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Bilharzial Stricture in the Terminal Ureter

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That form of bilharziasis which affects the urinary bladder is mainly due to *S. haematobium*. When the worms settle in the vesical veins ova are deposited in the tissues leading to fibrosis; and because the vesical veins drain the lower third of the ureters, these may also become involved in the inflammatory process. Consequently, stricture formation in the terminal ureter is a not uncommon complication, and it may be a serious one, of bilharzial infection.

Gelfand (1950) states that stricture of the ureter in the African is uncommon compared with dilatation (incompetence), a conclusion with which my experience does not agree, though unfortunately I have no figures with which to contradict him. However, he finds clinical ureteric involvement in 32 per cent. of African cases. In my series of 86 cases, all in Europeans, 35 showed involvement of the ureters—a percentage of 40.7. But it should be pointed out that under the circumstances of private practice pertaining in Southern Rhodesia, a urological surgeon would only deal with those bilharzial cases showing complications or those sent to him for cystoscopy, and many cases of uncomplicated bilharziasis would never reach him. I therefore believe my figure of ureteric complications to be exaggerated and it is probable that in reality it should be lower than that quoted by Gelfand for African cases.

Further, it should be pointed out that due to most Africans suffering constant re-infection and the fact that they may not present themselves for treatment until a late stage, the disease in the Bantu usually exhibits much more severe complications than in the European. It is therefore emphasised that this exposition of the treatment of ureteric complications is primarily based on the European and is not necessarily applicable to the African, for whom more radical methods of treatment may be required.

Material

There were 86 cases of bilharziasis in the group, 46 of which showed evidence of the disease on cystoscopy, five cases showed symptoms of bladder neck obstruction and were shown to have *S. haematobium* ova in the bladder neck resections, and the other 35 cases were all cases of ureteric involvement. One of these cases was a stricture of the middle third of the ureter, which was treated by excision and end-to-end anastomosis. The remaining 34 cases form the basis on which this paper was formulated.

All these patients were referred complaining of pain in the loins, though some complained in addition of other symptoms such as frequency. Twenty-eight cases gave a definite history of treatment for bilharziasis and the remaining six cases, though without definite history, had exposed themselves to infection either as fishermen or by swimming in dams. Those cases with a definite history had all been treated for bilharziasis at least two years previous to the onset of their ureteric symptoms and one (which was subsequently treated endoscopically) had a 20-year history.

The age group ranged from 12 to 50 years, with an average of 31.1 years, and one of the worst cases, with a fibrous stricture in the wall of the terminal ureter 1.3 cm. thick, was in a 14-year-old boy.

Out of these 34 cases, 18 were treated endoscopically (ten males, eight females) and 16 by operation (15 males, one female), with one death in the operative series. In 26 of the cases the affection was bilateral and in eight

cases unilateral. Only one case showed incompetence at the uretero-vesical junction, reflux being demonstrated on a micturating cystogram, and in this case the other ureter was the site of an intramural stricture which required dilatation. No case demonstrated any calcification in the terminal ureter or bladder, a condition which is not uncommon in the African; and finally, in only one case did the dilatation of the ureter, when it occurred, extend beyond the pelvic brim. This case, a male aged 17, presented with a non-functioning kidney which was treated by nephrostomy and later re-implantation of the ureter into the bladder.

All cases were submitted to intravenous pyelography and urinalysis; the latter showed that urinary infection was uncommon, only six cases in all giving a positive culture prior to cystoscopy or operation.

Pyelographic Appearances

The main X-ray appearances indicating involvement of the ureter in bilharziasis are either hold-up of dye in the ureter or irregularity of the lower ureter, either of which may be associated with dilatation of the ureter.

(1) "Hold-up."—By this is meant that the ureter still shows dye to be present in the pelvic segment in the 25-minute (or later) films on I.V.P. It is, of course, not pathognomonic of bilharziasis, but is suggestive of it in a patient living in an area endemic for the disease. It is the earliest sign of involvement of the terminal ureter, but is not, I believe, due to direct involvement, but signifies compression of the intramural ureter by fibrosis in the bladder wall.

(2) "Irregularity" of the pelvic segment of the ureter indicates a patchy fibrosis occurring in the muscular wall of the ureter itself. It may occur with delay in excretion, but very often there is no hold-up in the ureter and many cases of this type may be seen during I.V.P. for other conditions.

(3) Dilatation may occur with either of the above types. When it occurs in type one, however, it means that there is an extension of the fibrosis of the bladder wall into the ureteric wall. This ureteric fibrosis may be entirely intramural or it may spread into the extramural ureter, in which case the narrowed terminal segment can usually be seen on I.V.P. Dilatation occurring in type two is also due to fibrosis of the ureteric wall encircling the ureter, but because of the previous patchy fibrosis, dilatation in this type may at first be irregular, leading to saccule formation in the lower ureter.

