ELECTRO-COAGULATION OF THE PROSTATE

IMMEDIATE AND LATE RESULTS

BY

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Perurethral methods of treating prostatic obstruction, though still in their period of trial, are undoubtedly finding a place in the field of surgical therapeutics. I feel, therefore, that a report on a short series of cases, most of which were operated on over five years ago, is of interest, and particularly so from the point of view of later results. The method of operating used in this series is one that I evolved as a result of experimental work in 1926, and first put into use in February, 1927.

The technique is described in the *British Medical Journal* of December 8th, 1928, and what I am writing now is supplementary to what I then wrote.

Technique

Briefly, the technique entails the use of two instruments (Fig. 1):

1. *The Diathermy Catheter*, with a coude bend and a small metal tip, which can be activated from a diathermy machine. It is used for filling and emptying the bladder and for coagulating the tissue that is causing obstruction of the vesical orifice. The manipulation of this instrument is controlled by vision through:

2. *The Suprapubic Cystoscope or Prostatoscope*.—This latter instrument is introduced into the bladder by suprapubic puncture. Through it a clear view is obtained in one field and from above of the whole vesical orifice and its surrounding abnormalities (Figs. 2 to 5).

By the combined use of these instruments any obstruction that may be encroaching on the vesical orifice can be clearly visualized and coagulated with selective precision. Since the technique was first introduced I have made two modifications:

1. The original diathermy catheter was insulated with a cover of boilable lacquer. This insulation was found to be inadequate. The minutest crack in the lacquer allowed the current to leak and cause a burn of the urethra. I have had two cases of papilloma of the bladder in which the technique described above was being used, where the urethra was burnt in this way—one slight, and the other extensive and serious. The risk of this occurring has now been eliminated by covering the lacquer with a thin metal sheath. This serves the double purpose of protecting the lacquer, and, should a leak occur, the whole length of the

instrument becomes warmed, and no damage is caused to the urethra.

2. Before withdrawing the sheath of the suprapubic cystoscope a piece of rubber tubing is passed through it into the bladder for drainage. This is a valuable modification of the technique, for it acts as a safety valve should the catheter become blocked; it lessens the risk of pre-vesical cellulitis; it provides an effective way of irrigating the bladder for as long as is necessary after the operation, and helps very materially to combat the effect of sepsis. The fistula will close in two to four days after the removal of the tube.

Choice of Cases

All cases with undoubted and persistent symptoms of prostatic obstruction, in which on rectal examination the prostate was large, smooth, and movable, and in which the clinical condition and renal functions were satisfactory, have been submitted to suprapubic prostatectomy. The remainder, provided they were not obviously moribund, were treated by electro-coagulation.

It will thus be realized that the technique has been put to a severe test, and this should be taken into account in assessing its value as judged by results. The ages of the patients have varied from 50 to 84 years, and the duration of symptoms from two months to ten years. Frequency was present in all the cases, and eighteen had varying degrees of incontinence. No fewer than twenty-five cases had retention of urine on admission to hospital.

This high figure is accounted for by the fact that many of the cases were admitted as emergencies into a Poor Law hospital, where the proportion of such cases is high as compared with those with less acute symptoms.

Physical Examination

The usual general survey of the patient was made. In the selection of suitable cases for electro-coagulation rectal examination is of the utmost importance. Those cases with marked enlargement and prominent bulging into the rectum are best treated by prostatectomy. Cases suitable for electro-coagulation are those where the prostate is only slightly enlarged, those where the enlargement is chiefly in an upward direction, and those in which the prostate is smaller than normal.

In this series twenty-one were noted as being larger than normal, eleven as being smaller than normal, and the remainder normal. Residual urine varied from two ounces to complete retention. Pyuria was present in nineteen cases. The blood urea was estimated in all the cases except seven.

FIG. 1.—The cystoscope should have been shown as entering the bladder nearer the pubic symphysis and in a vertical direction.

The results are shown in the following table:

Blood urea in mg. per 100 c.cm.		30-39	40-49	50-59	60-69	70-79	80-89	90-99	Over 100
No. of cases	...	8	5	11	3	2	2	3	1

Perurethral Cystoscopy

Wherever the diagnosis of prostatic obstruction was reasonably clear cystoscopy was not carried out. In the main the cases that did not require this examination were those with definite enlargements and those that had been admitted with retention and had been relieved by

were noted. These observations were of considerable value in the small or slightly enlarged prostate, and gave definite evidence as to the portion of the vesical rim that was causing the obstruction and required coagulating. I found it impossible to estimate with any degree of accuracy the size of the prostate by perurethral methods, and much more dependable information on this point was obtained by rectal examination and by using the suprapubic cystoscope.

