Review article

Monitoring the functional capacity of patients with rheumatoid arthritis for three years

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Abstract

Objective: To quantify modification of functional capacity in a three-year period in a group of patients with rheumatoid arthritis (RA) using HAQ and EPM-ROM inventories.

Methods: Forty patients with RA on methotrexate (MTX) as disease-modifying antirheumatic drug (DMARD) were followed for up to three years. The functional status was assessed at the beginning and end of the period by HAQ and EPM-ROM.

Results: Thirty-two patients were retrieved, with initial HAQ score of 1.14 ± 0.49 (mean ± SD) and EPM-ROM score of 5.8 ± 2.75. After an average period of three years, the HAQ score was 1.13 ± 0.49 and EPM-ROM score, 6.81 ± 3.66. In the subgroup of seven patients submitted to orthopedic surgery, HAQ score decreased from 0.84 ± 0.72 to 1.64 ± 0.56 and the EPM-ROM score, from 5.8 ± 1.80 to 8.3 ± 0.74. In the subgroup of non-operated patients, HAQ score varied from 1.2 ± 0.45 to 1.07 ± 0.70 and EPM-ROM score, from 5.7 ± 3.06 to 6.4 ± 3.90.

Conclusion: In a group of RA patients in use of only MTX as DMARD, there was little change on HAQ score and EPM-ROM scores over the average period of three years. Worsening functional capacity was observed in the group of operated patients in comparison to the not operated ones. This fact alerts us to the need for use of broader therapeutic regimens availability of musculoskeletal surgeries in a timely manner in patients with RA.

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Acompanhamento da capacidade funcional de pacientes com artrite reumatoide por três anos

Resumo

Objetivo: Quantificar a modificação da capacidade funcional em um período de três anos em um grupo de pacientes com artrite reumatoide (AR), utilizando os inventários HAQ e EPM-ROM.

Métodos: Quarenta pacientes com AR em tratamento com metotrexato (MTX) como fármaco antirreumático modificador da doença (DMARD) foram acompanhados por até três anos. O estado funcional foi avaliado no início e no final do período por HAQ e EPM-ROM.

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Introduction

Rheumatoid arthritis (RA) is a chronic inflammatory disease in which the joint inflammation presents as synovitis. The inflammation causes joint pain, swelling, and stiffness, as well as systemic symptoms such as fatigue, weight loss and anemia. The synovitis is the main factor that leads to joint destruction and, if untreated, may progress to serious joint damage, with loss of functional capacity.  

RA is a condition that affects approximately 0.5–1% of the adult population worldwide, and its occurrence is observed in all ethnic groups. There is a predominance of females (two to three times, compared to males), occurring mainly in patients between the fourth and sixth decades of life, although there are occurrences of RA in all age groups.  

The negative consequences for physical functioning in RA patients are multidimensional, with loss of muscle strength and endurance, besides the loss of range of motion (ROM) of joints, due to changes caused by the disease. For a proper understanding of the situation of the patient, a multifaceted view is required, because the only use of laboratory tests will not allow a comprehensive assessment of his/her functional capacity.  

Functional capacity is a key factor of morbidity and a predictor of mortality in RA patients. The Health Assessment Questionnaire (HAQ) is a commonly used tool to assess the functional status in RA patients, but some studies have shown an inverse relationship between sensitivity to change in HAQ and disease duration, so that the duration of the disease influences the degree of functional improvement.  

HAQ was developed by Fries et al. (1980) to assess functional capacity in RA; and the dysfunction occurs early in the disease, due to factors that are not entirely clear.  

The pain per se can lead to functional loss, even in the absence of radiological changes, which only become evident with the persistence of synovitis. HAQ has been translated and validated into many languages, including Brazilian Portuguese by Ferraz et al. in 1990.  

Functional capacity in RA can also be assessed by EPM-ROM, which is a standardized measure of the potential range of motion of joints in upper and lower limbs. The scale assesses ROM of 10 large-and-small, right-and-left joints by using a goniometer.  

