

[MUSIC PLAYING]

MALE SPEAKER: So first, I would like to introduce Dr. Katie Traylor. She is an assistant professor in the Department of Radiology. She's a Director of the Head and Neck Imaging, and Katie will talk to us about the evidence-based protocol for surveillance imaging for head and neck cancer.

KATIE TRAYLOR: All right thank you so much for inviting me to do this talk on evidence-based protocol for surveillance imaging studies. I have no disclosures. Why do we image these head and neck cancer patients? While we want to use it for staging, monitoring, surveillance, surveillance is important because you have one shot at cure. Many developing treatments have improved survival, including immunotherapy, but you really just want to cure them at the beginning.

So our imaging choices are diagnostic CT or an MRI or you can do some sort of combination, a PET/CT or a PET/MRI. So with PET/CT, you can do your CT with attenuation correction, low-dose only without contrast, or you can do a diagnostic CT combination with or without contrast, depending on your patients need or renal disease. CT and MRI are utilized to assess disease presence, disease burden, as well as nodal involvement.

Squamous cell carcinoma is the most common histopathology of head and neck cancers at 95%, so we're kind of going to focus on that. We have PET/CT versus just the diagnostic CT. So even with the patient receiving optimal treatment, approximately half of the patients will recur. You might not image all of them, but in the era of CT, we were noting 50% of recurrences within the first year. We would get 75% recurrence within the first two years, however with the development of PET/CT and its inflammation, that increased to finding 75% recurrence within the first year and 90% within two years.

So when do these patients tend to recur? Well despite optimal treatment, approximately 28% will still have treatment failure. Imaging helps find these recurrences earlier. PET/CT actually finds them earlier than just using diagnostic CT and clinical exam. In fact, we had found that 66% of recurrences were detected by CT even when the patient was clinically asymptomatic, or it wasn't noted on physical exam to be present.

So some benefits of PET/CT, it helps determine the locoregional disease, the lymph node involvement, as well as distant metastases FDG is much more sensitive in identifying metastatic non-enlarged enlarged lymph nodes on diagnostic CT. So on CT diagnostic, you might not have an enlarged lymph node or an orthologically suspicious lymph node, so you're kind of stuck. So PET/CT can be really helpful in those patients.

Also, it's really helpful in determining treatment response, as well as residual or recurrent disease. This is especially true in areas such as the larynx, where post-radiation edema can be tricky for some people. It really can be mast-like, and to the untrained eye post-radiation changes can look like mast and recurrence. Post-treatment PET just helps us determine who needs to be biopsied, who can be followed, and who needs palliative treatment.

PET accuracy is time dependent, so we really need a baseline PET prior to any manipulation to the tumor or biopsy or treatment. The reason is because FDG is relatively non-specific, so any inflammation, infection, tumor will all have FDG uptake. So you really need to wait the eight to 12 weeks for restaging and post-treatment PET, and that helps die down all of that post-treatment changes in FDG so we can focus on looking for actual tumor.

So if you wait this eight to 12 weeks, that actually improves the sensitivity to about 80%. If you get anxious, and you end up imaging a PET/CT before the eight weeks, that lowers your negative predictive value and your accuracy, so that's the problem with imaging too early. As you reach this eight to 12 week mark, you start getting that higher negative predictive value.

So you really need your first post-therapy scan to be a PET/CT. That needs to be performed at eight to 12 weeks after the therapy. And then most people do this for quarterly diagnostic CT of the neck. And you can add or not the year PET/CT follow-up.

So FDG PET is very sensitive for head and neck malignancies, greater than 95%. It doesn't really aid in T-staging of primary tumors like CT or MRI does, but some primary tumors are just too small, and you don't see that on CT or MRI, and the clinician doesn't really see them on physical exam, either.

They usually have clinical lymphadenopathy, and that is about in 3% to 7% of these unknown primary cases. So PET CT is very helpful with unknown primaries. It has a sensitivity of 88% to 97% with a specificity of about 68% to 74% for detecting these unknown primaries with nodal metastases in the neck.

