

It is not intended to exaggerate the menace of this disease to the public health. Nevertheless, although the disease in New York City has apparently been mild and has shown little tendency to spread, it is apparently on the increase there and the possibility should be borne in mind that it may acquire virulence and epidemic prevalence.

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**The relation of the parathyroid glands to electrical hyperirritability.**

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The following observations were undertaken for the purpose of obtaining information as to the relation between parathyroid lesion and infantile tetany and of the value of the galvanic reaction as a diagnostic sign of the disease.

In all 25 operations were done on 18 dogs, tests being carried on during August and September, 1910, and from March, 1911, to the present time.

Information was sought on the following points:

1. The limits of response to be expected in peripheral galvanic stimulation of the normal dog.
2. The influence of age upon this galvanic response.
3. The comparability of electrical response in the dog to that of man.
4. The incidence of electrical hyperirritability and tetany following injury to or removal of 1, 2, 3 or all of the parathyroid glands.
5. The time of appearance of these evidences after operation.
6. The length of time by which the electrical evidences precede the physical signs of tetany in their appearance.
7. The constant or varying qualities of the changes of response to electrical stimulation.
8. The frequency of the presence of the electrical evidences of tetany when all other signs are absent.

9. The predisposition to more sudden and severe electrical irritability, when further parathyroid loss is suffered, by animals previously subjected to parathyroid injury.

10. The influence of gestation on the galvanic response of parathyropriva animals.

*Technique.*—Ether anesthesia.

Three procedures or a combination of the first two were followed.

1. The parathyroid gland or glands were exposed, lifted on the point of a needle and excised or crushed.

2. A thyroparathyroidectomy of one side was done.

3. A complete thyroparathyroidectomy was done on both sides and thyroid extract given to the dog.

For the galvanic tests the peroneal nerve-muscle group was used. The negative electrode was placed on the upper abdomen, the positive over the peroneal nerve as it passes around the head of the fibula. The instrument employed supplied a galvanic current from dry cells and was provided with a rheostat, polarity switch and balanced milliamperemeter measuring from .2 to 10 milliamperes.

*Findings.*—

1. In normal adult dogs K.C. is usually less than 2 m.a. and may vary between 1 m.a. and 3 m.a. A.C. is usual at from 3 to 5 m.a. It is seldom less than three and often greater than 5 m.a. A.O. is rarely obtained at less than 5 m.a. K.O. is never below 5 m.a.

2. Young puppies are less susceptible to galvanic stimulation than grown dogs. K.C. and A.C. alone are obtained at less than 5 m.a. Frequently K.C. alone is obtained and not often below 3 m.a.

3. Comparison of the findings on normal and parathyropriva dogs with over 300 observations on normal children and children having tetany shows that galvanic response is very similar in the two classes.

4. Of 4 dogs with one parathyroid gland removed, none developed frank<sup>1</sup> tetany. Two showed mild anodal hyperirritability

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<sup>1</sup> By frank tetany is meant the development of tremors, muscular or laryngeal spasms, convulsions or paralyses.

during a period of 10 days following operation. One showed moderate anodal hyperirritability during a period of 7 days following operation. One showed no electrical change during 11 days after operation. The removal of one parathyroid resulted in only moderate lowering of the anodal reactions.

Of 8 dogs with 2 parathyroids removed none developed frank tetany. Two showed marked electrical hyperirritability to K.C., A.C., A.O. and K.O. during 25 days following operation. Two showed marked anodal irritability during 13 days and 10 months respectively after operation. Four showed very slight anodal irritability during periods of from 1 to 4 weeks after operation. Electrical irritability of varying degree follows injury to or removal of 2 parathyroid glands.

Of 2 dogs with 3 parathyroids removed neither developed frank tetany. Both gave prompt and marked anodal irritability with occasional low response to K.O. Observations were continued for 36 days after operation.

Of 4 dogs subjected to complete thyroparathyroidectomy at one operation, two gave complete hyperirritability on day following operation and developed tetany two days later. One developed marked anodal irritability with tetany the following day. One, for 46 days, showed neither electrical nor other symptoms of tetany.

Of 7 dogs having part of their parathyroid tissue removed at one time, and the remainder later, 5 developed prompt and complete electrical change and frank tetany. One showed no hyperirritability but died of tetany in six days after operation. One showed complete galvanic reactions but died on the sixth day without other signs of tetany. Prompt and complete hyperirritability, followed in from one to two days by severe tetany, resulted in the removal of all parathyroid glands.

5. Electrical change was noted in from 5 to 48 hours after operation. The promptness and severity of its development depended to a considerable degree upon the amount of parathyroid tissue removed.

6. In all dogs developing frank tetany the electrical diagnosis was established from 1 to 3 days before other symptoms appeared. Lesions which failed to produce tetany were usually accompanied

by electrical change. Marked hyperirritability was present in one case for 11 months without other symptoms of tetany.

7. Sixteen dogs at some time during their periods of observation gave response to all forms of current at less than 5 m.a. Seven dogs with all parathyroids absent were constantly low in all reactions. Five dogs, 2 with all glands removed, 3 with 2 removed, 1 with 3 removed, were constantly low in all but K.O. Four dogs, 3 with 2 glands removed, 1 with 3 removed, gave constantly varying reactions.

In one instance there was constant low K.C., high K.O. and great variation in the anodal tests.

As a rule the electrical change is sufficiently constant to make the test a valuable one. Variations are, however, to be expected.

8. Eight dogs, 2 with 1 gland, 4 with 2 glands, 2 with 3 glands removed showed marked and complete electrical hyperirritability without other symptoms of tetany. Parathyroid injury sufficient to produce hyperirritability does not necessarily result in frank tetany.

9. Eight dogs were subjected to parathyroid injury and later to further loss of glands. In each instance the electrical changes following second operation were more rapid in development and more severe than those noted after the first operation.

10. While under observation 2 parathyropriva dogs littered normally and 1 aborted at about 1 month. None developed tetany during gestation or lactation. There was moderate increased irritability during gestation which became more marked during lactation. No electrical change occurred in the animal which aborted.