Selective Sacral Neurectomy in Interstitial Cystitis with a Minimum 18 Months Follow-up

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In the past, far advanced interstitial cystitis carried almost no hope for cure except by cystectomy with associated uretero-sigmoidostomy or diversion of the urine to the skin. The fact that a certain number of patients accepted this rather than go on with their disease was proof positive of the discomfort they had suffered. The purpose of this paper is to merely carry the follow-up a bit farther on cases reported by one of us at the American Urological Meeting a year ago. Most things are of value only if they are capable of standing the 'test of time'.

We have followed the rule that this operation should be reserved for the grade III classification of Hand, also employed by Engel, Meads and O'Connor. This grade represents the most advanced stage of the disease, where the lesions are usually diffuse and fissure readily on distension; the bladder capacity is usually greatly reduced. All of our cases fell into this classification and all had received all of the known therapies without more than just transient relief.

A. M. Meirowsky, of the department of neurosurgery at Vanderbilt University School of Medicine, by personal letter to our late Professor of Neurosurgery, Dr. Eldridge Campbell, informed him of 2 cases of Hunner's ulcer treated by differential sacral neurotomy. Dr. M. K. Moulder of the Department of Urology suggested this and worked with Dr. Meirowsky to pioneer this procedure on selected cases. A report of this work was published in the Journal of Urology about 2 years ago.

Meirowsky discovered, some time previously, while working with paraplegics, that differential sacral neurotomy increased bladder capacity through a reduction in the parasym pathetic outflow to the detrusor and of the sacral somatic outflow. The results of these studies prompted his experiments with Hunner's ulcer.

Our department of neurosurgery, headed by Dr. Eldridge Campbell until his untimely death, and later by Dr. Robert Whitfield, became interested in the problem. We were most happy to find some sort of relief for a small group of people with this miserable disease for which we had been able to do practically nothing except occasional transient palliation—and this was very occasional.

Our series consists of 6 patients, all grade III according to Hand, who were studied and operated upon between December 1955 and February 1957. All were female. The range in age was from 35 to 69, with an average age of 54. Their symptoms had been present between 5 and 12 years, with an average of 9-2 years. All had severe pain. All had the large variety of treatment prescribed but only one had had a partial cystectomy. Two had gross hematuria. In every instance, the ulcers had been observed cystoscopically on several occasions.

Cases indicated for this procedure consist of those with Grade III lesions in which all known methods of treatment have failed save cystectomy, and in which nerve blocks produce a definite increase in bladder capacity.

Method

Pre-operative Observations. Before operation, selective blocks of the sacral nerves were made under radiographic control. Bladder capacity was determined before and after operation.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Nerves blocked</th>
<th>Bladder Capacity (cc.)</th>
<th>Bladder Pressure (mm. water)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.H.</td>
<td>S3</td>
<td>Before - 45 After - 170</td>
<td>Before - 600 After - 430</td>
</tr>
<tr>
<td>H.I.</td>
<td>S3</td>
<td>30</td>
<td>320</td>
</tr>
<tr>
<td>M.P.</td>
<td>S3</td>
<td>175</td>
<td>320</td>
</tr>
<tr>
<td>C.A.</td>
<td>S3</td>
<td>290</td>
<td>170</td>
</tr>
<tr>
<td>R.S.</td>
<td>S3</td>
<td>25</td>
<td>240</td>
</tr>
<tr>
<td>A.H.</td>
<td>S3</td>
<td>85</td>
<td>220</td>
</tr>
</tbody>
</table>

block, and the intravesical pressure at maximum distention was also established. The results are recorded in Table I. Operation was not advised in those cases where there was little increase in capacity following block, in accordance with Meirowsky's work.
Operative Exposure. A mid-line incision was made over the sacrum. The muscles was stripped back beyond the sacral crests bilaterally. The sacral foramina were identified by reference to the spinous process of the 5th lumbar vertebra. The 2nd and 3rd sacral foramina were unroofed, the nerves (anterior primary rami) freed and, in the 4 later cases, the 2nd and 3rd sacral nerves stimulated in turn, while cystomtergraphic observations were made. A member of the group estimated by digital examination the contractions of the anal sphincter and of the levatores ani. This stimulation of the nerves at the time of operation, was an innovation conceived by Dr. Campbell after the first 2 cases had been done, for he felt that this would aid in selecting the proper nerves to be sectioned. The 3rd sacral nerves were sectioned and a small piece removed to prevent reguration, in all 6 cases. Hence the term 'neurectomy' rather than 'neurotomy'.

