

Historical Profile

Historical Perspective: Gavriil Ilizarov, MD

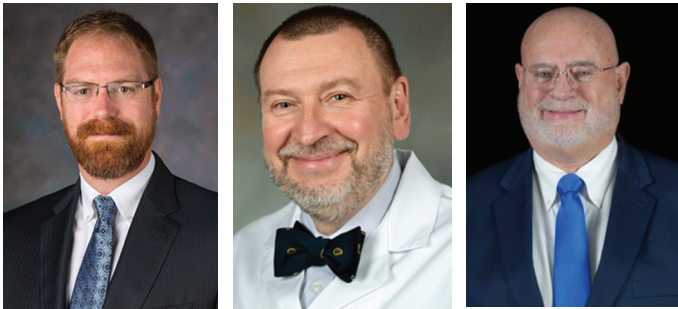
Christopher Iobst, MD¹; Panel: Alexander Cherkashin, MD²; Robert Wigginton, Eng.³

¹Nationwide Children’s Hospital, Columbus, OH; ²Texas Scottish Rite Hospital, Dallas, TX; ³Ortho Ideas, LLC, McKinney, TX

Correspondence to: Christopher Iobst, MD, Nationwide Children’s Hospital, Department of Orthopaedics, 700 Childrens Drive, Columbus, OH 43205, E-mail: christopher.iobst@nationwidechildrens.org

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Christopher Iobst, MD; Alexander Cherkashin, MD; and Robert Wigginton, Eng.

Christopher Iobst, MD (CAI) – Since 2016, Dr. Iobst has been Director of the Center for Limb Lengthening and Reconstruction at Nationwide Children’s Hospital. He has 20 years of experience using circular external fixators but never had the opportunity to meet Professor Ilizarov.

Alexander Cherkashin, MD (AC) – Dr. Cherkashin worked with Professor Ilizarov at the Center in Kurgan, Siberia, from 1983 to 1995, and became the head of the hip pathology department. Since 1995, he has been at the Texas Scottish Rite Hospital. He is currently the Director for the Division of Clinical implementation in the Center for Excellence in Limb Lengthening and Reconstruction.

Robert Wigginton, Eng. (RW) – Mr. Wigginton is currently the Chief Technical Officer at Metalogix developing open posterior external fixator systems. He was the Director of International Manufacturing for Smith and Nephew and served as the surgical liaison for North American visitors to the Ilizarov Center. For his work, he was given the title of International Honorable Professor by the Ilizarov Center and issued the decree “Friend of Russia” by President Vladimir Putin.

Introduction

Gavriil Ilizarov (1921–1992) would have celebrated his 100th birthday in 2021 (Figure 1). His contributions to the field of orthopaedic surgery are simply extraordinary. While he is most famous for the circular external fixator system that bears his name, his principles of distraction osteogenesis revolutionized the field of limb lengthening and reconstruction. Despite having no formal education in orthopaedics, he developed a method that became so successful that an 800-bed orthopaedic hospital was built for him in Kurgan, Siberia. The Russian Ilizarov Scientific Center for Restorative Traumatology and Orthopaedics became the largest orthopaedic clinic in the world.



Figure 1. Doctor Ilizarov in surgery, Kurgan (photo courtesy of Dr. Cherkashin).

To commemorate his birthday, we thought it would be appropriate to honor his memory with an article dedicated to him. Unfortunately, the number of people still alive that worked closely with him are dwindling. Consequently, the opportunity to get first-hand accounts of him as a surgeon, innovator and human being is priceless. We were fortunate to get two individuals who each worked closely with Professor Ilizarov, Alexander Cherkashin, MD and Robert Wigginton, Eng., together to discuss their relationships with him and provide insight into his personality. The following are excerpts from a 90-minute recorded virtual conversation held in December 2021.

CAI: Gentlemen, thank you for taking the time to discuss Professor Ilizarov with me today. What was your first impression when you met him?

