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Incisionless Brain Surgery

You are listening to ReachMD, The Channel For Medical Professionals. Welcome to Medical Breakthroughs from the University of Pennsylvania Health System with your host North Western University internist Dr. Lee Freedman.

Incisionless brain surgery, it sounds too good to be true. What is this technique and is it appropriate for our patient. Welcome to Medical Breakthrough from University of Pennsylvania Health System on ReachMD XM160. This is Dr. Lee Freedman your host and with me today to discuss incisionless brain surgery is Dr. Jason Newman assistant Professor of Otorhinolaryngology, Head Neck Surgery at the University of Pennsylvania School of Medicine.

DR. LEE FREEDMAN.

Dr. Newman, thank you for being with us.

DR. JASON NEWMAN:

It is my pleasure.

DR. LEE FREEDMAN:

What is this procedure called incisionless brain surgery, can you tell us a little about it.

DR. JASON NEWMAN:

Of course, well, what this is we are actually going entirely through the nose to do surgery on certain portions of the brain and high up in the sinuses.

DR. LEE FREEDMAN:

So, it kind of spares any incision through the skull or through the skin everything is done through the nose.

DR. JASON NEWMAN:

Exactly, so we are taking advantage of the fact that the nose and the sinuses which are inside and above the nose are in direct apposition to the structures above them, which is brain and the dura and some of the other area like the pituitary gland and the optic

nerves and so were able to extend our surgery through the nose and through the sinuses to get to these areas without having to make any incision elsewhere.

DR. LEE FREEDMAN:

That is fascinating. So, I imagine that this is appropriate only for certain types of brain tumors or brain situations.

DR. JASON NEWMAN:

Absolutely and what is interesting is that this is a feel that is truly in an incredibly fast rate of evolution right now. The entire field of cranial base surgery.

DR. LEE FREEDMAN:

Hmm, hmm.

DR. JASON NEWMAN:

It has only been in existence as far as the publications have gone for about for 50 years. So, really some of the founding father of this field are still with us and still contributing to the field, but even in this 50 years there has been an incredible change in the technology. When this field was originally began most of the surgeries that were done were done with incision in the scalp removing a portion of the cranial plate, the skull itself and then making incision in the front of the face.

DR. LEE FREEDMAN:

Hmm, hmm.

DR. JASON NEWMAN:

Kind of removing tumors by joining those two areas that involved retracting the brain quite a bit so that you could get that out of the way while you doing the surgery above and making a lot of cosmetically unappealing incisions into the front of face to get the surgery from the front. Overtime, a lot of technology has changed, we have started to use endoscopes which had become routine for lot of surgeries including abdominal surgery and sinus surgery and it began occurring to us that is seemed reasonable to start using this entire endoscopic approach to both visualize and resect tumors in this area. So, if you look at how it is evolved initially we were using the endoscopes just to get a better view from the front of the face into the tumors, but slowly overtime as more people have adopted this technology, we have actually started to do the entire surgery endo-nasally meaning through the nose.

DR. LEE FREEDMAN:

Beside just the scopes I imagine has been great development of the surgical tools and equipment that you need to use.

DR. JASON NEWMAN:

Absolutely, in fact without some of the innovations in the equipment and in the tool this would not be possible and if you look at some of the things that still remain as the obstacles it is often the technology. So, for example, one of the things that we are routinely doing now is something called intraoperative navigation. What we actually do is prior to the surgery and sometimes even during the surgery, the patient's anatomy is being registered on a CAT scanner or sometimes on an MRI. So, our instrument actually are being navigated into the field while we are watching them on a 3 dimensional CAT scan or MRI. So, we can actually literally see not only where we are on the screen that comes from the endoscope we were also seen where we are in 3 dimensions relative to the patient's anatomy and of course relative testings like the eye and the big arteries and veins that come in there likely carotid.

DR. LEE FREEDMAN:

So, I imagine that certainly allows for more precise resections and to receive fast to recovery less collateral damage to the brain with these techniques.

DR. JASON NEWMAN:

Yes, if you take some of the simplest surgery that we do with this, the recovery period is incredibly fast, some of the surgery that are on the smaller end we are sending the patients home sometimes the very next day whereas even just making an incisions to a craniotomy you know, you are generally needing patients not only staying for couple of day, but staying in the ICU for few days before even considering going home. So, we are really changing the recovery on this patient significantly and then of course there is the psychological aspect of recovery as well, waking up with literally no incisions there is much more rapid return to normal activity once you are out of the hospital.

DR. LEE FREEDMAN:

That must be magnificent for these patients.

DR. JASON NEWMAN:

Absolutely, and I think you know the think that is the most difficult right now was that we know that we can use this on everyone. We still has limitations to where we can use it so, lot of patients are coming in hoping to undergo the surgeries and because of technical specifics they are not always amenable to the surgery, but we are constantly expanding the indications for it.

DR. LEE FREEDMAN:

What are some of this impediments or hurdles that make certain patients not candidate, it is not enough equipment or something anatomic with their tumor what kind of things cause the patients not to be candidate.

