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CASE REPORT

Aphasia rehabilitation during adolescence: a case report

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ABSTRACT

Purpose: Descriptions of speech-language interventions addressing the unique aspects of aphasia in adolescence appear to be nonexistent. The current paper presents the case of a male adolescent who experienced a stroke with resultant aphasia and the speech and language therapy he received. Furthermore, we discuss the issues that are unique to an adolescent with aphasia and how they were addressed with this particular patient.

Methods: Traditional language and apraxia therapy was provided to this patient with inclusion of technology and academic topics.

Results: The patient demonstrated improvements in his speech and language abilities, most notably his reading comprehension and speech production. Age-related issues, including academic needs, group treatment, socialization, adherence/compliance, independence and family involvement, emerged during intervention.

Conclusion: Although aphasia therapy for adolescents may be similar in many aspects to selected interventions for adults, it is necessary for the clinician to be mindful of age-related issues throughout the course of therapy. Goals and interventions should be selected based on factors salient to an adolescent as well as the potential long-term impact of therapy.

► IMPLICATIONS FOR RESEARCH

- Aphasia and its treatment in adolescence need to be further explored.
- Academics and technology are important aspects of aphasia treatment in adolescence.
- Issues specific to adolescence such as socialization, adherence/compliance, and independence are important to address in speech-language therapy.

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Introduction

Although stroke is a health risk for older adults, with 66% of new strokes occurring in people over the age of 65 years,[1] strokes also occur much earlier in the lifespan. Indeed, the incidence of stroke in adults less than 55 years of age is increasing.[2] Recent reports suggest that 83,000 strokes occur annually throughout the world in people less than 20 years of age.[3] Stroke etiology in younger age groups greatly vary and are more typically of unknown origin when compared to causes of stroke in older adults.[4–6] Arteriosclerosis and hypertension are the primary causes of strokes in older adults, whereas contributors to stroke in the young also include alcohol/drug consumption, cardioembolism, extracranial artery dissection and migraine.[7,8] While there is a growing understanding of causes for stroke in younger individuals, there remains limited information about specific disabilities associated with stroke at younger ages and their rehabilitation.

Aphasia, a language disorder resulting from stroke, occurs in approximately 25–40% of people who experience a stroke.[9] In general, the impact of aphasia on the social and economic aspects of life is significant;[10–12] however, it is possible that the effects of aphasia on everyday life may differ between those who are in their middle to late years and those who are in their adolescent years.

For example, aphasia presents long-term consequences that are unique to adolescents such as effects on academic achievement as well as personality and social development.[13] These consequences occur within the context of a developing brain and an increased need for independence from parents.[14–18] Technology and social media also play a large role in the lives of adolescents and may be more critical to daily functioning than with older age groups.[19,20] Rehabilitation of language skills must consider all of these variables as therapeutic interventions are developed and implemented. Descriptions of interventions addressing these areas in adolescents appear to be nonexistent in the aphasia literature. It is important to attend to the needs of this unique population in order to provide better therapy outcomes and quality of life.

In an effort to highlight the variables needing to be addressed during language interventions for adolescents with aphasia and bring attention to an understudied area of aphasia, the current paper presents a retrospective review of the case of a male adolescent who experienced a stroke with resultant aphasia and the speech and language therapy he received over an 18-month period. Furthermore, we discuss the issues that are unique to an adolescent with aphasia and how they were addressed with this particular individual.

Case report

We will begin by outlining YA's medical and academic history, followed by initial and follow-up language assessment results and a description of the therapy given to address his aphasia and apraxia of speech. A discussion of the issues unique to this patient due to his young age is presented.

