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ORIGINAL ARTICLE

Total hip arthroplasty in the treatment of degenerative disorders in rural and urban patients – A retrospective, randomised and controlled study

Kazimierz Rąpała[1,2,4], Aleksandra Truszczyńska[1,2,5], Adam Tarnowski[3]

[1] *Faculty of Physical Education and Sport, Biała Podlaska, Academy of Physical Education, Warsaw, Poland*
[2] *Orthopaedic Department, Medical Centre for Postgraduate Education, Independent Public Hospital, Otwock, Poland*
[3] *Psychology Department, Military Institute of Aviation Medicine, Warsaw, Poland*
[4] *University of Social Science, Warsaw, Poland*
[5] *Jozef Pilsudski University of Physical Eduction, Warsaw, Poland*

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Abstract

Introduction. Farming is hard work which may lead to overstrain and osteoarthritis of the hip and knee. Hip osteoarthritis has been rarely discussed in the Polish literature.

Objective. The objective of the study was to determine the differences in hip osteoarthritis in urban and rural patients. The differences concern: prevalence, etiology, degree of degeneration and time spent in hospital.

Materials and method. Hospital records of 200 patients were analysed who were divided into 2 groups. Group A consisted of 79 rural patients: 39 males (49.4%) and 40 females (50.6%), mean age 66.09 (±9.48), mean BMI – 27.26 (±4.47). Group B consisted of 121 urban patients: 51 males (42.1%), and 70 females (57.9%), mean age 67.74 (±8.88); mean BMI – 27.33 (±4.21).

Results. There were no differences observed regarding hospitalization times, but statistically significant differences were noted concerning the causes of osteoarthritis in both the rural and urban patients. No statistically significant differences were found between the types of prosthetic implants.

Conclusions. 1) There are no differences between rural and urban patients who received surgical treatment for hip osteoarthritis, although more patients operated upon were urban patients. 2) The degree of hip degeneration was greater in rural patients.

Key words

hip arthroplasty, femoral acetabular impingement, etiology, coxarthrosis diagnosis, coxarthrosis prevalence, farmers

INTRODUCTION

The issue of public health in rural patients has been the subject of numerous studies [1, 2, 3]. These studies have stressed the differences in the incidence of commonly occurring diseases, such as cardiovascular, gastrointestinal diseases, etc. [4]. Regarding orthopaedic disorders, there are studies concerning, among others, postural disorders and rural youth [5].

Disorders and diseases of the locomotor system, however, particularly injuries and accidents, are more common in urban patients. This is related to heavier traffic, injuries at building sites and in industry.

Work in farming is hard, and may lead to overstrain and, consequently, to osteoarthritis of the hip and knee. Consequently, numerous studies on osteoarthritis have been published in the English language [6, 7]. In the Polish literature, however, issues related to osteoarthritis of the hip have yet to be discussed in detail.

Objectives. The aim of this study was to determine the differences in hip osteoarthritis in urban and rural patients. The detailed goals concerned:

1. Comparison of the percentage of patients with coxathrosis among rural and urban dwellers.
2. Etiology of osteoarthritis in rural and urban patients.
3. Duration of hospitalization.
4. Assessment of the degree of hip degeneration in rural patients, compared with urban patients.

MATERIALS AND METHOD

Analysis covered the hospital documentation of 200 patients who received treatment at the Department of Orthopedic Surgery at the Medical Centre for Postgraduate Education, Otwock, Poland, during 2009–2012.

The patients' medical records and radiographs were retrospectively, randomly selected from the hospital computer database. The criteria for patient qualification for the study were degeneration of the hip, confirmed by radiography, pain while walking, night pain, and positive Duchenne and Trendelenburg signs. All the patients qualified for the study had been admitted to the hospital according to a specific procedure which required medical consultation and clinical testing as follows: a cardiac evaluation of patients, 3 urine tests, gynecologic examination and orthopantomogram – all aimed at excluding any focus of infection, as well as vaccination for viral hepatitis. All patients who were to undergo surgery had been prophylactically treated against thrombosis with low molecular weight heparin for several weeks.

Address for correspondence: Aleksandra Truszczyńska, Orthopeadic Department, Medical Centre for Postgraduate Education, Independent Public Hospital, Konarskiego 13, 05-400 Otwock, Poland
E-mail: aleksandra.rapala@wp.pl

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The criteria for excluding patients were: other pathological abnormalities of the hip, other joint disorders, and previous surgery or arthroplasty of the hip.

