It is essential that the antiserum be monospecific, reacting equally well with unknown and standard, and that the antigen to be measured exists in a single molecular size. Agar gel is prepared with a suitably titrated antiserum, and antigen in appropriate dilution is allowed to diffuse radially into the agar. Single precipitin rings will be formed, the diameters of which can easily be measured. The square of the radius of each ring is directly proportional to the concentration of that antigen.

The following paper was also presented:

**AFRICAN TRYpanosomiasis On THE WITWATERSRAND**

CYNTHIA COHEN, Department of Pathology, SAIMR, Johannesburg

---

**Urinary Stress Incontinence**

R. P. SCHACH, F.R.C.S., Urologist, Johannesburg

**SUMMARY**

A method of maximal Faradic stimulation of the perineal musculature under general anaesthesia is reviewed. The treatment was carried out on a group of 30 unselected patients with stress incontinence, many of whom had undergone previous surgery. The results indicate that there was a considerable improvement in the majority and that the treatment was worth a trial, especially before surgery, in patients who are reluctant to have operative treatment or who are poor surgical risks, and in those where surgery has failed.


Urinary stress incontinence is one of the common complaints of female patients seeking advice from gynaecologists and urologists. The purpose of this article is to present the author's experience in 30 cases treated with maximal Faradic stimulation of the perineal musculature in a modified form to that described by Moore and Schofield.

**MATERIAL AND METHOD**

In those patients who complained only of stress incontinence and little in the way of previous urinary symptoms, the patient was allowed to return home as soon as she had recovered from the anaesthetic. Where she had additional urinary symptoms, or a history of these, the procedure was often preceded by cysto-urethrography and combined with panendoscopy and either intravenous or retrograde urography, if these were warranted.

The treatment was carried out under general anaesthesia consisting of Fabantol, supplemented by nitrous oxide and oxygen and minimal halothane when necessary; muscle relaxants were never given. The apparatus used was the Universette, producing a surged Faradic current with the maximum output possible. The duration of the contraction was 2 seconds and about 15 contractions were produced per minute. The patient lay in the lithotomy position with the indifferent pad electrode under the sacrum and the active button electrode over the perineal body. In the first few cases the treatment was stopped after about 30 contractions. As it was often noticed that there was no evidence of muscle fatigue at this stage of the treatment, in subsequent cases it was continued until 200 contractions had been obtained, or was terminated earlier with the onset of muscle fatigue, but this rarely occurred before the 200 contraction mark had been reached. This increased duration of treatment, and hence the number of contractions obtained, differs from that of Moore and Schofield who produced 4 - 6 maximal tetanic contractions in each patient. Only a small minority complained of a slight transitory discomfort or ache in the perineum or thighs after treatment. All except 3 patients had only one treatment; in 2 it was given twice and another patient, having undergone 4 operative procedures previously, requested it to be given a third time as she derived considerable benefit on each occasion and her improvement has remained so since the last treatment.

**DISCUSSION**

The incontinence may be only slight and occasional, when it is often regarded by the patient as being nothing more than a nuisance, and she is quite content to continue as she is. On the other hand, it may be so severe that life becomes almost intolerable at times and the embarrassment from the wetting interferes with normal social and sporting activities. Many of these patients have at some
time or another had urinary complaints and a detailed urological history is essential. It is important to establish whether she has true stress incontinence, or whether it is of the urge type. The latter is very common and may be due to vesico-urethral irritability in association with true infection, vulvovaginitis due to various causes, or as part of the so-called 'urethral syndrome' where the symptoms may be not unlike those of a true urinary infection, but pyuria and bacteriuria are often absent, and the symptoms are more troublesome during the earlier part of the day. Attention to the underlying cause of urge incontinence will often cure or improve it. As the treatment in question is preferably confined to cases of stress incontinence, the possibility of the patient having true incontinence should be determined before advising treatment, as true incontinence is generally regarded as being unsuitable. In practice it has been found that the patient not uncommonly has both, cannot always distinguish one from the other and wishes to try the treatment irrespective of the outcome. Although one has been reluctant to offer the treatment to patients who have already undergone surgery, their plea for help has not been left unanswered and some of them have improved.

The presence of some associated gynaecological abnormality, such as a large fibroid uterus or ovarian mass, should always be excluded, as its presence is more likely to cause incontinence during stress. As it has been found in this series that there is rarely a great relationship between the degree of prolapse and the severity of the stress incontinence, the presence of prolapse should not be regarded as a contra-indication to electrical treatment.

If a patient has a troublesome cough, everything possible should be done to improve it before commencing therapy. The possibility of her being on diuretics should always be borne in mind, as rapid overfilling of the bladder when toilet facilities are not immediately available may result in 'an accident', as it is often referred to by the patient.

