MEDICAL ASPECTS OF THE TREATMENT OF BENIGN PROSTATIC HYPERTROPHY*

E. COWLES ANDRUS, M.D.

BALTIMORE, MD.

THE medical aspects of the treatment of benign hypertrophy of the prostate are summed in the fact that this condition produces obstruction to the urinary tract in elderly men; 85 per cent of the cases demanding operative relief are over sixty years of age. I propose to deal particularly with two phases of the problem: with the evaluation of the resultant functional renal impairment and its treatment, and with some of the complicating factors due to senescent changes in the cardiovascular system.

It seems scarcely necessary to say here that a careful and complete physical examination of the patient should constitute one of the first steps in the treatment of this disease. Such may disclose complicating or coexisting abnormalities (nephritis or heart disease) which must be dealt with as promptly as the urinary obstruction itself.

With hypertrophy of the prostate obstruction of the urinary tract distal to the bladder gradually develops. The anatomical changes which result are well-known. It is necessary here only to draw attention to the fact that the effects of back pressure are bilateral as far as the ureters and kidneys are concerned. The bladder wall hypertrophies, and trabeculation becomes evident; in many cases diverticula appear. The uterers are dilated irregularly; the renal pelves are enlarged and encroach upon the parenchyma of the kidneys. Of the local changes in the kidney so much may be said: in the absence of infection the microscopic alteration in the tubules are far more pronounced than are those in the glomeruli.

The impairment of renal function is generally assumed to be the result of three factors:

1. Back pressure in the urinary tract, even in the early stages, before atrophy of the kidney parenchyma occurs, its powers of elimination are seriously affected.

2. Infection, leading to cystitis, pyelitis, and sometimes pyelonephritis, and

3. Primary renal disease, the result of previous nephritis or of vascular changes in the kidney.

To these should be added a fourth: the functional capacity of the kidney is diminished by any appreciable degree of circulatory insufficiency.

The extent of functional damage may be evaluated by chemical analysis of the blood (it is customary to measure the blood urea) and by the ability of the kidney to eliminate phenolsulphonephthalein. Of the greatest diagnostic and prognostic significance are the successive estimations of the blood urea and of the phthalein excretion after free urinary drainage has been established. Following this, and after the administration of adequate quantities of fluid, the blood urea usually falls and the output of phthalein increases. If, after these procedures, renal function is not improved or restored it must be assumed that irreparable structural damage to the kidney has taken place. Careful physical examination may have revealed the cause of some part of this. Thus, in some cases, the presence of palpably thickened peripheral arteries and narrowed, tortuous arteries in the fundi oculorum, often with patches of exudate in the retinae, indicate widespread vascular disease. It is scarcely to be expected that prostatectomy will cure this state of affairs, although the relief of urinary obstruction and the elimination of infection in the urinary tract, may prolong the patient's life.

* From the Medical Clinic and the James Buchanan Brady Urological Institute, Johns Hopkins Hospital, Baltimore. Read before the Section of Genito-Urinary Surgery, New York Academy of Medicine, April 16, 1930.

Consider briefly the records of two typical cases:

The first, a man of sixty-five, was admitted with complete urinary retention. The blood urea at that time was 100 mg. per cent and the output of phthalein following catheterization was 11 per cent, with an appearance time of fifty minutes. A retention catheter was inserted, and fluid was administered up to 4000 c.c. daily. Four weeks later the blood urea had fallen to normal (30 mg.) and the phthalein excretion had risen to 30 per cent with an appearance time of only eleven minutes. Normal renal function was by no means restored but considerable improvement had occurred.

In the second case, a man of fifty, there was but slight urinary obstruction; the blood urea at the time of admission was 80 mg. per cent and the phthalein excretion 15 per cent. The phthalein appearance time remained at eight minutes for all the observations. The patient had pronounced hypertension, blood pressure 250/140, thickened tortuous arteries, and cardiac hypertrophy. His eye-grounds showed conspicuous papilledema, hemorrhages and huge patches of exudate. Despite the institution of free urinary drainage adequate renal function was never established. The development of myocardial insufficiency, although the patient was digitalized, handicapped the administration of fluid. Two weeks later the patient died. In the meantime the blood urea had risen to 300 mg. per cent and the phthalein had decreased to a mere trace.

