NIFEDIPINE PRETREATMENT FOR AUTONOMIC DYSREFLEXIA DURING ELECTROEJACULATION*

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ABSTRACT—Ten spinal-cord-injured males who exhibited autonomic dysreflexia during electroejaculation were given sublingual calcium channel blocker nifedipine pretreatment to prevent this complication. Nifedipine was successful in decreasing peak systolic, diastolic, and mean blood pressures during the procedure. The use of nifedipine resulted in fewer aborted trials and allowed higher energy delivery during the procedure.

Autonomic dysreflexia, an exaggerated sympathetic reflex in response to noxious afferent visceral and somatic stimuli, is commonly seen in spinal-cord-injured patients whose thoracic injury is above T5, the upper level of sympathetic outflow. Spinal injury above the sympathetic outflow prevents modulation of the reflex by supraspinal centers. Varied stimuli, such as bowel and bladder distention, urinary tract infections, and leg fractures can induce the reflex, which is characterized by paroxysmal hypertension, bradycardia, headache, sweating, piloerection, facial flushing, anxiety, and malaise.[1,2]

Electroejaculation is a relatively new technique used in spinal-cord-injured men who have absence of ejaculation from their injury.[3] Through insertion of a rectal probe and application of electrical energy, the sympathetic nerves controlling ejaculation are stimulated. This creates a great deal of noxious afferent visceral and somatic stimuli, and profound autonomic dysreflexia can be seen.[4]

Others have reported using calcium channel blocker nifedipine to prevent or treat autonomic dysreflexia during CO_2 cystometry[5] and cystoscopy.[6] The present study attempts to determine the efficacy of sublingual nifedipine pretreatment in preventing the profound dysreflexia seen with electroejaculation. The electroejaculation procedure provides an excellent study situation because the degree of stimulation is great and can be accurately and objectively recorded for each procedure.

Material and Methods

Ten spinal-cord-injured males with lesions above T5 were evaluated. Ages ranged from twenty-six to thirty-eight years (mean age 30). Time from injury varied from three to twenty-one years (mean 9 years). Bladder management was either with intermittent self-catheterization, condom catheter drainage, or suprapubic tube. All had had episodes of autonomic dysreflexia in the past.

Electroejaculation was performed with a transrectal probe and Model 10 electroejaculator (G&S Instrument Company, College Station, Texas). The electrical energy was delivered in 3–4-second pulses of progressively increasing voltage in a pattern determined by

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TABLE I. *Effect of nifedipine pretreatment on systolic blood pressure*

Case No.	Without Nifedipine			With Nifedipine		
	Trials (No.)	Mean Peak Systolic	Mean Systolic	Trials (No.)	Mean Peak Systolic	Mean Systolic
1	1	210	169	5	188	150
2	1	188	165	4	145	127
3	8	156	139	3	127	114
4	1	232	198	8	206	168
5	2	175	140	2	170	154
6	5	186	155	1	150	127
7	2	204	176	13	183	154
8	1	184	150	2	131	115
9	3	179	146	7	183	153
10	1	240	191	11	193	168
TOTALS	25	Avg. 196*	Avg. 163*	56	Avg. 168*	Avg. 143*

*p = <0.01.

TABLE II. *Effect of nifedipine pretreatment on diastolic blood pressure*

Case No.	Without Nifedipine			With Nifedipine		
	Trials (No.)	Mean Peak Diastolic	Mean Diastolic	Trials (No.)	Mean Peak Diastolic	Mean Diastolic
1	1	160	102	5	98	83
2	1	112	101	4	78	74
3	8	99	91	3	74	67
4	1	148	124	8	108	93
5	2	100	90	2	105	89
6	5	110	96	1	80	72
7	2	126	99	13	101	85
8	1	100	87	2	83	72
9	3	103	87	7	91	78
10	1	110	102	11	103	90
TOTALS	25	Avg. 117*	Avg. 98*	56	Avg. 92*	Avg. 80*

*p = <0.01.

the operator. Each trial lasted until semen was obtained (approximately 20–30 stimulations), or until severe hypertension or headache required termination.

A total of 81 electroejaculation trials were performed, 25 without nifedipine pretreatment (1–8 trials per patient) and 56 with pretreatment (1–13 trials per patient). In those receiving pretreatment, 20 mg nifedipine were given sublingually fifteen minutes prior to stimulation. One patient had the dose modified to 10 mg because hypotension occurred on a previous 20-mg dosage, and 3 had the dose increased to 30 mg because 20 mg seemed inadequate on previous trials. Blood pressures were recorded prior to stimulation and every thirty to sixty seconds during stimulation. The peak systolic, peak diastolic, mean systolic, mean diastolic, and mean arterial pressures were noted for each trial, as were the maximum voltage and milliamperage (mA) delivered.

Results

Table I shows the effect of nifedipine on the peak systolic and mean systolic blood pressures noted during electroejaculation. With the exception of mean systolic pressure in Case 5 and mean peak systolic and mean systolic pressures in Case 9, all pressures were markedly lower after nifedipine pretreatment. The systolic pressures for the group as a whole were statistically less after nifedipine.

Table II shows the peak diastolic and mean diastolic pressures in the control group and nifedipine group. In all cases except for the mean peak diastolic pressure in Case 5, pressures were lower with nifedipine pretreatment, and the difference was statistically significant between the groups.

All mean arterial pressures (Table III) with the exception of Case 5 were noticeably less after nifedipine pretreatment.

