

Speaker 1:

Welcome to Optimal Neuro Spine Podcast. A podcast about optimizing our brain and spine in health and disease. Each episode, leading neuroscientists, neurosurgeons, educators, patients, spine care and quality improvement experts discuss their research, experience, emerging science, surgical advances, and insights about how to optimize neurological and spine care. Now, here's your host, Dr. Max Boakye.

Dr. Max Boakye:

Welcome to the Optimal Neuro, Spine Podcast. We are back after a little bit of time off in the month of February. We resumed today, with an interview with Dr. Mark Bilsky to talk about the treatment of spinal metastases, cancer is spread to the spine.

Dr. Max Boakye:

Just in the way of introduction. Dr. Bilsky currently is an attending neurosurgeon at Memorial Sloan Kettering Cancer Center and professor of neurological surgery at Weill Medical College of Cornell University. He holds the William E. Sneed Endowed Chair for neurosurgical, spine oncology and is chief of the Sloan Kettering, Memorial Sloan Kettering multidisciplinary spine tumor service.

Dr. Max Boakye:

His clinical practice is focused on the surgical treatments of both metastatic and primary malignant and benign spine and spinal cord tumors. He developed the NOMS decision framework, in order to provide a basis for the rational integration of new technologies and evidence based medicine into the treatment of metastatic and primary spine tumors. And it remains the most popular decision framework, for making decisions about treatment of metastatic spine tumors.

Dr. Max Boakye:

He has published more than 220 peer reviewed articles and delivered, over 400 lectures worldwide on the management of spine, in skull based malignancies. He has served multiple editorial boards, including the Journal of Neurosurgery: Spine, Neurosurgery and the Annals of Surgical Oncology.

Dr. Max Boakye:

He's won numerous awards, including the Willet F. Whitmore Award for Clinical Excellence at a Memorial Sloan Kettering Cancer Center. It's really a privilege, to talk to him about the current treatment of spinal tumors, specifically metastatic tumors, to the spine.

Dr. Max Boakye:

Dr. Bilsky. Welcome. I should mention that I also, did some training with Dr. Bilsky back in 2003. So he's sure like taught me everything I know, about how to treat these tumors.

Dr. Mark Bilsky:

Max I think you knew an awful lot before you got here, but it was such a privilege and thank you for the invitation to be on the podcast. I really, really appreciate the opportunity.

Dr. Max Boakye:

Awesome. Let's start off by talking about your current practice. What is your clinical practice like?

Dr. Mark Bilsky:

Yeah, it's interesting. It's sort of evolved over the past, 25 years. So when I got to Memorial, I principally actually did a brain and cranial based malignancies and that morphed about 15, 17 years ago. And now I do virtually a hundred percent spine tumors, 70% of which are metastatic, 10% primary bone tumors, including chordoma and chondrosarcomas. And then about 20% intradural benign tumors of which about 5% are intramedullary.

Dr. Max Boakye:

Mm-hmm (affirmative). Do you do any research?

Dr. Mark Bilsky:

Clinical research has been a huge part of our, really our mandate here. I think, we have evolved this multidisciplinary spine tumor program. And when that came together, now about 17 years, we really thought there were major holes in what we knew about spine oncology, both in the metastatic and primary tumor types.

Dr. Mark Bilsky:

And so most of what we've done over the past 17 years as a multidisciplinary group is really to, try to advance the field in a really meaningful way for both patient care, patient outcomes, tumor control, reducing complications and such. And so that's been a really marvelous work in evolution for a long time now, but mostly with this very large group that has evolved over these many years.

Dr. Max Boakye:

Memorial Sloan Kettering has always, ranked number one or number two Cancer Center in the country, if not a world. And so what you guys do there, is sort of like sets the trend for the practice of spinal oncology treatments. Looking back, how did you decide to focus your practice on spinal oncology?