So why is primary tumor identification important? Well, it's necessary for tumor staging as well as determining the appropriate patient management. So all of the substrates of the neck have different staging criteria and management considerations, so that's why we're really-- it's important to look for it. It also aids the surgeon to biopsy a specific target in the head and neck instead of doing these blind biopsies.

So this patient had the diagnostic CT. As we can see, we have this metastatic node in the left, level two nodal station. And then in the oral pharynx, we looked at both the tonsils and the base of tongue, and there was no asymmetry, no findings to suggest a mass or asymmetric enhancement to suggest any location of the tumor.

So we did a PET/CT. Here's the fused images. We have this asymmetric area of FDG within the left tonsil. So that helped target this area for biopsy, which the surgeon did and found out that this wasn't the primary malignancy.

Now a certain pitfall that can happen with these nodal metastases that are necrotic, which is very common in HPV-positive tumors, you can't just look at the PET/CT and say, oh, there's no FDG avidity. We don't have nodal metastases. And the reason is because PET/CT is not good at finding necrotic lymph nodes. It just isn't.

The FDG isn't going to be added in the necrosis. You may get a little bit of uptake around the periphery of the node, depending, but they could be occult negative on a PET/CT. So that's really when you need to look at the CT as well for that morphologic suspicion.

Now, indeterminate lymph node involvement is also very helpful on PETs. So we need to know the metastatic lymphadenopathy because it affects patient prognosis. It also helps the surgeon know how long the surgery needs to be and what sufficient coverage is needed to get all the involved lymph node involvement. It also can help determine neck dissection that is needed as well as radiation fields.

Here's a patient where they have a left oropharyngeal squamous cell carcinoma. It's very obvious on this fused PET, where it's quite large. This was the diagnostic CT, where this node was kind of indeterminate. It wasn't enlarged. It wasn't really suspicious morphology-wise, but when we looked at the PET/CT, this does have uptake and this was found to be a metastatic left level two node.

So on diagnostic imaging, we're looking at size, and we're looking at morphology. Now, morphology always trumps the size. We start looking for a rounded shape. So a lymph node should have a renal form appearance with a cissell fatty hyaline like the kidney. And once you start losing that shape, you have loss of fatty hyaline. When you start getting this focal cortical thickening or nodal inhomogeneity or cystic necrosis, those are concerning for disease on CT alone. If none of these are present, and they're all small and not enlarged, that's really when PET/CT becomes important.

So at the end of all of our reports, we do this NIRAD score. So this has really been embraced by both Hopkins, Emory, and ourselves, and it really helps the clinician know what we're thinking. So at the end of every report, we give a score. It has a P, an N, and a D. So P is for primary, N is for the nodal disease within the neck, and D is the distant metastases. And we give them a one through four, depending on what we think.

So a NIRADS 1, we don't think there's any recurrence. NIRADS 2, there's a low suspicion of recurrence. It might be a little ill-defined. Might just have just mild diffuse or moderate FDG uptake, but we're not thinking it's tumor. NIRADS 3, we're highly suspicious. This is discrete. It's either new, or it's gotten bigger from the old study, and you have this intense focal FDG uptake. NIRADS 4 is definitive recurrence. This is either by radiographic progression, clinical observation, or path proven. If you have any questions about NIRADS, you can definitely go to this website on the ACR for more information.

This is the scheme. So you still do your first scan at eight to 12 weeks after therapy. And depending on our NIRADS, this is the way you follow it up. So NIRADS 1, 2, 3, and 4.

So again, NIRADS 1, we're not suspicious at all, so you can do a longer follow up at six months. Once you do that scan, and it's still a P1, N1, D1, no further imaging is required. Our negative predictive value is 98%, and it's pretty-- that patient is pretty much considered cured.

Now, NIRADS 2, we're not 100% sure, but we're leaning towards it being benign. You need a shorter-term follow up, like at three months. And then once you do that PET/CT, you treat it like first initial scan, again, and then you go at the top. So a NIRADS 2 has a negative predictive value of 80%, so it's a little bit lower than the NIRADS 1.

