

79| Neuropsych Bite: Clinical Case 2 – With Dr. Ryan Van Patten

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Speakers: Ryan Van Patten, John Bellone



Intro Music 00:00



Ryan Van Patten 00:17

Welcome, everyone, to Navigating Neuropsychology: A voyage into the depths of the brain and behavior. I'm Ryan Van Patten...

John Bellone 00:25



...and I'm John Bellone. Before we get into today's episode, we want to remind you that our book "Becoming a Neuropsychologist" is now available. We think that the book is useful for a few different groups of people - anyone who is interested in pursuing a career in neuropsychology, such as high school or college students; anyone who's interested in learning about neuropsychology, even if they're not going to pursue a career in the field; and also people who are already in training to become neuropsychologists, such as graduate students and postdoctoral fellows. You can find the book online by searching "Becoming a Neuropsychologist" on Amazon or Barnes and Noble. If you've read it, please consider leaving an Amazon rating, we would greatly appreciate it. And today, we have a Neuropsych Bite for you. This will be our second clinical case presentation and Ryan's first. We plan to each present two of our own cases for this series, and then to branch out and have other people present their cases, including pediatric neuropsychologists.

Ryan Van Patten 01:21



We want to start off with several caveats. Our first few clinical cases have been, and will be, relatively straightforward. This is so that we can present them within the time constraints of a Neuropsych Bite, and so that we can focus our discussion on two or three key areas. We're not selecting the most complex cases, with counterintuitive cognitive profiles, and multiple medical and psychiatric comorbidities. We may do that in the future, but we're starting off simple.

John Bellone 01:51



And we don't purport to cover every aspect of a relevant topic. For example, in the first clinical case presentation, we discussed long-term cognitive effects of alcohol use, and in this case we'll talk about deep brain stimulation evaluations for Parkinson's disease. We hit some of the high points related to these specific patients, but we don't include comprehensive literature reviews and we will almost certainly leave out a few relevant issues.

Ryan Van Patten 02:16



Relatedly we only broadly summarize the cognitive data because listing each test score in an audio podcast just doesn't make sense. In a real clinical case presentation, the data sheets are often shared in a closed group of people. But, of course, this is not that.

John Bellone 02:33



Generally speaking, the purpose of these episodes is to provide a model for case conceptualization and presentation. Certainly there are other models for organizing cases, other conceptualization frameworks, and other presentation styles. Other people might disagree with our diagnostic formulations and/or disagree with the weights that we give to different components of the conceptualization. There also might be appropriate recommendations that we don't get to in our conversations here.

Ryan Van Patten 03:03



And, finally, these have all been outpatient adult and older adult cases. Neuropsychologists sometimes work in different settings, such as rehab hospitals, or forensic, or sport psychology settings. Many aspects of the evaluation vary across these arenas, including the referral question, who the patient or client is, and how the case conceptualization is approached.

John Bellone 03:28



So, with all of that, we now give you the second clinical case presentation.



Transition Music 03:33

Ryan Van Patten 03:42



Okay, this is a right-handed, black man in his late 70s. He was born and raised in the US. He is monolingual English-speaking. Twenty years of education. He is a retired podiatrist. Married for 49 years, with two adult children. And he was referred by his neurologist for a neuropsych evaluation to assess his current level of neurocognitive functioning and emotional functioning in the context of possible deep brain stimulation surgery for Parkinson's disease. So I reviewed his medical records and the patient and his wife participated in a clinical interview. A bit of background in terms of his cognitive and motor symptoms. The patient and his wife both first noticed his initial symptom of PD, which was reduced left arm swing, about 13 years before the appointment. He was first diagnosed with PD two years later. Prominent motor symptoms for him were: bradykinesia, or slow movements, resting tremor, freezing of gait, poor balance, which included multiple falls, hypophonia, which means soft speech, as well as dyskinesias, which are involuntary movements. At the time, he was experiencing significant motor fluctuations throughout the day. As I mentioned, he was falling several times per

week due to the poor balance, and he did have several head impacts from the falls but no reported TBIs.

John Bellone 05:16



Ryan, can I jump in super quick? Can you differentiate what you mean by head impacts versus traumatic brain injuries for the audience, if they might not know your rationale there?

