PROSPECTIVE RANDOMISED TRIAL OF INTENSIVE PHYSIOTHERAPY WITH AND WITHOUT STIMULATION OF THE PELVIC FLOOR IN TREATMENT OF INCONTINENCE FOLLOWING TRANSURETHRAL PROSTATE RESECTION

SHIV LAL YADAV[1], K.K. SINGH[2]

22 patients referred fron Urology Department, All India Institute of Medical Sciences, who were having incontinence post Transurethral Prostate Resection (TUR) Surgery have been included in this study. They were randomised into two groups— a) the Inactive group consisting of patients who were given physiotherapy only. b) the Active group consisting of patients who were given combined therapy (Electrotherapy plus Physiotherapy). Five of the six patients in the inactive group experienced no relief at all; however, one patient developed some active control. While the patients in the active group got rid of incontinence completely leading us to conclude that intensive physiotherapy in combination with electric stimulation could be offered as a first line treatment for Post TUR incontinence.

Urinary incontinence is a major problem after TUR. Ahmed Orandi (1973) described that most men with urinary incontinence after prostatectomy for benign disease have difficulty with control of reflex bladder activity and no evidence of true sphincter weakness.

Physiotherapy has been shown to increase the power of pelvic floor contractions and lead to improved continence. Karsov et al (1986) found physiotherapy-guided exercises to be a realistic alternative to other therapeutic modules. However, many patients do not respond adequately to physiotherapy.

Urinary continence requires a complex interplay between the urethral smooth muscle, the urethral and periurethral striated muscles with fast and slow twitch motor units, urethral vascular tone, the integrity of the pelvic floor and the relationship of proximal urethra to the intra-abdominal pressure. Urinary incontinence may result from inadequacy of any combinations of these functions. A number of factors could compromise the maintenance of continence, e.g. neural damage (Snooks et al 1984); or loss of sphincter musculature.

Electrical stimulation is a method of Neuromuscular Electrical Stimulation (NME) which provides a wave form which is concomitant with normal neuronal physiology. The NME stimulators are microprocessor based, providing a physiological asymmetrical bi- phasic wave form, i.e. there is prolonged recovery phase before the next impulse.

The shape of the stimulating wave is designed to mimic a normal human wave action potential. The pulse width is in microseconds with a frequency of 20-50 Hz. Intensity for an effective stimulation may be influenced by

1. Senior Resident.
2. Professor & Head.
Department of Physical Medicine & Rehabilitation, All India Institute of Medical Sciences, New Delhi.

determining the optimal delivery of stimulation.

Work on animals has shown that it is possible to produce an increase in capillary bed density increasing the number of mitochondria and the levels of oxidative enzymes in muscle fibres (allowing more prolonged aerobic respiration and thus reducing the fatiguability of muscles) (Hudlicka et al, 1986). The changes occur from 10 days onwards; after 25 days changes in muscle protein structure become apparent. Thus after 28 days of stimulation using a frequency of 10 Hz, fast twitch muscles fibres begin to convert to slow (tonic/postural) twitch fibres. The 14 days of therapy at 35 Hz. were chosen to augment the strength of the whole muscle (Numset et al 1976).

Furthermore, it has been shown that by using electrical stimulation, EMG activity can be recorded where previously there was none (Kidd, 1984).

Regardless of the methods used, the aim must be to hypertrophy the pelvic floor musculature, increase in urethral closure mechanism, increase in circulation and normal reflex activity.

The objectives of this study were to assess the efficacy of electrical stimulation and pelvic floor exercises, compared with pelvic floor exercises only, in the treatment of Post TUR incontinence.

MATERIAL & METHODS

In this study 22 cases referred from Urology clinics having Post TUR incontinence were included. History, signs-symptoms and physical evaluation were recorded.

The manual assessment of pelvic floor muscles power was carried out subjectively as well as objectively (appendix 1). Then patients were taught and instructed to practise their pelvic floor exercises at least 3-4 times a day (appendix 2). This training was reinforced and patients remotivated on their subsequent visits to the Physical Medicine and Rehabilitation Out Patient Department.