The progression of joint dysfunction occurs in a subclinical, slow and progressive way in the different stages of the disease, which complicates the acceptance of surgical indication by RA patients. However, the indication of surgery must be done early, in order to avoid the onset of joint deformities.  

In our environment, there are no studies on the long-term outcome of functional capacity in RA patients who were not treated with biologics. This study portrays the situation of availability of musculoskeletal surgeries performed in a timely fashion in patients seen in the Public Health Service.

“The progression of joint dysfunction occurs in a subclinical, slow and progressive way in the different stages of the disease, which complicates the acceptance of surgical indication by RA patients. However, the indication of surgery must be done early, in order to avoid the onset of joint deformities. In our environment, there are no studies on the long-term outcome of functional capacity in RA patients who were not treated with biologics. This study portrays the situation of availability of musculoskeletal surgeries performed in a timely fashion in patients seen in the Public Health Service. Considering that HAQ and EPM-ROM may reflect the changes in functional capacity over time, this study assessed the modification of the indices in question as a result parameter of indication of orthopedic surgery within a 3-year period in RA patients.”

Objectives

This study aims to quantify the change in the functional capacity of RA patients treated routinely at our Service of Rheumatology, Universidade Federal de São Paulo.

Methods

This prospective study involved 40 RA patients according to American College of Rheumatology criteria, all aged over 18 years at disease onset. All patients were informed on the content of the research and agreed to participate in the study by signing a consent form. RA patients in functional classes 2 and 3 treated with corticosteroids, nonsteroidal anti-inflammatory drugs, and methotrexate as disease-modifying antirheumatic drug (DMARD) were included in this study. Patients who used other DMARDS, or those with some pathology that would interfere with their movement, e.g., other musculoskeletal or neurological disorders, fractures with joint deformity, or with congenital malformation were excluded. Patients with diabetes mellitus and alcohol or illegal drug
users were also excluded. Our patients were selected sequentially, being inquired about duration of the disease, presence of morning stiffness (in minutes) and medications used at the time of enrollment. The overall clinical assessment and the counting of inflamed joints were performed by a rheumatologist, and HAQ and EPM-ROM tools were applied by one of the authors of this study (Oliveira LM). After an average 3-year period, 32 of those patients still being monitored at the outpatient service of Rheumatology, Universidade Federal de São Paulo, were reassessed.

Considering the occurrence of a 10% loss of functional capacity even in healthy individuals after the age of 50, we set the rate of loss of functional capacity expected by HAQ in RA in 20%. Thus, we compared baseline and final assessment data with respect to the loss of function, using HAQ (greater or lesser than 20%) and with respect to whether or not perform a surgery.

Continuous data were presented as mean (standard deviation – SD) and minimum and maximum values. Categorical data were expressed as absolute number and percentage. For the comparison between baseline and final assessments of variables (e.g., medications in use and function loss greater or lesser than 20% measured by HAQ), the chi-square or Fisher’s exact test was used.

Comparisons between continuous variables, such as HAQ and EPM-ROM scores and HAQ and EPM-ROM score changes, were only descriptive, due to the limitation imposed by the sample size. The correlation between variables was performed using the Spearman test.

The statistical package SPSS, version 15.0, was used, and significance was set at 5%.

Results

After a 3-year period, of those 40 patients included in the study we could reassess 32 subjects. Thus, eight patients were not reassessed: three had died and five failed to visit the service of Rheumatology. The characteristics of the group are shown in Table 1.

Seven patients underwent orthopedic surgery during the time period of this study and their data are described in Table 2. Table 3 shows the values for HAQ and EPM-ROM for patients submitted or not to surgery. Of the seven patients surgically treated, four underwent more than one procedure. The operations performed in the upper limbs (n = 5) were: synovectomy in three patients, wrist fixation in one patient, and metacarpophalangeal prosthesis application in one patient. The surgeries performed in the lower limbs (n = 9) were: synovectomy in the foot of a patient, a talocalcaneal fixation on another and knee prosthesis application in three patients. Table 4 shows the comparison of patients stratified with respect to loss of function by HAQ and whether or not a surgery was performed.

