Evaluation of a New Contrast Medium for Bronchography

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There is a continuing effort to obtain an agent which will supply better opacification and less irritation of the bronchial tree. Our experience in a nationwide program evaluating a new contrast agent, Hytrast,*** prompts this report. Hytrast is an aqueous suspension of 50 per cent W/V of combined iodine as a mixture of N (2, 3 dihydroxypropyl)-3, 5-diiodopyridone-4 and 3, 5-diiodopyridone-4. The suspension includes 0.5 per cent of sodium carboxymethylcellulose which is added as a vehicle for optimal viscosity.

Material and Methods

Fifty-seven consecutive examinations were carried out with this new contrast medium as requests were received by the diagnostic roentgenology department for bronchographic evaluations. A few of these represent studies of the same patient when it had been deemed advisable to study only one side at a time or to repeat the examination. Table 1 shows the diagnostic groups into which our cases fell.

Studies separate from bronchoscopy were carried out after a premedication regimen of a sedative one hour prior to the study and in most cases meperidine (Demerol) 50 mg. and atropine gr. 1/150 one-half hour before the examination. Approximately half of the examinations were carried out directly after bronchoscopy.

Ten of our patients had pulmonary function tests performed directly prior to eleven bronchographies (and bronchoscopy if this was also done). They were studied again shortly after completion of the bronchograms and then re-evaluated five or six days later. Patients were checked for temperature elevation prior to the examination and at daily intervals after the study. Follow-up films were made at five days or occasionally six days after bronchography and evaluated for residual contrast medium. All patients had postural drainage ordered.

Film quality was graded on a scale of 1 to 4 by three separate observers and the average grade is recorded as a good, fair, poor, or unsatisfactory study in Table 2.

Results and Discussion

One of the earliest methods of producing a bronchogram was the insufflation of barium powder through a bronchoscope as reported by Jackson1 in 1918. Others suspended bismuth in oil which was introduced at bronchoscopy to obtain bronchograms. The non-resorbability of these chemicals precluded wide use. Sicard and Forestier2 introduced the first practical agent when they used iodized poppy seed oil (Lipiodol). However, the slow process of elimination of the oil, especially when alveolar spill was present, was a disadvantage along with the tendency of granulomatous reaction to the retained oil. Work along the line of eliminating the retention of the opaque media led to the development of sulfanilamide powder iodized oil mixtures (Viscioldol).3 The hazards of sensitivity to sulfa drugs and the formation of methemoglobin were potent disadvantages to the acceptance of this agent.4 Water-soluble mixtures of contrast medium plus thickening agents such as carboxymethyl-cellulose or polyvinylpyrrolidone had many advantages over the earlier opaque oil media, but bronchial irritation and febrile reactions led to a continued search for better drugs.

Our most recent experiences prior to participating in the clinical trial of this new contrast agent had been with sulfanilamide

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iodized oil mixture (Visciodol) and propyl-iodone (Dionosil-aqueous).

In contrast with the iodinated esters iodopyracet and propyliodone which were used in earlier water soluble contrast mixtures, the chemicals in the new contrast agent are inert. The esters are hydrolyzed on the bronchial mucosa and yield irritating acids which are absorbed and excreted in the urine. The hydrolysis produces rapid clearing of the esters from the bronchial tree. Although this is a desirable feature at completion of the study, it necessitates a rapidly coordinated study for success. With the new contrast medium the study can be carried out at a more deliberate pace without fearing a decrease in opacity of the agent by chemical change and rapid absorption. The fine particulate new contrast medium which is 2 to 5 microns in size is eliminated both by postural drainage and by slow absorption. The bronchograms we produced with it demonstrated good coating of the bronchi. Alveolar spill was not a problem in interpreting the x-ray films (Fig. 1).

Other participants in the program evaluating this medium have noted clearing of the lungs in one to four days, even after spill into alveoli took place. In our study group we demonstrated complete clearing of the lung fields in 22 patients (43 per cent), minimal residuals in 22 patients (43 per cent), and interfering amounts of residual medium in eight patients (14 per cent).
Diseases of the Chest

Table 3—Residual Contrast Medium on 5-Day Follow-Up Films

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<th>Residual Contrast Medium</th>
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cent) of the 52 patients who returned after five days (Table 3). We have noted a slight increase in the frequency of alveolarization and the persistence of the contrast at the time of our routine five-day follow-up x-ray film in our latest bronchographic studies. This is in part attributable to the altered consistency of the new medium in the latest batches tested. Decreased viscosity and easier flow characteristics were introduced by the manufacturer in response to requests by many of the participants in the program evaluating this agent. Our personal preference was toward the more viscous mixture since our interest was directed more toward evaluation of the major branches of the bronchial tree than to the study inclusive of alveolarization which some physicians wish to see.