Dr. Mark Bilsky:

So I would say that was purely serendipity. I was a month from finishing residency, with a job that I'd had for a long time at Memorial and the chair at the time asked me to find a spine fellowship, with the intention of coming back and working with an orthopedic, attending Paul Rubery, who went away to Rochester to do a spine fellowship at the same time.

Dr. Mark Bilsky:

And despite having done brain tumor research with Jerry Posner and having absolutely, no interest in spine. In fact, I hated spine as a resident, I love Memorial and so I took that opportunity to go to University of Louisville, your hometown now, that had a spot open and took me for the year at the Leatherman Spine Center with Chris Shields and Steve Glassman from ortho.

Dr. Mark Bilsky:

I came back to MSK and Paul had stayed in Rochester. So I teamed up at that time with Patrick Boland, to do spines, but 90% of my practice again, was brain tumors and cranial based malignancies. And eventually by the grace of goodness, Phil Gutin came, as the new chief and wanted to consolidate the brain service, having hired two new faculty with really significant research interest in brain.

Dr. Mark Bilsky:

And he saw the need to build out a spine tumor program at that point. And that was around 2005, which really coincided with the development of spine radiosurgery. And so I was tasked with building out, spine tumors from the neurosurgical side.

Dr. Mark Bilsky:

Josh Yamada was tasked with building out spine, the newest radiation by Steve Leibel, who was the chair at the time. He was actually a prostate radiation oncologist, and he had this huge experience in brachytherapy and they were really the first adopters of IMRT. So he was a really natural fit.

Dr. Mark Bilsky:

And then ultimately Eric Lis, was a superb neuroradiologist who was also a car mechanic. And so he had this need, to do more than just read films and he became the interventional radiologist. And so it was the three of us that sort of coordinated together and then formed this really marvelous groove, the multidisciplinary spine tumor service, which now numbers about 30, physicians as part of that effort at Memorial.

Dr. Max Boakye:

I love that it, neuroradiologist and a car mechanic. That's an interesting combination.

Dr. Mark Bilsky:

He's also the best reader in the world, but he happens to be really talented.

Dr. Max Boakye:

Yeah. So let's delve into a little bit in the epidemiology. So what is the most common, metastases to the spine? What are the most common cancers that spread to the spine?

Dr. Mark Bilsky:

Yeah, I think still to this day for the unknown primaries that come into the emergency room, it's usually, at least in Memorial, it's going to be hematologic, either multi myeloma or lymphoma.

Dr. Mark Bilsky:

The most common Mets that we see as surgeons for surgery are non-small cell lung cancer, colon renal cell, and melanoma. And then, I think the most common bone lesions that don't need surgical treatment, are really the hormone driven tumors, breast and prostate, which often respond to systemic anti estrogen or androgen therapy.

Dr. Max Boakye:

What is the current role of surgery, in treating spinal metastases?

Dr. Mark Bilsky:

Yeah, I think at this point it really, is paired down to the two major indications, are really high grade spinal cord compression with or without myelopathy from solid tumor, radioresistant tumor histologies.

Dr. Mark Bilsky:

And the second one is really instability. Most of which can be treated with kypho vertebroplasty, but we're seeing a growing role for percutaneous pedicle screws, particularly in patients with burst or compression fractures with posture alignment disease, who really need a posterior tension band in addition to kypho vertebroplasty at the index level. And that's basically, what we operate on currently.

Dr. Max Boakye:

Can you describe the evolution of the surgical techniques? It used to be everybody did laminectomies. How has that changed?

Dr. Mark Bilsky:

Yeah, I think we went through that period of laminectomy and had really, significantly bad outcomes, and there was a major shift towards radiation and then really in the late eighties and nineties, as we got better instrumentation with pedicle screws, all of a sudden you could do much more aggressive, resection of tumor and then stabilizes the spine. So we didn't get these angiogenic injuries from a pure laminectomy.

Dr. Mark Bilsky:

And then it got very aggressive. All of a sudden we could do, more aggressive posterolateral decompression. And for a while, there was a huge movement towards anterior transcanthary resections of the vertebral body. And so a lot of people got 360 decompression fixation.