RW: I think I was in awe when we first met him beside the airplane. We had just spent a long time traveling from Memphis to New York to Moscow to Kurgan. [We had] very little sleep during that time. [When we arrived,] we had a four-hour presentation from him presenting case after case: “This is the patient, this is what I did, and these are the results.” That would go on over and over and over (Figure 2). You were just amazed at all the indications that he could correct and the results that he was getting. I was really amazed with him.

AC: My impression was a bit different.

At the time (as a frame of reference), that I was sent to the Center in 1983, there were already some rumors about Ilizarov. There was a book about him which [provided] some details about the doctor from Kurgan. There was even a movie about someone who was doing magical [things] with bones. [However,] in this movie, Dr. Ilizarov was a woman.

So, what was I expecting? I was expecting that upon my entrance [to the Center], he would come meet me, and he would be a great surgeon and a great teacher. I imagined him to almost hug me and start sharing his knowledge with me.

So, my first impression was complete disappointment. For the first two or three months that I was there, I never saw him. It was very difficult to get close to Ilizarov. He was extremely busy. And who was I? I was just [fresh] out of medical school, and initially, I was not allowed to take care of patients.

CAI: Do you remember when you got to see him the first time?

AC: The first time I saw him, that was devastating too. He didn’t share anything. He anticipated that you would watch and do what he is doing and absorb it. So, it was an education by example. If you want to learn, you must learn to tolerate his character, to tolerate his way of working, and tolerate his way of teaching.

Now, I understand that that was his way of teaching. No one had taught him. He didn’t have any mentor in his