Ryan Van Patten 05:24



Sure. Yeah. So when I say "head impact", I simply mean that he hit his head in some manner. A traumatic brain injury, or concussion, is a clinical diagnosis which results from a head impact but also leads to symptoms such as confusion, posttraumatic amnesia, headache, dizziness, mental fogginess, there are others. So, you know, somebody can hit their head and not have any symptoms, and it's not a concussion. It's important for us to assess whether or not somebody with a head impact has actually experienced a traumatic brain injury or a concussion. In his case, no loss of consciousness, no other symptoms related to the head impacts, so they seem to be what we might call "subconcussive".

John Bellone 06:11



Yeah, excellent, especially for Parkinson's disease and people who have lots of falls, this is very necessary to assess.

Ryan Van Patten 06:19



Agreed. So a unique aspect of this case compared to other neuropsych referrals is that he and his wife reported no major change in memory or other cognitive abilities. So, again, this referral was specific for the DBS procedure. In terms of his functional status, his wife had always cooked and handled the finances - no change there. More recently, she began providing some minor help with reminding him of his appointments and to take his medications. He had decreased his driving recently, but that was due to the PD motor symptoms. So, for example, he had one recent motor vehicle accident where he drove the car into the garage door by accidentally pressing the gas pedal instead of the brake, and this was due to dyskinesia. Also, as you might expect, he was not able to drive when experiencing the more severe dyskinesias, during the so-called "medication off" periods when his medications were not working. In terms of his medical history, he had hypertension. He also had back, hip, and knee surgeries decades earlier. He was taking Sinemet, which is carbidopa-levodopa, and a few vitamins and supplements. His mood was reportedly good, with the exception of feeling a bit down due to no longer being

able to play golf from Parkinson's motor symptoms. He did report an improvement in mood after taking dopamine-promoting medications. For example, he reported that he liked going for a drive because he felt good after taking the medications. There was no reported speeding or reckless driving, and both he and his wife denied impulsive or unusual behaviors related to the medications. No history of anxiety. Importantly, no anxiety regarding DBS. There was a relationship for him between experiencing some anxiety related to motor freezing - anxiety occasionally would bring on the freezing and he would feel anxious as a result of motor freezing. I assessed for auditory and visual hallucinations, particularly visual, because some parkinsonian syndromes, such as Lewy body dementia, can come along with those visual hallucinations. He reported that two years earlier he had noticed a spider crawling down a wall. His wife was present and had not seen the spider. But this was a one-time event and she reported that she thought this was just a floater in his eye or he misperceived shadows on the wall because it had not recurred, there were no delusions associated with it, and he had no other hallucinations. Finally, to round things out, his psychosocial and cultural history. He had strong social support from family and friends - his wife, children, and others. His developmental history and his sleep history were both unremarkable. No learning disorder, no ADHD, no REM sleep behavior disorder. He had no family history of any neurological or psychiatric illness. And no substance use or substance abuse history.

John Bellone 09:34



Great. Seems pretty uncomplicated and a pretty typical Parkinson's disease case. Can you tell us about the behavioral observations before we start talking about the test data?

Ryan Van Patten 09:44



Not much to report here. Everything was within normal limits or as expected. He had dyskinesias, as we would expect. He was on his medications during testing and the psychometrist reported that his PD motor symptoms did not interfere with his test scores - so he completed some motor tasks, and we can interpret those data. He did have a parkinsonian gait, as you might expect, and he used a walker. But there are no other behavioral observations that were significant. Nothing problematic that interfered with the test data, in my opinion.

John Bellone 10:17



Okay, great. Then let's jump right to the test results. What did you give and what do you find?

Ryan Van Patten 10:22



We completed a comprehensive two and a half to three hour neuropsych battery. Both embedded and standalone performance validity tests were passed. His estimated premorbid functioning was above average, as you might expect given education and occupation. Attention and working memory were in the average range. Processing speed tests were in the average range. On language tests, confrontation naming was average, but animal fluency was exceptionally low. He only generated seven animals in one minute. Scores on visual spatial and visual constructional tests were average. Learning and memory was a bit more nuanced. So, we administer the CVLT-II. His learning score was low average, with 4, 8, 5, 7, and 6 words learned across the five trials.



John Bellone 11:15

It's out of 16. Just for people who don't know.

