SALINE FRONTAL LOBOTOMY FOR THE RELIEF OF PAIN

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FEW PROBLEMS confronting the physician are more distressing than the patient with painful cancer. The suffering patient, his desperate family, and the responsible physician call upon the neurosurgeon for some means of relief from the devastating effects of chronic pain. After an evaluation of the patient, the disease, and the pain, the most suitable means of accomplishing this end must be individualized, namely, relief of pain with minimal sacrifice of essential function, time, and money. Saline frontal lobotomy is a valuable procedure in certain circumstances, and the purpose of this paper is to delineate our indications for this procedure.

THE PROBLEM

In evaluating problems relating to pain, prerequisite knowledge must be obtained regarding: (1) location of the pain and sites likely to be painful in the future; (2) general condition of the patient; (3) probable life expectancy of the patient; (4) potential for rehabilitation in the home or community; (5) psychological adjustment of the patient to his disease; and (6) basis for and intensity of the pain.

Unless major sensory nerves are involved, cancer patients ordinarily do not have severe pain. Rather, it is the tenacious persistency of the pain that drains their physical and emotional reserves. In many instances, the low intensity of the pain and the brief projected life expectancy warrant nothing more than analgesic medication. However, before yielding to the prospect of narcotic addiction, consideration must be given to the intellectual and social blunting unavoidably produced by these drugs in the increasingly larger doses required by a patient over protracted periods of time. In cases in which the pain is favorably localized for nerve blocks, such measures may give the desired temporary relief during the final weeks or months of life. For some patients, a surgical procedure is the optimal solution.

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TABLE 1

INDICATIONS FOR SALINE LOBOTOMY IN 16 PATIENTS

Indication	No. patients
Anatomic	12
Poor risk	12
Life expectancy <3 mo.	12
Unrelieved by narcotics	8
Psychiatric-psychological	5
Objectionable lesion	4
Addiction to drugs	5

To be considered for chordotomy or sensory rhizotomy, the patient should have a reasonable life expectancy of 3 months or longer. Furthermore, the patient's physical reserve must be adequate for him to undergo a major operative procedure of 2 to 3 hours' duration. Drug addiction or dependence, in our experience, lessens the patient's chance for satisfactory relief of pain. In patients with agitation or marked depression as a reaction to the disease, a satisfactory result often is not achieved, i.e., complete freedom from pain or a residual pain that can be relieved by oral medication. An overt emotional problem in the patient experiencing chronic pain is commonly associated with drug addiction, and both conditions markedly reduce the effectiveness of a technically successful chordotomy or rhizotomy.[9] It should be noted, however, that, in the large chordotomy series reported by Diemath, Heppner, and Walker,[2] there was no appreciable difference in benefit between the addicted and nonaddicted patients.

The efficacy of these procedures is further restricted by the anatomic regions in which pain relief can be accomplished. Thoracic chordotomy is unreliable for pain above the umbilicus, and high cervical chordotomy does not consistently result in analgesia above the upper thorax. Nevertheless, thoracic chordotomy is the best of the operations for the relief of pain, being ideally suited for painful pelvic cancers.

Sensory rhizotomy is effective for unilateral scalp and face, upper cervical, or chest wall pain. Bilateral denervation of the scalp is acceptable, but bilateral face, tongue, and pharyngeal sensory denervation is not tolerated. Upper cervical (C-1 to C-4) and thoracic

(T-2 to T-12) sensory rhizotomy can be performed bilaterally. Rhizotomy below L-1 interferes with the function of the lower extremities or sphincter control and is very rarely justifiable.

There remains a significant number of patients who cannot be managed by any one of these means. It is to this group that saline lobotomy is applicable.

FRONTAL LOBOTOMY (OR LEUKOTOMY)

Indications for Saline Lobotomy. One or more features may qualify a given patient for saline lobotomy: (1) pain outside the anatomic restrictions of chordotomy or rhizotomy, single or multiple sites; (2) a life expectancy of less than 3 months; (3) profound emotional reaction, agitation or depression, with or without drug addiction; (4) medical contraindication to a major surgical procedure; (5) severe pain inadequately relieved by narcotics; (6) preoccupation with the fear of impending death secondary to suffocation, hemorrhage, or starvation; and (7) necrotic, malodorous, or disfiguring lesions that have led to withdrawal from social intercourse with family and friends.

In the present series, most patients were found to have 2 or more indications for saline lobotomy (Table 1), the more frequent being short life expectancy, poor general condition, and multiple or inaccessible sites of pain.

Type of Procedure. Conventional prefrontal lobotomy affects all types of pain to some extent and therefore has no topographic limitations. While there is general agreement that leukotomy does not alter the patient's ability to perceive pain, the procedure does alter the psychological reaction to the perceived pain.[3] According to Scarff,[8] lobotomy interposes a relative barrier between pain reception and pain perception at the level of consciousness.

