

Etiology of childhood apraxia of speech



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Abstract

This paper explores many aspects of the etiology of childhood apraxia of speech (CAS) including specific characteristics, cause of pathology, impact on subsystems and an overview of a full assessment. Bernthal, Bankson and Flipsen (2017) discuss that childhood apraxia of speech is a speech sound disorder with distinct difficulty in motor planning and execution. There is no cumulative list of exact features children with childhood apraxia of speech possess, but the American Speech-Language-Hearing association released a position statement in 2007 with the three main agreeable elements.

Similarly, the motor-disorder has three main causes, two that are associated with neurologic elements and one (and most common) cause is unknown, or idiopathic (Bernthal, Bankson and Flipsen (2017). Bernthal, Bankson and Flipsen (2017) also go on to describe that children with childhood apraxia of speech may exhibit signs in all four subsystems: the respiratory system, the phonatory system, the articulatory system and the resonatory system. The paper also examines the methods use to evaluate a child with childhood apraxia of speech, and delves into both informal and formal measures. Finally, consideration for referral to other healthcare providers is discussed.

Keywords : childhood apraxia of speech, CAS, pediatrics, speech sound disorders, motor-based speech sound disorder

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Characteristics of Impairment

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Childhood apraxia of speech, also known as CAS, is a motor-based speech sound disorder (ODell and Shriberg, 2000). Before discussing the distinct features that can be present in a child with CAS, it is worthwhile to note the possible causes. There is not one exclusive cause for this disorder, but three accepted causes (Bernthal, Bankson, Flipsen, 2017). The first way it can present is the result of a neurological pathology, the second is that it can be co-existing with a neurobehavioral disorder, and the final cause is referred to as idiopathic CAS, because the origin is unknown (Bernthal, Bankson, Flipsen, 2017). Although the topic of definitive features of this disorder is heavily debated, there is no concise list exists. Rather, the American Speech-Language-Hearing Association, also known as ASHA (2007), recognizes three agreeable characteristics of the disorder to be “ inconsistent errors on consonants and vowels in repeated productions of syllables or words, lengthened and disrupted coarticulatory transitions between sounds and syllables and inappropriate prosody, especially in the realization of lexical or phrasal stress.” What this means is that teachers may report that a child does not produce a word the same way when it is repeated multiple times, parents may notice that their child takes pauses between words or syllables. A speech-language pathologist may notice that the child may seem like he or she knows what they want to say, but is having difficulty producing the sounds necessary to articulate their words (Hillis et al., 2004). Grigos, Moss, and Lu (2015) noted that for inclusion into the CAS group of their study:

Children with CAS also demonstrated at least four of the following characteristics: metathesis, vowel errors, timing errors (e. g., difficulty differentiating between voiced and voiceless cognates), phoneme

distortions, articulatory groping (e. g., visual struggle accompanying phoneme production), impaired volitional oral movement (e. g., excessive oral opening during an open/close sequence), reduced phonetic inventory, and poorer expressive than receptive language skills. (p. 1107)

In addition to speech difficulty, results of a study by Nijland, Terband and Maassen (2015) also suggest that children with CAS have impairments in the areas of sequential tasks, and complicated sensorimotor tasks when compared to typically developing children. In other words, a child may present with a variety of outward signs.

Impact on Subsystems

Childhood apraxia of speech can have effect all four subsystems of speech. Bernthal, Bankson and Flipsen (2017) discuss that because of the level of complexity and precise timing needed to control the larynx and respiratory cycle for intelligible speech, children with CAS often struggle with accurate production. Grigos (2017) discusses that the coordination of the four subsystems is what will be difficult for children with childhood apraxia of speech.

Respiration

The respiratory system may be impacted in children with childhood apraxia of speech in the sense that they have difficulty timing the movement of their air stream with their other articulators (Tukel et. al (2015). Grigos (2017) notes that unless a child has an underlying neurological pathology, the respiratory system is likely to not be further impacted. Therefore, the

function of the respiratory system without additional pathology will likely be normal, but rather the coordination of the respiratory system in combination with other subsystems will be what is impacted in childhood apraxia of speech.