Pulmonary function tests reveal that immediately following bronchoscopy, a mean reduction in vital capacity of 19 per cent occurred in the 11 instances in which it was measured, with a range of 5 per cent to 37 per cent. The maximal breathing capacity had a mean fall of 32 per cent, ranging from 18 per cent to 49 per cent. Changes of this magnitude are not greatly different from those reported by Christoforidis, Nelson, and Tomashefski. Mounts and Molar found a 20 per cent reduction in total vital capacity immediately after bronchoscopy with a return to normal after 24 hours. Follow-up studies within 24 hours were performed on only two of our patients and at that time the vital capacity and maximal breathing capacity were at prebronchographic levels. In all patients, the gross ventilatory studies were repeated at the end of five or six days and in none was there any deviation from the pre-procedure levels. Further studies will be carried out to determine the effects on diffusion capacity. A control group of patients undergoing bronchoscopy alone will be studied to determine the effect of introduction of local anesthetics in the tracheal bronchial tree.

The complications encountered in our series are summarized in Table 4. There was no adverse effect from local anesthetic. In one patient who was subject to frequent asthmatic attacks, a severe attack occurred the day after bronchography. This may have been fortuitous or may have represented sensitivity to the contrast medium. In 39 of the patients who were followed serially with daily temperatures, 11 had temperature elevations over 0.5° C. However, only one patient had a temperature over 38.5° C. His temperature spiked to 40° C the day after bronchography but returned to 37° C on the next day.

It should be noted that Mounts and Molnar encountered one death in a debilitated patient, who was studied with this contrast medium, and they felt that the procedure of bronchography was probably more to blame than the specific contrast agent.

Summary

A new contrast agent for bronchoscopy has been studied in 57 consecutive examinations. The agent has certain advantages in providing a good coating of the bronchial tree which may be related to the particle size in the aqueous suspension, the flow characteristics and the pharmacology which leads to less irritation of bronchial mucosa.

Resumen

Se ha estudiado un nuevo medio de contraste para broncografía en 57 exámenes consecutivos. El material tiene ciertas ventajas al producir un
buen recubrimiento de la pared bronquial, que puede estar en relación con el tamaño de las partículas de la suspensión acuosa, las características de fluides y sus cualidades farmacológicas que lo hacen menos irritante para la mucosa bronquial.

Resumé

Un nouveau produit de contraste pour bronchographie a été étudié au cours de 57 examens consécutifs. Le produit a des avantages certains: il permet un bon revêtement de l’arbre bronchique qui peut être imputé à la taille des particules dans la suspension aqueuse, et les caractères du liquide et sa constitution pharmaco-logique diminuent nettement l’irritation de la muqueuse bronchique.

Zusammenfassung

Ein neues Kontrastmittel für Bronchographie wurde in 57 aufeinander folgenden Untersuchungen geprüft. Das Mittel, das eine gute Darstellung der Wand der einzelnen Bronchialbaumäste liefert, hat bestimmte Vorteile; sie können in Beziehung gesetzt werden zu der Partikelgröße in der wässrigen Suspension, der daraus resultieren-

den Vertielung der Flüssigkeit und der Verträglichkeit, die zu einer geringeren Reizung der Schleimhaut in den Bronchien führt.

References


Penicillin "fallout"

It is apparent that penicillin, like many other therapeutic agents, cannot be used without some degree of risk. Moreover, the incidence of allergic reactions will continue to grow as penicillin is used more and more extensively both in human and veterinary medicine. However, penicillin still remains the most potent member of our antimicrobial armamentarium and we, as physicians, should adhere to certain precautionary measures to help insure its continued usefulness. Unlike the diffusion of poisonous radioactive materials from atmospheric nuclear shots, we can do something about penicillin "fallout." Indeed, for the sake of the patient and the legal implications to the physician, it may be best to abandon the use of penicillin except where proper studies indicate it to be the only effective drug for the treatment of a specific infection.


Anatomic Heart Lesions in Chronic Evolutive Polyarthritis

Necropsies of 12 patients with chronic evolutive polyarthritis revealed in six cases anatomic heart lesions. In three cases, the lesions were fibrous, discrete, marked by valvular thickenings and very limited commissural fusion. In the three other cases, the lesions are very inflammatory and in one instance, there was considerable mitro-aortic endocarditis.

These anatomic lesions were clinically manifest in only one in whom, at 62 years of age, pericardial rub and aortic insufficiency appeared suddenly.

Such data bring confirmation of the frequency (about 40 per cent) of anatomic heart lesions in chronic evolutive polyarthritis and also of the rareness of audible major valvular lesions (about 5 per cent). These anatomic lesions are very often inflammatory and recall those met in Bouillaud's disease, but authors of the present work incline to think they are produced by chronic evolutive polyarthritis rather than by rheumatic fever.