MENTORS IN ORTHOPEDICS

JEAN-ALAIN EPINETTE

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SUMMARY

From his Provençal roots to his established practice in Northern France, Jean-Alain Epinette has maintained a rigorous focus on the evolution of hip and knee arthroplasty. His career is anchored by the development of hydroxyapatite-coated implants and a pioneering commitment to clinical data through the OrthoWave system. As President of the European Hip Society, Epinette bridges the gap between surgical craftsmanship and digital technology, advocating for a future where objective documentation and robotic precision define orthopedic excellence.

Jean-Alain Epinette has dedicated his life to hip and knee surgery and has built an international reputation on hydroxyapatite. This reputation is the result of hard work and an understanding of what the complete training of a lower limb surgeon should be.

Jean-Alain Epinette, what are your origins, where do you come from?

> In fact I am a native of the South of France, born in Avignon in a small town near the famous vineyard of Châteauneuf-du-Pape!
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> When I was 7 years old, my father was transferred to Toulouse where I continued my secondary education at Pierre-de-Fermat. Toulouse is a beautiful city with people who still have their delicious southwestern French accent...
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> I was 15 years old and one evening, like in the movie "Bienvenue chez les Ch'tis", my father announced us good and bad news... The good news was for him with a professional advancement, the bad news for us because he was transferred to Lille for his job... at the time, for us, Lille was the North Pole!
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> I arrived in Lille in 1963 with my family to take the baccalaureate and start studying medicine.

Where did you study medicine?

> Studying medicine in an amphitheatre was a place that was both very open and conducive to many new encounters and experiences, such as my first surgery as a first-year student, as a spectator leaning against a glass roof overlooking the operating theatre... I should not have chosen neurosurgery as my first surgical experience: I passed out, slumped over the dome, and woke up in the bar where some kind souls had carried me, laughing at a probable promising surgical future!..
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> This period was marked by both the student social movements in France in May 68 and the great hippy movement of Woodstock, as well as Killy's grand slam in alpine skiing at the Grenoble Olympics in February of the same year...

> The recreation was over with the beginning of the preparation of the internship of the hospitals of Lille, which at the time was very selective, but essential to consider a surgical career ... and it was the beginning of 5 years of internship in neurosurgery, pediatric surgery and finally orthopedic surgery during the last 3 years ...

Why orthopaedic surgery ?

> My surgical orientation came very early, at the age of about 13... I had no particular choice at the time but the atmosphere of the operating rooms seemed magical to me! Later, after having been appointed as a hospital intern in Lille, I first turned to neurosurgery... always the magic of operating on brains !!!... Finally, I came back to Orthopaedics, remembering the very good reception of this team when I was a student a few years before.
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> From that moment on, I was passionate about orthopaedic surgery, especially in the field of hip and knee arthroplasty: we don't treat patients who are sick, but healthy patients suffering from locomotor problems, who can be put back on their feet... It's a harmonious mix of book knowledge, technical experience and a real empathy with our patients.
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> It is also a demanding discipline: after an abdominal operation, when the patient is discharged from the hospital, the story of the operation can be considered over... on the contrary, after a successful arthroplasty, the story begins, for many years of clinical follow-up of the implants.

How did your surgical training go at the University in Lille?

> I was lucky enough to spend my last years of internship in an excellent school of orthopaedic surgery in Lille under the aegis first of all of Pierre Decoulx, who was the first "boss" to have created in France the first department entirely dedicated to orthopaedic surgery. After his departure, the department was in fact shared between "the father's son", Jean Decoulx on the one hand, and Antoine Duquennoy on the other. Both were exceptional surgeons, with very different profiles, and unfortunately faced with a constant rivalry in their therapeutic options and scientific achievements. This continuous opposition has certainly hindered the development of Lille Orthopaedics, especially since the private-public coexistence has never been as harmonious as in other great Orthopaedic Schools.
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> At the end of my internship, I remember another great moment represented by the doctoral thesis in medicine, the Hippocratic oath, and the presentation of the scientific work under the gaze of all the former Masters all along the tables of the thesis room... My pride of the time was to provide an "inaugural" work dedicated to the total prosthesis of the hinged knee with an opus of 525 pages in two volumes!
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> After three years as chief of clinic in the department of my master Jean Decoulx, I realized that my state of mind could only be liberal in a... liberal practice! When I told my boss that I was leaving him to work in private practice in a small clinic in the middle of nowhere, he asked me "why leave a prestigious university department to go and operate only on wrist fractures and femoral necks?" ... I replied that I did not think I would operate only on wrist fractures in the future!...