In the first case the functional incapacity of the kidneys was due, for the most part, to the obstruction of the urinary tract. In the second it was incidental to generalized vascular disease. Of particular interest is the fact that, although the total excretion of phthalein in the second case was lower than in the first, the dye made its appearance in the urine within the normal time after injection.

To consider only one phase of the effect of age in rendering more difficult the problem of prostatic hypertrophy, any operative procedure upon a patient in the seventh decade of life or thereafter is undertaken in the face of a diminished circulatory reserve.

In the younger individual, in the absence of cardiovascular disease, the circulation, with the aid of its compensatory mechanism, is adequate to meet the most varied demands. With advancing age, however, coincident with degenerative changes in the blood vessels and myocardium, its functional reserve gradually decreases. The arteries become more or less sclerosed; irregular plaques are formed in the intima and may involve the medial coat. Diminution in the caliber of the vessels and impairment of the elasticity of their walls result. The changes in the myocardium are somewhat more varied. In the individual fibers histological alterations, pigmentation, occur which make it possible to distinguish an old fiber from a young one. Furthermore the myocardium may show hypertrophy or fibrosis. The first is the normal response to the increased work required to maintain an adequate blood supply through narrowed, inelastic arteries. Unless the valves are damaged or the resistance in the pulmonary circulation is increased, this enlargement is confined to the left ventricle. Secondarily the aorta dilates, chiefly in the region of its base and arch. The second change, myofibrosis, is due to one or both of two factors: First the normal increase in interstitial connective tissue and wasting of muscle fibers, which occur with age, secondly to localized or diffuse muscular degeneration and its replacement by fibrous tissue incident to impairment of the blood supply to the myocardium. The latter is augmented by any sclerotic narrowing of the coronary arteries either at their origin in the aorta or along their course.

Whatever may be the anatomical results of such changes the inevitable physiological effect is an impairment of the capacity of the heart to meet increased demands. The heart's efficiency depends upon the integrity of its metabolism; this presupposes an adequate blood supply to the myocardium in proportion to the load placed upon it. The circulatory requirements under normal conditions can, in the majority of cases, be supplied, but

unusual demands (over-exertion, fever, hypertension etc.) cannot be met without some evidence of circulatory insufficiency.

Physical examination of the senile heart frequently presents the following clinical picture: The impulse is often obscured by overlying emphysematous lung; when visible or palpable it is usually displaced somewhat to the left. The relative cardiac dullness is enlarged, particularly to the left and downward, and the retrosternal dullness, in the first and second interspaces, is widened, corresponding to the dilated aorta. The heart sounds at the apex are distant and feeble, and are often accompanied by a blowing murmur (functional mitral insufficiency). Over the base the aortic second sound may be sharp but, in the absence of hypertension, is not greatly accentuated. More characteristic is a systolic murmur in the second right interspace, sometimes transmitted upward. This is produced, supposedly, either by arteriosclerotic stiffening of the aortic cusps or by the relative disproportion in the diameter of the normal aortic orifice and the dilated arch. The cardiac rhythm may be normal but is often interrupted by ventricular extrasystoles. Rarely auricular fibrillation may be present.

In the absence of myocardial insufficiency such patients present few symptoms referable to the heart. They are conscious of limitation of their capacity for physical work, and occasionally complain of palpitation; this latter symptom is sometimes lacking even in cases showing numerous extrasystoles. As the circulation becomes overtaxed, however, more obvious symptoms develop: fatigue, breathlessness while talking, dyspnea on slight exertion and orthopnea. Finally a small proportion of these patients complain of typical anginal pain. The physical signs of myocardial insufficiency may be present in varying degrees. These include evidence of pulmonary edema, râles at the lung bases, hepatic enlargement, and edema of the extremities.

