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REPORTS

Cerebellar Tumor Case
It's All in the Family: CAPD Cases

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By The Way -- I Have A Brain Tumor

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Mrs. Brown is a 64 year old woman with a known sensory-neural loss. She wears a hearing aid in her left ear and was referred for audiological services to investigate the possibility of using binaural amplification. She was evaluated here previously in 1984 and at another facility in 1986, where she obtained her hearing aid.

Traditional audiometric testing here revealed a flat moderate sensory-neural hearing loss that was bilaterally symmetrical (speech average: RE = 42 dB, LE = 43 dB).

As I was doing impedance testing, Mrs. Brown stated that she didn't know if it was relevant but she had a brain tumor. Into the booth for discrimination testing using the Hirsh recording and then of course the SSW. Mrs. Brown reported that she was taking Synthroid for a thyroid condition, another reason to give the SSW?

It is interesting to note that while Mrs. Brown's live voice discrimination scores in quiet were 96% for the right ear and 100% for the left, these scores decreased when the words were presented on tape. Her scores for the tape-recorded list were 88% for the RE, 76% for the LE. Mrs. B also reported that it is easier for her to understand women's voices than men's voices.

Impedance audiometry revealed a Type A tympanogram bilaterally; however, greater compliance was noted for the left ear. Stapedius muscle reflexes were obtained at 500 and 1000Hz for the LE, but needle movement interfered with the measurement for the RE. Because the acoustic reflex thresholds were 110dB when stimulating the RE, reflex decay was not attempted.

A review of the patient's 1984 files from this Center revealed not only an audiogram, but an SSW as well. Audiometrically, Mrs. Brown's peripheral hearing had decreased in sensitivity from 1984 to 1986 to 1992, especially in the RE (see Figure 1). In the RE the drop was from 27 to 42dB and in the LE from 32 to 43dB.

Neither of the SSW tests fell within normal range for the TEC analysis (see Figure 2). The first test was Overcorrected and the follow up was O-MI (although the RC Condition was MO). The 1984 results while O were quite mild and consistent with cochlear impairment. However, the 1992 results showed a large increase in percent of error when compared with the findings six years before in the RC Condition. There was also a significant Order H/L on the recent test.

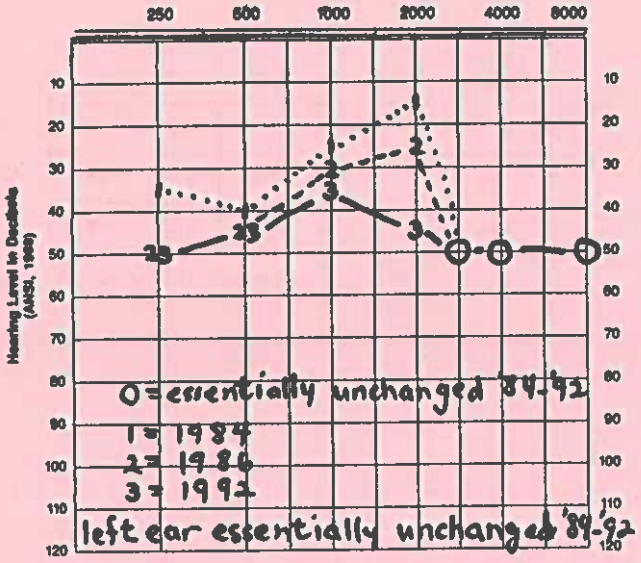

Figure 1. Change in puretone audiogram from 1984 to 1992 in right ear.

An Q-MI score in the presence of retrocochlear signs (e.g., raised acoustic reflex thresholds stimulating RE) would suggest dysfunction at the mid-brainstem level. However, we would expect with a right sided problem to have the poorer WDS on the right instead of the left.

