MEASUREMENT OF SPEECH AND LANGUAGE CHANGE WITH ACUPUNCTURE TREATMENT OF APHASIC PATIENTS

Shirley A. Porrazzo, M.A.
Aphasia Section, VA Hospital, Minneapolis, MN

For thousands of years, the Chinese have employed acupuncture -- the use of needles inserted into the body to treat disease and to relieve pain -- for a variety of medical disorders, including speech problems and paralysis secondary to stroke. Recently there has been a growing interest in Western medicine in the use of acupuncture techniques, particularly for anesthesia and pain control. This interest is reflected in the medical literature, although many of the references consist of speculations and theories about how acupunture works, and relatively few are single-subject case descriptions. There has been little information reporting the controlled study of the efficacy of such treatment; however, a few studies are available in which acupuncture has been used to treat sensory-neural hearing loss, with mixed results. There is, to my knowledge, nothing yet published regarding the use of acupuncture to treat adult aphasia.

At Minneapolis Veterans Administration Hospital, our interest in the possibility that acupuncture might affect speech and language performance in stroke patients was stimulated by observation of one of our patients, who received acupuncture treatments for relief of pain secondary to his cerebral injury. This patient had initially been treated by us for several months for aphasia secondary to trauma. He had returned a few times for re-evaluation and short-term treatment during the three and one-half years since onset. He had a spastic right-sided hemiparesis and sensory loss; he also had pain on the right side which was constant, and unrelieved by medication. He returned to the hospital in September, 1973, to undergo acupuncture treatments for control of the pain. He was receiving treatment in the Aphasia Section during and following the course of acupuncture treatment. This improvement was observed during conversation with him and in controlled and standardized testing of speech and language abilities.

The patient himself was very much aware of these sudden changes, and he enthusiastically reported improvements as they occurred. After the first two treatments, his pain was totally relieved. During the course of treatment, his speech and language behaviours fluctuated from day to day. Sometimes he was suddenly much improved; occasionally he seemed to have a temporary reduction in certain abilities such as naming or sentence formulation. Sometimes he was energetic after a

treatment; more often he was quite fatigued for an hour or two. Before he left the hospital we summarized the improvements noted by us and by the patient. They included the following: He improved in recalling and producing names of people and places. He had reduced latency in oral reading. He had better comprehension and increased speed in silent reading. His auditory comprehension was improved. (As an example, on the Token Test, total errors for Part I through Part IV went from 20, pre-treatment, to 8 post-treatment.) His ability for simple arithmetic improved. Spontaneously-produced sentences were less latent, longer, and more grammatically correct, and he was able to express more complex ideas than he had previously. His vocabulary increased. He had greater range of arm and leg movement, and was able to walk more quickly. He regained temperature sensation on the right side, and had an improved sense of taste. He was sleeping better, and felt better generally.

Personnel in occupational therapy independently noted decreased spasticity and increased range of motion in the upper extremity on the affected side.

The patient was discharged from the hospital in November, 1973, and readmitted again in January, 1974. He reported that some of the pain had returned, and that his language abilities had diminished since the time of his hospital discharge. However, he had not returned to the pre-treatment level of function. Five more acupuncture treatments were administered during February; once again, improvement was noted.

These adventitious observations suggested that a controlled exploratory study might be appropriate. The present investigation was designed primarily to determine whether the speech and language abilities of aphasic patients would improve concurrent with acupuncture treatment.

PROCEDURES

The subjects were five adult male aphasic outpatients who were at least one year post-onset CVA, who had unilateral left hemisphere brain involvement and stable speech and language status, and who did not exhibit ongoing physiological changes. Their age range was 43 to 65 years, with a mean age of 51 years. Each of these patients had received at least one year of intensive speech and language treatment in the Aphasia Section. Results previously obtained in periodic testing with the Porch Index of Communicative Ability showed that their speech and language performances had stabilized at levels above the 80th percentile and that they had generally reached their predicted levels of language function.