Could you tell us about your mentors?

> A professional career is very often marked by the memory of "mentors" who were at one time or another at a key period of this personal journey... The medical curriculum is no exception to the

rule... As far as my "surgical" experience is concerned, three mentors remain very present after so many years.

The first is Jean Decoulx, my master at the Lille Faculty... A fascinating and unusual character, in many respects. He had a fantastic operating procedure and I learned a great deal during my years of internship, and then my clinical training, in this very particular field of hip and knee arthroplasty, both in primary and revision surgery... Without any doubt, his teaching was decisive for my future orientation, in particular after my thesis in 1978 devoted to hinged knee prostheses... Moreover, it was he who made me discover at the time the interest of computerized studies, and gave me a taste for computers via his very first Apple IIE computer in the 70's !!!

I must, of course, mention Maurice Müller... He was revered at the time at the Lille University Hospital, and in this battle of influence between Müller and Charnley, we always chose the Swiss school, following in the footsteps of the AO, of course. For more than ten years, I went on a pilgrimage with my colleagues to the "higher course of arthroplasty" in Bern, in order to imbibe its famous formula "the basics, the current, the novelties". Ah, that lecture hall with the Eidophor and the live broadcasts... a real treat. Afterwards, we were very close, we called each other by our first names, and I remember with emotion our first meal together during a Sofcot congress... He was a genius forerunner, as much for the understanding of hip arthroplasty as for computerized studies, but unfortunately perhaps too far ahead of his time, with a technological evolution that was still hesitant at that time.

At the Bruay La Buissière clinic, which was still only Bruay-en-Artois, I had developed an intense activity in uncemented arthroplasty, which had brought me into direct contact with both Bill Harris and Jorge Galante. This is how I came to implant the first four "Miller-Galante 1" prostheses in Europe on May 21, 1985, which were very innovative at the time because of the use of a non-cemented anchorage obtained thanks to a titanium mesh coating. The photo of this operation still hangs in my office! In fact, we started a very friendly relationship at that time, and after a stay at Rush Presbyterian Hospital in Chicago, Jorge asked me to perform the placement of his Miller-Galante prosthesis during a congress in Nice, intended for the very first presentation of his prosthesis in Europe. When I told him that it would be better for him to perform the operation, he replied: "No, Jean-Alain, if this operation fails, and I perform it, people will say that the prosthesis is bad... if you perform it, they will say that you are a bad surgeon"... So we were welcomed in the operating room of our friend Jacques Tabutin, with Jorge Galante in the operating room and Jo Miller as moderator of the live session. When the last staple was put in place, it was a huge relief to have finished this operation without a hitch, which has remained engraved in my memory, all the more so as Jorge asked me the following year to carry out the same implantation of his prosthesis... Bis repetita placent!

I could also have mentioned Ruud Geesink, whom I met in 1987 after my first placements of uncemented hydroxyapatite-coated rods. I was convinced by his "black" book on dog experiments, and since that very first episode, the story of these "biologically" fixed implants has not stopped for the next thirty years! In the meantime, we published together as editors under the aegis of Jacques Duparc, an issue for the very first time bilingual of the "Cahiers de le Sofcot" the first book on the 7 years experience of this bioactive fixation mode, with the name "HA, the third way" as opposed to cement and porous metal... It was on this occasion that, on my return from a Sicot trip to South Korea, and in response to the crude and unfounded criticisms of the alleged complications of hydroxyapatite formulated by Bill Harris, I was asked by Jacques Duparc and

Levon Doursounian to respond in the columns of Maîtrise Orthopédique with a small text in the form of a respectful pamphlet... it was "The gospel according to St Bill", which did not go unnoticed at the time!...