NIRADS 3, we're highly concerned. You need to look at the patient pretty much in a timely manner and probably biopsy that patient, because we're highly concerned that there is residual tumor there. NIRADS 4, it's unequivocally tumor. It's either unequivocally tumor on pathology or on imaging, and you can either just treat or palliate based on that exam. So this scheme OF post-treatment imaging determines who to biopsy, who to follow, but there is some room for noting on the follow-up examination.

So I just wanted to touch on PET-MRI. It's a new, up-and-coming scanning system that we use, and a lot of clinicians might not be clear on when is the best time you use PET-MRI. So these patients that need PET-MRI, you're suspicious of skull-based invasion, intracranial extension, perineural tumor spread. Anything that's better identified on MRI, this can be helpful.

So perineural tumor spread is not always PET-avid. In fact, it's most commonly not PET-avid. So it's especially important to utilize an MRI to see the extent. On PET/CT, you can kind of defer it if you start seeing infiltration of the fat where the nerve will go, or you have asymmetric enlargement of the foramina, where the nerve goes through. That can kind of suggest that MRI is the best. It's also helpful in determining radiation necrosis versus tumor extension intracranially. And just like PET/CT, it helps evaluate locoregional disease, lymph node involvement, as well as metastatic disease.

So some pathologies where PET-MRI is especially helpful, nasopharyngeal carcinomas, these aggressive sinonasal carcinomas, anything that will invade the orbit or have intracranial involvement, questionable recurrence within the post-treatment neck, as well as the current esthesioneuroblastoma. Now esthesioneuroblastomas, we use dototate instead of FDG, but that's the only difference.

So here is a patient. It's a 64-year-old male with a T3, N2 nasopharyngeal carcinoma. He had post-chemo radiation in 2017, but then in 2019, he was found to have recurrence and had extensive surgery. Here's his next scan after his surgery, and we still have recurrent disease, which is markedly FDG-avid within the right nasopharynx. All this enhancement in the surrounding soft tissues are just radiation changes.

This was the diagnostic CT. As you can see here, this is, again, the obvious recurrence within the right nasopharynx. However, we do have this enhancement within the right temporal lobe with surrounding hyper-density related to vasogenic edema. Could this be radiation necrosis or could this be tumor? It's hard to tell on CT.

This is the coronal. Again, here's your tumor along the right nasopharynx. And we have asymmetric enlargement of the foramina when compared to contralateral side. And here's that mast-like area of enhancement within the right temporal lobe.

So here's two months prior. This is where it presented, where we had this little bit of enhancement vasogenic edema. This was really felt to be posts-radiation changes. However, if we look at the PET-MRI, this is obvious tumor. So this is markedly FDG-avid. You have the perineural tumor spread along the right cavernous sinus, a little bit of narrowing of the subject carotid. Radiation necrosis will not have FDG avidity. It's one of the good studies to look at to tell the difference between radiation necrosis and tumor.

So here it is on the coronal. This is that enhancing FDG-avid mast, and then this is just innervation atrophy with enhancement throughout the right muscles of mastication to show the perineural tumor spread along the tumor branches-- or the nerve branches.

So look at the chest. This is the concern for metastatic disease. We look at the CT chest. We have this pulmonary nodule slowly increasing in size over time. So it goes with its metastatic potential here.

So, in conclusion, it's best to have a pre-treatment baseline PET prior to any surgery or biopsy. You want your follow-up PET no less than eight to 12 weeks following treatment. Your PET/CT will find recurrence earlier. And PET/CT is helpful for unknown primary and to troubleshoot indeterminate lymph nodes. An MRI can be helpful with oral cavity, prevertebral invasion, and skullbase and sinus malignancies. Thank you so much.