In brief, the value of perurethral cystoscopy and urethroscopy, where this technique is used, is to show that there is no obstruction in the urethra other than in

FIG. 2.—The normal vesical orifice.

FIG. 3.—Case 5. Bilateral and middle lobe enlargement of the prostate. Treated by electro-coagulation. Normal relief.

FIG. 4.—Case 31. Bilateral and commissural enlargement. Electro-coagulation. Normal relief.

FIG. 5.—Case 40. An enlargement of the right lateral lobe being coagulated. Normal relief.

catheter. In cases where the symptoms had some atypical features, and where the prostate, on rectal examination, was small, cystoscopy was as a rule carried out. The type of cystoscope used was one allowing of prismatic and direct vision.

A general survey of the bladder and trigone was made. Trabeculation was particularly looked for, and calculus and tumour were excluded. Attention was now directed to the prostate itself, and any gross finding noted. The experimental practice of plotting out a series of cystoscopic fields, and from these making a composite picture, was given up early in the series, for it was found that the information obtained was not worth the trouble it entailed and the extra intraurethral manipulation that the investigation involved. Before withdrawing the sheath of the cystoscope a direct-vision telescope was inserted, and as the instrument was withdrawn the contour of the vesical orifice and the encroachments on the prostatic urethra

the prostatic portion and at the vesical orifice, to exclude other conditions of the bladder that might account for the symptoms, and to ascertain if there is trabeculation of the bladder as indicating obstruction of the urinary outflow. It may be taken as an axiom that if there is trabeculation of the bladder and no stricture of the urethra, there is obstruction at the vesical orifice, however unconvincing the signs may be from perurethral cystoscopy and examination of the prostate itself.

Immediate Results

The convalescence of these cases has in the main been uneventful and free from anxiety. While the suprapubic drainage tube and the catheter drained the bladder the patients were comparatively comfortable. After these had been removed, and up to the end of the third week after operation, they complained of varying degrees of bladder irritability—frequency, precipitant micturition,

and dysuria. During this period the sloughs are separating, and as a rule they come away in small fragments and are passed per urethram without any difficulty. There has been a remarkable absence of haemorrhage, which is a striking contrast to what occurs in the resection and punch operations. In no case has there been primary haemorrhage. Trivial secondary haemorrhage occurred in three cases; in none of these did it last more than forty-eight hours, and it ceased entirely after the passage of fragments of slough.

Incontinence occurred in six cases. In all of them it was temporary. In one case the cessation of the incontinence coincided with the passage of a medium-sized slough. Inflammation round the vesical orifice and consequent dysuria is to be expected after treatment by perurethral methods. In ten cases it was more marked than usual, and lasted for varying periods up to three months. Epididymitis occurred four times—bilateral in one and unilateral in three instances. The inflammation cleared up in all cases with expectant treatment. In seven cases large sloughs formed, giving rise either to difficulty in micturition or to temporary retention. In five of these the slough was passed naturally, with great relief to the patient. In one case it was evacuated by means of a Bigelow's evacuator, and in the remaining case it was removed in the jaws of a small lithotrite after being crushed, the procedure being controlled by means of the suprapubic cystoscope.

Prevesical suppuration occurred in two cases. The first was the tenth of the series. The suppuration was extensive, and a suprapubic incision had to be made to evacuate a large quantity of pus. All cases after this one have had a tube inserted into the bladder, and only one case of this complication in a mild form has occurred since.

Remote Results

All the cases that are here reported were operated on during the five years 1927-31. In twenty-nine cases it is more than five years since the operation, and in the remaining thirteen from two to five years. The following table gives an analysis of the results.

Normal relief	...	...	...	50	per cent.
Partial or temporary relief	...	...	...	22.2	" "
No relief	...	...	...	11.1	" "
Died...	...	...	...	16.6	" "

Not traced: 6 cases.

For the purpose of this classification "normal relief" means that the patient passes his urine in a good stream, has no frequency and no dribbling, and does not get up to micturate more than once in the night. This is a very high standard of relief, and were it lowered a little the number in this category would be considerably higher.

Partial Relief

In this group six cases derived very considerable relief from the operation, but could not be classified under "normal relief" because frequency, though diminished, was still present. The following two had marked relief for a period, and then the symptoms returned.

