INTRATHECAL PHENOL BLOCK IN TREATMENT OF INTRACTABLE PAIN OF MALIGNANT DISEASE*

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INTRACTABLE PAIN may be due to many causes other than malignant disease, but undoubtedly the largest single group is due to malignancy.

The relief of intractable pain due to malignant disease has generally been neglected, because these patients usually have fatal disease, and there has been a tendency simply to use narcotics in an endeavour to make their lives more tolerable. Patients treated in this way are incapacitated for their remaining days by pain and drug depression. A more reasonable approach to the problem is to endeavour to control the pain in a manner which will permit these patients to enjoy the fullest possible life compatible with the disability imposed by the disease. This is a fertile field for cultivation by the anaesthetist.

Pain associated with malignant disease may be produced by several mechanisms. Direct infiltration of tissues by the tumour involves peripheral nerves, and produces local pain. Chronic inflammatory reaction about an enlarging tumour may also be a causative factor. A common cause of pain is root pressure produced by vertebral metastases. Spinal nerve roots and peripheral nerves may be directly infiltrated, and peripheral nerves may be involved in the process of scarring following radiation therapy. These causes of pain are such that relief by the destruction of individual peripheral nerves can seldom be satisfactory, and treatment can only be successful when directed to the nerve roots or the pathways for pain within the central nervous system.

The ideal in treatment would be achieved if it were possible to destroy those fibres serving pain sensation, and to leave intact all other sensory fibres. This is the philosophy of the selective tractotomy which the neurosurgeon endeavours to obtain in such cases, and of thalamotomy. To the present time we have no chemical substance which can be guaranteed to produce this situation, although experience suggests that phenol in certain concentrations and applied by the techniques which we shall describe may at times produce this ideal situation.

The use of the injection of neurolytic agents to obliterate intractable pain was first suggested by Dogliotti in 1931, when he advocated the use of absolute alcohol for this purpose. While this technique has been widely used and with varying success, the use of alcohol destroys all sensation in the segments treated and by irritation of neighbouring roots may produce severe pain from alcohol neuritis. In 1955 Maher¹ reported the successful use of solutions of phenol injected into the spinal fluid for the relief of pain in patients suffering from carcinoma, and described this technique as sparing other sensation and motor function in

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the segments treated. Subsequent reports by Nathan,^{4,7} Brown,⁹ and others have established the usefulness of this technique.

It should be emphasized that both phenol and alcohol will destroy all nervous tissue, so that technical features of the treatment assume great importance when these substances are used for the relief of intractable pain. Regardless of care and technique, the injection of either phenol or alcohol into the subarachnoid space produces patchy degeneration in the spinal cord, degeneration of some motor fibres, and arachnoiditis, which may result eventually in vascular lesions of the cord and paraplegia. These factors must always be kept in mind in arriving at a decision to use this form of therapy for the relief of intractable pain.

SELECTION OF PATIENTS

In selecting patients for treatment, the risks entailed must always be weighed against the anticipated benefits. It is still impossible to destroy conduction of pain without, at the same time, destroying some other afferent fibres. Destruction of the sensory component of the sacral nerve roots results in loss of control of bladder and bowel, and the situation must indeed be desperate before one may feel justified in exchanging discomfort for incontinence.

Not infrequently one is importuned to abolish pain by the use of neurolytic techniques when much less dangerous methods will, for the time, suffice. In selecting patients for such treatment it is wise to consider what other methods may serve to control the pain with less danger to the patient. The objective must be not only to relieve pain, but to maintain the activity of a normal life for as long as may be possible.

If pain can be controlled by minimal sedation, without incapacity produced either by the pain or the narcotic, the patient should not be exposed to the hazards of neurolytic block. In these circumstances one must be most careful in dealing with the patient. Too frequently the anaesthetist has been introduced as the person who will relieve all the pain. Under these circumstances flatly to refuse assistance is a callous and unjustified disappointment. The problem must be discussed with the patient with whatever degree of frankness may be possible within the framework of the individual's insight and emotional response to the problem, and the decision to postpone drastic treatment should appear to be a mutual one, reached with the reassuring understanding that something more may be done if the situation becomes desperate.

The anaesthetist must remember, too, that very frequent pain may be relieved by palliative radiation to reduce the size of a tumour. Where such treatment is being or may be undertaken, time should be allowed for it to succeed before employing more heroic methods.

This conservative approach to treatment of intractable pain by neurolytic agents does not mean that we would reserve such treatment for the moribund terminal state. On the contrary, it is most valuable where a patient who is incapacitated by pain may be returned to an active useful life by its abolition. There are, of course, circumstances where the disease itself has already produced as much damage as might ever be produced by neurolytic block, when one need

be concerned only with the comfort of the patient. In other cases, the pain is so intolerable that any probable complication may be cheerfully accepted.