The tests used to evaluate speech and language were placed into two batteries. The daily test battery consisted of a group of short tests, some specially designed, which could be administered in less than 30 minutes to each patient, and which sampled auditory comprehension, reading comprehension, word recall, confrontation naming, word and phrase repetition, and oral reading abilities. A description of the tests in the daily test battery is as follows: The auditory comprehension test had four equivalent forms, each consisting of 20 questions to which the patient answered "yes" or "no." Most of the questions were comparative in nature such as, "Is an apple bigger than a watermelon?" The four alternate forms of this test were also used in printed form to evaluate reading comprehension. The word recall test elicited one-minute samples of words beginning with designated letters of the alphabet, e.g., "Tell me all the words you can that begin with the letter 'c'." Confrontation naming was evaluated with two one-minute samples. In one of these, the patient was asked to name as many famous persons as he could from a panel of 30 pictures of famous persons. In the other, he was asked to name as many objects as he could from a panel of 70 pictures of objects. In another task, the patient was asked to repeat a pair of words such as, "main, name, main, name;" and for the second minute, to repeat them in the reverse order ("name, main; name, main"). The phrase repetition task consisted of ten two-word phrases, such as "manila envelope," which the patient was asked to repeat. The oral reading task utilized the Guttman Articulatory Product paragraph, which the patient read aloud. The standardized test battery consisted of the Porch Index of Communicative Ability, the Token Test, the Nelson Reading Tests, and the spelling and arithmetic sections of the Wide Range Achievement Tests. A two-minute picture description task and a one-minute task of recalling animal names were also included.

Standardized tests were administered and scored in the prescribed manner. For most of the other tests, responses were scored with a revision of the multidimensional scale developed by Porch. For nonstandardized tasks other than those using a one-minute sample, the time in seconds was also recorded. An occupational therapist evaluated upper extremity active range of motion, muscle tone, and grasp and pinch strength with standardized tests, and other standardized tests were used to evaluate hand coordination and dexterity.

When the study began, the subjects discontinued occupational therapy and treatment for speech and language deficits. The first phase of the study was the baseline phase, which lasted for three weeks. A stable baseline of performances was established, and both batteries of the speech and language tests and the upper extremity tests were continued throughout the treatment phase, which began with the administration of the acupuncture treatments. Each treatment consisted of the placement of 12 to 15 needles in

the skin at various acupuncture points located on the arm, leg, shoulder, throat, neck, and face of each patient. Three pairs of leads were then individually attached to six of the needles and moved to six others at specific time intervals to provide electrical stimulation. For the first treatment, most of the needles were placed on the right (affected) side of the body. Treatments were administered three times a week for the first and second weeks, and two times a week for the third and fourth weeks, for a total of ten treatments. One week after the series of acupuncture treatments had been concluded, the post-treatment phase began. The study is presently in the third week of the post-treatment phase.

The tests have been administered on the following schedule. The standardized test battery, which included the PICA and the other standardized tests of reading comprehension, spelling, and so forth, was given at the beginning and end of the baseline phase and at the end of the treatment phase. The daily test battery has been given five times a week since the beginning of the baseline phase. During the third week of the post-treatment phase, the daily test battery was rescheduled for administration once a week throughout the balance of the post-treatment phase. The upper extremity evaluations have also been made periodically throughout all phases of the study.

