MENTORS IN ORTHOPEDICS

ELIZABETH ARENDT

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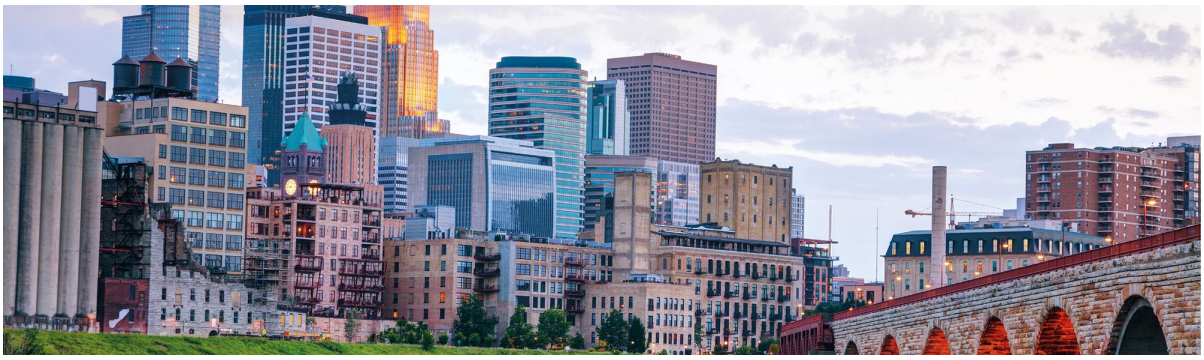
SUMMARY

Dr. Elisabeth Arendt's trajectory from a communal Chicago upbringing to a leadership role in sports medicine reflects a career-long commitment to addressing gender-specific clinical disparities. A pioneer in analyzing anterior cruciate ligament injury patterns and patellofemoral biomechanics, she integrated European objective anatomical assessments with North American soft tissue techniques. Beyond her technical contributions, Arendt's advocacy for institutional parental leave and professional diversity has reshaped the surgical environment, emphasizing the necessity of mentorship for the next generation of surgeons.



We met Elisabeth Arendt, guest speaker at the past Lyon Knee Days. Born into a large, Luxembourgish family living in the United States, she spoke at length about her professional career and personal life from a woman's perspective, emphasizing her commitments to high-level sport and medicine, two subjects among many others that she is passionate about.

Elizabeth Arendt, what is your background?

> I was born in Chicago where there were very communal neighbourhoods: we lived in the German neighbourhood. I have Luxembourg roots, and my parents spoke the German dialect of Luxembourg even though they had been in the US for several generations. They were both raised in a small area of Wisconsin where they continued to speak the language. Then my grandfather moved to Chicago during Prohibition, and when Prohibition ended, he ended up working in a brewery! I am the seventh of nine children. My mother had seven children in ten years and two children in the ten years after that, so I was kind of the surrogate mother for my younger sister and brother.

What was life like in Chicago at that time?

> We were raised in Chicago in a very German neighbourhood. There was a very small park across the street from my house called Brands Park. The Chicago Park District was very active in getting people to do activities and there were lots of sports you could participate in. If you signed up you

got one point, and if you won you got 3 points, 2 points for second place and so on. You added up the points and at the end you got this very thick wool jumper that nobody ever wore because it was heavy and itchy, but everyone wanted one! So we participated in all the activities in our neighbourhood: I played floor hockey, softball, different types of skating, ping-pong, volleyball and... horseshoes! I won two gold medals in horseshoes for the city of Chicago in my age group.

I once won a ping-pong tournament as a teenager, but believe me, I was no Forrest Gump! The sport I played that I really loved was volleyball. At that time we had a room with a very low ceiling, and the rules were really weird: you could catch a ball and then attack, i.e. have two contacts with the ball. Volleyball has changed since then: only one contact with the ball is allowed instead of two. When we played basketball, again the rules were very different and this continued when I went to high school. Basketball went to five people in my senior year. The reason the girls' teams were six people is because they thought the average girl didn't have enough stamina to play the whole court. I ended up playing on a volleyball team that was a prodigy team for a team called the Chicago Rebels; we were just a backup team, but we ended up seeing a little bit how women could play sports at a semi-, I wouldn't say professional, but semi-national level where they travel to different cities.