Ryan Van Patten 11:17



Right. Six out of 16 total words. His short and long delay, both free and cued recall, were all low average. And then in terms of recognition, his hits were 16 out of 16, but he had 11 false positives. So those are some notable scores from the CVLT. Logical memory, story recall, immediate recall, or Logical Memory I, was in the average range, but Logical Memory II was in the low average range. Recognition was average. Visual Reproduction I was below average and Visual Reproduction II was low average. Moving on, his phonemic fluency was in the average range. But his scores on the D-KEFS Trails Number-Letter Sequencing were low average. On the Color-Word Interference Inhibition subtest, his time was in the average range, but he committed 11 errors, which is a lot and below average. Same test, Inhibition/Switching had to be discontinued at the practice due to so many errors, and he was not truly able to understand the task. He also completed the 64-card Wisconsin, and he completed zero categories, which is below average. His total number of errors was exceptionally low. Perseverative responses was low average, perseverative errors was average. That wraps up the cognitive testing. We also administered a few self-report forms. His Geriatric Depression Scale score suggested minimal depression. The Pittsburgh Sleep Quality Index was normal. But his Apathy Scale score was 15, which suggests the presence of apathy.



John Bellone 13:02

All right. So, let me just try to summarize a little bit and then we can talk about what this all means. So, first of all, this is a pretty bright man, he's above average on all the premorbid functioning estimates - makes sense given his occupational and

educational achievements. His performance was generally intact in attention span, processing speed, working memory, phonemic fluency, confrontation naming. But he did have difficulties, particularly on aspects of executive functioning - you talked about problem-solving, inhibition, set shifting. He had difficulty on the semantic fluency task - naming animals. And, in terms of his memory profile, it was a little bit mixed. So he did have some difficulties on certain learning memory tasks - recognition memory - characterized by high false positive errors on the list learning tasks, so he was basically saying yes to all of the words. He's not reporting significant depressive symptoms, but little bit of apathy and poor sleep quality.

Ryan Van Patten 14:11



Yeah, that sounds spot on. So, with all of that in mind, I diagnosed mild neurocognitive disorder, probably associated with Parkinson's disease. And I did give some thought to the distinction between mild and major neurocognitive disorder for him. As we'll discuss, it has implications for DBS. So here is a little bit of language from my report. I said, "It is possible that his IADLs are being mildly affected by cognitive impairments although his wife has been providing assistance with many of these activities for years, so it's difficult to determine to what extent he could be fully independent. His motor symptoms may be interfering with driving." So, big picture, there are certainly objective cognitive impairments that most likely represent decline from a prior level of functioning. But in terms of his IADLs, it's not clear that he has any significant impairment due to cognition in his ability to complete those activities. There is impairment in driving due to motor symptoms, but cognition is less clear. So ultimately, I think mild neurocognitive disorder, or MCI, would be the most appropriate diagnosis.

John Bellone 15:26



Yeah, I agree. I mean, you said that he was using his pillbox to manage his medications. He needs a little bit of reminding to do medication management and with those types of tasks, but in general, it sounds like he's mostly able to manage them.

Ryan Van Patten 15:40



Right. He needs a few reminders from his wife regarding appointments or medications, but that can happen to anyone, young or old. And certainly, as people age, in healthy aging, sometimes a reminder can be helpful. That doesn't prove dementia, of course.

John Bellone 15:56



Yeah. And in the DSM-5, it allows for some help in terms of managing ADLs before getting into the dementia diagnosis. So we can have the mild neurocognitive disorder, aka mild cognitive impairment, and still need a little bit of help with some of our activities of daily living.

Ryan Van Patten 16:15



Right.

John Bellone 16:16



Okay, so what do you think this all means in relation to his candidacy for the DBS procedure?

Ryan Van Patten 16:26



Yeah, good question. One unique aspect about this case was that at the time of the neuropsych testing, and even the feedback, the patient and his wife had not yet met with their neurologist to talk about DBS in detail. Typically, in the center in which I was working at the time, and in most centers, as far as I understand, the meeting with the neurologist will happen first. The neurologist will explain DBS from a brain and PD motor symptom perspective. And then they will meet with the neuropsychologist and we talk about cognition and emotion. So, due to a scheduling glitch, they had not yet met with their neurologist, and that was important for how I framed the results.

John Bellone 17:10



Yeah. For me in my group practice, I see a lot of pre-DBS patients, and I find it's a little mixed. Sometimes they've been fully informed and they're just waiting for my results to go through with the procedure. Other times, they're in the very early stages and haven't really thought about it too much. Their neurologist just wants to get the cognitive testing to see if it's even something they should discuss. So I've seen people at different stages of that planning process as well.

