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Influence of local pressure on athetoid,  
electro-myogram of spastic paraplegia in  
water, and influence of oxygen inhalation on  
the tone of voice in athetoid of cereb-ral palsy  
(a preliminary report)

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**Abstract**

As described in the foregoing, a certain degree of desirable effect can be recognized in every instance of the present trials. However, in order to apply these methods in clinics it is necessary to carry out further studies on the mechanism that operates in bringing about such an effect, but this paper is presented as a preliminary report.

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**INFLUENCE OF LOCAL PRESSURE ON ATHETOID, ELECTRO-MYOGRAM OF SPASTIC PARAPLEGIA IN WATER, AND INFLUENCE OF OXYGEN INHALATION ON THE TONE OF VOICE IN ATHETOID OF CEREBRAL PALSY (A PRELIMINARY REPORT)**

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Cerebral palsy has come to be treated from systematic standpoint even in Japan, and the results of such treatments have been gradually recognized to be clearly fruitful. Essentially such a treatment should be conducted with a functional training as its core. However, it is obvious that we can obtain still better results if we find some effective steps to supplement these treatments. With this point in mind the following experiments were conducted.

OBSERVATIONS

I. BEAMAN<sup>1</sup> has observed that changes are brought about in the movement of athetoid under the pressure of crepe bandage. Concerning these changes the author obtained some interesting findings by recording electromyograms (EMG) by the following methods.

Using surface electrodes of one square centimeter, electric current is induced concurrently in both biceps brachii and triceps brachii in the case of the upper limb. Crepe bandage is bound at the seven following sites and the records are taken for 30 seconds at each site.

- |                               |                                 |
|-------------------------------|---------------------------------|
| 1. Entire upper limb          | 5. Shoulder, elbow, wrist joint |
| 2. Brachial and ulnar regions | 6. Elbow and wrist joint        |
| 3. Brachial region only       | 7. Elbow alone                  |
| 4. Ulnar region only          |                                 |

In addition, by winding a blood manometer tourniquet around the upper arm and forearm under three varying pressures of 150—130 mmHg, high, 100—80 mmHg, moderate, and 50—70 mmHg, low in three combinations of each for the total of nine sets, respective records are taken for 30 seconds.

With the use of the same surface electrodes mentioned in the foregoing, electric current is induced simultaneously in both quadriceps and the inner ham-

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string of the lower limb and by applying the crepe bandage on the seven following sites, the records are taken for 30 seconds each.

1. Entire lower limb
2. Thigh and leg regions
3. Thigh regions only
4. Leg region only
5. Knee and ankle joints
6. Knee joint alone
7. Ankle joint only

For the control both sides of the upper and lower limbs of 5 patients with cerebral palsy athetoid were similarly tried.

In the application of crepe bandage, some effects can be recognized, and those that show especially marked effect are the brachial and ulnar regions under the bandage pressure and as for the lower limb there can be clearly observed a decrease in the number of spikes and the narrowing of amplitude in EMG. However, the athetoid movement itself does not disappear (Fig. 1).

As for the pressure under a blood manometer tourniquet, in the case where the pressure is maintained between 100 and 80 mmHg in the brachial region and between 50 and 30 mmHg in the ulnar region, marked effects can be recognized as in the cases just mentioned above.

II. Taking an interest in the fact that several patients with spastic paraplegia claim it easier for them to walk in water while taking swimming lessons<sup>2</sup>, electromyograms of the patients with spastic paraplegia were taken while they were in water, and the following results were obtained.

The electrodes as illustrated in Fig. 2 are prepared. Namely, the rubber sponge part is pasted to the inductor with rubber cement and fixed with rubber bands in order to eliminate humming. The bath is made 80 cm deep and the water temperature is kept at 37°~38°C. A metal screen of 120×120×150 cm is put in the bath and the patient is placed in the metal screened bath. Electric current is induced in three muscles; triceps surae, tibialis anterior and quadriceps femoris (vastus lateralis).

For the control, a groups of seven children with spastic paraplegia were selected. Records of them were taken at different postures such as standing on both feet, standing on one foot, standing on both feet placed on the planks, 2, 4, 5 cm thick, on land; while in water, standing on both feet and on one foot, floating both in prone and supine positions on a buoy. It is needless to say that before taking records these children were sufficiently accustomed to water to remove any fear from them.