I was brought up Catholic and I went to an all-girls Catholic school which I think served me well. It was all girls, and they played their own sports. They were the leaders, class presidents and made up the student council. We had no barriers to our aspirations. I was class president in my first year, student council president in my last year, and I played basketball and volleyball. I grew up in a very lively family that played a lot of sports and did a lot of things together. This reinforced my social interest in sport. I never thought about sport as a potential career, I wasn't good enough, but it certainly made me think a little bit more about doing something with the workings of the human body, my interest in that field.

Why did you choose medicine, and more specifically orthopaedic surgery?

My older brother studied medicine and ended up becoming a professor of biology. He was a few years ahead of me. When he was in medical school, I started to think about it a little bit, I thought about nursing: it seemed like an interesting field. Once I got to high school, I got interested in science and biology, and then I went to college to study biology. I grew up in Chicago, and then I went to the University of Rochester, New York, on a Bausch & Lomb science scholarship. Bausch & Lomb, as you may know, is an ophthalmic company that offers a scientific prize and a scholarship to Rochester for the best science student. So I went to Rochester, which was a Division 3 school, as they had it in those days. Our school had hockey for women, but that was the only sport. I entered college in 1971. The first year I wanted to play volleyball so I went to a physical education class. As I had already practiced a lot, the teacher asked me if I wanted to help her teach, which I accepted. So I started teaching volleyball, and then our inter-university championships wanted to switch to the new rules of the game. I organised the new program for USVBA varsity. This year marks the 50th anniversary of the passage of Title IX. Title IX was a US law that said if you received government funding, you had to give women the same opportunities as men in all activities. This permeated other fields like law, engineering, etc. but the field that was really revolutionised was athletics. All of a sudden athletics, in colleges mainly, had to start providing more opportunities for women, to elevate them to a level where they had equal opportunities. Not necessarily equal funding, and people can argue about the semantics of that, but equal opportunity. In my school, in my second year, we started a volleyball team. We had pick-up uniforms, part-time coaches, we

only trained twice a week in the evenings, but for me it was great. When I graduated we had two teams, a 12-game schedule, new uniforms... It took me to another level of sport. The women needed someone to take care of their injuries. The female athletic director said to me, "I really think you'd like this, Liza, and we'd pay you too! I agreed and became a student athletic trainer, and that's what did it: this opened the door to an incredible world of sports injuries. There was a book, I still remember it, it was a blue cover book by O'Donoghue and it was about sports injuries. I thought it was unbelievable, that you can be a doctor and take care of this. At the time I thought maybe exercise physiology would be a fun field to get into, but I ended up becoming an athletic trainer. We got into the training rooms, which became co-ed, and that's when I met Ken DeHaven, the orthopaedic surgeon who looked after our men's football team. I started doing some research with him, shadowing him and hanging out with him. And that's when I decided that orthopaedics was something I should study.

What were the next steps?

It ended up being a bit difficult, to be honest. I stayed at the University of Rochester Medical School - it was a very good school and I had been accepted. I missed my family, but in our family we celebrated every birthday, every baptism, every time someone lost a tooth, so I thought it would be very difficult to concentrate on my studies, so I stayed in Rochester. As my residency approached, I wanted to go elsewhere, so I started interviewing for orthopaedics. I was a good student, but not a brilliant student. When I was interviewing for orthopaedics I found out that I was one of the first women: if they had accepted me, I would have been one of the first women in many programmes. Some people looked at me with a lot of curiosity, I was asked a lot of questions that were totally illegal at the time and certainly still are today: they asked me if I wanted children, why I wasn't married; they never asked me if I was sexually active but they certainly inferred it by trying to ask questions about my sexual orientation, how I would handle children if they accepted me, etc. It was difficult to live with, but I had no choice. I understood why people were curious, but I felt it was unprofessional to ask questions in this context. I know that the woman carries the children and has a heavier burden during a certain period of pregnancy and birth, but having a young child as an intern is difficult for men and women. I think it was a bit macho of them to think that the burden of raising a child did not affect the man and that he could do well as an intern, but not a woman. There was no kind of parental leave for men or women in those days.