Ryan Van Patten 17:37



Right. So a few things that I talked with them about in feedback. First, I'm not a neurologist or neurosurgeon, so I wanted to stay within my lane. But I just briefly mentioned some of the motor benefits of DBS, which can be reductions in tremor, reductions in dyskinesias and the on/off fluctuations, and importantly, reduction in the need for Parkinson's medications in people for whom it works. But I spent most

of the time talking about cognitive and emotional effects of DBS. So, first off, we were talking about diagnosis. And a quick and simple model for understanding our diagnosis and how that relates to our DBS recommendations would be that DBS is typically almost always contraindicated in people with dementia. Part of our job is to rule out that this person has dementia and if they have dementia, and it's irreversible, it's very rare for that person to get DBS. This is because people with that level of cognitive impairment often get even worse after DBS and have further declines in their functional abilities and cognition, and it leads to a poor quality of life. There's also concerns about informed consent - like, someone with dementia, can they truly provide informed consent for such a complex procedure and process? So that's major neurocognitive disorder or dementia. On the other end, as you might expect, DBS is not cognitively contraindicated in people who are cognitively healthy. So what we have here, as happens sometimes, is this person has MCI, or mild neurocognitive disorder, and then it's murky. There are no clear guidelines, one way or the other, for decisions about DBS, cognitively, in people with MCI. So at that point, what I do, what I did with this patient is I stepped back from the diagnosis and talked to them about some of the literature, which suggests that some specific cognitive impairments can be related to poor outcomes following DBS. This literature is complicated and nuanced. But sometimes with poor cognition, poor pre-DBS cognition, there can be outcomes such as delirium and confusion, a longer hospital stay after the procedure, and/or more rapid, later cognitive decline. I temper this by saying this isn't always the case, this is probabilistic risk. And this is always a risk-benefit decision that the patient has to make in the context of their own values and what's important to them, and their own health status. So I educated them in that regard. One other thing that I always mention is that there are very rare adverse events, cognitively and emotionally, from DBS. So the cognitive adverse events that are severe are very, very rare. The most common adverse event would be delirium or confusion, but that's 1 to 2% of people. Emotionally, depression is more common. Five to 10% roughly or so of people who have DBS can have this adverse event of depression afterwards. And I think it's important for patients and families to simply know about the possible downsides of DBS and weigh that against the improvement in quality of life related to improvement in motor symptoms that can happen.

John Bellone 17:41



Yeah, definitely. It's always the pros/cons analysis, risk-benefit calculation, and I'm glad that you talked through this with them. Obviously, then they should have that conversation again with their neurologist and neurosurgeon. And you had mentioned the fact that people with MCI are not contraindicated for this procedure necessarily, meaning that they can still pursue DBS. And it's a good thing because

the rates of mild cognitive impairment are pretty high in people with Parkinson's disease, especially as the disease progresses the rates of cognitive decline increase. So it's a good thing that they're not contraindicated because of that factor. And of course, it's a spectrum too, right? So someone could have very subtle cognitive difficulties, in that mild cognitive impairment stage, or it can be closer to the dementia part, right? It's a spectrum. We treat it as a category, but really, someone can be anywhere on that spectrum.

Ryan Van Patten 22:15



Right, that's such an important point. So, as a neuropsychologist, we can try to stage the person along the continuum to think, "Is this person a mild MCI case?" Like they just barely have enough objective cognitive impairments for me to slap a label of MCI and they might be actually a healthy, older adult? Or are they cuspy with respect to MCI versus dementia, in which case they might be progressing into the dementia range soon. And with that latter person, I would be much more concerned, as you suggested.

John Bellone 22:49



Yeah. And of course, our job is not to decide whether or not they are a candidate or not. We just inform the neurologist and the patients, based on the cognitive data, if they're close to the dementia threshold. We'll say that, and then they can make the decision - the neurologist, neurosurgeon, family. We don't make that decision, luckily.

Ryan Van Patten 23:11



Right. Right. So we are part of a care team. And we provide our evidence-based opinion to that interdisciplinary team, the patient, and their family, and then they ultimately make this informed decision based on the risk-benefit analysis we talked about earlier, whether or not to proceed. So it's good that we don't have to weigh in on one side or the other, make the final decision one way or another. We just have one piece of the puzzle to talk about.



John Bellone 23:38

Yeah. Great. Why don't we talk about some recommendations and plan?



