THE USE OF INTRAVENOUS DIAZEPAM (VALIUM) AS A SEDATIVE AND RELAXANT IN UROLOGICAL ENDOSCOPIC PROCEDURES

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THE PURPOSE OF THIS STUDY was to assess the usefulness of intravenous diazepam as an adjunct to topical anaesthesia in urological endoscopic procedures and to determine its possible role in the management of outpatients undergoing these investigations. Until the effects and duration of action of the drug were better known it was considered wise to limit its use to inpatients. However, as our experience grew it was administered to a small number of outpatients (10 per cent of cases in the series).

In this study of 73 patients (72 males and one female) no premedication was given and the patients were allowed breakfast. In five cases (7 per cent), diazepam was the sole agent, and in 68 cases (93 per cent) topical urethral anaesthesia was used as well. Seventy-five per cent of the patients were over 60 years of age. The blood pressure, pulse rate, tidal volume, and minute volume of respiration were measured before and after the injection. The results and recovery time were assessed according to various parameters, and a dose schedule based on age and weight was suggested. A comparison was made with other methods of anaesthesia and the side effects and their incidence were recorded.

The following endoscopic procedures were carried out under diazepam: cystoscopy with or without panendoscopy (62 patients), cystoscopy with retrograde pyelography (7), cystoscopy and urethral dilatation (1), cystoscopy and biopsy of prostate (2), cystoscopy and extraction of ureteral stone (1). Table I gives the age and weight distribution of the patient sample.

CLINICAL DATA

Dosage

The dosages given ranged from 3 to 20 mg. From an analysis of the age, weight, and dosage in those cases yielding the most satisfactory clinical results, the dose schedule shown in Table II was evolved. Doses should be reduced in the debilitated patient, and somewhat larger doses should be used in apprehensive patients and heavy drinkers.

Technique of injection

Intravenous diazepam has an onset of action of 60–90 seconds. Two-thirds of the calculated dose (diluted in saline to 1 mg/ml) may be injected and the patient observed. If he does not become drowsy and relaxed, the remainder of the dose is injected, and if he still remains alert, a little more (up to one-fourth of the calculated dose) may be given.

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TABLE I

	Number	Percentage
Age distribution (males)		
20–30	2	3
30–40	1	1.5
40–50	6	8
50–60	9	13
60–70	19	26
70–80	28	39
80–90	6	8
90–100	1	1.5
Total	72	
Weight distribution (lbs)		
100–110	3	4
110–120	5	7
120–130	6	8
130–140	12	16
140–150	15	20
150–160	9	12
160–170	9	12
170–180	5	7
180–190	2	3
190–200	3	4
200 and over	4	6
Total	73	

TABLE II

Age range	Dosage
20–40	1 mg/12.5 lb
40–60	1 mg/15 lb
60–80	1 mg/17.5 lb
80–100	1 mg/25 lb

Further increase in dosage will not benefit the patient and may lead to deep and prolonged sedation, demanding full recovery room supervision during emergence. Moreover, investigations such as retrograde pyelography, where patient control of respiration is important, will be rendered unsatisfactory. In those difficult cases where diazepam alone seems not to be sufficient, the addition of small doses of an analgesic such as morphine or meperidine, or a light general anaesthetic, would appear to be indicated.

The introduction of dibucaine (Nupercaine) solution into the urethra may cause pain, particularly in apprenhensive subjects, and this may be avoided by giving the diazepam first.

Results

The clinical results were assessed in terms of the degree of relaxation, co-operation, and sedation, the presence or absence of side effects, the degree of discomfort or pain, and the recovery time. It was considered that good results were obtained in 51 patients, fair results in 16, and poor results in six. Table III shows the comparative success of this series in relation to previous cystoscopies on the same patients.

TABLE III

COMPARISON WITH PREVIOUS CYSTOSCOPIES

		No. of patients
No previous cystoscopies		49
Previous cystoscopies with local alone		15
much easier with diazepam	14	
no difference	1	
Previous cystoscopies with spinal		2
better with diazepam	2	
Previous cystoscopies with general anaesthetic		3
no particular preference	3	
Previous failure to cystoscope under local		3
successful with diazepam	3	
Failure to cystoscope under diazepam		1

Patient recall

Ten patients were unable to recall the procedure. Several of these had appeared to feel pain during the test, were given larger doses, and had prolonged recovery times. Absence of recall is more likely with larger doses.

