A NEW TREATMENT FOR UNILATERAL RECURRENT HYDROTHERAX DURING CAPD

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ABSTRACT

A 46-year-old woman undergoing CAPD developed a recurring right sided hydrothorax. Instillation of tetracycline HCI and triamcinolone acetonide did not correct the condition. However application of a fibrin adhesive (Tissucol) made it possible to achieve permanent adhesion of the pleural layers. This paper describes the method in detail.

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CASE REPORT

A 46-year-old woman had renal failure secondary to a histologically confirmed hemolytic-uremic syndrome. CAPD was started after implantation of a Zellerman-Oreopoulos peritoneal indwelling catheter. The patient suffered no complications

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during the training period and was discharged after only a few weeks. Three months later at an ambulatory follow-up examination the patient had an asymptomatic pleural effusion on the right side, and radiography showed a homogeneous shadow over the entire middle and lower fields on the right lung.

No cause for the effusion was demonstrated on bacteriological nor cytological studies of the aspirate; however a glucose concentration of 360 mg/dl suggested that the dialysis fluid had passed from the peritoneal cavity into the right pleural space.

To clarify the situation further we infused technecium 99 into the abdominal cavity after the method described by Adam et al (1). Thirty minutes after instillation, there was much more activity over the right side of the chest than over the left suggesting a communication between the abdominal cavity and the right pleural space. The appearance in the pleural space of Indigo carmine, which had been added to the dialysate shortly before, confirmed that this was a communication hydrothorax.

In three sessions we drew off 3.5 L of thoracentesis fluid and substituted hemodialysis for CAPD. We then attempted to produce a pleurodesis by the instillation of tetracycline (5, 8) after removing the fluid through a drain inserted in the sixth intercostal space in the scapular line. The drain was linked with a three-way-system so that after the fluid was removed, we could instill 500 mg tetracycline solution to the diaphragm. Subsequently 20 ml of physiological saline solution could be instilled to allow the fluid to gravitate towards the diaphragm, solution 1 was instilled via the drain and to achieve the distribution of the instilled preparation. After two hours longer, this procedure was repeated on three consecutive days to provoke adhesion of the pleural layers.

However when CAPD was resumed the dialysate again promptly passed into the pleural cavity. After a repeat aspiration of the fluid, 80 mg of triamcinolone acetonide (Volon A) was instilled into the pleural space on three consecutive days (2). On the second day, the patient developed a febrile reaction, a temperature of 39°C and respiration-related pain in the right thorax. We interpreted these symptoms as evidence of a pleuritic reaction to the instilled preparation. After two days the symptoms resolved spontaneously. Five days later CAPD was resumed again. On this occasion no dialysate passed into the pleural cavity and after 10 days of observation, the patient was discharged into outpatient care.

Six weeks later the patient had a recurrence of her hydrothorax. Over a period of three days, 1500 ml of dialysate fluid, which had accumulated in the right chest, was suctioned off via a French 20 thoracic drain inserted in the sixth intercostal space in the scapular line. During this time the patient was again put on hemodialysis.

When the pleural cavity was completely empty the pleural layers were made adherent using the fibrin glue, Tissucol Immuno GmbH* (12, 13).

The Tissucol® kit consists of two components:

1. Aprotinine-calcium-chloride thrombin solution provided in two separate vials:
   (a) 12 ml calcium-chloride solution (40 mmol/l) and aprotinine (1500 KIE/ml) and
   (b) 12 ml lyophilized thrombin (4 NIH/ml)

The contents of these two vials are mixed together shortly before application to obtain solution 1.

2. Tissucol fibrin glue containing fibrinogen, factor XIII, and calcium ions.

With the patient in a sitting position to allow the fluid to gravitate towards the diaphragm, solution 1 was instilled via the indwelling thorax drain. Then 20 ml physiological saline solution were infused into the pleural space to prevent agglutination in the drain and to achieve the distribution of solution 1 to the diaphragm. Subsequently 20 ml of Tissucol fibrin glue (component 2) were instilled followed by 20 ml of physiological saline solution.

Thereafter the drain was removed. In order not to interfere with consolidation

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of the adhesion process, CAPD was discontinued for an additional five days. During the next three years of observation by regular chest X-rays, we detected no further recurrence.

DISCUSSION
A right-sided hydrothorax is a rare but well-known complication in patients undergoing peritoneal dialysis or suffering from portal hypertension with ascites (1,4, 6,7, 10, 14, 15, 18). The mechanism of these effusions remains to be clarified. Singh et al have postulated that the hydrothorax is produced by fluid transported via lymphatics (15) - a view which is supported by the fact that dye or technecium 99m instilled into the abdominal cavity does not appear in the pleural effusion. On the contrary, Grefberg et al (4) demonstrated that methyl tironine could not move from the abdominal cavity into the pleural space and also found anatomic defects in the diaphragm on autopsy. The cause of these defects is obscure.

In our patient dye and technecium 99m instilled into the abdominal cavity appeared in the pleural space suggested the presence of an anatomic defect. It is noteworthy that the hydrothorax described in these patients did not appear upon initiation of CAPD.

Further studies are needed to determine whether the communication defects noted in the diaphragm are due, in part, to the greatly increased abdominal pressure.

Several workers have shown that tetracycline and triamcinolon can induce pleurodesis by local inflammation of the pleura, and these substances have been successful in the treatment of spontaneous pneumothorax (2,5,8). However, this technique was not successful in our patient. Scheldewaert et al have described trials of talcum (14), but this method could only reduce the size of the effusion. Therefore others attempted to obliterate the pleural space using fibrin adhesion (12, 13) as is done to manage bleeding during abdominal vascular operations (16) as in treating persistent and recurring spontaneous pneumothorax (12, 13).

This method uses the last phase of blood clotting and works in the manner of a two-component adhesive - the first contains thrombin and calcium chloride; the second consists primarily of fibrinogen, a number of other plasma proteins and calcium ions. Mixing the two components leads to coagulation and, in a further reaction, to stabilization of the resulting "clots" due to polymerization of the fibrin (17).

The only possible side effect cited is inoculation of component 2 with hepatitis virus from the plasma proteins. This risk cannot be excluded entirely although the material is controlled by RIA and the manufacturer claims that "Tissucol is free of HbS antigen". Our patient showed no signs of hepatitis after this treatment.

Although Rodriguez Perez et al have reported success with the methods for pleurodesis mentioned above (10) the fibrin adhesion method has certain advantages: The principal goal of pleurodesis is to achieve an appropriate inflammation. If the inflammatory reaction is too mild, effective pleurodesis will not develop; if it is too strong, it will produce pain and cardiovascular stress. In comparison fibrin glue leads directly to pleurodesis by active adhesion of the pleural layers and thus is more predictable and less painful. Moreover, fibrin glue not only produces adherence of the pleural layers but also immediately after instillation, fills up existing defect in the diaphragm. It will be necessary to confirm our success in a larger number of patients before this method can be accepted as the treatment of choice for hydrothorax during CAPD.

REFERENCES
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