differ from those reported by Fishman *et al.* (1956) and Hanley *et al.* (1958). One possible explanation is that there was some difference between the type of patient included in the various series. In fact, the investigation reported here was restricted to patients with a thoracic scoliotic deformity which had developed before adult life, whereas previous workers have tended to include a variety of deformities, some of recent onset.

It has already been pointed out that patients with deformed chests often suffer from chronic bronchitis. Therefore it might be suggested that this condition was responsible for some abnormalities in pulmonary function found in scoliotic patients. Certainly in the present investigation the results of spirometric and static lung-volume studies differed between patients with and without bronchitis. However, the evenness of ventilation, and ventilation-perfusion ratio, were disturbed to a similar extent in both groups of subjects. It would therefore seem likely that the deformity of the lungs associated with thoracic scoliosis was the prime cause of the abnormalities in ventilation and perfusion.

The way in which deformity of the chest produced the abnormalities in distribution of air and blood within the lungs in the subjects of the present study is uncertain. The uneven ventilation might have been due to bronchial distortion or to restriction of some lung segments. It is less easy to understand the factors underlying the uneven blood flow. The large negative value for perfusion which was present in two scoliotic subjects has not been seen in emphysema (Read, 1959) or in interstitial pulmonary disease (Read and Williams, 1959). It implies that in these two cases there were regions of the lung in which poorly ventilated alveoli were relatively well perfused. Such areas might well lie in partially collapsed lung segments.

In conclusion, it is suggested that scoliosis of the dorsal spine may be associated with abnormalities of the ventilation-perfusion ratio throughout the lungs, even in the absence of bronchitis. This disturbance of pulmonary function, in addition to alveolar hypoventilation, predisposes the scoliotic patient to hypoxia.

Summary

Pulmonary function was studied in 14 patients with severe scoliosis of the thoracic spine. Arterial blood gas analysis was performed in nine; estimation of vital capacity, one-second forced expiratory volume, evenness of ventilation, and ventilation-perfusion ratio were made in 10, and static lung volumes were measured in seven.

In all cases the arterial oxygen saturation was found to be lower than would be expected from alveolar hypoventilation alone.

The maximum breathing capacity was reduced in all cases. Patients who suffered from bronchitis in addition to scoliosis tended to have a marked increase in airways resistance and some increase in reserve volume. Those without bronchitis had a normal degree of airways resistance and residual volume, but a reduction in total lung capacity.

Both patients with and without a history of bronchitis showed abnormalities of distribution of gas and blood flow, and ventilation-perfusion ratio, throughout the lungs. It is suggested that these disturbances of pulmonary function were due to scoliosis, and that they predisposed to the development of hypoxia.

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MANAGEMENT OF ACUTE MYOCARDIAL INFARCTION COMPLICATED BY HAEMATEMESIS

BY

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The administration of anticoagulants to patients with coronary thrombosis is almost routine practice, and there is substantial evidence that this treatment significantly reduces the mortality rate and the incidence of thrombo-embolic complications (Tulloch and Gilchrist, 1950; McCluskie and Seaton, 1959).

One of the main contraindications to anticoagulant therapy is the presence of haemorrhage or haemorrhagic tendency in the patient. Severity of the infarct and the presence of shock may outweigh the risk of further haemorrhage and make the use of an anticoagulant justifiable and necessary. The use of long-acting anticoagulants in the presence of a possible further haemorrhage is inadvisable in view of the fact that their action cannot be immediately antagonized, since the administration of intravenous vitamin K₁ leaves a period of hours before the prothrombin time returns to normal. The anticoagulant of choice under these circumstances is heparin; its activity is rapidly antagonized by intravenous protamine sulphate, but it has the disadvantage that for maximum efficiency it has to be given intravenously and at intervals of four to six hours. Even with heparin great care is necessary.

The greater effectiveness of the intravenous over the intramuscular route has been demonstrated by Bauer *et al.* (1950) and by Wynn *et al.* (1952), and these workers have maintained patients on intravenous heparin for up to 14 days. A case is presented where intravenous heparinization was maintained for 3½ weeks using a "polythene" cannula with a Gordh adapter.

