

## Section of Surgery

President—E. ROCK CARLING, F.R.C.S.

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### Endothoracic Sympathectomy

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ENDOSCOPY has in recent times become not only a well established, but also an extremely valuable branch of Surgery. Though primarily used as a method of diagnosis, by improvements in equipment and technique, it is now also possible by this means to perform operative measures of considerable magnitude.

The thoracic sympathetic nervous system may reasonably be regarded as one of the more inaccessible parts of the body, but viewed from within the pleural cavity, the sympathetic chain and splanchnic nerves are only separated from this cavity by the parietal pleura. The object of this paper is to describe the successful resection of the stellate ganglion and splanchnic nerves by an endoscopic technique. It is not intended to assess the value or otherwise of this treatment for the clinical conditions described.

The possibility of section of the splanchnics and excision of the stellate ganglion, via the thoracoscope was suggested during operations on the lungs. In the majority of such cases the roots of the great splanchnic nerve could be clearly seen glistening through the pleura, thus giving a direct guide to the position of the nerve, the position of the stellate ganglion was seen during operations for internal pneumolysis and gave support to the suggestion that such an operative approach was feasible.

Trial was made on the cadaver, and it became obvious that the simplest method would be to work with two cannulae, one for the thoracoscope and the other for the passage of instruments. It was also obvious that it would be convenient to have two instruments that could be passed through the same cannula at the same time, one being a plain pair of forceps and the other a minute pair of scissors. These instruments were specially made, and proved sufficiently strong and satisfactory. Together with a small blunt hook, they are all that are required for use with the standard thoracoscope. It was also found on the cadaver, that the pleura could be picked up and cut with the forceps and scissors, thus exposing the underlying structures.

#### TECHNIQUE

Both for the excision of the stellate ganglion and section of the splanchnic nerves, the preliminary essential is a complete pneumothorax on the side of the operation, induced over a period of some days, and checked by radiography. The operation for resection of the splanchnics is performed with the patient prone, and for the excision of the ganglion in a half-sitting posture. The position of the lung during each operation can be thus foretold.

For the splanchnic resection the patient is placed face downwards on the operating table and the thoracic cannulae inserted under local anaesthesia between the 7th and 8th, and 8th and 9th ribs in the mid-axillary line. Using the upper cannula for viewing and the lower one for operating, the pleura is anaesthetized with 2% novocain by means of the long standard endoscopic syringe. An excellent view of the bodies of the vertebrae is obtained, and the diaphragm remains well down and the lung falls out of the way. The area of the parietal pleura which is infiltrated should cover the space of three vertebral bodies and also extend outwards to the necks of the ribs. It is interesting to note that the sensitivity of the pleura seems to diminish in a forward direction, so that while the pleura over the neck of the ribs is highly sensitive, the part which is reflected on to the mediastinum appears to be almost insensitive.

After infiltration, an assistant holds the viewing cannula and thoracoscope steady, so that both hands of the operator are free to manipulate the instruments through the operating cannula. The pleura is picked up at a convenient spot as low down as possible and cut with the scissors from the neck of the ribs to the front of the vertebræ. The pleura is elastic, and it is quite easy to pick it up and clean, without danger of damaging other structures.

The scissors are now removed, and the blunt hook inserted. With the forceps holding the pleura at the anterior end of the incision out of the way, the hook is passed towards that part of the vertebral body where it passes out of sight, and with a little gentle manipulation it is passed under the great splanchnic. The nerve is quite unmistakable when seen, as it can be drawn well forward and will spring back again like a piece of elastic. When seen through the thoracoscope it appears to be about the size of the median nerve at the wrist. The nerve is then grasped with the forceps and cut in two places as far apart as possible with the scissors. By gentle dissection at the side of the vertebral body, the sympathetic chain can be cut in a similar manner.

