son's disease treated for months with fresh beef parathyroids and of one patient treated with injections of the nucleoproteid. No influence on the disease could be determined.

PROGNOSIS

Prognosis in tetany will naturally vary according to the etiologic factors and to the severity and acuity of the seizures. Operative tetany has become rare since careful methods of thyroid extirpation have been adopted and due regard paid to the preservation of the parathyroid. In gastric tetany the mortality is still 50 to 75 per cent. With prompt control of severe attacks by calcium intravenously or by hypodermic administration of parathyroid nucleoproteid, many more cases may be brought to operation and permanently cured. Frankl-Hochwart, from a recent review of fifty-five cases seen ten to fifteen years before, concludes that the prognosis of the idiopathic tetany is not nearly so good as was supposed. Of the patients eleven died, seven had chronic tetany, nineteen had slight symptoms described as "tetanoid," six had myxedema; only nine remained well.

TREATMENT

In the treatment of tetany causal factors should be remembered. In children rachitis should be treated with phosphorus and cod-liver oil. In gastric tetany surgery must remedy the underlying mechanical conditions that are the cause of stagnation, dilatation and intoxication. Emotional disturbances, exposure to heat or cold must be avoided. Meat should be excluded from the diet. Milk is well tolerated and may be of advantage by reason of its large calcium contents. Moderate catharsis and diaphoresis, saline irrigations and the ingestion of large amounts of water may be of slight value in elimination of metabolic poisons. Formerly thyroid preparations were frequently given and apparently with benefit. Kocher has seen disappearance of tetany symptoms under thyroid and thyroid preparations. Frankl-Hochwart and others have seen no benefit from thyroid preparations; rather the reverse.

There can no longer be any question about the efficiency of calcium and parathyroid administration. In severe acute attacks, whether postoperative, idiopathic or of gastric origin, 3 to 5 gm. (45 to 75 gr.) of calcium lactate in 400 or 500 c.c. of normal salt solution should be given intravenously. The action of calcium on control of symptoms is evanescent and the dose may have to be repeated in twelve or twenty-four hours. The parathyroid proteid prepared according to the directions of Beebe is of equal value and should be given hypodermically, 1 c.c. of a 1 per cent. solution every three or four hours for two or three days and then less frequently. Good results from both calcium and the parathyroid proteid in chronic cases have been reported by Beebe, MacCallum, Halsted, Putnam, Poole and others. Dried extracts of the gland have proved less efficacious. Pal reported marked benefit from the use of pituitary extracts in a boy with severe tetany. Ott from experiments on cats concludes that pituitary extract given hypodermically is equal to calcium in the control of spasm. In man the 20 per cent. infundibular extract that is now on the market may be given intramuscularly 7 to 10 drops three times daily. Transplantation of the parathyroids may be of great service in the future in chronic cases of tetany. Christiani has transplanted parathyroids in rats and cats and found the grafts successful after periods of two to five years. Von Eiselsberg transplanted a parathyroid obtained during a goiter operation into the rectus muscle of a woman suffering

from chronic tetany, the result of a total thyroidectomy that had been done twenty-seven years before. The tetanic seizures disappeared except for occasional slight spasms of the glottis and electrical irritability became normal.

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A REVIEW OF 542 CASES OF PROSTATECTOMY *

EDWARD STARR JUDD, M.D.

ROCHESTER, MINN.

Included in this study are all of the cases in which a total or partial prostatectomy had been performed previous to April 1, 1911, in St. Mary's Hospital. Four hundred and sixty-one operations were performed for benign hypertrophy of the prostate, seventy-four for cancer, and seven for tuberculosis. The relative occurrence of cancer and hypertrophy was about one in six. Cancer and hypertrophy were observed together in several instances.

Although we were unable to determine any specific etiologic factors in this type of hypertrophy, the cases under our observation differed in this respect from those reported by von Frisch¹ and others. We noted that the condition occurred twice as frequently in men living in the country as in those living in the city. Only a small percentage of them had ever had specific infection.

The greater number of these patients were operated on between the ages of 60 and 70 years. In the series of 542 cases, eleven were under 45 years, 105 were from 50 to 60 years, 268 were from 60 to 70 years, 131 were from 70 to 80 years, fifteen were over 80, and the ages of the remaining twelve were unknown.

Regarding the civil state: 417 were married, ninety-four were widowers and nineteen were single.

The average duration of symptoms before the patient came for operation was 5.96 years. Although we have not chosen our patients because they were good risks for operation and have operated on patients many times that we knew had lesions of vital organs, we have endeavored to operate only on patients whose specific symptoms were dependent on prostatic enlargement. In our experience it has not always been easy to determine this point.

