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BEVERLEY R. TUCKER, M.D.

Professor of Neurology and Psychiatry, Medical College of Virginia  
RICHMOND, VA.

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PITUITARY DISTURBANCE IN ITS RELATION TO THE PSYCHOSES OF ADOLESCENCE \*

BEVERLEY R. TUCKER, M.D.

Professor of Neurology and Psychiatry, Medical College of Virginia  
RICHMOND, VA.

One should always be cautious in exploring a more or less new field, but not so excessively prudent that the gathering of material and the discovery of truths become impossible.

Quickly to orient ourselves, we must deal briefly with the pituitary gland and some of its disorders, then with adolescence in general and some of its mental disturbances, and after this consider the bearing the one may have on the other.

*Function.*—Each of the three parts of the pituitary body has been endowed by investigators with separate functions. Among the functions of the anterior lobe are body growth and the development of secondary sex characteristics. It may also have to do with the regulation of the menstrual period in the female. Two of the chief functions of the posterior lobe are the control of carbohydrate metabolism and an influence on blood pressure stability. It seems also to play a part in uterine tonicity and probably that of other involuntary muscles. The functions of the intermediate lobe are not settled.

Schmidt and May<sup>1</sup> believe that the active principle of the posterior lobe is derived from the tethelin produced by the anterior lobe, and we know that the pituitary gland is actively connected with most of the other endocrine glands. The anterior lobe of the pituitary is said to be derived from the epithelium of

\* Read before the Section on Nervous and Mental Diseases at the Sixty-Ninth Annual Session of the American Medical Association, Chicago, June, 1918.

1. Schmidt, C. L. A., and May, E. S.: Jour. Lab. and Clin. Med., 1917, 2, 708.

the oral cavity, and the posterior lobe, from the cells of the interbrain.

*Disorders.*—Total extirpation of the pituitary gland is fatal, and of the anterior lobe is fatal, but of the posterior lobe is not necessarily so. Cushing has apparently shown that either undersecretion or oversecretion of the pituitary may be associated with hydrocephalus. Cushing, myself<sup>2</sup> and others have shown that hypopituitarism seems the responsible factor in certain cases of epilepsy. The pituitary gland may be functionally disordered by illness, injury, tumor, adolescent changes, or pregnancy.

In general, hypopituitarism beginning before puberty exhibits obesity, smooth skin, lessened perspiration, diminished body hair, undersized genitalia, and in the male a tendency toward feminine appearance, or in the female diminished menstruation or amenorrhea. If the anterior lobe is especially affected, we usually have in addition slow pulse and voracious appetite. If the undersecretion especially affects the posterior lobe, we note lowered blood pressure, increased sugar tolerance and adiposity.

On the other hand, hypersecretion occurring before puberty may account for precocious mental and sexual development, excessive body hair, long bones and early puberty. One of my patients has menstruated regularly since her second year and had fully developed pubic hair at the age of 6 years. If the anterior lobe is especially affected by hypersecretion, the sex characteristics are prominent and an increased libido is often present. Hyperactivity of the posterior lobe will account for decreased carbohydrate tolerance and at times increased blood pressure.

In discussing certain mental changes connected with pituitary secretion, Cushing, in his book, noted temperamental changes, wakefulness, lack of concentration, indecision, irritability and distrust occurred with hypersecretion. With hyposecretion, he found disturbances ranging from mild psychoses to extreme mental derangement, epilepsy, inability to concentrate, impairment of memory and, at times, drowsiness. In 1914, I<sup>3</sup> also described certain mental conditions and

changes in personality due to disturbance of the pituitary gland.

*Adolescence.*—Now that the field has been briefly prepared, it will be well to consider some of the general characteristics of adolescence, which, as Stanley Hall says, is “a new birth—for the higher and more completely human traits are now born.”

At this period, in a few years, the boy and the girl crystallize into the man and the woman. Adolescence is especially marked by development in physical and sex characteristics; by changes in emotion, love, conduct, ambition and domestic relations; by an elaboration of tastes, desires, dress, social instincts and religious views; by self-consciousness and self-analysis.