Dr. Mark Bilsky:

In the mid nineties there was really that, WBB classification came along that showed people how to do these en bloc resections. And it sort of made sense. I think we've, again, are starting to evolve away from en bloc even for primary tumors, but for metastatic tumors, most of those patients were really not great candidates for these very aggressive resections, either en bloc or insulation of gross total.

Dr. Mark Bilsky:

Our original paper, I think around 2004 was really on a posterolateral approach where we would, come from the back and take a high-speed drill, draw off the lamina, draw off the pedicle and facet joint.

Dr. Mark Bilsky:

And then you could come around the dura and take out tumor. And at that point, because we were using a lot of subliminal hooks and even wires at that point, we really felt the need for a 360 reconstruction. And so from posterior, we put cement into that defect of vertebral body and then do a posterior fusion, but we really stopped doing anterior transcanthary, many years ago now it's really been 15, 17 years.

Dr. Mark Bilsky:

Once we got radiosurgery where we started to get histology independent responses, we really didn't see the need to do these gross total resections anymore, to do these really aggressive surgeries on patients with metastatic disease who were often, impaired in so many other ways, they had so many other medical comorbidities or the extent of disease was so significant, that they simply wouldn't tolerate those big operations.

Dr. Mark Bilsky:

And that really evolved into what we do now on virtually every patient, which is what we call separation surgery, which is really a posterolateral decompression with fixation. But the intent of that surgery isn't to take out all the tumor, to try to achieve tumor control, right? It's simply to create a better target for the stereotactic radiosurgery.

Dr. Mark Bilsky:

Again, where we've gone, in the postoperative setting from about 30% control with really aggressive surgery and conventional external beam radiation to our first paper, which was in 2014 showing sort of the separation surgery filed by radiosurgery, where we showed about 90, 95% control with high dose radiation as a postoperative adjuvant with this really minimalist surgery.

Dr. Mark Bilsky:

And we've now, have three publications one's published, one's in submission, for renal cell colon and non-small cell lung cancer. And that number held up were about 94% local tumor control. Now was separation surgery, followed by SBRT. And so what we've tried to do is, pair down this surgery to something that's incredibly tolerable, gets them out of neurologic trouble.

Dr. Mark Bilsky:

We decompress the spinal cord. We stabilize across that segment and then we get them to effective radiation for tumor control. And that's been a huge evolution and really, given patients the ability to tolerate this. Get back, to a fully ambulatory status and then get back to early systemic therapy after the radiation.

Dr. Max Boakye:

That's really interesting, because I think when I was with you in 2003, we're still reconstructing the interior column, sometimes with methyl methacrylate and all that. So with the separation surgery, you're not seeing, you now have longer term data that you're not seeing failure of the instrumentation and that sort of thing.

Dr. Mark Bilsky:

So one of the fallacies, I think. I think what we tried to get people to understand is that taking out more tumor, wasn't going to give you better tumor control. It was just taking out more tumor, the biology of that tumor predicted, the recurrence. And with radiosurgery, you need a two millimeter margin on the spinal cord, to give an effective dose of radiation to the entire tumor volume.

Dr. Mark Bilsky:

There was never really this intent to stop people from doing anterior reconstruction. And in fact about 50% of the patients, where we come around anteriorly and there's a big defect in the vertebral body, or we take out a significant amount of the bone. We still do anterior construction with methyl methacrylate. The difference in the strategy really is that we used to take out the disc and put pins in and then use that as a rebar to wrap the cement and then compress down with a posterior hardware.

Dr. Mark Bilsky:

And I think with pedicle screw fixation, with that sort of three column fixation, we've gotten less aggressive with needing to put pins in. And so if we have a defect, we basically just do an open vertebroplasty to reconstruct the anterior column. The other major change really is in the reconstruction on the pedicle screw side, because we used to go minimum two above, two below the index level with pedicle screws.

