Section of Urology.

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The Cholesterol Content of the Blood in Relation to Genito-urinary Sepsis.

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(ABSTRACT.)

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In the surgical treatment of cases of obstruction in the lower urinary tract, especially that due to prostatic enlargement, there are two aspects of the patient's general condition which have to be considered in deciding as to the nature of the operative procedure required, and as to the most favourable time for the successful performance of such, viz:—

(1) The degree, if any, of defective renal function present. (2) The capacity of the patient to resist the spread of sepsis to the upper urinary tract and renal parenchyma, since a local focus of infection in the nature of a cystitis, of greater or lesser degree, is almost invariably present in such cases.

This second question appears to be the more important from the surgical standpoint, while it is one in regard to which clinical examination alone often fails to give a satisfactory answer. The present paper is a contribution to the study of this problem. Both experimental research and clinical observation suggest that cholesterol plays an important rôle in relation to the processes of immunity. An attempt, therefore, has been made to determine whether the cholesterol content of the blood might be utilized as a measure of the capacity for antibody formation possessed by the individual, and as a practical guide to the degree of "surgical risk" involved in operative procedures in cases of prostatic enlargement, where the clinical manifestations alone may give no such information.

Using the method of Myers and Wardell slightly modified, we found the normal cholesterol content of the blood in a series of twelve normal cases to vary between 0·191 per cent. and 0·133 per cent., with an average of 0·161 per cent. These values are in agreement with those of other workers. It has to be noted that, as the patients in all our cases of prostatic enlargement are over 50 years of age, the average normal cholesterol content should be reckoned as somewhat higher since hypercholesterolæmia is commonly associated with arteriosclerosis, granular kidney, and other degenerative conditions of the later period of life.

The blood-urea nitrogen was also estimated in all cases by Folin and Wu's method.

Eighty-eight cases of chronic obstruction due to prostatic enlargement,

confirmed at operation or on post-mortem examination, have been investigated at the Leeds General Infirmary. No selection of cases was made; indeed many more patients suffering from genito-urinary conditions were investigated, but were subsequently proved not to be cases of prostatic enlargement. Prostatectomy was carried out in fifty-six cases either as a single or two-stage operation. As for the others, they were considered unsuitable for major operation, sometimes on clinical grounds alone, in many instances as a result of our laboratory investigations. This applies especially to the later cases, as we gained confidence in expressing an opinion as to the surgical risk of prostatectomy from our cholesterol estimations.

Twenty-seven of the patients died, and an autopsy was obtained in all except two cases. It has thus been possible to correlate fully our findings with the degree and distribution of sepsis present, if any.

Our conclusions, briefly, are:—

(I) Out of eighty-eight cases of urinary obstruction due to enlarged prostate, eighteen gave a low blood cholesterol value (below 0·126 per cent). Of these, sixteen died of pyelonephritis and two recovered. Whereas of the other eleven deaths in the series in which the blood cholesterol was 0·130 or higher, only one death was due to an ascending urinary infection.

(II) In approximately only 50 per cent. of the patients with a low cholesterol value who subsequently died of pyelonephritis did clinical opinion of the general condition of the patient contra-indicate operation; moreover, all those cases showed, in addition, more or less defect in renal function upon which, rather than upon the latent sepsis, the clinical manifestations depended.

(III) Thus no certain information as to the resistance of the patient to such post-operative spread of sepsis is afforded in many instances by considering the patient's clinical condition alone. Nor does the degree and type of local sepsis in the nature of the cystitis which is present in greater or less degree in all such cases provide reliable information as to the powers of resistance of the individual. In cases of marked cystitis both high and low cholesterol values were obtained.

(IV) It is suggested that a low "blood cholesterol" in a case of acute or chronic retention due to prostatic enlargement is significant of a low capacity for antibody formation, and points to the case being a "bad surgical risk" as regards prostatectomy.

(V) Genito-urinary sepsis with the risk of ascending infection is of more importance to the surgeon than is nitrogen retention from defective renal functions. A high blood-urea figure alone is not serious as to ultimate prognosis; since such cases, of the blood cholesterol was normal or high, gave a normal blood urea after a period of suprapubic drainage. When prostatectomy was postponed until such nitrogen retention in the blood had disappeared, uniformly successful results were obtained, and a more rapid convalescence ensued.

On the other hand, the combination of a high blood-urea and a low cholesterol content is of very serious prognosis, and points to an undoubtedly bad surgical risk. In all such cases (seven in number), except one in our series, the patients died.

DISCUSSION.

Mr. J. F. DOBSON said that these investigations had been carried out by Dr. MacAdam from an absolutely unselected series of cases under different surgeons: they were nearly all hospital patients. He drew attention to the great difference in the treatment and the results of enlarged prostate in private patients and in hospital

patients. In the hospital class of patient it was very difficult, if not impossible, to carry out any satisfactory palliative treatment and sometimes it was necessary to do a prostatectomy in cases which might usually be considered unsuitable. For that reason it was justifiable, both for the surgeon and the patient, to run considerable risks. It was noticeable that in Dr. MacAdam's series the deaths which occurred in cases with a high cholesterol content were mostly from such conditions as cardio-vascular disease, chronic nephritis, pulmonary complications, &c. These cases were running a legitimate risk. He would never regret having done an operation in such a case in which, the local conditions proving satisfactory, the patient succumbed to cardiac or pulmonary complications. The cases with a low cholesterol content were in a different category: of eighteen of these, sixteen died, some merely after catheterization or cystotomy. In the case of these with low cholesterol figures, cystotomy and catheterization were equally fatal. Here, it appeared, they had to deal with a class of case in which the risk of any treatment was extreme. And it had to be noted that in only 50 per cent. of the cases would it be said that the case was a poor operative risk from clinical considerations alone.

It was not clear what this low cholesterol content indicated; whether it meant that the kidneys were already badly infected, or that the resistance of the patient to infection was so low that after any surgical procedure whatever he succumbed to a rapidly extending renal infection. Much further investigation of these cases was necessary. It appeared that in the majority of them an early fatal issue was inevitable and that both catheterization and cystotomy were equally dangerous. He mentioned the need, in this connexion, for further investigation into the value of urinary antiseptics. The occurrence of these advanced and practically hopeless cases which formed a definite proportion of our hospital cases could only be avoided by earlier diagnosis, earlier surgical treatment and the avoidance, as far as possible, of catheterization.