It is important to stress the difference between these three types, because once dilatation has occurred in the terminal ureter, whether regular or of saccule type, it is likely to be progressive and require radical treatment. This view is based on three premises:

(a) It is the modern view that ureteric peristalsis is due to a myogenic contractility rather than a neurogenic one, and therefore once fibrosis has occurred around the circumference of the ureter, the peristalsis is completely interfered with, leading to proximal dilatation.

(b) A minority of cases of bilharzial fibrosis of the lower ureter show an incompetence of the uretero-vesical valve, with reflux, and in these dilatations of the ureter follows the same pattern as in the cases showing stenosis (Gelfand, 1957).

(c) Experimental evidence would seem to show that any process which prevents the passage of peristaltic waves is responsible for the formation of hydroureter (Watson Beach, 1931; Murnaghan, 1959; Scott and De Luca, 1960).

Treatment

(1) Cases showing "delay" or "irregularity" of the lower ureter: Because fibrosis has not encircled the ureteric wall in these cases, peristalsis is not greatly interfered with and therefore simple dilatation of the ureter with bougies through a cystoscope should suffice to relieve the patient's symptoms. And this is borne out clinically as relief is immediate, though it usually needs to be repeated at intervals of approximately six months. With these cases it is usually advisable to perform an ascending ureterogram (the catheter being withdrawn a second before the film is taken) at intervals to be sure that no dilatation is occurring due to extension of the fibrosis.

Case History No. 25.—European male, aged 26. Complained of pain in both loins (the left being worse) of three months' duration. History of treatment for bilharziasis four years ago.

Urinalysis—N.A.D.

I.V.P.—Kidneys and ureters: normal outline, but both ureters full of dye on 30-minute film.

21.10.59—Cystoscopy: normal bladder and ureteric orifices; right ureter, bougies 6F-10F passed; left ureter, bougies 6F-8F passed (9F would not pass).

23.10.59—Pain relieved.
27.6.60—Pain recurred.
28.6.60—Ureters both dilated to 9F.
29.9.60—Pain relieved.
12.4.61—Pain recurred and ureters again dilated with relief.

(2) Cases showing early dilatation and no extravesical ureteric narrowing: The I.V.P. in these cases show slight dilatation of the ureter, but the narrowed portion is confined to the intramural ureter. (It may be necessary to take oblique views to demonstrate this.) Here it is reasonable to suppose that only the intramural ureter is fibrosed, and in such cases it is usually impossible to pass bougies cystoscopically until the orifice is slit for 1 cm. with a Collings knife through a panendoscope. Thereafter bougies in increasing sizes can usually be passed. Provided regular dilatations are performed, the patient can be kept symptom-free and progressive dilatation of the ureter is obviated.

Case History No. 14.—European female, aged 32. Long history of dilatation of ureters after bilharzial infection in childhood.

First seen 1st October, 1956, with complaint of pain in left loin and two recent attacks of left pyelitis.

I.V.P.—Showed normal kidney outlines and function. Right ureter: no dilatation, but irregularity lower end and delayed secretion. Left ureter: delayed excretion and slight dilatation of lower end of the bladder. Cystoscopy showed inactive bilharzial tubercles on the left of the bladder (seen on every subject cystoscopy).

R.U.O.—Slightly narrowed.

L.U.O.—Severely stenosed.

Both ureteric orifices slit with Collings knife and bougies to size 7F passed.

Next seen 26th February, 1957. No pain left loin; slight pain right loin.

Cystoscopy—

L.U.O.—Appeared normal. Bougies to 7F passed.

R.U.O.—Patulous inflamed. Bougies to 6F passed; 7F would not pass.

5.3.57—I.V.P. showed no dilatation of ureters, but delayed emptying of right ureter.

Next seen 11th December, 1957. Slight pain both loins. Attack right pyelitis two months ago. Both U.O.s dilated to 8F.

Next seen 13th November, 1958, when both U.O.s dilated to 8F.

15.11.58—I.V.P.: Both kidneys and ureters appear normal and there is no hold-up in the ureters.

Thereafter the patient was seen and had her ureters dilated on each occasion to 10F at intervals of approximately six months until 14th April, 1961. Each time with relief of the loin pain for which she requested dilatation.

(3) Cases showing ureteric dilatation with extramural stenosis: In these cases the ureteric fibrosis has extended outside the bladder, and as it encircles the ureteric wall dilatation of the proximal ureter occurs. Even though cystoscopic bougies will pass, such treatment will do nothing to arrest the progressive dilatation of the ureter above the constriction; and if bougies will not pass, it will not help for a like reason to open the ureter above the bladder and dilate the stricture retrogradily. Therefore in these cases a re-implantation of the ureter into the bladder is called for and should be instituted without delay.