Case history

YA's aphasia resulted from an ischemic infarction involving the left cerebral hemisphere at 18 years of age. The stroke was secondary to what his physicians have called "moyamoya-like" disease, but has only been definitively diagnosed as carotid artery dysplasia and stenosis. YA's condition was described as "moyamoya-like" due to the presence of constricted arteries, particularly the right and left internal carotid arteries, and blood clots at a young age.^[21] His family verbally provided medical history that YA began experiencing transient ischemic attacks (TIAs) at age 8. The source of the TIAs was determined to be carotid artery stenosis. Physicians determined that corrective surgery was not an option at the time, secondary to YA's age and continued growth. He was placed on blood thinners and gradually the TIAs stopped occurring. Ten years later, however, YA was admitted to the hospital exhibiting aphasia, apraxia of speech, and right hemiparesis. A MRI revealed a large infarction involving the majority of the left middle cerebral artery (MCA) territory. A CT angiogram of the neck and head indicated occlusion of the left internal carotid artery and markedly decreased caliber of the right internal carotid artery, as well as a congenitally hypoplastic right common carotid. Of note, multiple collateral vessels surrounded the right carotid terminus and M1 segment of the right MCA in a "moyamoya-like" pattern.

Prior to the stroke, YA enjoyed sports, video games, and spending time with his peers. YA experienced significant academic struggles following the onset of his TIAs and required special education services. Specific information on YA's academic performance was not available from the school system at the time of this case report. YA transitioned to a homeschool program at the age of 16. At the time of his stroke, YA was attempting to complete his high school degree through a computer-based home program.

After YA's initial hospitalization following his stroke, he was transferred to an inpatient rehabilitation unit, followed by a day rehabilitation program, and then outpatient rehabilitation. YA received speech-language therapy 5 days a week while in inpatient rehabilitation as well as the day rehabilitation, and 4 days a week at an outpatient facility. His right hemiparesis resolved rather quickly, although he has a persisting mild sensory deficit on the right side. YA began outpatient speech-language therapy with the second and third authors about six months after his stroke. Approximately 1 year post-stroke, he resumed homebound classes required to complete his high school degree. The school system provided teachers, computer-assisted reading of course material and testing, and once a week speech-language pathology services.

Assessments

YA's initial assessment reported here occurred six months post-stroke followed by reassessment 2 years post-stroke. The following assessment results were obtained through formal assessments [Western Aphasia Battery-R (WAB-R) ^[22]; Boston Naming Test (BNT) ^[23]; subtests of the Boston Diagnostic Aphasia Examination (BDAE) ^[24]; Copy and Recall Treatment ^[25] (CART)], and observation.

Initial assessment results

Overall, YA demonstrated moderate Broca's aphasia and moderate-severe apraxia of speech with a *WAB-R Aphasia Quotient (AQ)* of 31.4. The AQ represents the composite score of several subtests (e.g., spontaneous speech, auditory verbal comprehension, repetition, and naming and word finding) and reflects severity.^[22] An AQ of 31.4 is considered severe.^[22] On the *BDAE*, his auditory comprehension was characterized with 85% accuracy following single step commands and 50% accuracy following two-step commands, intact auditory comprehension of pictures, letters, and numbers; but body-part identification was at 70% accuracy. On the *WAB-R*, he comprehended spoken names of objects, shapes, letter and colors, but scored 83% on numbers and 67% on body parts/fingers. He could not follow directions that included left or right with a body part (e.g., Show me your right ear). Also on the *WAB-R*, he could follow simple one- and two-step spoken commands (with repetition needed on two-step commands) but he was only 71% accurate on the commands with complex syntax. On the *WAB-R* Reading subtests, he demonstrated adequate comprehension of written words and six out of the eight written sentences. He could not follow any of the written commands from the *WAB-R*. Although sentence level reading comprehension on the *BDAE* was within the normal range, more complex, longer material was very difficult for YA to comprehend. YA was only able to name the first two pictures of the *BNT* and exhibited difficulty repeating stimulus words and verbalizing any personal information beyond his first name, last name, names of family members (*BDAE*). He was only able to imitate three single-syllable words out of presented stimuli. Additionally, he displayed moderate-severe verbal apraxia characterized by phonemic substitutions during the repetition task. Similar results were indicated on the *WAB-R*; he named only 3 of the 20 objects presented, with a few semantic paraphasic errors. He was able to give two animals for the Word Fluency subtest. His repetition was limited to a few one-syllable words and one common two-syllable word. He verbalized the two words "Cookie ... this" in his description of the Cookie Theft Picture (*BDAE*). On the *WAB-R* Picture Description, he said, "Fishing", "I don't know", and "boat". Written expression was limited to writing of basic personal information (names, birthday, age) and some labeling (7 out 15 pictures in the assessment portion of the *CART*). YA was unable to independently write all letters of the alphabet and demonstrated severe impairment in recognition of phoneme-grapheme relations in written dictation tasks. In terms of written expression, he was able to write his name but not his address nor any dictated words, numbers or letters on the *WAB-R*. He wrote three letters of the alphabet. He could, however, copy a sentence with only a few missing letters. Observationally, YA was able to respond to informal conversational questions at the single word level, although he frequently experienced word finding errors. YA was also able to appropriately respond to yes/no questions and follow single step commands in the context of conversation in therapy.