Over the past three years we have made an effort to evaluate the use of intrathecal phenol blocks for the treatment of intractable pain associated with neoplastic disease. During this time we have treated 37 patients in the Princess Margaret Hospital (Ontario Cancer Institute) and in the Toronto General Hospital (Table I). The small number of patients treated in this manner reflects

TABLE I
37 PATIENTS TREATED (Jan. 1960 to Apr. 1963)
Ages 23 years to 71 years
Female 30; male 7

Number of subarachnoid phenol blocks	55
Died since treatment	15

TABLE II
SITES OF PRIMARY LESION

(a) Genito-urinary	
Cervix	20
Kidney	1
Testis	1
Ovary	2
Uterus	1
Urinary bladder	1
(b) Gastro-intestinal	
Stomach	3
Colon	1
Rectum	3
(c) Hodgkin's disease	1
(d) Pulmonary	1
(e) Breast	1
(f) Unknown	1

the conservative attitude of all concerned in their treatment, but it is of interest to note that confidence in its application is growing, since 12 of these patients were treated in the period from January 1, 1960, to March 31, 1962, and 25 in the subsequent twelve months.

Eleven of these patients had more than one block at the same admission, either for bilateral pain or for pain at a different site. Six patients returned for a further block after periods of relief varying from five weeks to five and one half months. Of the seventeen repeated blocks, ten were for pain at the same site, while seven were done for pain arising at a different site. The primary site of the lesion is of some interest. The great preponderance of patients with carcinoma of the cervix reflects the tendency of metastatic spread of this disease to involve the lumbosacral plexus, and, perhaps, the fact that these patients survive rather longer than some others (Table II). Our results have been most encouraging. Nineteen of these patients (51.3%) had complete relief of pain till death, or for a minimum of one month, at the last follow-up. Six of these returned for further treatment when pain recurred. Eleven patients (29.7%) had moderate relief with reduction of sedation, or good relief which lasted less than one month. Two

(5.4%) were improved, though relief was incomplete, while the remaining five patients (13.6%) had no relief following the block. Fifteen have died since treatment (Table III).

TABLE III
RELIEF OF PAIN WITH TREATMENT

I Complete.	19
II Moderate to good	11
III Incomplete (improved)	2
IV None	5

COMPLICATIONS

1. *Temporary* (23 cases recorded, see Table IV)

The complications occurring immediately following phenol block have been recorded in only 23 of the 37 cases under review. Three patients had transient difficulty in micturition. Transient weakness of the lower extremity on the blocked side occurred in all patients who had phenol injected in the lumbar area. This occurred in 18 patients, produced no great disability, and lasted for only one to two days. One patient had intense hyperaesthesia and an exacerbation of pain for several hours after injection of the phenol, before the pain was completely relieved. One patient complained of severe headache, which disappeared completely on the day following the block.

TABLE IV
TEMPORARY COMPLICATIONS (23 cases)

(a) Transient weakness of lower limb	18
(b) Difficulty in micturition	3
(c) Hyperaesthesia	1
(d) Severe headache	1

2. *Permanent* (Table V)

Since the objective of treatment is to relieve pain without disturbance of other sensation and without motor change, all changes other than pain relief have been listed as complications.

TABLE V
PERMANENT COMPLICATIONS

(a) Sensory	
Numbness	8
Paraesthesia	1
(b) Motor weakness	7
(c) Loss of control of bladder and bowel	4

(a) *Sensory changes.* Eight patients had decreased sensation to pin prick in the dermatomes involved and one had persistent paraesthesia which was not painful.

(b) *Motor changes.* Seven patients had demonstrable weakness of muscles of the lower extremity, without significant disability.

(c) *Loss of bladder or bowel control.* Four patients of the 37 treated required indwelling catheters.

The wisdom of making an adequate neurological assessment of the patient before proceeding to treatment is emphasized by the fact that two other patients had lost control of bladder and bowel function before treatment, while one had a paretic leg.

We have met three patients in whom attempts at intrathecal phenol block were thwarted by inability to locate spinal fluid in the lumbar region. All three had massive involvement of the vertebral column in metastatic malignant disease. In two of these, tumour was actually aspirated through the spinal needle. One of these patients developed paralysis to the level of the mid-thoracic region within seven days of the unsuccessful attempt at lumbar puncture, and had extensive extradural tumour. We were grateful that we had not been able to inject the phenol in this case, since undoubtedly it would have been assigned some blame for this complication.

