SALINE LOBOTOMY FOR RELIEF OF PAIN DUE TO ADVANCED CANCER

THOMAS J. BRIDGES, M.D., AND HENRY R. LISS, M.D.

RELIEF OF intractable pain secondary to advanced cancer can be effected by prefrontal lobotomy. A satisfactory "psychosurgery" effect can be produced by fractional injection of physiological saline solution into the frontal lobe. Untoward effects, which may occur during transorbital instrumentation[6, 9] or during the injection of procaine or alcohol[1, 3, 4, 7] to produce a frontal lobe interruption, are minimized by the use of saline.

At the Francis Delafield Hospital, New York, N.Y., "saline lobotomy" has replaced surgical lobotomy as a means to provide comfort for terminal patients who no longer obtain pain relief from medication. We have given graded injections of physiological saline into the frontal lobes of 12 patients in the terminal stages of advanced cancer. The resulting spatial destruction of cerebral tissue has uniformly produced a satisfactory lobotomy type of effect on their pain.[9, 10]

METHOD

Preoperatively, the patient is evaluated as to type and location of tumor, life expectancy, suitability for other pain relieving procedures such as cordotomy, the type of analgesics being used and their frequency, and the response of the patient as well as his demands, appetite, awareness of surroundings, and interests.

Bifrontal burr holes are made at the level of the coronal suture line 3 cm. from the midline. The dura is opened in a stellate fashion, and the cortical vessels are coagulated. Scalp closure is effected. Penicillin and streptomycin may be given prophylactically during the postoperative period.

Twenty-four to 48 hours after operation, at a time when the patient has pain, the first saline injection is made. The patient lies in bed in his room or ward, and the clean-shaven scalp is prepared with hexachlorophene (pHisoHex) and benzalkonium chloride (Zephiran Chloride). A blunt, round-tip, 20-gauge puncture needle is inserted by freehand technique to a depth of 8 or 9 cm. from the surface of the scalp. The desirable plane is from the coronal suture line to the posterolateral margin of the orbit. Five cubic centimeters of warm physiological saline is injected at depths of 8, 7, and 6 cm., as the needle is withdrawn. The deepest injection is approximately 1 cm. above the orbital plate. A total volume of 15 cc. is used for each injection. On subsequent injections, the needle is directed more medially. When repeated injections of one frontal lobe no longer produce an observable effect, injection of the opposite frontal lobe is performed.

MATERIAL

This procedure has been carried out upon 12 patients with intractable pain due to extensive cancer. Over the past 2 years the patients were selected according to the usual criteria: (1) pain too extensive for cordotomy or other pain relieving procedures; (2) drug addiction; (3) pronounced situational depression.

RESULTS

The diseases, duration of pain, the side, number, and volume of frontal lobe injections are summarized in Table 1, page 324.

Initially injections were made in alternate frontal lobes approximately every other day and the total single volume of saline injected was 30 to 35 cc. In the last 6 patients satisfactory relief of pain has been effected by injection of a total volume of 15 cc. in 3 increments of 5 cc. each into one lobe at different depths. Daily to weekly injections into the same lobe were repeated as needed to control pain. On occasion, 1 instillation has been sufficient, in other instances up to 4 injections into the frontal lobe were required. When pain control ceased to be accomplished by repeated injections into one frontal lobe, injection of the opposite frontal lobe was found to be effective.

From the Department of Neurological Surgery, Columbia University College of Physicians and Surgeons; the Francis Delafield Hospital; and the Neurological Institute of New York, New York, N.Y.

Received for publication June 17, 1957.

Less effect was obtained if the needle tip was pushed down through the orbital cortex and then withdrawn, as this left a tract through which saline could escape into the subarachnoid space, thereby reducing the size of the local lesion. A total volume of 5 cc. at any one site was most satisfactory. Attempts to inject a larger volume resulted in escape of fluid alongside the needle, without producing a detectable increase in lobotomy effect.

It has been possible to provide satisfactory relief of pain in each of the 12 patients.

COMMENT

We have not had complications in the form of infection, hemorrhage, or seizures. Aspiration prior to a subsequent injection of saline along the same plane occasionally revealed a small collection of dark-tinged fluid pocketed at the site of the last injection. Only occasional gross effect upon the pulse, blood pressure, or state of consciousness has been noted in our patients. Occasionally a patient has been briefly uncommunicative.

