

## ERB'S PALSY

BY

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The term Erb's palsy is applied to that particular type of birth palsy in which the paralysis, or paresis, is confined to muscles supplied by the fifth and sixth cervical nerves. The deltoid, supra-spinatus, infra-spinatus, teres minor, biceps, brachialis, brachio-radialis, and supinator muscles are usually involved in severe cases, whereas in mild cases only some of these muscles are affected. As a result of the paralysis of the above muscles, the attitude of the arm affected by Erb's palsy is characteristic and follows logically on the lack of power in the paresed or paralysed muscles, that is, the arm hangs inert by the side as a result of lack of power in supra-spinatus and deltoid; the elbow is extended as a result of involvement of the elbow flexors; the hand is rotated so that the palm faces backwards, resulting from the unopposed pull of sub-scapularis and loss of power in the supinator and brachio-radialis. There are no sensory changes.

The palsy is now usually accepted as being due to stretching of the supra-clavicular portion of the brachial plexus during birth, and therefore obstetrical technique is a main factor in considering the etiology.

Apart from a report on 150 selected cases by Sever (1916), a search of the literature has failed to reveal any other large series of these cases, and it was felt that useful information about the condition and the results of treatment could be elicited by reviewing the cases which have attended the out-patients' department of this busy provincial teaching hospital during the last twenty-one years. Actually 125 cases of Erb's palsy presented themselves during that time, but the author has only been successful in tracing and interviewing thirty-seven of this group. For the purpose of studying the incidence of the condition, the whole series of 125 cases has been reviewed. In discussing the effect of treatment, only the thirty-seven cases followed up have been considered.

### Incidence

Of the 125 cases sixty-six occurred in male children, and fifty-nine in female, a sex incidence very slightly in favour of males. Sixty-eight cases showed a left-sided palsy, and fifty-three showed a

right-sided palsy, while four were bilateral. At the time of review the ages of these cases varied from 2 years 1 month to 25 years.

### Birth Details

As birth injury is accepted as a causative factor, it was not surprising to find that fifty-four cases occurred in primigravida, while twenty-nine cases were second children. Subsequent pregnancies accounted for forty-two cases. It is interesting to note, however, that the paralysis occurred in a fifteenth child, a breech birth with extended arms, and also in a sixteenth child, a vertex presentation delivered without forceps.

Moreover, it was found that ninety-one cases were delivered as vertex presentations, and in forty-seven of these forceps were used to assist delivery. (In the thirty-seven cases reviewed, four mothers particularly stated that there had been trouble with delivering the arm or shoulder, but such details could not be obtained in other cases.) Of thirty-two breech presentations, eleven necessitated the use of forceps. Thus forceps were used in approximately half the number of deliveries, and the part played in causation of palsy is problematical. Sever's experiments on the cadaver suggest that lateral bending of the head and neck to the opposite side causes injury to the fifth and sixth cervical nerves, and the vigorous use of forceps may be an etiological factor in these cases. In addition, there is more likelihood of causing injury to the brachial plexus and subsequent Erb's palsy in delivering the arms in a vertex presentation than in a breech presentation.

However, by far the most striking factor noticed was the large size of the babies at birth. Apart from two average cases weighing 7 lb., two weighing 6½ lb. and 6½ lb. respectively, and one weighing 5 lb., all other cases weighed 8½ lb. or over, several weighing 10, 11 or 12 lb. while one weighed 13 lb. and another actually 16 lb. The average weight for the series was 11½ lb. Presumably a big baby causes greater trouble in delivery, particularly in bringing down the arms if they are caught above the head.