Observations at Operation. Table II records the results of stimulation of S2 and S3 in the last 4 cases. In 2 instances S2 gave marked bladder response but in the other 2 only

TABLE II. OBSERVATIONS AT OPERATION

<table>
<thead>
<tr>
<th>Patient</th>
<th>Nerves stimulated bilaterally</th>
<th>Change in Bladder Pressure (mm. water)</th>
<th>Rectal Sphincter Spasm</th>
<th>Contraction of Levator Ani</th>
<th>Nerves divided bilaterally</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. H.I.</td>
<td>S2</td>
<td>320-450</td>
<td>marked</td>
<td>none</td>
<td>S3</td>
</tr>
<tr>
<td>4. C.A.</td>
<td>S2</td>
<td>320-380</td>
<td>slight</td>
<td>marked</td>
<td>S3</td>
</tr>
<tr>
<td>5. R.S.</td>
<td>S2</td>
<td>200-600</td>
<td>none</td>
<td>moderate</td>
<td>S3</td>
</tr>
<tr>
<td>6. A.H.</td>
<td>S2</td>
<td>380-600</td>
<td>slight</td>
<td>slight</td>
<td>S3</td>
</tr>
</tbody>
</table>

No stimulation cases 1-3.

S3 had any effect on the bladder. S2 seemed to have more effect on the contractions of the rectal sphincter and levator ani but no conclusions can be drawn from this small experimental group.

RESULTS

Table III records the post-operative results, as far as the bladder is concerned, in the first few weeks following operat

TABLE III. POST-OPERATIVE RESULTS (BLAGGER)

<table>
<thead>
<tr>
<th>Patient</th>
<th>Nerves divided</th>
<th>Bladder Capacity (c.c.)</th>
<th>Frequency</th>
<th>Healing of Ulcer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. B.H.</td>
<td>S3</td>
<td>45</td>
<td>0 PSU.</td>
<td>No</td>
</tr>
<tr>
<td>2. H.I.</td>
<td>S3</td>
<td>20</td>
<td>10 min.</td>
<td>Yes</td>
</tr>
<tr>
<td>3. M.P.</td>
<td>S3</td>
<td>150</td>
<td>15 min.</td>
<td>Yes</td>
</tr>
<tr>
<td>4. C.A.</td>
<td>S3</td>
<td>300</td>
<td>1 hr.</td>
<td>Yes</td>
</tr>
<tr>
<td>5. R.S.</td>
<td>S3</td>
<td>50</td>
<td>10 min.</td>
<td>No</td>
</tr>
<tr>
<td>6. A.H.</td>
<td>S3</td>
<td>350</td>
<td>30 min.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

vesical neck from further ulceration and to control haemorrhage, which had been severe, and strangely enough her bladder has now nearly healed of her previously present Hunner's ulcer. Some time in the near future, when the ulcer is entirely healed in the urethra, it is hoped a reconstruction of the urethra can be accomplished.

All of the other 5 patients have been checked regularly and there has been no recurrence of ulcer and no diminution of bladder capacity. One of the patients complains of a few symptoms of frequency without any objective findings to substantiate the cause.

This is a small series with a short follow-up, but at the present time the results warrant a continuance of this procedure in selected cases. As more and more cases are treated by this procedure, our knowledge will increase and the evaluation of the treatment can then be estimated. It may be necessary in some cases to section S2, as has been done in certain neurogenic bladders. We are indebted to Drs. Moulder and Meirovsky for initiating this procedure and to Drs. Campbell and Whitfield for so ably carrying on this work.

SUMMARY

1. Six patients having undergone post-sacral neuroectomy for the cure of interstitial cystitis are reported.
2. In all cases blocking of the 3rd sacral nerve contributed to the bladder detrusor activity.
3. In 2 cases blocking of the 2nd sacral nerve contributed to bladder detrusor activity and in 2 cases produced no response.
4. In 5 cases there has been complete healing of the lesions with return of bladder capacity to normal, and no return of symptoms. In one case the result has not been 100% but there has been definite improvement.
5. It would seem that after an average of 24 months one should be able to state that post-sacral neuroectomy is definitive and the treatment of choice for all interstitial cystitis falling into Grade-III classification.