Phonation

As the air stream moves superiorly from the lungs through the phonatory system, it meets the vocal folds. Children with childhood apraxia of speech typically will have reduced control and coordination of voicing (Ballard, Maas and Robin, 2007). This means that the vocal folds are not exempt from the decreased coordination difficulties associated with CAS. Moreover, it implies that patients with childhood apraxia of speech could produce a voiced phoneme in place of what should be a voiceless phoneme, and it could contribute to one of the three agreeable features of CAS, inappropriate stress placement (Darley et al., 1975).

Articulation

When the air continues past the vocal folds, it will meet the articulators. Tukul et. al (2015) report that during their study they found that participants diagnosed with childhood apraxia of speech had significant lack of control over their articulators. Clearly, if a child is unable to plan their movements, or control the placement or timing of their articulators, shaping them to produce the correct speech sound would be very troublesome. Another way articulation difficulty presents in children with childhood apraxia of speech, is altered prosody (ODell and Shriberg, 2000). Kent and Rosenbek (1983)

explain that altered prosody may mean that present in slow speech rate or prolonged pronunciation of sounds due to slow articulatory movement.

Resonance

The air resonates in the oral or nasal cavities to produce the sounds that we hear. It is no surprise that resonance is another example of how inconsistency is present in patients with childhood apraxia of speech (Sealey and Giddens, 2010). Grigos (2017) explains that if the child's timing of the velopharyngeal port is inappropriate, they may produce a nasal phoneme when mean to produce an oral phoneme.

DESCRIPTION OF SPEECH ASSESSMENT WITH INFORMATION SPECIFIC TO THE DISORDER

Any child of concern should undergo a speech sound assessment along with an oral motor exam and hearing exam to determine pathology and if any further referrals are necessary (Bernthal, Bankson and Flipsen, 2017).

Bernthal, Bankson and Flipsen (2017) describe the goals of a speech sound assessment to be to ascertain if the child's speech is deviant enough from what is typical, identify possible pathology, establish possible treatment options if they are deemed warranted, as well as make determinations in regards to prediction of the outcome if intervention is not initiated.

Assessment can take place in a multitude of ways, and both formal and informal assessments play important roles in being able to perform a thorough evaluation and see the whole picture and form a diagnosis. In addition to assessment, a speech-language pathologist must also interpret results and formulate a treatment plan. However, first a child may undergo a

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speech screening to determine whether or not additional assessment is necessary (Bernthal, Bankson, Flipsen 2017). This process is relatively quick and can typically be given in 5 minutes (Bernthal, Bankson, Flipsen 2017).

INFORMAL ASSESSMENT TOOLS

After a child has been through the screening process, the speech-language pathologist will determine if further examination is necessary. If further assessment is needed, the speech-language pathologist will then begin a thorough speech sound assessment. One of the first steps of this process is evaluating the child through informal measures such as simple conversation and review of previous medical history (Strand, et al., 2013). This may take place in the form of interview-style questioning (Bernthal, Bankson, Flipsen 2017). The speech-language pathologist may ask the child a series of questions to get an idea of their natural speech in a relaxed setting. Prompts such as asking the child their name, some of their interests, the names of their family members or what school they go to can provide integral examples of the child's speech ability because it uses familiar speech sounds that should be included in their inventory (Bernthal, Bankson, Flipsen 2017). At this time, the speech-language pathologist should listen for prosodic and fluency errors, and inconsistent repetitions. A benefit of this kind of assessment is that it can also be done in groups, and interpersonal skills can be observed.

