

THE USE OF PHENOL AND MYODIL IN THE TREATMENT OF TRIGEMINAL NEURALGIA AND ATYPICAL FACE PAIN

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When all symptomatic causes for face pain have been eliminated a group remains in which the pathological process is unknown but in which the pain apparently arises within the nerve. Of this group tic douloureux is one definite subgroup while the remainder are usually classified as atypical trigeminal neuralgia or atypical face pain. Their surgical treatment has presented many problems, not the least of which has been the proper selection of cases suitable for operation. Although most can be relieved by section of the Vth nerve, the resulting corneal anaesthesia presents at least a theoretical disadvantage. Usually this numbness of the cornea is unimportant because sensation remains intact on the other side, though occasionally conjunctivitis or even corneal ulceration may occur. If the motor root is cut unilateral weakness of the muscles of mastication occurs. These complications are rare, however, and in the vast majority of cases section or injection of the Vth nerve provides relief from pain with minimal disability.

A major problem arises when the pain reappears on the other side; then, should surgical intervention become necessary a procedure must be chosen that will relieve the pain without damaging touch fibres, so that corneal anaesthesia is avoided. In true trigeminal neuralgia various procedures have been advocated as alternatives to section of the nerve. These include decompression of the gasserian ganglion by incision of the dura mater overlying Meckel's cave (Taarnhoj^{1, 2}), or mere traumatization of the ganglion by pressure (Stender³), or section of the descending tract of the Vth nerve at the medullocervical junction (Sjoquist⁴). These procedures can be offered to patients in whom a second side has become involved, but the results are only fair (Schurmann⁵) and for this reason they have not supplanted section of the nerve as a primary procedure. Thus cases with bilateral face pain still constitute a serious problem.

A solution of phenol in myodil of a concentration

between 1 in 20 and 1 in 15 has been used by Maher⁶ and Nathan and Scott⁷ and others to relieve the pain originating in spinal nerves without producing overt neurological deficit, but the results are inconstant. For example, Mark *et al.*⁸ report a series of cases in which concentrations varying between 1/13 and 1/10 have been used. Some of their patients in whom lower concentrations were used suffered mild complications (weakness, paraesthesiae) while some with higher concentrations escaped. Occasionally the relief from pain was short-lived. In my experience a solution of 1/12 is the most satisfactory; concentrations above this are liable to produce anaesthesia while those below produce indifferent, unpredictable and frequently short-lasting results.

In spinal work the solution is injected into the subarachnoid space and allowed to bathe the affected nerve roots for about 30 minutes by careful positioning of the patients. After this time the phenol is 'fixed' and no further nerve-root destruction occurs if the oil should move elsewhere. This technique was felt to have a place in the treatment of face pain in the hope that corneal sensation and motor power would remain intact while the pain was relieved. The problem is to deliver the phenol and myodil to the Vth nerve in such a way that it bathes the nerve as closely as possible without dilution by cerebrospinal fluid or the interposition of other tissues.

Operative Technique

The Vth nerve can be bathed with phenol and myodil by introducing the solution into Meckel's cave and allowing it to lie in the little sleeve surrounding the nerve. In this series it has been injected under direct vision through the posterior fossa as in Dandy's operation for section of the Vth nerve. This route was chosen in preference to injection through the foramen ovale because dilution with cerebrospinal fluid and the interposition of other tissues such as arachnoid or dura mater can be avoided.

The patient is placed face down with the head slightly turned to bring Meckel's cave as nearly as possible into the vertical position. The posterior fossa is opened through an oblique lateral skin incision and a small craniectomy. The cerebellum is retracted medially; the VIIth and VIIIth cranial nerves, the internal auditory artery, and the petrosal vein are bypassed; and the Vth nerve is exposed as it enters Meckel's cave. The structures beyond are packed off with small cotton pledgelets and with a curved blunt needle about 0.5 ml. of phenol and myodil are introduced into Meckel's cave and allowed to remain in contact with the nerve for at least 30 minutes. In two cases the phenol and myodil was changed after 15 minutes, but this does not appear to have affected the results. It is unnecessary to remove the solution, for the phenol rapidly becomes 'fixed', and the incision may be closed as soon as a satisfactory injection has been achieved.