Associated diseases

No patient was refused diazepam because of age or illness. Diazepam is contraindicated in cases of known hypersensitivity to the drug and in myasthenia gravis. The following disease processes were present in the patients studied: cardiac arrhythmias: atrial fibrillation (2), extrasystoles (ectopic beats) (2); chronic bronchitis (5); multiple sclerosis (2); congestive cardiac failure, controlled with Digoxin and diuretics (2); diabetes (1); hypertension (170/110) (1); paraplegia (1); arteriosclerosis: peripheral arterial disease (1), arteriosclerotic heart disease with previous infarction (5), cerebral arterial insufficiency (2).

Precautions

One elderly man (82) whose reactions, speech, and thought processes seemed slow and laboured, was given 5 mg of diazepam and was still drowsy two days later. The drug should be used with care in the elderly, and in patients suspected of having organic brain lesions, and should not have been used in this case.

Side effects

During the procedure a fall in blood pressure and a moderate hypoventilation were observed in more than half of the patients. In addition, the following side effects were encountered: patient moving on table (1), coughing (5), hiccoughs (4), gasping (1), complaining of pain (5), failure to pass cystoscope (1). The coughing, gasping, and hiccoughs occurred immediately after injection and lasted less than a minute. In two cases the coughing was more prolonged, but the patients had chronic bronchitis.

Following the procedure dizziness was encountered in 21 patients, drowsiness in 10, and prolonged recovery time (over three hours) in three. Approximately 50 per cent of those complaining of dizziness and drowsiness had returned to normal after one hour; 75 per cent in two hours; and almost 100 per cent in three hours.

Heart rate

There were no significant changes in the heart rate or rhythm. An occasional slight increase in rate was attributable to pain felt during the procedure. Atrial fibrillation (rate below 120) and infrequent ectopic beats were not regarded as contraindications and remained unaffected by the drug.

Systemic blood pressure

A fall in systolic blood pressure was observed in 48 cases (66 per cent, Figure 1). In the five cases in which it fell by more than 30 mm Hg there was pre-existing systolic hypertension. No corrective therapy was needed, and in most cases the blood pressure was rising or had returned to normal in 10 to 15 minutes. Muscle relaxation leading to decreased venous support and decreased venous return is suggested as a possible mechanism for this hypotension.

One patient had a diastolic fall of 20 mm Hg. He was in poor physical condition and was probably hypovolaemic.

Ventilation

Tidal and minute volumes were measured with a ventimeter before and five minutes after injection, and respiratory rates were measured as well.

Tidal volume. In 80 per cent of cases there was a fall in tidal volume, and in 20 per cent a rise. The mean effect was a fall of 12 per cent.

Minute volume. In 50 per cent of cases there was a fall in minute volume and in 50 per cent a rise, the mean effect being a fall of 3 per cent. The decrease in tidal volume was partially compensated for by a rise in respiratory rate. In general the larger doses caused greater falls in tidal volume, but in no case was ventilation depressed to such an extent as to need therapy or assistance. The patients were all rousable and would take deep breaths on command.

Ventilation was also measured during the recovery period. In those cases in which it had been depressed, it showed a gradual return to normal.

Recovery from the Effects of the Drug

Recovery from the effects of diazepam was measured using the following parameters: (*a*) pegboard test, (*b*) static ataxia test, (*c*) ability to walk, (*d*) ability to speak, (*e*) subjective feeling of drowsiness.

Pegboard test[2]

Patients were presented with a rectangular board with 36 holes at each end and required to transfer as many pegs as possible from one set of holes to the other in 30 seconds. A postanaesthetic score of not more than 2 less than the score on the preanaesthetic test was considered normal. The tests were repeated at one and two hours and, if necessary, three and four hours following the injection.

Where the optimal dose was given, full recovery usually took place in one to two hours, and where the dose was too large, recovery took three to four hours.

