MANAGEMENT OF TRIGEMINAL NEURALGIA

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SYNOPSIS

49 patients with trigeminal neuralgia who did not respond or were intolerant to medical treatment were treated surgically by either radiofrequency gangliolysis or microvascular decompression of the trigeminal root entry zone with satisfactory results. Compression of the root entry zone by arterial loops or veins were noted in all but three patients who had compression by small epidermoid cysts. Microvascular decompression is recommended for the fit patient under 65 years of age. Older or infirm patients are considered more suited for radiofrequency gangliolysis.

INTRODUCTION

Trigeminal neuralgia (synonym: tic douloureux) is a well-known pain syndrome characterised by paroxysms of facial pain, localised to a peripheral area of one or more of the three divisions of the Trigeminal Nerve, and lasting for some seconds only. The pain is severe, even excruciating, and is commonly described as stabbing, cutting, grinding, or tearing in nature. Between the paroxysms there is no pain. As a rule, "trigger zones" are present, most commonly near the eye, the nose, or on the alveolar margins. The slightest stimulus at these points induces a paroxysm. Frequently chewing, swallowing, washing the face, or even the slightest touch provokes a paroxysm of pain. In the typical case, which occurs predominantly in the latter half of life, apart from the pain no neurological disturbance is present. It is different from non-paroxysmal facial pain (i.e. "atypical" trigeminal neuralgia) which does not satisfy the above description and is not covered in this study.

The treatment of choice of trigeminal neuralgia is with Carbamazepine (Tegretol) and/or Phenytoin Sodium (Dilantin). Surgical treatment is reserved for patients who do not respond or are intolerant to these drugs.

In the Department of Neurosurgery, Tan Tock Seng Hospital, surgical procedures have been performed on 49 such patients in a four year period from 1982 to 1986.

PATIENTS AND METHODS

Prior to 1983, the operation most frequently carried out for this condition was percutaneous radiofrequency trigeminal gangliolysis (RFG). Since 1983, the popularity of RFG had waned, and the operation performed most frequently was microvascular decompression of the trigeminal root entry zone (MVD) via a suboccipital craniectomy. Three patients scheduled for microvascular decompression had excision of tumours instead when these were found to be the cause of the trigeminal neuralgia. One patient alone had posterior rhizotomy via the extradural approach via the middle cranial fossa.

Radiofrequency Gangliolysis (RFG) was performed using the technique described by Sweet and Wepsic (1). Preliminary lateral and submento-vertex skull XRays were taken to identify the foramen ovale and adjacent anatomical landmarks. The patient was sedated with Droperidol and Fentanyl so that he lay quietly but readily responded to questions. The insulated cannula with its obturator was introduced into the foramen ovale by the Hartel technique. Local anaesthesic was injected at the point of insertion which is a point 2.5 cm lateral to the oral commissure. To reach the foramen ovale, the surgeon aimed the tip of the cannula to a point 3 cm anterior to the external auditory meatus and in the line of the ipsilateral pupillary centre. When the foramen was penetrated, the obturator was removed and replaced with a temperature monitoring probe. Stimulation was then carried out with impulses of 100 Hz. If the electrode had been placed correctly, the patient reported paraesthesias in the division responsible for pain. If not, the electrode was repositioned. As the electrode depth of penetration was increased, its exposed tip would sequentially encounter the third, second and first sensory rootlets in that order. By this physiological testing we were able, with high degree of reliability, to locate the electrode tip in the proper posterior rootlets of the Trigeminal Nerve prior to making the heat lesion. A lesion was then made with the electrode tip temperature held at 60 C for 60 sec. Sensory testing was then carried out. The goal was hypalgesia or analgesia to pin prick test in the division mediating the pain. Up to three heat lesions were required. At the end of the procedure the corneal reflex was tested. If corneal sensation was impaired, methylcellulose eyedrops were applied four times daily and the patient instructed to look out for eye redness. The patient was discharged the next day.

Microvascular decompression (MVD) of the trigeminal root entry zone was carrierd out according to the method described by Janetta (2). Under general anaesthesia, with the patient in the lateral decubitus position, a short retromastoid scalp incision was made. A small suboccipital craniectomy was performed, exposing the lateral sinus rostrally and the sigmoid sinus laterally. The dura was opened and micro-dissection commenced at this point. Arterial loops found compressing the root entry zone were dissected off the nerve and shredded Teflon placed between the vessel, nerve and brainstem to keep the offending arterial loop away from the neural structures. Veins compressing the nerve were coagulated with bipolar diathermy and divided to prevent recanalization. Tumours were removed as completely as possible. Haemostasis was checked and dural closure carried out, followed by scalp closure.

RESULTS

In 27 cases, compression by an arterial loop or a small vein was noted. In three cases, a cholesteatoma was discovered impinging on the trigeminal root entry zone. The presence of these tumours were undetected preoperatively in two patients who had CT scans. The third patient did not have a CT scan done preoperatively, but her tumour was also very small and it was unlikely that a CT scan would have revealed its presence. After excision of these tumours, it was not possible to determine whether any arterial loops had been pushed against the root entry zone when the tumours were present.

All the patients treated with RFG had excellent pain relief initially. Subsequently two patients had recurrence of severe facial pain. One of them had the recurrence only a few months after the procedure. He was 70 yrs old and refused both MVD and repeat RFG. Posterior rhizotomy via the middle cranial fossa using the Frazier-Spillane procedure was evenutally carried out. He still has pain occasionally but the attacks are now controlled with Carbamazepine. The other was the middle aged women. She had recurrence of facial pain about a year after the RFG. Suboccipital craniectomy was carried out but exploration of the root entry zone revealed a small cholesteatoma. After excision of the cholesteatoma, she has been free from pain. Another 3 patients had recurrence of mild facial pain that were controlled with medication and did not require surgical relief. There were no serious complications and no deaths. Facial analgesia was always present in the offending divisions of the Trigeminal Nerve. The area of analgesia usually grew smaller with time. There were no complaints of anaesthesia dolorosa. Corneal anaesthesia was absent in all cases. This reflected the fact that none of our patients had VI division involvement.