Case 32.—Kept well for two years, when symptoms began to return. X-ray investigations showed stone in the lower end of the left ureter and a medium-sized stone in the bladder. Three months after return of symptoms the patient was operated on elsewhere. The left ureter was opened and the stone pushed into the bladder, which was then opened, the stones being removed and the prostate enucleated piecemeal with difficulty; the patient died on the fourth day after the operation.

Case 35.—Had marked relief for three years; then his symptoms began to return. Three and a half years after the electro-coagulation a suprapubic prostatectomy was carried out elsewhere. There was no difficulty in enucleating the prostate. The patient died the sixth day after the operation.

Unrelieved Cases

Three examples of this group are given below.

Case 14 was 84 years of age, and in a very feeble condition. Electro-coagulation gave him slight relief, but he returned in fifteen months with retention of urine. No further operation was done, but he improved after being catheterized for a few days. Twelve months later he "died of old age."

Case 16.—Had had frequency and incontinence for ten years before admission. The incontinence continued in spite of two electro-coagulation operations, one eleven months after the other.

Case 34.—Had two friable stones removed by litholapaxy at the same time as the electro-coagulation. He was readmitted twelve months later with a recurrence of symptoms, when prostatectomy was carried out and another stone in the bladder removed. He died three months later.

Causes of Death

There were six deaths in the series.

Case 6.—Was admitted with clinical signs of uraemia. He had a large prostate with bilateral and commissural enlargement. Blood urea, 75 mg. per 100 c.cm. During the fourth week after the operation his blood urea was up to 180 mg. per 100 c.cm., and he died of uraemia. (This was an early case in the series, and my enthusiasm rather warped my judgement. This patient should not have been operated on, as his trouble was too far advanced.)

Case 19.—Ten days after operation this patient passed urine freely and had no residual; could hold urine for five hours. Nine weeks after operation he had repeated attacks of epistaxis, from which he died a week later.

Case 21.—This patient was 80 years of age, and had suffered from diabetes for several years and haematuria for three months. His blood sugar was 333 mg. per 100 c.cm., and his blood urea 52 mg. per 100 c.cm. The blood urea went up to 85 mg. per 100 c.cm. on the seventh day after the operation, and on the eighth day he became comatose and died.

Case 26.—Had marked cystitis at the time of diathermy and twelve small vesical calculi, none of which was larger than a small pea. He died on the third day after operation, and the post-mortem examination showed an ascending pyelonephritis.

Case 28.—Admitted with retention of urine and a history of having had incontinence for six months. A small adenoma growing from the right side and filling the vesical orifice was destroyed. His convalescence was normal. On the eleventh day he was emptying the bladder completely without any difficulty. During the fifth week after the operation he became insane, and had to be transferred to a mental ward, where he subsequently died.

Case 29.—Admitted with chronic myocarditis, cystitis, and incontinence of urine. Electro-coagulation of left lobe was done. He had marked cystitis, which began to improve after the eighth day. It never completely cleared up. His cardiac condition became worse, and he died on the thirty-seventh day after the operation.

These cases illustrate in a striking manner what bad risks many of the patients in this series were. Case 26 was the only death that was directly attributable to the operation. In the light of subsequent experience I do not think this patient was suitable for treatment by this technique. A cystotomy was the only procedure that was feasible in his case. It seems unreasonable to blame the technique for the death of Case 21.

Untraced Cases

The untraced cases call for no comment. The immediate results were no better or no worse than the average, and there is no reason to think that had it been possible to trace them they would have materially affected the statistics.

Summary

1. By means of the technique described above the whole of the vesical orifice and its immediate surroundings can be seen in one field, and any tissue obstructing the orifice can be destroyed with selective precision.

2. The method has been put to a very severe test, inasmuch as all cases that were not suitable, or were in too bad a condition, for suprapubic prostatectomy were, provided they were not moribund, treated by it.

3. The immediate and remote complications and results are described.

4. Normal relief was obtained in 50 per cent. of the cases, and this standard of relief has been maintained for over five years. By using a little discrimination in the selection of cases, and with increasing experience, the proportion of cases enjoying normal relief would probably exceed 80 per cent.

5. The death rate directly attributable to operation by this technique is very low, even when the worst possible risks are dealt with. By eliminating the very bad risks it can probably be reduced to less than 1 per cent.

RESIDUAL INFECTION OF THE JAWS

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"Residual infection" is a term employed in dental surgery to describe an obscure and indefinite condition occasionally met with in edentulous mouths, or in areas from which teeth have been removed. The condition has recently aroused much interest, but as yet the bone pathology has received little attention. It is proposed in this paper to review the pathology, aetiology, and treatment of residual infection with reference to cases which have come under the writer's personal observation.