TABLE III. *Effect of nifedipine pretreatment on mean arterial pressure*

Case No.	Without Nifedipine Trials (No.)	Without Nifedipine Mean Arterial Pressure	With Nifedipine Trials (No.)	With Nifedipine Mean Arterial Pressure
1	1	124	5	106
2	1	122	4	91
3	8	107	3	83
4	1	149	8	118
5	2	109	2	110
6	5	116	1	90
7	2	125	13	108
8	1	108	2	86
9	3	107	7	103
10	1	132	11	116
TOTALS	25	Avg. 120*	56	Avg. 101*

*p = <0.01.

Table IV compares the mean peak voltage and milliamperage delivered. With the exception of Case 6, all patients had at least equal values and in most cases it was possible to deliver much higher energy after nifedipine pretreatment. Again, statistical significance was found between the control and pretreatment trials.

In the nontreatment group, 8 of 25 trials were stopped prematurely because of severe hypertension or complaints of headache or other intolerable symptoms. None of the 56 trials attempted with nifedipine treatment were stopped prematurely.

One patient had transient hypotension associated with a 20-mg dose of the drug. This was managed by placing him in the supine position for ten minutes, and there were no sequelae. He subsequently did well on future trials with a reduced dose of 10 mg. There were no side effects from the drug in the other patients.

Comment

Control of autonomic dysreflexia in high spinal-cord-injured patients can be obtained in one of two ways: eliminating the afferent drive or blunting the sympathetic efferent response. The afferent input may be eliminated by posterior rhizotomy or spinal anesthesia. Bladder mucosa topical anesthesia with intravesical lidocaine can be useful in preventing stimulation from bladder manipulation.[7] The efferent response can be blunted using sympatholytic agents such as phenoxybenzamine, phentolamine, phenothiazines, or prazosin.[2] These drugs are less than ideal for periprocedural prophylaxis because some require intravenous (IV) administration and others require days to take effect. Also, unwanted side effects, such as orthostatic hypotension or sedation, may be seen. Nitroprusside requires IV administration and can be associated with a rebound effect.

Nifedipine is a calcium channel blocker which prevents the entry of calcium into the smooth muscle cell, a necessary step for muscle contraction. With smooth muscle contraction slowed, peripheral vascular resistance is increased less by sympathetic stimulation. It is a rapid-acting drug which can be given sublingually and has been used in the emergency treatment of hypertension.[8] Its rapid onset and short duration of action make it an ideal drug for periprocedural prophylaxis.

Lindan, Leffler, and Kedia[5] used oral nifedipine to prevent autonomic dysreflexia during

TABLE IV. *Effect of nifedipine pretreatment on electrical energy delivered*

Case No.	Without Nifedipine No. Trials	Without Nifedipine Mean Peak Voltage	Without Nifedipine Mean Peak (mA)	With Nifedipine No. Trials	With Nifedipine Mean Peak Voltage	With Nifedipine Mean Peak (mA)
1	1	8	175	5	20	490
2	1	5	70	4	21	512
3	8	17	450	3	17	500
4	1	6	75	8	16	381
5	2	29	525	2	29	550
6	5	21	445	1	20	500
7	2	15	350	13	19	496
8	1	10	225	2	22	500
9	3	17	320	7	21	500
10	1	15	175	11	21	415
TOTALS	25	Avg. 14*	Avg. 281*	56	Avg. 21*	Avg. 484*

*p = <0.01.

cystometry. Most recently, Dykstra, Sidi, and Anderson[6] found nifedipine given sublingually to be useful in controlling and preventing autonomic dysreflexia in patients undergoing cystoscopy. However, in performing cystoscopy on patients with a previous dysreflexic response, a certain amount of cystoscopist bias may increase the level of care taken during subsequent cystoscopies to avoid the same situation. By correlating blood pressure changes and actual electrical energy delivered during electroejaculation, our study provides an objective evaluation of the efficacy of nifedipine for dysreflexia prophylaxis. Also, the degree of the noxious stimulus is very great, creating a model where reproducible profound dysreflexia is seen.

With two exceptions (Cases 5 and 9), all blood pressures were lower after nifedipine treatment. The average of the various pressures for each group were in all cases statistically significantly lower in the treatment group. The subjective findings, i.e., headache, sweating, general malaise, were also greatly reduced. In addition to improved safety, more procedures were completed and higher energy delivery was possible.

Some pressure measurements for Cases 5 and 9 were higher with nifedipine than in the control trials. Case 5 was a twenty-six-year-old, complete T3–4 paraplegic managed with a condom catheter after having undergone external sphincterotomy. In addition to stool softeners, diazepam and baclofen, he was taking ephedrine for postural hypotension. As a sympathomimetic agent, it is possible that the ephedrine augmented the autonomic dysreflexic response and impaired the effect of nifedipine. Case 9 was a twenty-seven-year-old, complete T3 paraplegic managed with intermittent catheterization. Nothing unusual in his history or medications could be found to explain why nifedipine pretreatment did not lower his pressure parameters. The blood pressure elevations seen in both of these patients were slight.

We believe nifedipine is the drug of choice for prophylaxis of the extreme autonomic dysreflexia seen during electroejaculation of high spinal-cord-injured patients. Since our initial experience with these 10 patients, we now routinely give nifedipine prophylaxis to all patients undergoing electroejaculation if they have had any history of autonomic dysreflexia. We recommend 20 mg as the initial sublingual dose given fifteen minutes prior to the procedure. The dose can then be modified up or down based on results and/or side effects.

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