Follow-up assessment results

At 2 years post-stroke YA progressed to a mild-moderate aphasia and apraxia of speech with a *WAB-R AQ* of 76.3 ([Table 1](#)). An AQ of 76 and above is considered to reflect a mild aphasia. Complex yes/no questions continued to be difficult for him although he was able to demonstrate 90% accuracy with the questions presented in the *WAB-R*. Body part identification improved to 83% accuracy. Following two-step commands continued to be difficult for him with a score of 45/80 or 56% accuracy with the auditory sequential command stimulus on the *WAB-R*. At the conversation level, he inconsistently answered questions correctly

Table 1. Scores from Western Aphasia Battery-Revised.^[8]

Subtests	Test 1	Test 2	Maximum score
<i>Spontaneous speech</i>			
Information content	5	7	10
Fluency, grammatical competence, and paraphasias	2	9	10
Total	7	16	20
<i>Auditory verbal comprehension</i>			
Yes/no questions	54	54	60
Auditory word recognition	48	56	60
Sequential commands	32	45	80
Total	134	155	200
<i>Repetition</i>	6	6.4	100
<i>Naming and word finding</i>			
Object naming	8	54	60
Word fluency	2	9	20
Sentence completion	2	10	10
Responsive speech	2	7	10
Total	14	80	100
<i>Reading</i>			
Comprehension of sentences	26	40	40
Reading commands	0	18	20
Written word-object choice matching	6	6	6
Written word-picture choice matching	6	6	6
Picture-written word choice matching	6	6	6
Spoken word-written word choice matching	3	4	4
Letter discrimination	6	6	6
Spelled word recognition	1	3	6
Spelling	1	3	6
Total	55	92	100
<i>Writing</i>			
Writing upon request	2	6	6
Writing output	0	22	34
Writing to dictation	0	3	10
Writing dictated words	0	8	10
Alphabet and numbers	2.5	22.5	22.5
Dictated letters and numbers	0	7	7.5
Copying a sentence	9	10	10
Total	13.5	78.5	100
<i>Aphasia quotient</i>	31.4	76.3	100

and required repetitions. He would not independently request clarification and would attempt to mask reduced comprehension with noncommittal statements during conversation. YA admitted to difficulty with comprehension during group conversation with friends. He reported understanding approximately half of most group conversations and he would rarely request clarification. YA demonstrated improved auditory processing in structured tasks with a lack of environmental distractions. However, he self-reported that with distractions present, either noise or thought related, his auditory comprehension suffered. He occasionally required repetition of directions or questions and, as previously discussed, he would not always initiate a request for clarification.

