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Which deliveries require paediatricians in attendance?

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Abstract

The mode of delivery and one minute Apgar score were taken from the neonatal records of 2086 full term infants born at one obstetric unit over 12 months. There were 1554 spontaneous vaginal vertex deliveries, 26 vaginal breech deliveries, and 506 operative or instrumental deliveries. The obstetric records of the operative deliveries were reviewed to determine whether fetal distress had been an indication for intervention, and the obstetric records of the spontaneous vaginal vertex deliveries were also reviewed for fetal distress detected antenatally. When fetal distress was present antenatally in spontaneous vaginal vertex deliveries the frequency of a one minute Apgar score below 7 was 10.2%. In operative and instrumental deliveries where fetal distress was the indication for intervention the frequency of a one minute Apgar score below 7 was 15.6% after non-rotational forceps delivery, 13.9% after rotational forceps delivery, and 45.8% after caesarean section. In the absence of fetal distress the frequency of an Apgar score below 7 was 2.4% after spontaneous deliveries, 7.1% after non-rotational forceps delivery, 13.2% after caesarean section, and 18.4% after rotational forceps delivery. The presence of fetal distress considerably increased the frequency of an Apgar score below 7 in each category except rotational forceps deliveries.

Paediatric services to an obstetric unit may be organised rationally in the light of local staffing conditions with the help of these findings.

Introduction

Though theoretically desirable, it is not practicable to have someone skilled in neonatal resuscitation present at the delivery of every baby. Most obstetric units have developed guidelines defining when a paediatrician is needed. These guidelines normally include all preterm deliveries and all operative and instrumental deliveries performed on full term infants. To determine whether this is necessary, we attempted to define the factors most likely to increase the need for resuscitation.

Methods

Details of all 2086 term deliveries at the Northern General Hospital, Sheffield, from July 1980 to June 1981 were reviewed to determine the mode of delivery and one minute Apgar scores. Since there is a prima facie case for the presence of a paediatrician at the delivery of preterm infants (less than 37 weeks' gestation), all 195 preterm infants were excluded from the study.¹ The obstetric records of operative and instrumental deliveries were reviewed to ascertain whether fetal distress was an indication for the intervention. In most cases fetal distress was clearly stated in the delivery records; if not, in this study it was defined as one or more of the following: (a) meconium stained liquor, (b) unspecified bradycardia, (c) type II decelerations or loss of beat to beat variations in the fetal heart trace, (d) antepartum haemorrhage leading to emergency caesarean section. The obstetric records of the full term deliveries were also reviewed for evidence of fetal distress. In these case notes fetal distress was less well described and the commonest criteria of fetal distress found retrospectively were unspecified bradycardia and meconium stained liquor. The type of abnormality used to define fetal distress had no effect on the distribution of Apgar scores.

We defined one minute Apgar scores as high if 7 or more, medium if 4 to 6, and low if 3 or less. Comparison of Apgar scores in different groups was by χ^2 testing with correction for discontinuity.

In the absence of fetal distress the mode of anaesthesia for caesarean section had no effect on the distribution of Apgar scores, so all caesarean sections without fetal distress were analysed together regardless of anaesthetic technique.

Results

Of the 2086 term deliveries, 1554 were spontaneous vertex vaginal deliveries, 26 were vaginal breech deliveries, and 506 were operative or instrumental deliveries. The obstetric records for 1311 of the

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spontaneous deliveries were reviewed for evidence of fetal distress; the rest were unobtainable but the distribution of one minute Apgar scores in these infants did not differ from that of the others. Vaginal breech deliveries were not assessed for fetal distress because of the difficulties in interpreting meconium liquor in this group, but only 21 out of 26 had a high Apgar score. Of 506 operative or instrumental deliveries, the obstetric records of 470 were reviewed. Fetal distress was significantly commoner ($p < 0.001$) in infants delivered by forceps than in those delivered spontaneously or by caesarean section (table I).

Infants were categorised by mode of delivery and (other than breech) by the presence or absence of fetal distress. The distribution of one minute Apgar scores in each category was analysed. Between 12% and 46% of all infants with fetal distress had an Apgar score below 7, the risk of such a score being least in spontaneous deliveries and greatest in infants delivered by caesarean section (table II). In the absence of fetal distress 2% to 18% of infants had an Apgar score below 7, the risk of such a score being least in spontaneous deliveries and greatest in deliveries by rotational forceps (table III). The cumulative percentage of infants with an Apgar score below 7 was related to the category of delivery in decreasing order of risk (figure). Thus if a paediatrician had attended the six categories at greatest risk (20% of all term deliveries), over one half of all infants with a low or medium Apgar score would have been correctly identified.

