streptomycin being included. The interval enabled a greater number of patients to be included, for only three were in hospital long enough to appear in both trials. In the first trial seven men and six women were given a total of 180 injections. In the second trial six men and seven women received 149 injections.

The nurse giving the injections worked strictly to a pre-arranged plan, allocating 2 ml. or 4 ml. on a random basis. Only she knew the type of injection the patient had received.

One of us (L. C. K.) investigated on the following day the pain reactions of all the patients. Like them, the observer did not know which injections had been given, whilst both results and injection volumes were so recorded that only later could they be fully correlated. On three occasions it was not possible to record the results because the patients concerned were not fit to give a true record of the pain experience.

Pain reactions were classified as "immediate" and "delayed," with three arbitrary grades in each group (1=mild or mild; 2=moderate; 3=severe).

RESULTS

The results are shown in the Table. It will be seen that there are many more moderate and severe delayed reactions associated with 4-ml. than with 2-ml. injections. The pattern

Results

		Size of Injection	Degree of Pain			Total	
			1	2	3		
<i>Trial I (180 Patients)</i>							
Initial pain	..	{	4 ml.	70	12	6	88
			2 ml.	76	14	2	92
Delayed pain	..	{	4 ml.	67	14	7	88
			2 ml.	82	8	2	92
<i>Trial II (149 Patients)</i>							
Initial pain	..	{	4 ml.	64	10	3	77
			2 ml.	67	3	2	72
Delayed pain	..	{	4 ml.	58	12	7	77
			2 ml.	61	9	2	72

is the same in each trial, which adds further significance to the results. In both trials combined, 40 moderate and severe delayed reactions occurred with 4-ml. injections as compared with only 21 with the 2-ml. injections ($\chi^2=8.62$, $P<2\frac{1}{2}\%$). The results for initial pain, although showing a similar trend, are not statistically significant.

CONCLUSIONS

If 1 g. of streptomycin sulphate is administered intramuscularly as a 2-ml. injection, significantly less delayed pain can be expected compared with its administration as 4 ml. Rising viscosity prevents less than 2 ml. being used, but this volume is satisfactory when using a No. 1 serum needle.

Streptomycin sulphate, now marketed as a prepared 2-ml. injection, is thus the most convenient and satisfactory form available. At the same time this packing minimizes handling by the nursing staff, and, if the rubber-capped vials are used, enables the officially recommended precautions against skin sensitization to be carried out. (Packing in a glass ampoule makes this impossible.)

Our thanks are due to Mr. N. W. Please for examining the statistical validity of our results; to the nursing staff and patients for their willing co-operation; and to Glaxo Laboratories Ltd. for preparing and supplying the streptomycin solutions.

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Metastases from Carcinoma of Bronchus causing Enormous Enlargement of Liver

The following case is reported on account of the enormous enlargement of the liver produced by metastatic tumour deposits.

CASE REPORT

A man aged 68 attended the Bradford Royal Infirmary on April 20, 1953, with a complaint of dyspnoea, abdominal swelling, and pain in the right upper quadrant of the abdomen of several weeks' duration. There was a history of productive cough during the past year and haemoptysis on several occasions during the previous three weeks. On examination he was very dyspnoeic. Palpation of the abdomen revealed a greatly enlarged and hard liver which was thought to be malignant.

On July 13 he was admitted to St. Luke's Hospital, Bradford. On admission (temperature 97° F. (36.1° C.), pulse 110, respirations 24) he was confused and dyspnoeic; there was neither cyanosis nor jaundice. Oedema of both legs and of the scrotum, penis, and sacral region was present. The abdomen was greatly distended and tender, and the lower border of what was thought to be the liver was palpable in the lower extremity of the abdomen. The breath sounds on the right side of the chest were diminished. He became progressively more confused and died on July 18.

Post-mortem Examination.—The relevant findings were as follows. At the hilum of the right lung there was a firm grey-white neoplasm, about 2 in. (5 cm.) in diameter, which appeared to originate in the main bronchus of the right middle lobe. There was no pneumonic consolidation. The liver was enormous (weight 19 lb. 4 oz. or 8,730 g.), and contained numerous metastases, ranging in size up to 4 in. (10 cm.) in diameter. The mediastinal, aortic, and upper abdominal lymph-nodes showed obvious metastatic involvement. The supraclavicular and axillary glands were not enlarged. The peritoneum, omentum, spleen, pancreas, adrenal glands, kidneys, and brain showed no macroscopical evidence of metastatic involvement. In the gastro-intestinal tract there was no evidence of a neoplasm. Five small superficial ulcers were present in the mucosa of the stomach along the greater curvature.

The histological features of the bronchial neoplasm were those of an undifferentiated carcinoma of "oat-cell" or spindle-cell type. The appearances were uniform throughout the primary growth and the metastases. The ulcers in the stomach were not neoplastic.

COMMENT

The noteworthy feature of this case is the size (8,730 g., normal about 1,500 g.) of the liver. Cases in which livers with metastatic growths have attained great weights (13 between 5,000 and 10,000 g., and 7 exceeding 10,000 g.) are referred to by Willis (1952). The livers reported by Kikuth (1925) and Fried (1925) weighed 11,800 g. and 6,400 g. respectively, and were from cases of lung carcinoma.

In the above case the liver retained its normal shape despite extensive neoplastic involvement, and we are reminded that, next to local lymphatic spread, the liver is probably the most frequent site for metastases in carcinoma of the bronchus (Hadfield and Garrod, 1947; Willis, 1953).

I have to thank Mr. J. Dawson and Dr. C. L. Davidson for the clinical data relating to this case.

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