
THE INTELLIGIBILITY OF THE SENSITIZED SPEECH TESTS IN THE DISORDERS OF THE CENTRAL AUDITORY MECHANISMS

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The hearing symptoms associated with disorders of the central auditory mechanisms are very often absent and sometimes of an extremely elusive nature. In a few cases only they are as handicapping as normal deafness due to cochlear or auditory nerve impairments.

This fact may help us in explaining why the first really significant breakthrough on this problem was achieved in the early 1950's. As a matter of fact the routine auditory tests—such as the pure tone threshold, the supraliminal tests with pure tones, the speech articulation curve —, failed for a long time to give reliable results.

Thus, in the course of about ten years, experience has allowed us to work out a series of more elaborate tests, some of which make use of pure tones presented under special conditions, while others use specially devised or processed speech material. The experience of our Department in this particular field is based mainly on the use of the so-called sensitized speech tests, consisting primarily of methods called “the distorted voice test”, and “the time-compressed voice test”.

We have performed our sensitized speech tests on a number of patients with spontaneous lesions, tumours, vascular disorders, inflammatory processes, multiple sclerosis etc. — of the cerebral hemispheres or the brain-stem or who had undergone surgical removal of the temporal lobe for focal epilepsy.

In spontaneous pathology, on account of the impossibility of establishing the microscopical limits of the disorders, the presumed site of the lesion was determined on the basis of an extensive clinical neurological examination.

Let us now describe separately the audiometric findings in brain and in brain-stem pathology.

For the former purpose we shall confine our remarks to those patients who underwent surgical removal of brain tissue. As compared to data established in spontaneous pathology the study of auditory function following temporal lobectomy undoubtedly offers the advantage of correlating the qualitative and quantitative aspects of the hearing performance with the anatomical limits of the lesion, based on the neurosurgical operative report.

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And this (Fig. 1) is a typical audiometric picture after right temporal lobectomy: threshold acuity for pure tones measured on both ears is well within normal limits. No patient shows any kind of significant hearing-loss, in the sense of diminished threshold acuity.

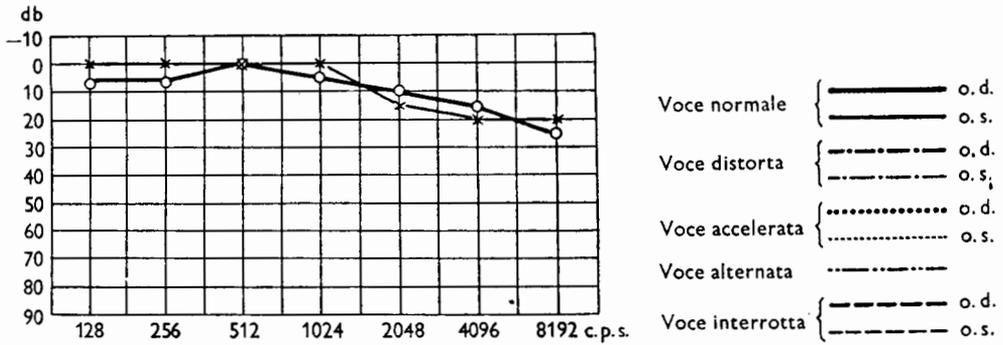


Fig. 1. Lobectomia temporale Dx.

The routine tonal tests—such as SISIGram, auditory adaptation and so on—give normal values. Intelligibility for normal speech material is in accordance with pure tone threshold acuity.

When in those patients the sensitized speech material is monaurally delivered, at progressively increasing intensities, it becomes very clear that the articulation

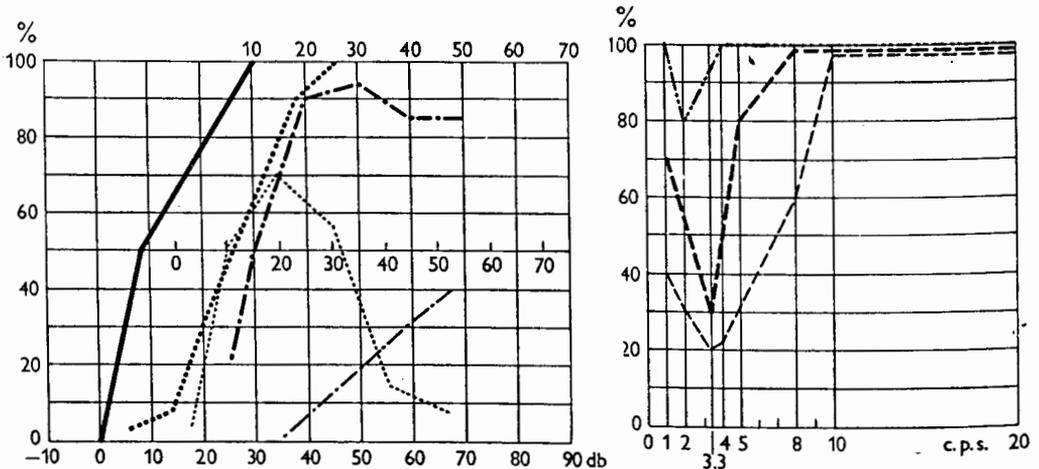


Fig. 2. Lobectomia temporale Dx.

curve is distinctly worse in the contralateral ear, where the intelligibility falls to about 50%. The ipsilateral ear gives, on the contrary, normal results (Fig. 2).

