to comment on the treatment of pneumonia in adults, but the view may be expressed that the continuing high mortality from this disease might be considerably reduced if the large general hospitals throughout the country were to provide better facilities for treating such cases in the open air. In the private house continuous open-air treatment can, in the majority of cases, be instituted with little inconvenience to other members of the household. Despite this there is frequently great reluctance on the part of parents to expose their stricken child to the cold air, and perhaps this reluctance could be largely overcome if the practitioner in attendance felt more strongly convinced of the great value of this harmless and easily applied remedy.

In this investigation the mortality rate only has been considered and no mention is made of the effect of an open-air regime on the duration of the fever or the incidence of complications. These questions and certain others are at present being investigated; nevertheless the actual mortality from pneumonia must remain the vital issue when judging the success or failure of any method of treatment, and it is a sincere belief in the life-giving qualities of the "airs from heaven" which has prompted this paper.

Summary

The importance of open air as a therapeutic measure in acute primary pneumonia in children is emphasized, and the belief is expressed that the value of this remedy is not sufficiently appreciated at the present day.

A comparison is made between a series of cases treated according to an intensive open-air regime and a control group of cases treated by other measures.

Exposure to a moving current of cold fresh air throughout the whole febrile period is advocated in all types of pneumonia in children of all ages, and it is suggested that if this simple and harmless expedient were to supersede certain of the more meddlesome forms of therapy frequently employed the lives of many children would be saved.

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Samuel Meaker (*J. Amer. med. Ass.*, December 5, 1936, p. 1847) discusses the treatment of human sterility. He states that all recent advances are based on a better understanding of the aetiology, which in the majority of cases is not one single defect but the summation of several factors. Absolute sterility is found clinically in only 30 per cent. of cases, the remaining 70 per cent. showing only a group of factors tending to depress fertility below the threshold of conception. These factors are so rarely limited to one patient that Dr. Meaker has ceased to speak of sterility in man or woman, but only of a sterile mating. Excluding rarities he considers the following the important factors of infertility: (a) genital hypoplasia, the organs showing the differentiation of a girl of 10 with ovarian immaturity and imperfect or absent ovulation; (b) abnormal viscosity of the endocervical secretions of chemical or infective origin; (c) partial or complete obstruction of the Fallopian tubes; (d) deficient oogenesis due either to depression in ovarian or pituitary secretions. Effective treatment is assured by complete diagnostic study. Male sterility can be examined by an accurate evaluation of semen. Endocervical infections are best treated by cautery; insufflation of gas and iodized oil only relieves partial obstruction, and salpingostomy may establish patency of the tubes. Deficient oogenesis calls for the services of the endocrinologist, and whereas hypoplasia once established can benefit little, Dr. Meaker believes that herein lies an opportunity for preventive gynaecology by proper attention to menstrual behaviour and to the health of the adolescent girl.

AUDITORY NERVE SECTION IN MÉNIÈRE'S DISEASE

BY

R. RUTHERFORD, F.R.C.S.

The object of this investigation was to determine whether an accurate estimate of the depth of the internal auditory meatus from the outer table of the skull could be made before opening the skull, and if this was achieved to advocate the division of the eighth nerve when indicated through an operating endoscope in much the same way as one would use a cystoscope in the urinary bladder, thus reducing operative trauma to a minimum. If a suitable endoscope could not be devised it was thought that it might be possible to slip a flat graduated retractor into the subdural space, and when the calculated depth was reached to retract gently and find the foramen at once.

Preliminary Investigations

A preliminary investigation was made at the Museum of the Royal College of Surgeons, some fifty Egyptian and North American Indian skulls being measured with a view to finding a common factor whereby the depth could be estimated. The bi-mastoid diameter and the internal auditory meatus chord were correlated with the following results:

44	per cent.	of skulls	had the factor	2.6
16	"	"	"	2.5
12	"	"	"	2.3
8	"	"	"	2.1
6	"	"	"	2.8
6	"	"	"	2.2
4	"	"	"	2.4
2	"	"	"	3.0
2	"	"	"	2.9

In the above measurements the point taken on the mastoid process was situated at the upper and posterior part in the same horizontal plane as the internal auditory meatus. From the point of view of a consistent factor, and the difficulty of deciding which point on the mastoid process should be taken since the internal auditory meatus in the intact skull is invisible, the above factors have no practical value.

Other tentative measurements were made, and it was found that when one pair of supra-orbital notches was present the distance between each notch corresponded in the majority of cases with the distance between each internal auditory meatus; this was even true of the artificially deformed skulls of the North American Indians, these being flattened from before backwards and from above downwards, so that the bi-mastoid diameter is widened. The latter measurements, it was felt, did not lend any practical assistance because of the absence of one or both supra-orbital notches in a small percentage of skulls.

Dr. G. M. Morant, lecturer on anthropometry at University College, London, very kindly made a full statistical inquiry on a large number of English skulls at his disposal (100 male and 100 female). He found that an accurate estimate of the depth of the internal auditory meatus could be made from an external measurement, that external measurement being the distance between the asterion and the auriculare. To use his own words: "Taking all measurements in millimetres, the required asterion-internal auditory meatus chord is obtained by multiplying the determined asterion-auriculare chord by 0.581 and adding 26.33. So that the equation, which can be applied to either sex and to either side, is:

Asterion-internal auditory meatus = $26.33 + 0.581$ asterion-auriculaire."

