opia. The use of a common set of records for all the children referred either to the school clinic or the hospital requiring treatment for squint or amblyopia would be administratively much easier and be more sensible from a clinical point of view. In this particular area a child with a squint and amblyopia detected as a result of a sight test at school could have three sets of records each kept in a different place—for example, a school clinic card, hospital records (if operation was necessary), and separate notes for the orthoptist. Furthermore, it is quite common for a child to attend both the hospital and the school eye clinics. For example, he could be referred before he goes to school to the hospital clinic with a squint, only to default and reappear at the school clinic after his amblyopia had been picked up again as a result of a sight test done at school. In such circumstances a second round of attendances would start on a second set of records, and much extra work by the ophthalmologist and orthoptist and unnecessary attendances for both parent and child could be prevented by the initial set of records being readily at hand.

The idea of one set of records for all these children, together with the concept that they should all be seen in the same clinic, led to our thinking that it would be better to have a special

children's eye clinic. This clinic would draw cases referred both from the general practitioners and as a result of sight tests at school. Furthermore, the traditional orthoptic record sheets have been dispensed with and all notes kept on the ophthalmologist's records.

The idea of a children's eye clinic is not an entirely new one because in some parts of the country—for example, Northampton—children with ocular defects detected at a school eye test are seen in a "school clinic" held in the hospital eye department, although they are not recorded on hospital records. This applies, however, only to those children who live in the borough of Northampton. Children living just outside the borough at present come under the County Health Authorities and are referred to a "school eye clinic" held elsewhere in the town of Northampton. Rationalization of anomalies such as this should come with the imminent merger of the three divisions of the health services. This will mean that advances in preventive medicine will have to originate from a single source and probably, in the case of specialized subjects such as this, this would be the hospital part of the service. The concept of a children's eye clinic centred in the hospital eye department seems to be ideally suited to fill this role.

Hospital Topics

Technique of Oil Myelography

JAMES BULL

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Some medical men regard myelography with apprehension and most patients are apparently told by their friends that it is a frightening procedure. If the examination is properly conducted both parties are wrong. Like many techniques in medicine, history plays a large part in its development or lack of development. Just over 50 years ago Sicard struck upon this method of investigation quite by accident. Two or three millilitres of iodized oil (Lipiodol) was introduced inadvertently into the spinal theca by one of his assistants. Relieved to find that the patient suffered no ill, Sicard tilted him head-downwards and noted that the oil flowed along the theca. Thus oil myelography was born. Ever since that time there has been a tendency in many places to introduce the oil blind after lumbar puncture in the ward, and to use about the same small quantity as Sicard. For many years his method was used to define a complete block in the spinal theca and for this purpose 3 ml was quite adequate. Over the years, however, myelography came to be used for several other purposes including particularly the diagnosis of protruded intervertebral discs when the profession became aware of this condition about 35 years ago.

The main factor inhibiting the use of more oil has been the tradition in Britain not to remove it because by using small quantities it seemed unnecessary. On the other hand, medical men have been reluctant to introduce a quantity two, four, or six times as large as Sicard used, and still leave the contrast in the patient knowing that it is very slowly absorbed and sometimes

hardly at all. In the United States it has been the practice for many years to at least attempt to remove the contrast substance (however small a quantity was injected) for medicolegal reasons. It was in that country that the trend to use larger quantities developed, knowing full well that it could be removed afterwards.

Perhaps the most important factor leading to advances in technique has been the advent of the image intensifier and television screen. Nowadays, wherever this facility is available, the whole examination should be conducted in the x-ray department. Indeed it can be so conducted with the old-fashioned fluorescent screen, but less satisfactorily.

Details of technique

Unless the patient is apprehensive he or she requires no premedication. Having first explained the procedure to the patient and disillusioned him as far as possible of its horrors, one places him face-down on a tilting x-ray table with a pillow under his lower abdomen and pelvis to reduce the lumbar lordosis. The lumbar spine is then examined on the television screen and a suitable site chosen for the lumbar puncture. Any of the spaces from L2/3 to L5/S1 can be used. It is useful to place a heavy metal marker (such as a Spencer Wells forceps) across the spine at the site one intends to puncture, the level of the iliac crest being a less accurate means of determining a particular spinous process. It is also helpful to have a choice of level of puncture as one naturally wishes to introduce the needle at a site other than where the lesion is suspected.

Having chosen a suitable spinous interspace, a small quantity of local anaesthetic is injected into the skin and deeper tissues.

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In fact a spinal anaesthetic is hardly necessary if one of the sharp disposable needles* now available is used. A 19 gauge has been found to have a satisfactory bore. If any difficulty is encountered in obtaining cerebrospinal fluid the position of the needle point can easily be checked with the aid of television in both frontal and lateral planes. Having introduced the needle into the correct position one can raise the spinal pressure by tilting the patient feet-down some 10° and thus collect a specimen of cerebrospinal fluid more quickly, after attaching a three-way disposable tap† to the needle. Furthermore, the patient is now in the right position for the introduction of the oily contrast substance. At this stage the pillow can be gently removed.