Of our failures, one patient with Hodgkin's disease who had no relief after two blocks was relieved of his pain by decompression of his spinal canal by laminectomy. A second patient finally had a spinal-thalamic tractotomy with good results.

One patient who had moderate relief from phenol block was submitted to cordotomy. He was cured of his pain, but became paraplegic postoperatively.

TECHNIQUES

Three of the intrathecal phenol blocks under review were done with a solution of phenol 7.5 per cent in Ethidon, and 52 with a solution of phenol 5 per cent in glycerin. The solution of phenol in Ethidon has no virtue except that of radiological demonstration of the distribution of the solution. It has the disadvantage of adding another irritating substance, which may itself produce arachnoiditis, and which should therefore be removed from the subdural space.

Brown⁹ has stressed that the phenol should be dissolved in completely dehydrated glycerin. We have found a solution of 5 per cent phenol in 95 per cent glycerin to be quite satisfactory. We have arranged for this solution to be provided in ampoules containing 1 cc. It appears that this solution in ampoules may be stored indefinitely without deterioration.

SITES OF INJECTION (TABLE VI).

Sites of injection are of some importance in relation to the complications. All our complications have occurred in injections in the lumbar region. Injections here are designed to influence the roots of the lumbosacral plexus.

TABLE VI
SITES OF INJECTION

Lumbar	39
Lower thoracic	10
Mid-thoracic	5
Upper thoracic	1

TECHNIQUE OF PHENOL BLOCK

Injection of the phenol solution should be made in the region of the segments involved in the pain. Experience dictates that where the involved area covers more than three segments, additional injection sites must be used. Since the solution of phenol in glycerin is hyperbaric, and since gravity is employed to bring the solution into contact with the nerve roots, only one side may be treated at a single injection.

The patient is positioned with the painful side down, on an operating table which may be broken so that the area to be treated is, as far as possible, the lowest point in the arc of the spine. The needle must be inserted in such a way as to ensure a free flow of spinal fluid. The patient is then rotated posteriorly towards the operator to an angle of about 30° with the vertical and injection of the phenol solution in glycerin is made slowly in increments of 0.3 c.c. Injection is followed very quickly by a warm sensation or minimal paraesthesia in the distribution of the roots affected, and this is followed rapidly by anaesthesia of these roots. A waiting period of 3 to 5 minutes between increments of solution will make it possible to determine the distribution of the effect. At the end of this waiting period an additional increment should be injected. Our maximum amount of solution has been 1 c.c. The patient is then maintained in position for 30 minutes, and returned to bed with the head flat in the supine position. We have directed all patients to remain flat in bed for a period of 12 hours, although not necessarily supine, in an endeavour to avoid post-lumbar-puncture headache.

SUMMARY

We have reviewed the use of intrathecal phenol block for the relief of intractable pain in 37 patients suffering from malignant neoplastic disease. Nineteen (51.3%) of these patients received complete relief of pain, until death or for a period exceeding one month. An additional eleven patients (29.7%) had moderate to good relief with reduction of sedative, or complete relief which lasted less than one month. Two patients (5.4%) were improved although relief of pain was incomplete. Five patients (13.6%) had no relief. The only serious complication was incontinence, which occurred in four patients who had blocks of sacral nerve roots and required indwelling catheters (10.8%).

We have found intrathecal phenol block using the technique which we have described to be a useful and simple method for the control of intractable pain in malignant disease, with an incidence of complications which is acceptable under the circumstances in which it is applied.

RÉSUMÉ

Nous avons fait une revue de la littérature sur l'usage du phénol en injection intrarachidienne pour le traitement des douleurs incoercibles chez 37 malades souffrant de maladie néoplasique maligne. Dix-neuf, de ces malades, soit 51.3 pour cent, ont senti leurs douleurs disparaître jusqu'à leur mort ou pour une

période dépassant un mois. Onze autres malades, soit 29.7 pour cent ont éprouvé un soulagement allant de modéré à complet avec une diminution de la sédation, ou un soulagement qui a duré moins d'un mois. Deux malades, soit 5.4 pour cent, ont été améliorés, mais le soulagement de la douleur a été incomplet; 5 malades, soit 13.6 pour cent, n'ont éprouvé aucun soulagement. L'unique complication sérieuse a été l'incontinence qui est survenue chez trois malades à qui on avait bloqué les racines sacrées et qui ont dû garder une sonde à demeure (10.8%).

En employant la technique que nous avons décrite, nous considérons que le blocage au phénol intrarachidien est une méthode simple et utile pour traiter les douleurs incoercibles des maladies malignes; dans les circonstances où ces traitements son donnés, nous sommes d'avis que la fréquence des complications est acceptable.

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