

specific instead of blind antibiotic therapy should this become necessary.

The symposium also includes papers on antibiotics in the perioperative period⁵ and on the clinical pharmacology of antibiotics which have a more general appeal than to the anaesthetist,⁶ and one on septicaemia⁷ with emphasis on Gram-negative forms and treatment of the shock which these may induce. Two others are of direct interest in the operating theatre itself.^{8,9} Waterson's account of hepatitis B as a hazard in anaesthetic practice defines the precautions necessary before, during, and after operation on a patient whose blood contained or might have contained this virus. While it is not practicable to examine every surgical patient's blood for the presence of HBsAg, Waterson's formidable list gives ten indications for doing so. These include not only liver disease and other diseased states but such categories as prisoners, inmates of institutions for the mentally defective, drug addicts, prostitutes, homosexuals, and the tattooed, with a footnote that "this list should not be regarded as exhaustive."

Moudgil and Wade's review of anaesthesia and immuno-competence discusses a large amount of work, with which many people may be unfamiliar, on the effect of anaesthetics on the various functions of different types of leucocyte as well as evidence that anaesthesia increases the mortality from experimental infections. It would have been helpful if different anaesthetics could have been placed in an order of demerit from this point of view, but perhaps that is not possible.

¹ *British Journal of Anaesthesia*, 1976, **48**, (1).

² Skinner, T, *British Medical Journal*, 1873, **1**, 353.

³ Lumley, J, *British Journal of Anaesthesia*, 1976, **48**, 3.

⁴ Gaya, H, *British Journal of Anaesthesia*, 1976, **48**, 9.

⁵ Darrell, J H, and Uttley, Anne H C, *British Journal of Anaesthesia*, 1976, **48**, 13.

⁶ Wilkinson, P M, *British Journal of Anaesthesia*, 1976, **48**, 25.

⁷ Powrie, Suzanne, and Norman, J, *British Journal of Anaesthesia*, 1976, **48**, 41.

⁸ Waterson, A P, *British Journal of Anaesthesia*, 1976, **48**, 21.

⁹ Moudgil, G C, and Wade, A G, *British Journal of Anaesthesia*, 1976, **48**, 31.

Thoracic outlet compression syndrome

Our mammalian predecessors carried their front limbs in a dependent position, so that they could stand on all four limbs. When we assumed an upright posture our arms became dependent and parallel to the trunk. This moved the nerves, arteries, and veins which leave the thorax to pass into the arm laterally and increased their angle of flexion. The combination of this acute angle and the stretching caused by the weight of our arms might be expected to give everyone a thoracic outlet syndrome, but the support given by the muscles of the shoulder girdle is normally adequate. If, however, this support fails, or if the neurovascular bundle or the bony outlet of the thoracic cage is anatomically abnormal, the nerve, the artery, and the vein may be stretched or compressed.

The symptoms of thoracic outlet compression have been attributed to cervical ribs, the first rib, the scalene muscle, compression between clavicle and rib, and compression beneath the coracoid process and the first rib.^{1,2} Undoubtedly all of these structures may cause symptoms but proving that they are the cause of a patient's complaints may be a difficult clinical problem.

The most common symptom is pain in the C8 or T1 dermatome, particularly when the arm is dependent or after

carrying heavy weights. Sometimes symptoms are produced by raising the arms. The pain is felt along the whole length of the inner side of the arm and hand and is a mixture of burning and stabbing pains, paraesthesiae such as pins and needles, and numbness. If the nerve root is continually stretched or compressed the motor fibres can be damaged, producing weakness and wasting of the small muscles of the hand.

Symptoms due to compression of the subclavian artery are less common. Raynaud's phenomenon, coldness of the hand, and claudication of the forearm muscles when working with the arms above the head are the usual symptoms. Thrombus may form in the subclavian artery and emboli may block the digital arteries, causing gangrene, or a poststenotic subclavian aneurysm may develop. If the subclavian vein is compressed the arm may become swollen during heavy exercise, and the risk of an axillary vein thrombosis is increased. The confirmation of arterial or venous compression at the thoracic outlet is relatively simple with the aid of angiography.

The problem patients are those who present with pain in the arm. The possible causes of pain in the C8-T1 dermatome are legion, but the most common by far is osteoarthritis of the cervical spine and cervical disc disease. It is essential to exclude these two conditions and other central spinal lesions before accepting the diagnosis of thoracic outlet syndrome—even in the presence of a radiologically demonstrable cervical rib. Nerve conduction studies have been claimed to be helpful³ but have been found by others to be of little value.⁴ Clinical tests which precipitate the symptoms—such as abduction of the arm, the military brace position, and traction on the arm—only support one's suspicions: they do not confirm the diagnosis.⁵

If other causes of the patient's symptoms can be eliminated and there is a demonstrable cervical rib it is worthwhile exploring the neck through a supraclavicular incision and excising the rib. Again, if there is no cervical rib or other bony abnormality to suggest a fibrous band but the diagnosis of thoracic outlet syndrome seems certain, the only effective way of changing the anatomy of the thoracic outlet and relaxing any tension or pressure on the neurovascular bundle is to excise the first rib. The easiest way to do this is through an incision in the axilla.⁶ When the first rib is approached in this way the important structures can be pushed upwards and protected and the rib excised safely. Operating through a cervical incision is difficult and hazardous. In a report by Kremer and Ahlquist⁴ of 49 first rib resections for the thoracic outlet syndrome 42 patients had relief of their symptoms. Though such good results indicate the care with which the patients were selected for operation they also show that first rib resection is worthwhile for the right indication.

Usually there is time to investigate the patient fully and deliberate on the advisability of operation, but one form of thoracic outlet syndrome should be treated as an emergency. Patients who present with emboli in their fingers from a subclavian aneurysm or a stenosis due to compression should have an emergency arteriogram and exploration of their neck to remove the thrombus and repair the artery. If such a patient is not treated urgently he may have more emboli and lose his hand.

¹ Peet, R M, et al, *Proceedings of the Mayo Clinic*, 1956, **31**, 281.

² Rob, C G, and Standeven, A, *British Medical Journal*, 1958, **2**, 709.

³ Urschel, H C, Paulson, D L, and McNamara, J J, *Annals of Thoracic Surgery*, 1968, **6**, 1.

⁴ Kremer, R M, and Ahlquist, R E, *American Journal of Surgery*, 1975, **130**, 612.

⁵ Telford, E D, and Mottershead, S, *Journal of Bone and Joint Surgery*, 1948, **30B**, 249.

⁶ Roos, D B, *Annals of Surgery*, 1966, **163**, 354.