Standard leukotomy, or lobotomy, has been criticized by Lewin,[5] White, Sweet, and Hackett,[9] and Grantham.[4] The objectionable effect of the more extensive operations is dissolution of the personality. Ideally, the change in personality should be solely beneficial, the patient becoming less sensitive to pain without being any less sensitive to his social environment.[3] The undesirable effects of standard leukotomy are: inability to profit by experience, reduction in restraint, appearance of such features as selfishness and tactlessness,[5] facetiousness, and intellectual and moral deterioration.

Selective leukotomy has been proposed as a means of obtaining satisfactory amelioration of pain with maintenance or minimal alteration of intellect and personality structure. The more extensive operations tend to achieve greater relief from pain but also are more likely to produce socially crippling defects of personality.[3] Grantham[4] selected the lower medial quadrant of the frontal white matter rostral to the lateral ventricle for limited leukotomy using electrocoagulation. Scarff[8] used a sucker tip to interrupt these frontal fiber tracts.

White, Sweet, and Hackett[9] developed a new method of electrodestructive leukotomy in which electrodes were implanted and withdrawn in stages over a period of several weeks. The rationale of incremental leukotomy is based on the great variation in the extent of leukotomy required for relief of pain among individual patients. These authors concluded from their experience that "... it is not safe to cut corners and attempt to make sufficiently extensive lesions in both frontal lobes to relieve pain at one, or even two, sessions." With implanted electrodes they were able to increase the size of the lesion while the patient remained under observation, thereby hoping to produce a minimal but adequate leukotomy effect. They considered that 16 of their 19 patients were satisfactorily relieved of pain.

In 1958, Bridges and Liss[1] reported their experience with saline lobotomy. With little modification we have adopted their method. There are several advantages in this type of lobotomy:

1. The procedure requires only the making of 2 burr holes and is well tolerated with the use of local anesthesia.
2. The equipment needed is simple and readily available.
3. Radiological control is unnecessary.
4. The frontal lesions can be enlarged by reinjection in the patient's room.
5. Any saline escaping from the intended site of injection is innocuous.
6. The procedure is safe and can be completed in 30 to 45 minutes.

Surgical Technique. A limited amount of hair need be shaved over the frontal scalp. Through bilateral, coronally oriented incisions, burr holes are made 3 cm. from the mid-line just in front of the coronal suture. After the dura is opened and the cortex coagulated, a ventricular cannula is directed into the tip of the frontal horn. A blunt 20-gauge

spinal needle is then directed in a coronal plane passing to the outer canthus and in a sagittal plane parallel to the falx cerebri. The needle should pass 1 cm. rostral to the tip of the lateral ventricle, the exact location of which has been established with the ventricular cannula.

The roof of the orbit normally lies 8 or 9 cm. from the exposed cortex. The needle is passed to a depth of 6 cm. from the cortical surface, and normal saline at body temperature is injected at 6-, 4-, and 2-cm. depths. This is done bilaterally. Although Bridges and Liss[1] injected 15 cc., initially we injected 9 to 10 cc. on each side. For later injections the needle is directed more medially, and the deepest injection is made at 8 cm. to allow for the thickness of scalp and bone.

PRESENT SERIES

During the past 2 years, 16 patients have been considered suitable for bilateral saline lobotomy, 11 at the Veterans Administration Hospital and 5 at the Charity Hospital of Louisiana in New Orleans.

Selection. Indications for saline lobotomy have been given previously. To our surprise, the estimation of life expectancy was regularly accurate. Twelve patients were selected for the procedure because their projected life expectancy was less than 3 months. The longest period of survival in this group was 72 days; the shortest, 3 days; and the average, about 6 weeks. Of the 4 patients with an estimated life expectancy beyond 3 months, 1 died 7 months postoperatively, 2 are living beyond the 3-month period, and 1 patient has been operated upon within the past 2 months.

Reinjection. Eight, or one-half, of the patients were reinjected 1 or more times, and an additional patient refused a second injection. Of this number, 6 received a second reinjection and 2 were reinjected a third time. Several interesting features became apparent on studying the pattern of reinjections.

1. The interval between the initial injection and reinjection ranged from 3 to 114 days (average, 30 days).

2. The interval between the second and third injections was 5 and 16 days in the 2 patients on whom this was necessary.

3. The necessity for a second injection was unrelated to the length of survival, to the severity of the original pain, or to any other obvious factors.

4. The only objectionable frontal lobotomy effect in this series was seen on the third injection in a patient injected 45 and 50 days after the initial procedure.

The majority of reinjections were carried out in the treatment room or at the bedside. Two long term survivors have been reinjected in the outpatient clinics. It has been a simple matter to insert a spinal needle through the surgically prepared scalp.

RESULTS

In order to appraise the effects of saline lobotomy objectively the following information was obtained: (1) the patient's subjective evaluation of his pain; (2) independent opinion of the family or friends in attendance; (3) nursing data for matters such as medication, appetite, ease of nursing care, sleep pattern, etc.; and (4) the opinion of the physicians caring for the patient.