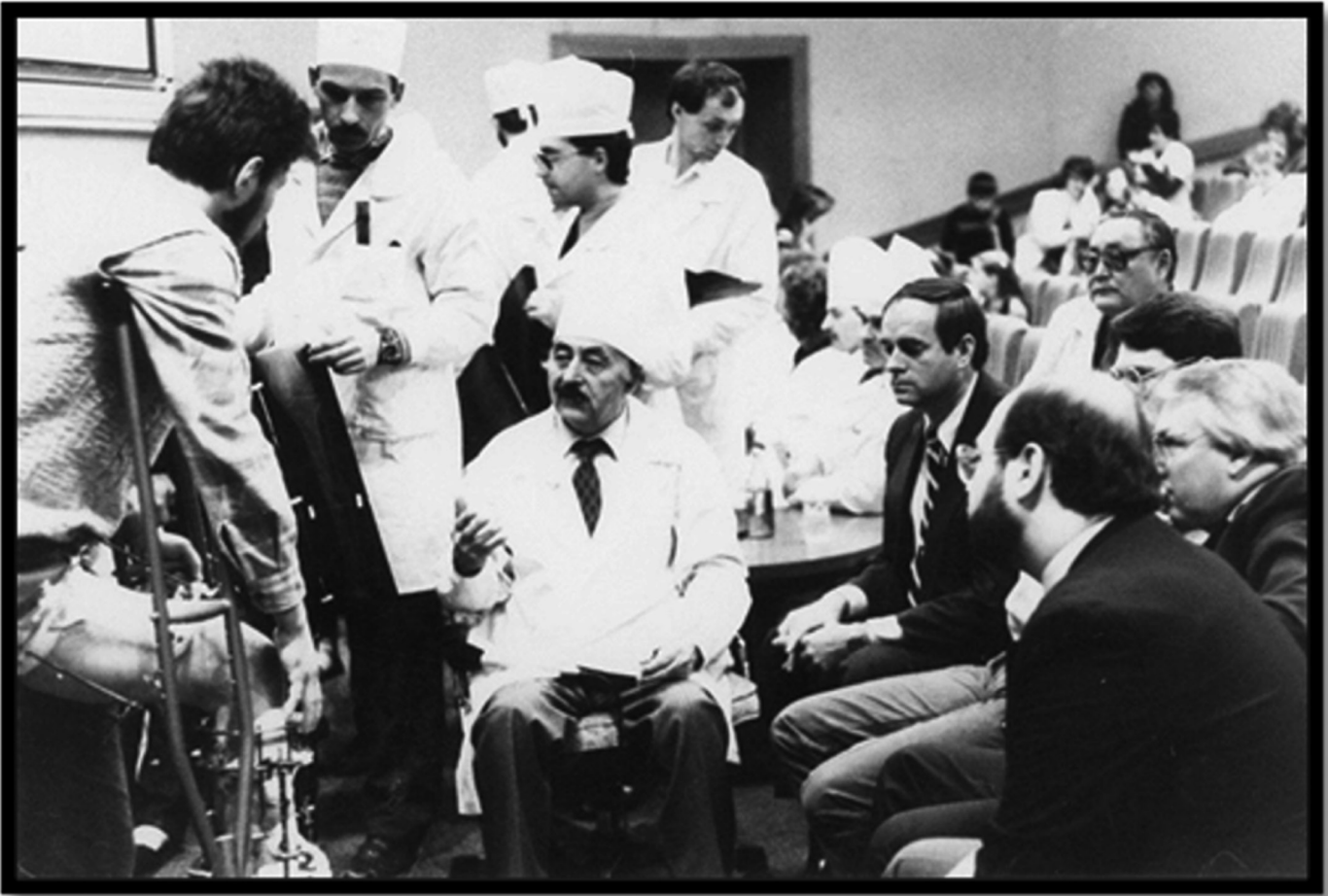


Figure 2. Grand Rounds review January 1988: Professor Ilizarov, Robert Wigginton, Jack Blair, Alex Lukianov with surgeons and patients from the Russian Ilizarov Scientific Center (photo courtesy of Robert Wigginton).

life. So, he just probably didn't know any other way of doing it. He thought: "If no one was teaching me and I achieved this, then why do I need to spend time to teach you? If you are talented, you'll stay and you'll learn. If not, I don't need you."

CAI: That must have been difficult.

AC: Well, as soon as you understand his idea was to learn by example, you would want to stay... because he was a genius. He was discovering things that no one else could see (Figure 3). He was coming up with new proposals that no one else was even thinking about. But you had to be next to him to learn it. You couldn't wait for a time when he would explain it [to you later].

[In his defense,] he probably didn't even have time to go and teach. He had so many patients. He had so many clinics. He also had a lot of responsibilities being the director of the Center (Figure 4). As the director, he would tend to micromanage—that was his nature. He wouldn't let any detail slip: the color of the paint in the corridors, what ceramics to use in the OR, what equipment to buy, or what furniture should be in the doctors' offices. He didn't have time, and he was not a good manager of his time. As a result, that was probably the only way for him to teach. If you wanted to learn, you had to stay close to him.

CAI: How was he to work with on a daily basis?

RW: He was always very kind [to me]. Basically, [he] knew only two words in English and that was, "Bob,



Figure 3. Professor Ilizarov in surgery. He can often see what others cannot, Kurgan (photo courtesy of Alex Cherkashin, MD).

drink.” He was always there. If he couldn’t do it, then he would have someone else take care of my needs. So, for me, he was very pleasant to work with (Figure 5). But I also knew that he could be a terror too, and everyone at the Center was afraid of him.

AC: First of all, he was a very smart person. He was a very good organizer. He knew how to behave differently with different people. Depending on the expected outcome, he would act accordingly. We, the employees at the Ilizarov Center, were 100% dependent on him with our job placement and even with our apartment. I lived with my family in the dorm initially, which was property of the Center. Later, he would give you an apartment, but



Figure 4. Professor Ilizarov in his office. He had many responsibilities as the director of the Center. Note the wrench in his right hand (photo courtesy of RISC).

it was in a building which also belongs to the Center. So, I was completely dependent on him, and when you are dependent on him, he would not necessarily be nice and polite.

