“はかる”技術で未来を創る
東陽テクニカ

Orthopaedic digital planning tool mediCAD

Zenshukai Hospital Case study

Zenshukai Hospital
Dr Shinya Yanagisawa, Director, Gunma Institute of Sports Medicine, Chief of Orthopaedic Surgery

Head of Radiology Department, Zenkai Hospital (see Mr Ohmori)

Introduction

Pre-operative planning in orthopaedic surgery is one of the factors that prevented a complete filmless system in the hospital. Film is required to carry out orthopaedic-specific measurements and pre-operative planning, and the use of film has placed a heavy burden not only on the orthopaedic department, but also on other departments, including the radiology department.

At Zenshukai Hospital, efforts were made to reduce the burden on doctors and staff by digitalising pre-operative planning in orthopaedic surgery. We spoke to the hospital, which has one of the highest numbers of orthopaedic operations in the country, about its initiatives from the respective perspectives of the orthopaedic and radiology departments.

Filmless is now a reality with the introduction of digital planning tools.

Reduced time and improved accuracy in pre-operative planning.

Q. Tell us about Zenshukai Hospital.

Dr Yanagisawa: The Zenshukai Medical Corporation Zenshukai Hospital opened in 1983 and celebrates its 40th anniversary in 2023, while the Gunma Institute of Sports Medicine, which is attached to the hospital, celebrates its 30th anniversary. The Department of Orthopaedics / Sports Orthopaedics deals with knee joint diseases, hip joint diseases, spinal diseases and sports disorders, and is staffed by 10 specialist doctors and about 30 part-time doctors. The hospital is one of the top hospitals in the country in terms of the number of joint replacements performed, with 387 hip replacements and 380 knee replacements performed in 2023, as well as 490 knee meniscus operations and 138 periprosthetic knee osteotomies. In the hospital, specialists, the operating theatre, nurses, rehabilitation staff, radiologists and other relevant departments work together to provide high-quality, specialised medical care. The hospital is also a teaching hospital for knee diseases, where doctors are trained and numerous studies are conducted.

Name: Medical Corporation Zenshukai Zenshukai Hospital
Location: 54-1, Hikarui-machi, Maebashi, Gunma 379-2115

※Trade name: orthopaedic digital planning tool mediCAD / medical device certification number: 303ADBZX00010000

Mr Ohmori: The Department of Radiology currently employs 14 radiologists. X-ray examinations are carried out using three general radiography units, plus two ward portables and one operating theatre portable. film output has been drastically reduced. However, film output continued to be used for pre-operative planning in orthopaedic surgery, as this could not be done on the PACS viewer. With the introduction of the digital planning tool, all examination images in the hospital have been digitised and a completely film-free operation has started.

Q. What challenges have you faced so far with orthopaedic imaging?

Mr Ohmori: First, Dr Yanagisawa consulted with us about whether it was time to have software to create drawings in digital format, although we had been using film for sizing while performing such a large number of surgeries at Zenshukai Hospital. On the other hand, the radiology department outputs a considerable number of films for pre-operative planning in orthopaedic surgery alone, and there were concerns about operation in the event that the imager broke down and could no longer be repaired. We had heard that it had become difficult to obtain repair parts for the imager in recent years. In addition, the film was taken by measuring the distance from the tube to ensure a constant magnification rate, but even then it was difficult to guarantee accuracy.

Dr Yanagisawa: The manual work using film was cumbersome and, to a certain extent, a guideline was used, which made it difficult to ensure accuracy. We heard that digital planning can be done accurately in presentations at conferences, etc., and as we have a considerable number of surgeries at our hospital, we were keen to introduce the system.

We proposed the introduction of digital planning because we have a large number of surgeries at our hospital and we wanted to introduce it.

Q. What does pre-operative planning mean to you?

Dr Yanagisawa. In terms of joint prostheses, I can simulate in my mind once what would happen with this amount of osteotomy, so I think it is a very important process. The digital planning tools have made it easier to simulate this.

Q. What were your key considerations in selecting the system?

Dr Yanagisawa: The emphasis was on being able to plan more accurately and in detail for surgery and to be able to transfer directly from film. 3D was not considered as CT imaging is not performed preoperatively.

Q. How effective has the digital planning tool been since its introduction?

Mr Ohmori: As for the magnification rate, we felt confident that we were getting better accuracy. As for filming, there is no need to bother, as all we have to do is insert the steel ball and take a picture. In terms of operation, we can say that we don't have to do anything anymore.' When we used to output films, we had to get requests from doctors, print them after receiving the request, and then have the printed films delivered via nurses and assistants. There were times when we needed the film urgently, and each department felt burdened, and I think it was inconvenient for the doctors to not have the film when they wanted it themselves. We had to devise various ways to respond to this, but all of these problems have been resolved. In this age when people are encouraged to change the way they work, I feel that the workload has been greatly reduced throughout the hospital, not only for the technicians, but also for the nurses and assistants.

Director, Gunma Institute of Sports Medicine
Director, Department of Orthopaedic Surgery
Dr Shinya Yanagisawa

Dr Yanagisawa: In the days of film, you had to first find the film, find the Schaukasten, hold the film up there, get out the template sheet, draw the lines, ... and then do it manually, but now.

can be easily planned with the five digital planning tools installed in the hospital. One effect of the introduction of the system is that it has improved planning accuracy in relation to knee replacement surgery, allowing for safe and accurate planning.