Alteration of the patient's condition becomes apparent with relaxed attitude, less fear of passive movement, increased interest in food and surroundings, more voluntary movement in bed or ambulation, and with more self-help and cheerfulness. There was transitory or no confusion, disorientation, or amnesia and no incontinence in our group. The patient might regain his former interests.

The ability to recognize, localize, and appreciate induced pain remains. The patient is not disturbed by the procedure, and when it is necessary to repeat the injections at close intervals there is no objection or fear.

It has been found desirable to evaluate the effect of each 15-cc. injection for at least 24 hours before reinjecting, because the relief afforded by the individual injection is not predictable. The number of frontal lobe injections will depend upon the persistence of symptoms. From 1 to 4 unilateral injections may be adequate, or additional injections of the opposite frontal lobe may be required. Intensity of pain, severity of disease, and life expectancy all influence the number of injections that will be required.

Complete pain control can be obtained, but it may be preferable to reduce pain and preserve alert co-operation, rather than to risk marked personality disturbance in an effort to remove all vestiges of pain.

It is possible to reduce pain and to reduce drug administration from morphine 15 to 20 mg. every 2 to 3 hours to aspirin and oral codeine, 30 mg., twice in 24 hours. Anorexia, constipation, somnolence, or obtundity, so often seen with heavy sedation, are alleviated, but personality changes are kept at a minimum. Social behavior may be improved toward family, friends, fellow patients, and medical personnel.

After unilateral surgical lobotomy,[5] the pain relief may be of short duration. Traditional bilateral surgical lobotomy for relief of intractable pain also may fail, especially when the surgeon attempts to preserve the patient's social adjustment. Graded saline injections into the ipsi- or contralateral frontal lobes is the simplest means to obtain additional relief and to preserve the personality. Repeated injections can keep pace with increases of pain intensity or gradual waning of the effectiveness of the original operation.

The type of lesion produced in the frontal lobe by the injection of saline will be discussed in another paper. On gross inspection, however, the areas of destruction produced by the expansion pressure of the volume of saline are small.

CONCLUSIONS

Control of persistent pain from advancing cancer may be accomplished with the production of frontal lobe lesions by the injection of warm normal saline solution. Frontal lobe lesions and personality changes of any desired degree may be effected by this technique. Our goal has been to produce pain control with a minimum of personality disturbance or organic side effects. In severely debilitated patients saline injection lobotomy is the simplest, least devastating procedure. It can be repeated as often as necessary without the physical stress and danger of major intracranial surgery. Its simplicity and stepwise effect make it a valuable tool for pain relief for the unfortunate patient with advanced or extensive cancer.

(For references see page 325.)