For resection of the stellate ganglion, the patient reclines on the table so that the chest is at an angle of 30 degrees with the horizontal. In this position the lung falls downwards and backwards, leaving a good space in the region of the upper ribs. The cannulæ are inserted under local anæsthesia from the front this time, the viewing cannula between the 1st and 2nd ribs, and the operating cannula between the 2nd and 3rd, each being inserted about two inches outside the lateral border of the sternum. Using both the direct and oblique vision thorascopes, an excellent view of the dome of the pleura is obtained, and the line of the great vessels can be plainly seen, the veins, including the intercostals being particularly prominent. The pleura is infiltrated with local anæsthesia from above the neck of the 1st rib to the 3rd, and cut from below, upwards. The neck of the 1st and 2nd ribs are thus exposed. This area is then cleaned by careful dissection with the scissors and forceps, and the tissue removed kept for section. In one of the cases operated upon, the sympathetic ganglion was definitely seen, and its removal thus simplified; in the other it could not be identified with certainty, and a more extensive dissection had to be carried out. In both these operations as described above, the bleeding is negligible, and consists only of a very slight ooze from the minute vessels behind the pleura, which can be swabbed away by a small pledget of gauze held in the forceps.

Omnopon gr.  $\frac{1}{3}$  and scopolamine gr.  $\frac{1}{150}$  were used as premedication in four operations, the fifth receiving morphia gr.  $\frac{1}{4}$  only.

*Summary of cases.*—The operation of sympathectomy by the endothoracic route was performed on four patients. In one case the procedure was carried out on both sides. It has thus been done on five occasions. Two of these cases had hypertension, in addition to which, one of them had coronary occlusion. One was a case of persistently painful amputation stump, and the other was a case of Raynaud's disease. The operations were all performed between 3.3.39 and 19.8.39. A short account of two cases is given.

Mrs. C., aged 39, admitted to Sheffield Royal Infirmary on 27.2.39 on account of hypertension. Blood-pressure 238/140. Induction of artificial pneumothorax on the right side was commenced on the day following admission, and was complete by 3.3.39. The right great splanchnic was resected by the method described above. On the same day blood-pressure half an hour after the operation was 140/108 rising to 210/140 on the following day. It remained at this level until her discharge from hospital on 8.3.39. She was readmitted to Sheffield Royal Infirmary on 20.3.39 for a corresponding operation on the left side. This was carried out on 21.3.39, part of the sympathetic chain being removed at the same time. The stellate ganglion was resected on the right side only: the patient gave an excellent clinical result, with alteration of thermal and other conditions in the arm associated with section of the sympathetic supply. On admission the blood-pressure was 230/150, and on discharge on 6.4.39 was 216/136. Sections of the tissue excised were reported upon as follows: "Large non-medullated nerve." In this case there were no pleural adhesions, both lungs collapsed well, and from a technical point of view it was most encouraging.

Mr. C., aged 51, admitted to Sheffield Royal Infirmary 16.7.39. The right arm had been amputated just below the shoulder-joint, nine years previously for osteomyelitis of humerus. Two years ago pain commenced in the stump. A terminal neuroma had been removed with partial relief of the symptoms, but these had again become severe during the last three months. On 18.7.39 the stump was injected with novocain and on 21.7.39 another terminal neuroma was dissected out, with but little relief. It was then suggested by Professor Ernest Finch that removal of the stellate ganglion might be beneficial.

Artificial pneumothorax was commenced on 9.8.39 and completed 18.8.39, when an excellent collapse was obtained. Endothoracic excision of the stellate ganglion was carried out on 19.8.39. The sympathetic chain in this case was identified behind the pleura. Histological examination of the tissue removed confirmed the presence of sympathetic ganglion cells.

There was immediate cessation of symptoms after the operation, and the patient left the hospital free from pain. It was interesting to note that while the novocain was active at the site of the operation, the patient exhibited contraction of the pupil on the corresponding side, which disappeared in about two hours, but there was no permanent inequality of the pupils.

By using this method it would incidentally be perfectly feasible to inject the sympathetic with alcohol under direct vision, and if the pleura were allowed to heal, before the pneumothorax absorbed, there seems to be no reason why the procedure should not be repeated indefinitely.

All the cases were operated upon at the Sheffield Royal Infirmary, and I wish to express my gratitude to the physicians and surgeons under whose care they were admitted.