

Prevalence of Coxitis and its Correlation with Inflammatory Activity in Rheumatoid Arthritis

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Abstract

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BACKGROUND: Rheumatoid arthritis (RA) is an autoimmune inflammatory disease characterised by intra-articular and extra-articular manifestations but very rarely with coxitis.

AIM: This study aimed to investigate the prevalence of coxitis, clinical changes, and its correlation with the parameters of inflammatory activity.

METHODS: A cohort of 951 patients diagnosed with ACR/EULAR (American College of Rheumatology/European League against Rheumatism) 2010 criteria was enrolled in this prospective, observational and analytic research study. The CBC (Complete Blood Count), ESR (Erythrocyte sedimentation rate), CRP(C - reactive protein), Anti CCP (Antibodies to cyclic citrullinated peptides), X-ray examination of palms and pelvis, and the activity of the disease as measured by DAS - 28 (28 - joint disease activity score) were carried out in all subjects. Independent samples t-test was used to compare the group's characteristics, whereas Pearson correlation test was used to analyse the correlation between study variables.

RESULTS: Of the total number of the subjects, 730 (76.8 %) were females, whereas 221 (23.2%) were males. The average age was 51.3, y/o while the most of them were between 40 - 49 y/o (32.6%). The prevalence of coxitis was 14.2%, mostly found in males (19.46%). The echosonographic prevalence of changes was 21.45%, while the radiological changes were 16.3%; in both cases, the changes were more expressed in males. The analysis showed that inflammatory parameters were significantly higher in patients with coxitis.

CONCLUSION: Coxitis has high economic cost because it ends up with a mandatory need for a total hip joint prosthesis. Thus the results of this study can serve to plan and initiate early preventive measures.

Introduction

Rheumatoid arthritis (AR) is an autoimmune chronic inflammatory disease which is characterised by small and large joint polyarthritis which over the time can lead to invalidity. It is spread all over the world, and it can affect all races, both genders and all age groups, and it has an incidence rate that ranges from 0.5 - 1% of the total population [1]. The onset of disease may be slow (the more frequent form) or rarely fast [2]. The disease has articular and extra-articular systemic manifestations [3]. The disease is

not related to vocation, social status, nationality, religion or level of education [4].

Coxitis starts with restrictive pain in the hip joint which radiates to the knee. The pain is expressed more in the external and internal rotation, and those movements are hard to execute. Anteflexion and retroflexion among those patients are limited, and therefore their steps are short and slow. Movement restrictions are also found in adduction and abduction. The examination tests for hip joint are positive [5].

In the terminal phase of the disease, the patients have severe pain and large limitations as they can move only with the help of a second person or

with crutches. High activity of the disease as measured by DAS – 28 is also an important factor for hip affection [6]. The damage is caused not by the only disease itself, but also from the use of the glucocorticoids which can cause the osteonecrosis of femur head [7].

Due to migration or displacement of the femoral head from the process of inflammatory synovitis, the acetabular protrusion is presented and the dislocation of the femur head that can be measured with delta angle [8]. Progression of damage may be faster in time and can be measured [9]. Osteoporotic fractures can be presented in this pathology, and they can pose a threat to patient's life [10]. Diagnosing and monitoring the changes in coxal articulation with ultrasound during rheumatoid arthritis is an excellent and irreplaceable clinical method [11]. On average 3 - 5 years from the onset of coxitis, it is necessary to perform the prostheses implantation by an orthopedist (arthroplasty joint).

The main purpose of this study was to investigate the prevalence (clinical, echosonografical and radiological) of coxitis in RA. Also, we aimed to investigate its correlation with the inflammatory activity parameters. The specific objectives of the study were to investigate the prevalence of coxitis based on gender and age, to investigate the results of inflammatory parameters in patients with and without coxitis, and if there are any changes in clinical manifestations and radiologic findings according to gender in patients with RA.

Material and Methods

In this prospective study were included 951 patients that were treated in Rheumatology Clinic (inpatients and outpatients) during period January 2012 – December 2016 through the descriptive, investigative and analytic method. Patients are diagnosed with RA according to ACR - EULAR 2010 criteria.

Every patient is examined for complete blood count, ERS, CRP, RF, Anti CCP, pelvic X-ray (Philips Bucky Digital Diagnose apparatus), coxo-femoral articulation echo sonography (Sonoscape S 40), and when these methods were not clinically definitive for diagnose, we moved on to MRI of coxofemoral articulation (GE Signa HDe 1.5T MRI) or CT scan (Siemens Biograph 6 PET/CT).

Touching of coxofemoral joint is marked as positive to: pain in external and internal rotation, anteflexion and retroflexion, adduction and abduction, limitation of these movements, synovitis (echo of art. coxae), impossibility of walking and sitting, as well as radiological changes: erosion, narrowing of articular

space, protrusion, subluxation and other changes. Also, the activity of disease is measured with DAS - 28.

