SPREAD OF INJECTATE AFTER STELLATE GANGLION BLOCK IN MAN: AN ANATOMICAL STUDY

M. GUNTAMUKKALA AND P. A. J. HARDY

SUMMARY
Stellate ganglion injections were performed using methylene blue 20 ml in 20 cadavers before postmortem examination. There was spread of solution into the posterior mediastinum and over the apical pleura. There was no spread onto the thoracic sympathetic chain.

KEY WORDS
Anatomy stellate ganglion. Anaesthetic techniques, regional: stellate ganglion block.

Injection of solutions onto the precervical fascia in man has been used to block the cervicothoracic sympathetic outflow in the so-called “stellate ganglion block”. It has been claimed that the injected solution spreads to cover the upper thoracic ganglia [1]. A recent study showed that functional sympathetic block did not occur in thoracic dermatomes [2].

The sympathetic chain lies anterior to the vertebral bodies in the neck, but as it descends across the first thoracic vertebral body, it lies lateral to the vertebral body [3]. From T1 caudally, the sympathetic chain descends in a subpleural plane across the necks of the ribs. In the lower thorax, at the origin of the splanchnic nerves, the sympathetic chain starts to resume an anterior relation to the vertebral bodies, which is maintained into the lumbar region. A study was performed in cadavers using methylene blue 20 ml to observe the pattern of intrathoracic spread after stellate ganglion injection.

METHODS AND RESULTS
A study was performed in a series of 20 (13 male) cadavers in the mortuary before postmortem. The age at death varied from 22 to 95 yr. A standard anterior stellate ganglion injection was performed in each. A 23-gauge needle was inserted lateral to the trachea at the level of the cricoid cartilage in an antero-posterior direction to contact bone. The needle was withdrawn 0.5 cm and 0.01% methylene blue solution 20 ml injected.

A standard anterior postmortem was performed, with great care during handling of the lung and pleura on the injected side. The lung was retracted in an anteromedial direction and the relation of the injected methylene blue to the anatomical structures noted. If the solution was not visible through the pleura, a note of the position of the solution was made during evisceration.

Solution was observed to lie in the posterior mediastinum in the prevertebral plane (fig. 1) and noted to spread from the neck caudally to T3 (n =

![Diagram Fig. 1: Diagrammatic cross-section at T2 showing plane of dye spread (D) in relation to the sympathetic chain (S) and pleura (P).](http://bja.oxfordjournals.org/)

M. GUNTAMUKKALA, M.B., B.S.; P. A. J. HARDY, B.Sc.(Hons), M.B., Ch.B., F.C.A.Naes.; Pain Clinic, Gloucestershire Royal Hospital, Great Western Road, Gloucester GL1 3NN. Accepted for Publication: January 7, 1991. Correspondence to P.A.J.H.
2), T4 (n = 17) or T5 (n = 1). In some cases, solution was observed over the apical parietal pleura. In none of the cases did the injected dye spread onto the lateral subpleural surface of the vertebral bodies in the region of the sympathetic chain.

DISCUSSION

In the present series of observations in cadavers, an attempt was made to provide an anatomical explanation for the physiological failure of stellate ganglion block to produce thoracic ganglion block [2]. It is possible that the spread of dye in cadavers differs from the spread of local anaesthetic in vivo. In some cases (for example intercostal blocks) which lie within the surgical field, it may be possible to observe spread in vivo under direct vision, but even then spread of dye solution may differ from spread of local anaesthetic. This type of study is not possible with stellate ganglion block. The use of aqueous methylene blue was better than previous injection techniques which used more viscous solutions [1] which may have created artefact.

From our observations, it would appear that in cases where block of the thoracic portion of the sympathetic chain is desired, this will not be achieved by stellate ganglion block. The only way to ensure thoracic sympathetic block is to block the chain directly [4] or indirectly, for example during interpleural block [5].

REFERENCES