A MODIFICATION OF THE TIFFANY OPERATION
FOR TIC DOULOUREUX

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(Received for publication December 14, 1961)

The purpose of this paper is to revive and propose a modification of the operative procedure of subtotal removal of the ganglion of Gasser for the treatment of tic douloreuse as proposed and executed by Tiffany in 1894.

Early surgical treatment for this disease comprised division or avulsion of the peripheral branches of the 5th cranial nerve. These neurectomies resulted in only temporary relief of pain and consequently were abandoned except in special circumstances. After many years of trial and failure with peripheral neurectomies, partial to complete removal of the Gasserian ganglion was practised. During the latter part of the nineteenth century and the first half of this century major contributions dealing with the surgical treatment of tic douloreuse were made by Mears, Rose, Horsley et al., Hartley, Krause, Tiffany, Spiller and Frazier, Keen, Cushing, Hutchinson, Dandy, Stookey, Sjöqvist, and Taarnhøj.

In 1884 Mears suggested the removal of the Gasserian ganglion. Rose is accorded the distinction of being the first to carry out this procedure (1890). Horsley et al. in 1891 described avulsion of the dorsal root of the Gasserian ganglion through a temporal, intradural approach. In 1892 Hartley reported alleviation of the pain of tic douloreuse by removal of the 2nd and 3rd divisions of the trigeminus and a portion of the Gasserian ganglion. He did not suggest or practise avoiding the fibers in the ganglion that supply the cornea and his drawings of the face after operation indicate that there were sensory alterations of part of the cutaneous area supplied by the ophthalmic division. Tiffany in 1894 proposed sparing of the ophthalmic fibers and suggested that the motor component be preserved although he was not able to obtain this objective invariably. In part his conclusion was "The intracranial operation for the cure of facial neuralgia which should be done is removal of the lower two-thirds of the ganglion of Gasser with the second and third branches at their foramina of exit from the skull, all in one piece, so as to be certain of the amount of tissue taken away" (Fig. 1). Spiller and Frazier in 1901 published results of dorsal-root section of the 5th cranial nerve in dogs.

Fig. 1. Tiffany's operation. The lined areas indicate the portion of the dorsal root, ganglion and peripheral nerves removed totally.
and found that there was no regeneration of fibers in the spinal tract after division of the dorsal root; consequently removal of all or part of the ganglion was thought unnecessary. In a segment of this article Frazier described the technique of total dorsal-root section of the trigeminal nerve in man. As recorded in the second edition of the monograph On Facial Neuralgia and Its Treatment (1919), Hutchinson had continued to practise the Tiffany operation of subtotal removal of the lower two-thirds of the ganglion and the intracranial parts of the 2nd and 3rd divisions. He emphasized the latent reduction in the area of cutaneous anesthesia which may occur subsequent to operation. In the 1920s Frazier, Dandy, and Stookey successively described partial sections of the dorsal root without intentional damage to the Gasserian ganglion. (The partial section of the dorsal root was performed by Frazier and Stookey through a transtemporal approach, whereas the partial section by Dandy in most instances was carried out through the posterior cranial fossa.) During the past three decades most neurosurgeons using some type of subtotal section of the sensory root have attempted to obtain permanent relief of pain, prevention of corneal ulceration by sparing of the ophthalmic part of the dorsal root and preservation of the motor root. In 1937 Sjögqvist proposed trigeminal tractotomy. His objective was retention of tactile sensation of the face with elimination of pain and temperature. In this procedure section was made in the distal medulla oblongata, severing the spinal tract of the 5th cranial nerve. Although this operation has not enjoyed widespread usage, probably because of higher morbidity and mortality, it none the less attains the objective set forth. In 1952 Taarnhøj published the results following the "decompression" of the dorsal root and ganglion of the trigeminal nerve in patients with major trigeminal neuralgia. Several surgeons have modified this method with variable results.

In the neurosurgical clinic of the Kings County Hospital in Brooklyn, New York, most of the proposed methods of surgical treatment for tic douloureux have been given trials. During the 1930s and early 1940s most patients with tic douloureux were submitted to partial section of the dorsal root. In particular it was noted that section of the lateral two-thirds of the dorsal root resulted in loss of cutaneous sensibilities of the area supplied by the 2nd and 3rd divisions of the trigeminal exclusive of that triangle of skin bounded by lines drawn from the external canthus of the eye to the upper alae nasi thence along the mid-lateral nose to the inner canthus of the eye and then along the mid palpebral fissure to the external canthus (Fig. 2). It was found that if complete loss of cutaneous sensation of all the area supplied by the maxillary division was to be attained it was necessary to divide at least the lateral three-fourths of the dorsal root. In doing so the lateral half of the upper eyelid was made anesthetic and analgesic and frequently the corneal reflex was abolished (Fig. 3). In all events, if the corneal reflex was to be preserved by a "standard" differential section, then the triangle of skin as described retained normal sensibilities. More importantly a "trigger" zone of the clinical syndrome under consideration may be, and

Fig. 2. "Standard" section of lower two-thirds of the dorsal root.