PedsCases Podcast Scripts

This is a text version of a podcast from Pedscases.com on "**Developmental Regression.**" These podcasts are designed to give medical students an overview of key topics in pediatrics. The audio versions are accessible on iTunes or at www.pedcases.com/podcasts.

Developmental Regression

Developed by Annie Poon and Dr. Lyn Sonnenberg for PedsCases.com.
December 14, 2018.

Introduction:

Annie: Hello, my name is Annie Poon, I am a medical student at the University of Alberta and I am joined by Dr. Lyn Sonnenberg, a neurodevelopmental pediatrician at the University of Alberta. In this PedsCases podcast, we will be discussing an approach to developmental regression in children. Welcome, Dr. Sonnenberg;

Dr. Sonnenberg: Thanks for having me!

Annie: Thank YOU for having me, I'm loving the new office! For those of you that don't know, Dr. Sonnenberg is now the Director of Education Technologies in the faculty of medicine education office here at the U of A.

Dr. Sonnenberg: Haha! I am loving my new role and office!! So, what's the game plan for today?

Annie: By the end of our podcast, we hope that listeners will be able to:

1) Define and recognize developmental regression
2) Obtain pertinent information on the history and physical examination
3) Develop a broad differential for the causes of developmental regression.
4) Order relevant investigations to make a diagnosis

For a general overview of development please listen to our PedsCases podcast on Developmental Assessment. You can also find evidence-based developmental milestones on the PedsCases Developmental Milestones chart, the link to which I have posted in the script: (https://pedscases.com/developmental-milestones). Let's start with a clinical case.

Case Presentation:

Dr. Sonnenberg:
Bailey is a 14-month-old infant referred to a developmental pediatrician for loss of fine motor and communicative abilities. Bailey's parents report that in the last 3 months, Bailey has lost previously acquired skills such as grasping her cheerios and has stopped making eye contact with them, and does not point to things she wants, as she had previously done. She has always been healthy and meeting her developmental milestones so her parents are understandably concerned. At her one year well-baby exam, her doctor noted that her head circumference growth had slowed. What could be causing this loss of milestones?

Definitions:

Annie: Very interesting case! Could you tell us a little about developmental regression? How does it differ from developmental delay?

Dr. Sonnenberg: Developmental regression occurs when children lose certain developmental skills that they had previously successfully acquired. Essentially, they move backwards in their development. In contrast, developmental delay is when children reach milestones later than expected, or experience plateaus in their skills. Developmental regression and developmental delay can occur in one or multiple skills domains.

Annie: What is the significance of developmental regression and why should we worry when we see it?

Dr. Sonnenberg: The incidence of developmental regression is rare but is important to recognize as it can signal a serious underlying condition, some of which can be treated if noted early.

When seeing a patient with developmental regression, there is an extremely broad differential diagnosis. Many disorders which cause regression are extremely rare and are best diagnosed by pediatric sub-specialists. However, there are several broad categories to consider. Throwing the ball to you, can you name a few?

Annie: Due to my amazing internet perusing skills, I CAN name a few:

1) Autism Spectrum Disorder – In which parents noted a regression in language, communication and/or social skills at initial presentation.
2) **Neurodegenerative Disorders – Such as Rett's Syndrome or** Metachromatic leukodystrophy (MLD) present with loss of skills and focal neurologic signs.
3) Inborn Errors of Metabolism (IEM) – Such as these complicated names I can't pronounce!

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Dr. Sonnenberg: Phenylketonuria or Mucopolysaccharidosis, which can present with developmental delay, and a wide variety of manifestations.

Annie: Thank you for the save, Dr. Sonnenberg. They don't teach you pronunciation in medical school! So back to the list…

4) Structural Brain Disease – Such as hydrocephalus or tumours can lead to progressive brain injury.
5) Infectious Diseases – Recurrent infections in an immunocompromised host or an infection that crosses the blood-brain barrier can damage the brain
6) Psychiatric Disease – Such as OCD or depression can present as a loss of skills, although it is controversial about whether these conditions cause true regression.

Are there any I am missing?

Dr. Sonnenberg: Great work! I have a few more categories on the differential that we should think about:

7) Seizure Disorders – Such as Lennox-Gastault syndrome. These can cause neurological impairment and subsequent developmental regression
8) Trauma/Injury – Can cause a loss of skills
9) Sensory deficits – for example, progressive vision or hearing loss
10) And finally Psychosocial causes – Significant psychosocial distress or toxic stress can temporarily cause regression in skills.

The causes I just listed are often easier to rule out based on the history, physical exam, and imaging!