A discussion with Mrs. Brown's physician disclosed that her tumor was in the cerebellum. Based on the audiometric findings the doctor sent the patient for another CT scan. He reported no evidence of change since her last CT (done sometime after 1986 so there is no baseline CT to compare with the SSW). Jack Katz suggests that the tumor is likely on the right side. The SSW effect is usually on the side of the lesion, although bilateral effects may be seen. The acoustic reflex thresholds stimulating the RE were either elevated or absent. Mrs. Brown did not return for further testing.

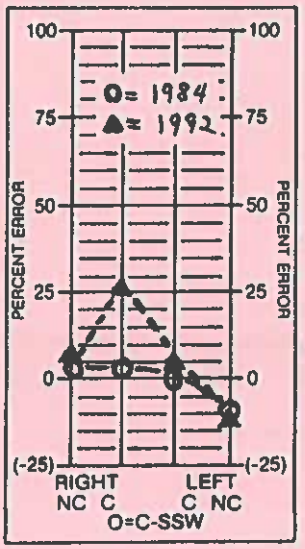

Figure 2. SSW-grams for 1984 and 1992

Prognosis for improved hearing using binaural amplification was felt to be guarded. It was recommended that she obtain a second hearing aid on a trial basis.

This case was instructive in that:

1. It reminds us that central and peripheral problems often coexist, and that we should be on the lookout for them regardless of the purpose of the evaluation.

2. It does indeed seem as though central cases tend to do more poorly on recorded discrimination tests than on live voice presentations.

3. It appears, as suggested in the literature, that one can monitor a central problem audiometrically, often with greater sensitivity than by using sophisticated anatomical scans.

4. As stated in the SSW Workshop Manual and in this publication (13:3), cerebellar lesions often show up as a retrocochlear problem. Most often mimicing a brainstem disorder.

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TYPE-A SIBLINGS

Susan M. Brandner

'Charlotte' (age 8-1) and her brother 'Wilbur' (age 11-7) were referred for central auditory processing evaluation by a speech-language pathologist. In school Charlotte is reported to be inattentive, has difficulty following oral directions and poor sound-symbol association skills. Her speech is reported to be hard to understand and is therefore receiving speech therapy. Emphasis of the therapy is on articulation and basic concepts.

Wilbur had been referred to the Child Study Team previously because of concerns about his academic performance in reading, language arts, spelling and in following oral directions. They indicated that "his performance on auditory perception tasks was marked by extremes". However, he was not referred for CAP testing at that time. Wilbur is receiving speech-language therapy services at school.

Charlotte was the first to be evaluated for possible CAPD. Her puretone thresholds were within normal limits, except for her left ear where her thresholds were -10dB @ 4000 Hz, 20dB @ 6000, and 15dB @ 8000. In addition, her discrimination scores are poorer than one would expect for an 8-year-old with good hearing sensitivity. Charlotte is very much aware of her difficulty in understanding in the presence of background sound. While taking the Speech-in-Noise test she said, "I hate this!"

Wilbur is also reported to have difficulty understanding in the presence of background noise. He will remove himself from a noisy group situation and sit alone elsewhere rather than to deal with the noise. His thresholds are within normal limits with a PTA of 2dB for the right ear and 5dB for the left. He did not perform as poorly in the presence of noise as Charlotte did. Their scores are shown in Table 1.

	DISCRIMINATION SCORES			
	Charlotte		Wilbur	
Condition	RE	LE	RE	LE
Quiet	80%	88%	96%	88%
Noise	40%	28%	68%	68%
Difference	40%	60%	28%	20%

Table 1. Word discrimination scores (W-22, Technisonic recording at +10 S/N).

It is no wonder that Charlotte hated this task! One has to wonder if Wilbur has to avoid noisy situations, why are his scores so good? Is maturation making this a difficult problem to document or would a different result have been obtained if the Speech-in-Noise task had been dichotic as it occurs in the environment? Both Charlotte and Wilbur had /o/ for /l/ substitutions. This is an indication of decoding difficulty.

On the SSW both of these children had Type-A patterns, placing them in the integration group. Table 2 displays their SSW test results.