The next step is very important for it is now that a subdural or extradural injection can be avoided. However experienced the operator may be, there is always the slight danger that part of the bevel of the needle is outside the subarachnoid space and if this happens some of the contrast substance will pass extra-arachnoidally. Before injection a length of disposable plastic tubing‡ and a 20-ml syringe containing the contrast substance are attached. The contrast substance is then slowly injected under television control, the hands of the operator being well out of the x-ray beam. Since the patient has been placed somewhat feet-down one can watch the droplets falling caudally to the end of the lumbosacral sac and can then be confident that a pure subarachnoid injection has been achieved, for no such free flow occurs extra-arachnoidally. The amount of contrast substance to be introduced depends on the capacity of the lumbosacral sac of the patient being examined and it varies greatly. On average about 12 ml is adequate unless one expects to find a complete block, in which case between 2 and 3 ml is enough.

After an adequate amount has been introduced (more can always be added) the tap is turned off and the tubing and syringe are removed, leaving the needle in situ. The patient is then tilted feet-down about 45° in order to get a good outlining of the lumbosacral sac. Appropriate radiographs are then taken. Next, the patient is tilted down into the horizontal or near horizontal position. This lengthens the column of contrast, and most of the lumbar region can then be radiographed. If a disc protrusion is pressing on the theca, it should now have been shown. If the findings are negative the patient should be tilted somewhat head-downwards until the head of the contrast column reaches at least as far as the lowermost dorsal region, to exclude a mass at or near the conus medullaris. At this stage the examination may be complete and the contrast substance withdrawn by the following procedure. The patient is tilted into such a position that the needle point lies in the middle of the pool of contrast substance; this is usually near the horizontal. The plastic tubing and syringe are reattached and the oil is removed by gentle suction under television control.

When the examination is negative it may be necessary to carry it further and place the patient in the supine position. This involves withdrawing the needle. The classical example is a vascular malformation (angioma) which usually lies posteriorly and will not be outlined by the oil in the prone position. In such cases the needle must be reintroduced afterwards to remove the oil. If the patient is tired one is justified in leaving this step until the next day.

Examination of the Dorsal Region

The patient must be tilted head-down about 45°, but before this a firm halter must be placed over his shoulders to give him support. He is then instructed to extend his neck as much as possible, his chin being supported by small pillows. This creates a watershed at the foramen magnum and stops the contrast

substance running into the skull. The oil nearly always runs rapidly through the dorsal region at the point where gravity allows it to overcome the normal dorsal kyphosis. Radiographs must be taken as the oil moves along. The dorsal region is much more easily examined in the supine position, the contrast substance then being contained in a smooth concavity; but the posterior border of the dorsal region alone seldom shows a lesion.

Examination of the Cervical Region

The most important point to remember is to have enough oil available nearly to fill the cervical canal. Like the rest of the bony spinal canal the cervical region varies very much in cubic capacity from patient to patient. The operator is helped in filling it by the fact that most cervical spines can be made very lordotic if the chin is well extended. If one can fill the canal in this very lordotic position both anterior and posterior aspects will be outlined thus making the supine examination unnecessary and allowing the needle to remain in position throughout the examination. To achieve such filling one usually needs at least 12 ml. As in the examination of the dorsal region, the patient must be tilted about 45° head-down, the chin being maximally extended, to fill the cervical canal. After achieving this, he can be tilted back to the horizontal or near horizontal position to make him more comfortable, and at the same time retain the oil in the cervical region. Radiographs—frontal, oblique, and lateral—can then be taken at leisure. If examination of the anterior part of the foramen magnum is wished the operator can either flex the chin slowly or tilt the patient slightly head-downwards or do both. As a rule this completes the radiographic examination and the patient can then be tilted feet-down to accumulate the oil under the lumbar needle and withdraw it as described above. If, however, the cerebellar tonsils need to be examined, the needle must be removed and the patient re-examined in the supine position. Finally, the patient is again tilted feet-down, the needle reinserted, and the oil withdrawn.

Complete Block

When a complete block is suspected, the myelographic examination should be conducted quite differently. The features arousing the suspicion of a complete block may be clinical or radiological or both. Suspicious signs and symptoms need not be discussed here. Examples of positive radiological signs pointing to the possibility of a complete block are (1) changes in a vertebral body, pedicle or elsewhere, suggesting the presence of a metastasis or of myelomatosis, (2) if the interpedicular distance of one or more adjacent vertebrae is increased beyond the normal an intraspinal mass is very likely, and (3) the presence of a widened exit foramen at any level raises the suspicion of a neurofibroma.

The myelographic problem in these situations is to define, if possible, both the upper and lower borders of the lesion in order to give the surgeon maximum information. If the contrast is introduced by the lumbar route, the lower border of the lesion *only* will be defined. On tilting the patient's head downwards it is obviously impracticable to maintain him at an angle of about 45° for more than a few minutes. This time is usually insufficient to allow the contrast substance to pass cranially beyond the block. What has to be remembered is that a complete block should be diagnosed only if the factor of time is introduced. It may take upwards of 24 hours for seepage to occur past the block. For this reason a cisternal examination should be undertaken and thus allow gravity to play its part.

