YUTAKA INABA

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SUMMARY

Dr. Yutaka Inaba's career reflects a rigorous commitment to surgical precision, rooted in his foundational fellowship with Dr. Lawrence Dorr. From his upbringing in Tokyo to his current leadership at Yokohama City University, Inaba has integrated CT-based navigation and robotics to address complex developmental hip dysplasia. His recent work focuses on managing periprosthetic joint infections through innovative perfusion techniques. As he prepares to host the WAIOT congress, Inaba emphasizes the necessity of clinical honesty and attentive patient care.

From a foundational fellowship with the late, great Dr. Lawrence Dorr to his own pioneering work in Japan, Dr. Yutaka Inaba has built a career on the relentless pursuit of surgical precision. He channeled his experience in computer navigation to tackle the unique challenges of developmental dysplasia of the hip, developing novel techniques and systems. Now a leader in both robotics and PJI treatment, he discusses his journey, his mentors, and his vision for the future.

To begin, could you tell our readers about your background? Where were you born and raised?

> I was born in Tokyo. During my childhood, my family and I moved to Kanagawa Prefecture, where Yokohama is the largest city. I have worked at Yokohama City University for 25 years and still live in the prefecture, in Kawasaki City, which is about a 50-minute drive from my university. We are also excited to host the upcoming WAIOT congress in Yokohama.

What led you to pursue a career in medicine, and specifically, why did you choose to become an orthopedic surgeon? Was there a family influence?

> Yes, my father was a medical doctor, and watching him as I grew up inspired me to become a doctor as well. During my time as a medical student and resident, I developed a passion for surgery. Initially, I intended to become a general surgeon, perhaps focusing on gastrointestinal surgery. However, I met one of my key mentors during my residency, Dr. Kikkawa, a Japanese orthopedic surgeon, who inspired me to enter the orthopedic field.

You also spent time training in the United States. Could you tell us about that experience and your mentors there?

> I studied abroad in the United States, spending almost a year from 2004 to 2005 at the Dorr Institute in Los Angeles. There, Dr. Lawrence Dorr, a very famous surgeon who sadly passed away in 2020, became a great mentor to me. I respect him immensely and miss him. During my fellowship, I worked with Dr. Dorr on computer navigation for total hip arthroplasty. At the time, he was developing a new system for minimally invasive total hip arthroplasty using computer navigation, and he was always pushing the field forward. This experience was foundational, and after returning to Japan, I continued my studies in computer navigation.

How has that fellowship influenced your current practice? Do you still use navigation, and have you incorporated robotics?

> Absolutely. It is a direct continuation. After I left Dr. Dorr's institute, he went on to develop a robotic system for total hip arthroplasty. Today, I use both computer navigation and robot in my practice. Upon my return to Japan, I developed a navigation system specifically for hip osteotomy. This procedure is common in Japan due to the high number of patients with developmental dysplasia of the hip (DDH), but it is technically demanding. About 15 years ago, I developed a computer navigation system to perform these osteotomies more safely and accurately, and we are still using it.

What are the primary benefits of using navigation and robotics in hip arthroplasty?

> The main benefit is precision. For both total hip arthroplasty and osteotomy, we can perform the surgery with much greater precision. A major complication in total hip arthroplasty is dislocation, and preventing this requires very accurate implant positioning, including the cup and stem. With navigation and robotic software, we can create a very precise pre-operative plan and then execute it with a high degree of accuracy during surgery.

Is this technology even more critical for patients with hip dysplasia?

> Yes, that's correct. In general, total hip arthroplasty for a patient with hip dysplasia is more difficult than in standard cases. However, several papers have shown good results in dysplastic patients when using this technology. We believe that navigation and robotics are very useful tools for this specific patient population.

You mentioned dislocation. Do you often use dual mobility cups in your practice?

> Some surgeons in Japan use the dual mobility system, but I do not use it routinely. According to our Japanese registry, the use of dual mobility cups is about 10% in Japan. This is less frequent than in European countries, partly because the system was introduced to Japan only about ten years ago. My belief is that if we achieve very precise implant positioning, particularly with the aid of navigation, we do not need to use a dual mobility system for all patients.

Do you also use navigation for revision surgery?

> Yes, we can use navigation in select revision cases. However, most navigation and robotic systems are developed for primary arthroplasty, so applying them to revision surgery can sometimes be difficult, though it is possible.

What is your approach to pre-operative imaging?

> In Japan, CT-based navigation and pre-operative planning are very popular. Many surgeons use CT scans because we have a large number of DDH patients with severe deformities. The CT scan allows us to check the three-dimensional structure of the pelvis and femur, which is essential for our CT-based navigation systems. My interest in this CT-based technology is also why I am heavily involved in the Japanese Society for Replacement Arthroplasty, where many surgeons share this interest.

Could you describe your department at Yokohama City University?

> I returned to Yokohama City University in 2005 as an assistant professor and was promoted to professor and chairman in 2018. At our university hospital, we have several specialized teams. My specialties include the hip joint and pediatric orthopedics, a field I worked in for six years at a children's hospital. Our department has a hip joint team and a pediatric orthopedic team, and it is within these teams that we have developed new techniques like computer navigation for osteotomy and other pediatric surgeries. In total, our orthopedic department consists of seven teams: spine, hip, knee and foot & ankle, musculoskeletal tumor, sports medicine, and rheumatoid arthritis. Including fellows, we have 35 orthopedic surgeons in the department.