How was your activity organised?

After setting up as a private practice in 1981, my choice very quickly turned to hip and knee prostheses, almost exclusively, which was not a very usual approach at the time... It must be said that during my training at the Lille University Hospital, arthroscopy was in its infancy, and so I was never interested in arthroscopic surgery, either for sports or for ligaments... the influence of my boss Jean Decoulx did the rest!

During all these years of practice in Bruay, several evidences have proved to be good intuitions with hindsight. First, the discovery of unicompartmental knee prostheses in 1982, then hydroxyapatite-coated hip and knee prostheses in 1987, followed by ultra-cross-linked polyethylene in 2000 and finally dual mobility cups for all my patients in 2011.

This is how my practice of unicompartmental knee prosthesis began, shortly after my installation, as this option of partial knee prosthesis was not favoured by my masters in the Faculty... I therefore sent my first 4 indications to Philippe Cartier and assisted him in his operating theatre during these four "delocalized" operations, in the pure tradition of the "Compagnons Artisans" that we are, in fact... A real friendship between us followed, marked by the joint publication in 1998, with Gérard Deschamps and Philippe Hernigou, of another book of the Cahiers d'Enseignement de la Sofcot, also bilingual... This international clinical experience concerning this prosthetic model was a fabulous experience... everything was written in this book and is still very current! My loyalty to Philippe Cartier and to his recommendations concerning unicompartmental knee prostheses has remained intact throughout these years of practice, with the pleasure of seeing them revived now with "robotic surgery"!

Concerning HA hydroxyapatite coated prostheses, my experience quickly joined those of the other members of the "HA Club" with in France the Artro group, then ABG, and in the US, our common work with Jim D'Antonio and Bill Capello... Our results, scrupulously documented in the framework of our OrthoWave software at our Documentation Center in Bruay, after the personal fitting and analysis of 4241 HA hip prostheses and 918 HA knee prostheses, highlight, after these thirty years, findings that have remained the same over the different models implanted. This experience, which is regularly published, has remained in line with international publications, with particular attention now being paid to new forms of "biological" fixation, naturally.

Ultra-cross-linked polyethylene (HXLPE) appeared to me almost as a matter of course after a few setbacks with fractured ceramic inserts for "hard-hard" couples made of alumina ceramic... We talked a lot at the time about the problem of squeaking! In vitro and simulator studies convinced me of the interest of this new form of "soft" joint in preventing long-term wear of our hip prostheses. It was a promising experiment with a ten-year publication in the Journal of Arthroplasty, comparing ceramic-ceramic with a ceramic-HXLPE pair, with no significant difference in wear between these two friction pairs...

It was only after the improved "sequential" irradiation version of this HXLPE for dual mobility cups became available, that I wanted to solve both the problem of long-term wear, and also hip instability. The solution lay in this combination of a dual mobility cup and a new generation

"stabilized" and not recast HXLPE insert. Despite many denials from my colleagues when I defended this "DM for all" option back in 2011, ten years of clinical experience have convinced me of the merits of this once iconoclastic approach, with an article recently published in 2019 in the Efort Open Journal with my Canadian friends and in particular Pascal-André Vendittoli ambigously entitled: "Dual mobility total hip arthroplasty: should everyone get one?".

You have mentioned your activity, but surely there are also subjects and techniques that inspire you?

Since the very beginning of my surgical career, which has been oriented towards arthroplasty, I have remained convinced that the best approach to lasting success can be represented by a triangle whose three sides are, on the one hand, the surgical practice itself, on the other hand, the analysis of the implants and of the surgical tactics aimed at obtaining optimal results, The third side is the documentation of the implants and of the clinical and radiological results, which used to be done with punched cards or paper notebooks, but nowadays is done by computer and in particular with online collection of the observation and result sheets.

