SOCIETY OF BRITISH NEUROLOGICAL SURGEONS
SYMPOSIUM ON THE RESULTS OF OPERATIONS ON ACOUSTIC NEUROMAS

At its 38th meeting in Trinity College, Dublin, in July, 1948, the Society of British Neurological Surgeons held a symposium on acoustic neuromas. As it was hoped to present the largest number of cases possible, invitations were sent to Dr. Gilbert Horrax (Boston) and Professor Herbert Olivecrona (Stockholm). The latter was unable to attend owing to illness but sent his paper which was read for him. Since the figures in these papers added to those given in the subsequent discussion make up totals which have never before been available in the same place, it has been thought desirable to make them accessible to a wider public.

The discussion, in which Professor Sir Geoffrey Jefferson, Mr. K. Tutton, and Mr. A. Dickson Wright took part, is summarized.

A COMPARISON OF RESULTS AFTER INTRACAPSULAR ENUCLEATION AND TOTAL EXTRIPATION OF ACOUSTIC TUMOURS
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The operative treatment of acoustic tumours, has, from the early days of neurosurgery, been a subject which has intrigued those who have attempted to deal with these growths. They present to a surgeon the challenge of a benign tumour in a situation from which they must be removed with the utmost skill and delicacy in order that the patient may not be left with disabling or disfiguring sequelae.

It will be remembered that in the very early days of surgery of the nervous system, a symposium relating to these tumours was held in connexion with the International Neurological Congress in 1913, and at that time the outlook for patients harbouring such lesions was well nigh hopeless. The prevailing mortality, even for an extremely incomplete operation at the hands of the most skilled surgeons, ranged from 58% (Horsley) to 83.8% (Krause) both as presented by Tooth (1913). It was, therefore, a tremendous advance in the surgery of acoustic neuromas when Harvey Cushing in 1917 published his monograph in which he described a method for their intracapsular removal. This operation could be performed with a relatively low mortality (20% at that time but later reduced to less than 10%), and thus offered to patients at the least a good chance of surviving the operation, with a further fair chance of a period of useful life varying from five to 25 years or more.

A second significant advance in the treatment of acoustic tumours came with Dandy's description in 1922 of an operative procedure for the total removal of these growths. Since that date an increasing number of neurosurgeons have in large measure adopted his technique, and recently a further refinement has been introduced, especially by Cairns (1931) and Olivecrona (1940), by which the facial nerve may often be preserved.

Since the introduction of the method for the total excision of acoustic tumours there has been some uncertainty among neurosurgeons as to the useful survival of patients in this category compared with that of those who had been subjected to a very complete intracapsular extirpation. The object of this communication, therefore, has been to attempt a comparison of the results obtained by these two procedures. The series compared are those of Cushing representing patients who had been operated upon by the intracapsular technique, and the series from the Lahey Clinic representing patients from whom the tumours have been

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These figures of Harvey Cushing's series are determined from articles by his former pupils, Van Wagenen, 1934; Eisenhardt, 1937; Cairns, 1936, and Davidoff, 1940.

Throughout this discussion it must be remembered that Cushing's statistics date from the earliest days of neurosurgery when even his technique was not as perfect as it later became, and when the modern adjuncts of electrosurgery, strong suction, and the antibiotics, were unavailable. Furthermore, his results as to useful survival must, to a certain extent be estimated from the percentages given in the follow-up reports by Van Wagenen (1934), Cairns (1936), and Davidoff (1940), covering a period of three years, and from further less extensive data derived from personal knowledge and from reports kindly supplied by Dr. Louise Eisenhardt.

First one must define what is considered to be useful survival. This is difficult, and there are many criteria, as pointed out by Cairns in 1936. However, so far as my present purpose is concerned, I have considered that patients were leading useful lives if they had returned to some sort of occupation whether it was their previous one or otherwise, or in the case of women, if they were able to do the major portion of their usual housework. Furthermore, with older patients, if they recovered with no serious disability but were enjoying life although not returning to work, their lives, I think, should be considered as useful. Patients having marked disabilities, particularly ataxia and blindness, even though the blind patients might be well in all other ways, have not been considered as useful.

Methods of Comparison.—In attempts to interpret the results of various operations, writers have made use of two general statistical methods. One of these has been to base percentages only upon those patients surviving five years or more after operation. In our discussion this method would be quite unfair, since a very large number of patients who have had intracapsular extirpation die during the first five post-operative years, whereas the mortality for those having total extirpations is almost nil. The only true method of interpretation, therefore, is to compare the percentages of useful survival with the total number of patients operated upon, since what we wish to find out is in any given number of patients presenting with acoustic tumours, how many of that total number will be living useful lives five years or more after operation.

Survival Rate for Intracapsular Enucleation.—These figures of Harvey Cushing's series are determined from articles by his former pupils, Van Wagenen, 1934; Eisenhardt, 1937; Cairns, 1936, and Davidoff, 1940.