DR. JASON NEWMAN:

Sure well that is a good question and again that is a constantly evolving question because it is changing all the time. So, one of the thinks that was initially in obstacle in the surgery was that on should through the bone of the sinuses and into the space above there, the intracranial space. The anatomy in this region sometimes can get somewhat difficult to navigate because of the optic nerves and the carotid arteries that are in this region. So, depending on where the tumor is relative to those structures we cannot always approach it through the nose. So, for example, if a tumor is seems to be going more lateral than the medial wall of the orbits or in another words if it find to starting to wrap lateral to the orbit we can actually get around the bony component of the orbit very far so that becomes a limitation, so the tumor does not necessarily have to be that big to cross that barrier, but because of the nature of the scopes and our instruments even though we can see around corners we can't comfortably operate so far around the corner that we are at risk of obtaining at positive margins or if not being able to control bleeding in these regions. So, that as an obstacle what we can see and where we can go to is one obstacle, but another important obstacle is reconstructing this area, so as you can imagine the brain and the cerebrospinal fluid spaces are sterile and the nose of course is very far from sterile. So, when we are done with these surgeries one of the critical points is making sure that you recreate the division between the intracranial space and the intranasal space and that is it obstacle when you are removing large tumors because you are creating a very large defect in the region where you are trying to get to these defect through two nostrils.

DR. LEE FREEDMAN:

Hmm.

DR. JASON NEWMAN:

So, you can imagine you can take a piece of bone in a measuring 7 x 3 cm and put it into this region because you physical cannot get in there and on top of that a lot of the structures that you are trying to get back into the intracranial space are very delicate so you cannot push very hard on them and you know lay down lot of foundation so that is an obstacle that we are still addressing and we had come up with the lot of techniques to improve it including a lot of technological advances were using essentially tissue sealants that are often water based or glues that we take fat and fascia from the patient's thigh from the fascia lata often put it up there and then essentially glue it into place in order to reduce the rate of leaks, you can take small bone grasp and do that and that one of the newer things that we are doing is we are actually taking the mucosa from inside the nose meaning the mucous membranes from the inside of the nose and creating pedicle swaps of the tissue that are still attached to the blood supply and rotating it up into this region. The advantage of doing that is you are bringing healthy blood supply tissue to this area as oppose just to fascia or fat which is devascularized by the time you are getting it up there.

DR. LEE FREEDMAN:

Oh, its fascinating almost like you do a skin graft somewhere else bring healthy mucosal tissue there.

DR. JASON NEWMAN:

Exactly.

DR. LEE FREEDMAN:

If you just tuning in you are listening to Medical Breakthroughs from university of University of Pennsylvania Health System and ReachMD XM160, The Channel for Medical professionals. I am your host Dr. Lee Freedman and with me today talking about incisionless brain surgeries Dr. Jason Newman Assistant Professor of Otolaryngology at the University of Pennsylvania School of Medicine.

DR. LEE FREEDMAN:

Dr. Newman it strikes me as if you are describing all this that this might be an area where robotic surgery might help since the structures are so close and intermittently related, has that been applied to this technique.

DR. JASON NEWMAN:

It is interesting that you asked that because that is actually what we believe is that next frontier for this surgery. The field of robotics is really in its infancy in this part of the body. At the University of Pennsylvania some of the physicians in our department are the pioneers in this field and in fact were the first people to ever perform robotic surgery in the throat and in the voice box. We are now turning the table from this and trying to apply it instead of down into the throat up into sinus and skull base region. It is incredibly fun and exiting to be involved in this new field because we are literally the first people in the world to be doing this. I think the application for it are going to prove pretty outstanding, but this also still falls in the category where the technical component is probably the biggest part that needs to be addressed at this point.

DR. LEE FREEDMAN:

It is kind of the rate of limiting step development of the computer programs in all.

DR. JASON NEWMAN:

There are a few parts to it. When we look it what needs to be done for this surgery the instrumentation right now for some of the robotics is meant for abdominal surgery most people are probably heard of sometime of prostate surgery that is being done with robotics and the instrument that we need up in the skull base are just the lot different are lot smaller and we also working in a lot deeper of a whole that is restricted by bone as opposed to in the belly and in the pelvis there is not of lot of bony anatomy that is interfering with what you are doing. So, for example a drill has not yet been created which is you know relatively frequently used instrument in the skull base because we are dealing with the lot of bone and robotics there is literally not yet drilled. But the 3 dimensional components is really the key to why we think robotics is going to be helpful. Right now with the endoscopes we are operating on a 2 dimensional plane. Our visibility is excellent, but it is still 2 dimensional. So, as the structure start becoming much closer to each other and the need for 3 dimension becomes much more critical were finding that the robotic component is really going to help.

DR. LEE FREEDMAN:

And I know it is a rapidly developing field only 50 years old the whole field of cranial base surgery do we have any information on relative prognosis with the incisionless surgery versus the more traditional surgeries.

DR. JASON NEWMAN:

That is one of the biggest question that of course comes up not only in our patient's care, but also in our scientific meetings because of

course we do not want to be embracing a technology what we feel like we are taking step back or its with regard to curing cancer because ultimately as important as it is for us to have incisionless surgery and to avoid scars and to avoid a lot of the other things that we associate with big surgeries. We do not want to compromise on cure rates for cancer. So, the data at this point appears to be relatively good with regard to demonstrating that the cure rate is equal and possibly higher with this type of surgery and additionally it is showing undoubtedly that hospital stays are shorter, quality of life is improved, and overall rate of complications in general is lower. We are really happy to see that component is definitively improved. The long-term survival at this point little bit difficult because you really need years of experience to determine how well someone does you know for 10 years survival for example.

DR. LEE FREEDMAN:

Right.

DR. JASON NEWMAN:

And we are not at 10 years for lot of these technologies.

DR. LEE FREEDMAN:

Dr. Newman, thank you so much for being our guess this week on Medical Breakthroughs from the University of Pennsylvania Health System and thank you for taking us through what sounds like a very exiting rapidly evolving field of incisionless brain surgery.

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