The Blood Pressure in Advanced Urinary Bilharziasis

BY

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Hypertension may at times ensue when there is back pressure on one or both kidneys, from disease in the ureter or from increased bladder tension which is reflected back on the kidneys. It would seem, however, that hypertension does not often complicate such obstructive lesions in the lower urinary tract. But in his Croonian lecture McMichael (1961) lists hydronephrosis as one of the factors which may cause hypertension. Frequent and often serious lesions are found in the bladder and ureter in urinary bilharziasis. In the bladder we meet fibrosis, calcification and reduced capacity with increased intravesical pressure; in the ureter either dilatation or stenosis or both commonly associated with hydronephrosis (Honey and Gelfand, 1960). Gelfand (1961) points out that in bilharzial hydronephrosis hypertension is rare and discusses the relationship between advanced urinary bilharziasis and the nephrotic syndrome or pyelonephritis.

Other known results of an old standing bilharzial infestation of the urinary tract are secondary infection of the bladder, ureters and renal pelvis. A pyelonephritis is a distinct possibility in advanced bilharzial infestation, and this, too, may be a factor leading to hypertension. In a recent annotation in *The Lancet* the need to pay greater heed to the ascending route via the ureteric lumen in the causation of typical pyelonephritis is stressed. McMichael (1961) lists pyelonephritis as one of the renal causes of hypertension, and in Uganda Leather (1961) found that nine patients out of 46 suffering from hypertension had pyelonephritis.

Object of Study

It was decided early in 1959 to select only those adult African males who had what might be defined as extensive bilharzial disease, which included calcification of the bladder on X-ray or by dilatation of one or both ureters, with or without hydronephrosis. Cases with mild or uncomplicated disease are not likely to cause hypertension, and this study is therefore limited only to the severe forms of urinary bilharziasis. Cases showing the severe complications in the urinary tract were selected consecutively. In most cases the examination included radiography (straight and lateral of the abdomen and an intravenous

pyelogram), clinical and microscopical examination of a urine specimen of each patient, as well as a culture of a catheter specimen, and a blood urea estimation.

In determining the blood pressure a sphygnomanometer was used. The blood pressure was taken on the day of admission to hospital and repeated with the patient in bed. The systolic pressure was taken as the point when the sounds were first heard, and the diastolic pressure as that point where the clear sounds changed and became muffled.

The pressure was regarded as being normal if the diastolic pressure was under 90 mg. Hg. and the systolic below 150 mm. Hg. These figures are approximately the same as those adopted by Leonard and Galea (1961).

As these patients were confined to the ward and spent most of the time in bed, it is regarded that these figures are reasonably basal. It is appreciated that it is possible to obtain more basal conditions, but this was not feasible in a very busy general ward, and consequently it was hoped that this study would serve as a pointer as to whether there is sufficient justification for a much more elaborate investigation. Most of the subjects were admitted to hospital because of pain or colic of a renal distribution, dysuria and frequency of micturition. Very few were admitted primarily as cases of hypertension.

RESULTS

Fifty-one subjects with severe urinary bilharzial disease were studied. Of these, 32 (62 per cent.) had normal pressures and in 19 (or 27 per cent.) the pressure was elevated.

Of the 19 cases, the pressure was regarded as being mild when it was between $\frac{150}{90}$ and $\frac{180}{110}$ and moderate over $\frac{180}{110}$ but below $\frac{200}{120}$. From $\frac{200}{120}$ and above in either systolic or diastolic the blood pressure was taken to be severe.

The results are shown in the table below in 19 cases with hypertension:

Mild	10	(Pressure below $\frac{180}{110}$)
Moderate ...	5	(Pressure $\frac{200}{120}$)
Severe	4	(Pressure from $\frac{200}{120}$ upwards)

The readings in the four severe cases were:

$\frac{170}{150}$ $\frac{200}{140}$ $\frac{200}{120}$ $\frac{280}{120}$

HYDRONEPHROSIS

Of the 51 cases, 39 had hydronephrosis of varying degree. In 26 of them it was bilateral and in 13 unilateral. Of these 39 cases, 26 showed calcification of the bladder.

Of the 39 cases with hydronephrosis, 24 or 62 per cent. had a normal blood pressure, and in 15 (38 per cent.) it was elevated.

In the 26 cases with bilateral hydronephrosis the blood pressure was normal in 16 and 10 showed some degree of hypertension.

$\frac{140}{100}$ $\frac{135}{100}$ $\frac{160}{125}$ $\frac{170}{115}$ $\frac{140}{100}$
$\frac{180}{100}$ $\frac{130}{100}$ $\frac{170}{150}$ $\frac{170}{110}$ $\frac{170}{110}$

Of these 10 cases there were seven with calcified bladder.

Of the unilateral cases (13), eight had severe hypertension, five had an elevated one, three of them being cases with calcified bladder.

$\frac{170}{90}$ $\frac{210}{120}$ $\frac{170}{110}$ $\frac{140}{120}$ $\frac{200}{140}$

URINARY CULTURE

In 28 cases a urinary culture was done. In 11 it was positive, and in 17 no organism was found from the urine specimen. In the 11 with a positive culture the blood pressure was elevated in six.

