INFECTED ARTHROPLASTY OF KNEE: EVALUATION IN ARTHRODESIS WITH SEMI-RINGS

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ABSTRACT

There were eight knee arthrodeses in infected total knee arthroplasties between January, 2006 and July, 2008. The mean age was 66.3 years old (63-80), three patients were male and five female. The method of choice was external fixation with semi-rings and the mean follow up was 21 months (12 – 40 months). This is a multicentric prospective study with patients answering the Nottingham Health Profile, an objective questionnaire which evaluates quality of life. We observed an improvement of 49% in the levels of preoperative quality of life compared to postoperatively, as well as 100% of radiographic union. These are facts that confirm the safe use of this technique to the treatment of infected total knee arthroplasty. Level of Evidence IV, Case series.

Keywords: Arthrodesis. Infection. Arthroplasty, Replacement, Knee. Quality of life.

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INTRODUCTION

Infections in total knee arthroplasties represent a serious problem for the orthopedist, with incidence of approximately 1% to 2% of prosthetic surgeries.[1-5]

In some patients, the situation is more complicated due to loss of bone stock, deficiency of the extensor mechanism, instability, important pain and functional impotence, and its revision (change of prosthesis) is not always possible. In select patients arthrodesis or fusion is the salvation procedure that would practically solve the problem.[2,6-8] According to Smille "the need for arthrodesis is the last correction of the fault".

The methods used for this purpose are apparently the internal fixators (intramedullary nails, screws and plates) or external fixators. External fixation offers potential advantages allowing manipulation for angular correction, focal compression and reduction of the risk of systemic infection.[8-10]

The objectives of this study are to evaluate consolidation time and to compare the pre- and postoperative quality of life indexes in patients with infected knee arthroplasty, discussing the changes brought about by the arthrodesis technique with compressive semi-ring fixator.[11]

MATERIAL AND METHODS

Eight (8) arthrodeses were performed in the period from January 2006 to July 2008 due to infected total knee arthroplasties on three (3) male and five (5) female patients with mean age of 66.3 years (63 - 80 years), using the external fixator method with semi-rings. (Figures 1 A and B)

Inclusion criteria were patients with infected unilateral knee arthroplasty, treated by the method described here, with minimum postoperative follow-up of 12 months and consent form signed by the patients and their families.

They were monitored in the pre- and postoperative periods in outpatient regime until radiographic consolidation, removal of the external fixator and return to daily life activities. To perform this multicentric study, the patients prospectively answered objective questions pre- and postoperatively through the Nottingham Health Profile[12] questionnaire, evaluating quality of life. (Appendix 1).

RESULTS

Analyzed in the period from January 2006 to July 2008, eight patients, with mean follow-up time of 21 months (12 - 40 months) with infected knee arthroplasty, with mean evolution of 5.4 months (3 - 13 months), three of whom were male sex and five female, with mean age of 66.3 years (63 to 80 years), where the predominant etiological agent was Staphylococcus aureus. (Table 1) They were operated by the compression technique with semi-rings (Figure 1), with radiographic consolidation occurring on average at 4.6 months (3 - 6 months). (Table 1) At

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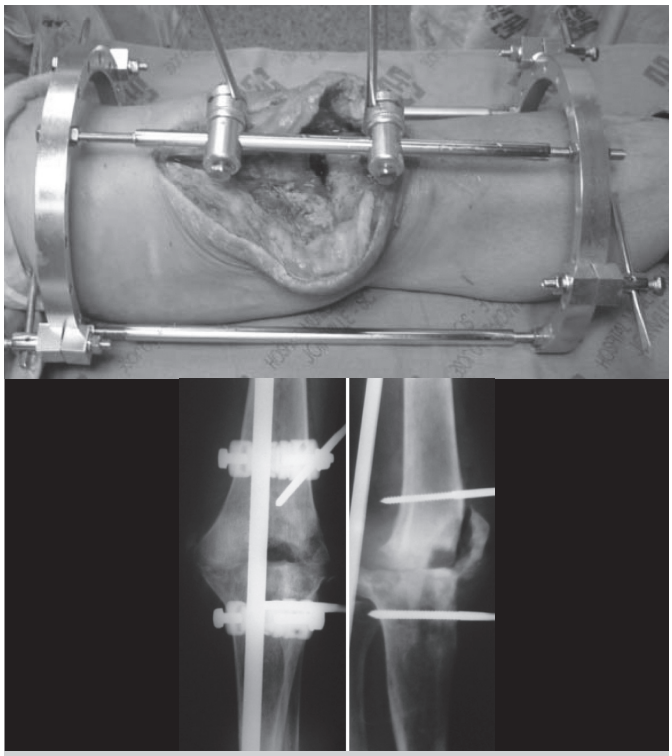

Figure 1. *(A) Transoperative aspect of arthrodesis with external semi ring fixator. (B) AP and lateral radiographic study of the technique.*

Table 1. *Discrimination of the patients with respective data on age, sex, predominant etiological agent in the culture, duration of infection and time to radiographic consolidation of the arthrodesis.*

Patient	Age	Sex	Etiology	Infection	Consolidation
I	64 y	F	S. aureus	12 months	3 months
II	53 y	F	S. aureus	13 months	4 months
III	68 y	F	S. aureus	6 months	4 months
IV	80 y	F	S. aureus	8 months	5 months
V	73 y	M	S. aureus	10 months	6 months
VI	64 y	M	S. aureus	3 months	5 months
VII	66 y	M	S. aureus	7 months	6 months
VIII	63 y	F	S. aureus	5 months	4 months

this time, the external fixators were removed. Data were gathered according to the Nottingham Health Profile quality of life questionnaire, preoperatively and postoperatively, at least 12 months (10-16 months) after surgery. (Table 2)

The results were analyzed by simple arithmetic mean, which confirmed significant statistical difference among the mean values for quality of life of the patients submitted to the technique. The lowest number of incapacities (No) was qualified as better quality of life. (Table 2)

The mean percentage of differences for improvement of quality of life was 49% (37% - 60%).