All of these patients had proved advanced cancer. The majority were handled on a consultation basis, the patient remaining on the service treating the original cancer. These patients consequently have not been observed as closely by us as would have been the case had they been on the neurosurgical service.

With the exception of 1 patient who refused reinjection, saline lobotomy was beneficial in every case. In retrospect, reinjection was possibly indicated more often than it was done. In the final few weeks of life, a few patients were given narcotics by injection. Because of the patients' poor general condition, reinjections were rarely done in the final 2 weeks of illness. Since the procedure is so innocuous, we would now recommend reinjection when recurrent pain is no longer relieved by oral medication. On the basis of this experience, we would not hesitate to reinject the frontal lobes at any time beyond a 48-hour interval. Although only 2 patients required more than a second injection, there would be no contraindication to this should the situation call for additional lobotomy effect. After a second injection, however, it might be wise to make additional injections of 10 cc. into only one frontal lobe, since the one undesirable result in our hands was produced by a third bilateral injection.

Seven patients were able to return to their homes. One of these at home for 4 months has carcinoma of the tonsil with metastatic invasion of the brachial plexus. He has been re-

injected as an outpatient. No undesirable intellectual or emotional effects have detracted from his symptomatic freedom from pain. This is noteworthy, because Scarff[8] attributed the 14% poor results in his series to direct tumor involvement of large primary sensory nerves.

In most cases, appetite has improved. Particularly impressive has been the favorable effect on patients with profound mental depression. Elithorn, Glithero, and Slater[3] also concluded that the prospects for relief were good in instances in which the psychological reactions are largely a depressive or anxious preoccupation with symptoms. Poppen and Freshwater[7] state that lobotomy is most efficacious in the patient who is fully aware of his disease and its course.

Withdrawal symptoms in those patients receiving large doses of narcotics before surgery have not been seen despite discontinuation or drastic reduction of the drug, and physical signs of drug withdrawal were not observed.

Generally, the patient no longer complained of pain. Medication was not infrequently requested, but we feel that, in large part, this was habituation rather than an expression of suffering. We discouraged the use of placebo injections because of the recognized fallacy of attempting to determine the nature of the pain by the degree of relief obtained with placebos. When questioned directly by the authors, the patients either denied the existence of pain or described their pain without any affective connotation of suffering. They no longer appeared to be in either an agitated or a depressed state. Nursing care was facilitated because many patients were more cooperative and more willing to care for their personal needs and became more active in moving themselves in bed or ambulating in the wards, and, therefore, they less frequently requested the services of the nursing personnel.

Complications. Bridges and Liss[1] reported transitory or no confusion, disorientation, or amnesia. Two of our patients were obtunded and withdrawn for 48 hours before regaining their preinjection state of awareness. One patient developed hemiplegia and global aphasia 6 hours after injection. A spinal tap revealed clear fluid and a pressure of 270 mm. of water. She was discharged on the sixth postoperative day with mild hemiparesis and emissive dysphasia. Two weeks later disability was confined to impairment of the right hand for finer movements. A second patient has transitory left hemiparesis after both of 2 injections, and right frontal metastasis was suspected though unproved.

There were no infections and no instances of poor wound healing. Fever of 1 or 2 degrees was not uncommon during the first 3 days following injection. A similar febrile response was noted by Grantham[4] following prefrontal lobotomy.

DISCUSSION

We have no original thoughts on the mechanism by which destruction of the frontal lobe affords relief of pain. In this series, there has been no anatomic or pathological verification of the lesions produced by the injection of saline into the frontal white matter. That the changes are to some degree permanent is suggested by the persistence of the undesirable frontal lobotomy effect for 6 weeks at the time of this writing in the patient given a third bilateral injection.

We propose that saline lobotomy be employed more widely. In view of the negligible morbidity attendant upon the performance of bilateral burr holes, medical contraindications are rare. When carried out in stages as described, unacceptable emotional and intellectual changes should be uncommon complications. In the unusual instance of profound frontal lobe effect, it is a moot point whether this is any more deplorable than the psychic and mental deterioration associated with prolonged administration of narcotics in large amounts.

It is difficult to depict accurately the oftentimes dramatic effect of this procedure. The most enthusiastic person concerned with a given case has usually been the referring physician. Many of these patients have been so miserable that death would have been considered a blessing by all concerned. It is exactly this sort of patient who is most benefited by saline lobotomy. The family is grateful for the termination of the painful state even if the patient lives only an additional week or so. Often the patient is confined to the hospital solely because of the need for narcotics by injection, and almost one-half of our patients were physically able to leave the hospital after saline lobotomy.

SUMMARY

The various means of relieving pain in ad-

vanced cancer patients are considered, and the indications for saline lobotomy are given. The advantages of this procedure over other types of frontal lobotomy are discussed. The results in 16 patients have been gratifying. This experience has convinced the authors that saline frontal lobotomy is an ideal procedure in selected patients.

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