My first communication to the SOFCOT in 1982 was entitled "The contribution of computers to daily surgical practice", which shows how early I was convinced of the importance of computers in our professional activities... It was only after several years and numerous attempts to keep up with technological advances that I was to develop the first real software package for clinical monitoring of prostheses, under the name of OrthoSoft, which would later become O. Soft, split in 1996 into an "office" branch and a branch purely dedicated to clinical research in hip and knee arthroplasty, under the name OrthoWave. This version, initially offline under Omnis Studio, has then migrated to an online solution first in Java, then in its current form in AJAX procedures in cloud computing and optimal security of data transfers, in strict compliance with official recommendations, of course. The recent v7 version of OrthoWave offers promising possibilities of more pleasant and quicker input modes on tablets or smartphones, with either a "light" version, or a specific mode dedicated to purely epidemiological registers, with the "register" mode. The addition of a "connected patient" function also allows purely automatic monitoring of patients and their prostheses over the years.

We have already hosted for the last 20 years, in our OrthoWave servers, more than 200.000 records of hip and knee prostheses, for more than one thousand registered surgeons and feeding this database, now called "Health Data Warehouse". This "warehouse" is thus able to satisfy all clinical data requests, particularly in the context of the new MDR (Medical Device Regulation) regulations. The future seems promising for this tool, which was set up more than 25 years ago, with clinical evaluation now at the heart of future concerns, both for surgeons and politicians!

All these achievements have been envisaged and pursued over the years within the framework of a Clinical Research Centre for Arthroplasty (CRDA) in Bruay, which I had the opportunity to set up as early as 1991, with continuous documentation and scientific exchanges for the last thirty years.

What do you think about new technologies in Orthopaedics?

What is fascinating about the surgical discipline of arthroplasty is that it lends itself to the constant introduction of new technologies, whether they be implants themselves, components, their combinations, or means of investigation or operating procedures. What gave rise in the 1980s to a somewhat unbridled efflorescence of almost continuous innovations has since benefited from increasingly strict control by our official regulatory bodies as well as our scientific work,

which must obviously be considered an excellent thing, even if some may argue that "this control of innovation kills innovation...".

In fact, in the 1980s, the main focus was on implant fixation, with the classic cement vs. non-cement duality, later joined by "biological" fixations such as hydroxyapatite. Then, frictional couples were put in the spotlight for the problems of wear and osteolysis after the concept of "cement disease" had been discarded... This was followed by the promotion of hard-hard, metal-metal versus ceramic-ceramic couples, and then by the polemics surrounding ultra-cross-linked polyethylenes (HXLPE). It now seems that these concerns about implant fixation are no longer really at the forefront. With the longevity of current prostheses, the future lies rather in the prevention of the two factors of failure in the medium, long or very long term, namely wear and tear of the joint components on the one hand, and postoperative instability on the other... The debates about more or less shortened, or even simply "short", stems appear to be relatively secondary, and hip resurfacing, although it retains an undeniable interest, remains a "niche" indication...

If we want to discuss new technologies, we must focus on three main areas of research that touch on the three main areas of our discipline: implants, education, and mastery of the surgical gesture... We could therefore mention successively the manufacture of joint components using additive technology, the contribution of virtual reality to teaching, and of course robotic surgery...

For the time being, this technology of additive manufacturing by 3D printing has only limited indications in our practice, essentially for "on demand" instruments, prototypes, and above all ultra-porous coatings that perfectly simulate the bone structure and therefore favour a particularly efficient bone rehabilitation that is useful in all difficult cases, and in particular acetabular revision. This is how real reconstructions of bone blocks such as hemi-bases can be achieved with amazing results, allowing us to predict the loss of interest in maxi bone grafts in such cases... In fact, for the time being, only cupules and tibial plates have really benefited from these new techniques as standard... but the future undoubtedly belongs to them...

Virtual reality" is amazing because it is so easy to adapt to a new, purely virtual environment... For those of you who, like me, have only had experience of these tools with the joysticks of your children, it is a real discovery of a new environment: after a few minutes, you really feel like you are in the operating theatre. A demonstration by Eleftherios Tsiridis at a Sofcot congress in Paris in front of 400 people was met with great enthusiasm! We can therefore consider that soon all the learning not only of basic surgery could be provided by these new technologies of "virtual reality", if not for the moment of "augmented reality"... In addition to basic learning, the interest could be to become familiar with a new implantation technique, or any other new surgical procedure in a repetitive, inexpensive way, and likely to have comparative scores such as already described in several publications... Is this the programmed end of dissections in the anatomy laboratory?... One could think so in the very near future!