In the research are not included patients with the degenerative disease, periarticular rheumatism, infection coxitis, palindrome rheumatism, and those with congenital or acquired pathology of the hip joint. All patients were informed and agreed to be part of our manuscript. The research is approved by the local ethical committee.

Statistics

Statistical processing was performed with SPSS 20.0, 2:03 SigmaStat, SigmaPlot 2000 and Excel 2010. From the statistical analysis we drew a descriptive analysis, and from statistical parameters, we have determined the structure index, arithmetic average, standard deviation, standard error, and the confidence interval with reliability 95% (95% CI). The data are presented in tables and graphs.

A t-test of arithmetic averages was used for parametric data with a normal distribution of variables, while the Mann - Whitney Rank Sum Test was used for variables with non-normal distribution. Pearson's correlation test was used to test the correlation between study variables.

Results

In our research, we have analysed 951 patients with duration of illness ranging 1 to 18.2 years, with the average of morbidity of 4.85 years.

The majority of patients belonged to the group age 40 - 49 (32.6%) and 50 - 59 years old (24.5%), who altogether made up nearly 2/3 of all patients, and the least number of patients were of group age 70 - 79 years old (8.6%) (Table 1).

Table 1: Demographic data, distribution of group age by gender and average age by gender

	Females		Males		Total	
	Nr.	(%)	Nr.	(%)	Nr.	(%)
Frequency*	730	76.8	221	23.2	951	100.0
Group age						
30-39	120	16.4	31	14.0	151	15.9
40-49	237	32.5	73	33.0	310	32.6
50-59	189	25.9	44	19.9	233	24.5
60-69	122	16.7	53	24.0	175	18.4
70-79	62	8.5	20	9.0	82	8.6
Age, MEAN (SD) years **	51.0	(11.4)	52.4	(11.7)	51.3	(11.5)

* Chi-test (F vs. M) = 8.047, df = 4, (P = 0.09); ** Mann-Whitney Rank Sum Test.

The prevalence of coxitis was 14.2% in the study population, mostly found in males (19.46%), with the prevalence of echosonografic of changes of 21.45%, and of radiological changes of 16.3%; in both

cases, the changes were more expressed in males (Table 2).

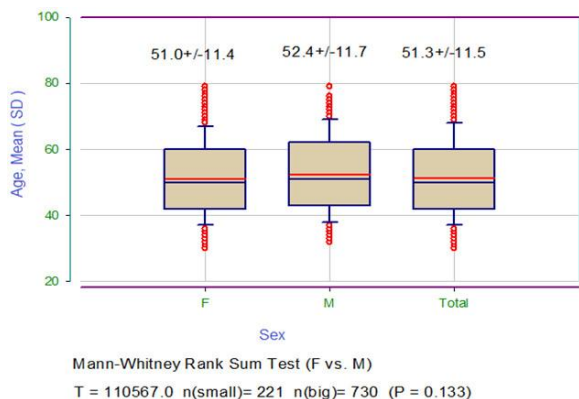


Figure 1: Patients age by gender

The patients with coxitis had a significantly higher level of all parameters of inflammatory activity ($p < 0.001$) compared to those without coxitis (Table 3).

Table 2: Coxitis prevalence, its radiologic, echosonographic, topographic changes and localization

Prevalence of clinical, radiological and echosonographic changes	Female (n=730) Nr. (%)	Male (n=221) Nr. (%)	Total (n=951) Nr. (%)
Coxitis prevalence by gender	92 12.6	43 19.4	135 14.2
Prevalence of echosonographic changes in art. coxae	140 19.18	64 28.96	204 21.45
Prevalence of radiological changes in art. coxae.	92 12.6	44 19.9	136 14.3
Localization of coxitis			
right	58 7.94	18 8.14	76 7.99
left	42 5.75	17 7.7	59 6.20
Topographic-radiologic changes in art. coxae measured by delta angel			
Cranio - lateral subluxacion	56 7.67	22 9.95	78 8.20
Acetabular protrusio	42 5.75	16 7.24	58 6.1

The results of Pearson's correlation analysis between the study variables are shown in Table 4, where it can be seen that all parameters of inflammatory activity are positively correlated with the clinical manifestation of the coxitis, the radiological changes as well as the mode of onset of the disease.