MALE SPEAKER:The next talk will be given by Dr. Marci Nilsen. She is an assistant professor with the Department of Acute and Tertiary Medicine in the School of Nursing, as well as with the Department of Otolaryngology. And we know Marci as one of the persons who runs the Survivor's Clinic along with Dr. Johnson, who has been very helpful with all of our patients. So go ahead, Marci.

MARCI NILSEN: Great. Thank you for having me. Let's see if I can, like everyone else, share my screen. So I'm Marci Nilsen, and thank you for having me, and thank you for staying on to let me finish out this great day of talks, especially given that it's nice and warm and sunny here in Pittsburgh.

But the importance of survivorship is what I'm going to talk about today. I'm really highlighting some of the issues that we see, and really why addressing these concerns are important. So, survivorship, while it's about post-treatment, survivorship actually is supposed to entail multiple-- a look at multiple issues that patients experience, the physical, the mental, the emotional, the social, and the financial effects.

And the National Cancer Institute has actually kind of changed their definition over time of what a survivor is. And right now, they're defining a survivor as somebody from the time of diagnosis until their end of life. And that we really should not just look at the patient, but we should also look at the family members, or really, their support system in addition.

And so there are multiple components of survivorship care. Surveillance, prevention, management, and coordination are what define high-quality care. And the management of late and long-- the identification and management of treatment-related effects is going to be the highlight of my talk. And, so, why is survivorship important?

So I was scrolling through Twitter one day, and I follow a couple of different survivorship groups, and one of the groups had a quote from a patient that said, "survivorship is not surviving without quality of life." And when you saw Dr Duvvuri's talk, all patients endorse that they want to be cured.

But in the post-treatment session-- in the post-treatment phase, really focusing on how to maximize their time that they have, now that they have been cured of their cancer. And they're living with the daily effects, and how can we make sure that they can get the best out of their everyday life.

And so there are a lot of late and long-term treatment effects that have been associated with head and neck cancer and the treatment. And so this was published by the American Cancer Society. And you can see it's vast, and it covers a multitude of different issues from musculoskeletal issues to swallowing and dysphagia to psychological effects. And it's really based on the treatment that patients have, and so maybe they don't all experience all of these, but many do have symptoms that cluster together.

And so in the Survivorship Clinic, this is just a bit of our recent data on what we've seen in terms of symptoms and treatment-related effects. And then I'll talk about, is this generalizable, and do we see this in other literature.

So since 2016, we've seen about 1,500 unique patients. Since we see patients more than once, this is about 3,000 encounters. And we do ask a lot of patient-reported outcomes to try to really focus on some of the main symptoms and side effects that we see. And we do use the well-validated University of Washington quality of life scale.

And the reason we chose it is because if you look at the end of the questionnaire, it asked patients what are the things that impact their life the most, at least in the last seven days. And so they can endorse-- they're supposed to endorse up to three, but patients endorse more than that. And so when we look at just that aspect of the scale, 93% of the patients say they have at least one issue that impacts them, and 60% of the patients have three or more issues that impact their daily life. So they're cured, but they are dealing with several things.

And if you go back and think about Uma's talk earlier, he highlighted that people want to be cured, but they also don't want to have side effects, like pain. So the top three issues that our patients report are swallowing, saliva, and pain. And so pain is really general. Patients come with a lot of different forms of pain when we see them in clinic. So this is just really a generalized reporting of pain, not specifically going into what type. And then speech activity, chewing are also in the top five.

On average, our patients report, again, about three of these, but the standard deviation is higher, so is this similar to other institutions? So this is an institution-- this is a paper from France, actually, in 72 disease-free head and neck cancer survivors. They were questioned at a one year. They were given the EORTC quality of life scale, the head and neck scale, patient concerns inventory, which has the head-neck specific component, and then the hospital anxiety and depression scale, or the HADS.

And the goal was, really, to try to assess patients' needs in this kind of cross-sectional fashion. And patients reported very similar issues to what we see. So fear of recurrence being top, but dental, health, teeth, dry mouth, fatigue, speech and swallowing, and being understood and chewing and eating were the most commonly reported symptoms or issues.