The programming and explanation concerning the stimulators were carried out. An electro-conductive gel was used as a contact medium. The cathode was placed over the perineal body, the anode was placed over a buttock held in place with adhesive tape.

The patients received stimulation for 30 minutes per day for 4 weeks at a frequency of 10 Hz with a balanced contraction and relaxation time of four seconds each and a pulse width of 80 microseconds. This was followed with 35 Hz for another two weeks.

After 6 months of completion of treatment patients were reassessed.

RESULTS

The median age of the inactive group was 55.8 years and of the active group, 58.2 years. The median number of months of incontinence for both groups was 1.5 months. Five of the six in the inactive group did not show any active control. However, one patient developed full voluntary control. In the active group, 4 patients had undergone surgery second time after a lapse of median time of 3 years. But the response to recovery was quite similar in both the subgroups of the active group. In first week there was no improvement at all; only 5 patients could contract pelvic floor actively.

The manual assessment reading for the inactive group from the first to the final reading changed from 0/1 to 3/3. The active group increased their maximum reading from 0/1 to 5/4.

On direct questioning none of the patients reported any discomfort or side effects from electrical stimulation.

The incontinence was reduced to zero in the active group patients. Only one of the patients in the inactive group achieved a zero score, i.e. no incontinence. None of the patients in the active group required further treatment. All the patients in the study were circulated with a questionnaire six months after their treatment was completed (Table 3).

TABLE – 1

PRE-TREATMENT DATA FOR ACTIVE AND INACTIVE GROUPS

	ACTIVE GROUP (Average) n = 16	INACTIVE GROUP (Average) n = 6
Age (Years)	58.2	55.8
Duration of symptoms (months)	1.5	1.5
Maximum pelvic floor assessment		
A – Objective	2	3
B – Subjective	2	2
Number of Surgery (T.U.R./more than once)	4	–

TABLE – 2

DATA FOR ACTIVE AND INACTIVE GROUPS BEFORE AND AFTER TREATMENT

	ACTIVE GROUP n = 16		INACTIVE GROUP n = 6	
	Before Treatment	After Treatment	Before Treatment	After Treatment
1. Leakage	16	0	6	5
2. Frequency	8	2	12	6
3. Mid-stream stop	0	16	0	1
4. Normal pelvic floor assessment :				
A – Objective	0	5	0	3
B – Subjective	1	4	1	3

TABLE – 3

PATIENT'S ASSESSMENT OF RESULTS AFTER INTENSIVE PHYSIOTHERAPY (INACTIVE GROUP) & PHYSIOTHERAPY PLUS ELECTROTHERAPY (ACTIVE GROUP)

	ACTIVE GROUP n = 16	INACTIVE GROUP n = 6
At the end of study require further treatment for incontinence (electrical stimulation)	0	4
6 months after completion of study :		
a) No change since end of study	15	3
b) Deteriorated	0	1
c) No reply	1	2

DISCUSSION :

This study demonstrated very encouraging results with pelvic floor muscles exercises combined with electrotherapy.

After six weeks of intensive physiotherapy one of the six patients in the inactive group, i.e. 16.5%, required no further treatment and 100% of the group given electrical stimulation and physiotherapy required no further treatment.

If severity of incontinence is measured by the number of leakage per week then the inactive group could be said to be more severely affected group. It should be noted, however, that the most severely affected patients in the active group achieved full continence, while five patients of similar or lesser degree of incontinence in the inactive group did not. The randomisation was not stratified by symptomatic degree of incontinence. The active group had fewer incontinent episodes but had been incontinent for longer.

Stimulation parameters in the study were derived from detailed analysis of the firing rates of motor unit action potentials of normal facial muscles. Pelvic floor muscle is very similar to facial muscle, i.e. it contains a similar ratio of slow oxidative motor units and fast glycolytic motor units and both muscle groups are under voluntary and involuntary control. Farrgher et al (1987) confirmed the effectiveness of this profile of stimulations when treating patients with chronic Bell's palsy.

In our study two frequencies were used sequentially, the first being a very low frequency, i.e. 10 Hz for 4 weeks which should improve the capillary bed of all structures stimulated and promote the changes which lead to an increase in slow oxidative motor units (Buller et al, 1960). This was followed for two weeks by stimulations with 35 Hz to augment muscle strength (Numsat et al, 1976).