The Condition Described

Clinically, a case of residual infection presents certain definite features. The patient is unwell himself, and has the appearance of a mild toxæmia; he is easily tired, and finds difficulty in concentrating his attention on any one subject for a prolonged period. When the upper jaw is affected antral disease is frequently present, and rheumatic pains and digestive disturbances are common. On examination the mucous membrane covering the affected ridges is found to be red and inflamed, and a number of pin-point ulcers, white in colour, are sometimes noted. The area is tender and the underlying bone may be rough, especially in the lower incisor region. The x-ray appearance is difficult to describe. In the lower incisor region the appearance may be that of an excrescence, while in the upper jaw the usual appearance is one of ill definition of the bony trabeculations.

The final diagnosis is made by culturing organisms taken from the affected region by means of a small round-headed dental burr, which is dropped into a broth tube. Cultures from positive cases are generally pure, and the infection is most frequently streptococcal in nature.

These patients have usually had very badly infected teeth, which have been removed by forceps. The infected bone has not been removed, and, because of poor resistance on the part of the patient, or as a result of some other factor, resolution of the alveolar bone does not take place, and the condition of chronic infection becomes established.

Treatment

The condition requires treatment not only of the local symptoms, but also of the general debility. Medical diathermy has been recommended, but in the writer's experience it does not produce a permanent cure. Operative treatment can be very satisfactory if it is thorough, but the mere removal of any bony excrescence is not sufficient. This may relieve dental discomfort, but will not benefit the patient's general health. It is essential to

remove as much as possible of the septic bone, while maintaining the shape of the alveolar ridge to assist in the subsequent fitting of dentures. When there is widespread infection of bone the operation may be done in several stages, using a local anaesthetic. It may, however, be more satisfactory to give an intratracheal anaesthetic.

A horizontal incision is made in the muco-periosteum on the outer side of the ridge, approximately midway between the crest and the sulcus, and the muco-periosteum is reflected from the ridge and held aside. With a sharp chisel the outer compact layer of bone is pierced, giving access to the cancellous portion. The soft bone lying between the outer and inner alveolar plate is curetted away and the resulting cavity swabbed out with acriflavine in normal saline (1 in 1,000). The area is then packed with acriflavine in glycerin for a period of five minutes. This produces a hyperaemia, and, in consequence, the tissues are thoroughly flushed out. All sharp edges of bone are trimmed off and the soft tissues carefully sutured in place.

Post-operative treatment consists of rest for several days after the operation. A mildly antiseptic mouth-wash is used every four hours, and pain can be controlled by the use of aspirin. A plaster of hot antiphlogistine, applied externally to the face, is very soothing. The sutures are removed on the fourth day, and pain and swelling have usually gone by the seventh. Dentures may be fitted in approximately four weeks after the operation.

Case Records

The following are four selected cases which illustrate the results obtained.

Case 1.—The patient had suffered from ill-health for many years, the chief trouble being arthritis of the hip-joint. He had had antrum, appendix, and teeth operated upon. For two years after the removal of the teeth his dentures were troublesome. X-ray examination showed the bone in the lower premolar, lower central incisor, and upper molar regions to be abnormal. A spear-point culture from the lower incisor region gave a growth of *Streptococcus haemolyticus*. At operation soft bone was removed from the affected regions. Three months after the operation dentures were fitted. These proved comfortable, and the general health was better.

Case 2.—The patient was suffering from bilateral antral empyema of fifteen years' duration. The radical operation had been performed and all the teeth extracted ten years previously. When the antral cavities were washed out pain was felt in the molar regions. X-rays showed dark areas in the upper molar and premolar regions. Spear-point cultures gave growth of *Streptococcus haemolyticus* and *Staphylococcus aureus*. The infected areas were curetted, and within two months the discharge had ceased and dentures were fitted.

Case 3.—The patient had bilateral antral disease, and the ridges of the upper jaw were tender to pressure. X-ray examination showed abnormal bone in the upper premolar and molar regions. The outline of the tooth sockets could be seen in the incisor region. Spear-point culture gave growth of *Streptococcus haemolyticus*, non-haemolytic streptococcus, and *Staphylococcus aureus*. A quantity of diseased bone was removed and the antral disease cleared up.

Case 4.—The patient had suffered from sciatica for more than a year, and manipulative treatment had given no result. X-ray examination revealed areas of bony rarefaction in the upper right first premolar region, this tooth being absent. Spear-point culture gave *Staphylococcus aureus* in pure culture. The affected area was curetted and a vaccine was prepared from the culture. Three months later the sciatica was gone, and the patient was enjoying normal health.

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