Group A consisted of 79 rural patients: 39 males (49.4%) and 40 females (50.6%), mean age – 66.09 (±9.48) years, mean BMI – 27.26 (±4.47) years.

Group B consisted of 121 urban patients: 51 males (42.1%) and 70 females (57.9%), mean age – 67.74 (±8.88) years, mean BMI – 27.33 (±4.21) years.

Statistical analysis. In the cases where the independent explanatory variables and explained variables were nominal, Chi-square test was applied to determine the statistical significance. Test for proportion differences was applied in order to establish effects on particular categories.

RESULTS

Analysis of the patients' medical histories provided information that allowed the establishment of the differences and similarities, as presented in the aims of the study.

There were no statistically significant differences between the groups regarding age and BMI: patients from both groups were overweight.

There were no differences regarding duration of hospitalization – 11.64 (±4.55) days for group A, and 12.37 (±4.83) days for group B.

Radiograph analysis was conducted by a highly experienced doctor who did not know the results of the clinical examination of the patients, or the qualification for their further treatment. On the basis of the radiographs, the following diagnoses were made:

1. Coxa vara in 49 patients (24.5%).
2. Femoral acetabular impingement in 45 patients (22.5%).
3. Idiopatic etiology in 33 patients (16.5%).
4. Dysplasia in 33 patients (16%).
5. Femoral head necrosis in 20 patients (10%).
6. Coxa valga in 15 patients (7.5%).
7. Coxa profunda in 4 patients (2%).
8. Injuries in 2 patients (1%).
9. 2 cases were unclassified and excluded from further analysis.

The degree of hip degeneration was analyzed according to a 3-degree scale proposed by Garlicki and Kreczka [8] (Fig. 1). Division of clinical and severity of degenerative changes of the hip [8].

I° – early type: short course of not more than 2 years, efficient and relatively well-preserved range of motion. X-ray – joint space narrowing, small deformation shape of the femoral head.

II° – medium-heavy type: duration of the disease 2–10 years, pain at night, inefficient gait, active range of motion limited to about 75%, flexion adduction contracture, walking on crutches. X-ray – narrowing of joint space, cysts, irregular thickening of the head and neck,

III° – heavy type: more than 10 years duration, constant pain, gait severely limited, no rotational and adduction and abduction movements. X-ray – complete abolition of joint space, cysts, osteophytes, deformation of the head in the form of a 'mushroom cap'.

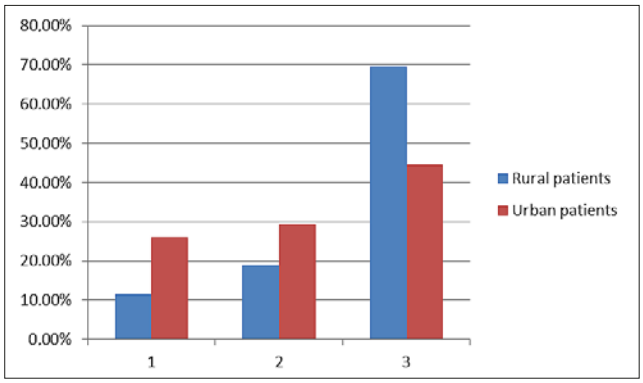

Figure 1. Comparison between degree of destruction of the hip joint and place of residence

The observed effect is statistically significant (Chi-square=12.569; df=2; p=.002). Patients from rural areas had significantly more advances changes; almost 70% of these rural patients had third degree destruction, comparing to only 44.5% in urban patients.

The following statistically significant differences were found regarding diagnosis of degenerative disorders between rural and urban patients. The disorders that were more common in rural patients were: coxa vara 33.38%, compared with 22.66% in urban patients, dysplasia – 20.25% in rural patients, 13.22% in urban patients, and necrosis capitis femoris – 13.92% in rural patients, 7.43% in urban patients. The disorder most common in urban patients was idiopathic coxarthrosis – 21.49% in urban patients, 8.86% in rural patients (Tab. 2).