Discussion

The workload of junior paediatric staff has greatly increased in the past few years, especially in centres with intensive care nurseries. It is desirable, therefore, that paediatric resources are used efficiently. Although most obstetric units have guide-

lines defining those deliveries that require a paediatrician in attendance these are not based on published data relating to current obstetric practice. Two factors which affect the decision to request a paediatrician are the presence of fetal distress and the planned mode of delivery. We have therefore categorised deliveries in this way for analysis.

The Apgar score is the only well recognised method of clinically assessing the newborn infant.² Since the need for urgent resuscitation depends on such assessment the one minute Apgar score is a better indicator of the need for paediatric attendance at delivery than measurements of physiological disturbance such as umbilical artery pH. We have used arbitrary definitions for low, medium, and high Apgar scores. Since the

TABLE I—Mode of delivery and incidence of fetal distress in 1781 term infants

Mode of delivery	Fetal distress	
	No	%
Spontaneous vertex vaginal	206/1311	15.7
Non-rotational forceps	64/177	36.2
Rotational forceps	36/90	40
Vacuum	3/4	75
Caesarean section (general anaesthetic)	24/127	18.9
Caesarean section (epidural)	6/60	10
Caesarean section (unknown anaesthesia)	3/12	25

TABLE II—Mode of delivery and one minute Apgar score in 1438 infants without fetal distress. Results are numbers and percentages

Apgar score	Mode of delivery			
	Spontaneous vertex vaginal delivery	Non-rotational forceps	Rotational forceps	Caesarean section
≤3 (low)	1 (0.1)	1 (0.9)	1 (1.8)	4 (2.4)
4-6 (medium)	25 (2.3)	7 (6.2)	9 (16.6)	17 (10.8)
7-10 (high)	1079 (97.6)	105 (92.9)**	44 (81.5)**	145 (86.8)***
Total	1105	113	54	166

** $p < 0.01$ and *** $p < 0.001$ compared with spontaneous delivery.

TABLE III—Mode of delivery and one minute Apgar score in 330 infants with fetal distress. Results are numbers and percentages of patients

Apgar score	Mode of delivery			
	Spontaneous vertex vaginal delivery	Non-rotational forceps	Rotational forceps	Caesarean section (general anaesthetic)
≤3 (low)	3 (1.4)	2 (3.1)	1 (2.8)	3 (12.5)
4-6 (medium)	21 (10.2)	8 (12.5)	4 (11.1)	8 (33.3)
7-10 (high)	182 (88.4)	54 (84.4)	31 (86.1)	13 (54.2)*
Total	206	64	36	24

* $p < 0.05$ compared with spontaneous delivery.

Histogram showing the effect of including progressively lower risk categories of delivery on the percentage of low or medium Apgar scores and on the percentage of all term deliveries. The total number of deliveries was 1794 and of low or medium Apgar scores was 120. The categories of delivery are: (1) caesarean section with fetal distress; (2) breech; (3) rotational forceps without fetal distress; (4) non-rotational forceps with fetal distress; (5) rotational forceps with fetal distress; (6) caesarean section without fetal distress; (7) spontaneous vertex vaginal with fetal distress; (8) non-rotational forceps without fetal distress; (9) spontaneous vertex vaginal without fetal distress.

proportions of low and medium scores were similar in each category of term delivery, we used the proportion of deliveries with a low or medium score in each category as an indicator of the relative need for paediatric attendance.

The rational deployment of paediatric manpower for neonatal resuscitation starts with the premise that all preterm deliveries (195 in this example) are attended. Thereafter the yield of low or medium Apgar scores may be calculated against workload by reference to the figure. The categories have been arranged in the figure in order of decreasing yield of low or medium Apgar score per births attended. For example, if 10% of all term deliveries (200) were attended, and these included all cases of caesarean section with fetal distress, all breech deliveries, all rotational forceps deliveries, and non-rotational forceps deliveries with fetal distress (the first five categories shown), then 34% of the low or medium Apgar scores would be included. A sensible decision in a hospital where a quarter of all deliveries could be attended by a paediatrician would be to select these five categories as well as all preterm infants and those without fetal distress undergoing caesarean section. This would yield among term infants 52% of the medium and low Apgar scores for the work of attending 19% of the term deliveries, in this example 62 out of 370.

A unit with more staff, however, might decide to attend all

instrumental deliveries. The figure shows that this would logically demand attendance at all spontaneous vaginal deliveries with fetal distress, since this group has a higher proportion of low or medium Apgar scores than non-rotational forceps deliveries without fetal distress. This decision would entail attendance at 37% of term deliveries but would yield 78% of all term infants with low or medium Apgar scores. Including preterm deliveries, this policy would mean attending 19 deliveries a week in our hospital studied, out of about 2300 deliveries a year. Attending 10% and 20% of term deliveries as outlined previously would mean attending a total of eight and 12 deliveries a week respectively.

The results may be used to guide the reader in which categories of delivery should be attended to produce the most effective work for the manpower available.

Two other aspects of our study require discussion.