Dr. Mark Bilsky:

And so if you had T7, we'd go T5 to T9 on the posterior fixation. And once we got fenestrated, PMMA augmented pedicle screws, we overcame the really bad problems that we have with tumor, which is one osteoporosis. And so we used to go along to distribute the load in multiple vertebral bodies. But when you put cement and you overcome that issue, and the second thing that happens is often if they get adjacent, if they get progression, it's that adjacent segment.

Dr. Mark Bilsky:

So if all of your hardwares, one level above or below, there's a good chance you're going to lose fixation. And with cement augmentation there, if they progress that adjacent level, there's still in cement and they hold fixation.

Dr. Mark Bilsky:

So we looked at fixation failure rates with a long construct, which was really, separation started just two above, two below. At a minimum, we had about a 3% failure rate for the duration of their survival. It was a good construct in the cancer population, with the short semi fenestrated screws, where we're simply going one level above and below with PMMA, augmented fenestrated screws, we're about 2% failure rate for the duration. So it just so happens that in this patient population, it's a very effective strategy.

Dr. Max Boakye:

So one of the advantages of the separation surgery is a shorter surgery, less blood loss. So you see increase in longevity and quality of life, from separation surgery compared to the older ways.

Dr. Mark Bilsky:

I think it's infinite. I think a lot of what we did was really, it was the right thing at the right time because we didn't have very good radiation. And so the sense was the more tumor you took out, the better chance you had of controlling it with conventional radiation, but those surgeries were often, much longer significant blood loss.

Dr. Mark Bilsky:

In the old days, we used to be there so long and the patient would get potentially cold over the course of that. We would 20% of the time come out, coagulopathic from both, from the side opinion and factored deficiency with elevated INRs. And we don't see that anymore. These are very short surgeries.

Dr. Mark Bilsky:

I think, the actual surgical time is usually about two, two and a half hours and it's infinitely tolerable. Most patients could go home at three days, but part of this therapy is really getting them set up for the radiation. So we do really monogram, CT for simulation while they're in house, they go home. Typically,

you get it radiated now within 12 days of the surgery and then they're back on systemic within three weeks.

Dr. Max Boakye:

You mentioned that some of the advances include fenestrated screws. And what kind of screws are you putting in? Are they MRI compatible? Have you migrated to some of the, newer MRI compatible screws?

Dr. Mark Bilsky:

Yeah, so we have routinely, used titanium and it's been very reliable for us. We don't really have imaging issues. We have focal MR sequences that really do a good job at subtracting out, artifact from the hardware. In terms of radiation delivery, right? There's a 3% shielding from titanium with fo time delivery. And so we've really never had an issue being able to contour beams and actually give that therapeutic dose and ablative dose to the tumor with titanium hardware.

Dr. Mark Bilsky:

We looked at cobalt chromium for a while. It's different stronger. I'm not sure that our, fixation failure rates were any different. Our rod breakage was any less, but there's a 9% shielding with cobalt chromium. They could not account for that in the dosimetry. And so we really have not used that to any significant degree. Peek, screws have just come out. It really is the first and only instrumentation that was really developed specifically for tumors, which was really a godsend in many ways.

Dr. Mark Bilsky:

I think for us, at least initially it was really most interesting for charge particle radiation. So proton beam and carbon ions, I think where we have come down on it now, it is very expensive and significantly more expensive than titanium. So we're definitely not going to integrate it, for every spine metastases, but where we do think it has a role, for sure is in primary tumors where we typically now are going to proton beam although we're now starting to look at hypofractionated protons instead of conventionally fractionated.

Dr. Mark Bilsky:

So very short course radiation, but there's a huge advantage to peek. And then patients who have failed radiation SBRT in the upfront setting so they get it as definitive radiation and fail. If we go back to operating on them, now we're going to peek simply because we're much more vested now going to proton beam as a postoperative adjuvant after failed SBRT upfront.