During the course of these and other changes, many what we may term physiologic-psychic upsets occur. In both sexes the imagination is overstimulated, judgment is not logical, sex attraction is based on passing fancies, extremes of fashion are indulged in and superstition is rampant. There is a craving for the dramatic and the mysterious. Most actors begin their profession during adolescence and secret societies flourish with adolescent members. Extremes of opinion and excesses of every kind are more common to adolescence than to any other period.

There is little wonder, therefore, that during this time, when the mental balance is upheld by so unsteady a hand, that it should frequently topple over. When this does occur, emotional instability becomes pathologically manifest by sexual perversions, crime, suicide, hysteria or dipsomania; menstrual disturbance, illness, injury, or shock may develop latent psychoses; and preexisting defects of development or bad heredity may now be recognized as dementia praecox, manic-depressive states, or paranoia.

It has been shown that there are definite changes in the pituitary gland at puberty, manifested clinically by changes in bone growth, fat, sugar tolerance, sex characteristics, body hair and in personality. Cushing cites an instance in which there were two distinct types, descended through the males, traced for several generations: a “virile type,” with early hirsuties; and a smooth skinned comparatively hairless, and what the patient called a “girlish type,” in which adolescence is delayed usually until the seventeenth or

<sup>2</sup> Tucker, B. R.: South. Med. Jour., 1914, 7, No. 8, 608; Virginia Med. Semi-Month., April 7, 1916.

<sup>3</sup> Tucker, B. R.: South. Med. Jour., 1914, 7, No. 8, 9608.

Classification	Clinical Findings	Röntgen-Ray Findings	Psychosis	Incidence
GROUP 1 Preadolescent oversecretion, with further increase during adolescence	Increase in body hair and sexual development and mentally precocious	Large sellae, with regular contour and smooth clinoid processes	Prejudices and infatuations, increased libido, psychomotor acceleration, sudden changes in temperament and usually transient hallucinations	Rather frequent
GROUP 2 Preadolescent oversecretion, with decreased secretion during adolescence	Same as Group 1, with apparent arrest at puberty	Large sellae, with probably irregular outline and some thickening of posterior processes	Drowsiness or probably trance states, with disturbance of pulse and blood pressure; other endocrine glands usually also affected	Rare
GROUP 3 (A) Preadolescent normal secretion, with increased secretion during adolescence	Previous history normal, or practically so, with marked increased libido and sex characteristics during adolescence	Not definite	Increase in libido and general nervousness, but rarely amount to definite psychoses.	Common in moderate degree, but mental changes rare
GROUP 3 (B) Preadolescent normal secretion, with decreased secretion during adolescence	Previous history normal, or nearly so, with delayed adolescence, frequently increase in fat and sugar tolerance; appetite voracious; pulse often slow and blood pressure low	General size of sellae about normal, but thickening and enlargement of clinoid processes, especially the posterior; encroachment on fossae usually shown	Dull, seclusive, self-absorbed; repetition of movement common; difficulty in expressing themselves in writing; unemotional, unaffectionate, obstinate, irritable; may or may not have hallucinations and delusions; resembles dementia praecox	Frequent
GROUP 4 Preadolescent undersecretion, with further decrease during adolescence	Previous history normal, usually increase in fat and sugar tolerance, underdevelopment of genitalia, lack of body hair, lessened perspiration, voracious appetite, delayed adolescence and often amenorrhœa in female	General size of sellae small, contour irregular, processes enlarged and encroach on fossae and club or tend to bridge	Psychosis is usually not very profound; have dullness, irritability, tardiness, lack of ambition, often truancy and sometimes epileptoid convulsions	Rather frequent

\*Usually these psychoses are preceded by illness, injury or great change in environment.

eighteenth year. Sudden growth at this period may be taken, in certain instances, as an index of the activity of this gland. One of my patients grew 9 inches during the summer of her sixteenth year and afterward died of a neighborhood pituitary tumor; a boy with congenital syphilis grew 13 inches in thirteen months, beginning at his sixteenth year; and an undeveloped boy grew seven-eighths inch in five weeks on pituitary feeding.

