Anesthesia in Tracheo-Bronchial Procedures*

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This paper does not attempt to advance anything new in the technic of bronchoscopy or bronchography, but we wish to report what we consider to be a safe and efficient anesthetic agent, which others have declared to be a dangerous drug. This substance is pontocaine (p-butyl-aminobenzoeyl-dimethyl-aminoo-ethanol). After having had unfortunate experiences with other topical anesthetics, pontocaine was tried and the results were so satisfactory that it has been employed for topical anesthesia to the exclusion of other preparations.

Ponctocaine has been used by us for topical anesthesia of the pharynx, larynx and trachea in bronchography and bronchoscopy. Our procedure consists in administering sodium pentobarbital grains one and one-half (0.1 Gm.) one-half hour prior to bronchography. Preceeding bronchoscopy, sodium pentobarbital grains one and one-half (0.1 Gm.) is given one hour before the contemplated procedure and dilaudid grains one thirty-second (0.002 Gm.) with scopolamine grains one two-hundred (0.00037 Gm.) one-half hour before. Anesthetization is the same in both instances. The pharynx is sprayed twice with pontocaine 2 per cent containing one drop of epinephrine 1-1000 to each cubic centimeter, using an average of 1.5 cc. For laryngeal and tracheal anesthesia, a one-half per cent solution of pontocaine also containing one drop of epinephrine 1-1000 to each cubic centimeter is instilled with a syringe and cannula in one cubic centimeter amounts at intervals of two or three minutes for four doses. This produces sufficient anesthesia to abolish the cough reflex for a long enough time to permit unhurried endobronchial procedures, but shortly afterwards the effect has worn off and the patient is able to clear his tracheobronchial tree of secretions, which is a decided advantage.

A review of the literature, we believe, will show why our results have been so favorable while others were not. Putney* employed pontocaine 1 per cent for topical anesthesia of the pharynx and larocaine (1-p-aminobenzoeyl-2-2-dimethyl-3-diethyiamino-propanol) 2 per cent for instillation into the trachea. He states: "The anesthetic power of 1 per cent pontocaine corresponds to that produced by 10 per cent cocaine, while 2 per cent larocaine is

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equivalent to twice that strength of cocaine.” We feel that a 20 per cent solution of cocaine would be a very dangerous anesthetic for this type of work. Moorhead\(^4\) found that close to one-half of his correspondents used 10 per cent cocaine by some method, the remainder being divided as to larocaine, pontocaine, and Forester’s solution. One observer wrote that “pontocaine has occasionally seemed toxic, but larocaine has never produced the slightest sign of toxicity; however, the pontocaine is not quite so effective as cocaine, the larocaine is definitely less effective.” Jackson and McReynolds\(^4\) objected to pontocaine because it would frequently precipitate an attack in asthmatic patients and because of its tendency to cause an irritation which may persist for several days. In spite of this they used the drug extensively except in asthmatic patients.

Criciani and Nogeura\(^1\) were able to produce an asthmatic crisis in all of their asthmatic patients by the intratracheal instillation of pontocaine and found that the same substance produced no attack in normal persons. They believed that this was due to the stimulation of the unstable vagosympathetic system which exists in asthmatics.

Thomas and Fenton\(^7\) reviewed the literature and reported eight instances in their experience of reactions to pontocaine. In all of these, amounts from five to ten cubic centimeters of a 2 per cent solution were used. They made patch tests with cocaine and pontocaine in a number of allergic individuals and found that less than one-half per cent gave positive reactions to cocaine, while over nine per cent demonstrated sensitiveness to pontocaine.

Hansen and Stealy\(^3\) reported sudden death following gargling with four cubic centimeters of 2 per cent pontocaine preceding gastroscopy. Derbes and Engelhardt\(^2\) reported five deaths following the use of either pontocaine or cocaine or both prior to bronchography. In all of their cases except one, the amount of pontocaine used was over two cubic centimeters of the 2 per cent solution.

We have used pontocaine for anesthesia in 496 bronchoscopies on 264 patients and in 103 bronchographies for the diagnosis and treatment of pulmonary tuberculosis, bronchiectasis, and bronchial asthma. Except in two instances, no untoward effects were observed. The first was a white male 27 years of age who had been diagnosed as bronchial asthma, but symptoms of bronchiectasis appeared. Bronchography was performed without incident and did not reveal any evidence of bronchiectasis. Two weeks later the patient requested that another instillation of the iodized oil be given because he had felt so much better following the bronchography. This was attempted. Anesthetization was uneventful,
but a few minutes after the instillation of the oil, the patient became cyanotic and respirations ceased. Following the administration of epinephrine and aminophyllin and oxygen, he was revived and later did not show any ill effects. Evidently this was due to either allergic shock to the iodized oil as reported by Mahon\textsuperscript{5} or to the oil acting as an obstructing medium as Waldbott\textsuperscript{9} believes.

The second instance was in a white male, age 53 years, who had arrested pulmonary tuberculosis. Symptoms of bronchiectasis caused him to be referred for bronchography. Following anesthetization, he developed wheezing, and in view of our previous experience, the iodized oil was not instilled. The wheezing subsided without any medication being necessary. Possibly this case was of the type described by Criclani and Nogeura.\textsuperscript{1}

Patch tests with pontocalne 2 per cent were made on 20 patients (none of whom had had bronchoscopy or bronchography) without obtaining the slightest reaction, though all of these had been diagnosed as having bronchial asthma. This is not a reliable indication of sensitiveness since Derbes and Engelhardt\textsuperscript{2} point out: "While patch tests to drugs causing contact dermatitis are highly specific and reliable, drugs which cause trouble following parenteral administration often can not be satisfactorily tested either by patch tests, scratch tests, or intracutaneous tests."

CONCLUSIONS

We feel that the poor results previously reported have been due to using too large an amount of the drug. The manufacturer advises that not more than one cubic centimeter of the 2 per cent solution or equivalent amounts of other strengths be instilled intratracheally. In the reactions which have been observed, amounts far in excess of this have been used. While the total amount of pontocalne used by us exceeds the advocated quantity, we feel that the addition of epinephrine to the solutions as advocated by Fussganger and Schaumann\textsuperscript{3} permits this. The epinephrine slows the rate of absorption of the drug and thereby allows detoxification to take place in the liver.

From our observations we believe that pontocalne is an excellent drug for anesthesia of the upper respiratory tree if it is used properly. Reactions will continue to be observed as long as overdosages of the drug are administered.

CONCLUSIONES

Estamos convencidos de que los malos resultados anteriormente comunicados se han debido al empleo de una cantidad muy grande de la droga (pontocalne). El fabricante aconseja que no se instile
en la tráquea más de un centímetro cúbico de la solución al 2 por ciento, o de cantidades equivalentes de otras concentraciones. En las reacciones observadas las cantidades que se han empleado han sido muy en exceso de ellas. Aunque la cantidad total de pontocaina usada por nosotros excede la cantidad aconsejada, opinamos que la adición de adrenalina a las soluciones, como lo recomiendan Fussganger y Schaumann,2 lo permite. La adrenalina retarda la velocidad de absorción de la droga y de tal modo permite que la detoxificación tenga lugar en el hígado.

Basados en nuestras observaciones opinamos que la pontocaina es una droga excelente para anestesiar las vías respiratorias superiores, si se la usa correctamente. Se continuarán observando reacciones mientras se administren dosis excesivas de la droga.

REFERENCES