He was not a bad person on purpose. This was just his way to achieve what he wanted. He was a huge workaholic, and he would expect everyone around him to work as hard as him or maybe even harder—definitely not less. If he ever saw any slack, even if it was not real slack but he thought you were slacking, he would immediately tell you that you were not doing well or not doing it properly.

He kind of—I hate to make it too strong—but he kind of treated us as his slaves. Not to the point that he would make you do something improper, but he anticipated that you would do exactly as he said and deliver the result that he expected. That’s it. And if not, then he would become really, really mad. He had a very short fuse. He could turn around and start screaming. When he



Figure 5. Ilizarov accommodating guests in his office, January 1988. Left to Right: Alex Lukianov, Professor Ilizarov, Jack Blair, Robert Wigginton, Eng. (photo courtesy of Robert Wigginton, Eng.).

screamed, it was not because he wants to make you feel bad but because he just could not behave differently. He had a very strong personality in everything. When he was not happy with you, he would make sure that you felt it one way or another.

CAI: What were his biggest strengths?

AC: Because of his background (being self-taught), he was not under the influence of [conventional] rules. He also didn't have a lot of detailed knowledge. Consequently, he was able to see things from a different perspective than other more "educated" people. This is what allowed him to make decisions about distraction osteogenesis. Because other people would never imagine that by pulling two bones apart, new bone would start to grow there. The others had learned all their life that you need compression, compression, compression. His mind was always open, and I think that was his biggest strength. Sounds funny, but his lack of detailed knowledge was a great strength.

He was also very good with observation. If he found something unusual, he would not stop. He would forget time and he would concentrate on trying to understand what was going on. He had a short temper, but if he found something unusual, he could spend hours just trying to decipher the reason.

Finally, although he was not an educated psychologist, he was great at psychology. There were different strategies that he used. When he was with a patient, he was the [quintessential] doctor. Every time a patient left a visit with Ilizarov, the patient felt better. Even if Ilizarov didn't do anything—just talked to the patient—he made patients feel better. Similarly, with the doctors at the Center, if he wanted to achieve something, he made you achieve what he wanted you to do.

When he had guests coming to the Center, he knew that he was dependent on those guests' opinions to spread [his methods] so he would be a wonderful host. He would organize everything and would be

very attentive. He would do things to help them be accommodated better. He would share the knowledge—maybe not all the knowledge—but try to give them what they wanted without giving what he did not want to give.

RW: He had two personalities: 1) What’s mine is mine, and what’s yours is mine because you work for me, or you are working with me. 2) Like Alex said, he kept the patient happy. He wanted to keep the foreigners happy too because he saw them as a source of income for him. I had no problems with him at all. When we would have surgeons present to him in the USA, the doctor would show him his patients and he would say, “That is not my method.” But he wouldn’t say what his method was.

CAI: I understand there were approximately 50 surgeries a day going on at the Center. Did Ilizarov oversee all of these surgeries?

AC: It would be very difficult to become one of Ilizarov’s personal patients. Obviously, with 800 beds, you can imagine he could not physically treat all of the patients. The majority of patients who became Ilizarov’s personal patients found their way to him through the Communist Party officials or through local government officials. The officials would write a letter to Ilizarov requesting he take care of the patient. Another way to get to Ilizarov was via referrals from his old friends. If you went the traditional route, you might not get to the Center for 5 to 10 years. Depending on [the patient’s] pathology, the waiting line was pretty long. Still, there were a lot of patients, and he was not available to do surgeries on a regular basis.

CAI: What was his typical surgical schedule?

AC: He would have, depending on his schedule, anywhere from one to ten surgical days a month. When it was a surgical day for him, I don’t think he ever did less than five or six surgeries that day. Simultaneously, he would have cases going on in at least five ORs.

CAI: What would it be like to operate with him?