Dr. Max Boakye:

How do you evaluate spinal metastases at your center? As I mentioned, your center is the top, center in a country. When a patient calls or comes in, how do you evaluate them? Do you have a multidisciplinary clinic? Do you follow standard protocols? How do you risk stratify?

Dr. Mark Bilsky:

I think we have developed this NOMS framework, which you know well, that really came about in 2004. And we recognize very early that the standard scoring systems like Tomita and Tokuhashi, which have been used for decades to assess patient treatment were really antiquated and they didn't address most of the important issues that we were concerned about, like spinal cord compression.

Dr. Mark Bilsky:

They couldn't incorporate biologics and checkpoint inhibitors into their survival models. And as you know, NOMS assesses those four sentinel decision points that we used to make decisions, neurologic, oncologic, mechanical civilian, systemic disease. It is really, allowed us to be cross-disciplinary because everybody in our institution who goes to look at a patient, goes back to those four sentinel decision points.

Dr. Mark Bilsky:

And while radiation, oncologists are superb at knowing radiation sensitivity, what they don't know is mechanical instability. And you give them the ability that every time they go to see a patient, they also need to assess that instability. It may just be that they do a pain score, and if they have movement related pain, axial load pain. Then that patient is considered unstable and needs that assessment. And so I think when you have a multidisciplinary group, using a framework like that really gets everybody on the same page, very early.

Dr. Mark Bilsky:

The thing about NOMS is we've tried to keep it mostly as a decision framework with the ability to integrate new technology and evidence based medicine over time. And so where it started, obviously in 2004 is significantly different from where it is now, but we do constant updates with everybody in terms of those decisions that are being made at any moment in time. And obviously do a lot of publications, in that regard as well, to try to keep that, NOMS fresh and updated.

Dr. Mark Bilsky:

In terms of multidisciplinary. I think we realized very early on, that we couldn't go this alone, that in 2004 as we got radiosurgery, what we knew prior to that was we weren't doing all that well. What we realized after that was, we started to treat people with radiosurgery and there were patients like renal cell with no spinal cord compression. And then the institutional mandate was you didn't take those patients to surgery until they failed radiation. And very often at six months or a year, they would fail.

Dr. Mark Bilsky:

Once we got SRS, stereotactic radiosurgery, it was clear those patients weren't coming back anymore. And then there was this mandate to figure out why and how to incorporate that into our decision frameworks. And the second thing that came out around that time, was really kypho and vertebroplasty.

Dr. Mark Bilsky:

We were very slow adopters of that, because we thought most of these fractures settled over time and really didn't need treatment. And then we started to see that population, that wasn't doing very well with stent, with best medical management or conservative management. And so that program evolved and we couldn't do that in a vacuum.

Dr. Mark Bilsky:

We had very different stakeholders, but everybody was treating the same patient. And so that's how we evolved, really this multidisciplinary program, which started out with the three of us, in around 2007. And again is morphed into a really significant enterprise across not only Memorial hospital, but the entire network that we have. I mean, that's really been a godsend for us.

Dr. Max Boakye:

So the patient comes in a new patient. Do they see you? And then you send them to XRT or do they see everybody on the same day? How does that work, in practice?

Dr. Mark Bilsky:

Yeah, so the revelation was that we needed to do multidisciplinary clinics that we, again, couldn't do this in a vacuum. You didn't want somebody sent to me, that ultimately needed radiation and not be able to get a radiation appointment for three weeks.

Dr. Mark Bilsky:

It took us three years to convince the institution that we had to be in the same space at the same time. And it started out again with three of us in a closet. I mean, we really had the small space that they could possibly give us, but at work. And so right now, we have a single triage number for the entire program.

Dr. Mark Bilsky:

Because again, you don't want a medical oncologist, outside trying to make a decision about whether it's radiation or surgery. So we have our own physician referral service, and basically it comes into our office. We have the most talented, spectacular, basically nurse liaison for the entire program is Cynthia Correa.