The primary symptoms of mechanical obstruction at the neck of the bladder are frequency, burning, pain and tenesmus. The secondary symptoms are loss of appetite, insomnia, loss of strength and weight. These secondary symptoms may be caused by damming back in the ureters and pressure in the kidneys; or they may be caused by intoxication from the presence of residual urine. The symptoms are identically the same and are probably caused by the same factors which produce symptoms in patients having insufficient kidney elimination. It is then very important to determine whether the patient is suffering from renal insufficiency alone, or whether he is suffering from auto-intoxication resulting from absorption and interference with kidney function, which interference is caused primarily by mechanical obstruction of the enlarged prostate.

Thompson² and Guyon³ state that 34 per cent. of men 60 years of age and over are affected with genuine hyper-

* Read in the Section on Surgery of the American Medical Association, at the Sixty-Second Annual Session, held at Los Angeles, June, 1911.

1. von Frisch, A.: Die Krankheiten der Prostata, Leipzig, 1910.
2. Thompson: Quoted from Die Krankheiten der Prostata by von Frisch, Vienna.

3. Guyon: Quoted from von Frisch.

trophy of the prostate, and in only 16 or 17 per cent. are symptoms present. It is not unusual in routine examinations to discover a very decidedly enlarged prostate which is not producing obstruction to the urinary flow.

If a catheter be introduced into the bladder and but a slight amount of residual urine be found in a case having marked secondary symptoms without great difficulty in voiding, we may expect little or no benefit from a prostatectomy, no matter how great the tumor's size. Moreover, in such a case, we would operate with great risk. On the other hand, if a great quantity of residual urine is obtained with the catheter (and atony is excluded) the case is one for prostatectomy, even though the tumor be small.

During the past few years we have not only been able to reduce our mortality materially, but have secured a more satisfactory convalescence and better results by spending a little more time in preparing these patients for operation. With a permanent catheter in the urethra or through a suprapubic stab wound we place the patient in the same condition, so far as emptying the bladder is concerned, as he will be after the prostate is removed. In other words, we divide the treatment into two stages, relieving the secondary symptoms first. This will enable the patient to eat, drink, sleep and improve generally in health. We have observed that these patients drink very small quantities of fluids in order to diminish the amount of urine, as a great deal of suffering is caused in voiding. Their arteries are hard and inelastic, and if we allow the condition to prevail it will be difficult to fill up the circulation; therefore, we encourage the patient to take a great quantity of fluid for several days, which fills the circulation and throws the kidneys into marked activity.

It is interesting to note that in almost every instance in which there was any quantity of residual urine, by the introduction of a permanent catheter the specific gravity became much lower within a few days. We have frequently seen it change from 1020 to 1008 or 1009 within a short time. An operation should not be performed until this reaction has taken place and the specific gravity has risen, which may occur in from one to several weeks. Thus the effect of the prostatic enlargement is overcome before the cause is removed.

In determining whether or not to operate for enlargement of the prostate we should consider first the specific symptoms dependent on the enlargement from which the patient is suffering at the time. These symptoms, according to Freyer,⁴ may be tabulated as follows:

1. There may be from 3 to 15 ounces of residual urine and the patient not using a catheter.
2. Extreme over-distention and dribbling.
3. Retention from time to time.
4. Ability to void some urine although the patient is obliged to employ a catheter to obtain rest and comfort.
5. Entire dependence on catheter.
6. Complete retention.

As a rule it is not advisable to operate if there be only two to three ounces of residual urine and only slight symptoms. This condition may exist for years without becoming worse.

One-fifth of the patients who presented themselves for operation were using a catheter either all of the time or occasionally. Nearly four-fifths of them had used a catheter at some time during their trouble. Eighty-one (15 per cent.) in the series had had a recent acute retention.

The cystoscope was not often used in prostatic cases as a means of diagnosis when it was first introduced. Within the past five years, however, we have employed it in over 95 per cent. of our cases and have found it of the greatest value in differentiating between tumors, cystitis, diverticula, in determining the presence of stones and in selecting the type of operation for a given case.

The perineal operation is the one ordinarily chosen because usually, a shorter and easier convalescence follows this method. But if the cystoscope shows a stone of any size in the bladder, if the median and lateral lobes are enlarged so as to make an intravesical tumor, or we are not able to reach the upper border of the gland with a finger in the rectum, we do a suprapubic operation.