Technique of Cisternal Myelography

With television control the fears of cisternal puncture, so uppermost in the minds of many people, are eliminated. In point of

*Yale spinal needle. Becton-Dickinson, Rutherford, New Jersey, U.S.A.

†Three-way stopcock K. 75. Pharmaseal Laboratories, Glendale, California 91201, U.S.A.

‡Sterile disposable extension tube. Length 22 in (56 cm). Blackwell Anaesthetic Equipment Co., England.

fact, the greatest worry should be fear of puncturing one or other posterior inferior cerebellar artery. In the normal person both arteries lie just off the midline and thus should not be at risk. Furthermore, as a rule they do not dip as low as the needle point when it is placed in the cisterna magna. In a small minority of normal subjects, however, these arteries may not only come to the midline but may dip below the level of the occipito-atlantal junction. Thus to be absolutely safe one should puncture between the atlas and the axis (where there is ample space between the spinous processes). There has been the occasional rare disaster of puncturing a posterior inferior cerebral artery at the occipito-atlantal junction.

As already indicated, the puncture at the C1/C2 level should be conducted under television control. The patient is placed in the true lateral position, the head flexed and supported by small pillows. The table should be tilted about 10° feet-down to enable the contrast substance to flow freely distally in the subarachnoid space in a similar manner to the lumbar technique described earlier. The same type of needle, three-way tap, tubing, and syringe are used.

If a complete block is present, about 3 ml of contrast substance is quite enough. After its introduction the needle is

immediately removed, as in these cases there is no question of withdrawing the contrast substance at the end of the examination. The patient is next tilted feet-down as far as the vertical if necessary. If he is paraplegic or tetraplegic and cannot support his own weight a suitable harness is used to support the crutch.

A complete block is easily seen on the television screen and appropriate radiographs are taken showing the upper level of the lesion. After this the patient is maintained in at least a semi-erect position to allow gravity to enable the contrast substance to seep past in part or in toto. After about half an hour he is re-examined and usually no seepage has occurred. The patient is then returned to the ward with instructions to remain in the semi or even quarter erect position (so far as the spine is concerned).

He should then be re-examined next day when the clinical picture allows such a delay. In most cases it will be found that some of the oil has now seeped past the block and collected at the lower end of the theca at the level of the first sacral vertebra.

The final procedure is to tilt the patient head-downwards in order to run the distal fraction of the oil up to the block. Radiographs are then taken and by synthesizing the two sets of pictures the extent of the lesion can be accurately defined.

Medical Education

Significance of Literacy in the Performance of Students in the First Year of the Nottingham Medical Course

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Summary

The "literacy" of a fresh intake of medical students as measured by standardized vocabulary tests has been measured and correlated with examination performance during the first year. Although most students lacked an upper social class upbringing, medical parents, or a classical education, the group performed to a high standard in the tests, comparable with an English honours intake. On the other hand, there appears to be no correlation between an extensive working vocabulary and the ability to perform well in any aspect of the course, apart from the community studies. A qualification in Latin confers no advantage at all on the aspiring doctor.

Introduction and Methods

Those who hold the view that medicine is a learned profession composed of men and women of broad culture must be saddened by the alarms raised at regular intervals in the medical press. It is said that as a learned profession medicine is on the decline; this is ascribed to a number of factors, such as the disappearance of the classics in education, the admission to medical schools of the lower social classes, and the general incompetence of

modern educational methods, which, it is claimed, have produced a semi-literate generation from which the candidates for the profession have to be drawn. One such claim¹ led us to put the matter to the test.

"Literate," "semi-literate," and "illiterate" are terms that do not lend themselves easily to scientific definition and measurement, but we believe that it is possible to measure with accuracy one major aspect of literacy—namely, the width and quality of a student's reading. We have worked on the hypothesis that the greater the number of words to which a person can give an acceptable meaning and which he can use accurately in context the wider his reading is likely to have been. We have discounted the possibility that a person can accumulate a large working vocabulary solely through conversation or exposure to media such as television. We realize that by employing vocabulary tests to measure width of reading we are not measuring linguistic expression in its full sense and are unable so far to evaluate scientifically complaints that modern students are unable to express themselves in writing—that is, are unable to handle the *syntax* of the language.²

TESTS EMPLOYED

The tests consisted of six basic word groups indicating the following vocabulary levels: (1) 6,000 words, likely to be reached between 8 and 9 years of age; (2) 12,000 words, likely to be reached between 11 and 12 years; (3) 18,000 words, likely to be reached between 15 and 16 years; (4) 24,000 words, likely to be reached in full-time education between 17 and 18 years; (5) 30,000 words, likely to be reached during the years of higher education; and (6) 36,000 or more words, words occurring so rarely that few people can ascribe a meaning to them.

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