Total cases operated upon (C. 1907-1932) 176
Total cases surviving five years or more 77 (99 deaths up to five years = 56.2% for five-year mortality.)

* The useful survival (estimated) of total cases was 44, that is, 25% of a total of 176 cases. (These figures were obtained from those given by Davidoff for the three-year period October, 1924, to October, 1927.) Even adding 10 to 15%, the percentage of useful survival would be less than 50% of total cases. If the figure of 44 useful survivors is compared with the 77 patients who survived five years or longer, the useful survival-rate rises to 57-1%, but this is not a fair comparison.

Survival Rate for Total Tumour Removal (Lahey Clinic series, 1934-43).—Patients during the last five years have not been included in order to make a five-year survival comparison, although the mortality from operation up to five years post-operatively for total extirpations is only 14.1% against 56.2% for intracapsular cases for the same period. As none of our patients with total extirpations has so far died after leaving the hospital for a period up to five years, the figure of 14-1% represents therefore the operative as well as the five-year mortality rate.

Total cases operated upon (1934-1943) . . . . 57
Total heard from . . . . 55
Useful survival . . . . 34 (61.8% of 55)

The useful survival rate of 61.8% of patients having had a total removal contrasts with the 25% useful survival rate in the intracapsular series.

If one compares the figure of 34 useful survivors of total extirpations only with the number of patients surviving five years or more, namely 44, the useful survival rate by this method rises to 77.2% as compared to 57.1% for intracapsular extirpations, but again it must be remembered that this is not the correct or fair method of comparison.

Operative Technique.—Little need be said on this score as our procedure was described in 1939. However, there have been since that date a few minor modifications.

We now make a relatively small skin incision similar to that used for eighth nerve section. Bone is removed down to the lowest portion of the posterior fossa, out to the mastoid cells and upward to just above the lateral sinus. A burr opening

* It should be said that most of those patients were in excellent condition and without facial paralysis, whereas with total extirpation the latter is almost always present.
is made over the occipital region, and a small rubber catheter inserted into the ventricle. This is left in place and fluid allowed to drain from the ventricle not only during the course of the operation but for 48 hours thereafter in order to keep intracranial pressure fully reduced. The patient is operated upon in the prone position under intratracheal ether.

After removing sufficient bone, the dura is opened by a flap which is turned outward, the posterior cistern evacuated, and the outer third of the cerebellar hemisphere removed by electro-surgical methods combined with suction. An intracapsular evacuation of the tumour is then performed, after which the capsule and remaining contents are gradually freed from the fifth nerve above, and the ninth, tenth, and eleventh nerves below. Great care is exercised at the lower pole not to ligate the main posterior inferior cerebellar artery, but only the branch which it gives off to the tumour. Severe ataxia will result if the main artery is sacrificed. The petrosal vein is controlled at the sinus by "gelfoam". The growth is next mobilized by freeing its attachments at the internal auditory meatus, and then by grasping the capsule with a suitable instrument it is drawn away from the pons, ligating any entering arterioles with silver clips. During the course of this manoeuvre an attempt is made to preserve the facial nerve but as a rule this has been unsuccessful. Our final procedure is to clean out the tumour within the internal auditory meatus by curettage. All suspiciously oozing places in the tumour bed are covered with "gelfoam" and the dural flap then replaced and sutured with silk completely so as to give a watertight closure. The skin and muscle flap is likewise closed in layers with silk.

The patient's eye on the affected side is kept covered for several days, and patients are given parenteral fluids for at least 48 hours before anything by mouth is attempted.

Mortality Rate for Entire Series.—A word as to the mortality figures for our entire series. From the inauguration of the neurosurgical service at the Lahey Clinic in November, 1932, until June, 1948, we have operated upon a total of 92 patients with acoustic tumours. There have been 13 deaths in the hospital from any cause whatever, making the operative mortality 14.1%. Of this total number, a few during 1932–1933 had only intracapsular operations. Furthermore, included among the 92 there were 13 patients who had been operated upon previously elsewhere, and in this group the mortality for complete removal was very high due to severe adhesions between the tumour and the pons. Out of the total there were 73 patients who had not been operated upon previously and from whom the tumours were completely removed. There were eight deaths in this group giving a 10.9% mortality, and I feel that it is this group which we will all have to deal with for the most part in the future inasmuch as secondary operations should, with rare exceptions, be unnecessary.

Summary

An attempt has been made to compare the useful survival rates of patients having acoustic tumours who have been operated upon by the two usual methods of intracapsular extirpation and total tumour removal.

As nearly as can be determined by the data at hand, about 25% of all patients who have had intracapsular removal of their tumours will be alive without serious disability or following some useful occupation five to 25 years after their operations. For those who have had complete removal of their tumours, over 60% will be leading useful lives.

The five-year mortality rate in the intracapsular series here studied was 56.2% whereas the mortality for the same period in those having total extirpations was 14.1%.

The conclusion seems obvious, therefore, that only under exceptional circumstances should a neurosurgeon be satisfied with anything less than complete excision of an acoustic tumour.

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