

# THE EFFECTS OF BILATERAL STELLATE GANGLION BLOCK ON MENTAL DEPRESSION

## *Report of 3 Cases*

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The idea of attempting to alter cerebral function by interruption of the sympathetic nerves to the cerebral blood vessels is not a new one. As early as 1899 Alexander<sup>1</sup> and in 1896 T. Jonnesco<sup>2</sup> performed cervical sympathectomy in the treatment of epilepsy.

More recently Mixter and White, as reported by White and Smithwick<sup>3</sup> in 1941, carried out bilateral cervicothoracic sympathectomy in a series of patients with severe epileptic seizures but found that the final outcome was disappointing.

Dandy<sup>4</sup> in 1931 reported his experience in the treatment of migraine by sympathectomy, as did Craig,<sup>5</sup> and Love and Adson.<sup>6</sup>

Royle<sup>7</sup> in 1932 described his experience in the treatment of a number of cerebral diseases by resection of the cervicothoracic sympathetic ganglia. However, Royle's previous writings on the relief of spasticity by sympathetic ramisection had been so thoroughly discredited that this contribution attracted little attention.

In 1943 and again in 1946 Risteen<sup>8</sup> and Volpitto<sup>9</sup> reported favorably on the use of stellate ganglion block in cases of cerebral vascular occlusion and other neurologic disorders.

During the past year our interest in attempts to influence cerebral physiology by interrupting the cervical sympathetic nerves has been re-aroused. In January, 1946, a woman, aged 38, was observed with complete left hemiplegia of five weeks' duration due to cerebral embolus. This patient had excruciating pain in the entire paralyzed side. There was such extreme dysesthesia of this side that the patient would scream when the skin was lightly touched. She presented a serious nursing problem because she would not tolerate any movement. Her discomfort was considered to be of thalamic origin. Since vascular occlusion in an extremity is usually associated with some degree of vascular spasm, it was considered possible that the thalamic pain in this case might be due to an associated cerebral vascular spasm. In an effort to relieve this

presumed cerebral vascular spasm it was decided to block the sympathetic nerve supply to the brain. Accordingly, on January 16, 1946, the right stellate ganglion was injected with novocaine. The patient exhibited a prompt physiologic response with a Horner's syndrome and increased temperature and dryness of the right side of the face and right upper extremity. There was no relief, however, from pain in the left side. In order to exclude a crossed sympathetic innervation to the thalamus, the left stellate ganglion was then similarly injected but again with little or no immediate relief. However, after the patient returned to her hospital room she developed very definite relief of her discomfort, and by the following day her thalamic pain had entirely disappeared and has not recurred.

Since the above experience, bilateral stellate block has been performed in a series of patients with cerebral vascular disease, brain atrophy, and parkinsonism.\* In some instances where it was deemed indicated, the novocaine block was followed by surgical interruption of the sympathetic nerve supply to the brain. These patients were frequently enthusiastic about the improvement which these procedures afforded them. But when motion pictures were made of the patients before and after treatment it was found that the actual improvement in motor function was relatively slight. We finally realized that what was being accomplished in these patients was that we were producing an alteration in their mood.

Most prominent and most constant responses in patients subjected to interruption of the sympathetic outflow to the brain were subjective experiences expressed in terms of greater sense of animation, self-security, and a feeling of well-being which often approximated euphoria. In general this subjective improvement overshadowed objective benefits, and one gained the impression that the patients performed better in motor and mental capacities because they felt better. In reviewing the previous status of these patients it was noted that the greatest display of elevated mood was found in those whose cerebral lesion was associated with a definite pre-existing mental depression.

The elevation of mood in these organic states was sufficiently impressive to suggest to us the use of bilateral stellate procaine block in individuals suffering with involutional melancholia, depressive states, extreme anxiety neuroses, and schizophrenia.

\* *In performing these injections the technic de Sousa Pereira has been found to be free of complications as well as being simpler and more certain than other methods. (de Sousa, Pereira A.: Blocking of middle cervical and stellate ganglions with descending infiltration anesthesia; technic, accidents and therapeutic indications. Arch. Surg. 50:152-165 (Mar.) 1945.)*

Three case histories are presented to emphasize the more concrete features of this reaction in depressed patients to temporary interruption of sympathetic impulses to the brain.

### Case Reports

**Case 1.** A minister's wife, aged 44, was examined on March 7, 1947. She complained of episodes of fatigue and dejection which had appeared during the previous October. At the time she expressed the opinion that she was an evil woman who had "sinned against God". She talked in an apathetic manner, had a marked psychomotor retardation, and reiterated that she had committed many errors and was utterly useless as a wife to a devoted husband. She stated that she had failed signally in helping him in his church work and set a bad example to the members of his congregation.

She had had a depressed state in 1932, from which she completely recovered after a period of nine months in a psychiatric hospital. In 1946 she was operated upon for a herniated intervertebral disk, during which ordeal she manifested no evidence of mental depression.

Bilateral stellate block was performed on March 7, 1947. One-half hour later she proffered a spontaneous smile and announced that the weight of feeling that she was going to perdition for her sins had suddenly lifted. "I have no sense of sin, everything seems so different now. I now realize that it was my attitude that made me feel as I did and that it was not the neighbors' denunciation of me, nor was it my operation which caused me to feel so low." She recalled all her feelings of being sinful and frankly could not understand how she could have entertained such ideas less than an hour before.

In contrast to her previous state of apathy and retardation, she was sprightly in manner and wholly alert in her answers and recitals of her subjective improvement, which persisted for two days.