We should like to stress here the most interesting finding, i.e. that auditory function has been found to be impaired to the same extent as after the surgical

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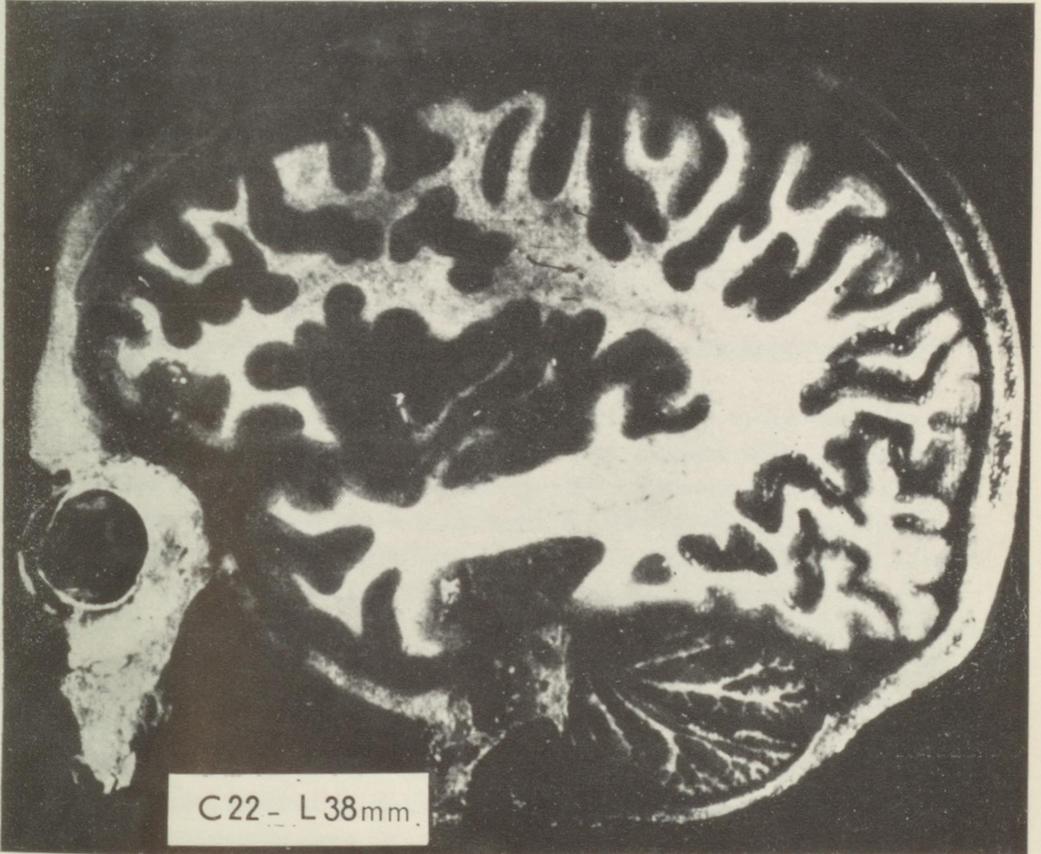


Fig. 3.

removal of the so called Heschl's gyrus, considered to be the site of the primary cortical auditory area (Fig. 3).

On the other hand the intelligibility defect regresses sooner after surgery, whenever Heschl's gyrus is spared, unless its function was impaired even before surgery.

In the disorders of the central auditory mechanisms at a brain-stem level the pure tone threshold acuity is often impaired. There is no characteristic pattern, but different aspects of high-frequency type neural loss. Poor articulation curves for sensitized speech material, with reduced intelligibility are commonly found, but—at variance with cortical dysacusis—the auditory disorder is often bilateral. This fact might be attributed to the much smaller distance separating the two auditory pathways at the brain-stem level, so that equally extended lesions yield a much higher incidence of severe and bilateral impairments when they are located in the brain-stem, than when they are located at a cortical level.

The more impaired ear has been found to be ipsi- or contralateral to the side of the brain-stem lesion in an equal number of cases.

In some patients, with little or questionable alteration of the pure tone threshold acuity a poor discrimination for normal speech is found, affecting one ear only. Such an observation is quite interesting, since it resembles a kind of unilateral "verbal deafness". We have called it "tonovocal dissociation".

Let us finally summarize the main differences between audiometric pictures in cortical and brain-stem (b.s.) pathology.

1. First of all the hearing impairment is slighter and strictly monolateral in cortical lesions, whereas it is more marked and often bilateral in b.s. lesions.

2. Another difference concerns the correspondence between the ear affected and the side of the neural lesion: while in the cortical pathology the hearing impairment is always crossed—namely it is always found on the opposite side of the affected hemisphere—in the b.s. lesions the hearing impairment is either ipsi—or contralateral with the same incidence. When tone speech dissociation occurs it is often contralateral.

3. A third difference is the occurrence of pure tone threshold impairments, which is more frequent in b.s. lesions. Although all the elements of a complete audiometric investigation lead to a general diagnosis of lesion of the central auditory paths in the b.s., the exact localisation of the disease can be established only with the aid of the other neurological signs and symptoms.