

INTERVIEW

In the world of orthopaedic surgery, **Adalbert I. Kapandji** is a household name. His textbooks on the physiology of joints may be found in libraries from the Far East to the Far West. But do we really know the man behind the books? Mr Kapandji works at the Clinique de l'Yvette, in Longjumeau. In this interview with Maîtrise Orthopédique, he tells of his life, his work, and his interests.



M.O. : Mr Kapandji - how would you describe yourself

A.K. In many ways, I am a maverick. For a start, I have a name that is a bit of an affliction. However, I have learnt to live with it, and have even come to find it interesting: It is a name with a very special sound, and a name with a history. Anybody can be called Smith or Jones, but I prefer to be called Kapandji. My father was a surgeon, and I have inherited his scientific curiosity, his intellectual rigour, his flair for surgery, and also a certain business sense. He taught me a lot - both knowledge and skills - and this is part of a legacy that I would call intangible. It comprises all the things that our parents give us, invisibly, through how they act and through what they know. Any physical or financial assets left to us by our parents may be taken away from us by the State, at any time: The intangible legacy left to us is what the term implies - something that cannot be touched or taken away. My mother came from the region of Tour. From her, I have inherited my artistic talents; while my maternal grandfather was an engineer, to whom I owe my technical skills. As you can see, I have received a rich legacy from my family, which is why - despite my initial reluctance - I have come to proud of my family name. And I shall try to pass on this pride in the family name to the next generation. I hope that I have given this family sense to my son, who, incidentally, is also a surgeon.

M.O. Tell us about your father.

A.K. My father was a Turk born in Greece. He went to the French lycée in Thessalonica, which is why his family sent him to Paris to read medicine. He graduated and went into specialty training in Paris. He wanted to be a hospital doctor, but since he was a foreigner, that was not a career option open to him. He worked with a number of famous surgeons, among them Sauvé, together with whom he developed the well-known Sauvé-Kapandji technique. My father was not an orthopaedic surgeon; he did a lot of abdominal surgery, biliary tract surgery in particular. But what made him unexpectedly famous was that "little" orthopaedic procedure on the distal radio-ulnar joint that has come to be used world-wide. He was working in Paris at a number of hospitals, commuting among the different centres. Towards the end of his life, he was naturalized, and was extremely proud to be a French citizen. Having had a "foreigner" for a father is yet another reason why I see myself as a bit of a maverick.

M.O. What other reasons are there?

A.K.As an undergraduate, I was politically "ultra-Left". That was not the done thing in medical circles. Since then, things have changed: I have developed further as a person, and experience has taught me a lot. However, I do not regret that militant phase of my life; and in post-Liberation France, being a "Leftist" was something that appealed to all politically minded young people. In many ways, it was an enriching experience. Nowadays, of course, there aren't many Leftist intellectuals left ...

M.O. How did you train to become a surgeon?

A.K. I started my specialty training as an Interne des Hôpitaux de Paris in '56, and finished in '60. I trained in general surgery, concentrating mainly on abdominal surgery, and even wrote my thesis on abdominal surgery. As a junior surgeon, I did paediatric orthopaedics in Pierre Lance's department, where I met Pol Lecoœur, an original thinker and a great mind. I "did" orthopaedic surgery mainly in Félix Poilleux's department of general surgery at Broussais Hospital, right up to the time when I was a Senior Registrar. I was happy there, and discovered that I liked orthopaedics. However, that did not keep me from doing abdominal surgery as well, and I managed to refine a device which, at that time, was much used to assess biliary tract function. It was the kinesimeter, which I made into the kinesigraph, which was then inflicted on several generations of junior doctors.

When I had reached Consultant's level, I was keen to get a career post in a public hospital. However, for a number of reasons, that option was ruled out at that time.

M.O. Do you not think that that might have had something to do with your somewhat nonconformist personality?

A.K. Of course it had - as became abundantly clear when I was with Prof. Lucien Léger. In his typical way, he asked me one day to produce for him ("on my desk by tomorrow lunch-time") all the references, in the international literature, on alveolar hydatid disease in Tyrol and Bavaria. I can't say that turned me on. I was very willing to do research work in the Department, but on interesting stuff, not on that sort of literature search.

He did not get the list of references on hydatid disease that he had ordered. And he was not a happy man. I know I had been a bad boy. And I think it was that incident that put paid to my career in that Department. So I had to go and look at the private sector. I realized at once that I could not do what my father had done, commuting between different hospitals - traffic in Paris had become much too heavy in the meantime. I also thought that, as a surgeon, I needed my own centre. With a number of highly motivated colleagues, who have since become friends rather than just fellow surgeons, I went on to create this private hospital in the southern suburbs, 27 years ago. It took a lot of hard work and perseverance to get it off the ground. I now have a centre that is very effective, and will stand comparison with any teaching hospital. I think that Life works in a mysterious way - you may not know where you are going, but you will eventually come out where you should.