And for this group, their concerns were actually a little bit higher than ours. So we have about three per patient. There's a four per patient. And so overall, it's fairly similar. And so based on our tool that we use is different than their tool, which could be why-- mine's a little bit more discreet when I tell you the top five, and there's is kind of more clumped together. But again, this just highlights that most patients come with multiple issues after treatment.

And so one of the issues that we talk about a lot in survivorship, and if you've heard me talk before, is neck disability. And the reason we kind of isolate this out is because it's really not assessed well in the University of Washington quality of life. But most of our patients report some degree of neck disability. So neck disability is just pain in their neck that limits their ability to do daily activities, so daily activities related to recreational activities, driving, work, and then just generalized pain.

And most of our patients do have mild to moderate, but you can see here that it does kind of differ based on their treatment. So, as you know, when patients receive a multitude or more than one treatment, they tend to have more complex needs, and that's what we've seen here.

When comparing non-surgical treatment to surgery alone, patients were 2.5 times higher likelihood of experiencing neck disability. And then when you look at surgery and adjuvant treatment compared to non-surgery, this goes up four point-- they are 4.16 times higher. If you look at the difference between non-surgical treatment and surgery plus adjuvant treatment, there really isn't a significant difference.

So I mentioned that symptoms do cluster together. So we looked at neck disability and swallowing. And we found-- what you may not be surprised-- but as your neck disability or somebody's inability to turn their head or their pain in their neck goes up, the likelihood of experiencing dysphagia also goes up.

And there was a recent study, we used the EAT-10, so the Eating Assessment Index, and they said-- the recent study showed that about 15 is when patients are at higher risk for aspiration. So you can see here, patients with mild disability on average have an EAT-10 of 13, so they're pretty close. And when you get to the moderate to complete disability, there EAT-10 exceeds that at 22.

So you may say that this is really just-- it's subjective. So patients are reporting these symptoms. Do patients actually have changes in their functioning after radiation in their neck? Yes. Yes, so they do. So patients here-- we actually took our patients from survivorship. They did consent for this. But we used some sensors. They actually use them in bioengineering with low back pain, in physical medicine and rehabilitation, and we positioned them on the head and neck, and we did some axial rotations, some flexion and extension in lateral bending.

And so patients here were just grouped into no pain versus having some degree of pain, and there was significantly higher range of motion in flexion and extension in lateral bending, and significant faster velocity in patients who didn't have any pain. So patients who had no pain had a greater range of motion and typically were able to move with greater velocity. And the same was seen when we looked at the neck disability index.

So, the first was just pain, zero to ten. The second was actually using this patient-reported outcome, and we saw very similar results, that if patients reported some degree of disability in their neck, they had less range of motion and less velocity. And so these subjective changes, or these subjective issues that patients report to you, can indicate that there are also objective changes.

And these are important, again, for daily activities like driving. If patients can't turn their head fast or react fast, this can impact activities like changing lanes or even leisure activities, such as one patient once told me that in the beginning, she wasn't able to really ride her horse. And then after physical therapy and, really, help focusing on her neck, she was able to do that. And again, that's a leisure activity, but it does impact your daily activities and your overall satisfaction with life.

And why is it important? So I already hinted at it, that it does impact patients everyday life, and we've seen this. So neck disability impacts quality of life. Patients who have some degree of disability have lower physical and social-emotional quality of life. So social-emotional being recreation, even appearance, mood. Physical being swallowing and pain. So it's important to note, if your patients report these changes, they will or may also likely have a lower quality of life.

So what about the physical distress that we see in our patients. So you can see here, we do give two patient reported outcomes to screen for distress and survivorship. The PHQ-8, which is a version of a tool that Mamta discussed in her talk, and then the GAD, which is the generalized anxiety disorder scale. And when you look at symptoms of depression and anxiety, you can see here that most of our patients report fairly minimal.

