

# PER RECTAL DIAZEPAM THERAPY IN CONVULSIVE DISORDERS

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## ABSTRACT

One hundred and twenty children with persistent convulsions (lasting  $\geq 10$  min) were treated with per rectal diazepam (dosage: 0.2 to 0.7 mg/kg/dose). Another group of 100 age matched children with convulsions, along with those who did not respond to rectal therapy were given intravenous diazepam in a dosage of 0.2 to 0.3 mg/kg/dose.

Rectal treatment was effective in 80.83% cases while intravenous diazepam was effective in 90% cases which is statistically just significant ( $p < 0.05$ ). No significant difference was observed in the efficacy of two routes of administration in controlling convulsions of different clinical types and various etiological groups ( $p < 0.05$ ), except for primary generalized type where intravenous route was more effective than the rectal one ( $p < 0.05$ ). No significant side-effect was observed with rectal therapy. Among the 23 (19.17%) children in whom rectal therapy failed, 12 (10%) responded to intravenous diazepam while the remaining 11 (9.17%) cases were resistant to both routes of administration.

**Key words:** Convulsions, Per rectal, Diazepam, Intravenous.

Seizures represent the most frequent problem of acute pediatric neurology and 7-8% of all children will have had at least one seizure before the age of five years. An intravenous (IV) injection of fast acting drugs, such as diazepam or clonazepam usually is effective but will necessitate the presence of a doctor. Intramuscular administration of diazepam is unreliable because of unpredictable absorption of the drug as it binds to muscle proteins(1). Oral route is not recommended during convulsions because of chances of aspiration although it takes lesser time to achieve peak levels as compared to intramuscular route(2).

In an unconscious patient it is reasonable to utilize rectal mucosa as a recipient for anticonvulsants. A solution of diazepam given rectally will be absorbed rapidly and almost completely(3) and plasma concentration of anticonvulsant is obtained within  $4 \pm 1$  minutes(4). However, clinical efficacy of diazepam administered rectally in treatment of acute convulsive episode and side-effects associated with this route of administration have not been studied extensively(5) particularly in the Indian setting.

## Material and Methods

One hundred and twenty children, who were admitted to the hospital with persistent acute convulsions (lasting  $> 10$  min) were treated with diazepam in a solution administered rectally. Another group of 100 children with acute convulsions (also lasting  $> 10$  min) and matched for age, sex and etiology of seizures, were given intra-

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*Received for publication: November 14, 1990;*

*Accepted: March 4, 1992*

venous diazepam in the dosage of 0.2-0.3 mg/kg/dose.

Each case was subjected to detailed history regarding duration and type of convulsion. The convulsions were classified according to the classification given by "International League Against Epilepsy" (6). As the purpose was to study the utility of different modes of therapy in dealing with acute crises at places where adequate facilities do not exist, EEG was not done.

Per rectal therapy was given with the help of a polyethene tube and a 2 ml disposable syringe. The tube was inserted gently into the rectum (4-5 cm above the anal opening) after lubrication with vaseline. Undiluted diazepam solution (available for IV use *e.g.*, Calmpose, Ranbaxy) was injected through the tube in the dosage of 0.2 to 0.7 mg/kg/dose. The single dose never exceeded more than 10 mg in any type of convulsive disorder. To ensure that no drug remained in the tube, 0.6 ml air was pushed after administration of the drug. The drug was administered with the patient lying prone or on the side and buttocks were compressed after removing the tube to prevent anal loss. If the drug was purged out, the dose was repeated. Time required to stop convulsion was noted in each case. In those cases where convulsions

did not cease within 5 minutes of per rectal administration, intravenous therapy in the dosage of 0.2 to 0.3 mg/kg/dose was tried and the effect observed. Statistical significance was determined by Z test.

## Results

The cases were grouped into three age groups, namely, birth to one year, 1 to 5 years and 6 to 12 years. Rectal therapy was equally effective in all the age groups. As compared with intravenous therapy, rectal treatment was effective in 80.83% cases while IV diazepam was effective in 90% cases, which is statistically just significant ( $p < 0.05$ ; *Table I*). Intravenous diazepam was more effective in all the etiological groups than rectal therapy except in birth asphyxia where rectal therapy controlled convulsions in 100% cases where as IV diazepam controlled them in 75% of infants only. These results are statistically insignificant ( $p > 0.05$ ; *Table II*).

