

BroadcastMed | varma_awake_craniotomy_final

My name is Abhay Varma.

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Awake craniotomy is like any other conventional craniotomy.

The only big difference is that during part of the procedure the patient is awake.

That allows the physician, the neurosurgeon, and the other team members, which include neuroanesthesiology, neurophysiology, to monitor the patient's neurological function real time, so you get a moment-to-moment feedback from the patient as to if there is any adverse effect of your surgical intervention.

It is indicated in patients with parenchymal brain tumors, tumors within the brain substance that are either within or very close to eloquent areas of the brain.

And it allows the physician to perform maximal safe resection of the tumor close to these areas without causing a new neurological deficit, or giving the patient a new deficit.

This technique is particularly useful for slow brain tumors of the brain called low-grade gliomas.

These are the tumors which tend to affect younger people, like they are in third or fourth decade of life, tend to be more often close to or within eloquent areas of the brain.

And the current philosophy is that they should be operated upon, because if left untreated, they continue to grow slowly.

And a fair proportion can turn more aggressive.

From slow-growing tumors, they can turn into more fast-growing tumors, or a higher grade glioma.

And this technique offers the surgeon to do maximum safe resection.

At the same time, we can also do what is called a staged resection, where you go in first time and remove as much tumor as you can safely, while preserving the eloquent areas of the brain.

And then you can come back after some time, maybe a few months or maybe a year or so later, because the mechanism of brain plasticity has allowed the function to move from that area that is affected by tumor to adjacent area of the brain, which is not involved by tumor.

And so you can go back and remap that area where the tumor was left.

And if you find that it is no longer causing any neurological problems while you're monitoring, you can remove that tumor.

So this allows the surgeon to resect the tumor in stages while preserving the function in a young patient with low-grade gliomas.

If we follow the technique of what is called sleep-awake-sleep-awake craniotomy, where when we start the procedure the patient is asleep.

In this institution, we are using intravenous anesthesia, total intravenous anesthesia.

And the patient is under deep sedation for the initial part where the patient is positioned.

The patient's head is secured in a Mayfield clamp or [INAUDIBLE] clamp depending on your preference while we are exposing, which includes making the incision in the scalp and performing the craniotomy, which is opening up the skull.

Once we have exposed the brain, then we map out the anatomical boundaries of the tumor with a technique called neuronavigation, which is widely available.

Once we have established the anatomical boundaries of the tumor, then we basically stop the anesthesia, so patients gradually wake up.

And then the patient wakes up to a degree that they are able to actively interact with the team.

And during that part of the patient's awake, we use different probes to stimulate the part of the brain where we have mapped out the tumor and also about 5 to 10 millimeters area around the margins, anatomical margins of the tumor and see if stimulation of any part would cause disruption of the function that we are asking patient to perform, whether it's language function or a fine motor skill.

And if we pick up any areas where there has been a disruption of the function or interference with patient's ability to perform that task, then we mark that area out.

And then we would resect the part of the tumor where there was no disruption of the function, what we call negative mapping.

And the area where we picked up neurological function, or what we think would be an eloquent area, we would preserve that area.

And during the resection also we can continue monitoring, especially in tumors which are going deeper into the brain close to deep white matter tracks, because now the present philosophy is also to preserve the white matter tracks, because they contribute significantly to patients' functions.

So we keep monitoring while we are getting deeper into the brain with a technique called subcortical mapping, which is essentially the same what you do with the cortical mapping, where you're stimulating and picking up responses.

And we're also using neuronavigation to see how far we are from the white matter tracks.

Once we have completed the resection, then the patient goes back to sleep again.

The anesthesia is resumed.

The patient is under deep sedation and then we do the closure.

We put the craniotomy flap back, close the scalp, and then the patient is woken up from anesthesia like in any other surgery and transferred to recovery.

With the current technology and the protocols that are very well established, this has more or less become now a standard of care.

It is no longer investigational.

Of course, there is ongoing research to make this technique better and better, but the technique itself is now widely accepted and well-established.

So it is a relatively safe procedure.

With the technology that we have now, we are able to perform this without any major adverse effects.

But there are certain group of patients where although they have tumor in or close to eloquent areas where we may not be able to offer it.

The major indication being the patient is not comfortable with it.

Any anxious individual who is not comfortable being awake during part of the procedure, you know, we respect that, and then we proceed with conventional craniotomy.

Then patients who are obese, because positioning can be difficult. They may be very uncomfortable during the awake part.

If the airway needs to be rescued during surgery, it can be difficult in a very obese patient.

Patients with chronic cough or breathing problems, it's relatively contraindicated.

Patients with already preexisting profound neurological deficit, where they already have a significant speech impairment, motor function, or cognitive impairment, where you cannot cause any more neurological deficit, or they are not able to cooperate in a meaningful way during surgery, this is not indicated.

Patients with mental health issues who are not able to cooperate because of cognitive issues or their understanding of the procedure.

Very young individuals, I don't deal with pediatric brain tumors, but I understand generally, pediatric neurosurgeons also would not offer it to children below 10 years of age.

Coming to adverse effects itself, you know, there are effects, but we can generally control them quickly during surgery, as long as we are well prepared and the patient has been carefully prepared, chosen, and we have made the full preparation for surgery.

Things like interoperative seizures, brain swelling, nausea during the procedure or headache during procedure, these are some of the side effects that the patients can experience, but we have tools in our armamentarium where we can quickly control these adverse effects.

Awake craniotomy is not a service that can be provided by one service, or one specialty.

You don't fly solo while offering this service to the patients.

This is a collaborative effort in modern neurosurgery, but we have speech pathologists, we have neuroradiologist, we have neuroanesthesiologist.

It's very critical to have a good neuroanesthesiology team, neuroanesthesiologists who are comfortable with performing awake craniotomy, and of course neurophysiologists who are monitoring the patients during surgery.

So it's a collaborative effort.

It requires multiple specialties, subspecialties.

So usually these resources are available in a big tertiary center, like MUSC.

That's why it's more frequently, or more commonly offered by academic institution, but any institution where they can bring together these services and make a team that can work together, this service can be offered.

At MUSC our philosophy is, or I would say the philosophy of the neurosurgery service is to provide the patients with state of the art, evidence-based service in which the patient is a full partner in the decision making process.

And so this procedure basically is in consonance with our general philosophy.

We offer a patient a technique where we can do maximum resection of a lesion in the brain, which otherwise may cause profound deficit if completely resected without monitoring.

And also the patient is part of the decision making.

The patient is fully involved in decision making to go ahead with the awake craniotomy.

We go to great lengths to prepare the patient for surgery.

Almost all patients they have had very positive feedback about this and they felt comfortable about the procedure and have not regretted undergoing the procedure.