It is unclear which of these elements made the major contribution towards the patients' control of continence, as we did not investigate the changes in vascularity or postural tone; however, we were able to demonstrate a small improvement in pelvic floor muscles power.

The six month follow-up questionnaire indicated that no patient in the active group deteriorated, none required any further treatment for their post transurethral resection incontinence, whereas 4 in the inactive group did.

CONCLUSION

The results of this study, a prospective randomised trial of physiotherapy versus physiotherapy plus electrotherapy after six months follow up, demonstrate that combined therapy is the method of choice for the treatment to all post TUR incontinence patients.

REFERENCES :

1. Buller, A.J., Eccles, J.C., Eccles, R.M. Interactions between motor neurones & muscles in respect of the characteristic speeds of their responses, Journal of Physiology, 150, 417-439, 1960.
2. Burgio, KL, Robinson, J & Engel, B. The Role of Biofeedback in Kegal Exercise Training for Stress Incontinence, American Journal of Obstetrics & Gynaecology, 154, 58-64, 1986.
3. Farrgher, D., Kidd, GL & Tallis, R. 'Eutrophic electrical stimulation for Bell's palsy,' Clinical Rehabilitation, 1 256-271, 1987.
4. Hudlicka, O., Cotter, MA & Cooper, J. 'Electrical stimulation & neuromuscular disorders'. Nixit, WA & Vborva, C (eds) Springer, Verlag, Heidelbrg pp 21-32, 1986.
5. Karskov, P., Belving, D., Bischoff, N., Gertsenberg, T., Pedersen, PH., Tikjob, G., Wormsely, M., & Hald T., 'Pelvic floor Exercise Vs Surgery for female urinary stress incontinence', Urology International 41, 129-132, 1986.
6. Kidd, GL. 'An Analysis of the firing characterstics motor units in the facial muscles of expression', Journal of Physiology 354, 55-59, 1984.
7. Lawson, J.O.N., 'Pelvic Anatomy', Annals of the Royal College of Surgeons of England, 54, 244-252, 1974.

8. Numsat, JL., MC. Neal, D. & Walter, SR., 'Effects of neuromuscular stimulation on human muscle' Neurology, 33, 608- 617, 1976.
9. Orandi, Ahmed et al, 'Transurethral incision of the prostate', Smith's General Urology, 13th ed, a LANGE Medical Book, pp 391, 1992.
10. Scott, OM., Vbrova, C., Hyde, SA. & Dubowitz, V. Effects of chronic low frequency electrical stimulation on normal human tibialis anterior muscle', Journal of Neurology, Neurosurgery & Psychiatry, 48, 774-781, 1985.
11. Snooks, S., Swash, N., Setchell, M & Henry, N., 'Injury to innervation of pelvic floor sphincter musculature in childbirth' Lancet II, 546-550, 1984.

APPENDIX 1

MANNUAL ASSESSMENT OF PELVIC FLOOR

A. OBJECTIVE

0 No contraction of pelvic floor (nil)
1 Contraction of pelvic floor but inability to maintain for 10 seconds (flicker)
2 Contraction held for 10-15 seconds (Patient counting audibly) (weak)
3 Contraction held for 16-20 seconds (moderate)
4 Contraction held for 21-25 seconds (good)
5 Contraction held for more than 25 seconds (strong Contraction)

B. SUBJECTIVE

1 No awareness
2 Aware of pelvic floor contractions
} cannot stop mid-stream
3 Can stop mid-stream, but still continence
4 Can stop mid-stream, no incontinence

Lowest score would be 0/1
Highest score would be 5/4

APPENDIX 2

PELVIC FLOOR CONTROL

1 Tighten pelvic floor muscles
Hold for patient's audible count of five-let go and repeat five times.
Increase hold time to ten counts.
2 See how quickly you can do ten tightens.
Increase to 20 tightens.
Increase speed and number of tightens.
3 Tighten the pelvic floor; 2 lift.....10 lift;
9 let go; 8 let go.....1 let go, relax.
Repeat five times.