With respect to surgery procedures, although the frequency of patients who had greater than 20% loss of functional capacity was not significant (Fisher, P = 0.16), those patients who underwent surgery had a three times greater risk of suffering loss of function greater than 20% during the study period (hazard ratio = 3.42) compared with patients not operated.

A correlation was noted between number of inflamed joints and baseline EPM-ROM score (0.46); between baseline EPM-ROM and baseline HAQ (0.46); between final EPM-ROM score and disease duration (0.45); and between disease duration and EPM-ROM change (difference between baseline and final scores). A strong correlation was noted between final HAQ score and HAQ change (0.74), influenced by the subgroup of patients who underwent surgery (Table 5).

Discussion

This prospective study involved 32 RA patients aged over 18 years at disease onset and with moderate functional impairment according to HAQ and EPM-ROM scores. After a mean follow-up of three years, the frequency of patients who had greater than 20% loss of functional capacity was...
but The Sokka and The patients. 

Table 3 – HAQ and EPM-ROM scores for patients who were or not submitted to orthopedic surgery.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Final</th>
<th>Methotrexate use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery n=7</td>
<td>HAQ 0.84 (0.72)</td>
<td>HAQ 1.64 (0.56)</td>
<td>4 (57%)</td>
</tr>
<tr>
<td>Without surgery n=25</td>
<td>HAQ 1.20 (0.45)</td>
<td>HAQ 1.07 (0.70)</td>
<td>21 (84%)</td>
</tr>
<tr>
<td></td>
<td>EPM-ROM 5.8 (1.80)</td>
<td>EPM-ROM 8.3 (0.74)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EPM-ROM 5.7 (3.06)</td>
<td>EPM-ROM 6.4 (3.90)</td>
<td></td>
</tr>
</tbody>
</table>

Data expressed as mean (SD).

Table 4 – Loss of function as measured by HAQ after three years of progression.

<table>
<thead>
<tr>
<th></th>
<th>&gt;20%</th>
<th>&lt;20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery</td>
<td>4 (57%)</td>
<td>3 (43%)</td>
</tr>
<tr>
<td>Without surgery</td>
<td>7 (28%)</td>
<td>18 (72%)</td>
</tr>
</tbody>
</table>

Data in absolute numbers and percentages.

not significant. Patients who underwent surgery had a three times greater risk of functional capacity loss greater than 20% during the study period compared with not surgically treated patients.

Our data indicate a relative score stability, not only for HAQ, but also for EPM-ROM over time. Although extensively used, the exclusive use of HAQ has proven more suitable to evaluate RA activity, while EPM-ROM is a more sensitive tool to changes in functional capacity. The use of EPM-ROM in this study has provided objective data about the ROM needed to perform activities of daily living. In fact, the EPM-ROM score is sensitive to the modification of functional status, translating the goniometry required to perform the basic activities of life.

Even in healthy individuals, there is loss of functional capacity throughout life, and in RA patients, such a loss is more significant. In our sample of RA patients with a mean age of 58 years, an HAQ score of 1.1 is equivalent to the score for people aged 85 years. Sokka et al., assessing functional capacity in RA patients, established that HAQ values smaller than 1 would mean a milder disease, while values above 2 would suggest a severe illness. The annual increase in HAQ score found by these authors was confirmed by Scott et al. These authors found an annual increase of 1% in HAQ score. Although the literature considers a 0.24-change in HAQ as clinically relevant, reductions of 0.19 can already considered as minimal improvement in function.

