



## Original article

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## REVISING HIP ARTHROPLASTY

### SUMMARY

A number of requests for revision of previously fitted prosthesis has become often due to numerous causes and is likely to be more frequent in the future. By an intervention we want to remove some of the complications related to prosthetic replacement of the hip joint and its application.

The causes are often interconnected. Those are biological problems related to prosthesis usage. We think that patient's behaviour leads to a number of complications as well.

What you need for this intervention is an experienced team, wide range of fitting appliances and a set of good instruments.

We replaced cement prostheses with cement ones in all but one case, and non-cement with non-cement or cement prostheses. We conducted anti-thrombosis prophylaxis and put a patient on antibiotics of high dosage for four days. Upright position was allowed depending on the general state starting from the third to seventh day.

*Key words:* revising hip arthroplasty, complications of primary arthroplasty

### INTRODUCTION

Revising hip arthroplasty is the procedure of replacements of the previously fitted hip prosthesis for different reasons. Essentially, it means solving a problem caused by using prosthesis (1).

Nowadays, artificial joints of the hip are being increasingly fitted in young patients that shall result in more and more complications as the time passes. Even 20 years ago, more than 2,000 total hip prostheses were fitted daily, which actually means around 700,000 annually (2). In the USA, there are about 250,000 fractures of the femur neck with an estimate that, in 2050, that number would exceed 750,000 likewise in many other developed parts of the world (3,4). It is normal to expect, having in mind the number of patients, a considerable number

of different complications which require the revision operation, in most cases the prosthesis replacement. That is why the awareness on possible complications is the first and important preventive measure.

When we are to make decision on the hip prosthesis fitting, we should always think about "what to do later" or take into account the opinion of Wiliam Osler "the solution of today becomes the problem of tomorrow" or "what is considered to be wisdom today, it will be nonsense tomorrow". We treated the patients with complications that require the prosthesis replacement, i.e. rearthroplastics. That is why we decided to analyze our modest amount of material and present it with the basic aim to present which complications require revision.

The aim of the paper was to present, based on our modest experience, both the reasons for

replacement of the previously implanted hip prosthesis and technical operation difficulties and results.

MATERIAL AND METHODS

We analyzed disease histories i.e. clinical and radiological results of those patients who had been fitted the hip prosthesis. They were revised in three hospitals in the Eastern part of Republic of Srpska. It total, there were 18 patients (Figure 1).

We could analyze neither indication for fitting of the primary prosthesis nor the post-operative course, because 16 patients were operated outside our area. Two patients were primarily operated in our institutions. The reason for fitting of the revision prosthesis was pain in the femur diaphysis, and as far as another patient was concerned, it was dislocation of the prosthesis femoral component.

The prosthesis aseptic loosening, as the reason for revision hip arthroplasty, was the case in two of our patients (Figure 2a);