Technique

The materials used were a 6-in. (15-cm.) length of size 2 polythene cannula, a polythene adapter, a Gordh adapter, and a French needle (see Fig. 1).

FIG. 1.—Apparatus for intravenous injection of heparin. Materials required.

FIG. 2.—The apparatus in position.

The venous return in the right arm was obstructed by a sphygmomanometer cuff inflated to 60 mm., and the largest vein in the antecubital fossa was selected. A subcutaneous weal of local anaesthetic (2% procaine) was raised, and the tip of the French needle introduced a few millimetres subcutaneously and superficial to the vein, before penetrating the vein a short distance (as

indicated by the free reflux of blood through the needle). The polythene cannula was then introduced through the needle, the needle withdrawn, and the polythene adapter fitted to the free end of the polythene cannula. Then 2 ml. of a 3.8% solution of sodium citrate was injected through the cannula by attaching a syringe to the polythene adapter, and after removing the syringe a Gordh adapter was fitted to the polythene adapter. By means of a syringe with a fine hypodermic needle (size 14) 10,000 units of heparin was injected into the Gordh adapter. A firm dressing was then applied to the site of entry of the cannula into the vein, and the various attachments were secured with strapping. Strict aseptic technique and sterilized materials were used throughout.

The French needle is rather large for introducing the cannula. If instead of using a size 2 polythene cannula the smaller size 1 cannula is used, this can easily be introduced through a size 14 aspirating needle, which is little bigger than the standard transfusion needle. Alternatively, the larger size of polythene can be introduced through a cut-down on a vein, as was done at a later stage in the same patient (see Fig. 2).

Clinical History

The patient, a housewife aged 43, was admitted to hospital on March 10, 1960, with a history of retrosternal pain and haematemesis. The night before her admission she had been seized with a severe upper retrosternal pain radiating through to the back between the shoulder-blades and down the right arm as far as the elbow. The pain had persisted, keeping her awake through the night, and had been associated with dyspnoea at rest. On the afternoon of her admission she vomited twice; the total quantity of vomit was estimated as about 10 oz. (284 ml.), and was described by the patient as being a brown fluid with particles "like tea-leaves" in it. Direct questioning failed to elicit any history of angina of effort or of indigestion in the past, but the patient did admit to having taken aspirin for a considerable period of time to relieve headaches, to which she was prone. In her personal history there was nothing of significance; her appetite was "fair," bowels regular, weight steady, micturition normal, menses regular 7/28, and she was a fairly heavy smoker. She had been admitted to the Edgware General Hospital in December, 1959, for haematemesis, which had not been severe enough to require transfusion, and for which subsequent barium-meal examination had shown no apparent cause.

On admission she was an anxious-looking woman, in pain, restless, and slightly dyspnoeic. There was no cyanosis, and she did not appear shocked. The pulse was 84 a minute, regular, and of good volume; blood pressure 130/90. In the cardiovascular system the jugular venous pressure was raised to ½ in. (1.3 cm.) above the sternal angle, and the only other abnormal finding was a gallop rhythm in a heart which was of normal size clinically. In the respiratory system the only abnormal finding was some fine rales at both bases. There were no abnormalities in any of the other systems, the abdomen being soft, with no tenderness and no palpable masses.

The haemoglobin on admission was 72%; total white cell count 10,600/c.mm., with a normal differential. The electrocardiograph showed signs of a recent extensive full-thickness anterior myocardial infarct.

In view of the history of haematemesis it was decided not to give her anticoagulants, and she was treated with absolute bed-rest and sedation. On this regime she made good progress, the signs of congestive failure disappearing within two days of admission, although the gallop rhythm persisted. Fifteen days after admission she suddenly collapsed with severe retrosternal pain, and on examination

was shocked, with a blood-pressure of 90/60, and a jugular venous pressure raised to the angles of the jaws. She was given 10 mg. of morphine and 1 mg. of "digoxin" intravenously, and 10 mg. of metaraminol intramuscularly. It was decided that she had probably had an extension of the original infarct, and that her condition was so serious that immediate treatment with anticoagulant drugs was indicated. To this end the polythene cannula, with the attachments described above, was introduced into the median basilic vein in the right antecubital fossa and 10,000 units of heparin given four-hourly. This treatment, and frequent intramuscular injections of metaraminol, succeeded in maintaining her systolic blood-pressure above 100 mm., and the maintenance of digitalization by mouth successfully controlled the congestive cardiac failure. However, her general condition remained poor. She was cold and clammy, with a tinge of cyanosis, and eight days after the commencement of intravenous heparin she again collapsed, the blood-pressure being 70/? and showing no response to intramuscular metaraminol.