The functional capacity measured by HAQ is influenced not only by age or duration of disease, but also by levels of pain and medications used. In Brazilian patients, there was a faster progression in HAQ scores compared to Spanish patients. This finding was attributed to the difference in the pain assessment and medications used. At that time, there was scarce access to biologic drugs in several centers in Brazil, while in Spain these medications were already widely available.

HAQ can predict the severity and dysfunction caused by RA during the progression of the disease – which is not evident with the use of other clinical measures. The functional loss after five years is related to female gender, older age at disease onset, HAQ >1 in the first assessment, comorbidities and depression. In addition to a positive correlation with disease duration, HAQ presents also a negative correlation with socioeconomic status.

In the present study, we observed a slight improvement in functional capacity measured by HAQ in the group of patients who did not undergo surgery and a significant worsening in the operated group. One can interpret this finding as a difference in disease severity between groups. Allegedly, the group not operated would suffer a less aggressive disease, although with a disease duration similar to that of the operated group. Thus, the more favorable progression of the non-operated group may reflect a condition more susceptible to control by medication. A worsening of both HAQ and EPM-ROM scores was observed in the RA group who underwent orthopedic surgery, denoting that their surgery may have occurred late, when the anatomical deformities (e.g., musculoskeletal impairment) already installed would prevent functional improvement of the joint.

Back when the patients in this study showed the first symptoms of RA, biologicals were not available in the Public Service. Currently the importance of the early use of DMARDS and biologicals in controlling the course of the disease in its first years has already been established. This window of opportunity may have been lost by the patients in this study, who had only methotrexate available as DMARD. Our findings agree with Sokka et al.’s, which emphasize the positive impact of an early use of DMARDS in functional capacity measured.

Table 5 – Correlations found among clinical data.

<table>
<thead>
<tr>
<th></th>
<th>Baseline EPM-ROM scoring</th>
<th>Final EPM-ROM scoring</th>
<th>EPM-ROM change</th>
<th>HAQ change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflamed joints (n)</td>
<td>0.46</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Duration of disease</td>
<td>NS</td>
<td>0.45</td>
<td>0.48</td>
<td>NS</td>
</tr>
<tr>
<td>HAQ, baseline</td>
<td>0.46</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Final HAQ scoring</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>0.74</td>
</tr>
<tr>
<td>EPM-ROM, baseline</td>
<td>NS</td>
<td>0.53</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

Spearman correlation, NS, not significant.
by HAQ. We can add to this the finding that functional disabil-
ity was a predictor factor of mortality in RA.12 Pain and joint
mobility are considered as important factors limiting the func-
tional capacity of RA patients.3,22,23 The loss of func-
tional capacity occurs early in the disease, with the presence of
acute inflammation.24 With the early use of DMARDs and after
controlling the disease activity, a functional recovery occurs,
followed by structural lesions that settle slowly and cumu-
latively. Thus, the functional deterioration may occur even
before the radiographic changes, which become relevant after
a lapse of five years from the onset of the disease.7,20

An inverse correlation between HAQ score and ROM of
some joints, e.g. wrists, shoulders and knees, was observed.24
EPM-ROM takes into account the ROM ranges needed to
perform wide-ranging functions, and not just a percentage
of amplitude loss caused by the disease, which can differ
depending on the joint.8 Our data show the expected cor-
relation between the baseline evaluation by EPM-ROM and the
number of inflamed joints. We also noted an EPM-ROM varia-
tion with the duration of disease, showing worsening in joint
mobilization capacity after a 3-year period.

In subjects with joint impairment consolidated by a disease
duration longer than 12 years, EPM-ROM remains stable, while
HAQ varies depending on the degree of disease activity.22
These questionnaires are complementary, to the extent that
HAQ is influenced by the subject’s adaptation to dysfunction
over time, while EPM-ROM reflects the capacity of the move-
ment itself.