Results

This procedure has now been performed on 8 patients.

The first patient subjected to this technique required three procedures before relief was obtained. The case illustrates the variable results obtained by different concentrations of phenol. This patient had had a section of the Vth nerve elsewhere many years before, but the pain had reappeared on the other side. The first injection was performed through the posterior fossa with 1/15 phenol in myodil, but the relief lasted only three months. The corneal reflex was unaffected. The pain returned and repetition of the same operation was attempted, but access to the posterior fossa was denied by adhesions resulting from the previous operation. A lumbar-puncture needle was introduced into Meckel's cave through the foramen ovale and a free flow of CSF was obtained; then with the patient in the face-down position 0.5 ml. of 1/15 phenol and myodil was injected, and he remained supine for 45 minutes. He retained his sensation of light touch and his corneal reflex, but was free of pain for only one month. A third procedure was undertaken, Meckel's cave being entered through the middle fossa by incising the tentorium cerebelli, and on this occasion 1/10 phenol in myodil was used. When last seen 14 months after the last operation the patient was free of pain and his corneal reflex was present.

In 4 other cases, varying in age from 32 to 72 years, immediate and lasting relief was obtained with 1/12 phenol in myodil for follow-up periods of 19 months, 14 months, 10 months, and 9 months. A sixth patient has suffered a recurrence of pain 9 months after operation and some further therapy may be necessary. The corneal reflex remained intact in every case except one, in which it was lost. Complications in these 6 cases were anaesthesia and mild paraesthesiae of the face with loss of the corneal reflex in one, and mild paraesthesiae of the face in another. An avoidable technical error produced a partial deafness in one patient resulting from the accidental severance of an aberrant internal auditory artery.

All these patients suffered from severe, persistent and disabling pains before their operation, for which medical therapy had proved unavailing.

There were two failures. In one of them the operation had to be abandoned because adhesions resulting from a section of the Vth nerve many years before had obliterated

Meckel's cave and the subarachnoid space around (a previous operation also made one of the successful cases very difficult). The eighth case was a total failure though a successful injection was obtained. This patient suffered from disseminated sclerosis, with severe face pain believed to be of thalamic origin. The Vth nerve had been sectioned at the ganglion elsewhere without success. A stereotaxic thalamic procedure was contemplated, but it was decided once again to attack the Vth nerve itself. The patient gained no relief from the procedure, and this must be attributed to poor case selection.

In summary, therefore, there have been 8 patients operated upon, 4 of whom have completely successful results to date, while a fifth has relief from pain but loss of the corneal reflex. There is one current relapse and two failures. There have, however, been 10 operations or injections, one patient requiring three procedures, two of which were followed by relapse before lasting relief was obtained. These relapses were associated with the use of 1/15 phenol in myodil, and when the concentration was increased to 1/10 on the third occasion a successful result ensued. 1/12 phenol in myodil solution was used in the other cases.

DISCUSSION

While it is too early to state that this procedure provides an answer to bilateral or even unilateral face pain, there is reason to hope that it may. It remains to be seen whether the relief so far obtained is permanent.

The injection could be performed through the foramen ovale. The reason why I chose the approach through the posterior fossa is that one cannot be certain of entering the subarachnoid space of Meckel's cave with a needle introduced by the former route, and the interposition of tissue between the nerve and the medicament affects the results. In my experience extradural and subdural injections in the spinal region have a much lower success rate than those into the subarachnoid space, presumably because intervening tissue prevents access of the phenol to the nerve. Injections performed through the foramen ovale would therefore be expected to have both a lower success rate and a lower complication rate (as measured by numbness, for example) than injection through the posterior fossa under direct vision. In point of fact this is only partially so. Jefferson⁹ has recently reported a series of 32 cases so treated, with a follow-up average of 13 months. In only half of his cases did he obtain a flow of cerebrospinal fluid to show him he was in the subarachnoid space; in the remaining cases he was presumably close by the cave but not inside it. In several of his cases there has been a recurrence of pain, while 8 patients (25%) have had a considerable sensory loss to the extent that they have required a protective side-shield fitted to their glasses. 14 others have had a moderately severe sensory loss though with a preserved corneal reflex. Yet theoretically the procedure is designed to avoid this; and with the posterior route none have lost their corneal reflexes.