The mortality in these cases is not affected by the type of operation. The suprapubic sinus, as a rule, requires a longer time to close, although the control is absolute from the time the urine is first voided through the urethra. The suprapubic operation is less likely to be attended with the painful complication, inflammation in the epididymis or testicle. The rectum has not been injured in any of our operations for benign lesions.

Of the 532 cases of which we have complete records, 323 were perineal operations for benign hypertrophy; twenty-five of these had stones in the bladder also. Fifty of the series were perineal operations for carcinomata. One hundred and forty benign cases were done by the suprapubic route; forty-one of these were associated with stones. Nineteen carcinomata were removed by the suprapubic route; two of these cases had stones in the bladder. Stones were present in 12.7 per cent. of the cases.

Closure of the urethral orifice is cared for in the first place by the smooth sphincter internus muscle which remains in a condition of constant tonus. This tonus must relax when there is need to void urine, and then comes the effect of the detrusor muscle.

The functional result, referring to the power to retain the urine after operation, is almost as important as the question of mortality. We rarely see patients with complete incontinence and consequently obliged to wear a urinal who can be kept at all comfortable, and many times they are much worse off than they were previous to the operation. Both the external and internal sphincters at the neck of the bladder must play some part in the control. In a case reported by Freyer (an autopsy following a suprapubic operation) the vesical sphincter was greatly dilated, yet there had been no incontinence. We know also that frequently after the tube has been removed following a perineal operation the patient has control by means of the internal sphincter before the perineal wound has become healed.

If the case be not complicated with cystitis, in most instances the symptoms will be entirely relieved by the removal of the obstruction, and it is not unusual for a patient to pass an entire night without voiding urine. We must bear in mind that a polyuria exists in these cases and that the intervals between emptying the bladder will increase as time elapses.

We have been able to trace 90 per cent. of our patients and nearly all of them report that they are absolutely relieved from pain. A number of patients operated on had partially lost control before there was any interference. Two of these patients, operated on by the suprapubic method, regained control after the operation. Two other patients in whom the same operation had been done were not relieved of this symptom. We have had

4. Freyer: *Lancet*, London, 1909, 1, 12: 5-1238

no patients with incontinence following the suprapubic operation for benign hypertrophy. There were two patients in whom the suprapubic operation was done for cancer, who had good control for some time after the operation, but who gradually developed an incontinence on recurrence of the old trouble. The presence of a stone in the bladder may be the cause of dribbling.

In practically all of our perineal cases we have done the intra-urethral operation through a median incision, being careful to preserve all of the prostatic capsule, especially in the region of the neck of the bladder. It has seemed to us most important to preserve the capsule, but not so important to save the elongated and distorted prostatic urethra. Seven perineal patients had some degree of incontinence, some of which had been dribbling for some time before operation. Three had old specific histories, though there was no evidence of the specific trouble at the time of operation. Besides these, there were eleven patients in whom the retentive power was not strong, but who were able to retain several hours before starting to dribble. Some of them had more difficulty in holding urine when lying down, while others could keep perfectly dry in bed, but would leak a few drops as soon as they got up. Several of the patients did not have good control immediately following the operation, but regained it in a few weeks.

To aid in recovering control we have employed the exercises suggested by Alexander and found them of great value. The procedure consists in filling the bladder and, as soon as dribbling begins, the patient is allowed to pass part of the fluid, holding the remainder as long as possible, then passing more, and so on until the bladder is emptied.

Ten patients report that it is occasionally necessary for them to use a catheter. In most instances this is not due to a mechanical obstruction, but the inability of the bladder to empty itself because of stretched muscle.

Seventy-four cases of carcinoma of the prostate were operated on, in most instances removing only a part of the gland. The immediate result has been quite as good as the results in benign cases. One patient is alive and comfortable four years and a half after the operation; one has lived over three years; four two years and six over one year.

Operation in these carcinoma cases should be advised only when obstruction and bladder symptoms exist. If the patients complain of radiating pains through the pelvis and back, in all probability the operation will not relieve them. We have observed seventy cases clinically diagnosed carcinoma of the prostate on which, for the above stated reasons, it did not seem advisable to operate. Two of these patients lived over four years with more or less discomfort and gradually increasing symptoms.

The average time required for a fistula to heal in perineal cases is twenty-one days. The average time in suprapubic cases is forty days. In our suprapubic cases three persistent fistulae remain; in the perineal cases there were six fistulae, although four of these healed and remained so for some time and then opened again.

Epididymitis and orchitis have seldom occurred except in patients having had previous attacks. This complication has been more common following the perineal than following the suprapubic operation.