But when-- you can see here-- mild is about 25%. Getting into the more moderate to severe group here, and in the more-- 20%. So patients getting into this mild, moderate, this should give you pause to really discuss with the patient and offer them a referral to, such a psycho-oncology. And the same as-- we see even a little bit less symptoms of anxiety in our patients, but it's still prevalent and should be screened for.

And so, one of the benefits to the pandemic-- and there's not a lot of them-- but there are some extension of services, like telehealth, so patients who have really been-- struggle to find a clinical psychologist in their area or mental health services in their area, do have the ability to use some more telehealth services, and get them connected. And so that's one of the things that we try to facilitate throughout the survivorship period.

And so again, why is this all really important? And it's important because-- I showed you this slide earlier, but I'm presenting a little bit different aspect of it. Of these 72 patients, the mean number of concerns expressed by a patient was correlated with a decrease in functioning. It was correlated with an increase in the symptoms of general worse quality of life symptoms and more head and neck specific symptoms.

But psychological distress was actually the main determinant of what they're referring to as long-term quality of life. And we could discuss whether one year is really long-term because a good portion of our patients were going to live past one year. And so, is that really long-term. But psychological distress was the main determinant of quality of life.

So this is a quote that I'm going to give you from one of our survivors. And I really don't take credit for improving this person's life, other than I connected him to the right services. And so this was a patient that was seen in survivorship and treated in one of our outlying community settings. "And what came, after all of my treatment was over, was a complete and utter devastation. What psychological well-being that I had before cancer was totally shattered. It was scattered and lost. I entered into a darkness, a sadness, a depression that I had never known before. I had no idea on how or where to start to pick up the tiny fragments of my mind and begin to somehow put them back together again. I was in a living nightmare."

And so, when we originally discussed services with this patient, he said, no, and he later called-- he later, actually, emailed, and said he was interested. So the importance of having a contact and introducing the topic may be enough to help patients kind of change their mind. And so the good part of the story is that we did connect the patient, and he is doing well, and he is very grateful for the connection that was made.

But it does highlight-- and there's more data that's been coming out-- the real risk of psychological distress and the impact in our head and neck cancer patients. And so, one of the inaugural head and neck cancer survivorship symposiums we had, we had Nosa Osazuwa-Peters speak, and he presented on some data related to the increased risk of suicide from the SEER data set, and that head and neck cancer patients are almost two times more likely to die from suicide than other cancers.

And so he came out with another study looking at the impact of virality or locality on suicide risk. And this was 405 suicides were identified in this data set. So this, again, was a SEER data set between 2000 and 2016, and they looked at the Metropolitan area, followed by urban and rural residents, and you can see the breakdown here.

But when you look at the rural residents, the rural residents, actually, had a higher risk. So residents in urban and metropolitan communities had a lower risk of suicide. So it's really important to know just some predictors and what to look at. And again, can we get these patients into services. And even if we're treating them or seeing them here, and they're going back into the community, how can we facilitate those and survivorship.

So all of these issues are really best dealt with by a multidisciplinary team, physical therapy, speech language pathology medical and radiation oncology, head-neck surgery, depending on the issues that arise. And we really try to utilize our team here and in the community to best serve our patients. And we have seen that there is a significant benefit, in terms of hospitalization, to a visit to Survivorship, so here at UPMC.

And so patients who had-- once you get past this initial treatment period and the post-treatment period-- patients did have a decreased utilization of the hospital system after having a visit to Survivorship. And I would say that I think part of it is just connecting the team and having contact people the patients can reach out to when they start to have an increased symptom burden or an issue that arises.

And so overall, head and neck cancer survivors experience a multitude of symptoms and treatment-related effects. And while you may not have all these members, like physical therapy and psycho-oncology, directly in your clinic, these patients do benefit from a multidisciplinary approach. And so can you make those connections? Can you start a network of providers that you trust and know can help patients? And then obstacles and challenges are still really present and can impact our high-quality care that we deliver. And so can we use technology-- I mentioned telemedicine-- so can we use that more to really start to address some of these issues.

So there's my-- there's my email if you have any questions. But I'm happy to take them.