commercially available. It is an adjustable-angled mirror which has a non-fog, non-mist surface convenient for use in laryngoscopy (fig. 1A). The detachable clip shown with the laryngoscope mirror and handle (fig. 1B) has been produced by and is available from Mr. Paul Rehkopf. Its advantages are adaptability to many types of laryngoscope blades and easy sterilization because of a removable disposable laryngoscope mirror. Figure 2 demonstrates the attachment of the clip and mirror to the laryngoscope blade and use of the device.

In the most practical application of this apparatus, trainee initially observe the technique of the instructor during laryngoscopy and intubation by watching his actions in the mirror and then reverse the procedure with verbal guidance by the instructor. The mirror does not impair the trainees’ view, nor do they have difficulty in transition from the reversed image seen in the mirror to direct laryngoscopy.

Orientation for both trainee and instructor can be provided by using the apparatus for laryngoscopy of a manikin prior to its use for laryngoscopy of patients (fig. 2).

Although a similar device was described by Boulanger and Lepage in 1966, the refinements described, with the adjustable-angle, non-fog, non-mist, disposable mirror and detachable, easily sterilized clamp are significant changes. It has also been apparent that this device is not widely known. Its advantages in training programs warrant consideration of its use.

REFERENCE


Use of the Pulse Monitor for Determining Sympathetic Block of the Arm

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The several commonly used indices of whether a stellate ganglion block, or sympathetic block of the upper extremity, is present include the development of Horner’s syndrome, anhydrosis, temperature changes, blockade of the psychogalvanic skin response, and vasodilatation of the vessels of the arm. Horner’s syndrome may occur without achievement of high thoracic sympathetic block because the anesthetic solution may bathe only the superior and middle cervical sympathetic ganglia and not reach the upper thoracic ganglia. Anhydrosis is sometimes difficult to ascertain in an air-conditioned environment. Temperature changes may be subtle and hence difficult to interpret unless a constant-temperature room is used. Psychogalvanic skin responses are depressed or abolished not only by sympathetic blockade, but also by depressant drugs, regional or general anesthesia, and marked debilitation. Vasodilatation is often difficult to observe for students and other inexperienced personnel, especially when severe trophic changes are present in the involved arm.

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We have recently been evaluating stellate ganglion (cervicothoracic sympathetic) block by digital plethysmography. Prior to block a commercially available digital photoplethysmographic device (pulse monitor) is attached to a finger of the involved arm and a baseline tracing on an oscilloscope is obtained. After calibration of the height of the curve on the oscilloscope to accommodate for any anticipated increases in magnitude, a stellate ganglion block is performed. When the block is successful, pulse-wave amplitude and the area incorporated under the curve are increased. A permanent record of these changes can be obtained by connecting a jack from the auxiliary output of the oscilloscope module to an electrocardiograph write-out module.

The following case illustrates the use of this equipment.

REPORT OF A CASE

A 47-year-old man had vasospastic disease of both upper extremities, worse on the right. Vasospasm as a major component of his disease was confirmed by the reactive hyperemia test. The
patient complained of pain and coldness of his hands and fingers, exacerbated by environmental conditions and smoking. Physical examination revealed cyanosis of the hand with ischemic ulceration of the tip of the fifth finger. A digital plethysmograph was placed on the middle finger of his right hand and a pre-block tracing obtained (fig. 1).

A stellate ganglion block, according to the anterior paratracheal technique described by Moore, using lidocaine, 10 ml of 1 per cent was accomplished. Plethysmographic tracings 2 minutes (fig. 2) and 6 minutes (fig. 3) after block are shown. Increases in amplitude of the pulse wave and the area incorporated under the curve are easily seen. The patient had significant relief of pain during this period. He subsequently underwent surgical sympathectomy of the cervicothoracic sympathetic chain on the right and is presently asymptomatic on that side.

DISCUSSION

Plethysmography has been used in the study and evaluation of peripheral blood flow since the beginning of this century. In 1905, Brodie and Russell first demonstrated the value of the plethysmograph in quantitating peripheral blood flow. In 1965, Strandess and Bell, using a strain-gauge plethysmograph with an impedance-matching circuit, were able to quantitate digital blood volume changes in various conditions, including vasospastic and arterial occlusive diseases.

Because of the self-centering, stable baseline characteristics of the modern electrocardiograph, this circuitry will not permit evaluation of volume changes which are reflected in shifts of the baseline, and hence true quantitation is not possible with this apparatus. However, this circuitry does not interfere with changes in amplitude and contour of pulse waves and easily produces a permanent record of vasodilatation. Neural control of the peripheral circulation is mediated by the amount of sympathetic tone of the smooth muscle of the arterioles and precapillary sphincters, which are richly innervated by sympathetic vasoconstrictor fibers. Sympathetic blockade results in vasodilatation with increased blood flow, which increases the volume of the digit. The increased volume resulting from sympathetic blockade is easily demonstrated with the pulse monitor. Pulse-wave amplitude usually increases to two to five times the amplitude prior to sympathetic block.

There has been considerable controversy about the effectiveness of stellate ganglion block for treating various disease states. The reasons for the discrepancy in results are chiefly lack of a uniform method for selection of candidates for block, use of the block as a last resort only, and lack of objective methods for determining the achievement of sympathetic blockade.

Digital photoplethysmography is an easily obtained, objective means for determining whether an attempted stellate ganglion block has in fact been accomplished.

REFERENCES