

Concerning the HSS score, among the patients included in the first group (2S TKA review), 66.7% showed excellent or good outcomes (Chart 2), while group 2 patients (one-step TKA review) showed 78% of excellent or good outcomes in the HSS score.

The results achieved with the SF36 questionnaire are presented on Chart 3:

Chart 1: *Patients' profile*

	Nr. of patients	Mean age (years)	Freq comorbidities
2S TKA Review Group	13	68	69% (at least one)
1-step TKA Review group	16	70.3	87,5% (at least one)

Chart 2: *Results of the HSS*

	HSS Excellent/ Good	HSS Fair/ Poor
2S TKA Review Group	66.7%	33.3%
1-step TKA Review group	78%	22%

Chart 3: *Results of the SF36*

SF36 (mean)	Functional ability	Physical aspects	Pain	Overall health status
2S TKA Review Group	37.7	30.8	54.3	70
1-step TKA Review group	51.9	34.4	43.75	81.1
SF36 (mean)	**Vitality**	**Social aspects**	**Emotional aspects**	**Mental health**
2S TKA Review Group	55	54.8	43.6	59.4
1-step TKA Review group	58.4	70.3	22.9	67.25

DISCUSSION

We found some differences in the amount of satisfactory results when both groups were compared. Patients submitted to two-step review had a lower HSS score, with 66.7% of them achieving a satisfactory outcome from a functional point of view, while among the patients submitted to one-step TKA review 78% achieved a score corresponding to a satisfactory result. Anyway, both groups demonstrate a satisfactory end result rate consistently with the ones found in other studies (6,23). Probably, patients submitted to two-step reviews tend to present lower scores due to the temporary use of spacers and for being required to undergo a higher number of surgical procedures.

Concerning quality of life, as reflected by the results achieved with the SF36 questionnaire, we noticed that, in at least six of the eight assessed domains, the group submitted to one-step arthroplasty review showed a better performance when compared to the other group. The one-step review showed an inferior result only for domains related to pain and emotional aspects, which are regarded as subjective scoring factors.

Patients who experienced prosthesis infection possibly remind of the situation immediately before the review surgery when answering the questions concerned to pain severity and emotional aspects on the SF36. The patients submitted to the one-step review, on the other hand, usually present some symptom of the aseptic failure of the implant (e.g., instability and pain) demanding a new surgery, theoretically more complex, thus emotionally affecting the patient. In literature, patients submitted to two-step arthroplasty review with the use of a dynamic spacer present a better functional end outcome compared to those using a single spacer, which indicates that the functional limitation caused by the spacer reflects on the end functional outcome.[18,19]

We found the assessment scores for quality of life and function (HSS and SF36) used in this study easy to apply and reliable in the follow-up of patients submitted to arthroplasty review procedures. The routine use of these score scales make the analysis of the results achieved clearer and more objective for healthcare professionals.

Infection in a knee arthroplasty corresponds to the most impacting complication for a patient's quality of life.[7,10,20] We should face prosthesis reviews (TKA), even when infected, as able to provide good results.[21,25] By conjunctively analyzing HSS and SF36, we can infer that the optimal objective of the treatment of deep infections on knee prostheses should be the reestablishment of function and quality of life by means of an arthroplasty review. Literature demonstrates that the two-step review is effective for treating infected TKA.[26] Therefore, we believe that we should seek ways to make the period with the spacer less limiting, and causing lower impact to a patient's quality of life. The use of dynamic spacers for the shortest time as possible may minimize the impact on these patients' quality of life during treatment.

Furthermore, we outline the need of focusing ourselves to practices that could reduce the infection rates in our environment, make the treatment period as smooth as possible to the patient, and to ways of measuring patient's satisfaction and quality of life for us to be able to provide closer functional outcomes to our patients' expectations.

CONCLUSION

Patients submitted to one-step TKA review surgeries show, in average, superior functional outcomes compared to those submitted to two-step TKA reviews. This fact leads us to consider the need of developing the technique for patients that are currently submitted to a TKA review in two steps.

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