Although the dysfunction due to pain and inflammation
can be modified by clinical and rehabilitative approaches,
this strategy may not be sufficient in the context of the sum of
structural joint injuries, regardless of the surgical approach.25
The best time for surgery indication in RA remains to be
defined, being hampered by the availability of surgical ser-
vice and the patient’s motivation.7,11,25 We must add to this
the fact that, even when indicated early, the surgery acts in
an indirect manner in function improvement, i.e., through
improvement of pain, rather than through regaining func-
tional capacity.19 Few studies have evaluated the long-term
effect of surgical interventions. Benoni et al. demonstrated
improvement in pain in RA patients who underwent surgery
of lower limb joints after one year of follow-up. The improve-
ment in HAQ score of at least 0.2 occurred only in cases of
knee and hip surgery, but not in ankle and feet surgery.26 On
the other hand, March et al. observed a reduction in HAQ only
in patients undergoing knee arthroplasty, and stability in HAQ
in those undergoing hip arthroplasty.25 Therefore, total HAQ
does not reflect the potentially expected functional improve-
ment after an orthopedic surgery in RA patients; and clinical
practice shows that the modification of HAQ has value as a
measure of the effect of other therapeutic modalities in
RA.27

In our study, we observed a positive correlation between
the final score of the HAQ and its changes over the 3-year
period, influenced by the subgroup of patients undergoing
surgery. This finding highlights the deterioration of functional
capacity in the group of operated patients, which is in agree-
ment with other authors that the effect of arthroplasty in
RA is more prominent in relieving pain than in the recovery
of function.19,26,27 Considering that disease activity is a key
determinant factor to explain the loss of functional capac-
ity, patients treated by rheumatologists have a more favorable
progression of AR versus those treated by physicians from
other specialties.12

Furthermore, we observed lower baseline HAQ scores in
the surgery group compared to the conservatively treated
group. No statistical analysis could be performed between the
two groups, in view of the diversity in the group of patients
operated and the small sample size. In four patients, more
than one type of surgery was performed, and three patients
underwent surgery both in their upper and lower limb. Two
patients underwent ankle surgery which, according to Benoni
et al., evolves unfavorably, with reduction of HAQ.27 As for
metacarpophalangeal arthroplasty, it is known that, although
the patient demonstrates satisfaction with improved pinch
and grip strength, the functional capacity shows modest
gains.28

Some of the limitations of this study reflect the deficien-
cies in tertiary care of Public Health Services in our midst.
Among them, we can mention the difficulty in establishing
the diagnosis of RA within the window of opportunity that
would allow the preservation of joint function, as well as to
getting the surgery needed in a timely manner. In our country,
there are long waiting lines for treatment in the Public Health
Service, and this can contribute to the deterioration of func-
tional capacity to the point that, when finally the surgery is
performed, the preservation of function is no longer possible.
In this context, the heterogeneity with respect to disease dura-
tion and the small number of patients undergoing surgery are
included.

This study was limited to a baseline evaluation and to
another, after approximately three years of progression. The
fulfillment of interim evaluations, and in particular a pre-
operative assessment for the surgical group, could shed light
on the worst course of operated patients. These patients may
present a more aggressive disease, and perhaps their func-
tional capacity was very poor at the time of surgery, justifying
their unfavorable outcome.

Finally, patients taking biologic medications were not
included in this study. It is not yet clear whether the biolog-
cals are responsible for a reduction in surgical indications
in RA patients.24,25,29 In general, it is known that the early
use of DMARDs in RA tends to decrease the disease pro-
gression, improve quality of life and also reduce the costs of
hospitalization, surgical procedures, and the long periods of
rehabilitation.31,30

Our data demonstrate that HAQ and EPM-ROM scores in a
group of RA patients seen in the Public Health Service have
not changed over an average 3-year period. The group of
patients undergoing orthopedic surgery experienced worsen-
ing of functional capacity versus the group of patients who
were not operated. This fact serves as a warning of the need to
use broader therapeutic regimens and also of the need for the
availability of musculoskeletal surgeries in a timely manner
for RA patients.

Conflicts of interest

The authors declare no conflicts of interest.
REFERENCES