REFERENCES

Meirovsky, A. M.: Personal communication.
THE DIAGNOSIS OF BLADDER TUMOURS*

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The commonest presenting symptom of a bladder tumour is haematuria, which may be repeated but frequently occurs on one occasion only. In males over the age of 40, about half the cases are due to neoplasms. It is therefore obvious that haematuria, however slight, should always be considered seriously. Thus the first essential in diagnosis is the proper investigation of all cases of haematuria. This phase is usually the responsibility of the general practitioner.

CLINICAL INVESTIGATIONS

These patients should have a full clinical examination, which, although usually negative, should not be neglected. An I.V. pyelogram is often helpful for it shows the state of the upper urinary tract and it may on occasion reveal a primary tumour of the renal pelvis or ureter, or the bladder tumour may be seen as a filling defect in the cystogram. Cystoscopy usually facilitates location of the tumour and its macroscopic characters can be observed. The exact pathology of the growth is determined by biopsy. A careful bimanual pelvic examination should be done under anaesthesia, for if the growth is palpable, it is almost certainly an infiltrating carcinoma. All these steps are universally accepted and should be carried out as a routine in every case.

In recent years evidence has accumulated that the examination of the urine for neoplastic cells, using the Papanicolaou stain, may be of value. Hazard et al. found neoplastic cells in 70% of cases with bladder tumours, and in cases with no tumour there were only 5.8% false positives. Rowland and Marshall noted that a number of their cases with false positives later developed bladder tumours. They found the test positive in 95% of their cases. This test, therefore, should be used in the follow-up of cases with bladder tumours, particularly if neoplastic cells can be detected before the growth can be seen cystoscopically. The test may also be used in cases of haematuria, when full investigation is negative, for some of these cases may later manifest a bladder tumour. It has also been suggested as a screening test for workers in the dye industry, for it is more acceptable to the workers than a cystoscopy.

ASSESSMENT

The prognosis of bladder tumours depends almost entirely on the histology of the tumour, and the depth to which it has infiltrated through the bladder wall. Pugh has shown that most tumours of a low grade of malignancy are confined to the mucosa and submucosa, while those that have infiltrated the muscle layers are mostly of a high degree of malignancy.

In view of the good results which are being obtained in the treatment of bladder tumours by transurethral resection and closed radon implants (Milner, Emmett and Winter-berger, Yates-Bell and Hendricks), it has become important to assess the histology and the depth of penetration endoscopically. Today there is little doubt that the best, and probably the only, method by which this can be achieved, is by means of the resectoscope. This method was strongly advocated by Milner in 1949, who found that his biopsy reports were remarkably accurate when compared with the operative specimens. These findings have since been confirmed by a number of workers.

The great advantage of the resectoscope is that the base of the tumour can be resected and, if muscle is included, histological assessment of muscle infiltration can be made. It can be argued that infiltration of muscle can be assessed by a bimanual pelvic examination. Marshall found that 33% of growths which were not palpable on bimanual examination showed infiltration of muscle in the operative specimen. Thus, this method alone is too inaccurate.

When examining a bladder which is the seat of a tumour, careful attention should be given to those parts not involved by the tumour, for Masina has described areas of reddening and oedema which may occur next to the growth or on occasion remote from it; biopsy specimens of these areas should be examined. One illustrative case has recently been seen, where a patient had a solid carcinoma at the bladder neck and an area of oedema on the dome, which on biopsy showed carcinoma. This case probably illustrates the thesis of Roger Baker that if the growth has gone through the muscle layer the lymphatics of a considerable area of the bladder are involved.

One difficulty in the use of the resectoscope is the treatment of growths in the dome of the bladder in the male, partly due to the mechanical difficulty and partly because the size of these tumours is more difficult to assess. Beach has suggested operating on these cases through a perineal urethrostomy in the prone position. An easy way out of the difficulty is to obtain a biopsy specimen of the growth with a rongeur and, if the growth is malignant, a partial cystectomy can be done.

LESS MALIGNANT TUMOURS

All bladder tumours have a tendency to recur and they therefore should be examined periodically for many years. It may therefore be of value to consider the behaviour of certain of the less malignant papillary tumours.

The typical villous papillomata with narrow pedicle, delicate fronds and benign histology do very well on cystoscopic diathermy, even though they continue to produce recurrences for many years. However, Deming found that 7.8% of his cases developed malignant tumours over a 15-year period.

The group of sessile papillary tumours with stunted fronds are on the borderline between the benign and the malignant. In the past the response of these tumours to cystoscopic