Hospital Topics

Prognosis and early management of birth injuries to the brachial plexus

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Summary

Twenty-four cases of birth injury to the brachial plexus were seen in 21 infants over 15 years. Obstetric complications were common, and in 11 cases traction was needed to deliver the shoulders. Three out of every four arms fully recovered after exercises. Splints were not needed. Reconstructive procedures were performed on three permanently paralysed arms when the children were aged about 4. There was no way of predicting which patients would recover. The muscles supplied by the suprascapular nerve were paralysed in all patients, and this paralysis persisted in those whose arms failed to recover fully.

Introduction

Paralysis of the arm from birth injury to the brachial plexus was probably first described by Smellie in 1764,¹ but it was Erb² who, in 1872, localised the lesion most commonly produced to the junction of the fifth and sixth cervical roots in the upper trunk of the plexus and gave his name to the condition. He attributed the damage to the "Prague manoeuvre" used in difficult delivery of the shoulders.

Nearly all subsequent reviews³⁻⁷ have been of selected cases, many being seen for the first time some months after birth, and follow-up often being incomplete. Only 7-36% of such patients fully recovered.⁴⁻⁶ In a cohort study from birth, however, 90% of patients had regained full use of their arms by the age of 4.⁹

We review here 24 birth injuries to the brachial plexus in 21 infants seen in one obstetric department over 15 years. All except the most transient palsies are included.

Present series

The 24 injuries occurred in 21 out of 34 299 live births during 1960-74, giving an incidence of 0.61 per 1000 live births. Eleven patients were girls. In 14 the palsy was left-sided, in 4 right-sided, and in 3 bilateral. No associated fractures were seen but there was one case of facial nerve palsy.

Obstetric complications were common. In 11 cases traction was used because of difficulty in delivering the shoulders, in three forceps

were needed, and two were breech presentations. Only five deliveries were uncomplicated. Eight infants (38%) needed active resuscitation.

In common with other series³⁻⁹ the birth weights were above average. With the exclusion of two unusually small babies (907 and 1430 g) delivered by shoulder traction because of breech presentation, the average weight was 4180 g (range 3486-5145 g). The obstetric figures generally agree with those in other reports,³ although a higher incidence of breech presentation is common.³⁻⁵ Tan³ emphasises that forceps not shoulder traction should be used in breech deliveries to deliver the after-coming head. In this series traction was used when there was difficulty in delivering the shoulders. Traction makes brachial plexus damage more likely,⁸ especially when the child is large and there is cephalopelvic disproportion.

DIAGNOSIS

In the classic presentation of Erb's palsy (the "waiter's-tip" position) the arm is adducted and internally rotated, the elbow extended, the forearm pronated, and the wrist flexed. Active movements are reduced or absent. Although local signs of damage to the plexus were difficult to find in this series, diagnosis was not difficult. There were two cases of isolated radial nerve palsy and one child, suspected of having Erb's palsy when 10 days old, was found to have a pseudoparalysis from an acute infective arthritis of the shoulder.

Careful and repeated examination was needed to ascertain the amount of damage to the plexus. Postural changes were noted particularly and only muscles that persistently failed to produce joint movement were accepted as paralysed. Sensory testing was not attempted, although in the more severe cases dryness of the denervated skin was clear. Tendon reflexes were of limited value in confirming suspected motor loss. The external rotators and abductors of the shoulder and the elbow flexors were paralysed in all cases, indicating injury to the upper trunk (C5 and C6 roots). In 14 of the 24 arms this was the total damage. In the remainder there was also paralysis of the wrist and finger extensors in four, indicating damage to the C7 root and in six the arm was completely flail from damage to the whole plexus. No patient had any detectable weakness of serratus anterior, and none had Horner's syndrome. No example of the lower or Klumpke pattern of paralysis was seen.

MANAGEMENT

The aim of treatment was to prevent the development of contractures while waiting for the brachial plexus to recover. The mother was taught to put the affected limb through a full range of passive movements many times a day. In all cases the wrist and fingers were extended and the shoulder was abducted and externally rotated to bring the hand behind the head. In the more severely affected full passive movements of flexion and internal rotation were also practised. Progress was carefully monitored by examination at gradually increasing intervals.

