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## Perspectives on Proton Beam Therapy: Benefits, Challenges, & Results

Announcer:

Welcome to ReachMD. This special program titled “Perspectives on Proton Beam Therapy: Benefits, Challenges & Results” is brought to you by Mayo Clinic.

Here’s your host, Dr. Jennifer Caudle

Dr. Caudle:

Proton radiotherapy has been in existence for a number of years. In fact, the first clinical patients were treated in the 1950s, but it wasn’t until the last 20 years when proton radiotherapy became widely available to cancer patients. And now, since its prevalence shows no signs of slowing, it’s time we take a look at the benefits and the challenges of proton radiotherapy. Coming to you from the ReachMD studios in Fort Washington, Pennsylvania, this is ReachMD, and I’m your host, Dr. Jennifer Caudle. And joining me to discuss this treatment option for cancer are Drs. Anita Mahajan, and Dr. Robert Foote. Drs. Foote and Mahajan, welcome to the program.

Dr. Foote:

Thank you.

Dr. Mahajan:

Thank you. It’s a pleasure to be here.

Dr. Caudle:

So, Dr. Foote, why don’t you set the stage for us. What should we as physicians know about proton beam therapy?

Dr. Foote:

Proton beam therapy is a more targeted form of radiation therapy when compared to conventional x-ray radiation therapy. With x-rays, they pass all the way through the body, treating not only the cancer target, but the normal organs that surround it. And it’s this dose of radiation from the x-ray to the normal organs that causes the acute side effects of radiation therapy and leads to those long-term side effects and complications. Protons just go a certain distance and then stop, eliminating a lot of the entrance and exit dose. So there’s a lower dose of radiation to the normal organs, and fewer long-term and short-term side effects and complications. This allows us to actually give more radiation treatments at a higher dose so that we can cure more cancers. One example is a skull base chordoma. This is a relative radiation-resistant tumor that requires a high dose of radiation to cure it. It is located right next to the brain stem in the brain in the ocular structures, which are very sensitive to the effects of radiation. Using protons, we can deliver a high dose of radiation to the chordoma to control it and cure it, but a lower dose to the eyes and the brain and the brain stem so you have a lower risk of side effects and complications a safer form of radiation therapy. We’re also able to give a higher dose of each treatment and decrease the number of treatments. A typical course of radiation is one treatment a day five days a week over six to eight weeks of time. With highly selective patients such as breast cancer and prostate cancer, we’ve been able to reduce the number of treatments from 30 to 40 down to about 3 or 5 treatments, making it much more convenient and less expensive for the patient.

Dr. Caudle:

That’s great. And thank you for providing us with that background, Dr. Foote. And turning to you now, Dr. Mahajan, you know, what do you consider to be some of the biggest benefits of proton therapy? And are there any specific patient groups that are ideal for this type of cancer treatment?

Dr. Mahajan:

Thank you. That's a great question. I think children are going to have the best benefit because we're actually curing a lot of their diseases and they're surviving. So as they survive, the side effects of radiotherapy and the other treatments show up. And this low dose of radiation that we can impact with proton therapy. So in traditional types of radiation, as Dr. Foote mentioned, the low dose of radiation goes to the structures next to the cancer and away from the tumor, and then that low dose of irradiation can be eliminated with proton therapy. And so there should be fewer side effects related to that reduction. So right now we're curing about 85% of our cancer in children. And we need surgery, radiotherapy, and chemotherapy. As these patients survive to be adults, they're developing chronic health problems related to these treatments; the surgery, the radiation, and the chemotherapy in at least 90% of the survivors. In 20% of the – these patients, health problems are so severe that they can actually lead to an early death as young adults from secondary cancers and heart disease. Proton therapy, because it provides less dose to the surrounding tissues and the organs in the normal non-target areas, there should be a reduction in side effects associated to those structures, and it decreased organ dysfunction, and better neurocognitive outcomes, lower malignancies and overall, better quality of life in these patients.

Dr. Caudle:

And looking at it from the other side, Dr. Foote what are the biggest challenges in treating patients with proton beam therapy?