*Pituitary Psychoses of Adolescence.*—In studying this subject, I divided my cases into the following groups:

Group 1. Those cases which gave evidence of preadolescent hypersecretion, with an apparent increased hypersecretion during adolescence.

Group 2. Those cases which gave evidence of preadolescent hypersecretion with an apparent marked decrease in the secretion occurring during adolescence.

Group 3 (a). Those cases with a preadolescent approximately normal history, in which during adolescence the secretion was increased.

Group 3 (b). Those cases with apparently normal preadolescent secretion, which during adolescence seemed to have a decided decrease in the pituitary secretion.

Group 4. Those cases in which there had been preadolescent hyposecretion and, in which during adolescence the secretion appeared to be still further decreased.

It was thought that our present clinical knowledge was too indefinite to attempt to separate into groups the cases in which symptoms of the anterior or posterior lobe seemed to predominate, although at times such predomination was noted. Also, for the reason that in all cases both lobes appeared to be more or less affected, the secretion of the gland was considered as a whole.

#### GROUP 1

CASE 1.—In a woman, white, aged 26 when seen, the psychosis began at 12½, without cause except adolescence. The menses appeared at 11. The father showed evidence of hypopituitarism. Her development was precocious mentally, physically and sexually. The cheek and jaw bones were prominent. The body hair was so much increased that at 15 she had to shave her entire arms when she put on short sleeve dresses. This hair was afterward removed by a chemical. The breasts were fully developed when she was 9 years of age. The pulse was 70; the blood pressure 125 systolic, when 26. A radiograph showed a large fossa, with smooth, clinoid processes. Mental symptoms began at 12½ and consisted of hypersensi-

tiveness, night rigors, wondering what the people she saw would look like when dead, transient hallucinations, loss of affection for her mother and sudden changes from gaiety to solemn intensesness.

CASE 2.—In a girl, white, aged 15½ when seen, the psychosis began at 14½, after a spell of homesickness. The mother was neurotic, and one sister had hyperpituitary symptoms. At the age of 15, she looked as if she were 20. The menses began at 13 and occurred every two weeks with excessive flow. She was precocious in her studies and sex characteristics, and her body hair was excessive. The blood pressure and pulse were normal. There was no history of drowsiness. The thyroid was enlarged, but there were no other hyperthyroid symptoms. A roentgenogram showed a large sella, 10 mm. wide and 12 mm. deep, with smooth anterior and posterior clinoid processes. Mental symptoms began at 14½, and consisted of "baby talk," hysterical seizures, writing up and down on paper instead of across, tantrums, loss of affection for mother, carrying on imaginary telephone conversations, playing imaginary basketball, infatuations for various men and women and persecutory ideas. These symptoms gradually disappeared, and she is now a well-ordered young lady of 19 but still has menorrhagia.

The roentgenograms in this group show large sellae with smooth clinoids. The most prominent of their mental symptoms are unreasonable prejudices for some people and infatuations for others, increased libido, psychomotor acceleration, transient hallucinations and sudden changes in temperament. The psychosis of this group may be said to resemble more or less what has been called profound hysteria.

#### GROUP 2

CASE 3.—In a girl, aged 15 when seen, the psychosis began at 14½, after a fever. The family history was negative. She was overdeveloped sexually, although about normal size and with normal features. The body hair was increased, and she was precocious in her studies. She had marked vasomotor mottling and flushed easily. The blood pressure was 148 systolic and 95 diastolic. The pulse was 130, and the thyroid was slightly enlarged. The menses were free and began at 12½. A roentgenogram showed that the clinoids were enlarged and the fossa was encroached on, although it was not small in general contour. The psychosis consisted of periods of a trance state, lasting days, in which she refused food, sighed deeply and would not talk. Out of these trance states, she would come suddenly. She had no delusions or hallucinations. She was affectionate to her family and very fond of dress. She was given anterior lobe pituitary gland extract and

became well in about three months. With this feeding, the blood pressure dropped from 148 systolic to 130, and her pulse came down from 100 to 80. The urine was entirely negative. The hyperthyroid symptoms disappeared.

I am of the opinion that this group is very small. Only a few cases could be separated, of which the foregoing is the best example.