Reading comprehension showed the greatest area of improvement. He was able to read stories with 2–4 moderately complex paragraphs with adequate comprehension as demonstrated on Yes/No or multiple choice questions, but he had difficulty answering many wh-questions or generating conclusions/inferences from the material read. For his school program, which consisted of high school level material, YA utilized a computer-assisted reading program so that the material was read aloud to him. Oral reading was extremely difficult for him due to his apraxia. YA exhibited significant progress in his verbal expression skills as was evidenced in his scores on the *WAB-R* subtests. He demonstrated a Spontaneous Speech score of 16 out of 20 in comparison to a previous score of 7 and a Naming and Word Finding score of 80 out of 100, improving significantly from an initial assessment score of 14. YA's verbal apraxia improved to a moderate severity, as evidenced in scoring

64 out of 100 on the verbal repetition task. At time of reassessment, he was able to imitate at phrase and short sentence level. In conversation, YA was able to answer the majority of open-ended questions. Despite having accuracy in his verbalizations, his answers were typically 1–2 words in length, unless cued to verbalize at the sentence level. He continued to exhibit word-finding errors during spontaneous speech. At 2 years post-stroke, he interacted with a wider range of friends at social events. YA's family reported significant increases in the length and complexity of his spontaneous verbal expression. However, YA self-reported that he occasionally limited verbal expression with friends in order to avoid embarrassment when experiencing word finding or apraxic errors. Although YA showed improvement in writing, he wrote independently at the short phrase or basic sentence levels. His accuracy in recognition of phoneme-grapheme relationships improved, but he continued to require cueing in dictation writing activities. His homeschooling program allowed him to complete course assignments and tests through reading and answering multiple-choice questions. However, prior to completing his degree he will be required to write at the short paragraph level. At time of reassessment, YA required moderate-maximum assist for written production of multiple sentences.

Therapy goals and intervention

YA initially received speech therapy in the inpatient rehabilitation setting for 3 weeks, he then participated in 6 weeks of rehabilitation in a day program, and was then discharged to outpatient services for the next 10 weeks. YA's verbal expression goal at time of discharge targeted verbal production of 2–3 word phrases in 5/6 trials with minimal cueing. His auditory comprehension goal involved following two-step directions with 80% accuracy. Reports from the outpatient speech therapist indicated that he had not met these goals at time of discharge. Six months following onset of aphasia, he was seen 4 days a week for 1-h sessions by two different therapists, the second and third authors. This period of therapy lasted approximately 8 months. At 2 years following onset, he was participating in speech therapy 3 days a week, 1 day a week with the school-based therapist and 2 days a week with the private therapists. This second period of outpatient therapy occurred for 11 months. His private therapists typically communicated electronically regarding goals and therapy techniques. Additionally, therapists would periodically review assignments given by other therapists to ensure continuity of care. He was seen almost strictly on an individual basis secondary to his refusal of group therapy. Goals were set through collaboration with YA and his family. His initial goals focused on communication abilities with family, peers, and within the community. Recognition of grapheme and phoneme relations in writing and oral reading were targeted in conjunction with functional communication. For example, rehearsal of common phrases was supplemented with writing selected phrase to dictation following attempts at oral reading. Familiar technologies, such as his iPhone, iPad and social media, were incorporated early in his therapy. As he resumed school and his verbal expression improved, his goals shifted toward writing, reading, and verbal expression of increased complexity (i.e., increased consistency of spontaneous speech at 3–4 word sentence level). Goals and therapeutic approaches were continuously modified, as YA was able to demonstrate consistently at target level. Therapy sessions incorporated academic vocabulary based on current classes YA was completing. All modalities of language were targeted throughout YA's therapy course. The following is a summary of therapy approaches attempted for each area of deficit.