Dr. Mark Bilsky:

And she brings those patients in, does the legwork to figure out where they are, makes best guess with us, to see whether it's radiation, interventional radiology. And then they get put into the multidisciplinary clinic, with one of the three attendings or four attendings that are there on any given day.

Dr. Mark Bilsky:

Once they're in that clinic, we can trade that patient around. We can decide best management. So if Josh Yamada looks at that patient says, this is not a radiation appropriate, they need surgery. They, the patient sits in the same room and the surgeon comes in and has that discussion with them. So it's a very efficient, way to manage patients, to disposition them and then get them to treatment in a very short period of time.

Dr. Mark Bilsky:

And now we have four, full multidisciplinary clinics a week, with minimum four services. So it's always interventional radiology, neurosurgery and radiation oncology and then we have physiatry in that clinic most days. And then we have pain management on two days a week.

Dr. Mark Bilsky:

So it's really become a very effective strategy for managing patient. I think the biggest issue is, if you create this program, do it with a single number, and then you have to garner trust in the institution that even though it's being sent to the surgical number, there's no vested interest in surgery. The only vested interest is best treatment, best outcome.

Dr. Max Boakye:

Mm-hmm (affirmative). So the advances in radiosurgery made the separation surgery possible. There are a number of different radiosurgery systems across the country. Which ones are you using in Sloan Kettering? And how does the outcomes differ from other types, like CyberKnife and other types of radiosurgery?

Dr. Mark Bilsky:

I think the strength of most of the units is really intensity modulation with the ability to modulate the strength in the contour of every beam. And so I think CyberKnife was so brilliant. The problem is for big volume tumors, it's of very slow delivery, with these nodal beams and there's a lot of hotspots and I think it was a brilliant device. I think it's probably better for small volume tumors.

Dr. Mark Bilsky:

IMRT was a huge advance. And then the next iteration of IMRT was really volumetric arc therapy, which almost gave people ability to infinite number of beams to sort of focus on the tumor and gave the ability to dose pain really closely. And for us, at least with standard IMRT, we were really good at contouring around the spine creating, concave shape. So we could do use, which meant we could treat 270 around the spine, but we had a very hard time doing circumferential plans, around the entire, dura for instance.

Dr. Mark Bilsky:

And now with this volumetric arc therapy, they have much better dosimetry for circumferential plans. I think in the old days we used a P32 plaque. So we had a dural plaque that could clear dural margins. And part of the way we used that is we had circumferential disease.

Dr. Mark Bilsky:

Again, we didn't think we could treat that postoperatively. So we would put the dural plaque, on the back of the dura, so that we could open up that plan and only treat 270 around the dura. So we had strategies around it, but the newer technologies are just more conformal and better contouring.

Dr. Max Boakye:

Mm-hmm (affirmative). And the volumetric arc, which system do you have? Is it variant or is it...

Dr. Mark Bilsky:

Institution is pretty variant centric. So its-

Dr. Max Boakye:

One question about instability and then we'll talk rapid fire about a treatment of individual tumors. Does everybody get a fusion? How do you assess instability? And when, how do you decide who should get screws?

Dr. Mark Bilsky:

Instability, without spinal cord compression. Just in terms of somebody comes in with a fracture, I think is that SINS has been a very good guide, to instability. So SINS was developed by, at that point, the spine

cause study group to define instability in cancer. And it was a very good process of taking experts and putting films up and saying, stable or unstable.

Dr. Mark Bilsky:

And the revelation early. I think all of us know the instability, in spine tumors is very different from trauma and even degenerative. And some of that has to do with there's very little, chance of sharing ligaments, et cetera. I think in essence, the other thing that we sort of see it as, is if I radiate that patient, will that pain get better or is this a fracture related pain? And we often talk about biologic pain, which is sort of night or morning pain, that gets better over the course of the day and really has to do with just active tumor, has nothing to do with fracture.

