Quantum leap in digital orthopedic surgery planning - planning in 3D

St. Franziskus Hospital in Cologne-Ehrenfeld

mediCAD®
The Orthopedic Solution

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Digital surgery planning is an integral part of orthopedics - if nothing else, simply because of the associated automatic complete documentation. The quality and time savings are also much higher than planning with films and templates. Nonetheless, not all digitally planned surgeries lead to a satisfactory result for the patient or the surgeon. The new option of planning on a computer screen instead of in only two dimensions as before promises great benefits. Planning in 3D means all exact mechanical/geometric parameters can be included. This enables tangible patient-specific prostheses.

**Digital surgery planning in 3D**

The Orthopedics I Clinic at the St. Franziskus Hospital in Cologne-Ehrenfeld has been using digital planning for entire orthopedic prostheses since 2006. The mediCAD® software from the mediCAD Hectec company has proven itself as a two-dimensional planning tool. The company has been working on the development of the program continuously since 1994. More than 3000 clinics and orthopedics practices around the world use it. The digital solution includes all planning methods, documents all processes correctly and covers all orthopedics surgeries - from hips to knees and spine, and feet and ankles. mediCAD® is certified and approved worldwide as a medical product. The basis is an implant database containing articles from more than 140 manufacturers. In addition to implants, surgeons also find a comprehensive range of osteosyntheses for planning in mediCAD®. In addition to the traditional proven 2D solution, mediCAD Hectec now also offers the corresponding 3D module components: mediCAD Hip® 3D, mediCAD Knee® 3D and mediCAD Spine® 3D are already on the market, and the planning software modules for shoulders and feet, and a mediCAD® web-based solution will follow in early 2018.

**At a glance:**

- Customized prosthesis with three-dimensional planning
- Three-dimensional planning for hip and knee
- Unprecedented increase in planning precision
- Cost savings through reduction of filters and instruments
- Automatic documentation of the planning
- Significant reduction of intraoperative complications
The St. Franziskus Hospital in Cologne has been relying on three-dimensional planning for hip surgeries with mediCAD Hip® 3D for quite a while now and is already planning on using the all new mediCAD Knee® 3D module.

For Chief Physician Dr. Klaus Schlüter-Brust, the increase in precision, which results in higher safety, is the best feature. At the same time, the software is so user-friendly and self-explanatory that even new users can very quickly create good plans. „After working together on three plans, an assistant physician can work independently,” says Schlüter-Brust. Since planning takes less than five minutes, emergency surgeries can also be planned as precisely and safely as elective surgeries. Volumetric measurements, detection of abrasions and the preoperative and postoperative comparisons have proven to be particularly important and helpful functions. The measurement of the femoral acetabular offset, the comparison of the healthy side to the dysplastic side and the overall leg condition with knee surgeries is just as important as, for example, planning of an osteotomy of the knee and hip joints. As an endoprosthetics center that provides maximum care, the Clinic must precisely document all deviations from surgical plans. Using mediCAD Hip® 3D significantly reduces these deviations and helps avoid intraoperative complications. In the case of replacement of an endoprosthesis, the measurement of the socket antetorsion and socket inclination in the 3D space enables the detection of problems with the previous prosthesis.
Patient-specific prosthetics

Since early 2017, the Clinic has been using the newly developed version of mediCAD Hip® 3D, which allows three-dimensional planning. After four months of using this new planning module, Schlüter-Brust has a very positive overall impression. “Three-dimensional planning allows for an unprecedented increase in planning precision. It opens up the path to CT-based three-dimensional navigation and the selection of patient-specific prostheses.” The best possible prosthesis was able to be selected until now, but a prosthesis that is an exact match can be created in the future. Prosthesis manufacturers can produce a customized prosthesis using the three-dimensional planning data. Together with patient-specific cutting templates, this guarantees exact positioning of the prosthesis at the planned optimal position.

An endoprosthetics center that provides maximum care

St. Franziskus Hospital is an academic teaching hospital with around 300 beds and 800 employees. In one year, an average of 15,000 patients are hospitalized and 37,000 patients are treated on an outpatient basis. The Orthopedics Clinic I, headed by Chief Physician Dr. Klaus Schlüter-Brust, is certified as an „Endoprosthetics center providing maximum care.“ Around 2100 patients in 42 beds are treated here annually. The digital planning software is installed on eight PCs, which the five-person team uses to digitally plan around 600 prosthesis surgeries per year, which are distributed about equally between knee and hip surgeries.
Cost savings

mediCAD HIP® 3D also enables postoperative control and analysis – an important step towards even greater safety for the patient. Used preoperatively, 3D planning will open up the possibility of dispensing with X-rays and CTs in favor of MRIs in the future. Three-dimensional planning enables accurate preoperative measurement of the patient’s specific bone situation. This leads to even more precise prosthesis planning and a reduction in filters and instruments needed, resulting in considerable cost savings. Examples of the higher planning accuracy include the exact detection of tilt, torsion of the pelvis and the sacral slope. Schlüter-Brust is convinced of one thing: “Even if three-dimensional planning takes up to ten minutes instead of five minutes as before, the benefits for the surgeon and the patient more than make up for that,” he says. This becomes even more clear in the case of complex operations, such as inversion and dysplasia surgeries or Bechterew patients. „Clinics that are now dealing with a choice of solutions for digital surgical planning should make sure that three-dimensional planning is included,” says Schlüter-Brust. The mediCAD® product range fulfills all requirements for modern surgical planning.

Positioning of the implants
mediCAD Hip® 3D - the high performance tool for the hip surgeries of tomorrow

With the new 3D module mediCAD Hip® 3D software from the mediCAD Hectec company, physicians will have completely new options for carrying out anatomical assessments, planning and measurements of hips, enabling them to achieve optimal, revision-proof surgery preparation.

The most important features of this new 3D module, which was developed in close collaboration with hip surgery specialists, include:

- Anatomical 3D and 2D viewing
- Segmenting of the 3D object
- Simple analysis of the current pathological situation
- Transparent view as well as distance and bone contact visualization
- Precise, simple and automatic measurement processes
- Simple selection and positioning of implants
- Range of Motion (ROM)
- Customized prosthesis with detailed planning
- Calculations of torsion
- CT image stitching for lower radiation exposure
- Data export for 3D printing of body areas

Measurement of the current pathological situation with mediCAD HIP® 3D