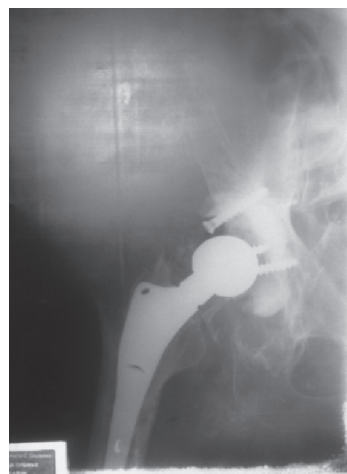


Figure 2a. Postoperative radiography in the same patient

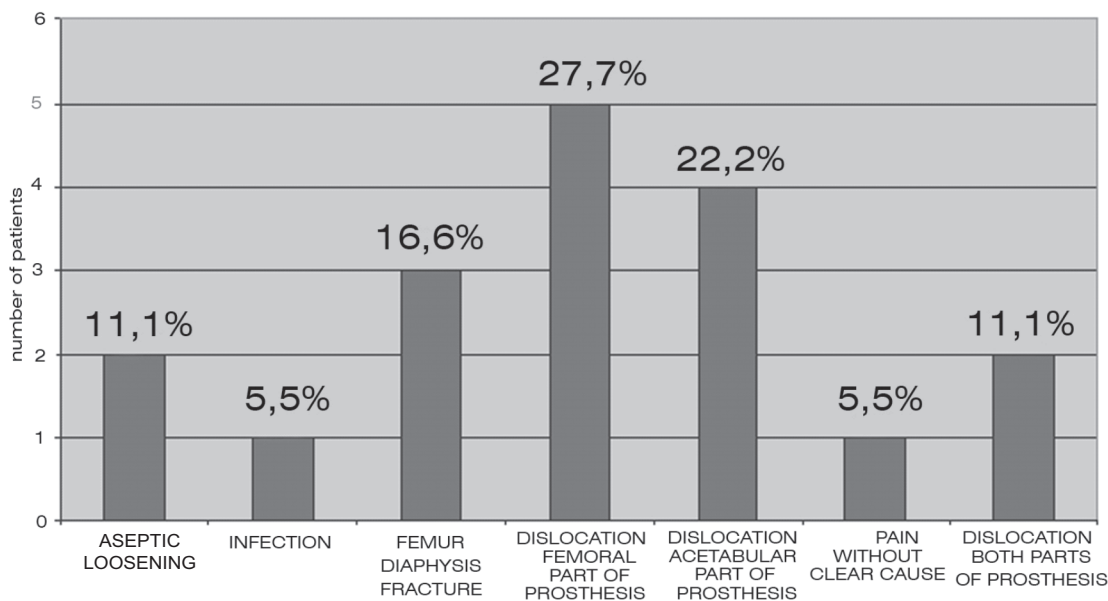


Figure 1. Diagram of the number of patients according to the indications for the revision hip arthroplasty

Indications for the revising arthro-plastics are the following:

1. Aseptic loosening of one or both prosthesis components (Figure 2).



Figure 2. Aseptic loosening of the acetabulum component in the patients preoperatively

2. Progressive loss of the bone mass of the femur or acetabulum. Protrusion of prosthesis and osteolysis of spine or/and deeper parts of the femur.

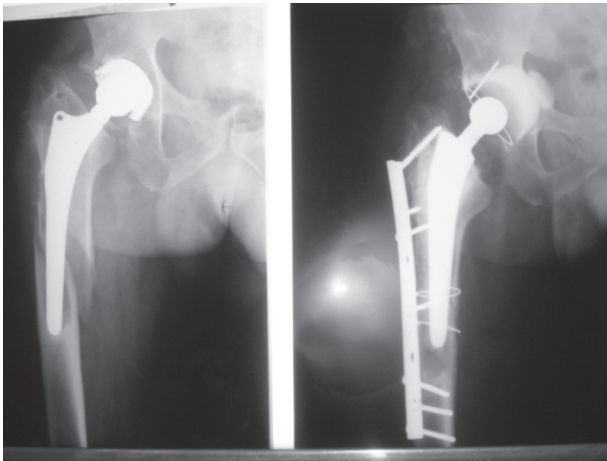
As the reason for revision hip arthroplasty, femoral component dislocation of the prosthesis was the case in five patients, and acetabular component dislocation of the prosthesis was the case in four patients. Dislocation of both components of the prosthesis was the case in two patients.

3. Infected prosthesis - stable or unstable  
As the reason for revision hip arthroplasty, the infection was the case in one patient.

4. Fractures of the implants of the trunk or joint - we have not had such cases.

5. Irreducible prosthesis-we have not had such cases.

6. Fractures of bones near implants or implants and bones' fractures - as the reason for revision hip arthroplasty, femur diaphysis fracture was the case in three patients (*Figure 3a, 3b*).



*Figure 3a.*  
*Fractures of bones*  
*near implants*

*Figure 3b.*  
*Postoperative radiography*  
*in the same patient*

7. Periprosthetic problems - ectopy ossification and fracture of trochanter.

8. Pain without clear cause usually in the femur diaphysis.

As the reason for revision hip arthroplasty, pain of unclear genesis was the case in one patient (*Figure 4*).



*Figure 4. Postoperative radiography of patient with*  
*pain of unclear genesis*

9. Prosthesis wearing out.

10. The coming period shall bring new complications for sure.

During the operations, we implanted the standard prostheses of the Aesculap type, such as 18 cemented prostheses and 2 cementless ones. We implanted neither hybrid nor revision prostheses.

The primary hip prosthesis was worn in the period of 3 to 20 years, with mean duration of 11.5 years.

Mean age of the patients was 66.8 years, (range 57 - 76 years).

Of the operated patients, 10 were women and 8 were men.