AC: If it was a personal patient of Ilizarov, you would discuss the patient with Ilizarov, you would prepare the patient, and you would get the plan from him (Figure 6). [In] surgery, you would start the frame application. Usually, you would put wires and supports and then he would come in, often from another OR, and look at what you had done. He would give you (at least it was true for me) a very hard time, he would explain how stupid you were, and how wrong the frame was assembled. He would say: “I didn’t say to do it this way! The plan was completely different.”

Often, he would change something: sometimes just a wire or sometimes change the position of an entire support. Next, he would perform the osteotomy. Finally, you would do the x-rays and present the wet x-rays to him. Usually, you had to chase him around in the operating room to show him the x-ray. He might decide to do some additional manipulation and then go on with another surgery. He was always in between many ORs doing different surgeries and keeping it all in his mind.

However, it could be quite unpredictable: sometimes he would start the surgery with you—shooting the wires himself and then leave you in the middle of the surgery to see x-rays of a patient from another OR. You had to be very attentive and understand that his mind worked differently. It was a nice education, but it was quite [nerve-racking].

CAI: What can you tell us about the stories of him smoking in the operating room?

AC: As I explained, a typical day involved him walking in between multiple ORs. Sometimes [in between cases] he would light a cigarette. He was a heavy smoker initially, but he didn’t smoke much the last few years of his life. He was warned that he was going to lose his limbs because of diabetes. But early on, he was a heavy smoker, and he would smoke in the OR (Figure 7). He would look around and sometimes the ash from the cigarette would fall on the table and he would say, “Don’t worry, it is sterile.” He was spending the entire day in the OR and sometimes he would not change his sterile gown for three, four, or five hours.



Figure 6. Alex Cherkashin, MD, presenting a patient to Professor Ilizarov for the consultation after surgery (photo courtesy of Alex Cherkashin, MD).

CAI: Since we are talking about surgery, I know that trauma patients were treated at the Center. Did anyone ever get a plate or a rod instead of a frame?

AC: By default, you got a frame—frame, frame, frame—nothing else.

The Center was built to prove that the Ilizarov method was a valid concept and that it worked for each and every orthopaedic or traumatology condition [where different fixation methods were used]. I only remember one time when a plate was placed there. I don't think Ilizarov ever knew about it. That was a patient that was not able to go into a frame.

RW: I remember times when I would take orthopaedic surgeons there and they would do a grand rounds type

presentation where they would show their cases. They would get up and say: "Ooh, look at me. I put this nail in, or I put these plates in and they failed. But I came back and put on this beautiful frame. Look how good it is!" And the response was always, "Why didn't you just put a frame on in the first place?"

CAI: Did he have a favorite surgery?

AC: No, I don't think he had a favorite surgery. He enjoyed challenges, that I can tell you for sure. Remember, he started as a general surgeon doing everything including obstetrics. He was even doing plastic surgery. He once mentioned a patient that he had [completely] reconstructed his nose. He had widespread interests. [Typically, he] had a huge line of surgeons with patients waiting outside of his office. When something



Figure 7. Professor Ilizarov smoking while on break in the operating room (photo courtesy of RISC).

interesting would appear, for example, just a stump of a finger, he would spend an hour just looking at the stump trying to see how to reconstruct it. He would look through the x-rays, think about interesting solutions, and create a new frame construct. He loved challenges: he would get involved very easily and forget about the time.

On the other hand, for him, there was no routine surgery. For example, the pelvic support osteotomy [was an operation we were doing] in my department three or four times a week. It was routine for us. But he would find something interesting. “You know what? Let’s do it a little differently. Let’s change the angle here... this is a woman, and if you do this pelvic support, typically there would be not enough access here in the perineal area. This is very important for women. Let’s do it differently this time.” He often came with a different idea which was frequently completely unexpected. You don’t anticipate it. You think [to yourself], we’ve done hundreds of

patients like that, so it’s going to be very simple. No, he was always on the lookout for something interesting.

CAI: Since he was self-taught, he must have had a lot of complications, at least early in the process. How did he deal with complications?