Dr. Mark Bilsky:

And what we think happens is that when you go to bed at night, your adrenal gland shuts down and these tumors are secreting inflammatory mediators all the time. And so when you go to bed and you're not making steroids, you get flare pain. When you get up and start moving, your adrenal glands, kicks back in and you start making steroids and that pain gets better. And that's why exogenous steroids. That's why we give Decadron for pain.

Dr. Mark Bilsky:

That Decadron, and anti-inflammatories do not work for mechanical pain. So I think the biggest issue, in SINS and probably underappreciated is really the degree of pain. And pain gets a three, which is the maximum score of SINS in every category with the exception of fracture subluxation. But realistically, what we're really talking about is pain. Because, and again in trauma, if you have an unstable fracture, you may get a neurologic injury, that's very unusual in cancer.

Dr. Mark Bilsky:

And so, we go by the pain first, if they have severe pain, VAs greater than seven and radiographic criteria, and we know it's mechanical in nature, the probability is at that point, we're going to treat it. If there are zero to four with a significant fracture subluxation, and they're sort of fixed, in that position maybe you follow them over time or maybe they had severe pain and then it settled over time.

Dr. Mark Bilsky:

Zero to four, we're probably not going to treat it because zero to four is mild pain. And most people with treatment kypho vertebroplasty or pedicle screws, you can get him down to his two, maybe a three, rarely a zero, but sometimes, but going from a four to zero is not meaningful, going from a seven to 10 to two, three is really meaningful.

Dr. Max Boakye:

Mm-hmm (affirmative). Let's say run quickly, give me a one or two sentence updates on modeling management to the following tumors. Let's start with breast.

Dr. Mark Bilsky:

Talking about first spine metastases?

Dr. Max Boakye:

Yeah. Breast metastases to spine. Yep.

Dr. Mark Bilsky:

Yeah. I think the vast majority of those, so many of them have mixed lytic sclerotic disease. So you really see instability in breast cancer and I think most of them go, they're ERPR positive or HER2 knew, they're going to go on a blocker. And most of those are well controlled until they really have advanced disease.

Dr. Mark Bilsky:

So I think there's very little role for surgery typically. And most of them go on any hormonal or hormonal therapy and they do really, really well if they're receptor positive. If they're receptor negative and HER2 negative, it's more complicated because we think there is some conveyance of radio resistance, that is in that specific tumor. And we're trying to figure out why that is now. We've just sort of appreciated that some of those patients are failing.

Dr. Max Boakye:

Okay. Lung.

Dr. Mark Bilsky:

I think the great advances have been both biologic and checkpoint inhibitors from the systemic standpoint. So I think that our local control on lung, our visceral control is significantly better.

Dr. Mark Bilsky:

What we know about biologic checkpoint inhibitors is they don't treat bone disease very well, with maybe one exception for renal cell, which is cabozantinib. But fortunately lung cancer, again, does not respond to conventional, external being radiation, meaningfully. It is a superb responder to stereotactic radiosurgery. And so I think we've sort of solved the problem of how we got local control with lung cancer.

Dr. Max Boakye:

And renal.

Dr. Mark Bilsky:

Renals really interesting. Again, major changes in biologics, VEGF and mTOR Inhibitors, Checkpoint Inhibitors. It is a major responder as well to radiosurgery in ways that conventional, external being radiation does not treat it.

Dr. Mark Bilsky:

I think the most interesting thing to come out of renal cell, was actually a study from Cleveland clinic that Jacob Miller was a primary author on. And for whatever reason, they continued patients on VEGF-TKIs during radiosurgery and their radiosurgery dose was 16 gray, which is actually relatively low for SRS.

Dr. Mark Bilsky:

It's a meaningful dose, but it's a little bit lower than we use. Our dose has been typically 24 gray single fraction. If we can get that dose in and our local control rates at 24 gray single fraction, without surgery. So we have a target and we treat is 98%, four year local control.

Dr. Mark Bilsky:

At 16 gray alone, it's about 82% control, but with a VEGF-TKI, concomitant with 16 gray rate of surgery dose, they were upwards of 96%. And I think it's the first time we've actually seen, what could truly be considered a radiosensitizer. And I think that was a real event.

