Modern models of endoprostheses and periprosthetic infection.

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Abstract

The main goal of the paper is to study epidemiology of infection complications after hip arthroplasty with modern models of endoprosthesis, using the research of other scientists. The authors used theoretic methods, which included analysis and review of literary sources. The authors found that modern foreign endoprostheses have significant advantages in terms of quality, functioning, and design. It is found that endoprosthesis component instability was most widespread causes of inflammatory process developments, as well as postsurgical hematoma, inflammation, postoperative wound edges necrosis, and others.

Keywords: Hip joint, Total hip replacement, Periprosthetic hip infection.

Introduction

Today treatment and rehabilitation of patients with severe acquired and congenital pathology of hip joints are one of relevant issues in orthopaedics [1]. Endoprosthesis replacement is considered most effective among many known methods: it allows reaching high rehabilitation effect and significantly increasing the patients’ life quality in a relatively short time [2]. The operation of total endoprosthesis replacement by complexity, extent of blood loss, threat of general and local complications takes the first place in orthopaedic surgery, and is fraught with numerous mistakes if made poorly [3].

According to foreign authors, the rate of prosthetic joint infection after first endoprosthesis replacement makes up 0.3-3.0% [4,5]. Forecasts for check-up operations are much worse, after them infection complications develop in 2.6-4.8% cases, and following a check-up operation in relation to infection process, backsets develop in 23.2-35.9% cases [6,7]. The infection rate varies depending on follow-up period of patient and makes up, according to different authors, from 0.3% to 2.22% in primary and to 5.9% in check-up operations [8-14].

Materials and Methods

In the course of research the authors used Medline®, Embase® databases, which contain the information about infectious complications after hip arthroplasty. The search for publications in Russian in peer-reviewed journals using RSCI (Russian Science Citation Index electronic base) and Elibrary.ru scientific electronic library. The authors reviewed publications related to hip arthroplasty with the use of foreign endoprostheses in research centers and hospitals of the former USSR and having complications. Data analysis was carried out only by officially published papers in the press publications.

Results

Leading research centers of the USSR have adopted hip prostheses of the world manufacturers of Europe and USA early in the 90’s. These were largely endoprostheses Zimmer (19.1%), Muller (14.3%), Waldemar Link (10.8%), DePuy (14.2%), Sulzer (7%), Kirchner-in 5%, Spotorno-in 4.6%, Poldi-in 3.7%, Zweymüller (3.1%), Matisa (2.6%). The next endoprostheses were used rarer: Wagner (0.4%), Ortos (0.2%), Lima-LTD (0.1%) [15-19]. Literature review showed that during the adopting endoprosthesis replacement infectious complications were observed from 0.3% to 4.8% [20].
However, for the last 10-15 years the situation has changed for the better, since the ratio of foreign endoprostheses made 95% [21,22].

According to Volokitina et al. [23], who maintained over 600 operations with European prostheses, infectious complication was in 0.9% patients. The experience in the application of modern foreign prostheses indicates significant advantages by design, quality, and exploitation [24]. Currently, new endoprostheses ESI, Fenix, BMSI appeared, which can be compared to foreign ones. These companies often use import raw materials to manufacture implants, they independently certified their production according to international standards, streamlined rigid internal control of production process. Infectious complication was observed from 1.2 to 1.8% [25,26].

The following most probable causes of inflammatory process development were found: endoprosthesis components’ instability; postsurgical hematoma; inflammation caused by reaction to suture material (suture sinuses); focal point of latent self-infection; postoperative wound edges necrosis, patient’s non-compliance with rehabilitation programme in postoperative period; injuries in postoperative period; endoprosthesis components’ destruction [27].

**Discussion**

Information presented in scientific papers regarding the usage of endoprostheses of world manufacturers such as Zimmera, Muller, Waldemar Link, Depuy, Sulzer, Kirschner, Spotorno, Poldt, Zweymüller in the territory of the former USSR indicates positive dynamics of results of treatment after arthroplasty, a decrease in infectious complications in early and late postoperative period. Thus, according to authors [28], doctors started to use endoprosthesis of the countries outside the CIS since 1994. Biomet endoprosthesis was used in 182 patients, Protek-in 19, Ortos-in 3, Lima-in 3. Out of 224 operations complications were observed in 5.9% (13 patients). Suppuration in 3.1% (7), in 2 cases suppurrative process was cut short, endoprostheses in others were removed. Dislocation in 2.7% (6 patients).

Davydov et al. [29] maintained hip replacement with “Endoprotetik Plus”-41 patients. Complications: fistula in 2 cases and in 1.5 months it was cut down, dehiscence-in 2, secondary regeneration, thrombophlebitis of hip vein-in 3.

Statsenko et al. [30], 221 operations were maintained in 202 patients. Age from 19 to 90 years old. Average age-54 years. All Muller endoprostheses. Complications: suppurrative-septic complications-5.2%.

For the period from 1996 to 2001 Shavpovalov et al. [31] switched to foreign EP “Zimmer” and “Waldemar Link”. Complications; instability in 1.1%, dislocation-in 2.2%, suppuration (early-0.7%, late-1.1%).

All over the world the rate of infectious complication development is about 1% after primary endoprosthesis replacement, and in the case of check-up intervention the risk increases 4 times [32]. The main factors [33] contributing to suppuration are operation length over 3 hours (90%), additional use of biological and synthetic materials (77.8%), technical challenges (71.4%), concurrent conditions (76.9%), blood loss over 1 L (69.2%).

**Conclusions**

According to national registers of Spain, Canada, Norway, Australia, Great Britain, USA, Denmark, Finland, Sweden [34-40], the rate of check-up complications after endoprosthesis replacement makes up 2-14%, while infection takes 2-3 rank place (0.6-16%) in the structure of all causes of check-up interventions [41-43]. The analysis shows that infection often develops in men when there are interventions related to inflammatory diseases, hip fractures, and necrosis of head of femur.

Thus, after using foreign endoprostheses there is a decrease in the risk of periprosthetic infection, since prostheses are better by design, quality, and the high level of training operational staff by study centers of Europe and USA allowed getting positive results; while noting high survival rate of foreign prostheses (97%) at the observation period 7-10 years, there is a marked decline in infectious complication (0.3-4.8%). Infectious complications, as a rule, were related to non-compliance with aseptics and antisepses, operation length, problems of postoperative care, patient’s social status (citizen or countryman).

**References**


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