	Charlotte				Wilbur			
8 Cardinal Numbers 1-8	3	3	4	1	2	1	2	2
	2	10	4	2	1	5	0	0
RSSW Scores	12	18	35	8	5	2	18	8
CSSW Scores	-8	-2[23]		-4	1	-2	6	-4
Age Norms	5	13	18	4	2	4	11	3

Table 2. SSW results for siblings.

Both Charlotte and Wilbur had many qualifiers. They each had quick responses (Q) and Wilbur had a tongue twister (TTW). These two responses on the SSW are associated with tolerance-fading memory problems. Both of them had perseverations (P), Charlotte many more than Wilbur. This is associated with poor decoding.

Wilbur and Charlotte each had age appropriate responses on the Phonemic Synthesis test. They both had quick responses on this test as well.

Lastly, the children were given the Binaural Separation subtest of the Willeford battery. Each had significant errors, performing below their age norms for each ear.

Charlotte and Wilbur have significant CAP problems and many of the specific difficulties appear similar. Charlotte's scores are poorer than her brother's, but this may be due to the effects of maturation. Wilbur is 11, the age at which many central auditory processing tests are not as sensitive as they are in younger children.

Both of the children should benefit from Phonemic Synthesis training, the use of an FM listening system and auditory-visual training. An evaluation by a pediatric occupational therapist might provide additional salient information to maximize academic success for these children.

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DO YOU PROCESS LIKE YOUR MOTHER?

Susan M. Brandner

Two 21-year-old women, fraternal twins, were referred to our center for CAP testing by a school for children with dyslexia. Last summer the sisters were diagnosed as "dyslexic" and were enrolled in a summer course emphasizing a multi-sensory approach for college preparation. Both had completed their junior year of college, twin-A at an Ivy League school (let's call her "Ivy") and twin-B at another highly competitive college (hereafter she's referred to as "Highly").

These women had sought help because they always felt that they had to work too hard to achieve success. Highly, who is considering a career in music, has more academic difficulties. She began to investigate dyslexia in female members of the family. Consequently, her mother, age 49, a professional artist came for the CAP battery to help in her daughter's research. We'll call her "Mother".

It is poignant to listen to these women describe their difficulties and frustrations over the years. Ivy says she mispronounces words in ways that people think is cute. She does not think it's cute. Highly speaks about the frustrations of scoring poorly on tests "when you know you know the information". "We often teach material to their friends, who say they never would have understood without our explanation." But on exams Ivy and Highly score below their friends.

"It becomes a psychological thing", reports Highly, "you begin thinking you're not smart."

Highly reports auditory problems. She often jumps into a conversation with a response that is completely wrong. One time she asked, "What, you have to have all your teeth pulled?" The friends got a good laugh out of that as the conversation had nothing to do with pulling teeth. Highly realized long before that she had a learning problem and this knowledge has helped her cope.

Mother reports that she has difficulty talking with someone when there is background sound. E.g., she needs to turn down the volume of classical music to talk with people.

As we are all aware, CAP testing is not as sensitive with people over the age of 11 as it is in younger children. These high-functioning women made testing even more challenging as they used their intellect to figure out answers that did not make sense.

Each of the women had excellent hearing for pure tones. The poorest PTA was 5dB for Ivy's LE. Highly's WDS in the LE was slightly depressed.

Speech-in-Noise testing was carried out to see how these women performed in noise compared to their scores in quiet. See Table 1.

Although Mother reports having difficulty listening in noise, she did well on the test. Only Ivy had a significant Speech-in-Noise score.

Table 2 shows the SSW results for Ivy, Highly and Mother. We have found the use of qualifiers were most helpful especially on older children and adults. This was indeed the case with these individuals.

	Ivy		Highly		Mother	
EAR	R	L	R	L	R	L
QUIET	100	96	96	88	92	96
NOISE	80	68	84	68	80	84
DIFF	20	28	12	20	12	12

Table 1. Discrimination scores in quiet and noise as well as the Diff (difference score) for each of the family members. Technisonic recordings of W-22s were used with speech spectrum noise at +10dB S/N.