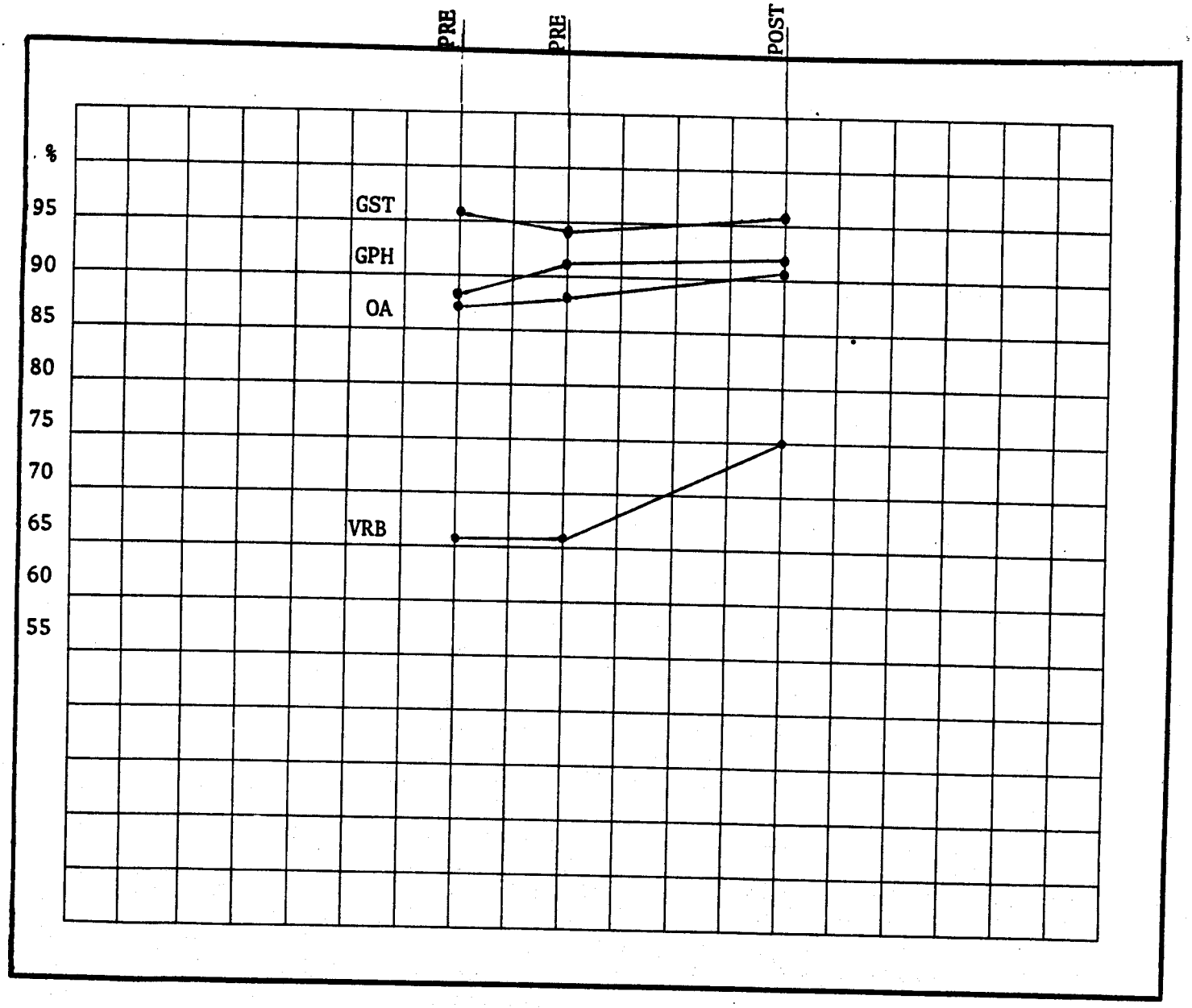
At this time, the investigation is not complete, but the PICA test results obtained to date have been calculated and are shown as composite mean scores on your handout. The first pre-test was given at the beginning of the baseline phase; the second pre-test was given three weeks later at the end of the baseline phase, just before treatment began. The post-test was given approximately one week after treatment was concluded.

Although the scores obtained by three patients increased substantially after treatment, a fourth gained very little, and a fifth was essentially unchanged. In order to summarize the data and to balance fluctuations which may have been due to factors of a non-language nature, the mean scores for all five patients were averaged, and the percentiles derived from their composite mean scores were graphed on the Recovery Curve. It appears that the greatest change occurred in the verbal modality of the PICA; there was no apparent change in the gestural modality.