## RESULTS

In the respective period, from one to five years, we did not have the cases of death, infections and thromboemboly. In one case, there was a recurrence of dislocation, and as for the second case, there was some pain in the upper leg without clinical and radiological signs of other complications.

Equalling (equalling of the legs' length) was achieved in 15 patients while there was reduction of the operated extremities in 3 patients, on average by 2,8 cm.

The patients' rehabilitation was initiated in cooperation with the physical therapist immediately after the operation in the sense of breathing; mobilization in bed, static exercises in bed, and the second postoperative day after aspiration drainage outlet was removed, sitting in bed and vertical positioning accompanied with previous exercises. On the third day, the patients started to walk on crutches or walker. Physical rehabilitation was continued after the patient was discharged from the hospital, the clinic of the physical medicine, because at that time the Health Insurance Fund did not finance the health resort treatments that those patients needed. Few patients, i.e. three of them financed themselves for the health resort treatments after operation.

All the patients were ready for their everyday activities, but since all 18 patients were retired persons, there was no need for their professional rehabilitation.

The patients used crutches or walker for 3 or 4 months, but a great number of patients, 12 of them, continued to use the stick for ever.

## DISCUSSION

The number of patients with the artificial hip joint inserted is increasing. The reason for that is the wish of patients to keep painless and mobile hip. Objectively, better knowledge about the hip

biomechanics, better prosthesis design and improved knowledge of the operative technics lead towards this aim. Apart from that, the age of patients is growing, so more and more often there are objective reasons for this intervention. Nowadays, 1.2 prostheses are inserted per 1,000 people annually. The requests for the revising hip prosthesis are present in all big medical institutions, while the number of these interventions will be growing in the future.

The aim of each intervention is to remove the problem and make the hip more functional, considering the expected life time of the patient. Almost all complications related to prosthetic hip may lead to prosthesis replacement. We had the following cases in our material:

- The occurrence of **aseptic loosening** in our patients was in 11.1% and the causes of its occurrence are of still insufficiently explained pathogenesis (5-9). The cause of this complication has not been sufficiently explained so far, but it is stated as follows: cementing technics, prosthesis positioning, reaction of the organism to a foreign body (6-9). Generally speaking, it can be said that it is the result of maladaptation and reaction of the live tissue to a foreign body (cement and metal).

- The occurrence of aseptic loosening is 3-5%, analyzing the five-year period of the operated patients (10). It is clinically manifested with the sharp pain on burden and its disappearance while at rest. Radiological visible area of luminous state around the cement, i.e. prosthesis, is not always the proof of clinical instability. According to Ritter, it is unstable sign because it is visible in 39% of cases, while prosthesis migration in those circumstances is present only in 4% of patients (11). We accepted this sign only in those cases followed by pain on burden which disappeared while lying.

The findings of the nucleotide radiography are very often unreliable because accumulation of nucleotids in the surrounding tissue is huge and there are not any of them at the place of dead bone. In that way, we can get both false negative and false positive results.

Aseptic loosening is more frequent in the femoral than in acetabulum component of the prosthesis, which used to be the case with our patients (27.7%:16.6%). Russoti et al. found some 1.2% of loosened femoral and 0.4% acetabulum components of prosthesis in patients five years after the operation, compared to the previous study in the same institution where the percentage was 24% and 12.5%, respectively. They concluded that decrease in the number of loosening was caused by the improvement of the operative technics for prosthesis fitting.

It is very difficult to notice the difference in biological and mechanical processes occurring in relation to inflammatory destruction of bones and development of loosening in cement and non-cement prosthesis (12).

There was also an aggressive role of granulocytosis noticed in the bones' destruction (13).

Maloney emphasizes the importance of biomechanical and histological research on the autopsy material (14).

Prevention of prosthesis aseptic loosening partly depends on the surgeon, while considerable part is contributed to biology of patients, which the surgeon cannot have the influence on (15).

It was also proven that polymetil metacrylat causes release of factors which support the bone resorption, i.e. leads to the aseptic loosening (16).

**Prosthesis dislocation** of one or both parts was the most typical complication in our patients. Dislocation of the prosthesis femoral component is, in most of the cases, the consequence of incorrect biomechanical relations established by operation i.e. prosthesis centralizing and non-physiological transfer of burden (6). The spine osteolysis leads to modified mechanical behavior of the prosthesis femoral component, which consequently leads to the femur diaphysis osteolysis in the upper part of prosthesis, especially its lateral wall (9).

