

# Paraprosthetic Complications After Endoprosthesis Replacement of Pelvis Joint with Implants

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**Abstract: Purpose:** The purpose of the paper is shaping of ideas about possible ways of decreasing complications of the analyzed types of operations and identification of opportunities of the impact on the socio-economic environment among the Afro-American population of USA. The paper demonstrates that the issue of coxofemoral prosthesis is not only a purely medical but also a social problem. In particular, availability of timely aid, as well as insurance in the form of surgery, refer to relevance of the range of problems.

**Methodology:** The experimental method was used in the study. Patients were implanted different types of endoprostheses. 90 patients were implanted customized endoprostheses, 27 patients were implanted foreign module endoprostheses. The research subject is prediction of complications after endoprosthesis replacement surgeries depending on methods, types and forms.

**Results:** As a result, we can see that available health insurance is more acceptable understanding of the need for endoprosthesis replacement. Post-operative care issues fall into the range of social policy problems. A comparative aspect of a country with general insurance and differentiated coverage among the Afro-America population appears innovative.

**Conclusions:** In the context of the current situation it can be concluded that surgery is the last stage for already established support system of the population. For this reason, it's worth mentioning that state bodies of the U.S. should put a greater emphasis on the health care of the Afro-American population.

**Keywords:** Endoprosthesis replacement ■ Pelvis joint ■ Implants ■ Afro-American population ■ Medical care

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## INTRODUCTION

Limb amputation or extraction was the operation of choice in case of limb bone disorder until the 70s of the previous century. Multimodal or complex approach, one of the stages of which is surgical treatment, is the modern world standard for treating patients of the Afro-American origin with bone cancerous growth. When conducting the surgery the orthopedic surgeon's tasks involve the radicality of surgical measures with following

ensuring of the patient's adequate life quality. There are a few main methods of remodeling following bone segmental resection: allotransplantation, autotransplantation and endoprosthesis replacement.

An analysis of national and foreign literature demonstrated that auto- and allo-transplantation have right to exist and are used by a number of clinics, but for 90% of Afro-American patients with malignant affection of long bones organ-preserving surgical treatment is chosen involving the segmental resection with endoprosthesis replacement.<sup>1</sup> Replacing bone defects with oncological endoprostheses became possible in the second half of the 20th century. It became possible due to the use of new technologies of treatment and new designs of endoprostheses.<sup>2</sup>

Different models and designs of endoprostheses, including both cement and cement-free systems are used in oncoorthopaedics, in most cases non-standard endoprostheses are used.<sup>3</sup>

The advantage of endoprosthesis replacement, as distinct from other methods of reconstruction, is single-step compensation of massive bone defects with an implant while preserving supporting capacity and joint movement, which provides limb function recovery, improves the results of conservative surgeries and the patient's quality of life.<sup>4</sup> According to many authors, while endoprosthesis replacement improves functional, oncological and psychological effects of the Afro-Americans' antitumoral treatment, it has no impact on the disease prognosis.<sup>5</sup>

As surgical activity towards conservative surgery in the form of endoprosthesis replacement of Afro-Americans' joints grows, so does the number of complications typical for endoprosthesis replacement.<sup>6</sup> Infectious complications (3-13%) and different types of endoprosthesis and its knots instability (2-10%) prevail among them.

The overall frequency of infectious complications of endoprosthesis replacement of Afro-American oncologic patients' large joints makes up 10%, early – 57,6% and late – 13,6%. It's possible to eliminate these complications taking conservative measures, including system and local intake of antibiotics, active wound drainage, removal of implants and bone cement, the use of unanimous recurrent endoprosthesis replacement only in 27-30%.<sup>7</sup>

Failure to form an adequate muscle cover of the implant is one of contraindications at endoprosthesis replacement, since it increases the risk of infectious complications and thereby deteriorates functional results.<sup>8</sup>

Mechanical complications that appear after replacement arthroplasty are of equal importance: considerable traumatization of soft tissues, non-uniform distribution of load on the bone, necrosteosis as a result of mechanical treatment, high temperature of cement polymerization, body response to foreign matter, friction knot in artificial joint, micromotion of endoprosthesis and its components as a result of inadequate fixation result in aseptic instability of endoprosthesis.