All patients treated by microvascular decompression also had excellent pain relief initially. There has been no recurrence of pain in all the cases treated by MVD. This may be due to the follow-up time being too short. In a few cases, the follow-up time had been only a few months. The length of follow-up is important as recurrences have been reported as late as 16 months post-operatively (3). Facial sensation was usually unimpaired and no hearing impairement has been noted. There was also no serious post-operative complications. Aseptic meningitis was noted in a few patients but settled after a few days.

DISCUSSION

Approximately 70% of the patients suffering from trigeminal neuralgia can attain control of the painful paroxysms with Carbamazepine (Tegretol) and a further 10-15% can be controlled by the addition or substitution of Phenytoin Sodium (Dilantin). However 5-10% of patients on these medications suffer serious side effects like skin rash, leukopenia, thrombocytopaenia, abnormal liver function, cerebellar dysfunction and have to discontinue medical therapy.

Numerous surgical procedures have been used to treat patients who are unresponsive to, or are intolerant of medical therapy. To obtain relief, the trigeminal nerve, ganglion, or tract has been "frozen, boiled, pickled, massaged, resected, decompressed and more recently, even inflated" (4). Current concepts

of surgical treatment for trigeminal neuralgia reflect emerging knowledge about its aetiology and pathogenesis. In most patients, as Walter Dandy had postulated, it is associated with arterial or venous compression, strategically located at the junction of the nerve with the pons (root entry zone) where central myelin merges into peripheral myelin. This leads to localised demyelination and altered physiology within the trigeminal system. The exact changes are probably complex and not fully known at present, but include "neural short-circuiting" or ephaptic transmission.

Other causes of pain resembling trigeminal neuralgia have been noted. Cerebello-pontinue angle tumours can result in neural compression directly or can displace vessels across the nerve. Removal of the tumours, where feasible, may cure the neuralgia and also pervent other symptoms due to further tumour growth and resultant neural compression. In 1—2% of patients with multiple sclerosis, demyelination with plaque formation at the root entry zone results in trigeminal neuralgia.

The number of patients treated in this study by either percutaneous radiofrequency rhizotomy or microvascular decompression of the Trigeminal Nerve root entry zone is too small for statistical study, but there is no doubt that MVD is the ideal procedure for treatment of trigeminal neuralgia in patients below the age of 65 yrs and in good health. It treats the cause of the neuralgia, allows removal of small tumours that might have been missed by CT Scanning, has a lower incidence of recurrence (see Table 3) and causes little, if any, facial numbness and corneal anaesthesia. Although in this small series we have not had any problems or mortality, we must always keep in mind that trigeminal neuralgia is a benign disease and that death and serious complications have occurred even in the hands of competent and experienced neurosurgeons performing this procedure. Burchiel's report (11) revealed that there is a 2% chance of serious morbidity, a 2% chance of death, a 14% chance that the Trigeminal Nerve may have to be partially sectioned, creating numbness in the face, and a 10 to 14% chance that a second major intracranial procedure will be required before the pain is relieved. Other complications reported (5,6) include permanent hearing loss, temporary cerebellar ataxia, temporary facial palsy and temporary, trochlear nerve palsy. Operative risks appear higher in the older age group (3). These potential risks make it imperative that the procedure should be offered only if medical treatment with Carbamazepine and/or Phenytoin Sodium has failed.

Moreover, there are some patients who are not candidates for microvascular decompression and others who are reluctant to undergo "brain surgery" if it can be avoided. The former group includes: age > 65 yrs, multiple sclerosis, unresectable intracranial mass, medical infirmity. Percutaneous radiofrequency gangliolysis can produce good results for these people. There is a recurrence rate at 5—10 yrs of around 30%. Full patient cooperation is required for correct electrode placement. However, this technique is advantageous because it is a minor surgical procedure not requiring craniectomy or general anaesthesia, the resulting numbness produced in the face is usualy not a problem, the procedure is easily repeatable if pain recurs, and there is minimal associated morbidity and essentially no risk of mortality. It is also much less expensive. A more recent development involves percutaneous injection of Glycerol into the Gasserian cistern, also under radiological control. Patient cooperation is not essential and the incidencce of anaesthesia dolorosa and other complications are less. This procedure has not been carried out in our Department yet for want of a suitable patient.

Trigeminal neuralgia that is not amenable to medical treatment can therefore be successfully treated surgically. The choice of surgical procedure should only be made after taking into consideration the patient's age, associated condition, general health, state of facial sensation, acceptance of associated risk and response to prior surgical procedures.

TABLE 1

Surgical Procedure	No. of Patients
Radiofrequency Gangliolysis	18
Microvascular Decompression	27
Excision of C-P angle tumour	3
Open rhizotomy	1

TABLE 2

Cause of compression	No. of Patients
Arterial loops/veins	27
Epidermoid cysts	3
No lesion found	0

TABLE 3

Technique	Series	Excellent Relief (%)
MVD	Janetta (7)	83.8
	Apfelbaum (8)	85.0
	Barba, Alksne (9)	73.0
	Van Loveren et al (10)	84.0
	Burchiel et al (11)	83.0
RFG	Sweet (12)	72
	Van Loveren et al (10)	61
	Nugent (13)	77

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