Prosthesis dislocation is the most frequent in the back access and it is up to 16%, 6% in the lateral access and below 4% in the front one (9,15) (Figure 5).



Figure 5. Irreducible prosthesis

We personally believe that dislocations are sometimes caused by behavior of patients, particularly in the first months after the operation. Inappropriate centralizing of any prosthesis components or axial instability anyway supports this condition.

**Progressive loss of the bone mass** can also be attributed to intolerance of bones towards the

foreign body, but even more to non-physiological allocation of the burden forces which lead to the femur diaphysis spine osteolysis around the prosthesis top. (9) Progressive loss of the bone mass will always bring about prosthesis loosening and theoretically, all patients will have it if they live long enough (8,17).

Hip joint osteolysis is caused by excessive reanimation of the joint, excessive number of deep holes for the cement entrance to the hip and biological reaction of the bone to the foreign body. Apart from that, this complication may also be caused by bad positioning of the acetabulum components of prosthesis, acetabulum dysplasia, patients suffering from rheumatic arthritis and neuromuscular disease and etc. It is also necessary to mention the inevitable impact of biological factors on occurrence of this complication as well as additional fracture of acetabulum (protrusion), to a great extent caused by the behavior of patients. It is particularly related to young population whose physiological activity exceeds tolerance of the connection of prosthesis-bone.

**Infection:** Regardless of the fact that the number of infections is reduced from 10% to acceptable 0,5%, applying antibiotics and providing surgery rooms with filtered air, it is still one of the most dangerous complications of the operated hip (18,19). Its diagnosis is difficult unless there is fistula. Nowadays, numerous clinical and laboratory diagnostic procedures are used to establish the diagnosis of the infected alloplastics of the hip joint (20).

We had a case of deep prosthesis infection caused by *Staphylococcus epidermidis* established twice during preoperative puncture or 5.5%. In this case we removed prosthesis and fitted it, revising six months later. Fortunately, it passed without infection two years after revising.

**Prosthesis trunk fracture** did not occur in our patients, but it regularly occurs after the spine osteolysis, while the prosthesis peak is steadily impacted in the channel, when the force of bending is transmitted to the trunk which leads to fatigue of the material and occurrence of this complication.

**Femur diaphysis fracture** was the problem registered in three patients, or 16,6%, and in our opinion, it was caused by primary fitting of the too

short trunk, possibly overlooked perforation of the channel during the first insertion as well as inappropriate behavior of patients. We were regularly removing the existing prosthesis trunk and upon osteofixation of the fracture point AO osteosynthesis, we fitted revising prosthesis depending on quality of bones and possible selection of prosthesis.

**Periprosthetic problems**, such as ectopic ossification and trochanter fractures are rare indications for revision. We did not have it in our patients.

It is necessary to emphasize that all the aforementioned complications rarely occur alone, and more often there are two or more complications. Therefore, aseptic loosening often occurs along with prosthesis dislocation. Loosening and infection regularly go together, progressive loss of the bone mass often accompany the femur diaphysis fracture and acetabulum protrusion. All of them make more complicated the delicate operations of the fitting of revising prosthesis which are complicated by their nature.

## CONCLUSION

We presented 18 patients who had the revising arthroplasty hip joint made, causes of revision as we could see and explain them and gave possible reasons for their occurrence. Unfortunately, we could not precisely determine the time from the primary to revising operations. Out of 18 patients only two were primarily operated in our institution, and most of others somewhere in the former Yugoslavia. Following the postoperative period of our patients for five years, we did not have the cases of death, infections or thromboembolism. In one case, we had dislocation relapse, and in other case there was some pain in the upper leg without clinical and radiological signs of other complications.

We emphasize that the following most optimum conditions, for this branch of surgery, should be met for the revising hip arthroplasty: experienced team of surgeons, good surgery theaters, wide range of implants and good instruments.

Publication of papers including a small number of patients broadens the experience in certain fields, which is the reasons for our presentation.