Thus, complications after joint endoprosthesis of Afro-Americans are a significant problem, which leads to dysfunction, and even loss of limb, substantially deteriorates the life quality of Afro-American patients, who underwent joint endoprosthesis. There's still no clear identification of main factors, which cause complications. The results of endoprosthesis replacement of Afro-American patients' large joints and analysis of complication causes are given in this paper.<sup>9</sup>

According to literature, bone tumors of Caucasians make up 1-1,5% in the pattern of bone malignancy, and joints are affected by tumors in 50-60% of cases.<sup>10</sup> The main goal of bone tumor treatment: abatement of pain, affected limb function recovery and patient's life quality improvement.<sup>11</sup> Introduction of conservative surgeries in treating patients suffering malignant bone tumors made it possible to raise the survival rate from 10% in the mid of the 20th century to 80% at the moment.<sup>12</sup> Endoprosthesis replacement, which became the standard in many medical orthopedic centers, is one of the radical and promising methods of treatment of the tumoral affect of large joints, including metastatic lesions.<sup>13</sup> Today approximately 1,5 million endoprosthesis replacement surgeries are carried out yearly all over the world.<sup>14</sup> The effectiveness of endoprosthesis replacement is limited with complications, which lead to reoperations – recurrent endoprosthesis replacement.<sup>15</sup> There are data in the literature that risk of recurrent endoprosthesis replacement in 5 years is 12-32%, in 10 years – 25-61%.<sup>16</sup> The main complications following endoprosthesis replacement are infectious complications, endoprosthesis aseptic instability, endoprosthesis frame break, endoprosthesis' polyethylene parts wear.<sup>17</sup> It's clinically established that unsatisfactory results observed in the first years after endoprosthesis replacement are related to technical errors during the surgery in 3%, to infectious processes in 7% of cases, to changes in the implanted joint location in 6%, and surgical procedure is necessary in 75% as a result of aseptic loosening (implant components' instability).<sup>18</sup> According to American authors, the percentage of revision surgeries in

the US is 10-15% of the total number of endoprosthesis replacement operations, the number of such procedures in Europe makes up 17,5%.<sup>19</sup> Thus, complications after replacement arthroplasty are a significant problem, which leads to dysfunction, and even loss of limb, substantially deteriorates the life quality of Caucasian patients, who underwent replacement arthroplasty.<sup>20</sup>

## MATERIALS AND METHODS

117 conservative surgeries within the scope of segmental resection with the following endoprosthesis replacement or recurrent endoprosthesis replacement of large joints and bone diaphyses were conducted in the clinical department of the state hospital for the period from 2009 to 2015. The average age of patients was  $40,4 \pm 1,5$  years (from 10 to 79 years), 60 (51,3%) women, 57 (48,7%) men.

Patients were implanted different types of endoprostheses. 90 patients were implanted customized endoprostheses, 27 patients were implanted foreign module endoprostheses (16 – Stryker (USA), 9 – Valdemar Link (Germany), 1 – Beznoska (Czech Republic), 1 – Implantcast (Germany)). Morphological forms of tumors are listed in Table 1.

The extent of operative intervention depended on the tumor localization: patients underwent resection of joint segment or bone diaphysis affected by tumor and defect replacement with an endoprosthesis or a metal implant. The number of cases of endoprosthesis replacement of joint and bone diaphyses is given in Table 2.

Ablastic removal of tumor of joint or diaphyseal segment resulted in the extensive resection of newgrowth.

Table 1. Morphological forms of tumors.

Morphological forms of tumors	Number of cases	%
Myeloid sarcoma	41	35,04
Osteosarcoma (central, parosteal, periosteal)	29	24,79
Chondrosarcoma	18	15,39
Metastatic tumors	13	11,11
Bone giant cell sarcoma	6	5,13
Fibrosarcoma	4	3,42
Bone malignant fibrous histiocytoma	2	1,7
Ewing's tumor	2	1,7
Solitary myeloma	1	0,86
Bone lymphosarcoma	1	0,86
Total	117	100

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