Operation

There are many types of uretero-neo-cystostomy devised, the simplest being that of the "split-ureter" technique which, however, does nothing to prevent reflux. The tunnel re-implant (Politano and Leadbetter, 1958) has been designed to prevent reflux in children, but is inapplicable in bilharziasis because the tunnel is the seat of fibrosis, which might stenose the ureter once again.

It is, I believe, important to guard against reflux if possible, because this may cause the dilatation to persist, whereas if reflux can be avoided it is reasonable to suppose that the ureter may return to its normal size once the fibrosis interfering with peristalsis has been removed. For this reason, whenever possible, I advocate the Vest cuff operation for re-implantation (Vest, 1956).

In this operation the ureter is sectioned at its entry into the bladder and any residual fibrous tissue trimmed away. One centimetre of healthy ureter is then split longitudinally and turned back on itself to form a cuff. The ureter is then implanted into the bladder with the cuff projecting on the mucosal aspect. This ensures that there is no raw surface unlined by mucosa and therefore healing occurs promptly and with minimum of fibrosis—a most important point when so much fibrosis has already occurred due to the bilharzial infection. Provided the cuff is maintained, reflux does not occur, but in order to maintain the cuff it is essential to fix the ureter securely on its outside entrance into the bladder wall, and this is best obtained by using three separate stitches of 0.0 chromic catgut at intervals around the circumference of the ureter to hold it to the bladder.

In addition to re-implanting the ureter, should any saccules be present, these are trimmed and the ureteric wall sutured in order to avoid any stasis and consequent infection in the post-operative period.

Rarely it may be found that after trimming the dilated ureter of its fibrous tissue, it is not long enough to be implanted into the bladder without tension. In such cases I have utilised a bladder-flap to bridge the gap, but this I feel is a very inferior operation and should only be used if direct re-implantation is obviously impossible.

At the completion of the operation a urethral catheter and a stab suprapubic catheter are inserted and the bladder closed, drainage being provided to the extravesical tissues. The suprapubic catheter is removed after one week and the urethral catheter at the end of two weeks.

Case History No. 28.—European male, aged 31. History of bilharziasis 10 years ago. Complained of backache of four months' duration.

22.5.60—I.V.P. showed a gross dilatation of the lower third of both ureters, with stricture formation in the terminal extravesical ureter. Kidney function and outlines normal.

Urinalysis: N.A.D. Hb.: 104 per cent. Blood urea: 26 mg. per cent.

3.6.60—Exploration of ureters showed both terminal ureters to be so dilated as to be almost the calibre of the small bowel and ending in a fibrous stricture which extended for one centimetre outside the bladder. The ureters were sectioned, their lower one-fifths being trimmed by excision of part of the wall, and they were re-implanted by Vest's technique. Pathological report on stricture: "Microscopy shows almost complete replacement of the ureteric wall by fibrosis due to schistosomiasis. Chronic inflammation with ulceration is also present."

Post-operatively the patient was discharged three weeks after operation, but it proved impossible to sterilise his urine and investigation revealed that he had a large residual urine. Accordingly on 19th August, 1960, T.U.R. was performed which showed "pronounced chronic inflammation with bilharzial ova present." Following this, his urine rapidly became sterile, though pyuria persisted for two months following this.

On 16th January, 1961, a check I.V.P. showed (quote) "compared with the previous report on 22nd May, 1960, there is now no apparent dilatation of either ureter, the neo-uretero-cystostomy showing an excellent result. The function of each kidney is normal and the right and left pyelograms are normal. Very little urine remains after micturition, the cystogram of the bladder being normal. In general, therefore, the examination indicates a normal upper urinary tract and radiologically a normal bladder following the operation."

It is interesting to note that in addition to the above patient, four other patients operated on in this manner were found in the succeeding weeks after operation to have infected residual urine due to bladder neck obstruction, and that after transurethral resection three of these bladder necks showed fibrosis with bilharzial ova. None of these patients showed clinical or radiological evidence of obstruction prior to operation, and it is therefore thought that the enforced bladder drainage after operation disturbed the satisfactory pre-operative equilibrium between the detrusor muscle and the incipient bladder neck fibrosis due to bilharziasis. This serves as a reminder, therefore, that in bilharzial infestation of the bladder it is as well to check that the bladder neck is normal, especially after any operation involving a temporary defunctioning of the organ.

Summary

Thirty-four cases of bilharzial involvement of the terminal ureter occurring in Europeans are analysed and divided into three classes, the treatment of each type being discussed with an illustrative case.

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