FORMAL ASSESSMENT TOOLS

Bernthal, Bankson and Flipsen (2017) discuss that formal assessment tools are useful when a speech-language pathologist is seeking normative data for <https://assignbuster.com/etiology-of-childhood-apraxia-of-speech/>

comparison material or universal testing procedures. This would provide quantitative data that can be used to track the child's progression as therapy continues, as well as enables the clinician to retest the child and compare their new results to their baseline findings. The recommended assessment battery for CAS according to Bernthal, Bankson and Flipsen (2017) includes a hearing screening, oromotor examination, analysis of both connected speech and single word tasks, stimulability tasks, and observation of phonological perception and overall intelligibility. Grigos (2017) also notes that an oral peripheral examination should be performed to discriminate between pathology deriving from function vs. structure. During this exam, one should examine facial symmetry and the appearance of the articulators (nose, jaws, lips, tongue, teeth and palate) (Grigos, 2017). Grigos (2017) also notes the many factors that need to be taken into consideration to pick the most appropriate formal assessment for a child, the chronological age needs to be taken into consideration, there should be a chance to observe sounds multiple times, in multiple positions, through different contexts. One test that meets a number of these requirements is the GFT-3. As Grigos (2017) mentions, the test gives the clinician the opportunity to assess sounds in any word position, assess sounds in both words and phrases, and includes stimulability tasks. For a child with childhood apraxia of speech, this would be appropriate because it is also a picture test, and again, with childhood apraxia of speech, the child knows what they want to say, but sometimes cannot articulate what they wish to say (Hillis et al., 2004). If the child being tested actually had childhood apraxia of speech, the child will be able to identify what the picture is, but may not be able to communicate that. However, although there are specific standardized tests for the assessment

of motor disorders such as the VMPAC, Bernthal, Bankson and Flipsen (2017) warn that “...the available published tests for childhood apraxia of speech appear to be inadequate for the task.” One test, the Verbal Motor Production Assessment for Children (VMPAC) is an example of a formal assessment that evaluates the oral motor mechanism, and tests it through sequential tasks (both speech and non-speech) that helps us evaluate neuromotor control (Hayden and Square, 1999). McCauley and Strand (2008) report their findings from their study that of the six tests they evaluated, the VMPAC was the only one that they considered to possess validity, but still does not have reliability. This is consistent with Bernthal, Bankson and Flipsen’s (2017) statement, and therefore, relying on standardized testing alone for the diagnosis of childhood apraxia of speech is not recommended.

TEAM/CONSULTATION CONSIDERATIONS:

For a child with CAS, in addition to the Speech Language Pathologist, other health care professionals should be involved with full assessment of the child to rule out any added pathology. To quote Bernthal, Bankson and Flipsen (2017) “ If in doubt, refer for further testing.” Any time children are involved, communication with the pediatrician is indispensable because they can provide background of the child’s milestone achievement and can also help coordinate care with specialists. As always, a consultation with an audiologist is vital so that the child can have a full audiologic examination to rule out any possible hearing loss (Grigos, 2017). A recommendation to an ear, nose and throat physician would be beneficial for further work up and any necessary treatment if any deformity or abnormality was seen during the OPE. If the child is also having difficulty with fine motor skills, like Nijland, <https://assignbuster.com/etiology-of-childhood-apraxia-of-speech/>

Terband and Maassen (2015) had stated was possible, suggestion to return to a primary care physician to inquire about referral to occupational or physical therapy could also benefit the child. Finally, a consultation with a neurologist may also be worthwhile, to rule out any possible underlying neurologic pathology. A report by Morgan and Webster (2018) cites that if warranted, a specialist may consider having a MRI performed to rule out neurologic lesions. Moreover, they acknowledge that patients with isolated CAS who undergo MRI assessment do not typically have lesions present.

Conclusion

In conclusion, Ballard, et al., (2010) state that there “ has been a debate over the diagnostic markers of CAS,” which has become evident through the lack of cumulative list of distinctive features, but it is clear that a variety of signs may be present. The study by McCauley and Strand (2008) reinforces that there is also no solidified “ gold standard” when it comes to formal assessment for childhood apraxia of speech and that more research must be done before that conclusion may be drawn. With this in mind, a combination of both formal and informal assessment, can help diagnose childhood apraxia of speech. Clinically speaking, if any question as to whether or not there are co-morbid (neurologic, audiologic, structural or other) factors in play, the child should be referred out for further evaluation and possible treatment by the appropriate specialist (Bernthal, Bankson and Flipsen, 2017).

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