

TABLE 1

Patient	CO ₂ Production			Change in Alveolar CO ₂ Tension mm.Hg.
	Before Morphine cc./min.	After Morphine cc./min.	Difference cc./min.	
JG	238	187	-51	+2.5
JP	239	107	-42	+5.0
HP	312	286	-26	+6.0
LC	233	165	-68	+4.0
RR	238	220	-9	+2.5
JA	204	162	-42	+5.0

while CO₂ storage was occurring following the decreased alveolar ventilation (respiratory center effect) and the resulting decreased alveolar capillary diffusion gradient. The role of the anesthetic agent in the production of carbon dioxide accumulation during thoracic surgery remains to be evaluated.

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TOXIC REACTIONS IN EPIDURAL ANESTHESIA

To the Editor.—May I make a rather late comment on the paper of Dr. Blundell and others on Xylocaine and Cyclaine for epidural analgesia (ANESTHESIOLOGY, May 1955)? Convulsive reactions in over 1 per cent of patients caused them to abandon Xylocaine despite its otherwise good characteristics for this technique.

They found that adding epinephrine, 1 part in 100,000, to the analgesic solution had no sustaining effect on the blood pressure, and though it is not actually stated it appears that they did not normally use epinephrine. The absence of influence on the blood pressure agrees with our experience, and we take it as evidence that the epinephrine in this dilution has a local vasoconstrictor effect which hinders its own absorption into the circulation and that of Xylocaine with which it is mixed. This is confirmed by our experience of toxic effects. When using Xylocaine, 2 per cent, without epinephrine, we repeatedly found it to cause drowsiness and even unconsciousness or mental agitation though never convulsions. In one case epidural *procaine*, 2 per cent, without epinephrine did cause convulsive twitching. Since adding epinephrine, 1 part in 100,000, we have never seen these signs of generalization, though initial doses of 2 per cent Xylocaine have been up to 40 ml., and continuous analgesia has been maintained up to 24 hours.

In the three cases detailed by Dr. Blundell, convulsions occurred two minutes, one minute, and almost immediately after the injection of the main dose of Xylocaine. The severity and speed of these reactions suggests another possibility other than absorption from the tissues—accidental cannulation of an epidural vein. This would seem an unlikely event, but it occurred here recently. Immediately after insertion of a polyvinyl catheter, venous blood flowed down the catheter and dripped from the end. The rate of flow was increased by aspiration with a syringe. On withdrawing the catheter a little the flow ceased. Since this occurrence we take precaution of aspirating before injecting anything through the catheter.

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