In EMG's taken on land in the postures of standing on one foot both the number and amplitude of spikes are greatest, proving to be under a heavy stress, while in water as they can stand on one foot without any support, standing on one foot is in more relaxed state than standing on both feet and both the number and amplitude of spikes are markedly less than those in the similar postures on

land. Furthermore, the posture in water at which the number and amplitude of spikes in EMG are least proves to be the prone position floating on a buoy.

III. In athetoid cerebral palsy we often hear that athetoid movement is lessened and the entire body is much relieved after oxygen inhalation. For the purpose of confirming this, records of the tone of voice were taken by oscillograph and the results were studied.

Oxygen inhalation is conducted with a closed circuit type anesthetic apparatus for the period of ten minutes with a mask on. Immediately before and after the inhalation the patient is made to pronounce words, ah, eh, ēē, oh and woo, and these are recorded on the tape and through Brown tube oscillograms are prepared. The results are compared with those of normal persons.

As shown in Fig. 4, there can be seen marked changes before the oxygen inhalation as compared with normal subjects but after the inhalation the type is about the same as in normal person.

#### SUMMARY

As described in the foregoing, a certain degree of desirable effect can be recognized in every instance of the present trials. However, in order to apply these methods in clinics it is necessary to carry out further studies on the mechanism that operates in bringing about such an effect, but this paper is presented as a preliminary report.

#### REFERENCES

1. BEAMAN, PATRICIA: Restriction, fatigue and motor capacity in athetoid children. *physiotherapy*. 48 (9); 231. 1962
2. TERASAWA, K. et. al: Swimming lesson in children with cerebral palsy. *ryoiku* 3; 73. 1962 (in Japanese)

Fig. 1. Case 1. A. I. 9 years Male (Athetoid type)

Upper : Biceps brachii  
Under : Triceps Brachii

right upper extremity

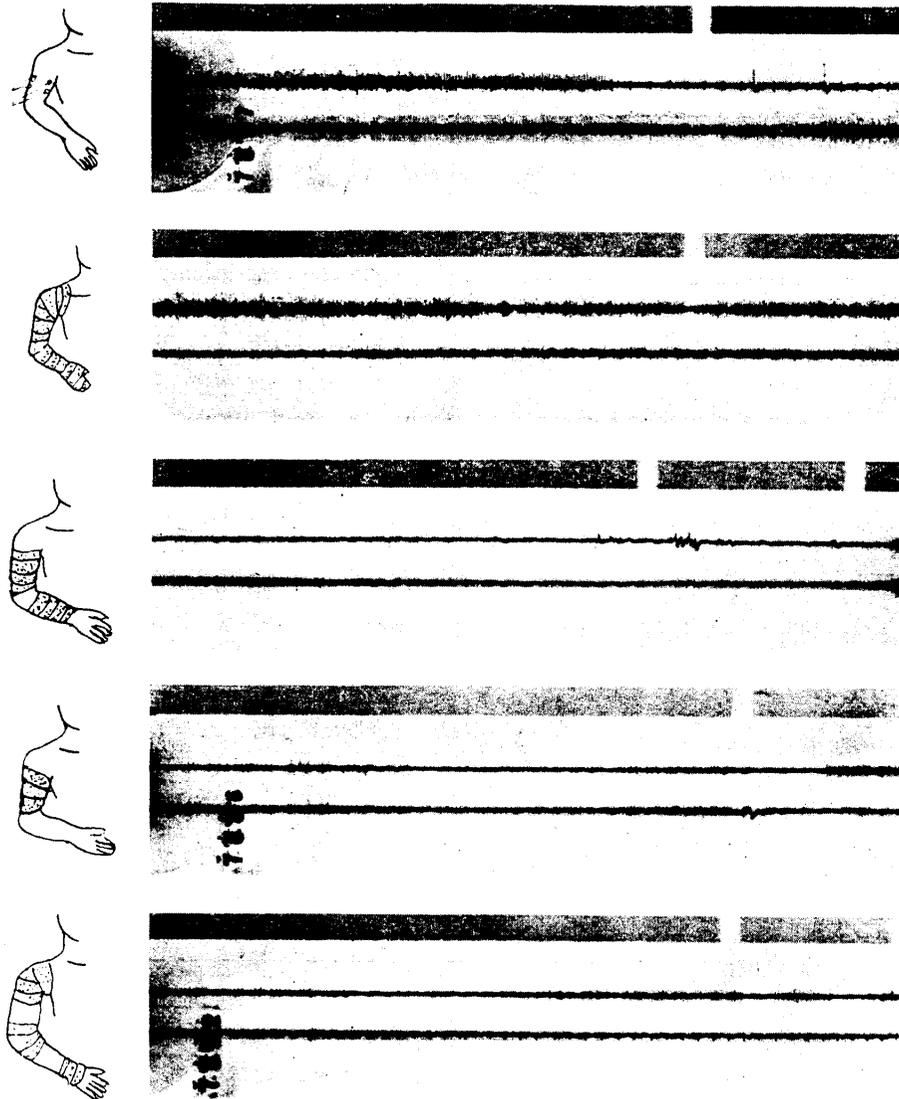


Fig. 2.