Auditory comprehension

Initial goals were directed at accuracy of increasingly complex (in terms of length, syntactic complexity and abstractness) yes/no questions and body-part identification. YA's receptive language was targeted with a variety of traditional methods emphasizing functionality that included auditory presentation of one and two step commands as well as yes/no and simple open-ended questions. Goals focused on consistent accuracy in body-part identification and answering yes/no questions in a conversational context. As YA's auditory comprehension improved, multi-step auditory commands were integrated as well as auditory story comprehension. When YA resumed his homeschool program, the therapist introduced auditory tasks related to topics of study on an academic level appropriate to current course. These tasks included auditory working memory activities utilizing academic vocabulary as well as academic content presented in a brief lecture format, followed by simple open-ended questions with the intent to replicate a classroom setting. For example, during his class on economics, the therapist presented auditory information on the definition of a monopoly and had YA answer open-ended questions at the end of the session. As YA's receptive language continued to improve, his goals were modified to include accurate comprehension of complex questions in social role play scenarios or mock jobs interviews.

Reading comprehension

Reading comprehension emerged as an area of strength for YA in both the therapy and homeschool settings. Goals were established to address accuracy in oral reading and comprehension at appropriate grade level. YA was initially presented with basic, functional reading stimulus such as texts from his phone and social media posts, as well as single sentences. Short paragraphs with both informational and fiction content were then presented at progressively higher-grade levels. Strategies for locating the main ideas and key words were presented. To address his academic needs, word problems with targeted mathematical processes, as well as passages involving government, were incorporated into language-oriented therapy. Websites that enable the user to modify the grade level of news articles were used as additional stimuli. One example of these websites is Newsela (www.newsela.com), a resource that alters the grade level presentation of various news articles and includes comprehension questions of varying difficulty. As YA was able to demonstrate consistent accuracy with concrete analysis of written information, the focus of therapeutic tasks incorporated successful recognition of inferential information in text. Reading therapy directed at academic success requires an additional level of complexity than therapy for reading comprehension aimed at functionality or pleasure only. Academic reading required YA to effectively identify main themes, analyze content, and apply the information learned from the material.

Verbal expression

Expressive language goals in therapy were directed at independent verbalization of personal information and experiences, increasing verbalization length to sentence level, reducing word finding errors, and improving naming accuracy. YA's verbal expression was initially targeted utilizing a combination of therapeutic approaches. His verbal apraxia was addressed through imitation drills of single syllable, consonant-vowel-consonant words, with both written and picture cues provided. The consonant sounds were taught to aid his motor programming, self-cueing for word production, and for oral reading. Additionally, YA simultaneously collaborated with the therapist to generate common phrases to rehearse at the

beginning of each session, as a form of script training. YA expressed a desire that these phrases were specific to information that he needed to convey to his parents and girlfriend. Initial goals involved selected accuracy of word level imitation, independent production of common phrases, and two-word phrase level verbal picture descriptions. As these goals were met with consistency, new goals were set for appropriate verbal expression in role play and scripting scenarios. Melodic Intonation Therapy [26] and Sentence Production Program for Aphasia [27] were both utilized to encourage sentence length verbal expression. Scaffolds with common sentence structures were used to facilitate sentence generation in response to pictures. As therapy progressed, Constraint Induced Language Therapy,[28] particularly with verbal descriptions of familiar tasks, was introduced. This type of therapy was implemented secondary to YA's propensity to supplement his conversational speech with gestures, facial expressions, and pictures from his phone. These forms of communication augmentation were encouraged in conversation with friends and family outside of his therapy sessions, but constrained during the session in an attempt to increase verbal expression. Of note, the intensity typically prescribed with Constraint Induced Language Therapy (approximately 8 h a week) was not employed during his therapy course. Constraint Induced Language Therapy was adapted to YA's current therapy sessions and utilized for 3 h a week. Other tasks included picture or sentence sequencing to tell a story followed by retelling. Academic vocabulary was targeted in confrontational naming and description tasks. For example, concurrently with his homeschool pre-algebra, YA would be asked to name a particular type of calculation and attempt to verbalize instructions of each step.

Conversation with familiar and unfamiliar communication partners was frequently employed in sessions. In the first year post-stroke, YA primarily conversed with family, his girlfriend, and a few select friends. He spent significant amounts of time on the phone with his girlfriend. His verbal interaction with others was limited to listening and responding with one-word answers. Decreasing verbal apraxia related articulation errors in order to improve intelligibility was also continuously targeted.