At this stage a noradrenaline drip (1 mg. noradrenaline in 500 ml. of 5% dextrose) was started, the Gordh adapter being removed from the polythene adapter, to which the drip connexion was then attached. By this means the systolic blood-pressure was maintained at a level of 110-130 mm., and administration of heparin was continued via the tubing of the drip set. It was necessary to continue the noradrenaline drip for three days before the patient's blood-pressure could be maintained on intramuscular metaraminol again. At this stage, 11 days after the insertion of the polythene cannula, there were marked signs of a local phlebitis along the course of the cannula, and it was removed. Since it was felt necessary to continue with the intravenous heparin, the polythene cannula was reinserted through the cut-down over the long saphenous vein at the right ankle, and by this means heparinization continued for a further 12 days.

The patient's general condition improved, and three days after the insertion of the polythene cannula at the ankle it was possible to maintain her blood-pressure without further assistance from pressor drugs. The good progress was maintained, and when the cannula had been in place for 12 days and phlebitis again developed it was decided that intravenous heparin could be discontinued. Her further course was uneventful, and cautious mobilization was begun. As soon as this was advanced enough she was submitted to a barium-meal examination to determine the cause of the haematemesis. This examination revealed no abnormality in the stomach or duodenum, and it was concluded that the haematemesis had resulted from an acute gastric erosion probably related to her habit of taking aspirin. Long-term treatment with anticoagulants was begun, using phenindione, and she was discharged from hospital on May 11, 1960.

Discussion

The possibility of using a polythene cannula as a means of introducing heparin intravenously at frequent intervals for a period of 23 days altogether was established in this case. The useful life of one cannula, as determined by the onset of thrombophlebitis, appeared to be approximately 11-12 days. Once *in situ*, it served as a useful channel for the administration of continuous pressor drugs when the patient collapsed. In shock, the setting up of a transfusion is frequently difficult and may require the use of a cut-down, so that the presence of an intravenous cannula is an obvious advantage. Furthermore, the size 2 polythene cannula is large enough for the transfusion of blood, so that if this patient had in fact had a further haematemesis it would have been possible to transfuse her through the same route. The disadvantage of size 2 cannula is that the

only needle large enough to serve as a means of introducing it is the French needle, which presupposes the presence of fairly large veins, unless a cut-down is to be resorted to. The use of size 1 polythene cannula, in combination with a size 14 aspirating needle as a means of introduction, makes the use of a polythene cannula a little more difficult than a routine push-in transfusion, and this size of cannula is quite large enough to take clear transfusion fluids, such as a noradrenaline drip.

Summary

A case of acute myocardial infarction complicated by haematemesis is described.

Treatment was by intravenous heparin introduced through a polythene cannula.

It was found that the useful life of one cannula was 11-12 days.

In addition to serving as the route of administration of four-hourly heparin, the cannula was used to administer pressor drugs continuously when the patient collapsed.

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INVESTIGATION INTO METHODS OF COLLECTION OF URINE FOR CULTURE FROM MEN AND WOMEN

BY

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The main purpose of this investigation was to see if it was possible to collect a satisfactory mid-stream specimen of urine from women. The collection of specimens of urine from men is also considered for comparison.

It is generally agreed that mid-stream specimens from men are satisfactory for culture, but in women it is said that the only satisfactory specimen is one taken by catheter.

I am sure that few would undertake catheterization of the male without a very good reason. On the other hand, catheterization of the female is done at the least provocation, and, what is more, the job is often left to the most junior nurse. I think that this difference is mainly due to the difficulty of it in the male and the ease of it in the female. Urologists have for some time stressed the danger of infection from catheterization in the male, but there has not been the same feeling about the female.

Although I have not kept a record of the cases, and therefore have no figures, I have noticed that some women, sent to my clinic with a chronic urinary