Although the occupational therapist has not analyzed her data statistically, she reported that scores suggest an improvement in sensation in those who had sensory impairment, and some increase in strength in all cases.

I would like to comment on some of the observations of these patients' functional communication abilities made by staff members during the study, as well as some observations

Mean scores for five patients who received acupuncture treatment in the study "Measurement of Speech and Language Treatment of Aphasic Patients"



made during testing. The patient who seemed, when we talked to him informally, to have improved the most in his verbal abilities, for some reason showed little change from pre- to post-treatment on his overall PICA scores. Yet this patient has a greatly enriched and more accurate vocabulary, he produces more expressive sentences, and he has become much more talkative.

On the PICA, this patient improved only three percentiles in his Overall scores. Percentiles derived from subtest scores show considerable inconsistent fluctuation across the three tests, and some of the fluctuations seem, in effect, to cancel each other.

Day-to-day fluctuations in the speech and language behaviour of aphasic patients are not uncommon, and seem, at least in part, to reflect temporary differences in fatigue level, emotional mood, physiological state, and the like, but unfortunately these fluctuations are often reflected in the responses given on tests which are very sensitive measures of speech and language behaviour.

Other fluctuations over time, in particular PICA subtest scores, may result from processing difficulties which are unrelated to the language modality in which that subtest is represented. For example, if the patient did not tune in to the word he is to repeat when it is spoken by the examiner during Test XII, the reduction of his score to 9 does not represent a decrement in verbal ability per se.

Scores obtained on the speech and language tests in the daily test battery also reflected a great deal of fluctuation from day to day, but they also showed some upward trends as well. Some of these trends have continued to date (the third week of the post-treatment phase). For example, the patients had seemed, on naming tasks, to be using certain strategies and making choices of certain words which were relatively consistent from day to day, but recently some of them have been naming pictures or objects which they had not previously named during some two months of testing five times a week. It is my feeling that they may not have realized all of the effects of the acupuncture treatments, even though the treatments ended in March.

I have not yet analyzed the two-minute picture description tests, but hopefully the results will give some indication of qualitative and quantitative changes which may have occurred in the patients' spontaneous speech.

There are no adequate medical explanations of the efficacy of acupuncture, but one is tempted to speculate that the language system, or perhaps the physiologic system, is becoming unlocked

or facilitated. The patients sometimes appeared to be better able to get into the task set and respond more quickly to the task, and this in effect sometimes raised their scores. In PICA's, 9's and 13's became 15's, but the quality of the verbal product did not necessarily change. On the other hand, a sentence fragment scored 12 could become more elaborate in terms of meaning, word choice, or complexity, but because of incompleteness would rate no more than 12 nevertheless.

You may have noted that I did not mention the period of time over which the post-treatment phase was to extend. The plan is to continue weekly and monthly testing for the present time, with the subjects remaining away from treatment. Hopefully, arrangements can be made for administration of another series of acupuncture treatments, and evaluation of changes which occur at that time. By then, analysis of the testing which has already been done would show which tests are valuable for continued use in this study, and the test batteries can be revised to become more effective and more efficient in detecting change in speech and language behaviour.

Whether noted informally or through testing, some of these changes have occurred and are occurring in the patients in the study, and although many of the changes are relatively minimal, they suggest some questions. Could patients who have plateaued at their predicted level on the PICA rise above that level after acupuncture treatments? Would the changes be permanent or of a temporary nature, and require "booster" treatments for the changes to be maintained? Or perhaps a given number of treatments is needed, or an optional way of spacing them. If used in the early months of post-onset, would the effects of acupuncture be enhanced?

Acupuncture is a therapeutic procedure which, for the time being, seems to be beyond a scientific rationale. But a lack of knowledge about the particular physiological or neurological process involved need not keep us from observing the effects of acupuncture treatment on the speech and language behaviors of aphasic patients. Further research with carefully selected subjects and rigorous measurement of aphasic behaviours is needed to demonstrate whether the use of acupuncture can be an effective and practical adjunct to traditional treatment for reinstatement of communication ability.