History and Physical Exam

Annie: As any good medical student/resident/physician knows, history and physical exam are vital in narrowing our differential and finding the underlying cause! So in our case, what should we be asking on the history?

Dr. Sonnenberg: We can start by asking for details of when the parents first noticed the regression. Was the loss of skills sudden, gradual, or fluctuating? Were there any significant injuries, illnesses, or traumatic events preceding that? Did she experience any seizures or vision loss? Parents may have noticed the child is bumping into things and tripping more often than before. Did they notice any other changes, physically or emotionally? For example, how was her feeding, sleeping, and elimination like? What else do you think we should ask?

Annie: We should ask about the Bailey's development from birth, starting with the pregnancy. Were there any complications during the pregnancy, during birth, or post-natally? If there is evidence of prenatal abnormalities, we would be more concerned of a congenital problem. What was her gestational age? Take a look at her growth charts and see how she has been tracking in terms of height, weight, and head circumference.

Was she meeting developmental milestones up until the regression? Focus particularly on the five main areas of development: gross motor, fine motor, speech/language, cognition and social skills. (We use the mnemonic Gotta Find Strong Coffee Soon to help remember the domains). Ask about medication use. Are her immunizations up to date?

Dr. Sonnenberg: Excellent! It is also pertinent to ask about family history: does anyone in Bailey's family have any early developmental concerns or delays? Were there any pregnancy loses, early childhood or unexplained losses? These can be concerning for metabolic diseases. What were her siblings like at her age? Are there other disorders that run in the family? A sensitive topic that is extremely important to address is the possibility of consanguinity. Consanguineous couples have higher rates of genetic disorders which can cause developmental regression.

Annie: How do we ask families about that without offending them?

Dr. Sonnenberg: Often, it is more embarrassing for the clinician to ask than it is for the couple to hear, as they already know they are related and it isn't an issue for them culturally. I like to phrase this question as "Are you and your partner related in any way outside from marriage." If you ask in a non-judgmental manner, it will be received as a routine question which IS what it is!

Annie: OK, so now that we have an approach to history, what would we be focusing on during the physical exam?

Dr. Sonnenberg: We would examine for any dysmorphisms such as distinct facial features, organomegaly, measure height, weight, and head circumference, and look for neurocutaneous features. Coarse facial features could point to conditions such as Hunter's disease, smaller head circumference could point towards Rett Syndrome, while a larger head circumference could be a sign of Autism Spectrum Disorder. As well, physical growth abnormalities could signal genetic or metabolic causes.
Next, we could do a quick neurologic exam assessing for spasticity, hypo or hypertonia, ataxia, and weakness. Then we could move on to assessment developmental skills and milestones.

Remember the 5 different domains of development?

Annie: "**G**otta **F**ind **S**trong **C**offee **S**oon"! What a fitting phase! I have probably spent just as much on coffee as I have on my medical school tuition so far! So we don't have time to review all of the developmental milestones but could you talk about what to expect in an infant of Bailey's age.

Dr. Sonnenberg: So let's look back at her last major developmental milestone stage, which was 12 months of age. A 12 month-old should be able to walk a few steps with a wide-based gait. They also develop fine pincer grasps – where they use their fingertips

to hold things now, which means they can start self-feeding and pick up small objects easily objects. In terms of speech and language, they will respond to their own name and can follow 1-step commands without gestures. Cognitively, they are able to understand cause and effect, trial and error, can imitate with gestures and sounds, and will use objects functionally. Finally, socially, they will point at wanted items and explore from a secure base.

Annie: Interesting! So with that in mind, let's return to Bailey and her history: Bailey's mother claims no prenatal difficulties or conditions such as gestational diabetes or hypertension Bailey was her second pregnancy and second child at the age of 32. Bailey was a term baby at 38+5 weeks via vaginal delivery. She has been tracking along the 70th percentile in terms of weight and height but her head circumference seems to have dropped to the 30th percentile since 8 months of age. There is no family history of similar symptoms and no disorders that run in the family. Bailey's older brother, who is 8, has been developing typically with no concerns. Bailey's parents have no familial relation to one another.

Bailey's parents note that she had previously been meeting all her milestones normally and was thoroughly enjoying playing with, picking up, and eating her Cheerios until a few weeks ago. They could not think of any preceding injury or illness and claims that Bailey had been perfectly healthy. As a previously very interactive child, Bailey was constantly babbling and pointing at things to draw her parent's attention to them but as of late, it seems she has lost all interest in doing that. In terms of eating, she still really enjoys her Cheerios but can't seem to pick them up like she used to. They have not noted any seizure episodes or signs of vision loss. Feeding and eliminating have been normal as well.