It has become increasingly apparent that the frequency and severity of postoperative complications may be materially lessened by adequate preoperative preparation.

Rest is a most important measure. Frequency of urination particularly at night may have so interfered with sleep that the patient is well-nigh exhausted. This may be relieved by catheter drainage. Sedatives, luminal or even opiates, should be prescribed as required.

Diet is often a perplexing problem. In the acute stages, with nitrogen retention, milk is borne best, (800 to 1000 c.c. daily). Subsequently a more complete diet may be administered. In cases with edema salt should be restricted (1.0 gm. or less). Even in the presence of nitrogen retention it is useless to reduce the protein intake below that amount necessary to maintain the patient in nitrogen equilibrium (50 to 60 gm. per day).

Fluids. The impairment of renal function due to obstruction of the urinary tract appears to interfere less with the excretion of water than with that of nitrogenous waste products. To the end that adequate nitrogen excretion may be accomplished as well as to combat the infection in the urinary tract it is often necessary to administer large quantities of fluid to these patients. This constitutes, sometimes, a very vexing problem. If the patient is not already nauseated forcing fluids by mouth may make him so. If signs of circulatory insufficiency are present too large a fluid intake may only make a bad matter worse.

It seems most advisable to determine first whether any degree of circulatory insufficiency exists. If such is the case it is unwise to force fluid at once but better to increase the fluid intake gradually after one or two days' rest and digitalization. In general, too, the administration of fluids by the intravenous route, in elderly patients, is to be undertaken with caution.

When this appears imperative the following method has proved useful. It is similar to that suggested several years ago by Dr. Matas. A silver cannula is inserted into a superficial vein, usually on the foot,

and is tied in place. Through this normal salt solution is injected continuously, regulated by a drop device quite similar to the Murphy drip so that the patient receives not more than 100 to 200 c.c. per hour. In this fashion large amounts of fluid may be given over a period of days and so slowly that the circulation is not embarrassed thereby.

Digitalis. As has been so often stated the indication for digitalis is myocardial insufficiency; the routine administration of this drug is not only useless but unwise. It should, however, be given to any patient showing signs of congestive failure, and in adequate quantity, i.e., 1.5 gm. standard leaves per 100 lb. body weight, or an equivalent amount of some standardized preparation. This is best administered in divided doses over a period of forty-eight hours or more, except in cases of acute failure to which it may be given more rapidly. After the maximum therapeutic effect has been obtained digitalis should be continued at 0.1 to 0.2 gm. daily to replace the amount normally excreted. If the patient has received this drug prior to admission digitalis must be administered in smaller doses and a longer period allowed for digitalization in order to avoid intoxication. The development of acute dilatation to which we shall refer presently calls for an increase in digitalis dosage, or, if the patient has not been fully digitalized previously, for strophanthin (0.5 to 1.0 mg. intramuscularly). In cases showing numerous ventricular extrasystoles the combination of digitalis with dionine may often restore the normal rhythm more quickly than does digitalis alone. This is given in capsules (Fol. digitalis 0.1 gm., dionine 0.006 gm.) and continued up to the therapeutic maximum for digitalis.

Operation. The circulatory strain resulting directly from an operation is due to one or both of two factors. The first is reflected in a reduction of the vital capacity. The normal vital capacity falls steadily during the sixth and seventh decades of life and thereafter, until at eighty it is but 45 to 50 per cent that of the normal at thirty years of age. Following an operation, particularly an abdominal operation, this is often still further reduced. The chief circulatory strain may be due to the second of these factors, i.e. the anesthetic. Here the choice is often a nice one. Aside from increasing the frequency of postoperative pulmonary complications, general anesthesia, ether or nitrous oxide, is attended by a degree of anoxemia and by secondary circulatory changes which must be regarded as dangerous in elderly patients. Herein lies the advantage of caudal or of spinal anesthesia. Except in occasional, very apprehensive, patients with symptoms of angina pectoris we have used caudal or epidural anesthesia, injecting 20 c.c. of a 3 per cent solution of procaine into the sacral hiatus. Morphia (16 mg.) is given the night before operation to insure rest and again just before the patient is removed to the operating room.

