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HYPERTENSION AND TUBERCULOUS RENAL LESIONS

BY

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Since the first demonstration of hypertension resulting from clamping of renal vessels by Goldblatt *et al.* (1934) and the subsequent report of a case of renal hypertension treated with nephrectomy by Butler (1937), great interest has been shown and large numbers of papers have been written on the subject. Reviews of the literature have been given by Abeshouse (1941), Langley and Platt (1947), Pickering and Heptinstall (1953), and others. The literature on tuberculous renal lesions and hypertension, however, is surprisingly small, and it is intended to review the published cases in the literature and to report two further cases.

Literature

The first reference I can find to renal tuberculosis as a possible cause of hypertension is Leadbetter, who is quoted by Mulholland (1940) as having performed nephrectomy on two cases of unilateral renal tuberculosis with initial blood pressures of 160/100 and 180/100; in one of these patients the blood pressure returned to normal after operation.

Braasch *et al.* (1940) referred to a series of 158 patients operated on for renal tuberculosis of whom 12 were hypertensive. He also reports a group of 37 patients with "auto-nephrectomy" due to tuberculous renal lesions of whom five were hypertensive. In discussing the reasons for this low incidence of hypertension in patients with extensively damaged kidneys he points out that these patients tend to be from a lower age group and also that "vascular sclerosis is uncommon in the presence of the renal pathological changes which occur with tuberculosis." He also noted that there was no greater incidence of hypertension in bilateral disease. Of the 11 cases which were traced, only two showed no fall in blood pressure post-operatively, and seven maintained a normal blood pressure on follow-up.

Abeshouse (1941) reviewed the literature concerning renal tuberculosis and hypertension and quoted details concerning five cases of tuberculosis of the kidney and hypertension which were operated on with successful cure of their hypertension. He adds three cases of his own, two of which are not quoted here, for although they had a fall in blood pressure the initial diastolic pressures were at no time above 96 mm. Hg.

Goidsenhoven (1947), in a review of 92 cases of renal tuberculosis, found six with hypertension, of which two only had a nephrectomy, both with subsequent fall in blood pressure. Barker (1951), in reporting a series of 100 patients with hypertension and unilateral renal disease, quoted nine cases of renal tuberculosis (some of which had been pre-

viously reported by Braasch), five of which were reported as successful two years post-operatively, two fair, and two unsuccessful.

In the accompanying Table are shown the cases reported in the literature. Seventeen of these are from series of five or more cases, and therefore give an indication of the actual success rate.

Cases of Hypertension and Tuberculous Renal Lesions from the Literature

Source	No. of Cases	Suc-cesses	Doubt-ful	Unsuc-cessful	Length of Follow-up
*Braasch <i>et al.</i> (1940) ..	11	7	2	2	2-5 years
*Crabtree and Chaset (1940) ..	1	1	—	—	14 months
Ostry (1948) ..	1	1	—	—	1 year
*Goidsenhoven (1947) ..	2	2	—	—	—
*Barker (1951) ..	2	—	—	2	2-5 years
Leadbetter and Burkland (1938) ..	2	1	—	1	—
Everett (1940) ..	1	1	—	—	—
Abeshouse (1941) ..	1	1	—	—	2 years
*Pickering and Heptinstall (1953) ..	1	—	—	1	—
Nesbit and Ratliff (1940) ..	1	1	—	—	—
Total ..	23	15	2	6	—

* From series of five or more cases.

Case 1

The patient, a boy of 17, was admitted to hospital on May 4, 1955. His story was that he had had a tuberculous thoracic spine at the age of 4 and for the year prior to admission he had complained of frequency, haematuria, and right-sided renal pain. Three months before admission he had been found to have a lesion in the right retina which was diagnosed as being a tuberculoma.

On examination he was seen to be small for his age. He had an angular kyphosis of the thoracic spine. His blood pressure was 210/180, but there were no other abnormal cardiovascular signs.

Investigations.—Blood urea, 36 mg. per 100 ml.; haemoglobin, 78%; leucocytes, 13,500 (polymorphs 78%). Urine culture showed the presence of tubercle bacilli in two out of three specimens examined. An intravenous pyelogram showed a non-functioning kidney on the right side.