Dr. Morant has compiled complete tables for the distances required for different values of the asterion-auriculaire chord, so that in practice these tables would be used and calculation would be unnecessary.

Surgical Anatomy

The posterior cranial fossa is bounded above by the tentorium cerebelli, anteriorly by the posterior surfaces of the petrous portions of the temporal bones and by the basi-sphenoid, and laterally, inferiorly, and posteriorly by the appropriate parts of the occipital bone, which is comparatively thin where it forms part of the base of the skull; the only anatomical abnormality likely to be met with is a diminution in size or entire absence of one or other lateral sinus, in which case the sinus on the opposite side is correspondingly enlarged; an emissary vein near the mastoid process may give trouble, but is readily plugged by means of a spicule of bone driven into its foramen. The normal lateral sinus runs horizontally outwards from the torcular Herophyli, and takes a sharp turn downwards at the mastoid process; it is within this angle that the trephine hole is made, so that the approach to the internal auditory meatus is straight and involves the least instrumental displacement of the cerebellum posteriorly. The internal auditory meatus lies on the posterior surface of the portion of the temporal bone near its apex, and at a depth which can be predetermined; its centre, in adult skulls, lies 5 mm. below the attached border of the tentorium cerebelli, and through it are transmitted the facial nerve, the pars intermedia, and the auditory nerve, in that order from above downwards. There is a safe distance of 10 mm. in adult skulls between the point of entry of the nerves into the meatus and the brain stem; in other words, it would be safe to sink a streamlined endoscope or flat retractor 10 mm. beyond the calculated measurement before coming in contact with the brain stem.

Physiology

If it is intended to introduce a cranoscope through a minimal opening in the posterior cranial fossa it may become necessary, owing to the limited field of vision, to identify the nerve strand seen by utilizing the fact that there is an action current in the auditory nerve when the auditory apparatus receives a physiological stimulus; it being assumed, of course, that the various manipulations are carried out under local anaesthesia, and that the cochlea is not so diseased as to be incapable of reception. A silver electrode passed down the operating tube of the cranoscope and resting on the eighth nerve, and the indifferent electrode engaging at the back of the neck, would suffice, when the sound stimulus was applied, to operate a string galvanometer and put the identity of the nerve beyond doubt; this confirmation is perhaps more of academic than practical interest, as no doubt an optical instrument can be devised to take in the whole field of the internal auditory meatus, and identify the structures in their anatomical relations.

Operation

A female, aged 65 years, a classical case of Ménière's disease, was referred to me for operation.

An obstetric dose of avertin was supplemented by ether inhalation. One and a half ounces of ether were used during the one and three-quarter hours operating time.

A flat malleable retractor was marked, the distance between the tip and the mark being the distance between the internal auditory meatus and the postero-superior border of the mastoid process of a prepared skull.

A transverse incision was made, stretching from the upper part of the posterior border of the mastoid process, slightly curved, with the convexity of the curve upwards, and going down immediately to bone and finishing at the external occipital protuberance. The muscles attached to the base of the skull were elevated, and a half-inch trephine hole was made about the centre of the right half of the occipital bone; this hole was carefully enlarged by nibbling forceps forwards to the posterior edge of the right lateral sinus, and upwards to the tentorial attachment, the extent of the opening being two inches in lateral extent and one and a half inches in antero-posterior extent. The bleeding from the scalp was controlled by immediate ligature, as the orthodox scalp forceps were found to be too cumbersome during the subsequent steps of the operation. The only troublesome bleeding from bone was that from the mastoid emissary vein, and this was easily controlled by a spicule of bone thrust into the foramen. The dura mater was next incised at the forward end of the skull opening, and the marked retractor slid very gently and very slowly into the subdural space until the mark was flush with the outer table; gentle traction backwards of the cerebellum immediately revealed the internal auditory meatus with the facial nerve above and the auditory nerve below; the latter was divided by tenotome. The patient was not at all shocked by the operation, and the day following was able to tell us she was quite free from giddiness and nausea, and, needless to say, was stone deaf on that side. She developed suppurative parotitis ten days following the operation, and succumbed on the fourteenth day.

The Suggested Cranoscope

With the kind collaboration of the Genito-Urinary Manufacturing Company, Ltd., an operating endoscope has been devised; the telescope and lamp are contained in an oval sheath with the "long end" tapered and still maintaining the oval section. The cross-section of the sheath is approximately $1\frac{1}{2}$ in. by $3\frac{1}{16}$ in. The central portion of the lumen is occupied by the telescope and lamp, leaving good-sized irrigation channels on either side. In the sheath the irrigating channels are large enough to accommodate the small hook knife without the latter interfering much with the flow of the irrigating fluid. The sheath is marked out in millimetres on the ventral surface, zero starting at the lens system and the distance between the lens system and the "long end" being no more than 10 mm. to avoid pressure on the

brain stem. The attached illustration does not show the subsequently modified "long end" which would scoop out the brain tissue when introduced; the incorporation of a "long end" designed like the end of a flattened catheter obviates this.

Conclusion

The section of this paper dealing with the proposed use of a cranoscope is, I believe, original; if practicable it would seem to open up an avenue of observation on brain surface appearances in cerebral lesions in the living.