Dr. Max Boakye:

Hmm. GI Colon.

Dr. Mark Bilsky:

GI Colon, not much to say, we think it's a very good responder to high dose single fraction. And it may be again, a tumor that has a little bit less response against the hyperfractionated, that eight to 10 grade times three. It's still probably in the mid eighties, but not nearly as high, as some of the other tumors. So it's interesting. We don't see a ton of it in the spine, but it's interesting. I think it definitely, there's something about lower dose, that's just not as potent for giving local tumor control.

Dr. Max Boakye:

Mm-hmm (affirmative). Prostate.

Dr. Mark Bilsky:

Prostate. It's really, really interesting. I would say for the first 15 years I was at Memorial if we saw one patient progress with epidural disease, it was a lot. And then they got significantly better with androgen blockade and all of a sudden, patients live significantly longer. And then they outlived the androgen blockade. And the minute they outlived that blockade, in the areas where they had sclerotic bone disease, they would blossom this massive epidural disease. And we had never seen it before, I would say 15 years ago.

Dr. Mark Bilsky:

And now we see about 60 to 70 of them. 60 to 70 patients without a year. And it was purely, the successful treatment locally allowed them to live longer and ultimately fail that androgen blockage. And then they developed this disease that we'd never seen.

Dr. Mark Bilsky:

Fortunately, even with high grade cord compression, you can treat those with conventional, external beam radiation. And so they can get 30 grade and 10, even if they have high grade compression and get pretty good tumor control upwards of 80%.

Dr. Mark Bilsky:

If they have high grade cord compression from that and they're myelopathic we take them to surgery, because we don't think we can decompress them fast enough, with conventional radiation alone. It will respond, but it won't involute, an apoptosis in a meaningful time period.

Dr. Max Boakye:

Final question for you. If you had a magic wand, what research questions would you answer and how would you optimize, quality of spinal metastasis management?

Dr. Mark Bilsky:

I think in terms of surgery, I think everything is getting more minimally invasive and more tolerable. So I think we've sort of more from major surgery, really significantly, morbid surgery, front backs, en blocs, et cetera, to separation surgery, to making the implant strategy shorter, to making those construct shorter.

Dr. Mark Bilsky:

And I think, we're just now getting the point where we're doing more tubular decompressions, we can do more MIS decompressions. And that may be the next iteration with maybe at the end of this, getting even to the point where we can do endoscopic resections, meaningful for tumor decompression.

Dr. Mark Bilsky:

The one thing we have done, which I think has been meaningful, again in terms of getting more minimally invasive is using the DaVinci robot mostly for paraspinal tumors like Schwannomas. And we have a pretty robust program. Now the last two that we did, I did a retroperitoneal tumor with a colorectal surgeon in the lumbosacral plexus.

Dr. Mark Bilsky:

And from the time of docking day out was 45 minutes. So I think it's a very effective strategy for patients, especially with Schwannomatosis who may have multiple resection.

Dr. Mark Bilsky:

And then I think in terms of the other, what we're looking at from a more global standpoint are really looking at the genomic and immuno genetic landscape of bone tumors, trying to see how to do things like radiosensitization, but also trying to see what conveys radio resistance to see we can impact these, tumors in a more compelling way. So I think that's kind of where we're going.

Dr. Max Boakye:

Well, we want to thank Dr. Bilsky, for a very interesting and fascinating update on the treatment of spinal metastases. And it's been a pleasure learning so much from my mentor.

Speaker 1:

Thanks for listening to Optimal Neuro Spine Podcast with Dr. Max Boakye. If you enjoyed this episode, we hope you share it with others.

Speaker 1:

Leave us positive reviews on social media or leave a rating and review on iTunes. Check out our website, maxwellboakye.com/podcasts for show transcripts and other information. Join us next time, for another edition of optimal neuro spine show.