I was accepted into an early entry program that I was very interested in. A man from the programme called me one morning (we didn't have emails or anything, we were accepted by telegram!) and he caught me a bit off guard. It was 7 o'clock in the morning, I was on a cardiology rotation at Genercy Hospital in New York. I remember it very well, he said to me, "Dr. Arendt, I would like to offer you a position in our program. I was so excited, I didn't know what to say. I said, "Thank you very much, but any programme I spend the next five years of my life in is worth thinking about; could I think about it overnight and call you tomorrow?" He got angry, called me Miss Arendt, not Dr Arendt, and said, "Call us back and we'll think about it." Long story short: I called back, they told me I couldn't come anymore.

That kind of put me on my heels. A lot of people came out of the woodwork saying I should sue the school, but I wasn't thinking about that at the time and that's not what I wanted to do. It showed me that boarding school would be difficult for me as a woman. So I wanted to stay where I felt I was accepted for who I was, not just for my femininity but for everything else. So I stayed at the University of Rochester where I did 12 years of school: 4 years of college, 4 years of medical

school, and 5 years of residency. It was great. Dr. Evarts was my president, Ken DeHaven was the sports head; he was a great mentor in so many ways, and also a great sports medicine specialist.

At that time, our programme was starting to be divided into sub-divisions. Before that we had pediatrics and spine, and then a sort of generalist department. Then hand started to be a separate entity, then sports medicine and arthroplasty. So I had the chance during my residency to see the early days of sports medicine as a separate discipline. Of course we had sports doctors, but they were out in the sticks and were considered undesirable. It wasn't really a discipline that was taught as a separate entity to interns, but I was privileged to be able to do so. Although the sports medicine residency was very dense, I still wanted more. I ended up wanting to go back to the Midwest, and there was a six-month fellowship at the University of Minnesota. I wanted to go to a Big 10 university because I thought it would be interesting to play women's sports in Division 1, to be the doctor for athletes who were much more talented than me at that age. I ended up getting accepted to the University of Minnesota, which was great. My older brother lived in Minnesota, so I had some family nearby. The six months turned into twelve months because they asked me to stay for six more months and they allowed me to go to Europe for six weeks, largely with the help of Ken DeHaven. It was a travel grant that I set up myself that allowed me to go to two places in Sweden - Linköping and Stockholm - and then to Switzerland. It gave me a taste of what Europe was like, it gave me an introduction to Europe and the different way Europeans do things. It was great! I've always loved travel, but it was this trip that gave me the taste for travel in Europe.

When I came back, I was offered to stay on as a full faculty member in Minnesota, which was perfect for me: my husband - I was married at the time - had started law school there, I had a brother there, and we were closer to Chicago where most of my family still lived.

How did the move to Minnesota go?

It was an interesting journey, and I had great support. I started my internship and then was asked to stay on as an attending. At the end of my fellowship I got pregnant and so I gave birth to my first child about seven months into my being an Attending. We didn't have organised maternity leave, I had my own disability insurance, as they did in those days for a fellowship. I kept it because at the time disability didn't cover pregnancy if you were pregnant when you took out the disability policy. I asked, "Do you cover pregnancy?" and someone said, "Of course, of course". "Great, can you confirm that for me in writing?" and he went to check and found that they didn't cover pregnancy: people at that time didn't even know the rules in place. I felt that people didn't know how to treat pregnant women in an organisation. So we put in place a maternity policy, which of course followed the state guidelines. My chairman said, "Do a survey and tell me what we should do". I'm really proud to say that was a start. Six years later we had an intern who got pregnant and she was able to benefit from this new policy. Now we have pregnancy leave for women, parental leave for men and adoption leave. It used to be six weeks for women, two weeks for men - I know in Europe it sounds crazy because you have more free time - but now we have six weeks for women, six weeks for men, six weeks for adoption. That's across the system, but it's really orthopaedics that has led the way. We're very proud of that, because a lot of institutions give the same amount of time off to men and for adoption.

