PROCaine FOR PaiN PRODUCed BY AORTIC ANEURYSM

While it is too early to appraise the usefulness of this device, it is presented to stimulate thought along physiological lines for the rehabilitation of these tragic cases. If the method proves successful, selective alternating stimulation of various nerves may well prove of benefit to paraplegic patients, once their spastic contractions have been toned down.

SUMMARY

A method is presented for "closed" electrical stimulation of a peripheral nerve in a paraplegic patient by means of a small buried inductance coil, controlled by the patient. This method is designed to facilitate walking, when aided by a special brace.

PARAVERTEBRAL INJECTION OF PROCaine FOR PaiN PRODUCed BY AORTIC ANEURYSM

CASE REPORT

LT. COL. THEODORE RASMUSSEN, M.C., A.U.S.,* AND MAJOR WALTER J. FARR, M.C., A.U.S.†

Surgical Service, 14th Evacuation Hospital, U. S. Army

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Although paravertebral injection of procaine and/or alcohol has become a recognized procedure for the relief of pain produced by aneurysms of the thoracic portion of the aorta, the reason for this relief, as well as the actual mechanism by which the pain is produced, is the subject of controversy. In previous cases reported by White,4 unilateral pain produced by aortic aneurysms was relieved by paravertebral injection of the corresponding side, and the relief was attributed to interruption of the afferent fibers from the damaged portion of the aorta. In the case to be presented here, the pain was substernal and not lateralized, yet prolonged relief was afforded, first by paravertebral injection of procaine on the left side and subsequently again by a similar injection on the right side. The case is reported for its implications concerning the mechanisms involved both in the production of the pain and in the relief of the pain by a temporary paralysis of the regional sympathetics.

CASE REPORT

1st Lt. Liu Ku Ming, Chinese Army in India, 25 years of age, first became ill in January 1944 while on active duty with his unit in Burma. He noted gradual onset of substernal pain, hoarseness, persistent cough, dyspnoea on exertion, and occasional hemoptysis. In May he was admitted to a hospital in the forward area and one month later was transferred to a base hospital. The pertinent laboratory findings here were a positive blood Wassermann and X-rays of the chest which showed a marked enlargement of the heart and an aneurysm of the arch of the aorta. During his 6-month stay in this hospital the persistent substernal pain necessitated 1 to 5 daily hypodermic injections of morphine (usually gr. 1/6), except for an occasional good day. During August and September cardiac decompensation developed and then disappeared on supportive therapy. In October he was started on an anti-syphilitic regime of potassium iodide and bismuth, without producing any change in his chest pain.

On Oct. 6, 1944 he was transferred to our hospital with the same principal complaint of vague, gnawing substernal pain which varied in intensity, being relatively slight at times and then again quite severe. There were marked hoarseness of the voice and bilateral absence of the pupillary reaction to light. Examination of the cardiovascular system showed a definite tracheal tug, a harsh systolic murmur over the entire precordium, left axilla, left interscapu-

* Retired from military service. Now at 3801 University St., Montreal 3, Canada.
† Retired from military service. Now at 955 Queen Anne Road, Teaneck, New Jersey.
lar area and right subclavicular region, and a softer diastolic murmur over the 2nd right inter-
space at the sternal border. The blood pressure was 130/40 in each arm. There was a char-
acteristic Corrigan pulse but no exaggeration of the capillary pulse was visible. The spleen
was moderately enlarged; the liver was at the costal margin and was not tender. There were
a few rales over the base of the left lung. Fluoroscopy and X-rays of the chest revealed a
markedly dilated heart with an aneurysm of the arch of the aorta which displaced the lower
segment of the trachea to the right. There was evidence of a small amount of fluid at the base
of the left lung and slight erosion of the anterior surfaces of the bodies of the 5th and 6th
thoracic vertebrae. There was no percussion tenderness over the sternum or spine.

During the first week under our observation an effort was made to stop the administra-
tion of morphine, and, at the expense of some discomfort to the patient, it was reduced to 1
or 2 doses daily. He remained in bed most of the time and took little part in the ward activi-
ties. The administration of potassium iodide and bismuth was continued. On Dec. 14, 1944
a paravertebral injection was done according to the technique of White and Smithwick,\(^5\)
and 15 cc. of 1 per cent procaine were injected along the left side of the body of the 1st
thoracic vertebra. A second needle was then inserted on the left down to the 2nd thoracic
vertebra, but freely flowing, non-pulsating arterial blood appeared, so the needle was with-
drawn. A left-sided Horner's syndrome and a sympathetic paralysis of the left arm appeared
within a few minutes, and there was no untoward reaction to the procedure. The substernal
pain was completely relieved for 2 hours and then returned with considerably reduced in-
tensity. During the next week there was a striking increase in his activity about the ward
and he complained of only mild and intermittent pain. He received morphine twice during
this first week, each time at night, and 4 times during the next 2 weeks. He then remained
free from pain, and after several weeks asked to be returned to light duty. While this was
being arranged he developed a severe upper respiratory infection on February 5, which lasted
for 2 weeks. Following this the substernal pain returned as before. On Mar. 7, 1945 the
paravertebral injection was repeated, this time, however, on the right side; 15 cc. of 1 per
cent procaine were injected alongside the 1st thoracic vertebra and 15 cc. alongside the 2nd
thoracic vertebra. A satisfactory right Horner's syndrome and sympathetic paralysis of the
right arm was obtained. There was again immediate relief of pain and the patient was dis-
charged to limited duty one week later, still free from pain.

On June 5, 1945, 6 months after the left-sided injection and 3 months after the right-sided
injection, he returned for reexamination. He had remained free of pain and able to carry
out his assigned duties with his unit. There was no significant change in his general physical
examination or in the examination of his cardiovascular system. X-rays of the chest showed
disappearance of the density at the base of the left lung, a slight decrease in the size of the
heart shadow, but no change in the aneurysmal shadow.

COMMENT

The interesting features of this case are, first, the relief of midline pain by paralysis of
the fibers of the upper thoracic portion of the sympathetic nervous system of the left side
and subsequently of the right side, and secondly, the prolonged relief which followed the
temporary paralysis produced by the injection of procaine.

It seems fairly definite, from the deep-seated and midline location of the pain and the lack
of local tenderness over the sternum and spine, that the painful impulses in this case were
arising in the aorta rather than as a result of pressure of the aneurysm upon the thoracic
cage or intercostal nerves. Since visceral afferent fibers from the arch of the aorta are believed
to reach the spinal cord via both the right and left sympathetic chains, the simple fact of
blockage of the afferent impulses of one side does not adequately explain the relief of pain.
Injection of each side, singly, resulted in relief of pain; thus it is reasonable to assume that
nerve impulses concerned with the production of the pain were traversing both sympathetic
chains. Yet interrupting the impulses of one side was sufficient to stop the pain.

The persistence of relief from the pain long after the procaine had been absorbed also de-