Dr. Foote:

One of the biggest challenges is identifying the patients who are going to benefit the most from the proton beam therapy. Certainly appropriate patients are those who've had cancers that are sensitive to the effects of radiation where we have an excellent chance of curing them, and they'll have the opportunity to live a long life. The other important selection factor is the location of the tumor. If the tumor is located to a very critical normal organ that's sensitive to the effects of radiation such as the eye or the brain, the brainstem, spinal cord, the heart or the lung, then they're more likely to benefit from the proton beam therapy as it's more targeted and would cause less harm to those normal critical structures. And then as Dr. Mahajan mentioned, age is a very important factor; that we have an excellent chance of curing the radiation-sensitive tumor and we know that person is going to live a very long time and be cured, then we want to lower the dose to the normal organs so that their quality of life and organ function is as normal as possible throughout their long lifetime. We're doing a lot of research to help identify the patients who will benefit the most from radiation. We're collecting survival statistics, complication statistics, quality of life information both from the patient and from their providers to help us identify those patients who will benefit the most from proton beam therapy.

Dr. Caudle:

And how about you, Dr. Mahajan? What are some of the challenges you're seeing with proton beam treatment?

Dr. Mahajan:

I notice a few challenges in our day-to-day practice. One of them being insurance coverage and the prior authorization process. This introduces delays and it causes a lot of anxiety in our patients. We do fear that it can actually contribute to decreased tumor control because of these delays. Access to proton facilities may be a bit of a challenge, especially for those patients who live away from a large city or a large academic program, and so the travel cost and the day-to-day access can be limited. And a lot of the proton centers have a certain capacity. And if we really fully embrace the benefits of proton therapy the existing proton centers might be flooded. The other thing is, is on the technical side, proton therapy is very precise and we have to take a lot of care and pay a lot of attention to immobilizing the patient, paying attention to the internal patient movement, and we have to make sure that we're targeting well on a day-to-day basis and making sure that we take into consideration all of the variables that can happen within that treatment and between treatments. And very young children require sedation, and those are things that we have to sort of work with on a day-to-day basis. And, um, what we have to also know is that protons do behave a little bit different than x-ray therapy. And really leveraging those differences and understanding them better is a future challenge.

Dr. Caudle:

For those of you who are just joining us, this is ReachMD, and I'm your host, Dr. Jennifer Caudle. Today, I'm speaking with Drs. Anita Mahajan, and Dr. Robert Foote about proton beam therapy for patients with cancer. So, Dr. Foote, continuing our discussion on what we should know about this treatment option, tell us, what's most exciting to you about proton beam therapy?

Dr. Foote:

I'm most excited by how well our patients seem to be doing. They're tolerating the course of treatment much better with fewer acute side effects and complications. They're enjoying a better quality of life; short-term and long-term. The shorter course of treatment for selective patients is much more convenient and causes less financial and psychological distress. And it's exciting to be able to lower the cost of medical treatment by offering fewer treatments rather than more treatment.

Dr. Caudle:

Okay. And unfortunately we're almost out of time today, doctors. But before we go, I'd really like to hear from both of you on what you

think the greatest takeaway is for our audience listening today. Dr. Mahajan, let's hear from you first.

Dr. Mahajan:

So I think for the appropriately selected patients, proton beam therapy is associated with fewer and less severe side effects and complications. There should be fewer cancer recurrences, better survival, which leads to decreased overall expense and increased convenience. If you have a patient that might benefit from proton beam therapy, you shouldn't hesitate to reach out. We're happy to share what we know and collaborate on how we might best improve that patient's quality of life. And even though I'm a radiation oncologist, I always tell my patients that I'd be very happy if I never treated another patient with radiation again. We're not there yet, and we're may never be there in my lifetime, but I do hope that we will get there one day. We work very closely with our medical oncologists and our surgeons to come up with alternatives and to reduce the need for proton therapy or any type of radiation. And there's a lot of effort on clinical trials, and we are combining these treatments with chemotherapy and surgery to really come up with the best possible option for our patients.

Dr. Caudle:

That's great. Thank you, Dr. Mahajan, for sharing that. And I'll give you the final word, Dr. Foote. What's your key takeaway from this discussion?

Dr. Foote:

We're making wonderful advances in our treatments for patients with cancer, and having much better outcomes by advances in surgery and medical treatment and radiation therapy. And the proton beam therapy is one of the remarkable advances that we have to offer to our patients today with cancer.

Dr. Caudle:

Excellent. Well, with those takeaways in mind, I'd really like to thank my guests, Drs. Robert Foote and Anita Mahajan, for helping us better understand how to best treat patients using proton beam therapy. Dr. Foote and Dr. Mahajan, it was great speaking with you today.

Dr. Foote:

Thank you very much for the opportunity.

Dr. Mahajan:

Thank you very much.

Announcer:

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