AC: Honestly, I never heard from Ilizarov that he had any complications himself. According to him, “There were surgeons who managed not to learn or be successful in doing what I am [teaching].” Also, he would not consider [calling it] a complication if something went wrong but then was fixed. He would just find the person who [was responsible] for this problem and he would find a way to teach this person how to manage this complication—how to bring it back to the initial plan.

For any questions about complications [he would say]: “If you are diligent enough, my method doesn’t have complications. If you know how to do it, then there won’t be any complications. But if you are not willing to learn, if you don’t understand, then don’t do it. Because there are no complications, you are just a bad surgeon.” I don’t remember him ever talking about complications, at least not his complications.

CAI: Why do you think that was the case?

AC: Remember, he went through [a long] time when he was ridiculed and not recognized. His method was called “the locksmith approach for orthopaedics”. [His method] was his baby and he was protecting it. Like any inventor, he was very jealous of his technique and didn’t want it getting into the wrong hands. [Therefore], he would diminish the number of complications. Not because he did it on purpose, he was just thinking, “Ok, this was a little problem and I know how to solve it. So, you shouldn’t [label it a complication] because that could be easily solved.” That was his approach.

CAI: How did he evolve from being a small community surgeon to running an 800-bed hospital?

AC: He was a very hard worker and a very dedicated person. He was also a visionary. He saw the possibilities of the method he developed. Initially, I don’t think he

was planning to have a huge hospital. He was treating whatever patients he would get locally, and then word of mouth started to bring him more patients from far away. Some well-known and important personalities became his patients. This gave him notoriety, even though he didn't receive any support from the official government or interest from the official Minister of Health. Finally, it became very controversial: people were getting in line to be treated in his hospital, but it was not even an officially recognized method of treatment.

The Central Institute of Orthopaedics and Traumatology sent someone to audit what he was doing. Ilizarov became very good friends with this person, Vladimir Goliakhovsky. Vladimir then helped to propagate his ideas in the Central Institute and with the Minister of Health. Eventually, some famous government officials were treated in the hospital and they got the government to recognize [Ilizarov] and give him money for further development. And this is how it was. There was not any magic. Just hard work and Ilizarov's ability to believe in himself and in what he was doing.

CAI: How was Ilizarov paid?

AC: He had a salary. I don't know what his salary was, and I never heard about it. I don't think it was huge. Based on the way he was living, I don't think he was well paid. He was not spoiled by money. His salary was maybe five or ten times bigger than mine but not more than that. When he died, there was nothing left.

He received a lot of support from patients. Gifts, food, cakes, candies, trinkets. Most of his daily necessities (apartments, utilities, vehicles) were given to him for free but moneywise, I don't think he was very well compensated. He didn't need it, and he didn't fight for it.

The Center had a garage with six or ten vehicles. He used each and every one of those cars. One vehicle (purple Mercedes) was given to him by the Italians as a gift because he signed an agreement with Medical Plastics giving the exclusive rights to his name (Ilizarov) outside of Russia.

CAI: Where did the fixator equipment come from?

RW: The Center had its own manufacturing facility on site on the hospital complex.

AC: The factory was part of the Center. It was organized and built by Ilizarov. It had a separate budget and separate accounting. We also re-used materials. I believe in the Center they are still re-using them. The last time I was in the Center in 2017 or 2018. I believe they are still using some parts from the time when I was there.

RW: I had the responsibility of integrating the original Ilizarov system into the USA. It was really a bucket of rust. And it's hard to sell sterile rust in the USA. [I was instructed] to ask Professor Ilizarov if we can change the ring material to stainless steel so that it doesn't rust and he said, "Oh, sure."

He had this theory that metal rings created a magnetism around the wound and helped it heal. His theory was never published. But if you look at it, [it is similar to] bone growth stimulators today. It is an electrical coil. He had already thought about the magnetic field that the steel rings created.