As a result of these findings cystoscopy was carried out on May 11, when a diffusely inflamed bladder was seen and both ureteric orifices were partially occluded. It was impossible to pass catheters up either of the ureters because of the inflammation.

Following this investigation he began to develop severe headaches, blurring of vision, and slight but definite papilloedema. Furthermore, his blood urea rose from 36 to 59 mg. per 100 ml. and it appeared that his hypertension had entered the malignant phase. In view of this, a right nephrectomy was performed on May 28, when a kidney extensively damaged by tuberculosis was removed.

Following this his blood pressure came down from 210/180 to 136/90 and has remained at this level for the seven months that he has been at this hospital (see Chart). During this time he has received antituberculosis therapy, but while on this he developed a cold abscess on the sternum.

Blood-pressure chart of Case 1.

Examination of the resected kidney showed caseating tuberculosis accompanied by secondary pyelonephritis. There was considerable fibrosis of Bowman's capsule, leading in many instances to partial or complete obliteration of the glomeruli. The interlobular arteries showed fibroblastic thickening of the intima and the larger arteries medial hypertrophy.

Case 2

A 49-year-old man was admitted to hospital on October 16, 1954, complaining of shortness of breath of 18 months' duration. Together with this he had had a cough productive of white sputum. There was also a history of orthopnoea and retrosternal tenderness on exertion.

On examination he was ill and cyanosed. The blood pressure was 240/160; there was pulsus alternans and a presystolic gallop rhythm at the apex. The heart was enlarged to the left, the apex beat being in the fifth left space in the anterior axillary line. The fundi showed the presence of early papilloedema.

Investigations.—A specimen of urine contained albumin and a deposit of epithelial cells and scanty hyaline casts. Blood urea; 100 mg. per 100 ml. An intravenous pyelogram showed good concentration of the dye in the right kidney. The left renal pelvis, however, was not outlined. Three specimens of urine cultured for tubercle bacilli gave negative results.

On October 29 cystoscopy showed that the right ureteric orifice was normal, as was the rest of the bladder. The left ureteric orifice was scarred and prevented the passage of a catheter. A further intravenous pyelogram done when his condition had improved showed that the left kidney was, in fact, non-functioning and there was no excretion of dye. Also, calcification was present in the upper part of the kidney.

In view of the severe hypertension and the non-functioning left kidney, nephrectomy was performed on November 17. A tuberculous left kidney was removed. Following this the blood pressure, which prior to the operation was 210/110, came down to 120/80 and remained at or under 150/100 until he was discharged.

Three months later he was readmitted for hypotensive drug therapy as his blood pressure was again 210/110. He was stabilized on reserpine 0.25 mg. three times a day and pentolinium tartrate ("ansolysen") 40 mg. twice daily by mouth. On this dose his blood pressure was controlled in the neighbourhood of 155/95 and he was again discharged.

He was seen again in the out-patient department when the dose of these drugs was readjusted because his blood pressure was once again increasing. In May, 1955, despite further antihypertensive therapy, he died in cardiac failure.

Pathological examination of the resected kidney showed areas of fibrosis and calcification. There was advanced glomerular fibrosis, and the arterioles showed intimal and medial proliferation.

Discussion

Hypertension occurring in patients suffering from renal tuberculosis seems to be rare, and it is doubtful if it differs from the incidence of hypertension in normal people of the same age group. In a series of 40 patients with renal tuberculosis who have been subjected to nephrectomy and therefore had fairly extensive disease, I have found only the two cases of hypertension reported above. This low incidence of hypertension is of interest in that renal tuberculosis causes progressive complete destruction of renal substance, and the fact that this process is not associated with the production of hypertension suggests that some other factor is responsible. This question of the relation between the renal lesion and the hypertension has, of course, been discussed since the original observations were made, but no very satisfactory conclusion has been reached. Attempts to relate specific vascular lesions to the onset of hypertension have not met with any real success (Longcope, 1937), nor has any specific

pathological change been found in those kidneys removed from hypertensive patients compared with similar changes not associated with hypertension. It would seem, then, that simple destruction of renal substance is not related to the incidence of hypertension, as is shown in its low incidence in tuberculous lesions.

