Plastic Units at Hill End Hospital, St. Albans, for their co-operation and for providing much of the clinical material.

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CALCULATION OF TUXFORD'S INDEX BY GRAPHICAL METHODS

BY

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Q.—In a large series of cases the calculation of Tuxford's index of nutrition in childhood is laborious and time-consuming. Is it possible to devise a graph from which the index may be rapidly computed?

Tuxford's (1939) index of nutrition in male children is given by the formula:

$$T = \frac{W}{H} \times \frac{379 - m}{0.3} \quad (\text{Equation 1})$$

where W =weight in lb., H =height in inches, and m =age in months.

The normal level of the index, according to Tuxford's data, which were based on 584,000 measurements made in 1909–10, is 1,000. Although this is naturally an arbitrary figure it is contended that the index does provide some basis for a comparison between different groups of children and between different stages of development among the

same children when a clinical examination is not possible. The validity of this assumption was tested extensively against clinical examination by Huws Jones (1938).

The calculation of the index for a large number of cases is laborious, and although a graphical method of calculation was indicated in the original paper it is not simple to use.

The original formula can be arranged as follows:

$$y = \frac{W}{H} \quad (\text{Equation 2}) \quad \text{and} \quad y = \frac{0.3T}{379 - m} \quad (\text{Equation 3})$$

It should be noted that " y " is an algebraic expression which is needed only for the construction of graphs and is not calculated in any individual case.

Construction and Use of the Graphs

Equations 2 and 3 can now be graphed separately. In the case of Equation 2, if y is the vertical axis and W the horizontal axis, then for one given fixed value of H there is a diagonal line which will fix all values for y and W . Consequently by drawing a series of diagonal lines, like contours, for each value of H from say 18 to 66 in. it is possible to cover all appropriate values of W , y , and H . The simplest way to construct this graph is to notice that along the horizontal line $y=1.0$, $W=H$, so the exact points for W for each height can be fixed—e.g., $H=20$ in., $W=20$ lb. Similarly along the line $y=1.5$, $W=\frac{3}{2}H$, so the exact points of W can again be fixed—e.g., $H=20$ in., $W=30$ lb. These points can then be joined by straight lines and extended if necessary. A skeleton of this is outlined in Graph 1.

In the case of Equation 3, again make y the vertical axis on exactly the same scale as before, only this time tabulate it on the right-hand side of the graph. If T is the horizontal scale moving from right to left, then, as before, a series of contours for each fixed level of m can be drawn which will be straight lines. The simplest method of drawing these is to take the two vertical lines $T=1,000$ and $T=900$, where y will be $\frac{300}{379 - m}$ and $\frac{270}{379 - m}$ respectively. This gives two points for each value of m , and thus the corresponding contour line will be fixed uniquely—e.g., $m=0$ and $T=1,000$, then $y=0.792$, and when $m=0$ and $T=900$, then $y=0.712$. The line joining these two points gives the contour for age at birth. This is illustrated in Graph 2. Graphs 1 and 2 may now be placed side by side so that the vertical axes coincide.

If it is proposed to use a separate index for females as suggested by Tuxford it will be necessary to construct an alternative Graph 2 from the formula:

$$y = \frac{0.27T}{355 - m} \quad (\text{Equation 4})$$

As previously, all the contours are straight lines which can be readily constructed by marking the two points where each line cuts the two vertical lines $T=1,000$ and $T=900$.

Use of the Graphs.—On Graph 1 measure off the weight of the child along the horizontal axis and the height along a diagonal contour; these will give a fixed point. Place a ruler horizontally through this point, move along the ruler on to Graph 2 until it cuts the appropriate age contour on this second graph, then move vertically downwards on to the T scale; this will fix the index of nutrition. An alternative method would

Tuxford's index of nutrition in childhood. Specimen chart: Weight 56 lb., height 50 in., age 120 months; index 967.

be to engrave Graph 2 on a transparent substance such as mica or celluloid, which could then be moved over the first graph until the age contour coincides with the appropriate point on Graph 1.

Accuracy of the Result

The accuracy of the result depends entirely upon the size of the scales and the skill of the draughtsmanship used in their construction. The best scales on ordinary 1/10-in. squared paper would probably be:

for y from 0.7 y to 1.5 $y=16$ in.
for W from 0 to 100=10 in.
for T from 900 to 1,100=10 in.

The height contours can then be drawn for every inch in height from 18 to 66 in. and the age contours for every 3 months from 0 to 168 months. In these conditions it will be possible to determine T accurately to the nearest unit.

To demonstrate the use of the graphs an illustrative chart is given. Start with weight 56 lb., move vertically upwards till this line cuts the contour for height 50 in., then move horizontally to the left until the contour for age 120 months is cut on Graph 2, then vertically downwards on to the scale for the index, which reads $T=967$.