Upon physical examination, Bailey is sitting and swatting at her snacks on the table. She is not making eye contact with you despite you sitting in front and talking to her with a toy in hand. You notice that she displays some hand wringing at midline in between trying to grasp her snacks. Despite the fine motor regression, Bailey can still walk independently around the room, although her gait is more wide-based than you'd expect. It almost looks like she has just started walking even though she has been walking for 2 months now. There are no signs of physical injuries, abnormalities, or organomegaly. Her head circumference, however, has crossed two major percentile lines.

Dr. Sonnenberg: Based on this history, what in our differential diagnosis seem the most likely to you?

Annie Due to the lack of any significant event prior to the regression, traumatic or environmental causes can be shuffled to the bottom of our list. Genetic disorders also seem less likely due to a lack of family history but we cannot rule it out. There are no signs of metabolic disorder, such as Phenylketonuria or Mucopolysaccharidosis. I am more suspicious of Autism Spectrum Disorder due to the lack of eye contact and social

engagement, and repetitive hand movements. However, she has acquired microcephaly and is female, which makes me more suspicious of Rett Syndrome because this trait is a salient defining feature of the disorder.

Investigations

Annie: So based on this broad differential, what initial investigations would you order?

Dr. Sonnenberg: We suspect that this may be a case of Rett Syndrome, there are a couple of investigations we should do. Because Rett syndrome is commonly due to a de novo mutation of MECP2 gene, we would obtain a blood sample for DNA analysis. Even though we could obtain an EEG, as they can be abnormal in patients with Rett Syndrome, we do not have to do one unless we are concerned about seizures, as an EEG is not needed for the diagnosis. Common things being common and the fact that Rett Syndrome can present with autistic-like features, it would be useful to perform a screening tool such as the Modified Checklist for Autism in toddlers (M-CHAT) if the genetic testing for Rett Syndrome came back negative.

Annie: So as a neurodevelopmental pediatrician, what additional investigations would you be focusing on in your clinic?

Dr. Sonnenberg: Great question! Bailey was probably referred to me to determine more her developmental stage and recommend how to best support Bailey's development and what additional resources her family would require. Using the "Bayley III Scales of Infant and Toddler development", I would assess her cognitive, motor, social, and language abilities at the time of her visit. I would also refer her to an early intervention program aimed at supporting development in the areas of need. We should start these programs right away, as a specific diagnosis is not needed for treatment and it can take several months before a specific diagnosis is confirmed. There are many supports for parents of a child with developmental delay so it is important to be aware of those resources in the local community and introduce them to the parents, including financial ones.

Key Points

Annie: Before we conclude, I just wanted to talk about a few key points for this case, and all PedsCases in general!

1) **Don't forget the obvious!** Are the motor abilities due to a vision problem? Are the language difficulties a result of hearing problem? Make sure to always include hearing and vision testing!
2) Common things are common! Be vigilant about possible Autism Spectrum Disorder and genetic/metabolic disorders.
3) Remember the biopsychosocial model! Sometimes it isn't entirely biological. For example, a school-aged child that suddenly doesn't talk. Ask about school

and social life and gauge the child's reaction. Maybe the child's environment is contributing to his lack of speech.

4) Always remember that you are working with a whole family, not just the child! Never negate parents' concerns, but try to educate in a patient and positive manner. Give care givers the tools to be successful in navigating their child's development.

Dr. Sonnenberg: Excellent! So in closing, I would like to go over the key points in assessing developmental regression, specifically.

1) Take any parental concerns around development and skills loss seriously! It is important to catch it **early** on and start early intervention programs as soon as we can.

2) The differential diagnosis is broad but can be narrowed with a thorough history and physical exam.

3) Take a thorough **history** focusing on the patient's developmental trajectory, details about birth, family history, and any significant events around the time of regression onset.

4) Perform a **physical** exam focusing on the area of regression and assessing other possible affected skills.

5) It is important to assess which **skill** or skills has regressed. In order to do this, we should be familiar with the recommended developmental milestones.

6) Order **investigations** (or refer to another specialist such as neurologist or geneticist) to ascertain the most likely diagnosis

7) Offer **early intervention programs** focusing on **skill development** and learning to use **adaptive equipment**

8) **Follow-up** to ensure the patient is well-connected to services, has the right equipment in place and that pain is being managed, if present. Also of importance is social and emotional support, as having a child with a complex disability can be isolating and draining. The social worker is often the greatest asset on the medical team, especially in cases like these!

Annie: Thank you, Dr. Sonnenberg! It was an absolute pleasure working with you and hearing your expertise on this topic. I had a lot of fun creating this case and I hope everyone found this podcast informative and easy to follow!

References

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