M.O. And what about the biomechanics of joints?

A.K. That was my lucky break. One day a colleague from my year, who was teaching joint mechanics at a school of physiotherapy, suggested that I should take over from him. I was pleased to accept, because I had already done quite a lot of anatomy teaching. I had done endless drawings on a blackboard during my two years as a voluntary Assistant Demonstrator. The reason the job was unpaid was that I was never properly appointed to the post. However, I went and taught the physios-to-be, and did them stacks of drawings, and through teaching the biomechanics of the human body I was able to learn the subject myself.

I read and re-read the works of Duchenne, who was really the father of biomechanics. His books, however, did not provide any anatomical drawings. I sat down myself, and drew up all sorts of diagrams, the idea being that each drawing should illustrate only one point, in such a way as to make that point readily understood by the observer. I therefore tried to base the teaching of biomechanics upon the principles of comics or some sort of "story-board" - in other words, a string of drawings that would illustrate the essential points to be made about the way the muscles and the joints work. As I was using these didactic principles, I thought what a shame it was that none of the drawings I had produced would go beyond the

physiotherapy classroom, to reach a wider audience. So I took a specimen chapter to an editor who had already been quite successful in publishing anatomy diagrams. He agreed to take my project on board - and I think it was a wise decision.

I published my three volumes on the Physiology of Joints. They were a great success, and are now read by all physiotherapists in France, and probably by a great many surgeons as well. The work has been translated into six languages, including Japanese. In fact, I am now better known abroad than I am here in France. It's an ill wind that blows no good.

M.O. Would you say that your success was merely due to your illustrating the writings of Duchenne?

A.K. I did not only read Duchenne's writings. I also read Steindler, and Fick, and many other authors who have dealt with biomechanics. Also, I evolved my own ideas. However, Duchenne was the one who influenced me most profoundly. I also - both as a teacher and as a practising surgeon - thought a lot about the way in which muscles and joints work.

This is how I discovered important things that were there for all to see but which, somehow, had not been put into words before. As far as the mechanics part of the books is concerned, that came from my love of physics and descriptive geometry, which I have inherited from my maternal grandfather. It was an application of lots of bits and pieces of knowledge that I had gleaned during my classical education. I have never had the benefit of any university level education in engineering or mechanics. However, I have always been a great reader. What has gone into my books is mechanics as I have experienced it - a live and living subject, rather than textbook theory.

M.O. How did you produce those drawings?

A.K. : By putting pencil to paper. Now, I do them on my computer. My mother is a painter. She taught me see things, and to draw them; and to reproduce on paper what I could see before my inner eye. However, I did not go into drawing in any professional way. In fact, I found out that I had a gift for drawing when I was teaching anatomy, doing chalk-and-talk sessions with first-year undergraduates.

One thing I can do is visualize things in three dimensions. And I can put these 3-D visions on paper. I think that when one has a gift for drawing, one first sees the drawing in one's head, and then puts it onto paper. In my first two volumes, I even created models - a sort of 3-D papercraft book - to illustrate joint physiology. These models are drawings in space, as it were.

M.O. One of the criticisms of your work is that it is not based upon experiments.

A.K. That is quite true. Many readers of my books have asked me, "Where is your laboratory?"

Some say that what I have produced is "armchair biomechanics." That's true. However, in all modesty, and at my own humble level, I would echo what Einstein used to say when asked where his laboratory was. He would show his pencil and a sheet of paper and say, "My laboratory is on my sheet of paper." I will admit that I have done "armchair" biomechanics, and I do not think that that is something to be ashamed of: I have thought about the shapes of the bones and joints, and the directions in which the muscles and the ligaments work, and I have found out certain things. However, these were things that were there for anyone to find. Basically, what my books reflect is my sense of wonder at the beauty and sophistication of the human body and of Nature in general. As Pythagoras said, "In Nature, all is Harmony."

Nowadays, biomechanics is pursued in overequipped laboratories, with stacks of electronic instruments. Under the influence of the English-speaking countries, we have come to over-

technicize our research, and the living structures have been forced out of sight behind tables of mathematical figures. I have thought a lot about these things, and I think that I now know the fundamental difference between industrial mechanics on the one hand, and biomechanics on the other. Many orthopaedic surgeons think in terms of industrial mechanics. I tend to say, provocatively, that biomechanics is "fuzzy" - there is no well-defined geometry; such axes as there are are intangible and ever-changing; and the joints involved are "supplied by the manufacturer" with a certain amount of play. However, this fuzziness is not a disadvantage, but an asset, in that it provides an extended range of functional possibilities. On the other hand, for this benefit to be realized there must be constant renewal of surfaces. Biomechanics is a science that must consider the dimension of Time, since living beings are "four-dimensional", subject to continual change from birth to death. Once wear is no longer compensated for by ongoing renewal, we are engulfed by entropy.