Given the focus of the upcoming WAIOT conference, how is your department organized to handle periprosthetic joint infection (PJI)?

> We do not have a separate team for PJI, but our work in this area began about 20 years ago. We started by using an intraoperative PCR test for the diagnosis of PJI, developing primers for both MRS-specific and pan-bacterial PCR. We also applied imaging technologies like FDG-PET and NaF-PET scans to diagnose infection. This work in molecular diagnostics was our starting point and has led to our involvement in infection societies in Japan and internationally, including the recent consensus meeting in Istanbul.

For diagnosing PJI, do you use Japanese-specific criteria or international guidelines?

> We do not have specific criteria in Japan. Most Japanese orthopedic surgeons use the international consensus meeting criteria.

Culture-negative PJI is a significant challenge. How do you approach diagnosis in these difficult cases?

> To diagnose culture-negative PJI precisely, we use PCR tests and extend the culture incubation period to about two weeks. We use sonication, but only for difficult cases where we suspect culture-negative PJI. If we can already detect an organism, we do not perform sonication, as we reserve those resources for the more challenging diagnostic situations.

What is your primary treatment strategy for PJI? Do you favor one-stage or two-stage revisions?

> Previously, we considered two-stage revision surgery the gold standard. However, a new technique called Continuous Local Antibiotic Perfusion (CLAP), developed by Dr. Akihiro Maruo in Japan, is gaining popularity. This technique allows us to retain the implant, so we now perform one-stage revision surgery with CLAP for most cases. We reserve two-stage surgery for very difficult cases with huge bone defects. This technique will be discussed by several Japanese speakers at the upcoming WAIOT meeting.

The CLAP technique sounds interesting. Does it require a long hospital stay?

> Yes, the hospitalization period in Japan is quite long due to our national insurance system, which allows patients to stay longer. The average hospitalization for a PJI patient can be 40, 50, or even 60 days. This extended stay allows us to manage the CLAP treatment, though we recognize this might be difficult to implement in other parts of the world.

When you do perform a two-stage revision, what is your protocol for antibiotic spacers and reimplantation?

> For spacers, we first try to identify the causative pathogen with a PCR test. Typically, we use vancomycin and gentamicin. For difficult-to-treat fungal infections, we incorporate anti-fungal drugs into the cement. If the structural integrity of the cement is compromised, we use static spacers made of a special hydroxyapatite block that contains antibiotics and releases them gradually. Local antibiotics are a very important part of our treatment algorithm, and we combine this with IV antibiotics, usually for 12 weeks in revision cases. For reimplantation, we use cement loaded with a dual combination of gentamicin and vancomycin.

How do you manage severe acetabular bone loss during reconstructions?

> We typically use an allograft combined with cages. For about 15 years, our practice has been to soak the allograft bone in a saline solution containing antibiotics for 10 to 15 minutes before using it to reconstruct the defect. We believe recreating the bone stock is a better long-term solution than implanting a large piece of metal. This more conservative philosophy of preserving bone seems to be a point of commonality between Japanese and European surgeons, in contrast to the more widespread use of large porous metal implants in the United States.

You are hosting the WAIOT conference in Yokohama next month. Could you tell us more about the society and the event?

> I became involved with WAIOT seven years ago at the recommendation of Professor Tsuchiya, the current president. He asked me to host this fourth meeting in Yokohama, which will take place on July 23rd and 24th. It's a two-day meeting, and we have already accepted 80 papers from 16 countries. The program will feature sessions with esteemed WAIOT faculty like Dr. Tsuchiya and Dr. Carlo Romano, presentations on current topics in bone and joint infection, and valuable case reports from abroad. Additionally, members from Japan will present their clinical results with the CLAP technique.

Why is Yokohama a good location for this conference?

> Yokohama is the second-largest city in Japan and a beautiful, historic port town. It is very conveniently located, only a 30-minute train ride or drive from central Tokyo and Haneda Airport. We have a large and convenient conference and convention center, which is why we are also hosting the 100th anniversary of the Japanese Orthopedic Association here in two years. There are many good reasons to come to Yokohama.

What are your professional projects for the future?

> I will be organizing several large meetings in the coming years. I will hold the Japanese Pediatric Orthopaedic Society meeting on this November, and the annual meeting of the Japanese Society for Joint Diseases next year. I am set to hold the annual meeting of the Japanese Society for Study

> of Bone and Joint Infections in 2027, and in 2028, I will hold both the Japanese Hip Society and the Japanese Society for Replacemet Arthroplasty meetings in Yokohama.

Outside of orthopedics, what are your hobbies and interests?

> My main hobby is playing golf. When I was a university student, I played the drums, but I stopped after becoming a doctor. Now, golf is the only sport I play. While there are not many courses directly in the busy cities of Tokyo and Yokohama, there are many good, albeit expensive, courses within a one to one-and-a-half-hour train ride or drive.

Finally, what advice would you give to young doctors who aspire to a successful career in orthopedic surgery?

> My advice is to “work hard and play hard.” Most importantly, we must be honest with our patients and truly listen to them. I believe there are many important insights contained within the patient’s voice. I always tell young doctors to listen carefully to what their patients are telling them. This is essential to becoming a good medical doctor, not just a surgeon.