Written production

YA's writing was first addressed through drill of phoneme-grapheme correspondence, writing to dictation, written confrontation naming, and writing basic personal information. Goals were set for independence in writing to dictation at letter and word level. As YA began to demonstrate increased consistency with writing at letter and word level, simple sentence writing was introduced. Cueing scaffolding during written expression activities involved initial written models of complete words and sentences. Gradually, written cues were reduced to single letters or even visual markers indicating number or words required for the complete sentence. As YA began to demonstrate increased independence with tasks, written cues were extinguished and only occasional verbal cues (phonemic and semantic cueing as appropriate) were employed. Tasks included picture descriptions using sentence structure scaffolds or unscrambling words to forms sentences. Written language was also elicited through texting during sessions. Recent research indicates that the use of texting in therapy increases the durability of this modality in the years post onset of aphasia.[29] Goals were also directed at functional writing, with focus on independence in completing various forms and check writing. His therapists introduced therapeutic targets involving accurate completion of job applications and medical forms. He continued to struggle with syntax and grammar at sentence level. Therapy emphasis then began

to merge with writing for academic success; he was required to write a paragraph in order to complete his academic program. Writing simple paragraphs was especially difficult for YA on multiple levels. Expressive language impairments alone presented challenges when attempting to generate a main idea and supporting sentences on a given topic. His spelling remained impaired as well. Therapy tasks incorporated topic-specific writing tasks related to his coursework. For example, in conjunction with his class on government, YA was asked to write a 3-5 sentence paragraph identifying the branches of government.

Specific interventions in rehabilitation with adolescents

Texting and social media

Early on YA demonstrated good use of technology to compensate for his communication deficits. He referred to pictures on his phone, on Facebook, and on Instagram when he was unable to adequately verbalize thoughts. He would search for items on the Internet that were related to his verbal message. He communicated with friends largely through text messaging. At 2 years following stroke, YA agreed to participate in an aphasia lecture. Two other individuals with aphasia spoke alongside YA and both were able to demonstrate more fluent verbal expression than YA. However, YA spontaneously showed the audience pictures from his Instagram account of him during hospitalizations and following surgeries. This immediately elicited a sympathetic reaction from the audience. The adept use of technology allowed YA to distinguish himself when he could not find the words to convey his message. The use of technology also allowed YA to be more independent with his home practice which was important because both parents were employed outside of the home. There are many iPad apps available either free or at low cost for articulation drills, sight word production, naming, language comprehension, and sentence generation that can easily be used with adolescents to address communication impairments. Examples of these apps include Apraxia Words,[30] Sentence Builder Teen,[31] Rainbow Sentences,[32] Sentence Maker,[33] Speak It,[34] Phonics Genius,[35] Tactus Therapy,[36,37] Constant Therapy,[38] Alligator Sight Words App,[39] Lingraphica free apps,[40] and Lexico Cognition.[41]

Academic concerns

At the time outpatient services were initiated by the current therapists (6 months post-stroke), YA was not involved in any academic activities. His parents were still overwhelmed with the medical issues and scheduling of outpatient services and doctors' appointments. However, the outpatient speech-language pathologists encouraged the parents to make contact with the school system to take advantage of services that could be provided to improve his speech and language abilities, to build overall cognitive endurance and abilities, and to work towards completion of high school. The speech-language pathologists provided their records to help school personnel understand YA's speech and language abilities and needs. One therapist spoke with the initial school speech-language pathologist and provided some guidance regarding treatment approaches and appropriate goals because this person had no experience in dealing with students with aphasia and limited experience in general with apraxia and aphasia. Notably, educating school personnel about stroke and aphasia is important and would promote academic success as has been detailed in the traumatic brain injury literature.[42,43]

As noted above, combining academics with intervention goals was critical for YA's success. Integration of therapy and academics

may be important for adolescents as a way to support their progression toward obtaining a high school diploma. The incorporation of algebraic terms into his therapy was described earlier. When taking Geography, he had to learn lists of terms and their definitions. Strategies for breaking words down into syllables had been introduced earlier in his treatment and then used on the school vocabulary to aid production of words, such as *sedimentary* or *stratosphere*. The ability to follow directions is critical in an academic setting so treatment also addressed comprehension of various types of instructions with a variety of directional terms as well.