Intravenous diazepam was more effective in primary generalized seizures as compared to rectal diazepam ( $p < 0.05$ ), while in all other clinical types of seizures there was no significant difference between the two routes of administration.

If the child was brought early, *i.e.*, within 15 minutes, no significant difference was observed between the two routes of

**TABLE I—Comparative Evaluation of Therapeutic Response of Diazepam by Rectal and IV Routes**

Age group (yrs)	Total No. of cases	Rectal route			IV route			Z	p
		No. of cases	Seizure ceased		No. of cases	Seizure ceased			
			No.	%		No.	%		
0- 1	95	56	47	83.93	39	36	92.30	1.287	>0.05
1- 5	98	47	39	82.98	51	45	88.23	0.398	>0.05
6-12	27	17	11	64.71	10	9	90.00	1.689	>0.05
Total	220	120	97	80.83	100	90	90.00	1.963	<0.05

TABLE II—Comparison Between Efficacy of Rectal and IV Therapy in Different Etiological Groups

Etiology	Rectal route		IV route		Z	p
	Seizure No.	Ceased %	Seizure No.	Ceased %		
Tetanus neonatorum	40	85.0	10	90.0	0.453	>0.05
Meningitis	34	79.4	29	89.7	1.144	>0.05
Birth asphyxia	1	100.0	4	75.0	1.155	>0.05
Febrile convulsions	25	100.0	32	100.0	—	>0.05
Encephalitis	6	16.7	7	57.1	1.678	>0.05
Epilepsy	3	100.0	9	100.0	—	>0.05
Cerebral palsy	2	50.0	—	—	—	—
Idiopathic	9	55.6	9	77.8	0.964	>0.05

administration ( $p > 0.05$ ). However, if the child presented late, IV route was more effective as compared to rectal route ( $p < 0.05$ ).

No significant side effects were observed with rectal therapy, except in one case whose respiration became irregular within 5 minutes of administration of diazepam. However, 4 children developed respiratory depression and one developed hypotension after IV diazepam. Recurrence was more common with IV therapy (5 cases) as compared to rectal treatment (1 case) which had a long lasting effect. The main procedural problem encountered with rectal therapy was purging out of the drug immediately after administration (observed in 11 children—8 of them infants).

Among the 23 (19.17%) children in whom rectal therapy failed, 12 (10%) responded to IV diazepam, while the remaining 11 (9.17% cases) were resistant to even intravenous therapy.

### Discussion

Rectal administration of diazepam was effective in acute treatment of convulsions in 80.83% of cases. In 10% cases, the treat-

ment failed whereas diazepam given intravenously had prompt effect. In 9.17% children, the convulsions were resistant to diazepam, irrespective of the route of administration. There was no significant difference in the efficacy of the two routes of administration in different etiological groups and clinical types of seizures. Hence, rectal route may be used as a reasonable alternative to IV diazepam in controlling convulsions, whatsoever be the etiology or clinical type. These findings are in agreement with those previously reported by Knudsen(7).

Lack of effect of rectal administration may be due either to technical or physiological problems, e.g., absorption of diazepam to fecal matter(8) or purging out of the rectal dose or uncertainty of the volume instilled. It is very important to keep the tube vertical or at a 45° angle while squeezing because, in the horizontal position, 27% of the contents are retained within the tube(8). Another possible reason can be the uncertain diffusion of the drug across the rectal mucosa, due to various lesions in the rectum(9). Lastly, it may be due to the fact that some convulsions

respond only to very high plasma concentrations. Fortunately, if the effect is inadequate, the administration of rectal diazepam can be repeated easily and safely.

The rapid and reliable anticonvulsant effect, simplicity of administration in a painless way<sup>(10)</sup> and the very few side effects make the rectal route of administration a valuable supplement or alternative to IV administration in infants and children. It takes less time to administer rectal therapy and can be given by a nurse or a paramedical worker, while it takes longer to start IV line to give diazepam, especially in a chubby toddler and needs the presence of an expert hand (a doctor) to give it slowly. Hence, this route can be recommended for use at home by parents of epileptic or mentally retarded children who have recurrent convulsions, after trying the drug in a calculated dose and observing the side effects during their stay in the hospital. The therapy can be used to tide over the acute crises, but not as a definitive treatment of these disorders.

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