Most of the cases reported, and those with which I have been associated, have been under operation for more than two hours.

The majority of cases of brachial plexus paralysis have occurred after operations in the Trendelenburg position with the weight of the patient's body taken by shoulder-rests and an arm in abduction. But paralyses have also been reported following operation in: (1) Trendelenburg position, arm not abducted; (2) the horizontal position, both arms abducted; (3) the horizontal position, gall-bladder rest—arm abducted; (4) the horizontal position, arm tied above head; and (5) the horizontal position, arm hyperabducted.

Anatomical peculiarities may also favour the occurrence of this complication. Ewing (1950) has drawn attention to the fact that if the abducted arm is externally rotated the head of the humerus fills the axilla and causes further stretching of the plexus. Backward extension of the arm will likewise strain this structure.

The aim of the surgical team—both surgeon and anaesthetist have responsibility in the positioning of the patient—must of course be to prevent this serious complication of surgery occurring. The position of the shoulder-girdle should be watched with extreme care, and all positions which might put it under abnormal strain should be avoided. Although short operations on lightly anaesthetized patients placed in one of the positions just described are unlikely to be followed by injuries to the brachial plexus, it is much safer to rule that under no circumstances should an arm be hyperabducted or placed in the arm-above-the-head position, and both arms should never be abducted simultaneously. Backward extension of the arm should be avoided, especially when a gall-bladder rest is in use, and the head should never be kept in lateral flexion during operation.

All these postures can be avoided with little inconvenience to the surgeon or to the anaesthetist. It is only when consideration is given to the Trendelenburg position that adjustment of traditional habits is required. If shoulder-rests are to be avoided, as of course they must, an alternative method of supporting the body weight must be sought. This problem can be solved by suspending the patient between pelvis rests. These rests, originally designed by Ogier Ward and in use at St. Peter's Hospital, have been used for several years and have proved to be extremely satisfactory. When the patient is suspended in this manner his shoulder-girdle is free of all stresses and strains, and an arm may be safely abducted for intravenous therapy, provided the angle of abduction is less than 90 degrees and the arm is internally rotated. The arm board, however, must be firmly fixed, as there is a tendency for it to slip downwards by gravity, thus causing hyperabduction of the arm.

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REFERENCES

- Clausen, E. G. (1942). *Surgery*, 12, 933.
Ewing, M. R. (1950). *Lancet*, 1, 99.
Kiloh, L. G. (1950). *Ibid.*, 1, 103.
Lancet, 1950, 1, 121.

Infection of a Secondary Carcinoma by *Salmonella* Montevideo

This report concerns the blood-borne infection of a secondary carcinoma by *Salmonella montevideo*.

CASE REPORT

The patient, a woman aged 63, was admitted to Hemlington Hospital, Middlesbrough, with a painful swelling of the left shoulder and fever. She gave a rather vague history of malaise and illness during the previous two months and stated that she had had rheumatism in the shoulder for many months. There was no history of diarrhoea or other gastro-intestinal symptoms. An x-ray film of the shoulder

showed considerable disorganization of the upper third of the humerus, an appearance thought by the radiologist to be due to either neoplasm or chronic osteomyelitis. Search for a primary growth was without result; blood culture was negative. Aspiration of a soft area of the swelling produced a small quantity of frank pus from which was obtained a pure culture of *Salm. montevideo*. There was no diarrhoea, and the appearance of the stools was normal, but selective culture gave a scanty growth of the same organism. The patient's serum agglutinated an O suspension of *Salm. montevideo* to a titre of 1/50 and an H suspension to the high titre of 1/2,400.

A provisional diagnosis of salmonella osteomyelitis was made and the patient was transferred to West Lane Hospital, Middlesbrough, where a full course of chloramphenicol was given. The salmonellae rapidly disappeared from the stools, but there was no improvement in the patient's general condition. The pain and swelling of the shoulder remained. Surgical exploration of the swelling revealed that the upper third of the humerus was invaded by a neoplastic mass which on section proved to be an anaplastic secondary carcinoma. Subsequently there was a discharge of pus from the operation wound from which *Salm. montevideo* was again cultured. The patient died three months after admission to hospital. The primary carcinoma was never found and permission for a necropsy was not obtained.

COMMENT

Salmonella infection in man, with the exception of infections by the typhoid-paratyphoid organisms, is characterized by local bowel infection; but transient invasion of the blood is not uncommon, and cases of septicaemia, typhoid-like illnesses, and metastatic abscesses do occur (Miles and Wilson, 1946). Presumably in the present case *Salm. montevideo* circulating in the blood found a suitable culture medium in a necrotic area of the secondary carcinoma, being protected by the poor vascularity of the centre of the tumour both from natural antibodies and from chloramphenicol. Though it is easy to see how such an infection could come about, the infection of a neoplasm by salmonellae does not appear to be a common occurrence.

We have been able to find accounts of two cases—both infections by *Salm. suispestifer*. In the first case the tumour concerned was an endothelioma of the neck (Van der Hoeden and Hulst, 1933), and in the second a myoma of the uterus (Gray, 1936). Dr. Joan Taylor kindly sent us from the records of the Salmonella Reference Laboratory for the years 1947–50 a list of nine cases in which salmonellae had been cultured from abscesses. In none of the cases was there infection of a neoplasm, but in two cases the infection occurred in a traumatic haematoma. The infection of a haematoma would appear to be essentially similar to that of a neoplasm; there would be a suitable culture medium and protection in the depths of the haematoma from the humoral defences of the patient.

Our thanks are due to Dr. Joan Taylor for the final identification of *Salm. montevideo* and for information from the records of the Salmonella Reference Laboratory; to Mr. Gilbert Parker and Dr. C. L. Elder for advice and for permission to quote from their case notes; and to Drs. A. K. Lamballe and Stanley Wray for opinions on the radiological and histological aspects of the case.

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REFERENCES

- Gray, L. A. (1936). *Bull. Johns Hopk. Hosp.*, 59, 231.
Miles, A. A., and Wilson, G. S. (1946). In Topley and Wilson's *Principles of Bacteriology and Immunity*, p. 721. Arnold, London.
Van der Hoeden, J., and Hulst, L. A. (1933). *Ned. Tijdschr. Geneesk.*, 2, 1639.