So I stayed on as an attending, that was in 1985-86. I had my first child in '86 and then I got pregnant again in '89. I started helping the men's teams. At that time the women's teams were not affiliated with the university but I wanted to start working with them, so I started helping one of the community members. When he retired I was able to take over the women's sports - at that

time they were completely separate in our institution: different athletic directors, different budgets - and I also helped out with the men. I gave birth to my second child in 1989. Shortly afterwards, my mentor and head of sports medicine at my institution, Rob Hunter, left for Aspen. So someone had to fill in for Dr Hunter at short notice, as his departure was sudden. I wasn't afraid to do it, but I had mixed feelings: I felt it was time for me to take care of my family, to cut back a little bit, but when we talked about it with my husband, he said, "Lisa, you love your job, you make a lot of money, and you see yourself still here in ten years. Let's just try to focus on this job for you. Your university was very good to you when you had your first and second child, now it's your turn to take over. The university needs you. So I became the medical director of men's and women's varsity athletics, and I was also the head doctor for the men's and women's basketball teams. It was an interesting time!

Around the same time, a lot of things started to fall into place on their own, perhaps by serendipity. The NCAA Safeguard Committee had a program where they would meet to talk about different rules, etc. They also chose an equal number of people from different backgrounds, men and women, orthopaedic surgeons, primary care, athletic directors, etc. They had a vacancy, and someone said, "If only we had a female orthopaedic surgeon in the Big 10 who would fill all these boxes," and someone said, "Well, you have one: Lisa Arendt, she's an orthopaedic surgeon who works at the University of Minnesota. So they asked me to be on the Big 10 medical safeguards committee, a three-year term that turned into a six-year term. That's how I got introduced to a system called Injury Surveillance System (ISS). As I said earlier, at the time I was involved in both men's and women's basketball, and I noticed the incredible number of ACL injuries in women. You would see 5-6 women with braces whereas it was very rare to see a man with an ACL reconstruction. So I started looking for a database to see if this was a Minnesota phenomenon, because the men's team was pretty good and the women's team at the time was not so good. That led me to the ISS, the NCAA database, which fed my growing interest in ACL. I published the ACL work - I presented the first three years, then I published the five-year data, and finally, with Julie Agel, I published the 13-year data. That data showed interestingly that, despite Title IX and a remarkable increase in women's excellence in basketball, there still seemed to be a very high incidence of women in basketball (three times as many in college at all levels of Division 1, 2 and 3), and about twice as many in football. The NCAA studied about 13 sports but football and basketball are the only sports among the 13 where men and women play with similar rules and equipment. So I chose basketball and volleyball, not really knowing that they were actually two of the most played sports in the world...

Why are you so interested in the kneecap? Is there a connection?

Absolutely. As I said, I was interested in the ACL and I was also interested in things that happened more frequently in women. Another study I did very early on and one of the things I looked at was stress fractures in women. I published a 10-year database from our own institution. It was about this time that the ACSM and other interest groups coined the term "female athlete triad", which began to recognise the coming together of disordered eating patterns and poor bone health, as well as the absence of menstruation, or at least disordered menstrual cycles, and the importance of menstruation for women to maintain good bone health. At the time, when I started working in the training room, I would say that a third of the women I worked with did not have a normal period. Frankly, they liked it! It was a nuisance: it was embarrassing to have your period if you were doing sport! We started to look into it, into the menstrual cycle and injuries. Finally, I would say that in my first 3 or 4 years, it was at that point, not just in our institution, but across the

country, that the negative aspects of the female athlete's triad and loss of menstruation, and in particular amenorrhea, but also menstrual disorders and oligomenorrhoea, started to be recognised. I started to get interested in it.