**MECHANISM**

There has been much speculation on the mechanism involved in maintaining urinary continence. The work of Jeffercoat on the obliteration of the posterior vesico-urethral angle during straining or in the erect position as the chief defect in causation of incontinence is well known. Hinman suggested that 4 factors were involved. Firstly, there is the tone of the smooth muscle fibres encircling the urethrovaginal junction controlling the low intravesical pressure in the bladder at rest. Secondly, tone is produced by the elastic tissue in the urethral wall. Thirdly, increased intra-abdominal pressure is normally equally transmitted onto the bladder and proximal urethra. The fourth factor is the state of tonic contraction of the pelvic floor muscles which increases during change of position from lying to standing, or on straining, as during coughing, and this contraction elevates the bladder base into the non-voiding position, when pelvic floor contraction is defective, the bladder descends into the low commencement-of-micturition position. and there is little resistance offered to emerging urine. Where there is associated cystocele from pelvic floor weakness, the base of the bladder is already at or near the voiding position, and the lack of pelvic floor contraction results in further descent of the bladder base with greater likelihood of incontinence occurring. The low position of the bladder neck also results in the loss of uniformity of distribution of the increased intra-abdominal pressure to the vesico-urethral region and thus further encourages incontinence.

Moore and Schofield have stressed the significance of increased urethral length of 1 cm or more through contraction of the pubococcygeus muscle, in association with increased tone of the pelvic floor musculature in normal females, during standing; in those with stress incontinence there is shortening of the urethra in the standing position. They had found that stress incontinence cases have a urethra shorter than 3 cm, the length which Lapides suggested was necessary for continence, and that the urethra elongates by 1 cm or more during maximal stimulation under general anaesthesia. The aim of the treatment is thus to try and improve the pelvic floor tone in the hope that continence will be restored or improved by elevation of the bladder base into the non-voiding position, and elongating the urethra and increasing its resistance, thereby restoring the imbalance between this and the intravesical pressure. Moore has shown that the treatment was most likely to benefit those cases where the urethra is not very much shortened, and that if it was 2 cm or more in length, the results were most favourable. In this series of cases, no measurements of the urethra were made and, as mentioned earlier, the cases were totally unselected in this and all other respects. Bates et al. have recently reported their findings of an extensive study of 238 female patients with stress incontinence by synchronous cine/pressure/flow/cysto-urethrography. They found that the basic abnormality in one group of these patients with stress incontinence on coughing, was an incompetence of the bladder neck which also opens up when the patient stands and that the degree of leakage depends upon the competence of the distal urethra. Their study distinguished another group of the patients who were unable to inhibit bladder contractions (as normal people are able to do), during bladder filling, on standing up or on coughing, the latter stimulating the contractions. This group often has a more marked degree of wetting and the term 'unstable bladder' has been suggested for this abnormality. Many patients who continued to have symptoms after attempted corrective surgery were found to have this type of 'unstable bladder', and in none of those who were diagnosed as having such a bladder pre-operatively did any improvement occur after surgery. Urge incontinence could also be explained on the same basis of inability to inhibit these contractions and this is the reason why some of these cases are relieved by anti-spasmodic therapy.

**RESULTS**

A questionnaire sent to the patients showed that only 2 did not derive any benefit at all. Although in a great majority there was a marked improvement to begin with, as noted at follow-up visits 4 weeks or less after treatment, the impression gained 2-3 months later was that in several of the initially dramatically improved or 'cured' cases the effect became less impressive, although the
majority continued to have at least moderate improvement, to the extent of being able to reduce the number of their pads or towels, and usually wetting only slightly or less than they had done previously. Five cases have remained completely dry at all times. Except for the 2 patients who were complete failures immediately after the treatment, and another who reverted to her pre-treatment state after 3 weeks, all the patients stated that the treatment was worth while.

An over-all assessment of the treatment indicates that the great majority of patients derive benefit therefrom, and considering that this series comprised an unselected group, several of whom had undergone one or more attempts at corrective surgery and had stress incontinence of marked degree, this form of treatment is certainly worth a trial, preferably before surgery, but even after if it has failed. As the survey has shown that the benefit lasted about 3 months on average, when the treatment is offered to a patient in the future, it will be pointed out to her that it may be necessary to repeat it about every 3 months as long as it proves beneficial.

The great majority of patients were instructed in perineal muscle contraction exercises, and were advised to carry them out as a supplement to the treatment, but only a small minority bothered in this respect, especially when they noticed that their improvement was maintained without them. Oestrogen therapy was also prescribed in some of the postmenopausal patients early in the study, but this was not persevered with as known beneficial effect of improving muscular control might have masked the primary object of this study in assessing the Faradic stimulation per se.

Alexander et al. have recently reported the use of continuous stimulation by means of an electric vaginal pesary in 18 patients with urinary incontinence, and good results were obtained in 12 out of 16 cases with non-neurogenic bladder. The author has not used this form of electrical stimulation to date but its use will be considered in the future if it is felt warranted.

I wish to thank Mrs Dawn van Heerden, who was responsible for carrying out the treatment.

REFERENCES

Books Received: Boeke Ontvang