The results of nephrectomy in these cases seems to be very satisfactory. Langley and Platt (1947), in a review of cases with various renal diseases, quote four successes in 18 in hydronephrosis, six successes in 16 in calculus and pyelonephrosis, and 17 successes in 27 in pyelonephritis, with a total success rate of 44%, which may be compared with 15 successful cases in 23 in this collected series from the literature. These collected results undoubtedly give a rather optimistic estimate of the position, since they include isolated case reports of successes without mentioning the concomitant failures, but 17 of the total of 23 come from series reporting five or more consecutive cases and therefore should be representative. It seems likely that this success rate can be related to the age group of these patients (83% of the series of Braasch *et al.* were under the age of 50), for in all these cases one is studying hypertension in a person suffering from a renal lesion, and a causal relation can only be assumed in cases where the blood pressure falls. In the older age groups there is an increasing incidence of patients with "essential hypertension" who also have a renal lesion and in whom nephrectomy causes no change in the blood pressure.

The two cases related above are of interest in that they both had malignant hypertension. Schroeder and Steele (1939) reported two cases of unilateral renal tuberculosis associated with malignant hypertension as shown by fundal exudates and haemorrhages, and a case reported by Pickering and Heptinstall (1953) had fundal exudates and was found to have arteriolar necrosis on section of the resected kidney. Otherwise this condition does not appear to have been reported. In Case 1, since the malignant phase developed while the patient was under observation, it is known to have been of short duration, whereas in Case 2 unfortunately no record of blood pressure was made before October, 1954. Case 1 is also of interest in that the patient undoubtedly had bilateral lesions, and in spite of that had a prompt and excellent response to nephrectomy. It has been stated by Platt, Pickering, Barker, and others that bilateral lesions are a contraindication to nephrectomy in the treatment of hypertension of renal origin. In renal tuberculosis, however, the remaining lesion is treatable by chemotherapy. It would seem justifiable to consider nephrectomy as treatment for the hypertension even in cases where there is bilateral disease but good renal function remains.

As mentioned in the pathology of the two cases here reported, there was evidence of a secondary pyelonephritis in addition to tuberculous renal lesions, and it seems likely that this is a factor, and possibly the chief one, in causing the few cases of renal hypertension in renal tuberculous lesions.

Finally, in this discussion of the subject I would like to emphasize the good results obtained in these cases. A still very commonly held opinion is that renal hypertension responding to nephrectomy is frequently talked about but rarely seen at first hand. Of series quoting all cases, successful and unsuccessful, hypertension is completely and permanently abolished in between one-third and one-half of the cases. In the cases with tuberculous renal lesions these figures are even better.

Summary

The literature concerning tuberculous renal lesions and hypertension is reviewed and cases which have had nephrectomy performed are reported. Of the total of 23 cases, 15 had a fall in blood pressure to normal levels following operation, two had a fall but a subsequent rise in blood pressure, and in six there was no alteration.

Two further cases are reported here, both having malignant hypertension, one responding to nephrectomy and one not.

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A CASE OF MYOTONIA CONGENITA WITH HYPOTHYROIDISM

BY

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Symptoms and signs suggestive of myotonia have been described in association with hypothyroidism. Since these are relieved by treatment of the thyroid condition, they have been regarded as part of the hypothyroid state (Hoffmann, 1896; Debré and Sémelaigne, 1935).

This paper records a case in which myotonia congenita (Thomsen's disease) and hypothyroidism were present simultaneously and in which the myotonia was not completely relieved even when the patient was made hyperthyroid.

Myotonia congenita is a hereditary disease of muscle characterized by prolonged involuntary contraction following a voluntary contraction (active myotonia) or mechanical stimulation (mechanical myotonia). The condition was first described by Leyden (1874), and Thomsen later published his classical account (Thomsen, 1876).