#### GROUP 3 (A)

There are a great many normal preadolescents who show marked signs of hyperpituitary symptoms during adolescence. In fact, a moderate extent of this is usual and normal. It is possible for this increased pituitary secretion to cause pathologic symptoms, but this is probably infrequent, for we could separate only a few cases belonging to this group. In consequence, we hardly feel justified in describing it.

#### GROUP 3 (B)

CASE 4.—In a boy, aged 14 when seen, the psychosis began at 13 without known cause, except adolescence. The family history was negative. The patient was rather a thin boy somewhat small for his age. At 14, the genitals were rather small and showed no signs of enlarging, and there was no sign of body hair. He complained of considerable headache. He had done very well in his studies until recently. There was no history of drowsiness. A roentgen-ray examination of the fossa showed a sella of about normal size, but with enlarged anterior and posterior processes, which showed clubbing at the ends.

The psychosis was interesting, in that he had marked repetition of movements, in which he would go up and down the front steps as many as 14 or 15 times before he could start to school; he would cross and uncross his legs until stopped by his parents and repeat many other acts. He could not concentrate enough to write a postal card, although the letters he would make were perfect. He could not dress himself. He would make grimaces, jump up and whirl and was excitable and irritable. His thought processes were slow. No definite delusions or hallucinations could be made out. He was put on whole gland pituitary extract and gradually became normal.

CASE 5.—In a woman, aged 18 when seen, the psychosis began at 16. There was no precipitating cause but adolescence. Her father's people were large, one sister had myxedema, and two brothers were very stout. She was about average size for her age, and her features were rather small. The genital and body hair was negative except for a fine, fuzzy growth of hair on her back. She had a headache which

was corrected with glasses. The blood pressure and pulse rate were normal. She had some drowsiness. She was a good student till 16, and then became a poor one. The menses began at 13 and were regular. The thyroid was rather full, but she had no hyperthyroid symptoms except a fine hand tremor. A roentgenogram showed the sella was about normal in size, but both the posterior and anterior clinoids were rough and enlarged and tended to bridge. The psychosis consisted of very poor memory, dulness at school and hallucinations of faces peeping at her and of hearing voices. She had become indolent, unaffectionate and indifferent and could not concentrate in writing. She was obstinate and appeared most of the time wrapped in her own thoughts. She recovered with whole gland pituitary feeding for three months.

This group, we believe, is the largest of all. The psychoses resemble dementia praecox. The preadolescent pituitary symptoms are negligible. The patients begin to be dull in their studies, seclusive and self-absorbed. Repetition of movement is common. Hallucinations and delusions may or may not be present. Difficulty in expressing themselves by writing is common. The patient is usually unemotional and unaffectionate, and obstinate and irritable if disturbed. The roentgenograms show thickening and enlargement of the clinoid processes, but the general size of the sella is about normal.

#### GROUP 4

CASE 6.—In a boy, aged 15 when seen, the psychosis began at 14½. The family history was negative. The boy was very fat, belonging to a mild dystrophia adiposogenitalis type. He had never been a very good student. Six months previous, he had an epileptic convulsion and two others in the next few months. The psychosis began with loss of ambition, inattention, laziness, obstinacy, lack of emotion, irritability and wanderlust. Once he ran away from home and was found after many weeks in a distant city. A roentgenogram showed a very small sella, with the posterior clinoids rough and large and bridging across the fossa to the anterior clinoids. In less than a year of feeding with whole gland pituitary extract, the patient went to college and has been there for a year. He stands well in his class, his conduct has been exemplary and he has had no more convulsions.

Quite a number of cases belong to this group, although the psychosis does not seem to be very profound. It consists chiefly of irritability, mental dulness, tardiness, truancy and general lack of ambition.

In some cases, epileptic convulsions occur. The roentgenographic findings are those of a small crowded fossa.

#### CONCLUSION

There seem to be definite reasons for believing that pituitary adolescent psychoses exist; that these psychoses may be divided into groups according to the clinical preadolescent status in comparison with the adolescent symptoms; that the roentgenographic findings correspond to the clinical type of the case, and that, in cases which show decreased pituitary secretion, the response to pituitary feeding is prompt and satisfactory.

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212 West Franklin Street.