## REFERENCES

1. Gregori M., Alberton M., Whitney A. et al. Dislocationem after revision total hip arthroplasty. JBJS 2002; 84:10.
2. Pšorn V.: Indikacije za ugradnju totalnih proteza zgloba kuka. U Artroplastika kuka. 64-70, Medicinski fakultet Zagreb, 1988.
3. Commings S. R., Rubin S.M.: The future of hip fractures in the United States. Numbers, costs and patient effects of the postmenstrual estrogen. Clin Orthop. 1990; 252:163.
4. Herman S.: ENDOPROTEZA KUKA. U Artroplastika kuka. Medicinski fakultet Zagreb. 1988; 140-144.
5. Beckenbaugh R., Ilstrup D., Total hip arthroplasty: A review of the hundred thirthy three cases with long follow up. J. Bone Joint Surg. 1978; 60A:306.
6. Collvile J., Raunio P.: Charnley low friction arthroplastys in rheumatoid arthritis: Study of complications and results of 378 arthroplastys. J. Bone Joint Surg. 1978; 60 B: 498-503.
7. Crownisebiel R.D., Brand R.A.: A stress analysis of the acetabular recontruction in protrusio acetabuli. J. Bone Joint Surg. 1983; 65 A:495.
8. Harris W. H., Schiller A. L., Choler J. M. et al. Extensive localised bone resorption in the femur following total hip replacement. JBJS. 1976; 58 A:612.
9. Woo. R. Moorey B., Dislocation of total hip prothesis. JBJS. 1992; 64A:1306.
10. Orlić D., Grospić R., Komplikacije u vezi ugradnje totalne endoproteze zgloba kuka. U Artroplastika kuka. 1986; 93-98. Medicinski fakultet Zagreb.
11. Cotes H. E., Favis M. P., Ritter M. A., Polyethylene wear with cemental backed acetabular cups. J. Bone Joint Surg. 1993; 75B:249.
12. Hozack W. J., Balderston at all. Cemented versus cementless total hip arthroplasty. A comparative study of equivalent patient populations. Clin. Orthop. 1993; 289:161.
13. Santarista S., Hoikka R., Ascola A. et al. Agresive granulomatosus laesions in cementless total hip arthroplasty. J. Bone Joint Surg. 1990; 72 B:986-990.
14. Maloney W. J., Justy M., Burke D. W. et al. Biomechanical and histological investigation of cemented total hip arthroplasty. Astudy of autopsy retrivied femurs after in vivo cycling. Clin. Orthop. 1989; 249:129.
15. Rao J. F., Bronstain R.: Dislocations following arthroplasty of the hip. Incidence, prevention and treatment. Orthop. Rev. 1991; 20:261.
16. Herman J. H., Sovder W. G., Anderson D. et all. Polimetil metacrilate induced release of bone resorbing factors. J. Bone Joint Surg. 1989; 71:A,1530.
17. Boby J. D., Moortiraer E. S., Glossman A. H. at all. Producing and amoiding stress shielding laboratory and clinical opservations of noncemented total hip arthroplasty. Clin. Art. 1992; 274:79.
18. Schulcer S. F. Harris W. H.: Deep infection after total hip replacement under aseptic conditions. JBJS. 1988; 70 A: 724 .
19. Nelson J. P.; Deep infection following total hip arthroplasty. J. Bone Joint Surg. 1977; 59 A:1042-1044.
20. Lyons C. W.: Evaluation of radiografic finding in painfull arthroplastys. Clin Orthrop. 1985; 195, 239-251.

## REVIZIONE ARTROPLASTIKE KUKA

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### SAŽETAK

**Broj zahtjeva za revizijom ranije ugrađene proteze iz brojnih uzroka postao je čest i vjerovatno će biti u budućnosti još češći. Zahvatom se želi otkloniti neka od komplikacija vezanih za protetsku zamjenu zgloba kuka i njenu upotrebu.**

**Uzroci su često međusobno vezani. To su biološki i problemi vezani za upotrebu proteze. Mislimo da i ponašanje bolesnika dovodi do određenog broja komplikacija.**

**Za ovaj zahvat neophodna je iskusna ekipa, veliki izbor ugradbenog materijala i dobar instrumentarij.**

**Mi smo cementirane proteze zamjenjivali cementiranim, sem u jednom slučaju, a necementirane necementiranim ili cementiranim. Provodili smo antitrombotičnu profilaksu i davali 4 dana visoke doze antibiotika. Uspravljanje pacijenta smo dozvoljavali zavisno od opšteg stanja pacijenta od 3 do 7 dana.**

***Ključne riječi:* reviziona artroplastika kuka, komplikacije primarne artroplastike**