Case Report

A man aged 20 was referred to University College Hospital in September, 1954, for assessment of his myxoedema, diagnosed nine months earlier. He stated that at the age of 5 he had suffered from stiffness in the legs. This did not greatly trouble him and disappeared after two years. At 12 years the stiffness reappeared. It was more severe and extensive than previously. His main difficulty was in starting a movement, especially if sudden, owing to stiffness of the muscles. The calves and forearms were particularly affected. He noticed that the muscle became prominent and hard and was occasionally painful. After performing a movement repeatedly the stiffness wore off. He was sometimes unable to move a limb for some seconds. The symptoms were worse in the mornings and when cold.

His athletic abilities, previously excellent, fell off markedly, and by the time he was 13 he had given up sport completely, though doing well at his studies. At 14 he was becoming slower physically and mentally. He gained weight rapidly and complained of lethargy and difficulty in concentrating,

and his work deteriorated, so that instead of being near the top he was now near the bottom of his class.

At 18 he joined the Army and was constantly in trouble on account of slowness and clumsiness. On a cold morning he was almost incapacitated. While on sentry duty he once "went stiff all over" and fell to the ground when an officer unexpectedly appeared.

He next complained of frontal headaches, constipation, and occasional double vision. On investigation at that time he was puffy about the eyes, his skin was cold and dry, his pulse 55, his basal metabolic rate -25%, and serum cholesterol 470 mg. per 100 ml. A diagnosis of myxoedema was made and he was treated with thyroid. His weight decreased, the headaches became less severe, and the stiffness was less marked.

When first seen at University College Hospital there was, in the absence of full details, some doubt about the diagnosis, and thyroid therapy was discontinued. A month later, on admission, there was slight puffiness around the eyes, his skin was cold and dry, his temperature 97° F. (36.1° C.), his voice low-pitched, his pulse 44, and blood pressure 130/80 mm. Hg. The thyroid was not clinically enlarged. The muscles were well developed, the calves appearing abnormally bulky; tone was normal and there was no wasting. The arm-, knee-, and ankle-jerks were sluggish, and direct percussion of the calf muscles and forearm extensors produced a contraction lasting about five seconds with marked grooving at the site of percussion. Following a firm hand-shake there was considerable delay in relaxation of the grip.

Investigations.—Plasma cholesterol was 275 mg. per 100 ml. (later 370 mg.). His basal metabolic rate was -30%; radioactive iodine uptake at 24 hours was 5% of total dose. The electrocardiogram showed a rate of 39 with normal voltage curves. The blood sodium, potassium, chloride, calcium, magnesium, and inorganic phosphate were all normal. His intelligence quotient was 100.

Electromyography (Dr. W. D. Fletcher).—"The strength-duration curves of the right extensor carpi radialis were quite normal, although the type response was rather sluggish. Electromyography with needle electrodes, however, revealed trains of high-frequency oscillations on insertion of the needle and on mechanical stimulation of the muscle. These findings, taken together, are typical of myotonia congenita."

Improvement, objective and subjective, followed the administration of quinine. There was no urinary creatine. The creatine tolerance was high (71% retained) and administration of creatine had no observable effect on the myotonia. These findings are in keeping with other recorded observations in Thomsen's disease (Milhorat and Wolff, 1938; Poncher and Wade, 1938).

While under investigation the patient became more myxoedematous and his myotonia more marked. Thyroid therapy resulted in an improvement in both conditions. Correction of the hypothyroidism, however, was not accompanied by abolition of the myotonia, although active myotonia became less obvious.

He was discharged from hospital on December 3, 1954, taking 0.4 mg. of sodium L-thyroxine daily. Six weeks later he was readmitted for observation. He stated he was physically and mentally more agile, but complained of perspiring hands and palpitations. He had been less troubled by stiffness.

On examination he had lost a stone (6.4 kg.) in weight since taking thyroxine. His pulse was 68 a minute and regular. Active myotonia was not observed, the grip relaxing rapidly, but there was still marked mechanical myotonia, particularly of the calf and forearm extensors. His basal metabolic rate was now +53% and plasma cholesterol 247 mg. per 100 ml. No urinary creatine was detected. Electromyography showed no change, being still typical of myotonia; the electrocardiogram showed no significant change. Slit-lamp examination revealed no lens opacities.

Histology of calf-muscle biopsy showed well-developed muscle fibres with no muscle atrophy. In spite of the weight