Rotational forceps—Chiswick and James reported a similar number of rotational forceps deliveries to ours.³ The incidence of fetal distress in both studies was 40%. In their study the incidence of delayed respiration at birth was considerably increased when fetal distress had been present, whereas in our study the high incidence of a low or medium one minute Apgar score (16%) was unaffected by fetal distress. Our findings are supported by other recent work.⁴ Since we have shown that our definition of fetal distress is associated with a decreased Apgar score in other forms of delivery, this finding suggests that a mid-cavity rotational forceps delivery is inherently associated with a decreased chance of a high Apgar score. This could be a risk associated with the failure to rotate spontaneously, or with the procedure itself, rather than the indication for its use.

Caesarean section—When infants with fetal distress were excluded the incidence of low one minute Apgar scores in our study was similar whether the caesarean section was performed under general or epidural anaesthesia. Our findings and our overall rate of low Apgar scores are similar to those reported.⁵ The interval between induction and delivery, which is an important factor,⁶ was not analysed in either study, but the

findings suggest that increasing care is being taken to avoid prolonged general anaesthesia.

Breech delivery was associated with an increased incidence of low Apgar scores in our study. Breech presentation and delivery are hazardous,⁷ and clearly these deliveries have priority for paediatric attendance.

The overall incidence of low or medium Apgar scores after spontaneous vertex deliveries in our study was 4.2%. This is similar to the 5.3% reported in a large American collaborative study,⁸ but less than the findings of another study, where 7.3% of infants had an Apgar score of below 6 at one minute after a spontaneous vaginal vertex delivery.⁴ Since this group had a policy of less intervention in the second stage of labour the results are not strictly comparable.

We did not set out to compare the benefit or risk to comparable infants of different modes of delivery. Our aim was to define "at risk" groups in obstetric practice that can be detected antenatally, so that a data base can be provided for rational decisions about perinatal paediatric services.

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SHORT REPORTS

Ulnar nerve palsy in a haemophiliac due to intraneural haemorrhage

Peripheral nerve lesions are a common complication of haemophilia, occurring in 10-13.6% of patients.^{1,2} The aetiology of these lesions has been reported to be intramuscular or intra-articular haemorrhage with subsequent extrinsic nerve compression.³ We report a case of ulnar nerve palsy due to intraneural haemorrhage and consider the implications of this finding for diagnosis and treatment.

Case report

A 9 year old boy with haemophilia presented after receiving a bump at play to the right elbow. He had severe haemophilia with a factor VIII concentration of 1-2% and required regular factor VIII replacement treatment on a home treatment programme. The results of regular screening tests for factor VIII inhibitors were negative. He had experienced few previous haemarthroses affecting the elbows. On examination the elbow joint was normal and there was no local bruising or swelling. The ulnar nerve was clinically intact. A radiograph of the elbow was normal. Treatment with antihemophilic factor was given and he was allowed home.

The next day he developed paraesthesiae on the medial border of the right hand but did not present again until four days after the original injury. At this time there was reduced sensation over the medial two fingers of the right hand and ulnar surface of the palm. The muscles of the hand innervated by the ulnar nerve were weak and he had developed a claw hand. No bruising, swelling, or tenderness was detected at the elbow or elsewhere in the arm. Factor VIII replacement treatment was started and surgical ulnar nerve decompression undertaken. Under tourniquet control a posteromedial incision was made and the cubital tunnel exposed. No free blood was in

the cubital tunnel when it was opened, but the nerve was hyperaemic for 2-3 cm and had a bluish discoloration. The epineurium was divided, with escape of free blood.

After surgery the wound healed well with no further bleeding. The next day normal sensation in the ulnar nerve distribution and a full range of finger movements had returned. Factor VIII treatment was continued for 10 days. At the time of his discharge he had full ulnar nerve function on clinical testing. About two weeks after surgery nerve conduction studies showed that motor conduction across the right elbow segment was slightly slower than normal and that on the left side. Ulnar sensory action potentials were present at the wrist but not at the elbow on the right side. Repeat studies three months later showed some remaining relative delay in cross elbow motor conduction but with considerable improvement since the first study.

Comment

Reported causes of peripheral nerve lesions in haemophilia include intramuscular, intra-articular, and perineural soft tissue haemorrhage and nerve compression from large pseudotumours. The nerve affected most often is the femoral, in association with an iliacus haematoma,⁴ followed by the ulnar nerve, which accounts for 17.2% of peripheral nerve lesions.¹ The cause of these lesions is thought to be extrinsic compression. This is the first report of a peripheral nerve lesion due to intraneural haemorrhage in a haemophiliac. The ulnar nerve at the elbow is susceptible to direct trauma, but in this case there were no local findings to confirm this as the site of nerve injury. The lack of localised swelling, bruising, or bony injury should not detract from the diagnosis, and the spontaneous, isolated development of an ulnar nerve palsy in a haemophiliac should prompt investigation for possible intraneural haemorrhage.