Postoperative Treatment. Digitalis should be continued after operation in doses just sufficient to maintain the therapeutic effect (0.1 to at most 0.2 gm. daily). During the first two postoperative days this is usually best administered by injection, digifoline 1 to 2 c.c. The interference with respiration caused by abdominal distension may sometimes contribute to circulatory failure. This should, therefore, be prevented as far as possible, and vigorously combated as soon as it appears. Certain drugs, and particularly morphine, contribute to distension by relaxing the intestine. Schlesinger's solution and pantopon seem less likely to foster distention and at the same time are efficient sedatives. After prostatectomy any treatment per rectum, enema or passage of rectal tube, is to be avoided on account of danger of embolism. Turpentine stupes, pituitrin or eserine are usually effective in dispelling distension.

One of the most alarming postoperative complications is acute cardiac dilatation. In this condition the myocardium becomes suddenly unable to accomplish an adequate

systolic discharge. Symptoms and signs of circulatory failure rapidly develop, the patient becomes cyanotic, the pulse rapid and thready, the blood pressure falls, the pulse pressure is reduced, pulmonary râles become evident and the liver is engorged. The heart is often demonstrably enlarged, its sounds are feeble, and a gallop rhythm is frequently audible. The cause of dilatation is not always immediately evident. It is theoretically due to an increase in the myocardial load beyond the optimum limit in proportion to its oxygen supply.

The most common causes of this complication are pulmonary embolism and coronary occlusion. The abrupt blocking of a greater or lesser portion of the pulmonary circulation suddenly increases the resistance to the output of the right ventricle. The added anoxemia contributes to the failure of the myocardium. Coronary occlusion, by depriving a portion of the myocardium of its arterial supply, may bring about acute and alarming symptoms of dilatation. If the occlusion involves a large vessel death is the inevitable result. If, however, it occupies one of the terminal branches, compensation may later be restored. Minor coronary occlusion may be attended by symptoms and signs of cardiac dilatation and by moderate fever and leucocytosis.

The patient with acute cardiac dilatation is often conscious, restless and extremely apprehensive. A sedative, usually morphia, should, therefore, be given at once. If the patient has not been previously digitalized this should be accomplished as rapidly as possible, best of all with strophanthin. The fall in blood pressure observed in such cases is due less to peripheral vascular relaxation than to the diminished systolic output of the heart. The administration of adrenalin in an attempt to raise the blood pressure by constricting the peripheral vascular bed may only increase the load upon an already overburdened ventricle. The use of caffeine (0.2 to 0.3 gm.) to stimulate systolic contraction of the myocardium is rather more logical.

When is the patient to be considered ready for operation? This must obviously be decided for each case individually and by the urologist and internist in consultation. More important than the patient's condition upon admission is the degree and rate of his improvement under treatment. As stated previously following the establishment of free urinary drainage and the administration of adequate amounts of fluid, the blood urea usually falls and the phthalein excretion rises. It is well to postpone operation as long as this improvement increases. And yet, in many cases, after a temporary improvement the infection in the urinary tract tends to increase with catheter drainage. To delay too long may, therefore, undo some of the good which has been done. From the point of view of the circulation the return of circulatory compensation should be awaited before operation is attempted. The problem consists in picking the point of maximum improvement for each case.

SUMMARY

The importance of a careful and complete physical examination of the patient suffering from benign hypertrophy of the prostate is emphasized. Generalized vascular disease may play no small part in the renal insufficiency so often encountered in these patients.

Many of the medical problems of hypertrophy of the prostate have to do with the anatomical and physiological changes which occur with advancing age. Among them the alteration in the cardiovascular system are most significant.

The preoperative and postoperative treatment of this condition is discussed from a medical standpoint.

The author desired to express his appreciation to Dr. Hugh H. Young for permission to follow these cases on his service, and to acknowledge with thanks the assistance of the staff of the Brady Urological Institute.