	Ivy	Highly	Mother
8 Cardinal Numbers 1-8	0 1 1 0 0 3 0 0	0 0 1 0 0 1 0 0	1 0 0 1 0 2 1 0
RSSW Scores	0 2 10 0	0 0 5 0	2 2 5 2
CSSW Scores	0 2 [6]-4	-4 -4 -7-12	-6 -6 -1 -4
Age Norms	1 3 5 1	1 3 5 1	1 3 5 1
Ear Effect	2/3	0/2	3/1
Order Eff.	4/1	2/0	3/1
Reversals	0	1	[2]
TTW	1	1	0
Delays	2	1	[16]

Table 2. SSW performance for 3 family members. [ ] = significant finding.

Both Ivy and Highly had TTWs on item #13 and erred on the same words in #4 and #20. For Ivy the TTW was some support for the significant LC score showing tolerance-fading memory difficulty (as expected). The delayed responses of Mother are generally associated with decoding difficulties. Some of the listening problems described by the women would surely point in that direction.

During the test of Phonemic Synthesis, Ivy responded correctly on 4 items that she knew she misheard but figured out. Although they were considered correct she said the words with questioning inflections. Highly had only one delay on this test, all answers were correct. Mother had 5 errors on the test (≥2 errors is significant for an adult). This provides further support for her having phonemic decoding difficulty.

The Binaural Separation subtest of the Willeford battery was also administered. On this subtest the mean for normal listeners is about 98 in the weaker ear and 99 for the stronger. To pass this test the person must be within normal limits for both ears. Ivy and Mother were each >1 SD below the mean on this task. Ivy was depressed in the right ear and Mother in the left. The results are shown in Table 3.

Ivy		Highly		Mother	
R	L	R	L	R	L
80	100	100	95	100	80

Table 3. Results on the Binaural Separation test for each ear.

All three of these patients appear to have central auditory processing problems. It is fascinating to note that of the twins, Ivy had the more documentable auditory processing problems (TFM and hints of DEC), but the higher academic achievement. Mother seems to have the same two categories of CAP difficulty and overall may be slightly poorer than

Ivy on CAP tests. In this case we might possibly be seeing the other end of the maturation benefit. Of the three Ivy appears to be the best candidate for auditory training. She has difficulty pronouncing words, especially new ones. Phonemic Synthesis training should enable her to hear the sounds more clearly and thus permit her to pronounce the words more accurately.

Finally, it is important to note that all three women showed evidence of TFM problems.

So when asked, "Do you process like your mother?", the answer is "yes, no and I don't know". Mother and Ivy were similar in that they had the same two types of limitations on our tests and yet they demonstrated the problems somewhat differently on the tests and different complaints about the effect of CAPD on their lives. Highly shared only one category with the other two family members. When younger would she have shown a DEC problem as well?

Based on probability, because there are so many people with CAPD, it makes sense that in some families there would be three who have the problem just by chance. On the other hand we do see a familial pattern of CAPD in the people with whom we work. So, in fact we really don't know how much of an inherited factor there is in this (or probably in most cases that we see). Once the gene(s) for CAPD are located, we might know a lot more.

Despite the fact that these are three high-functioning women they complain of CAP deficits and demonstrate CAP problems on our tests. What does this tell us as professionals?

We must listen to the concerns of parents, even when the children are doing well in school. I have never met parents who were wrong when they said that their child was having a problem. Parents may not be able to correctly identify the problem, but they seem to know something is wrong. Often when they bring their concerns to the school and/or the medical doctors they are not given assistance. This may be because the child is working at grade level (and that's enough achievement for in the minds of many professionals), or because the professionals are not sufficiently aware of CAPD and the profound effects they may have on an individual.

It seems to me that no child should have to experience the frustrations that these young women have described. As those of us who work with CAP problems have seen, a little bit of early intervention greatly reduces the problems. Later intervention when obtained at all is generally less effective and the results less complete.