Orthopilot system navigation in total hip surgery: accuracy of a light software in a study with 75 patients

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The major medico-legal problem in hip arthroplasty is the discrepancy of the limbs, even if the difference is closed to 1 cm. The other problem when we perform hip surgery is to determine the good offset of the hip. We do not have any tools during the surgery for measuring, with accuracy, the offset of the hip. The choice between normal or high offset stem depends on the feeling of the surgeon and the measurements on the X Rays before the surgery. The navigation has not showed the superiority of classical tools to perform the hip surgery, and sometimes this procedure increases the time of the surgery and the majority of surgeons have given up this technic. Aesculap has developed a light software to measure, during the procedure, the length and the offset of the limb. We have decided to assess this software during one year. We began this study in January 2012.

Materials and Methods: 75 patients with hip arthritis, 67% of female on average of 71 years old (39-89).

We have performed hip arthroplasty with a classical posterior approach, and with an Excia Hip stem. The navigation procedure is very easy; we use only one rigid-body at the upper part of the cotyle. First of all we record one point on the patella with the knee at 90° of flexion to determine the length of the limb then another point on the trochanter to determine the offset of the hip. After we begin the classical procedure with hip dislocation; we cut the neck, and we record the initial position of the cotyle. We work in the cotyle, and we put the cup in place. Then we go on to record the location of the new cotyle. The following work is on the femur; we use the different rasps and we record the position of the future stem. At this moment we must choose: the type of stem; normal or high offset and the length of the head. When we have chosen, we reduce the hip and we record the length and the offset of the hip. We use the same points employed at the beginning of the procedure. The aim of this study is to compare the measurements of the length and the offset before and after the surgery. We perform two types of measurements on the X Rays and we compare the results with the navigation data.

We use a statistical analysis with Mann-Whitney test. We compare navigation data and X Rays measurements. However the most important for us was to compare X Rays before and after the surgery. The aim was to give the same length and offset on the other side.

Results: For the offset: we showed/could see a decrease between before and after surgery with 15.13 versus 14.25 cm, and p<0.00076.

Then if we compare the both sides, there are no statistical differences with 14.9 cm versus 14.55 and p<0.18. Also we used 51% of high offset stem versus 12% without navigation.

For the length: there is no difference between before and after the surgery; 0,135 cm versus -0,194 cm and p <0.85.

We obtain a good accuracy close to 80 % with a range of 2.5 mm for the length and the offset.

Conclusions: this study has shown a good accuracy for performing hip arthroplasty. With this software we have avoided to change the length of the limbs and we have given a better offset, the same as the
contralateral side. This procedure is easy and does not request much more time; just 10 minutes more than
the surgery without navigation.

However the most important information for us was the restitution of the offset. Before navigation, we
used only 12 % per year of High offset stems instead of 51% with navigation.

We can still improve the accuracy of the procedure and we could also change some recorded points,
particularly on the patella.