# EDITORIAL

## ANESTHESIA OF THE SYMPATHETIC NERVES

Blocking of the sympathetic nerves with procaine has become an important diagnostic and therapeutic procedure. There are few systems in which results from a contemplated surgical procedure can be so accurately determined as in operations upon the sympathetic nervous system. As a matter of fact, the rapid progress which has been made in the surgical treatment of this important portion of the nervous system in the past decade probably has been due to the fact that it has been possible preoperatively to determine accurately whether the patient would be relieved by the contemplated procedure. An operation on the sympathetic nervous system probably is never justified without a previous anesthesia of the sympathetic nerves as a diagnostic test.

Temporary blocking of the sympathetic impulses by the infiltration of the region of the sympathetic ganglia with local analgesic agents is of immeasurable value in diseases of the peripheral arterial system, because in these conditions it is imperative from a prognostic and therapeutic standpoint to determine the degree of vasospasm. As has been previously emphasized by us, in a given peripheral arterial disease the prognosis and therapy in general depend upon the amount of vasospasm. The more vasospasm the better the prognosis and the more consistent the therapy, and conversely the less the vasospasm the poorer the prognosis. Whereas other methods can be used to determine the degree of vasospasm, certainly the most accurate is the determination of the degree of vasodilatation following the temporary interruption of the sympathetic impulses by blocking the sympathetic ganglia with local anesthetic. By this it is not implied that all patients who have vasospasm and who are relieved by the temporary anesthetization of the lumbar sympathetic ganglia should have a sympathectomy. In fact, in most of the cases of peripheral arterial disease associated with vasospasm conservative measures are efficacious in bringing about relief of symptoms. It is only in the relatively severe and progressive cases that ablation of the sympathetic ganglia is necessary.

Sympathetic block is also of utmost importance in those heretofore little understood conditions described as causalgia, in which a painful extremity has followed trauma. This condition should be rightfully termed "sympathalgia" because it is the result of dysfunction of the sympathetic nervous system. The manifestations are those of a sympathetic hyperirritability, namely, coldness of the extremity, sweating and pain, and are relieved by interruption of the sympathetic impulses. Previously many of these patients were considered malingerers and

considerable harm was done them because of improper evaluation of their symptoms. Although there may be some difficulty in distinguishing the malingerer from the individual who has a true sympathalgia because one of the characteristics of a sympathalgia is that it is bizarre in its manifestations, the differentiation can be accurately made by anesthetization of the regional sympathetic ganglia. Not infrequently temporary block of the sympathetic ganglia with a local anesthetic agent affects a cure, which is difficult to understand. Although the pharmacologic effect of such drugs as procaine is only fleeting, it is not unusual to observe a prolonged effect following the anesthetization of the sympathetic ganglia with these drugs. The only conclusion that one can draw is that the physiologic effect of the anesthetization of the sympathetic ganglia is much more prolonged than the pharmacologic effect.

In a patient with Hirschsprung's disease in whom removal of the lumbar sympathetic ganglia on the left side gives such dramatic results, one beneficial effect of the operative procedure can be predicted preoperatively by roentgenographic visualization of colonic contraction following the anesthetization of the lumbar sympathetic ganglia.

In our hands anesthetization of the sympathetic ganglia has been most valuable in the treatment of thrombophlebitis or phlegmasia alba dolens, a condition which heretofore has resisted most forms of therapy. Every obstetrician, gynecologist and surgeon has observed patients who have had thrombosis of a deep vein associated with fever, pain and swelling of the lower extremity and who have resisted all forms of therapy. Previously these patients continued to have pyrexia for periods of six to eight weeks during which time pain continued. Although this was undesirable, probably the most undesirable part of phlegmasia alba dolens is the likelihood of the persistence of postphlebitic edema which may last for years and be very disabling. Because of the observation in a case of typical phlegmasia alba dolens that there existed a paradox, that is, a cold involved extremity in an individual with pyrexia whose skin surface temperature elsewhere was elevated, the possibility of anesthetization of the regional sympathetic ganglia was suggested. The immediate relief of pain and the prompt subsidence of fever as well as the decrease in the size of the swollen extremity were astonishing. Clinical observations were supplemented by the experimental demonstration that in a thrombophlebitic segment impulses which were carried over the sympathetic nervous system produce spasm in the homolateral arterioles and venules. It is interesting from a biological standpoint that in thrombophlebitis in which the lesion is limited to the venous system the clinical manifestations are almost entirely those of arteriolar spasm. By relieving the arteriolar spasm, even though the thrombosis persists in the vein, the patient is relieved of his symptoms. We found in a large series of cases of typical phlegmasia alba dolens which would have resisted all forms of

therapy previously employed that by anesthetization of the regional lumbar sympathetic ganglia, a prompt subsidence of all manifestations occurred. Permanent relief of pain following the first anesthetization was obtained in 90 per cent of the patients. Sixty-five per cent of the patients had no fever within forty-eight hours after the institution of therapy; 24 per cent within three to five days and 7 per cent in from six to eight days. In only 4 per cent did pyrexia last longer than eight days. The edema had completely subsided within four days in 56 per cent, in from five to eight days in 32 per cent, in from nine to ten days in 8 per cent, and from eleven to twelve days in 3 per cent. Sixty-two per cent of the patients were discharged from the hospital as cured within four to eight days after the institution of therapy, 19 per cent left the hospital from the ninth to the twelfth day and only ten per cent remained in the hospital more than twelve days. Subsequent follow-up examinations over a period of from four months to five years have demonstrated that these patients have remained well. The prompt subsidence of the pain suggests that in thrombophlebitis it is due to the associated ischemia. The subsidence of the edema is undoubtedly due to the fact that in thrombophlebitis, because of the vasoconstriction of the arterioles, the blood supply through the capillaries is so decreased that a relative anoxia occurs. In the presence of anoxia it is well known that the permeability of the capillary endothelium is increased, which produces an increased exudation of fluid into the perivascular spaces. Equally as important for the persistence of the edema is that the pump which is responsible for movement of the lymph, namely arteriolar pulsations, is lost. By the reestablishment of the blood supply through the arterioles and capillaries the excessive exudation of fluid into the perivascular spaces is stopped and the perivascular fluid is rapidly moved away through the lymphatic system because of the reestablishment of arteriolar pulsations. The prompt subsidence of the fever is probably due to the fact that with a better vascularization of the thrombophlebitic segment a more rapid resolution of the inflammatory process in the vein results.

The use of more prolonged anesthetics in producing anesthesia of the lumbar sympathetic ganglia is not without danger. Previously alcohol was used for blocking the sympathetic ganglia. We now feel that it should be employed with caution because of the danger of alcoholic neuritis of the spinal nerves. In fact, we are convinced that an alcoholic block of the cervicodorsal sympathetic ganglia should not be done because of the close proximity of the stellate ganglion to the brachial plexus. Whereas the alcoholic block of the lumbar sympathetic ganglia is occasionally justified, it should be used infrequently because of the possible alcoholic neuritis of the genitofemoral nerve which is in close proximity to the lumbar sympathetic ganglia. Other longer acting local anesthetic agents are seldom used because of the necessity of infiltrating relatively large amounts of more toxic agents.

In certain cases of hypertension, in which splanchnicectomy and lower thoracic and upper lumbar ganglionectomy are contraindicated because of the poor risk of the patient, anesthetization of the splanchnics with procaine followed by alcohol injections is justified as a palliative procedure. The results in these cases are, however, less gratifying than in the cases mentioned.

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