M.O. You did not have any great teacher in orthopaedics?

A.K. Not really, no. I am, as it were, nobody's child. At one time, when I was turning from general surgery to orthopaedics, that was actually quite a problem. However, Merle d'Aubigné was very helpful.

Unfortunately, I was not his student; however, I went to see him one day, with Volume 3 of my book, the part on the trunk and the spine, which had not yet been published. He took a keen interest in my way of looking at the mechanics of the human body. He thought it was great, and readily wrote me a Preface, which I think was very complimentary. Thereafter, he always helped me as I was finding my way in the world of orthopaedic surgery. He made it possible for me to join the French Society of Orthopaedic Surgery, and to specialize in hand surgery. Merle d'Aubigné was my first adoptive father.

M.O. What has been your main line of surgery since you went into the private sector?

A.K. Initially, I was a general surgeon, and spent ten years in that discipline, albeit with an emphasis on orthopaedic surgery. However, the time came when I realized that if I wanted to be recognized as an orthopaedic surgeon, I could not go on doing general surgery. Fortunately, I was working with a number of colleagues who were able to take over the abdominal work, releasing me to go into orthopaedic surgery and to acquire the necessary qualifications in that discipline.

M.O. What prompted you to choose hand surgery?

A.K. I have always been fascinated by that immensely sophisticated tool, the hand. When I heard of a little outfit that called itself the Groupe d'Etude de la Main (Hand Study Group), I immediately wanted to take part in their activities. I had already looked at the hand from a number of viewpoints: art, anatomy, physiology, surgery; and I was fascinated by the idea of a study group that would look at a wider range of aspects than just surgery.

I was able to submit original work, and was thus admitted to this select group, which has now become the French Society for Hand Surgery. When I joined, Raoul Tubiana welcomed me and took me under his wings. He is my second adoptive father, and I shall be forever grateful to him for his help and his kindness. I went on developing my knowledge of hand anatomy and physiology, and have published a number of papers on these subjects, in particular on the thumb ray, which is an extremely clever bit of human anatomy. And I am still coming across features that fill me with admiration every time. In the Hand Study Group, and later in the French Society for Hand Surgery, I really came into my own. I have always felt at home in these organisations. We are all good friends, and, initially, the group was very small - quite unlike SOFCOT, which has become a juggernaut. I have always published within the framework of the Hand Study Group rather than that of SOFCOT.

M.O. What about pronation-supination?

A.K. That is my "hobby", as it were. Again, it's something that runs in the family, since my father was interested in that subject and had designed a surgical procedure to restore this movement. One day, I started wondering about the purpose of this movement, and then about how it had been made possible by phylogenesis. The essential question is: Why are there two bones in the forearm? Looking into this allowed me to make certain discoveries, and above all to realize that what had initially looked extremely simple was, in fact, extremely complicated. The two-bone pattern in the forearm is a most remarkable "invention", which goes back to the time when the fish were coming out of the sea to live on dry land, some three hundred million years ago.

Pronation-supination is a movement that did not really come in until the end of evolution - if one may call it evolution -, which raises some fundamental philosophical questions. It is also a movement that is predicated upon the integrity of two related joints - the proximal and the distal radio-ulnar joint. I have studied above all the distal articulation, which fascinates me. I have even designed a prosthesis for it, which is being developed.

M.O. Your method of treating wrist fractures has been applied with some success.

A.K. This method, too, comes from my being a maverick. During my training as a surgeon, I was always being told that one must not put pins or screws through a fracture site. That was one of the big taboos. One day, I found that by breaking this taboo, by pinning the fragments across the fracture gap, one could stabilize the bone to prevent secondary displacement. My technique for the management of fractures of the distal radius was the result of my breaking a taboo. Once I started pinning across fracture sites, I found that I was achieving much better fixation and enabling patients to undergo exercise therapy immediately after surgery.

Like many orthopaedic surgeons, I am acutely aware that the locomotor apparatus must be able to function continually. If you will allow me to coin a term, the locomotor apparatus is there to "locomote." Once it stops, it starts to decline, since it is movement that keeps it going. Thus, fractures, ideally, should be managed with immediate reduction and sound fixation, using the least invasive techniques possible; this would allow the affected limb to be used immediately and keep functioning.

M.O. How long does it take to get an idea accepted?

A.K. Getting an idea accepted takes a lot of time, and a lot of patience - or to put it more bluntly, you've got to go at it and keep at it. Timewise, it can take up to ten years. You've got to be pigheaded. I always think of the bailiff in one of Molière's plays, whose motto is "Ne'er let go."