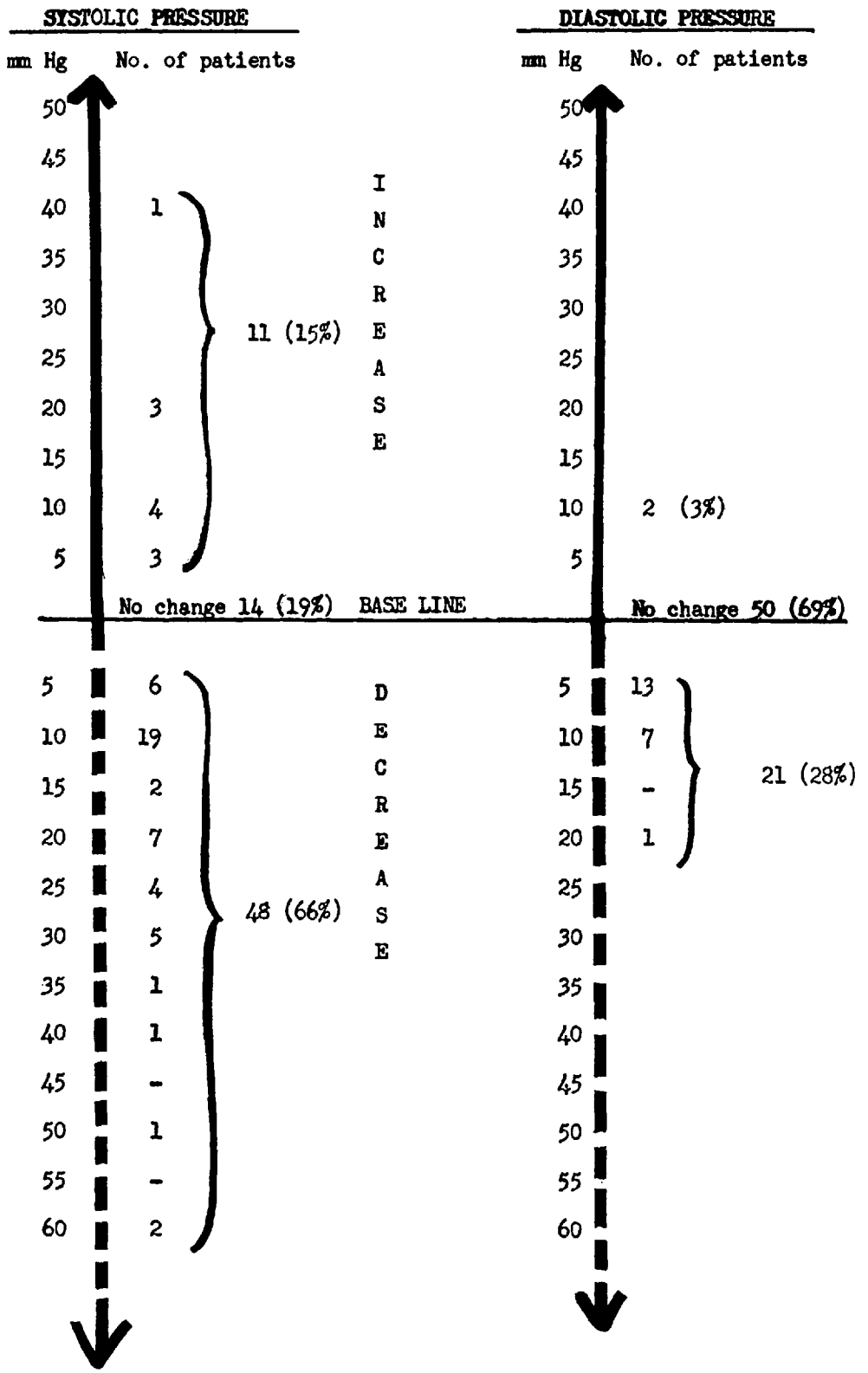

FIGURE 1. Blood pressure changes with diazepam.

The time required for return to the normal state (as indicated by the pegboard test) is shown in Table IV.

Static ataxia

Patients were asked to stand with feet together and eyes closed, and the degree of body sway was measured by a ruler attached to a stand. The test was administered before the injection and one, two, and three hours afterwards. Of those showing increase in body sway after one hour (Table V), most had returned to normal in two to three hours; these results showed a rough correlation with the results of the pegboard test.