Table 1. Distribution of proportions of different causes leading to the development of osteoarthritis of the hip

No.	Etiology	No. of patients		Proportion		Z	P
		Rural	Urban	Rural	Urban		
1	Coxa vara	24	25	30.38%	20.66%	2.243133	0.024888
2	Idiopathic	7	26	8.86%	21.49%	-3.57527	0.00035
3	Femoral acetabular impingement	15	30	18.99%	24.79%	-1.407585	0.159254
5	Coxa profunda	3	1	3.80%	0.83%	1.986678	0.046958
6	Dysplasia	16	16	20.25%	13.22%	1.891532	0.058553
7	Femoral head necrosis	11	9	13.92%	7.44%	2.111582	0.034722
8	Coxa valga	3	12	3.80%	9.92%	-2.439473	0.014709
9	Injury	0	2	0.00%	1.65%	-1.833397	0.066744

Almost no statistically significant differences were found with respect to the type of prosthetic implant. Statistically significant differences were found only regarding Profemur and Coreil implant, but these groups are too small to allow further analysis. Because of the fact some patients were disqualified from an operation during their first hospitalization (due to different reasons), only 167 implants were implanted and further analysed. In both rural and urban patients under 65 years of age, modern non-cemented implants with a filler and ceramic head were used, such as bicontact, ABG, Profemur. In rural and urban patients over 75 years of age, clinically tested, cemented Exeter implants were used (Tab. 3).

Table 2. Comparison of hip prostheses assumed, depending on place of residence

No.	Type of prosthesis	Rural	Urban	Proportion		Z	P
				Rural	Urban		
1	Bicontact	10	16	12.66%	13.22%	-0.16831	0.866339
2	ABG	16	27	20.25%	22.31%	-0.503659	0.614501
3	Exeter	9	16	11.39%	13.22%	-0.557473	0.577204
4	Other	3	6	3.80%	4.96%	-0.567761	0.570198
5	Corail	1	9	1.27%	7.44%	-3.060463	0.00221
6	Profemur	9	2	11.39%	1.65%	4.023337	0.00005
7	CFP	11	18	13.92%	14.88%	-0.271175	0.786256
8	Avantage	5	7	6.33%	5.79%	0.228063	0.819598
9	Alloclasic	1	1	1.27%	0.83%	0.431944	0.665782

DISCUSSION

The etiology of degenerative disorders is usually known. The most common causes of these disorders discussed in the literature are dysplasia, i.e. genetic etiology and injury [9, 10]. In the presented study, the most common disorders in rural patients were: coxa vara, followed by dysplasia and femoral acetabular impingement. In rural patients, coxa vara as a cause for osteoarthritis (33.38%) was more common than dysplasia (20.25%). The reason for this is the fact that more cases have been diagnosed as femoral acetabular impingement (in the cam form – 20.25%), and earlier such cases had been diagnosed as dysplasia. This situation is most probably due to late diagnosis. Rural patients do not report to an orthopaedic surgeon at the first onset of hip pain. They often wait until the pain and limitation reach the stage when they are difficult to manage. In the presented study, degenerative disorders as shown in radiographs, were often so advanced in rural patients that diagnosing femoral acetabular impingement as a cause for developing coxarthrosis proved impossible.

Ganz [11, 12] has claimed that femoral acetabular impingement may be a mechanical cause for hip osteoarthritis. Over the last 10 years, orthopaedists have been greatly interested in this theory which a allows establishment of the etiology of the disorder, and also the use of a different kind of surgical treatment in which the bone tissue is conserved, and only the part of bone that is the source of the impingement is excised.

It was found that in the 3 analysed years, rural patients constituted 40% of the patient population. It is believed that the degree of hip degeneration in rural patients was caused by lack of adequate and complete knowledge about the benefits of this surgery. Degree III of joint degeneration, which manifests itself in complete destruction of the joint cartilage, combined with femoral head necrosis of various degrees, was found in 69.9% of rural patients. Complete destruction of the joint may have been caused by hard farming work, usually connected with other employment.

It was not possible to ascertain whether all rural patients were farmers working on big farms because the patients' records mentioned only work on small farms.

Studies in Scandinavia, a country noted for farms of large size, analyzed the impact of the type of work and duration of work performance on the development of hip and knee osteoarthritis. Thelin et al. [13] examined the hip joints of 269 patients, verified by radiography, who had a narrowing of the joint space greater than 3mm. The studied patients' work required driving tractors and milking cows. The study group results were compared with the results of a clinical control group who consisted of 538 persons from the same region; their gender, age and duration of time occupationally occupied, were taken into consideration. The conclusion was that the degree of hip degeneration depended on the time occupationally occupied.

In another study, Thelin et al. [14] compared 427 farmers with hip disorders with a clinical control group of 369 healthy persons. They established that the risk factor was work on small farms requiring milking cows and breeding animals.