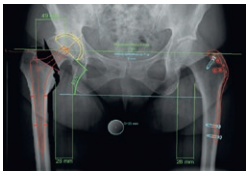
I think the accuracy of the magnification rate has improved a lot, because once the size is determined by the software's templating, the actual surgery often goes almost exactly according to the size. I can approach the operation with a certain degree of confidence.

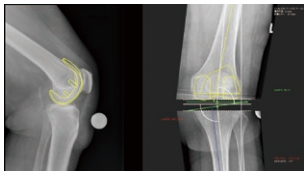
With regard to periprosthetic osteotomy, I think that the lines that used to be drawn somehow have become more accurate. For example, the software automatically takes the 62% FUJISAWA point on the articular surface. It's easier to get an answer if you just follow the software prompts to take the points. I feel that it is highly reproducible and reliable during the operation. In terms of time, I think it has reduced the time it used to take from 10 to 15 minutes to about 5 to 10 minutes. Other doctors have expressed similar opinions.

Chief of Radiology,
Guta Ohmori.

Mr Ohmori: We were outputting a total of more than 2,000 half-slice films and large quad films per year for almost all orthopaedic operations, which entailed considerable costs. In addition, the quality of the imager was deteriorating over time, but these problems were solved after the introduction of mediCAD. In fact, the imager broke almost as soon as mediCAD was introduced. This was a coincidence, but since it happened after the introduction of mediCAD, it did not cause any major problems. When we asked other doctors about hip and trauma planning, they told us that they only wanted to see simple information and measurement values for drawing on film

Zenshukai Hospital has introduced a server-and-client type digital planning tool, mediCAD, for pre-operative orthopaedic planning on a monitor. This has enabled filmless operation in the fields of hip and knee joint replacement, periprosthetic knee osteotomy and fracture treatment. Pre-operative planning can now be carried out at the timing required by the doctor.





※This article is based on what was said at the time of the interview. The information contained is personal opinion and does not indicate efficacy or effectiveness.

Yet it was difficult to get started because 'you have to prepare the film first', but some commented that the software allows them to check it immediately, so they are using it in various parts of the body. When we take images in the radiology department, we try to put an iron ball in emergency patients as much as possible.

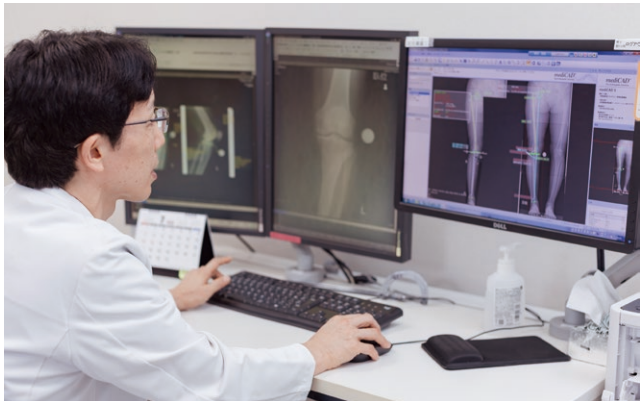
Q. Did you experience any difficulties in the transition from film to digital?

Dr Yanagisawa: It was less difficult than I had initially envisaged. I think digital was by far better, especially for periapical knee osteotomies. With film, you couldn't even keep a record of it. All you could do was take your own measurements and measure the angles, but now, you can get a pre-operative planning image on the screen in the operating theatre, so it's especially nice to be able to look at that screen as you go along.

Q. Which features of the software have you found particularly useful?

Dr Yanagisawa: The video tutorials showing how to operate the software are helpful and easy to use, even for new doctors. We have a lot of doctors who work out of the hospital, so I think the software is good for doctors who are not used to using it. In periprosthetic knee osteotomies, it is very helpful because you can operate the osteotomy by referring to videos, especially with regard to the centre of the head and the axis of the femur.

I also like the fact that it supports DLO (Double Level Osteotomy). That's what you need in a digital planning tool,



It is a surgery that is difficult to simulate, and I think it is easy to do because it can only be done digitally. The system has also been well received by the many young doctors at the hospital, and the fact that there is not much variation between surgeons is also an advantage.I am grateful to Dr Kimura, the chairman of the board of directors, and Dr Hagiwara, the director, for their wise decision to smoothly introduce the system.

Mr Ohmori: Many of the doctors at the hospital are research-oriented, and they said that if they wanted to refer to something in their research, they would really appreciate having the numbers on the images.

Dr Yanagisawa: The key point is that the various measurements can be kept as information. In research, measurements need to be analysed, and we found it useful to be able to retain the measurements used in preoperative planning, as we experienced difficulties in collecting this data when we conducted a study on periprosthetic knee osteotomy.

Q. What are your future goals for the hospital?。

Mr Ohmori: Of course we do our day-to-day imaging work, but I think the digital planning tools and equipment such as PACS are also very important in this digitalised age, so I would like to cooperate as much as possible while listening to the opinions of the doctors.

Dr Yanagisawa: As we perform all types of knee joint surgery, from arthroscopic surgery to periprosthetic osteotomies and artificial joints, imaging evaluation is very important in terms of assessing the patient's indications in detail. We always try to select the best treatment for each patient, while also taking advantage of the power of imaging.The radiology department is quick to do what doctors request and what they want to see improved. I am very grateful that when I ask for advice on images I want to take for research, they respond immediately. They are also very enthusiastic about taking pictures during surgery and always do the work we expect of them. In the future, I want to continue to push forward not only with our own consultations, but also in cooperation with the radiology department. I believe that Zenshukai Hospital is a hospital that is relied upon not only by the residents of the neighbourhood, but also by the citizens of the prefecture, so I will do my best to live up to their expectations.

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