TABLE IV

RECOVERY TIMES AS MEASURED BY THE PEGBOARD TEST

Hours	Patients	Per cent
1	30	47
2	16	25
3	14	22
4	3	4.5
>4	1	1.5
Total	64	

TABLE V

ATAXIA TEST RESULTS ONE HOUR AFTER INJECTION

	Patients	Per cent
No increase in body sway	26	44
Mild increase (1/2")	13	22
Moderate increase (1")	5	8.5
Marked increase (>1")	5	8.5
Unable or unwilling to stand	10	17
Total	59	

Ability to walk

Ability to walk without ataxia showed close correlation with the degree of static ataxia.

Ability to speak

Slurring of speech was present in a small percentage of patients immediately following the injection, but was not observed in any case after one hour.

Subjective feeling of drowsiness

In some patients, although objective tests indicated full recovery in one to two hours, there was still a subjective sensation of dizziness and lightheadedness, a complaint of not feeling quite right; this persisted for up to four hours.

SUMMARY

Diazepam (Valium) has been studied as an intravenous adjunct to topical anaesthesia in urological endoscopic procedures and the following points have evolved:

1. No premedication or preoperative preparation is necessary.
2. There is a wide variation in response and tolerance to the drug.
3. Respiratory and cardiovascular depression are minimal and no resuscitative measures were needed, even with larger doses.
4. Larger doses tend to cause prolonged sedation, slow recovery, and more marked depression of blood pressure and respiration.
5. With intravenous diazepam the presence or absence of topical urethral anaesthesia seems not to make any significant difference.
6. Most patients much preferred diazepam to local anaesthesia alone, and expressed about equal preference for other forms of anaesthesia.
7. In certain difficult cases, especially those with marked urethral scarring and narrowing and bladder inflammation, the sedative and relaxant effects of diazepam are insufficient to provide comfort for the patient and ideal operating conditions for the surgeon. The addition of an intravenous narcotic or a light general anaesthetic is suggested in these cases.
8. Intravenous diazepam may be used in outpatients, but because of the wide variation in response to the drug, cases of prolonged sedation with dizziness and drowsiness will occur. A recovery area with full recovery room care, if necessary, should be available for these patients and they should have someone to take them home.
9. Complete absence of recall occurred in ten patients (14 per cent). Several of these had appeared to feel pain and had been given larger doses. (The average dose in amnesic patients was 13.2 mg, whereas the average for the series was 11 mg.)

Résumé

On a fait une étude sur le diazépam (Valium) comme adjuvant intraveineux à l'anesthésie topique dans l'endoscopie urologique, et on en est arrivé aux conclusions suivantes:

1. Aucune prémédication ou préparation préopératoire n'est nécessaire.
2. Il y a une grande variation dans la réaction et la tolérance à ce produit.
3. La dépression respiratoire et cardiovasculaire est minime et aucune mesure de réanimation ne fut nécessaire, même si on l'utilise à des doses assez fortes.
4. De fortes doses tendent à produire une sédation prolongée, un retour lent à l'état normal et une dépression plus marquée de la pression sanguine et de la respiration.
5. Si on utilise le diazépam par voie veineuse, la présence ou l'absence d'anesthésie topique de l'urètre ne semblent faire aucune différence appréciable.
6. La plupart des malades l'ont beaucoup préféré à l'anesthésie locale seule et l'ont trouvée comparable à toute autre forme d'anesthésie.
7. Dans certains cas difficiles, surtout lorsque l'urètre est cicatriciel et rétréci ou s'il y a inflammation de la vessie, les effets sédatifs et résolutifs du diazépam sont insuffisants pour procurer le confort au malade et des conditions opératoires idéales pour le chirurgien. Il est suggéré, dans ces cas, de compléter par un narcotique par voie veineuse ou par une anesthésie générale légère.

8. On peut utiliser le diazépam par voie intraveineuse chez les malades des cliniques externes, mais comme les réactions varient beaucoup d'un malade à l'autre, il pourra se produire des cas de sédation prolongée accompagnée d'étourdissements et de torpeur. Il devrait y avoir une salle bien équipée pour surveiller ces malades après l'anesthésie, et il faudrait voir à ce qu'ils soient accompagnés lorsqu'ils retournent à leur domicile.

9. Dix malades, soit 14 pour cent, avaient complètement oublié ce qui s'était passé. Plusieurs parmi ces derniers avaient semblé ressentir de la douleur et avaient reçu de plus fortes doses. (La dose moyenne chez les patients amnésiques a été de 13.2 mg, alors que la dose moyenne dans l'ensemble a été de 11 mg.)

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