Comparing the two methods it is clear that, although at present the mortality in both series is zero, it is bound to be greater in the long run in any series involving a surgical procedure of any magnitude. The approach through the posterior fossa will only be justifiable if experience shows that it provides at least as good a chance of relief as that

through the foramen ovale, with fewer complications. This remains to be seen, but I am certainly surprised that there has been such a high rate of corneal and facial anaesthesia in the foramen-ovale series when experience would suggest that the protection afforded by the dura mater and the arachnoid in 50% of those cases (those where no CSF was obtained) would have tended towards preservation of these functions. Jefferson⁹ used 1/20 phenol in glycerine while I used 1/12 phenol in myodil, and so the difference in the results is not explicable by difference in concentration nor is it likely that glycerine used as a solvent instead of myodil could play any part; rather, one wonders whether the mechanical effects of the needle point could be an important factor. In any event, whatever the cause, such a high proportion of corneal reflexes lost would appear to weigh against the foramen-ovale route if it is to be used in patients suffering from bilateral pain. Clearly further experience with both methods is required before they can be fully evaluated.

It has been postulated that the phenol attacks the smaller fibres before the larger ones and that this gives it its selective action. Stewart and Lourie,¹⁰ however, have found that histologically all nerve fibres appear equally affected by the phenol and that there is no differential effect between those of pain and those of touch or motor power. Thus, in a section taken from the lumbosacral cord of an animal after phenol and myodil had been injected into the subarachnoid space, evidence of degeneration in fibres of all sizes was present and yet in the same section there were intact small and large fibres adjacent to the degenerated fibres. Factors other than size of fibres must therefore play an important part in the selectivity of phenol used clinically and, while its mode of action is obscure (and indeed, its therapeutic effect even has been called in question—Eisenhardt¹¹) there is little doubt in my mind that, whatever the mechanism, phenol and myodil can produce relief of pain without overt neurological change.

A considerable number of patients suffering from 'atypical face pain' have an underlying psychogenic cause for their condition. No greater mistake can be made than to subject these patients to Vth nerve section, because the pain will sooner or later pass to the other side. In

consequence there are a number of patients in whom no clear-cut psychiatric basis for their pain can be elicited yet whom one is reluctant to subject to operation or injection for fear of a spread of the pain elsewhere. If the treatment here described can be made to provide relief from pain without neurological deficit, the indications for operation can be extended to include this doubtful group with safety, and thus offer a chance of relief otherwise denied them.

SUMMARY

A technique for the treatment of trigeminal neuralgia and allied face pains is described, using a 1 in 12 solution of phenol in myodil. This is injected into Meckel's cave under direct vision. It is compared to a similar method described by Jefferson⁹ in which phenol and glycerine is injected through the foramen ovale.

Ten procedures have been performed on 8 patients, in all of whom except the first 1/12 phenol in myodil was used. Five patients have been completely relieved of their symptoms to date for periods varying from 19 months to 9 months. One of these 5 patients (the first to be submitted to the procedure) required three procedures before lasting relief was obtained. In this case the first two procedures were performed with 1/15 phenol in myodil, and lasting relief was obtained only after the third procedure, when the strength was increased to 1/10. A sixth patient has relapsed after 9 months. The remaining 2 cases were failures. In one of these, in which the operation had to be abandoned and no injection was made, the patient made no improvement; and in the other, in which a successful injection was obtained but no improvement resulted, it is very doubtful that the patient was suffering from true trigeminal pain.

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