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Medical Memoranda

Spontaneous Delivery of Placenta in Front of Foetus without Haemorrhage

Spontaneous delivery of a placenta in front of the foetus is a rare happening, and for it to occur without haemorrhage is very rare indeed.

CASE REPORT

The patient, a 7-gravida aged 43, was admitted to hospital under the care of Prof. Hilda Lloyd on May 24, 1947, as an emergency case with a prolapsed cord. Her last menstrual period began on Sept. 12, 1946, she was thus 37 weeks pregnant. She had no abnormal symptoms during this pregnancy, and was reported as having been normal before the onset of labour. Her six previous pregnancies included four normal ones and two breech presentations, both of the latter resulting in stillbirths.

She stated that pains had started at 5.30 o'clock that evening, the "waters breaking" two hours later with the escape of a "moderate" amount of blood-stained liquor. She was quite definite that it was "blood-stained water" and not pure blood. She also stated that the cord first appeared at the vulva shortly after this, and she then (and only then) sent for her nurse, who promptly summoned the doctor.

On admission at 9.45 p.m. her general condition was good, temperature 98.2° F. (36.8° C.), pulse 100, and B.P. 134/88. The urine contained no albumin, sugar, or acetone. There was no clinical anaemia. Abdominal examination showed the foetus to be lying obliquely, with the head in the right iliac fossa. She was having good contractions, one every three minutes, but the presenting part was not fixed. The foetus was a small one. No foetal heart could be heard. Inspection of the vulva showed a protruding loop of umbilical cord, involving about 6 in. (15 cm.), lying outside the vulva.

The patient was anaesthetized with thiopentone and gas, oxygen, and ether, and placed in the lithotomy position. After thorough disinfection of the vulva and prolapsed loop of cord, which was not pulsating, a hand was inserted into the vagina, and the placenta was encountered lying free but without any membrane attached. It was now obvious that the foetus must be dead; the placenta was removed, and the cord excised generously to minimize the risk of carrying infection upwards during the subsequent manoeuvres. The cervix was dilated between three and four fingerbreadths, soft, and thin. The presentation was a shoulder with the back anterior.

In view of the retention of membranes and the small dead foetus, immediate delivery was decided on. After internal version had been performed a leg was brought down, and gentle traction was exerted on the half-breech. The other leg was then brought down and the foetus delivered without difficulty as far as the waist. Both arms were extended and were now brought down. The body was then allowed to hang for two or three minutes by its own weight, after the manner of Burns. At the end of this time the cervix still gripped the head firmly, so the skull was perforated through the mastoid region, delivery then being completed without difficulty. There was no abnormal bleeding. Ergometrine, 0.5 mg., was given intravenously, and the retained membrane was removed with forceps. Again there was no unusual loss. The cervix and lower uterine segment were carefully examined, but were found to be undamaged. The patient was given 100,000 units of penicillin immediately, and a total of 500,000 during the next twenty-four hours, as a prophylactic, systemically. The puerperium was entirely afebrile, and was normal in every respect.

The foetus (with perforated skull) weighed 3 lb. (1.36 kg.), and was a male with a marked degree of hypospadias and double hare-lip. It revealed no sign of maceration. The placenta showed no gross abnormality, was normal in size, and weighed 11 oz. (310 g.)—a fair weight in proportion to the weight of the foetus.

COMMENT

It is suggested that the possible mechanism was that the placenta had a poor attachment, becoming detached with the onset of pains, and that the uterine contractions, possibly assisted by a mild degree of hydramnios (a not unreasonable assumption in view of the foetal abnormalities), drove the presenting part down and plugged the placental area. If this was partly or largely on the anterior surface of the lower segment the foetal back was ideally placed for the purpose.

The assumption that the placenta was attached to the lower segment seems to be the only possible explanation that covers the three facts of primary placental separation, retention of membranes completely, and absence of haemorrhage.

My thanks are due to Prof. Hilda Lloyd for permission to publish this case, and to Mr. Hugh McLaren, First Assistant to the University of Birmingham Gynaecological and Obstetric Unit, for his advice and encouragement.

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Suturing the Fractured Olecranon

For those who prefer simple suture to the use of wire or screw for the fractured olecranon the following method may be found useful in overcoming the difficulty of tying sutures tightly enough to give perfect fixation.

The fragments are drilled transversely. Two sutures are passed through the drill holes in opposite directions and tied as tightly as possible. The knots then lie one on each side of

the bone. One end of each suture is left long (Fig. 1). These long ends are passed across the bone and with the aid of an aneurysm needle are threaded under the sutures on the opposite side (Fig. 2). They are then tied together tightly across the bone, thus greatly increasing the tension of the sutures, and incidentally holding down the spur of bone commonly found on the upper fragment due to the oblique direction of the fracture (Fig. 3).

The principle is of course in common use at sea and for lashing loads on railway trucks and lorries.

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