Table 3: Laboratory characteristics of patients with rheumatoid arthritis according to presence or absence of coxitis (Independent samples compared with t-test)

Performed analysis	All patient	Patient with Coxitis	Patient w/o Coxitis	Value of P
CRP (mg/dl)	N = 943 26.07 ± 22.00	48.18 ± 25.20 (n=134)	22.41 ± 15.15 (n=809)	< 0.001
SE (mm/h)	N = 951 45.77 ± 36.00	79.38 ± 36.76 (n=135)	40.20 ± 25.28 (n=816)	< 0.001
Anti-CCP (U/dml)	N = 575 137.83 ± 84.00	275.25 ± 171.75 (n=97)	109.94 ± 123.18 (n=478)	< 0.001
Nr. (%) of patient positive in RF and WR	N = 951 (77.2%)	N = 123 (91.1%)	N = 611 (74.9%)	< 0.001
Nr. (%) of patient on fast on set	N = 951 (23.8%)	N = 102 (75.6%)	N = 125 (15.3%)	< 0.001

Discussion

Coxitis in RA is understudied, even when its presence causes a highly functional disability which can fast lead to disability. Surprisingly, even the few publications currently available are clinical case

reports; surfing on Pub Med, we could not find any research on the prevalence of coxitis in RA.

Table 4: Correlation of Pearson analysis between laboratory parameters, clinical and radiologic manifestation and the onset of disease in patients with RA (r)

	Clinical manifestation of coxitis	Radiological changes in art. coxae	Mode of beginning of the disease
CRP (mg/dl)	0.469**	0.317**	0.702**
SE (mm/h)	0.150**	0.326**	0.688**
Anti-CCP (U/dml)	0.424**	0.261**	0.606**
RF or WR positive	0.135**	0.698**	0.113**

* $p < 0.05$; ** $p < 0.01$; CRP Protein C reactive; SE (ESR) erythrocyte sedimentation rate; Anti CCP - Anti cyclic citrullinated peptide, RF rheumatoid factor; WR Waler Rose.

This clinical condition of patient – is crucial for dynamic function, has not received the proper attention of scientific research yet due to a “trap” caused from rarely touching data of hip joint and difficulties in the examination (in the past) of this joint compared to other joints. The results of our research prove that coxitis has not such low prevalence, thus should be clinically evaluated to maintain the motoric function of movement in patients. This finding is more expressed in men than in women and is more frequent in old group ages (Senile Rheumatoid Arthritis), compared to other group ages, and there is an important statistical significant difference between the high inflammatory parameters in patients with and those without coxitis. There is also a positive correlation between laboratory parameters, clinical and radiological manifestations and the quick start of the disease.

When calculating the prevalence and incidence of RA which is high (affects about 1% of world population) appears that coxitis is a big socio-medical problem. There are some studies that have compliance with the findings of our research in every element. Coxitis and its clinical features have been researched by authors Bourqui M, Gerster JC in 20 patients and they have noticed that more than half of patients with this pathology within a short time must undergo surgery because functional impediments while walking were significant [12]. Author Pučar studied the prognosis of coxitis in 81 patients with Rheumatoid Arthritis, by analysing the opening angle of the acetabulum with X - rays, and he found that there is a statistically significant increase in millimetres of this angle [13].

Nagao Y et co. investigated radiographic methods for measuring the angle of inclination in the acetabulum and noticed that the reduction of this angle is a precursor of injuries of movements in art coxae [14]. We have explored some scientific researchers by patients treated with total hip joint Arthroplasty. Since 1990 many studies are developed for surgical treatment correction of large joints damaged by RA and now this procedure is part of patient's treatment [15]. With this achievement, the global orthopaedic community has increased the quality of patient's life significantly with rheumatoid arthritis, and these methods are constantly improving [16].

Australian authors have investigated the reasons for the deployment of the femoral head of total hip joint arthroplasty, and rheumatoid arthritis has been the second cause of their clinical findings [17].

However, before undergoing surgical treatment, patients with RA should undergo a thorough clinical assessment because these methods despite the great advances have their complications that must be taken into consideration [18-19].

Finally, it is a great fortune for patients with rheumatoid arthritis that after a total hip joint arthroplasty they have rare complications compared to those with rheumatoid arthritis [20].

In conclusion, rheumatoid arthritis is a destructive inflammatory disease of joints, including the hip joint. Prevalence of coxitis is higher in males with a higher prevalence in older age groups. Prevalence of echosonographic changes is higher than the radiologic ones, whereas the prevalence of clinical changes is the lowest. Craniolateral subluxation is more frequent than an acetabular protrusion. There is an important statistical significance between inflammatory parameters, fast onset of RA and development of coxitis. As coxitis has a high impact on the health care system education of the patients about the disease activity plays a key role in the prevention of coxitis and its consequences.

Results from the research for the prevalence of coxitis can serve as important data for calculating some patients in need for Arthroplastic hip joints. These data can serve as a planning tool for the Ministry of Health as well as for planning the needs for arthroplastic hip joints in orthopaedics and traumatology clinics in the Balkan region and beyond because the incidence and prevalence of rheumatoid arthritis in the region are assumed approximately the same.

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