Ryan Van Patten 23:43

Sure thing, sounds great. I wanted to mention one other piece that I always mention to patients if it's relevant, which is what the literature says about the cognitive

effects of DBS more broadly. Typically, in group based studies, there are usually small, sometimes moderate, negative effects on executive functions, particularly verbal fluency. So I often talk about that verbal fluency finding, because for some people, it's a big deal. If you're a frequent public speaker, or for some reason you're a very verbal person and that's important to your quality of life, a small hit to verbal fluency could be a big deal. But if you're more of a hands-on person, and/or for whatever reason, it's less important, then that may play into that patient's decision. I just wanted to cover that real quick.



John Bellone 24:35

Yeah, good. And of course, it's all probabilistic, like you mentioned before. So you just inform them of that possibility.



Ryan Van Patten 24:41

Yep. So recommendations in the report that I also discussed in the feedback session. First and foremost, I recommended that their neurologist should discuss the risks and benefits of DBS surgery with them. Also, I thought it was important that they talked to their physician about the impact of his motor symptoms on driving, given that he was in that accident and he talked about the fact that he enjoys driving and that sometimes after taking the PD medications he would go for a drive to feel good. I felt like that was enough of a red or yellow flag to me just to raise awareness about this issue of driving safety and suggested conversation. I also recommended that they monitor his cognitive and emotional health and his functional capacity over time, given that it's possible that he would progress into a stage of dementia. I recommended he consult with physical therapy and occupational therapy around fall risk. He used walkers in his house, he had a few different walkers and different levels of his house, there's a three story home. And it was good he was using walkers, but he was falling regularly and I didn't want him to get injured, in particular experience a traumatic brain injury. As with many patients with Parkinson's disease, I gave them information about the local Parkinson's Disease Association chapter to look into for patient and family support groups. I covered some compensatory cognitive strategies, which I'm happy to go over. And I gave some brain health recommendations. One of those that's specific to Parkinson's disease includes skilled exercise, such as boxing, dancing, or tai chi, which can be especially helpful for people with movement disorders.



John Bellone 26:31

Of course, it's non-impact boxing, right? Non-contact. [laughs]



Ryan Van Patten 26:35

[laughs] Right. I didn't even think to specify that. But they're not getting in the in the ring, taking punches to the face -



John Bellone 26:45

[laughs]



Ryan Van Patten 26:45

- that would be less than helpful for sure.



John Bellone 26:48

Yeah. No, but you're right. There's a lot of research on boxing in particular but also dance and tai chi - any balance or, like you said, skill-based exercise.



Ryan Van Patten 26:59

Yeah, there's something about - Of course, exercise in its own right is important for brain health, cardiovascular aerobic activity, but in people who have these movement disorders, extrapyramidal symptoms and problems with voluntary movement, a skilled exercise where they are intentionally practicing these movements can sort of counteract that to some extent. And so as I mentioned, there are a few different options in that regard. But a lot of people derive good benefits from that.



John Bellone 27:29

Yeah, just going off of that, again, I think, you know, obviously, Ryan, you and I practice in different areas. But for any of us doing these evaluations, I think it's super important to have an awareness of the local resources available for Parkinson's disease patients. So there are many organizations in Orange County where I practice that I like - there's the Parkinson's Association of Orange County, and they have local support groups and different activities. They have boxing classes and yoga classes and dance and things like that. So I think it's just extra important. I wanted to emphasize that, that we give patients concrete resources that they can follow up on - emails and addresses, phone numbers, dates of support groups, whatever we have as easy as we can make it for them, because that social aspect and the skill-base exercises are so important for them.

Ryan Van Patten 28:21



Yeah. One other thing about the boxing, I've attended some of these sessions before. One of these organizations is called Rock Steady Boxing, and it was outstanding. I was so impressed. I attended as a helper, as a psychologist who I was helping refer people to their center, and I wanted to know more about it. The physical trainers and instructors who were working with these people were great. They had a great rapport, it was high energy, it was positive. I noticed the patients seem to really enjoy it. It seemed to be somewhere they could go where they could take back some of their own agency - you know, they could move around, there was padding and they wouldn't fall and hurt themselves, a lot of safety precautions, but they could finally move their bodies and relearn how to move in ways that were fun and exciting. And they could get their heart rate up and learn new skills. They just loved it. And so I was sold on its utility. Of course, there could be variability in how good these centers are, but I think it's a recommendation to certainly consider for people with PD.