So where does the patella come in? I didn't stop being interested in the ACL, but I felt it was getting a lot of attention. You could fill two whole rooms with articles on the ACL, on anatomy, and we're still learning more. I really felt that highly qualified people were already doing research on ACL and I didn't think I could match the kind of research they were doing. The two things I saw most often in the training room that were very poorly understood were the patella, and the hip. I felt that from the mid-thigh to the sacroiliac joint, it was a real black box for female athletes. We had so little understanding of the relationship between everything that was going on, your ovaries, your lumbar, your sacroiliac joint, your hip. The hip was extremely poorly understood at the time. It took a few more iterations and bigger thinkers than me to get into the hip, but the patella captured my imagination because I was sort of a knee surgeon. I was confused by what I was being taught, and although I credit John Fulkerson with bringing the patellofemoral joint to the United States, for anything that happened to the patella, whether it was injury or disease, arthritis or instability, the same operation was performed. You would move the tibial tuberosity medially, you would interlock the VMO and you would cut the lateral retinaculum. It didn't make sense to me. We weren't as smart as the French at the time or Central Europe; we recognised the patella alta, but we didn't understand that it had to be moved distally, or maybe we were afraid to do that. We would move the tibial tuberosity medially, but it didn't make sense; we never knew how much we were moving it, we never knew why we were moving it. I would ask the question, "How much do you move it?" and nobody could give me an answer. We would do some measurements, but none of those measurements translated into anything objective on the block. I ended up doing a little biomechanical project on the patellofemoral joint - again by serendipity - I presented it I think in 1989. It was at Lake Buena Vista at Disneyworld in Florida; it was an AOSSM at the time where if you gave a presentation, someone would discuss your presentation for 2-3 minutes. So I did this presentation: it was a bit about moving the tibial tuberosity and trying to understand the dynamics of what's going on in the soft tissue. At the time I was interested in MPFL - although I'm not sure we called it that at the time. My contrarian was John Fulkerson, and the person who was the moderator of the whole patellar femoral session was David Dejour. It was his first time speaking publicly at an American conference, so he was very anxious about speaking English and chairing this conference. So I was introduced to David and John Fulkerson. John Fulkerson was very complimentary, like a big teddy bear - people who know him know he is like that. At the same time I discovered that there was a group called the International Patellofemoral Study Group - IPSG. I asked David and John Fulkerson if they knew about this group, they said, "We met once, very small, but our next meeting will be in Interlaken. Would you like to come?" That's how I met Philippe Neyret, David Dejour, Scott Dye, Roly Biedert, a whole group of people who have become my friends since then! This introduced me to the wonderful world of patellofemoral articulation.

At the time, I thought that Europe was more advanced than the United States in its thinking about patellofemoral articulation. The French are very objective, they like to look at a lot of X-rays, they like to take a lot of measurements and use them. I thought it made a lot more sense, that you were much more objective in what you were doing. So I was trying to merge the approach of looking at the bone anatomy with the approach that was more prevalent in the US, which was more soft tissue, MPFL.... I hope we brought a little more soft tissue anatomy to the European thinking of the time. Of course, I don't want to take anything away from the Japanese, because they were also

doing MPFL, but at that time I think we had a little more collective thinking between the US and Europe. The IPSG brought a lot of international thinking, hence my interest in the patellofemoral joint. I think people really needed to be educated, sometimes not to do surgery.

This allowed you to get to know the Lyon school, can you tell us about this experience?

I am particularly grateful to David for helping me understand trochlear dysplasia. I admit my own limitations in understanding 3D anatomy. People who grew up with CT scans and MRIs may understand a little better how to take a two-plane image and think about it in three planes, but I grew up with simple X-rays. It took me a long time to understand trochlear dysplasia and to interpret two-plane anatomy into three-plane anatomy. We didn't have 3D reconstructions at the time. MRI had just arrived. Of course, MRI was mainly used to look at the ACL and the meniscus. There wasn't much cartilage at the time, it wasn't specific enough for that. Anyway, we would sit and look at X-ray after X-ray after X-ray. At that time I was doing a lot of anatomy, so I brought a lot of pictures and photos, and we would go through the anatomy of the medial and lateral side of the knee. I remember trying to understand, I knew that Henri Dejour had done this operation where he lengthened the patella when he had a baja patella. I didn't speak or read any French, but I remembered the picture, so I tried to find the article, I wrote to David and Phillipe and said, "I remember Henri Dejour did this...". That was when I started trying to integrate what I was seeing and hearing in Switzerland, Germany and France. As I had two very nice French friends, I started to gravitate more towards France and then I came to France for the La Patella meeting, which I think was in 2012. I was invited to speak about the MPFL. That's what introduced me to Lyon and a lot of people from Lyon, which was really great.