In an interesting multicentre study, 1,811 French general practitioners examined 5,425 patients, and evaluated hip and knee pain during the 24 hours preceding the examination, and general pain during the 8 days preceding the examination. They used the WOMAC scale and the VAS. Risk factors were as follows: age over 75 years, female gender, widowhood, retirement, unemployment, BMI exceeding 40, and lack of physical exercise [15]. Similar risk factors were found by Szpalski et al. for low back pain syndrome [16].

Jensen [17] described differences in hip osteoarthritis in rural and urban patients whose work required climbing ladders and stairs. He analyzed articles published over 40 years, and concluded that the risk factor in farmers was lifting weights of approx. 20 kg, and that a work span of 10 years doubled the risk of disorders. He did not find these risk factors in construction workers.

Another study concerned risk factors in patients with coxathrosis hospitalized in Denmark in 1981–1999. Tüchsen et al. [18] examined male seasonal workers and farm owners. They found that male farmers and farm employees whose work requires driving tractors were among the group at risk.

For the presented study, 200 hip radiographs of rural and urban patients treated at the Department of Orthopedic Surgery at the Medical Centre for Postgraduate Education in Otwock, Poland, were examined. The etiology and degree of hip degeneration was established, and it was concluded that hip osteoarthritis was more advanced in rural patients than in urban patients of a similar age and BMI.

In the literature quoted below, the authors used a Swedish patient registry to analyze data on patients who had arthoplasty in 1987–1998. The study group consisted of people whose work required driving large vehicles. Other factors, such as high BMI and smoking, were considered. The study did not find any impact of vibration on the development of osteoarthritis [19]. Another study [20] evaluated male hip joints in 3 study groups:

1. 120 farmers;
2. 1,130 rural inhabitants who were not farmers;
3. 1,087 urban inhabitants.

It was found that farmers were at higher risk of developing osteoarthritis than rural dwellers who performed a non-agricultural occupation.

An interesting study was conducted in Iceland among a study group of 1,408 patients, including 832 women, who had had hip or knee arthoplasty before 2002. The study group results were compared with the clinical control group of 1,082 patients who were the closest blood relatives of the members of the study group. There were 592 women in the

clinical control group. The study found a connection between osteoarthritis and the hardships encountered in performing the occupation of a fisherman or farmer by males. No such relationship was found in females [21].

A Danish study on an entire working population of citizens, including farmers, conducted in 1981–2006, assessed the risk of developing osteoarthritis of the hip or knee. The participants were examined again in 1996–2006. The conclusion was that workers who lift heavy weights are more at risk of developing osteoarthritis. The risk becomes greater after 1 – 5 years, and affects both males and females [22]. Although farmers develop pain in the musculoskeletal system, they do not take sick leave. A study concerning this problem was conducted among 1,013 farmers who were compared with 768 non-farmers [23]. Public health issues and the hardships of a farmer's work and their impact on the development of hip osteoarthritis were discussed in a study by Walker-Bone and Palmer [24].

Another widely-used scale for hip arthritis was designed by Kelgren and Lawrence. Their scale, widely-used in the literature, is a useful and relatively straight forward system for grading X-rays of the arthritic hip which takes into consideration: joint space narrowing, osteophytic lipping, sclerosis, bone contour deformity, measured by the following degrees:

1st – doubtful narrowing of joint space and possible osteophytic lipping;

2nd – definite osteophytes, definite narrowing of joint space;

3rd – moderate multiple osteophytes, definite narrowing of joints space, some sclerosis and possible deformity of bone contour;

4th – large osteophytes, marked narrowing of joint space, severe sclerosis and definite deformity of bone contour [25].

It can be assumed that the Kreczko scale is equal to the Kelgren and Lawrence scale, with exception of the 1st degree.

The above-mentioned literature concerns the impact of hard physical work on the development of hip osteoarthritis, which may seem debateable, as a mechanically normal hip can bear a very large strain. In contrast, dysplastic hips and abnormally built hips can degenerate as a result of overstrain during hard by work farm workers.

CONCLUSIONS

1. The availability of total hip arthroplasty is becoming comparable for rural and urban patients. This is because it is possible to treat patients in orthopaedic surgery hospitals experienced and trained in arthoplasty.
2. Fewer diagnoses of idiopathic coxarthrosis are being made, and more femoral acetabular impingement diagnoses as the cause for coxarthrosis.
3. It was found that the degree of hip degeneration was greater in rural patients than in urban patients, because hard physical work overstrains the hip joints and mechanically facilitates the destruction of abnormally built joints.

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