In fourteen cases in which there was considerable infection at the time of operation or in which there had been previous attacks of epididymitis, just before doing a prostatectomy an incision was made through the base of the scrotum, pressing the vas deferens through, then severing and ligating the cut ends. This procedure only

adds a few minutes to the operation. In none of these fourteen cases has there been any lighting up of the old trouble in the epididymis or testicles.

Fourteen of the 542 patients have returned on account of the formation of stones in the bladder following removal of the prostate. Two have returned a second time.

Sixty per cent. of this entire series are living and enjoying reasonably good health. Of the eighty-one patients who have died since leaving the hospital, thirty had carcinoma and twenty were reported as having been well for some time and then dying of other trouble. Twenty-nine died from kidney lesions at some time before the end of the second month. Autopsies were performed in nearly all of the twenty-nine cases and in each instance there was evidence of old infection or nephritis and acute nephritis superimposed.

This data would indicate that a great many if not all of these old men already had some sort of interference in kidney function. This impaired working ability should be interfered with as little as possible.

We consider that the treatment preliminary to operation is the most important factor which has entered into our work on these cases during the past few years. While it is not always necessary to employ a permanent catheter in the treatment, at the same time by its use we are able to eliminate from our mortality list a goodly percentage of the cases that previously had died from kidney changes.

ABSTRACT OF DISCUSSION

DR. ARCHIBALD MACLAREN, St. Paul: I recall some deaths that occurred during my early experience, wherein I did not recognize the danger from damming back of the urine and the infection of the kidneys, the post-mortems showing that the operation should not have been done at that time, if at all, on account of pyelitis, nephritis and shock.

The proposition that Dr. Judd makes regarding drainage is very good. I have seen him place a suprapubic catheter through a cannula and it is a very pretty aid in helping to clear up these cases, so that we can watch the patients and find out whether they ought to have any operation.

The common error in all of these cases has been, to my mind, surgical snap judgment, not taking time enough to work out their surgical possibilities.

Recently I removed a large obstructing prostate through the perineum in a man of 70, and he stood the operation so well that before he left the hospital I repaired a bad inguinal hernia which he could not control with a truss; and at that time in exploring the abdomen I found that he had a carcinoma of the large intestine which had never produced obstruction or bleeding. I did not know then and I do not know now how I would go about it to avoid making this same surgical error again.

I believe that Dr. Judd takes the only rational position in regard to the kind of operation. No single surgical method of attack is suitable for all cases. The decision between the suprapubic and the perineal operations ought to be settled by careful cystoscopic examination in each case. In my experience the mortality and the immediate results of the two operations are practically the same.

There is another type of case than the ones described by Dr. Judd, which I have never seen mentioned; and indeed I have never seen but one case myself. In this case the man had a partially controllable, overdistended, leaking bladder. He could urinate about every hour and a half, passing a couple of ounces. In his lower abdomen he had a large irregular tumor which had been under observation by two excellent men for over six months. This man was supposed to be suffering from a malignant tumor of the lower abdomen. I never got quite so nearly caught in my life as on this man who had been confined to his bed for nine months. He had never

had a catheter passed into his bladder. The gradual catheterization and later prostatectomy proved a perfect cure even with potency, which was a very important element so far as his judgment went.

I feel that the so-called conservative operation for carcinoma of the prostate should be very carefully considered. I believe that Dr. Judd will tell you that many of these cases of carcinoma were not diagnosed, perhaps, before the operation; but if a large, hard tumor of the prostate can be determined by the finger to be a carcinoma of the prostate, I doubt very much whether many of them ought to be operated on, in spite of Dr. Judd's proposition. Recently I sent a man, not to Dr. Judd, but further east, who had a conservative operation for carcinoma of the prostate. He came home in three weeks and almost immediately had the most terrific hemorrhages into his bladder. He was much more uncomfortable; his life was shortened. I believe that if these people can be taught the intelligent use of the catheter it will be much better for them than to undergo an operation, when only a part of a cancerous tumor is removed.

DR. GRANVILLE MACGOWAN, Los Angeles: Not all of us can have great hospital facilities like the Mayos, and are compelled to operate without them; and we do not have such unusually competent laboratory assistants to examine our pathologic specimens. Consequently any statistics we might give with regard to the number of cancers found among the prostates we have removed, would not have any value. I am satisfied to accept as a standard the statistics prepared at St. Mary's and Johns Hopkins.