Robotic surgery is naturally the most attractive area of interest, both for operators and for patients... For the moment, it is still limited to a few prosthetic surgery procedures, and its interest is mainly focused on knee prostheses, but this robot-assisted surgery is making great strides. Of course, we will still have to decide between preoperative scanning followed by modelling versus the "image-less" option, or between the "shared-control" operating modes of a robotic arm guiding the operator's hand versus the "supervised-controlled" option, with the robot carrying out all the actions by itself according to the pre-established schedule... In any case, it is

already a very precious help, waiting perhaps soon for remote surgery as demonstrated in cardiac surgery 20 years ago by Professor Marescaux during the Lindbergh operation in September 2001, 7000 km away?...

The real questions remain, of course, the not always demonstrated reality of a real benefit for the patient, given the cumbersome and costly logistics required for these robotic procedures. Moreover, in terms of education of young surgeons, used to being guided and supported by the robot, will they know how to succeed alone in case of equipment failure or events not foreseen in the preoperative planning? ... Our children, used to using a GPS for their travels, do they now know how to read a road map?...

In any case, above all these exciting innovations, which are already very prevalent, hovers the soon to be omnipresent notion of artificial intelligence, still limited for the moment to diagnostic methods or surgical decision support, but soon undoubtedly "boosting" the innovations already in progress...

Apart from your surgical practice, you are involved in various scientific societies, both French and international: what is your level of investment?

The scientific societies, which used to be called "learned" societies, are at the heart of our professional activity, and precisely in the scientific framework... it is the possibility of meetings between colleagues and (often) friends... but also by the common work of preparation of symposiums or round tables, the opportunity to progress in its ideas and its knowledge, at the same time logistic support of our professional activity.

The French Hip and Knee Society (SFHG) is a learned society partner of the French Orthopaedic Society... It is composed of experts and remains a key meeting place for our orthopaedic community. Having joined the Society since its creation in 1997 under the impulse of Charles Witwoet, I have remained a faithful member, with the pride of being its President from 2013 to 2015... This Society obviously progresses from year to year thanks to the state of mind which animates this community of specialists, with confraternity, conviviality and the search for scientific excellence... "No one enters here unless he is a surveyor", wrote Plato at the entrance to his academy...

But it is, of course, a national society where French is spoken... and therein lies the problem for our French fellow citizens who are often uncomfortable expressing themselves in English, which is the official language of all these congresses! Even SICOT, for which in principle the official language is French, has long since given in to the language of the other side of the Channel.

In fact, we can never encourage enough all our young surgeons, who are now much more able to travel during their studies, to join these international societies such as the European Hip Society (EHS), whose congress is being held in Lille in September 2021, after many ups and downs due to the health crisis! As President of the EHS, I look forward to seeing you all in Lille to continue sharing our knowledge and surgical expertise in hip surgery, with true French representation in all these international bodies... "Bringing Orthopaedic Hip Surgeons together"...

You spoke to us about your investment in IT tools for surgeons. How do you see the future of this tool?

The continuation of our IT work on the evolution of our OrthoWave software suite remains a passion for me... We must continue to work so that the future of our profession does not remain in

> the hands of our politicians. For that, the groupings of orthopaedic societies under the aegis of EFORT in particular, and the connections across the Atlantic are essential... The setting up of national registers, including in France, of course, is a keystone.
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> Each reader of this journal must take his or her place in this European orthopaedic community...We must thank the journal MO for helping us in such a beautiful way!

When you are not working, what are your hobbies and passions outside of orthopaedics?

> If there is still some time left for leisure, and especially after this EHS congress in Lille which really required a lot of time and energy, it will be possible for me to take up golf again, or to spend some good time on a terrace in the sun with a good book, or to watch the 540 or so films that I promised myself to see or rewatch. We can also take back the bike that's sleeping in the garage, and wait for winter and snow to come to taste again the exhilaration of snowy slopes on a snowboard ...
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> It will also be a (good) time for friends to get together and talk about everything... except joint replacements!!!