ORIGINAL ARTICLES

Scientific and General

TECHNIQUE OF CAROTID SINUS STIMULATION*

JOHN MARTIN ASKEY, M. D.
Los Angeles

PAROXYSMAL auricular tachycardia is encountered sooner or later in every general physicians practice, and constitutes a minor or major cardiac emergency depending upon the condition of the heart itself and the duration of the tachycardia. It responds to various treatments, often stopping spontaneously. Pressure over the carotid sinus is one of the measures used most frequently in stopping such attacks. The success of this maneuver depends upon eliciting a strong reflex vagal cardiac effect by mechanical stimulus of the nerve filaments in the carotid sinus. There are two requisites for the maneuver to be effective. First, precisely to locate the carotid sinus, second, to apply adequate stimulation. It is probable that many failures to stop paroxysmal auricular tachycardia are due to failure properly to locate the sinus, inasmuch as pressure over the common carotid artery below the sinus has no effect. There are few detailed descriptions of the application of this maneuver, and many medical students and physicians, we believe, are unfamiliar with the details of the technique.

PROCEDURE

The technique we use is as follows:

The patient sits upright in bed or in a chair. The chin is elevated to make the carotid artery more readily palpable. The patient is instructed to hold the stethoscope over the apex of the heart with the right hand. (Fig 1.) Taking his position in front and to the left of the patient, the doctor applies his right hand to the left side of the patient's head. With two or three fingers of his left hand, he then locates the pulsation of the right common carotid artery and follows it up the neck to about the level of the upper border of the thyroid cartilage, where the carotid sinus may be felt as a bulge at the bifurcation of the common carotid artery. (Fig. 2.) If the bulge is not felt definitely, the point of greatest pulsation usually will be the correct site. With the fingers of the left hand, pressure is then firmly made over this bulge backward and medially firmly enough completely to compress the artery. A slow vertical and rotary massage over the sinus is employed in order to stimulate the maximum number of nerve filaments. Adequate pressure is necessarily firm but not severe. It is not unusual for the patient to wince from the pressure. If the sinus is correctly located and massage is adequate, the tachycardia usually will terminate abruptly after a few seconds. It is not more effective, nor is it wise, we believe, to press longer than 5 to 10 seconds at a time. If the tachycardia does not stop after pressure on the right side, pressure may be made over the left carotid sinus, although it is seldom successful if pressure over the right carotid sinus fails.

COMMENT

By the above method, the carotid sinus is usually located readily, counter-support of the head to allow firm pressure is supplied, continuous auscultation of the heart to indicate the exact moment of cessation of the tachycardia is possible, and observation of the patient is permitted. Some advise standing behind the patient while applying pressure. It is always wise, we believe, to observe the patient's face at any time carotid sinus pressure is employed. Besides syncope which results from bradycardia or hypotension, sudden syncope due to a direct cerebral effect is also mediated through the carotid sinus nerves. Such a syncopal reaction usually occurs abruptly without any preceding bradycardia and is usually