Appendix 1. *Nottingham Health Profile Questionnaire on quality of life.*

The list contains some problems that people may face on a day-to-day basis. Please read each item carefully. If you have this problem, put an X below the "YES" column. If you do not have this problem, put an X below the "NO" column. If you are not sure of the answer, ask yourself whether this happens to you most of the time. It is important for you to answer all the questions.

Nottingham Health Profile (NHP)

Items	Yes	No	Domain
1. I am tired all the time			EL
2. I have pain at night			P
3. Things are getting me down			ER
4. I have unbearable pain			P
5. I take pills to help me sleep			S
6. I have forgotten what it is like to enjoy myself			ER
7. I am feeling on edge			ER
8. I find it painful to change position			P
9. I feel lonely			SI
10. I can walk about only indoors			PA
11. I find it hard to bend			PA
12. Everything is an effort			LE
13. I am waking up in the early hours of the morning			S
14. I am unable to walk at all			PA
15. I am finding it hard to make contact with people			SI
16. The days seem to drag			ER
17. I have trouble getting up and down stairs and steps			PA
18. I find it hard to reach for things			PA
19. I am in pain when I walk			P
20. I lose my temper easily these days			ER
21. I feel there is nobody that I am close to			SI
22. I lie awake for most of the night			S
23. I feel as if I am losing control			ER
24. I am in pain when I am standing			P
25. I find it hard to get dressed by myself			PA
26. I soon run out of energy			LE
27. I find it hard to stand for long (e.g., at the kitchen sink, waiting in a line)			PA
28. I am in constant pain			P
29. It takes me a long time to get to sleep			S
30. I feel I am a burden to people			SI
31. Worry is keeping me awake at night			ER
32. I feel that life is not worth living			ER
33. I sleep badly at night			S
34. I am finding it hard to get along with people			SI
35. I need help to walk about outside (e.g., a walking aid or someone to support me)			PA
36. I am in pain when going up or down stairs			P
37. I wake up feeling depressed			ER
38. I am in pain when I am sitting			P

EL = Energy level; P = Pain; RE = Emotional reactions; S = Sleep; SI = Social interaction; PA = Physical abilities.

Table 2. *Pre and postoperative results and the difference obtained by the questionnaire.*

Name	Pre-	Post	Difference
I	34% no	79% no	45%
II	32% no	84% no	52%
III	39% no	76% no	37%
IV	24% no	82% no	58%
V	24% no	84% no	60%
VI	31% no	76% no	45%
VII	31% no	74% no	43%
VIII	29% no	81% no	52%
Mean	30% no	79% no	49%

DISCUSSION

Demographically, world literature reports the incidence of total knee arthroplasty infection as being around 2%.[13,14] Various techniques are described for revision or arthrodesis in the treatments of this complication.[15]

There are descriptions of several arthrodeses with external fixation that can be performed in a uniplanar or modified biplanar manner, as well as categories with transfixing pins and circular molds.[16-20]

Patients with described prosthesis infection complications have their activities of daily living (ADLs) compromised and consequently their quality of life seriously affected.

Objective measures that evaluate the improvement of quality of life indexes will be able to validate or not validate a technique that minimizes the complications determined by infection in arthroplasty.

The surgical technique used for arthrodesis that was described previously has stabilization with concomitant compression and the possibility of correcting alignments over the course of the postoperative period as advantages, as described by literature when using circular fixators.

Partial weight bearing with crutches was allowed in our cases until radiographic consolidation, when full weight bearing was authorized with removal of the fixator after 30 days.

We opted for the Nottingham Health Profile questionnaire for evaluation of the quality of life index, as it is practical and objective in its questions and values everyday aspects of the patients.[12]

The results were consistent with literature as concerns age, sex, etiology and duration of the infection (under specific antibiotic therapy) without its remission.[19]

Our consolidation rate was 100% with a mean 4.6 months, consistent with literature that has its mean time ranging from 4.5 to 6.8 months when using an external fixator.[11,16] Oostenbroek et al.[6] described a mean time of 10.3 months for consolidation, reporting complications such as infection of the pins, pseudarthrosis and fractures of the femur and/or tibia in their cases, not present in our casuistry, except for superficial infections on the path of the femoral cross pin observed in three cases.

CONCLUSION

The results showed that there was consolidation in all cases and a statistically significant positive difference in the pre and postoperative answers to the quality of life questionnaire.

This study endorses the performance of this procedure as being reproducible and applicable for the resolution of total knee arthroplasty infection.

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