After an experience of twenty years in these operations, which very closely approximates Dr. Judd's figures in total number, I am frank to confess that I frequently cannot tell by my finger in the rectum, whether or not a man has cancer of the prostate. If there is much induration extending out along the seminal vesicles and including one or both of them, or the rectum is bound onto the prostate, I am satisfied that I am dealing with a cancer. If there is an ulcerative condition in the posterior urethra which can be seen through a large straight urethroscope, and it appears hard to the eye and is unyielding when touched with a swab, or if by a cystoscope or a straight urethral tube one can see similar ulcers at or within the neck of the bladder on projecting prostatic lobules, there is but little doubt that the condition is cancerous; but I have been deceived more than once when all these conditions were present.

I agree perfectly with Dr. Judd in regard to the necessity of preparing patients when there is polyuria, low specific gravity, low output of urea and symptoms of pyelitis. When the blood-pressure runs from 160 to 220, a similar need for preliminary preparation exists.

I know it is not necessary, and believe it is highly injudicious and cruel, to get a man out of bed in two or three days after operation.

You need not hurry in removing a prostate, any more than you need hurry excessively about any other form of operation. Take whatever time is necessary to complete what you started out to do. The old man who has placed himself in your care expects to urinate with ease, and he wants to empty his bladder and have his nightly rest; and you have no right, by operating on him against a split second stop-watch, to leave a portion of his prostate to obstruct and continue the condition in which he came to you. I have never seen a case of pneumonia following a prostatic operation. I think the fear of pneumonia is a bogey in these cases. I never insist on my patient getting out of bed until he is satisfied to do so and can move comfortably, and an extremely low percentage of fatalities justifies me in this course.

DR. CHARLES D. LOCKWOOD, Pasadena: I have done something like sixty prostatectomies in Pasadena, and there are one or two points that I want to speak of in connection with the operation.

1. As to hemorrhage. Dr. Judd did not speak of hemorrhage as a complication. The two patients that I have lost have died of hemorrhage, one a perineal, and the other a suprapubic operation, and I have had one patient whom I nearly lost from hemorrhage coming about the seventh day after opera-

tion. I have noticed that these men who heal up very quickly (this man healed so that he could pass his urine on the seventh day) are more likely to bleed than those who heal more slowly.

2. As to epididymitis, this has been a rather frequent complication with me, and I have noticed that it came on when I used a sound early. I was in the habit of passing a sound when I would remove the tube on the sixth or seventh day. Since I have abandoned that practice, epididymitis is rare. But I have had one case that occurred on the day the man began to pass his urine, and I think that is the time we are most apt to get epididymitis.

I believe too much emphasis cannot be laid on the necessity of preliminary treatment in these old men with distended bladders and with low vitality.

DR. EDWARD STARR JUDD, Rochester, Minn.: Dr. MacLaren stated that he did not believe it advisable to operate in all cases of carcinoma of the prostate. It was not my intention to convey the impression that we always advised operation. In a great many cases of hard carcinomas, as Dr. MacGowan has described them, which we run across in doing routine examinations, in which there had been no troublesome symptoms, nothing could be accomplished by doing a partial prostatectomy. But in the cases of carcinoma in which we have operated the patients came for treatment on account of obstruction to the flow of urine, and by removing a portion of their prostates we can relieve them of just those symptoms. As I have stated we have had something like seventy cases that were diagnosed as carcinoma in which we did not advise operation, because a good many of these patients complained not so much of the symptoms of difficulty in voiding urine, as of pains radiating around the back and down the sciatics. Very possibly a good many of them already had metastatic lesions in the lumbar vertebrae or some of the other bones. Dr. MacGowan says he is not always able to diagnose carcinoma of the prostate. Of our seventy-four cases of carcinoma, sixty-five were referred to us for carcinoma; nine cases were supposed to be benign and turned out to be malignant after microscopic examination.

Regarding the point of hiccup we have always considered that an evidence of insufficient kidney elimination; when the patient begins to hiccup it means that he is not eliminating. We were usually able to relieve that condition by sweats and increasing the amount of fluids. I do not know the exact percentage of cases in which we have observed this symptom.

SHORTENING OF AN OCULAR MUSCLE BY TUCKING*

H. W. WOODRUFF, M.D.

JOLIET, ILL.

The literature of operations designed to increase the power of ocular muscles contains descriptions of more than fifty methods. All of these may have served and many of them may be still serving their originators and others in the field for which they were designed.

It must be difficult, however, for the inexperienced operator to select from this number the one which will best serve his purpose. Naturally, in making his choice he should be guided by the following considerations: First, the safety of the method; second, its effectiveness, immediate and permanent; third, the cosmetic result; fourth, ease of performance; fifth, period of convalescence.

All these operations may be divided into three classes: First, those in which a new insertion is made nearer the cornea (the advancement operation proper); second, those in which the muscle is shortened but the natural insertion preserved, as (a) the tucking operation and

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