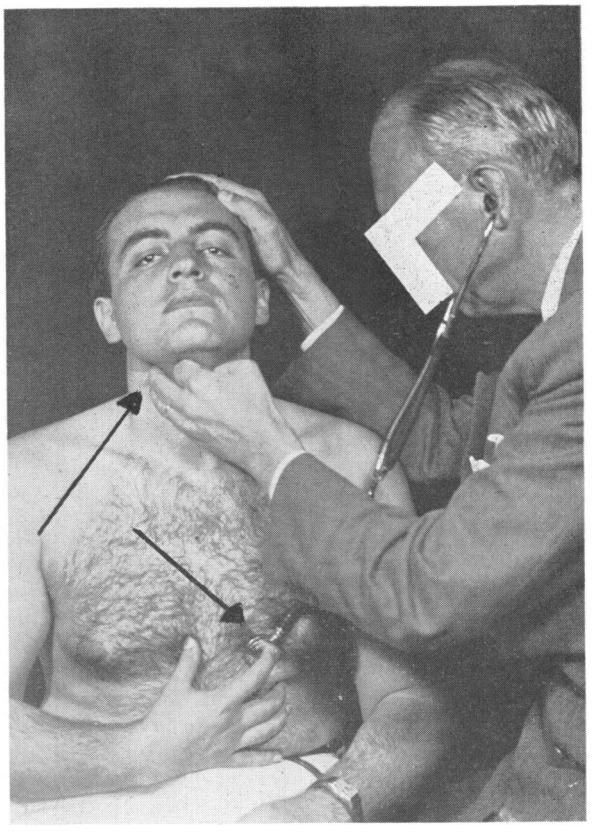

Fig. 1.—Position of patient and examining physician.

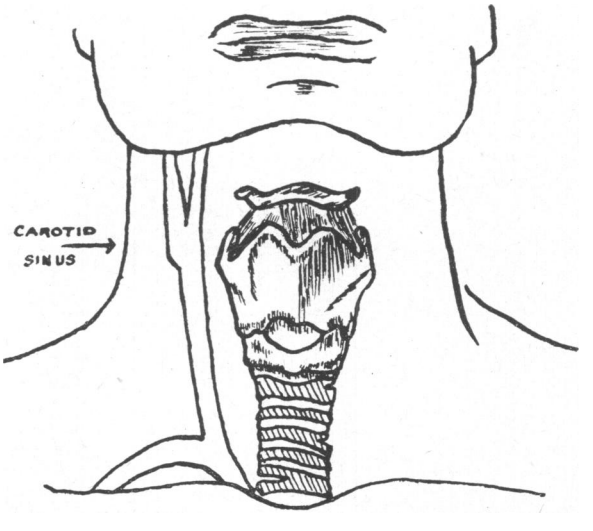

Fig. 2.—Topographical location of carotid sinus.

* From the Department of Medicine, University of Southern California School of Medicine.

Acknowledgment of assistance in the preparation of this paper is made to Dr. Joseph A. Pollia.

preceded by sudden facial blanching. Such a reaction is rare in paroxysmal supraventricular tachycardia, but may occur and one is always prepared if the technique includes standing in front of the patient. In case of a syncopal reaction, the hands are in ready position to hold the patient and to lower him into a recumbent position.

CONCLUSION

Carotid sinus stimulation also has a place in the differentiation of arrhythmias.[1] It has been used to identify the hypersensitive carotid sinus syndrome, and as a routine in complete neurological examinations. Its employment for the latter purpose in the middle aged or elderly individual with arteriosclerosis should be cautiously weighed. Untoward cerebral accidents have occurred[2] and although these are forunately very rare, the possibility should be recognized and should enter into the consideration of the indications and contraindications for the use of the maneuver.

1930 Wilshire Boulevard.

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VARIATIONS IN SIZE OF THE HUMAN STOMACH*

ALVIN J. COX, M. D.
San Francisco

TEXT books provide few and sometimes conflicting data regarding the size of the human stomach. Cunningham's Textbook of Anatomy contains the statement, "probably no organ in the body varies more in size within the limits of health than the stomach"; however, it is not clear whether "size" refers to weight or capacity, post mortem measurements of which are recognized to be misleading. Specific records of stomach size are not common, but several have been reported. All deal either with weight of the organ or with its capacity. Ross[1] reports the normal stomach capacity as 1-2 liters and the normal weight as 125 to 175 grams. Reed[2] notes the "average capacity" as 1600 to 1700 cc. and the normal weight range as 113.4 to 141.75 grams.