I came to Lyon in 2010, but not as a travelling fellow because at that time it was usually for six weeks. During that time I was also a team doctor for American hockey, and I had been away from my family for a fortnight: one for the World Games in Tampere, Finland, in 1990, and the other for Lake Placid in 1992. It was only for a fortnight, but I thought it was unreasonable to go away for longer. Anyway, I was asked to be the sponsor, which was fantastic, and we came. You can tell that Lyon clearly knows how to show people a good time, whether it's visual, food or intellectual! Of course, we ended up having dinner at Paul Bocuse's...

I'm really looking forward to coming back in the autumn, Lyon is a lovely city. I had been there a few years before for an IPSG gathering probably in the late 90s. It is interesting to note that Lyon is a knee school, but for me it also has a lot to do with the patella, because that is where my love of the patellofemoral joint developed.

You are considered a role model for women in orthopaedics. Do you think we are moving in the right direction?

From a purely intellectual and capacity point of view, women can become orthopaedic surgeons. Yes, sometimes it takes more strength, but as you well know, smaller men, older men, are also doing this job. I think there are very few cases where you need absolute strength, if you understand biomechanics and leverage systems and so on. You also have other people who can help you. I think women were wrong when they went into this field: they were trying to imitate men. I say the same thing for athletics: if you try to imitate the male athletic model, there are a lot of things wrong. If you try to emulate the pure model of the male doctor, and even worse the male surgeon, you find that it is a failing model. Many men have never known their children in their early childhood, which is not good for the children or the father. So I think what women have

> brought to medicine is the ability to try to be a whole person. I think women have played an important role in allowing men to step back and say "I have to do this for my family. I have to do this as a father " . When I first started working, I used to take time off to go and watch my kids play. It was unheard of. I was shutting down an operation so you could watch your kids play baseball after school. I remember my president saying to me, "I don't know if it's you, Liza Arendt, or if it's because you're a woman, but clearly we do things differently in this office now". That was the late 1980s... Gradually, I think when women came into the business, they themselves wanted to spend more time with their families and that allowed other people to say "Yes, this is important to me too". I think in this day and age, at least in the US, it's all about quality of life. Of course, sometimes you have to make concessions, but I wanted women to know that it was important for me to be a mother, that it was important for me to be a wife. Of course, other people could raise my children, but that's not what I wanted: I wanted to be the only one raising my children. There are many men my age and older who regret not having spent more time with their children when they were younger. I like to think that women have brought to the profession a way to be a complete person. The more successful you are at home, the more successful you are at work and vice versa: it's a balance. If you are unhappy in one place, you will not be the best in other parts of your life. Men need to allow women into the workplace to bring diversity.

> This diversity comes in many forms and just as you accept the diversity brought by women, you must accept the diversity of sexual orientations, religious beliefs, etc. The only way to take care of people, the whole population, is to have a more diverse workforce so that people can see a bit of themselves in it. As for whether I am an example for other women, I sometimes think I could have been a better role model. I didn't really think about mentoring and sponsorship until the last two years. Jo Hannafin, who was the first female president of AOSSM, said to me "Liza, many men have mentored women, but very few have sponsored women". That's a message I'd like to pass on: men need to look around and see the talented women and men below them and help them rise to their full potential. There are wonderful women and surgeons all over the world who would not be where they are today without the mentorship of men. But now we need more mentoring. We need more women to be part of the "group", as I was at the IPSG, as I was at the Lyon school. They accepted me for who I was and wanted to share their knowledge with me, as I wanted to share mine with them. It was great.

Thank you for the nice interview.