John Bellone 29:29



Yeah, excellent. I'm looking at the list of classes in my area here. There's water aerobics. There's this one that caught my eye - the "tremble clefs" music therapy group. "Tremble clefs", brilliant. Anyways, I think it's good to be hooked up with these local resources.

Ryan Van Patten 29:49



I did want to mention one other thing related to this patient who I presented. I did consider Alzheimer's disease as a comorbidity. So, listeners, you may have noticed as I went through some of the data, from one lens, some of his results may have suggested early Alzheimer's disease - category fluency was very low, learning and memory were low. And so I think that's possible. There wasn't enough evidence to concretely diagnose AD. But I did mention that some of the evidence was partially consistent with that. If AD was present, it probably was not very progressed, given that the patient and his wife hadn't noticed major cognitive changes. There weren't major memory problems in his daily life. And I think it is possible that all of his cognitive profile is entirely explained by Parkinson's disease. He had been diagnosed for 11 years, and PD can be related to learning and retrieval deficits on memory. So I just wanted to mention that I had considered AD as a comorbidity. It's important to do so because if someone has Alzheimer's dementia, that is likely a rule out for DBS, but there was not strong evidence for it.



John Bellone 31:05

That's a good caveat to mention. Why don't we just talk a little bit about the cognitive strategies that you recommended, and then we can probably wrap up after that?



Ryan Van Patten 31:12

Sure. So a few specific cognitive strategies tailored to him would be that he might benefit from repetition of verbal material, given his learning and memory scores. Prompts and cues might help him learn and recall more information. He might benefit from habitually using one source of information about his daily schedule, like a calendar, which could help him remember doctor's appointments, medications. Certainly, if they go through with DBS, there's a high burden on the patient and their caregiver, both pre-, peri-, and post-operatively - with appointments, medication changes, and tailoring the device to the person. So if he goes through with this, it will be very helpful for him and his wife to be very well-organized. I suggested the possibility of using special places for commonly misplaced objects. And the provision of written instructions that could help him with complex or multi-step tasks given constraints on his memory.



John Bellone 32:18

Yeah, I'm glad that he has his wife as a support. If he was on his own, I would be much more concerned about him going through this procedure. But he has that support there.



Ryan Van Patten 32:27

Agreed, yeah. I think it's easy to underestimate the burden on patients and their families of the DBS procedure. Before, during, and after - there's financial burden, there's cognitive burden. So, to some extent, I think about this like recommending somebody return to work or return to driving. This is a cognitively demanding task for the patient and their families. So the fact that he had strong social support was very helpful.



John Bellone 32:57

Just going back to the resources, I thought of another one. There are the LSVT BIG & LOUD therapy programs. I don't know if they're all over the country or internationally available, but those are some programs that I've heard good things about as well.



Ryan Van Patten 33:13

Yeah, for the parkinsonian gait, for the shuffling gait, those types of treatments can be really helpful as well. And it's a similar idea to skill exercise, right?



John Bellone 33:26

Yep. And then just one last thing, Ryan, do you think it would be good to consider repeating testing for this person? What are your thoughts there?



Ryan Van Patten 33:35

Yeah, good question. I'm glad you mentioned that. So another important function of the pre-DBS evaluation is establishing a baseline. So we test them before DBS and then, if he goes through with it, after DBS we would and should test him again. And then we can measure whether or not there have been any major cognitive or emotional changes related to DBS. We want to track if there are negative impacts of the procedure, we want to track them and then provide any support that we can. So certainly if he goes through with DBS, I would like to see him again afterwards. Even if not, it could be helpful given that we diagnosed mild neurocognitive disorder, and he and his wife would probably be interested in wanting to know if this is progressing and if so at what rate. They might start to notice functional difficulties if his cognitive symptoms do progress. So even if there is no DBS, within a year or two, I'd be very open to seeing him again.



John Bellone 34:40

Okay, great.



Transition Music 34:45



John Bellone 34:45

Well, that does it for today's clinical case. I'd like to quickly add that I often send pre-DBS patients links to a couple podcasts by neurologists talking about DBS to a lay audience, and I've included these in the show notes for this episode in case you'd like to listen to them and/or share them with patients. And, as always, thank you so much for listening and join us next time as we continue to navigate the brain and behavior.



Exit Music 35:12



John Bellone 35:35

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Ryan Van Patten 35:47

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