Group therapy

At the onset of his therapy, YA was encouraged to participate in aphasia group therapy. Despite group members being only 6 years his senior, YA was extremely resistant to involvement. He demonstrated consistent compliance with all other therapy recommendations, but was firm in his denial of group therapy. He was unable, or unwilling, to articulate the reasons behind his decision. A family member speculated that, even though YA was somewhat close in age to a few members, he felt uncomfortable in a small group setting. Although speculative, his discomfort could be because unlike many stroke patients, YA did not experience observable or chronic physical impairments. This, in combination with his ability to respond appropriately in social situations, made his aphasia difficult to identify during brief encounters.

During the course of therapy, YA's opinion of socialization within an aphasia group began to shift and he initiated a desire to attend the local support group. His grandmother attended the first meeting with him and, prior to introductions, many group members had already assumed she had aphasia with YA attending to provide her support. YA used humor to deflect the potentially embarrassing situation, joking that he was just there for the pizza. During the meeting, he appeared engaged when conversing and answering questions, but somewhat disinterested when other group members dominated the conversation. He stated that he wished to attend future meetings. Perhaps this reflected an acceptance of his aphasia as a chronic condition and a willingness to have the local aphasia community included in his social sphere. Research does indicate that participation in group therapy encourages communication gains in the long term.[44-46] Anecdotal data indicate increased quality of life and adjustment to life with aphasia when an individual is engaged in community groups.[46] However, it remains unknown as to whether the same benefits are observed if the individual does not identify with group members as peers due to large differences in age.

Socialization

Social interaction with peers remained a priority for YA, as it is with many adolescents.[47] Prior to and following his stroke, YA had a girlfriend and they spent significant amounts of time on the phone, texting, or dating. YA practiced a select number of phrases to express to her, but did not appear to have other concerns about their communication. He indicated that she led all conversations and this was not a concern to him. Their relationship eventually ended and now his communication impairments may present new challenges as he begins dating. Communication in dating situations for adolescents/young adults is an important aspect of socializing that will need to be addressed in therapy.

Acceptance by peers is an important part of adolescence [48-51] and YA clearly wanted to be accepted by his peers. His lack of physical symptoms, his excellent nonverbal communication skills and his relatively good comprehension made it easier for him to hide his communication disorder. Unfortunately, this led

him to deny his problems by failing to initiate communication and thereby failing to practice the limited verbal skills that he had with his peers. This could potentially have an impact on his future social maturity.

Discussion

This retrospective clinical report highlights the varied treatment techniques, progress, and unique issues that occurred during intense outpatient and school-based speech-language pathology services provided to an adolescent with aphasia over an 18-month period. Because this is a clinical report it does not serve to make a claim about the effectiveness of the treatment program described, but provides specific information about the progress this adolescent male made during therapy and concerns specific to treating this age group. Therapeutic goals were integrated with social media, texting, and academics. Issues related to group therapy, socialization, adherence/compliance, independence and family involvement became apparent throughout this adolescent's participation in therapy.

Group therapy and socialization are important in facilitating aphasia recovery.^[10,45,52-54] Furthermore, the positive influence of technology's role in aphasia rehabilitation is becoming better understood.^[55,56] In the current case, the therapists working with YA recognized the importance of each and incorporated them into therapy. Although involvement in group therapy was not appealing to YA, maintaining a social connection with others remained essential for him. This connection was greatly enhanced by technology, such as texting and Instagram. It is recommended that future investigations regarding aphasia treatment for adolescents examine the role of technology in maintaining a connection with one's peer group and whether the isolation previously reported by adults with aphasia ^[10] is avoided.