Results

Eighteen of the 24 arms (75%) fully recovered. Of the 14 arms with damage only to the C5 and C6 roots 12 fully and two partially

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recovered. Of the four arms in which the seventh cervical root was also damaged, three recovered fully and one partially. Three of the six flail arms fully recovered and three partially recovered. Recovery generally followed a centripetal pattern, the more distal movements returning first. In cases of eventual full recovery the outcome was apparent within one week to five months, although observation was continued for an average of nine months to confirm the accuracy of the assessment. All arms that recovered showed some improvement within the first two weeks and most had returned to apparent full function within one month. No persistent joint contracture developed in any of the 18 arms in which neurological recovery was apparently full. Six arms remained partially but permanently paralysed. They improved up to 12 months, but little after that. In all, paralysis of the external rotators of the shoulder persisted, this being the only deficit in two. All developed an internal rotation contracture at the shoulder of between 30° and 90°, and four had loss of up to 40° extension at the elbow.

Reconstructive procedures were delayed until the child was around 4 years old—old enough to co-operate in preoperative muscle charting yet before starting school. A teres major tendon transfer was done in three children, permission being withheld in a fourth. One child also had a flexor-to-extensor transfer at the wrist. The outcome of this type of operation was reviewed by Wickstrom.⁴

Discussion

These findings indicate that some recovery occurs in nearly all cases of Erb's palsy, even when the whole plexus has been damaged, and that three out of every four fully recover within a few months. In cases of full motor recovery contractures may be prevented by simple passive exercising, a procedure well within the capacity of the mother. There is no need to splint these limbs, as is sometimes still advocated.¹⁰⁻¹² Contractures reflecting the residual muscle imbalance are difficult to prevent in patients with irrecoverable plexus damage. Parental manipulations have not proved sufficient, loss of external rotation range at the shoulder being particularly troublesome. Surgery is the only effective treatment for these difficult cases. It is hard to see how splinting—for example, in an abducted and externally rotated position—could prevent these contractures. Indeed,

splinting may cause contracture.⁶ It is impossible at an early stage to predict which cases will recover and which will not. Therefore, to splint when an effective, risk-free method of treatment is available is to take an unjustifiable risk of causing an iatrogenic contracture in a limb which would otherwise probably recover.

In all cases in the present series the muscles supplied by the suprascapular nerve (supraspinatus and infraspinatus) appeared to be paralysed at least temporarily, and persistently in all those limbs that failed to recover completely. Probably this nerve suffers severely in depression of the shoulder, both because its course between the plexus and the scapula is short and because it is relatively firmly fixed to the bone where it passes through the suprascapular notch. It appears particularly apt to suffer neurotmesis, while anatomically more caudal nerves with a longer course and serving more peripheral muscles suffer only a neuropraxia and rapidly recover. Hence the rather paradoxical centripetal pattern of recovery.

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Reducing outpatient attendances

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Summary

Outpatient attendances can be reduced by indirect contact by letter and telephone; this frees the consultant to concentrate on patients attending for the first time. Such methods have not yet been fully exploited in the National Health Service.

Introduction

Some consultations in National Health Service hospitals take place between patient and doctor at the outpatient clinic. In

private practice in Britain and in other countries, notably the USA, letters and the telephone are often used as additional means of consultation. Selective use of these can reduce the strain on patients, doctors, nurses, and records clerks and has been successful in a surgical clinic devoted mainly to diagnosing and treating upper gastrointestinal tract disorders.

Initial attendance

Limitation of future visits depends, among other things, on creating good relations with patients when they first attend. The initial consultation is therefore conducted without hurry. This is achieved by starting clinics promptly and by making special appointments so as to avoid too many patients waiting with the consequent curtailing of interviews. At the end of the examination, plans for future investigation and management are discussed with the patient and, when possible, accompanying relatives.

Patients are given further appointments only if subsequent management is likely to be affected by the results of the initial investigations. When such tests are unlikely to produce fresh evidence, selected patients are told that they will be informed of the results by letter but

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