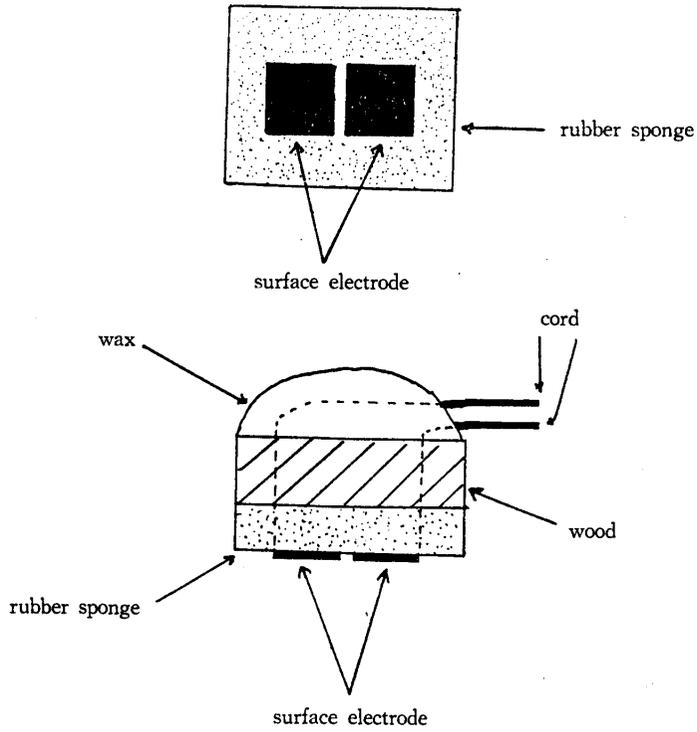


Fig. 3 Case 2.  
H. N. 14 years  
Female  
(Spastic type)  
left leg

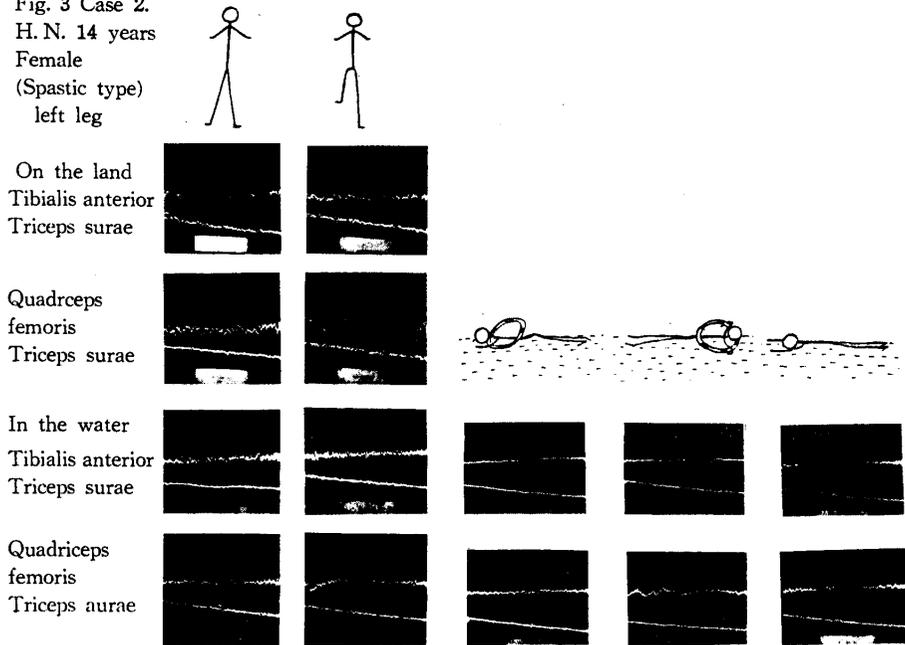


Fig. 4. Case 1. S. S. 12 years Male (Athetoid type)