Adolescents can be difficult to work with in a therapeutic environment due to issues of adherence or compliance.^[57,58] A number of factors may contribute to this, including not wanting to appear different or to need help. Recovery from aphasia is a lengthy process and motivation can lessen if an individual expects rapid results. Fortunately with this case, YA was generally compliant and extremely participatory during treatment. Overall, he reported that he enjoyed therapy and worked hard in his sessions. Each of his therapists understood the importance of developing a therapeutic partnership and building a strong relationship with the client to help motivate this client.^[59,60] YA's family member reported that because the speech-language pathologists working with YA showed investment in YA's progress, he was more motivated to willingly continue in therapy.

The ability to see the long-term consequences of a disability takes abstract thinking, which can be lacking in some adolescents.^[57] To help YA understand the relevance of treatment, his treatment goals were linked to his long-term personal goals. He wanted very much to get married and have a family, but understood he needed a job to support the family. To get a well-paying job, he needs a high school diploma and some additional training, either at a vocational technical school or a college program. Although he never enjoyed academic work (and his speech-language treatment often resembled school work), he could see how this is necessary for having a chance at a typical life.

Another consideration with this age group involves development of independence. When parents have a child with a disability, they at times change their management of that child, sometimes providing more structure and support or requiring less in terms of compliance to family rules, academic work, and household responsibilities for that child than other siblings at the same age.^[61] Especially in

the current situation, where YA had a potentially life-threatening condition, the parents were, of course, relieved that he survived his stroke but fearful due to his continuing medical problems. They had to be sensitive to his medical needs and give more leeway when his health was in question. However, after recovery from the surgeries to repair blood flow and improved communication, his parents needed counseling about setting appropriate expectations and demands. Each parent had developed his and her own pattern in dealing with YA. The clinician discussed with them their concerns and differences in approaches to the management of YA's behavior. They requested help in understanding what was realistic to expect from YA and guidance in developing his responsibilities around the house, as his stamina and communication were improving. They needed reassurance that it was important to set greater demands in order for him to be able to function as an independent adult, as long as there was no medical contraindication. A particular issue involved his financial management of disability payments. To help build accountability and maturity, it was suggested that the parents talk with him about their expectations and the purpose of the disability payments (to pay for medical and living expenses, to help him recover). They mutually agreed to a plan whereby he would be paid for completing his chores, homework, and other tasks and that he be responsible for paying for some of his own needs.

Traditionally, goals in aphasia therapy are largely focused on the restoration of language skills to premorbid levels of functioning. In comparison to an older aphasia population, adolescents have not yet had the chance to experience major life events such as earning a college degree, beginning a career, getting married, or having a family. However, it is likely that expectations for these experiences persist after the onset of aphasia. Therefore, aphasia therapy no longer becomes focused on restoration of communication, but preparation for significant life events. In contrast to having goals to return to independence, the therapist now has a role in aiding independence for the first time. Aphasia and the interventions selected to address it, will have a lifelong impact on an adolescent. Clinicians should be prepared to address issues that might not consistently arise with adult clients with aphasia, such as managing parental expectations for adolescents, building social skills or directing therapy goals at academic success. In managing YA's case, it was also necessary to address his motivation and compliance for continuing therapy on a long-term basis.

Conclusions

Overall, this case highlights the language intervention of an adolescent with aphasia and the unique variables encountered in treatment that may be characteristic of this age group. Issues related to academics, group treatment, socialization, adherence/compliance, independence and family involvement emerged during intervention. The speech-language pathologists involved with this case addressed each of these challenges through tailoring therapeutic interventions to address the unique issues and educating the family as necessary. Future research should address the needs of this unique population and provide more insight into systematic interventions for adolescents living with aphasia.

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