TABLE 1

RESULTS FOR 12 PATIENTS GIVEN SALINE LOBOTOMY FOR RELIEF OF PAIN DUE TO ADVANCED CANCER

Pt. Sex Age	Diagnosis Date confirmed	Site of sev. pain & duration	Operation & date	Injections & site: Right No.	Right Vol., cc.	Left No.	Left Vol., cc.	Interval bet. 1st & last inj., days	Over-all results	Course of pt. after last inj.
G.B. M 67	Sq. cell ca. of tongue 5/53	Lt. half of face; 10 mo.	Rt. lobotomy; lt. trephination, 1/8/54	...	...	3*	45	...	Mod. relief	Died, 40 days; aspiration pneumonia
D.H. M 62	Pancoast tumor; sup. sulc. syndrome 10/53	Pain & weakness rt. upper extremity; 15 mo.	Bilateral trephination, 9/15/54	2	25	1	10	9	No narcotics; aspirin	Disch. home, 17 days
D.T. M 63	Mesothelioma of pleura 5/54	Burning, constant lt. chest pain; 6 mo.	Bilateral trephination; implantation rt. frontal electrodes, 11/12/54	2	30	3	50	6	Paraldehyde; no narcotics	Died, 2 days
M.R. F 31	Sq. cell ca. of cervix 2/52	Griping pain in abdomen; 4 mo.	Bilateral trephination, 12/17/54	3†	50	2	45	6	Occas. mild narcotic	Died, 1 day
S.B. F 33	Adenoca. of ovary & peritoneum	Dist. abdomen with constant squeezing pain; 6 mo.	Bilateral trephination, 10/14/55	...	...	3	50	3	Occas. narcotic; long intervals without	Died suddenly, 2 days
M.S. Fi 66	Sq. cell ca. of cervix 3/55	Low-back pain & epigastric mass; 2 mo.	Bilateral trephination, 11/10/55	...	...	2	25	5	Codeine b. i. d.	Gradually downhill; died, 27 days
E.S. F 57	Epidermoid ca. of nasopharynx 1/55	Dull, constant pain & weakness rt. upper extremity; dysphagia; 6 mo.	Bilateral trephination, 1/20/56	5	75	1	20	74	Occas. codeine & Thorazine‡	Gradually downhill; died, 58 days
C.E. F 57	Adenoca. of stomach 3/56	Progressive epigastric pain; 4 mo.	Rt. lobotomy & lt. trephination, 3/10/56	...	...	3	87	7	Restless but no pain; slept well	Home, 4 days
L.M. M 53	Adenoca. of colon 4/53	Constant aching pain in abdomen & lower back; 6 mo.	Bilateral trephination, 6/8/56	...	...	4§	60	3	Occas. narcotic; restless at first; then much quieter	Died, 14 days
J.O'C. M 20	Osteogenic sarc. of rt. femur, metast. to pelvis & chest 7/55	Constant sev. pain in rt. thigh & groin; 3 mo.	Bilateral trephination, 7/24/56	3	39	2	30	43	Good relief; placebos or occas. sedative	Died, 28 days
J.D. M 80	Adenoca. of prostate, metast. to spine & femur	Constant, dull pain, both legs & feet; 15 mo.; sev. pain lt. thigh; 5 mo.	Bilateral trephination, 11/5/56	3	51	1	18	16	Aspirin & codeine b. i. d. or placebo	Disch. to nursing home, 52 days
I.S. M 66	Adenoca. of rt. kidney, metast. to lung, lower spine & thigh	Constant sev. pain rt. thigh; 5 mo.	Bilateral trephination, 12/7/56	...	...	2	38	6	Placebo; good relief but lethargic	Gradual deterioration; died, 20 days

*One injection of 4 cc. 1% procaine and 2 injections of normal saline.
†Two injections of 1% procaine, totaling 10 cc., in addition to those of normal saline.
‡Chlorpromazine hydrochloride.
§Four injections of normal saline combined with 3% iodopyracet compound (Diodrast Compound).

REFERENCES

1. BAILEY, O. T.; SMALL, W. T., and INGRAHAM, F. D.: Procaine block of frontal lobe white fibers as means of predicting effect of prefrontal lobotomy; I, experimental studies. *J. Neurosurg.* 9: 21-29, 1952.

2. FREEMAN, W., and WATTS, J. W.: Prefrontal lobotomy; surgical relief of mental pain. *Bull. New York Acad. Med.* 18: 794-812, 1942.

3. NULSEN, F. E., and GRANT, F.: Relief of pain in advanced carcinoma by prefrontal injection of procaine. [Abstr.] *A. M. A. Neurol. & Psychiat.* 69: 653-654, 1953.

4. PUTNAM, T. J.: Procain base in iodized oil introduced transorbitally as test for effects of lobotomy. *Tr. Am. Neurol. A.* 75: 125-128, 1950.

5. SCARFF, J. E.: Unilateral prefrontal lobotomy with relief of ipsilateral, contralateral, and bilateral pain; preliminary report. *J. Neurosurg.* 5: 288-293, 1948.

6. WAGENEN, W. P. VAN: Personal communication. Cited by WALKER, A. E.[8]

7. WAGENEN, W. P. VAN, and LIU, C. T.: Procaine block of frontal lobe white fibers as means of predicting effect of prefrontal lobotomy; II, clinical evaluation. *J. Neurosurg.* 9: 30-51, 1952.

8. WALKER, A. E.: Psychosurgery; collective review. *Internat. Abstr. Surg.* 78: 1-11, 1944.

9. WATTS, J. W., and FREEMAN, W.: Psychosurgery for relief of unbearable pain. *J. Internat. Coll. Surgeons* 9: 679-683, 1946.

10. WOLFF, H. G.: Some observations on pain. *Harvey Lect.* 39: 39-95, 1943.