POST MORTEM MEASUREMENTS

Measurements of the capacity of the stomach post mortem are not reliable because of the impossibility of standardizing the degree of distension of the organ. Differences in the amount of muscle, rigor mortis, and other post mortem changes may influence the distensibility. A more reliable index of stomach size is the total area of the mucosa after it is spread so that all folds are removed. In stomachs which are not distended, the mucosa, because of its folds, has an area greater than that of the muscular wall. When the latter is stretched the mucosal folds are progressively flattened until they disappear and the mucosal surface is uniformly parallel to that of the muscle. This disappearance of the mucosal folds on stretching of the stomach is an end point which can be recognized readily. Although most methods of stretching cause some further tension to be applied to those portions of the mucosa, where folds are absent or disappear early, this does not lead to much increase in area because gastric mucosa can be stretched only slightly after the folds are flat, and will tear before there is much increase in area. This standardized stretching procedure is easily accomplished with the excised opened stomach and such a method has been used in this study.

One hundred and twenty-six human stomachs obtained at autopsy have been measured. Most of the specimens were obtanied within six hours of the time of death, and none has been included in which post mortem digestion of the mucosa has been been more than superficial. The stomachs have been opened along the greater curvature and have been pinned to a board in the stretched position before fixation in 4 per cent aqueous formaldehyde. After fixation, maps have been prepared by tracing the outline of each specimen on paper, and the areas of gastric mucosa have been measured from the maps by means of a planimeter. Average values for stomach mucosal area obtained in this way are 843 sq. cm. for males and 763 sq. cm. for females.

All of the stomachs were weighed after formalin fixation and removal of the attached ligaments and masses of fatty tissue, and the value was corrected later by subtracting the weights of the attached portions of esophagus and duodenum, which were removed after histological sections had been prepared. The average stomach weight was 165 grams in males and 150 grams in females. Fig. 1 shows the relation between the mucosal area and the stomach weight in the individual cases. The greater weight of those stomachs having large mucosal areas indicates that differences in the latter are not due merely to variation in degree of stretching. Preliminary observations show the greatest thickness of mucosa in the stomachs with large areas, so it is apparent that the mucosal area provides a rough index of the quantity of mucosal tissue present.

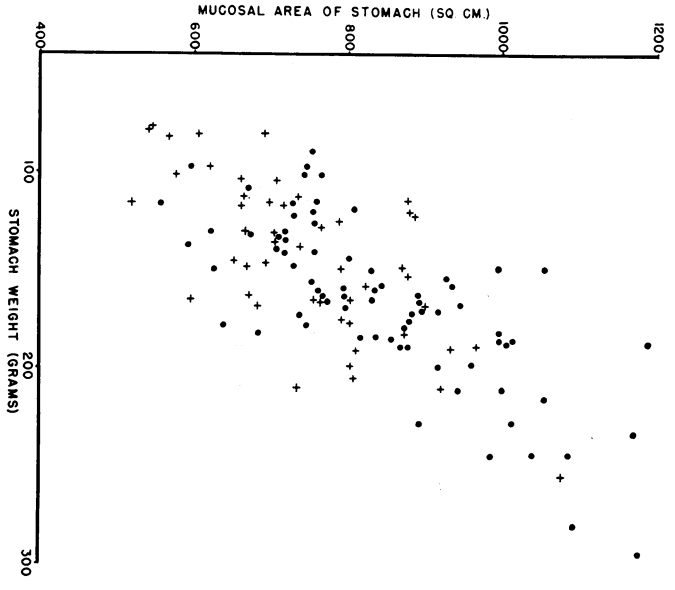

Chart 1.—Differences in Size of the Human Stomach (based on measurements of 126 stomachs).
Solid circles represent males; crosses represent females. One additional stomach from the series (area 1536 sq. cm. and weight 453 gms.) was so much larger than the others that it was not included in this chart.

The extreme values for mucosal area in this series are 520 and 1536 sq. cm., and the range of stomach weight is from 77 to 453 grams. These represent variations of three and six fold respectively. The differences are not related to age of the patients, which ranged from 19 to 83 years.

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* Read before the Section on Pathology and Bacteriology at the Seventy-fourth Annual Session of the California Medical Association, Los Angeles, May 6-7, 1945.

From the Department of Pathology, Stanford University School of Medicine, San Francisco.