**Case 2.** A married man, aged 35, presented himself at Cleveland Clinic because of nervousness and depression on April 21, 1947. Two months before, he had become apathetic, exhausted, had lost interest in his work, and could not sleep. His appetite and sexual libido had suddenly waned. He became self-condemnatory in terms of sex inadequacy, schooling, and retro-rationalized his present condition by attributing it to auto-eroticism in his youth. He had frequent crying spells, entertained ideas of futility, and hinted at suicide.

In 1936 he had had a long episode of depression, from which he eventually recovered. During the war years he was in active military service and was discharged with an excellent conduct record.

Bilateral stellate block was carried out on April 23, 1947. Immediately after the physiologic effects were observed he openly grinned, something which his wife had not observed for several months. He asserted suddenly that he no longer felt like jumping out of the Clinic window, as he had contemplated doing an hour before. At the moment of complete sympathetic block, which was more pronounced on the left side, he had a sudden feeling "as if the world became lighter and brighter". "It seems as if I have a little more courage to do the things we had planned to do. I do not feel over-elated, but I just feel that now I have a chance. I hope this will never wear off." His wife, who is a nurse, pronounced the change as a "miracle" and happily exclaimed that "this is the man I really married".

The transformation persisted for two days. He whistled at home, on the first night he went to sleep spontaneously and awoke with high spirits. The feeling of well-being or normal cheerfulness (euthymia) persisted well over seventy-two hours.

**Case 3.** A man, aged 49, who led a busy life as a building contractor, was first examined on March 4, 1947. He stated that he had become progressively depressed for the past month and came to the conclusion that his brain was no longer functioning. His wife testified that he had frequent crying spells, was extremely unstable, very despondent, and was unable to concentrate on his work. He predicted dire disaster for himself and his business, felt that he was no longer useful to himself or to his community, and had definite surges of suicidal impulsions.

In the past history it was revealed that he had had a sharply delimited episode of depression, nervousness, and insomnia during 1942. He was given shock treatment for a period of seven weeks and completely recovered his normal joviality and animation.

We found him to be in an abject degree of depression and suggested shock treatment. He was in such agony of indecision that he refused to consider this therapeutic program and argued that it was useless to do anything for him because his case was utterly hopeless.

A bilateral stellate block was performed on March 5, 1947, with 10 cc. of 1 per cent novocaine injected into each side. He developed a bilateral ptosis of mild degree, an immediate contraction of both pupils, and increased warmth of both hands.

His first reaction was to announce that his memory was suddenly keener, and he was able to recall six numerals which had been presented to him one minute before. He announced that he was more objective about his depression. Most edifying was his feeling that he could make decisions with more promptness and security and that his concern about the future was not so great. His psychomotor tempo was decidedly increased. He ceased having crying episodes, which were well demonstrated an hour before the block, and expressed the feeling that he could now proceed with shock therapy without hesitation.

The euphoria persisted very definitely for three full days, after which time he was not so brisk and self-secure but still maintained that his mind was better, that he could think better, and "the extreme melancholy has been taken away from me".

The positive and favorable effects of bilateral stellate ganglion block in patients with true endogenous depression, such as involuntional melancholia or the depressed phase of manic-depressive psychosis, develop with the appearance of the Horner syndrome and anhidrosis of the face. Some patients report a preliminary sense of flushing on the side of the head ipsilateral with the site of injection. After the procedure is completed on both sides the facial expression usually becomes animated by a spontaneous smile. The dejection, the sense of futility, the agony of indecision, the tendency to self-depreciation and self-denunciation so characteristic of the melancholic state give way to a general sense of well-being and to a normal self-estimation. Two patients after injection recollected with puzzlement and amazement the morbid content of their ideas and obsessions which were entertained but a few minutes before. The freedom from morose mood and its concomitant morbid ideation was a striking subjective experience acutely appreciated by several subjects and usually was announced without solicitation.

In general, physical animation accompanies the psychic acceleration. Normal sleep and appetite reappear in striking contrast to the long, pre-existing period of insomnia and anorexia.

Naturally all these benefits are short-lived. The duration of mood enhancement in these cases did not extend beyond seventy-two hours after procaine block.

In patients who proffered "depression" as one of many other symptoms and whose condition was patently psychoneurotic, the procedure of stellate block did not produce either a heightened affect or a relief from the subjective tensions. From this it would appear that blocking of the sympathetic nerve supply to the brain may offer a therapeutic test for differentiating the deep anxiety psychoneuroses from truly endogenous depressions, being similar in this respect to electric shock. To be most effective, both stellate ganglia should be blocked at the same sitting. It is our present opinion that the alteration in mood is due to some factor other than cerebral vasodilation.

Two schizophrenic patients, both in hebephrenic regression, were subjected to bilateral cerebral sympathectomy by resection of the superior cervical ganglia. Here again the results were practically barren of any modification or enhancement of affect, and the psychotic behavior was in no wise modified.

### Summary

Temporary block of sympathetic impulses to the brain by procaine injection of both stellate ganglia in 3 patients suffering with endogenous mental depression induced a heightening of affect, a relative euphoria, and a transitory relief from morbid ideation and psychomotor retardation.

No such affective reaction was obtained by applying the same technic to psychoneurotic patients, to schizophrenic subjects, or to patients without cerebral or mental disease.

The effect of stellate block on depressed mood suggests that the sympathetic outflow to the brain plays a role in contributing to the cenesthetic or mood level of consciousness. Amplified studies are indicated in order to determine whether sympathetic interruption to the brain through surgery will permanently modify the cyclic behavior of the affective reaction psychoses and whether it can in some cases replace prefrontal lobotomy in the treatment of chronic depression which has proved refractory to shock therapy.

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