There were five cases in the series who had hydronephrosis, calcification of bladder and positive urinary culture. In two the pressure was normal, whereas in three it was elevated ($\frac{131}{100}$ $\frac{140}{120}$ $\frac{140}{100}$).

CALCIFICATION OF THE BLADDER

Ten cases with calcification of the bladder showed no sign of hydronephrosis on the pyelogram. In five of them the pressure was normal and in the remaining five it was elevated:

$\frac{130}{105}$ $\frac{155}{120}$ $\frac{165}{100}$ $\frac{200}{120}$ $\frac{160}{100}$

Seven of these ten cases, however, had a dilated ureter in one or both sides. In four of them the blood pressure was normal and in three elevated ($\frac{130}{105}$ $\frac{165}{100}$ $\frac{200}{120}$). In four of the seven cases there was dilatation of a ureter on both sides, the blood pressure being normal in two and elevated in two ($\frac{130}{105}$ $\frac{165}{100}$).

In one of the three cases with unilateral dilatation the blood pressure was raised ($\frac{200}{120}$).

In two cases with calcification of the bladder no pyelogram was carried out. In both of them the pressure was normal.

BLOOD UREA

The blood urea was determined in 35 cases. In nine it was elevated above 40 mg. per cent., the highest figure being 88. The blood pressure was normal in three, the other six showing an elevated level, the figures being $\frac{130}{105}$ $\frac{140}{100}$ $\frac{180}{100}$ $\frac{170}{110}$ $\frac{160}{100}$ $\frac{135}{100}$. Four of them had bilateral hydronephrosis.

AGE

The age of the 19 subjects with hypertension ranged between 22 and 55 years; three were over 50 years, their blood pressure being $\frac{200}{140}$ $\frac{200}{120}$ $\frac{170}{110}$.

There were five between 30 and 40 years, and in this the highest was $\frac{155}{120}$. In the rest the pressure was of the mild type. Eleven were under 30; in eight of them the pressure was mild ($\frac{170}{90}$ $\frac{180}{105}$ $\frac{170}{100}$ $\frac{130}{100}$ $\frac{160}{100}$ $\frac{170}{110}$ $\frac{160}{100}$ $\frac{170}{110}$), but in three it was severe ($\frac{170}{150}$ $\frac{260}{120}$ $\frac{140}{120}$).

Of the 19 cases with hypertension, there were four without hydronephrosis.

COMMENTS

In a series of 51 African subjects considered to have an advanced form of urinary bilharziasis in the bladder and renal tract, the blood pressure was normal in 32 (63 per cent.), but in 19 cases it was elevated. Whereas in ten of the latter the elevation was mild, in nine it was moderate and severe. This is perhaps of greater import when it is remembered that in three with a severe elevation of the pressure the ages were between 20 and 30 years. Many of the subjects with the elevated pressure were under 40 years of age—at an age when an elevated pressure should not be expected. These figures would tend to show that urinary bilharziasis may be a factor in the production of hypertension in tropical Africa. Admittedly, in most the elevation is not marked, but occasionally it was moderately or markedly raised. When one remembers the large numbers of Africans in Central Africa with the disease, bilharziasis may play a not insignificant part in altering the blood pressure level.

When one attempts to explain the cause of the hypertension in these cases one finds it difficult to do so. Of the 19 cases, four had no hydronephrosis. Further, out of 26 cases with bilateral hydronephrosis, the blood pressure was normal in 16. There were also more cases with a normal blood pressure in the series with unilateral hydronephrosis. Thus it would seem that hydronephrosis itself is not always accompanied by an elevated pressure; nor do the figures indicate that hypertension is usually associated with dilatation of a ureter or ureters, for out of seven subjects showing ureteric dilatation four had a normal blood pressure.

The same applies to the calcified bladder, for the pressure may sometimes be normal when the viscus is so affected. Further, in some of the cases of hydronephrosis showing some hypertension the bladder was not calcified.

Nor could one blame an infected urinary tract for the pressure increase, as sometimes the blood pressure was raised, the urine being sterile. In those with a positive urinary culture and a raised blood pressure the degree of tension was mostly of the milder type. Nor did it follow that when the subject had hydronephrosis calcification of the bladder, and a positive urinary culture, the blood pressure would be consistently raised, for out of five such cases in the series two had a normal pressure.

An examination of the blood urea levels indicated an elevation of the pressure (mostly slight) in the majority of the subjects with such an increase which was usually found to be associated with a bilateral hydronephrosis.

If it can be accepted that complicated urinary bilharziasis leads to some elevation of the blood pressure, the precise mechanisms by which this is effected are not clear. Hydronephrosis, hydroureter, calcification of the bladder with urinary infection have been considered, but it was not possible to blame or exclude any one of them as factors in its causation. More information probably would be obtained from cystoscopic studies, but this was not undertaken in this investigation.

SUMMARY

(1) The blood pressure was studied in a series of 51 cases of advanced urinary bilharziasis.

(2) This study would appear to show that in about a third of the cases the pressure was raised, but in most of these it was slight. Nevertheless, occasionally it was raised significantly.

(3) The relationship between hydronephrosis, ureteric dilatation, calcification of the bladder,

urinary infection and age of the patients is discussed.

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