

8 YEAR-PERIOD COMPARATIVE ANALYSIS OF PERI-AND POST-OPERATIVE COMPLICATIONS OF NAVIGATED AND CONVENTIONAL KNEE AND HIP ARTHROPLASTIES BASED ON STATISTICS PROVIDED BY THE QUALITY INSTITUTE OF HEALTH INSURANCE ORGANIZATIONS IN GERMANY

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INTRODUCTION

Hip and knee joint replacement is nowadays one of the most common surgeries in Germany with over 300.000 procedures every year. The frequency of peri- and post-operative complications varies depending on the study (Mahomed 2003; Zhan 2007).

Since 2001, every hospital in Germany is required to report any peri- and post-operative complications, which occur during the implantations of knee and hip prostheses and/or the hospital stay to an external institute for quality control. Since 2001 the data was collected by the quality institute of health insurance organizations, the so called „Bundesgeschäftsstelle Qualitätssicherung (BQS)“ (Federal authority for the assurance of quality). Since 2009 this was done by the AQUA-Institute (Institute for Applied Quality Improvement and Research in Health Care GmbH). The purpose of this study was to evaluate the published data of these institutes and to differentiate between the rate of peri- and early postoperative complications of conventional and computer navigated surgical procedures.

The hypothesis of the study was that there is no increase in the rate of peri- and early post-operative complications as a result of the navigated surgical procedure.

MATERIALS AND METHODS

A retrospective analysis and a statistical evaluation of the BQS data set on initial implantations of knee and hip endoprotheses between 2004 and 2012 were conducted.

The share of navigated surgery of total surgeries, additional operating time due to the navigation procedure measured in minutes, the intra and post-operative surgical rate of complications, the general post-operative rate of complications, and the comparison of patient population with regard to age, sex and ASA-classification were subject of the analysis. Furthermore, the rate of patients who were able to walk and take care of their personal hygiene without assistance on the day of their discharge from the hospital was also registered. Additionally, the duration of the hospitalization measured in days was recorded and compared.

RESULTS

Overall, the number of implanted knee endoprotheses rose from 110.000 in 2004 to 133.000 in 2012, including a doubling in the share of the navigated knee endoprotheses from 6.8% to 11.2%.

Additional operative time for the implantation of knee prostheses decreased from initially 20 minutes in 2004 to 11.3 minutes in 2012.

The rate of patients with at least one surgical intra and post-operative surgical complication decreased by 50.0% from 3.2% (2004) to 1.6% (2012) in the case of conventional total knee arthroplasty. A similar decrease could be observed in case of computer-navigated total knee arthroplasty, as the rate of complications was reduced from 2.6% to 1.6%. Focusing solely on the rate of general post-operative complications, a decrease from 5.9 % (conventional) or 4.7% (navigated) to 2.9%, respectively, was observed.

98.21% of the patients were able walk without assistance in case of navigated and 97.6% in case of the non-navigated total knee arthroplasty. 98.62% of the patients with navigated total knee arthroplasty and 98.12% with conventional total knee arthroplasty could take care of the personal hygiene without assistance.

Furthermore, there was no difference in the age structure: 45.1% of the patients in case of navigated surgery were between the age of 70 and 79, and 44.0% of the patients in case of non-navigated surgery. The hospitalization period was reduced from 16.04 days (2004) to 12.4 days (2012) in case of navigated knee prostheses and from 16.4 days (2004) to 12.21 days (2012) in case of the conventionally implanted prostheses.

In the area of hip prostheses, the total number of total hip arthroplasties increased from 138.000 (2004) to 152.500 (2012), with a relatively stable share of navigated prostheses from 1.63% (2004) to 1.4% (2012). Additional operative time in case of the navigation decreased from 14.8 minutes (2004) to 5.3 minutes (2012).

The rate of patients with at least one surgical intra or post-operative complication showed a decrease from 5.0% to 3.0% for both the conventionally and computer navigated hip prostheses. The rate of post-operative general complications with navigated prostheses showed a higher drop in percentage points from 4.5% to 1.85% than with non-navigated prostheses, which decreased from 5.0% to 3.0%.

Walking without assistance on the day of discharge was possible for 98.28% of the cases with navigated hip prostheses and for 97.31% of cases with conventional prostheses.

Taking care of personal hygiene without assistance was possible for 98.32% of the cases with navigated hip prostheses and for 97.63% of the cases with conventionally implanted prostheses.

Moreover, the age structure did not show any differences: with a share of 35.2% of the navigated prostheses and a share of 37.7% of the non-navigated prostheses the age group between 70 and 79 had the highest representation in both cases.

Furthermore, no difference in the occurrence of secondary illnesses, assessed with the ASA-classification, was depicted. ASA 2 had the highest share with 63.0% (navigated) and a share of 59.0% (non-navigated) among the patients.

Similar to the knee prostheses, the hospitalization period decreased in both groups at the same rate: the average hospitalization period shortened from 16.46 days in 2004 to 12.85 in 2012 in case of navigated prostheses. Likewise, there was a reduction from 16.71 days (2004) to 12.52 days (2012) in case of non-navigated prostheses.

DISCUSSION

Despite high expertise and having used navigation for years, still very few endoprotheses are navigated. However, through a regular application of the navigation, a reduction of the operational time was accomplished up to 11 additional minutes in knee surgery and up to 5 additional minutes in hip replacement. The analysis did not show an increase in either peri-operative or post-operative appearance of complications as described in recent literature (Burnett 2013; Bathis 2004; Bonutti 2008).

DISCLOSURES

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