AC: He was a strong believer that [using] stainless steel helps to treat bone pathology. And it was because of the stainless steel that some of the properties of growing bone in his frame were so good. I don't know how true it is, but he was a believer in it.

CAI: How did new components get added to the system?

AC: The frame was always evolving. Ilizarov was always working [on it]. He had a patenting department. They were a separate department in the hospital dedicated to patenting his ideas.

CAI: How did he like to spend his time outside of the hospital?

RW: His relaxation was that he loved nature and he loved to be in it. I guess when he was in the USA, he loved to shop. He would accumulate goods to take back. He loved Tic-Tacs.

AC: Whenever he had the chance (although later [in life] it was less and less possible), he would spend time in nature. He would just spend time outside and he would walk around. When he was treated in New York for an ulcer on his big toe, he was doing a lot of walks around Central Park. At a later time [in his life], he didn't have much ability to do that.

CAI: Did he have any pets? Or hobbies?

AC: He had a dog and a couple of talking parrots. He liked to collect stuff such as pins and seashells. There is a story about him going into a seashell store while traveling. Ilizarov immediately went to some shell that was absolutely unimpressive. He looked at it and said, "How much is that?" The owner said, "This guy knows his stuff because he went to the most expensive one." He knew the rarest one.

When he was traveling and had time, he liked to show tricks. He would show tricks to children sometimes in the hospital. Usually, when he was sitting at the dinner table, he always had a little kit of tricks with him and some boxes where the coin would disappear. He liked to be the

center of attention. He would do anything and everything to keep it and tricks were his favorite way of doing it (Figure 8).

CAI: Bob, you had a unique experience being an American traveling back and forth to Kurgan in the 1980s. How many trips did you take back and forth?

RW: Over 35.

CAI: What was the climate like for Americans in Kurgan at that time?

RW: When I first started going there, you felt like you were being watched all the time. Really, I've had the opportunity to travel all over the world. People [all over the world] want the same thing in life—food on the table, a roof over your head, and a better life for your kids. They're (the Russians) no different. One thing I can say is that once you have a Russian friend, you have a friend for a lifetime.

I knew the KGB were always there. You knew your room was being bugged. You read the stories or see the movies about Russia and America and it's basically true. Everything was scrutinized the whole time. I was being



Figure 8. While waiting for his Mercedes to be repaired, Professor Ilizarov entertained the group with magic tricks in front of the Shyka (Russian 57 Chevy stretch limo). Left to Right: Robert Wigginton, Eng.; Professor Ilizarov; Alex Lukianov, Nick Zelensky, Professor Shevtsov, KGB (photo courtesy of Robert Wigginton, Eng.).

watched. One of the generals in the KGB was stationed at the hospital.

I remember arriving the first time to the airport in Kurgan. Everybody gets off the plane and Ilizarov's stretch 1957 limo pulls up right next to the plane.

He came onto the plane and said, "You all come with me."

Stupid me, I said, "What about our luggage?"

He said, "Oh, don't worry about it. We will get it to the hotel for you."

I asked, "Well, how are you going to know that is my luggage?"

He said, "Don't worry. We'll know."

The KGB was out.

CAI: Ha-ha. What a great story. Let's finish our discussion with the opportunity to dispel several of the orthopaedic myths about Ilizarov. First, the circulating story is that distraction osteogenesis was discovered by accident when a patient turned the fixation elements the wrong direction.

AC: I heard the story from one of Ilizarov's first colleagues (Valeria Trokhova) who claims she was present at the time. The initial design of the frame was to hold fractures or a knee arthrodesis in place. (Ilizarov's first patent shows an example of a knee arthrodesis.) Patients were asked to perform compression from time to time during treatment since tension in the crosswires would often decrease over time. Because Ilizarov was traveling so much, it was common that other physicians would care for his patients. Radiographs were regularly obtained to monitor the healing and callus formation.