Because of my pigheadedness, I have managed to achieve a lot in life, especially at my centre. It's a question of keeping at it, never letting go.

M.O. Have you ever had any ideas that didn't lead anywhere?

A.K. Of course I have. For instance, there was that trapezo-metacarpal joint prosthesis. I was one of the first to design such an implant, at about the same time that de la Caffinière was developing his first spherical prosthesis. I have always felt that this joint, which has two axes and two degrees of freedom, should be simulated by a cardan joint. So I designed a non-rigid silicone implant, whose outstanding feature was the very accurate reproduction physiological pattern of the trapezo-metacarpal joint.

Sadly, this design disappeared in a drawer, at an implant manufacturing company which had other prostheses in its range. This meant that my implant remained virtually unknown, although it is as good as the others: I have myself implanted some thirty devices of this

type, with good results. Subsequently, my implant suffered when Silastic®, as a material, fell from grace. However, I have a model that provides exactly the same function, based on the same cardan joint principle, but made of metal - and I am still hopeful that it will be made into a prosthesis one day. For me, set-backs are never more than temporary.

M.O. You have made the point that orthodox opinions in orthopaedic surgery are necessary for the transmission of knowledge, but may be an obstacle to creative progress.

A.K. Progress in science is driven by nonconformists - same as in politics, by the way. There, too, progress comes from nonconformists. As a general rule, these people are unpopular, because they upset the applecart, they go against the current of accepted opinion. However, they can, by and by, introduce new ideas. Progress comes from ideas which, at the outset, are somewhat heretical. Pinning across a fracture site was, at first, utter heresy, and even now the idea is not universally accepted.

M.O. Yes, but there are many unorthodox ideas that are simply bad.

A.K. That is quite true. However, it's a question of looking behind what, at first sight, is an airy-fairy idea, to see how it could be rationally applied to achieve some useful end. Orthodox opinions are, of course, important for the transmission of knowledge and skills. In orthopaedic surgery, as in any field of human endeavour, there is a problem of transmission. Mankind accumulates knowledge, with each generation depositing another stratum on top of what has been established by their predecessors. It all goes back to the heritage business that I was talking about earlier in this interview. One has to pass things on.

Some things one can write down in textbooks or in papers; others cannot be passed on other than through shared experience. This means being with somebody in their working environment, being with someone who already has the relevant knowledge or skills and who can transmit them to the younger person, to the one that may - quite properly and without condescension - be called an apprentice. I think that in orthopaedic surgery it is vital to retain this time-honoured training system where the "master craftsman" teaches the "apprentice", who, in turn, will build upon what he has been taught and pass on his skills and knowledge to yet another learner. It is a chain reaction of teaching-learning-teaching.

I have written a poem on this subject. It is about Stradivari, who died without having revealed the secret of his famous varnish that made his violins sing. I think that what Stradivari did was very, very wrong. When it comes to the transmission of knowledge, we must all do the opposite of what Stradivari did.

M.O. What do you think of the transmission of orthopaedic know-how in this day and age?

A.K. The number of scientific meetings has increased beyond belief. There are national congresses, and international congresses, and congresses at European level. It has become impossible to attend all of these meetings. Of course one learns a lot by going there. But one also learns a lot from being with other surgeons, and travelling around Europe or around the world, to see what other surgeons do and how they do it. That, to me, is an important way of learning; and, unfortunately, it is not something that our young colleagues can readily do nowadays. As soon as a junior surgeon has finished his specialty training, he has to find a permanent post; there is no time for travelling.

There is, of course, the possibility of learning from those that are already in practice. However, looking over somebody's shoulder at an operation is not the same as doing the procedure oneself - it's a less efficient way of learning. Also, private hospitals are not recognized as training centres, which means that a major part of the know-how that exists is not available for transmission.

M.O. Do you then think that the private sector should be given at least some training function?

A.K. Yes - so much is lost at present, simply because once a surgeon is working in his own corner of the private sector, he cannot transmit his know-how to anybody else.

When one is with a young colleague who has just finished his training and knows it all, one can easily be made to look like an old duffer. It is difficult to transmit one's know-how to someone younger, whereas one could benefit from that younger colleague's familiarity with the latest techniques. For teaching to work, there has to be a learner; what I mean is that there has to be a formal relationship where one is the teacher and the other one is the learner. Organizing training in the private sector is not easy. A doctor's relationship with his patient is a one-on-one situation, in which the presence of a third person will necessarily interfere.

There are, however, examples of where such training efforts have been successfully made in private institutions. I am thinking for instance of the French Hand Institute, where students both from France and from abroad are receiving training.

It's not a question of turning every surgeon in the private sector into a teacher. However, those who have something to say and to transmit should be able to do so, in an official capacity and as part of the general scheme for the training of specialists.

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