In this instance, the physician was scared to show the radiographs to Ilizarov because the nurse had accidentally turned the distraction nuts the opposite way. (All patients in Kurgan were kept in the hospital for their entire course of treatment.) Everyone was expecting to hear a stern critique, since Ilizarov was known to have a short

temper and sharp tongue. He was examining the series of radiographs and going back and forth reviewing them while everyone was waiting to hear what he was going to say. Instead, he said, "Who was doing this? Could you ask them to continue doing turns the same way?" He reviewed the radiographs again over the next few weeks and asked, "Do you see anything on these x-rays?"

"No, no," was the answer.

"Don't you see the bone forming?" That is how the story goes...

CAI: So, it was an anonymous nurse that we all must thank for the magnificence of distraction osteogenesis. The second myth involves the idea for his frame design. Did it come from a wagon wheel or the spokes of a bicycle wheel?

AC: Ilizarov was travelling a lot since he was the only physician for a large geographical area. He used the horse carriage as part of his traveling. He noticed the collar around the horse connected to rods that pulled the sled. The horse would move everything through the collar and rods connected to the opposite rail. He was thinking, "What if I had something not directly connected to the bone but outside the bone to navigate..."

[Caveat to the above explanation] Ilizarov was known to be a big entertainer and liked to be the center of attention. He might sometimes tell different [origin] stories himself depending on his audience. Therefore, it is still not exactly known what the initial spark was which made him think about a circular fixator...

CAI: Is it true that he would cut the bone by performing a corticotomy that spared the intramedullary blood vessels rather than a traditional osteotomy that violates the intramedullary space?

AC: Ilizarov would sometimes explain what he believed but do something completely different. He was a strong believer that you must preserve the osteogenic tissues. That was not a joke. But [as for] the corticotomy, I don't think he ever did it the way it was described.

His principles were to avoid a large incision, never pull the periosteum from the bone, and never use a huge osteotome. He made a little incision, but there was no soft tissue protection—there were no elevators. He used a very narrow osteotome. But where did it go? It would go everywhere. He would start with a cortical cut, but then he would go through the bone—often too deep. He would say: “Oh, you know, the arteries, they’re OK. They actually move away from the object if you are not trying to hit directly on the artery.” For the posterior cortex he would put his narrow osteotome longitudinally and do a couple passes along the posterior cortex. That was his idea of avoiding the intramedullary vessels. However, he never explained what he was doing.

He would go through the bone in multiple passes—in and out, in and out. It would take sometimes 20 or 30 minutes to finish the corticotomy. At the end, he would grab the two rings and just crack the bone using osteoclasts. When I first saw him performing the corticotomy, I thought, “#@%^^, he is going to crush this bone...” because he had done so many passes through the cortex.

In the majority of cases, his corticotomy looked more like a shatter-otomy with multiple fragments. He has a patent somewhere stating that the multi-fragmented osteotomy produces better regenerate because of the huge area of healing. I don’t think it was ever proved on a scientific level though. Very often what you would see on the x-rays was an oblique or spiral bone cut. It was not a straight line—almost never a straight line. Sometimes the cut would propagate into the wires. He would look at them and say, “Let’s put another wire to have better fixation of the fragment.”



Figure 9. Professor Ilizarov performing corticotomy, Kurgan (photo courtesy of Alex Cherkashin, MD).

That was his way of making a “corticotomy” (Figure 9).

Surprisingly, Ilizarov himself never published it, so there is no picture or publication of the corticotomy as done by Ilizarov. Probably the first documentation was published by Vladimir Schwartzman. Then Dror Paley did his interpretation of the corticotomy with drawings showing the use of periosteal elevators which Ilizarov never used. There was no protection on the periosteum with his method.

CAI: Fascinating to hear the real story behind each of these orthopaedic “urban legends” surrounding Ilizarov. I can’t thank each of you enough for donating your time today and providing your insights about Professor Ilizarov. I am sure *JPOSNA*[®] readers will appreciate this opportunity to get a better idea about who Professor Ilizarov was as a physician, as a teacher, and as a person.