### Treatment: Thirty-seven Cases

The treatment of all cases was that of adequate splintage associated with massage, together with exercises in older children. A simple abduction

TABLE  
ANALYSIS OF TREATMENT OF THIRTY-SEVEN CASES OF ERB'S PALSY

| Treatment started |          | No. of cases | Completely recovered | Length of treatment (years) | Failures | Length of treatment (years) |
|-------------------|----------|--------------|----------------------|-----------------------------|----------|-----------------------------|
| Under             | 1 month  | 13           | 12                   | 2                           | 1        | 4                           |
| At                | 1 month  | 5            | 2                    | $\frac{3}{4}$               | 3        | 2                           |
| "                 | 2 months | 8            | 3                    | 1                           | 5        | 1                           |
| "                 | 3 "      | 1            | 0                    | —                           | 1        | $3\frac{1}{2}$              |
| "                 | 4 "      | 2            | 0                    | —                           | 2        | $2\frac{1}{2}$              |
| "                 | 5 "      | 1            | 0                    | —                           | 1        | 7                           |
| "                 | 7 "      | 1            | 0                    | —                           | 1        | 2                           |
| "                 | 9 "      | 1            | 0                    | —                           | 1        | 2                           |
| Over              | 1 year   | 4            | 0                    | —                           | 4        | 2                           |
| "                 | 4½ years | 1            | 0                    | —                           | 1        | 2                           |

light metal splint was used with the shoulder abducted and externally rotated, the elbow flexed at a right angle and the forearm supinated. By hanging coloured balls over the cot or pram, active movements were encouraged early. The average length of treatment seems to have been about two years, although many cases achieved complete recovery in much less than this period, while several unrecovered cases had longer treatment. Treatment was started at varying intervals after birth. In some cases it was not started till late, as the diagnosis was missed in the early stages, and in other cases the parents were told that no treatment could be given till the baby was older. Unfortunately, the main difficulty which militates against successful treatment is the early development of contractures in the unaffected muscles of the arm, resulting in deformities and loss of power to carry out essential movements.

Cases have been divided into groups according to the age when treatment was initiated. It can be immediately seen that the age when treatment was started plays an important part in the final result of the case.

**Group 1. Cases treated under one month of age.** It can be seen from the table that twelve out of thirteen cases treated before they were one month old recovered completely, although one of these cases subsequently (ten years later) developed a crippling scoliosis. The only failure in this group was one right-handed case that was unfortunately neglected while under treatment. Failing to attend for massage and passive movements, he developed a stiff shoulder and elbow while splinted in the second position. This necessitated subsequent manipulation and has left him with a wasted deltoid, impaired abduction and internal rotation of the shoulder, and limited pronation. He is now using the left hand for all purposes.

**Group 2. Cases treated at one month and later.** Out of five cases, in only two was a complete

recovery obtained. In the other three cases although treatment was prolonged, in one case as long as twelve years, severe disability remains. Two cases in this group needed division of the right pectoralis major tendon to alleviate adduction deformity. In no case was it found necessary to divide the subscapular tendon as advised by Sever.

**Group 3. Cases treated at two months or later.** Out of eight cases, three only showed a complete functional recovery, although two of these cases revealed some wasting of the deltoid muscle on the affected side compared with that on the other.

**Results of late treatment.** Cases where treatment was commenced at three months or later invariably did badly. Apart from group 1 cases, and two complete recoveries in group 2, all other cases showed impaired function. The moral from this analysis is that treatment must be carried out from birth. It is wrong to say, 'Wait till the baby is older.'

At the shoulder abduction was limited in all cases so that the arm could not be raised beyond a right angle in the milder cases, whereas in the severe cases 30 degrees of abduction only was possible. In these cases there was a varying degree of wasting of the deltoid muscle, and it was frequently stated that work was only possible as long as it could be carried out below shoulder level. External rotation was also limited; in fact, wasting and contracture of the subscapularis led to internal rotation deformity. Thus, the eight right-hand cases in this category were unable to comb the hair and have become left-handed for all common purposes.

At the elbow extension was limited in four cases, while in three there was limitation of supination movement to the mid-position only.

The handgrip remained unaffected in all unrecovered cases.

One case in group 9 was associated with severe mental defect. This child, birth weight  $7\frac{1}{4}$  lb., a vertex presentation on delivery without forceps,

was only noticed to have a palsy at six months, and did not commence treatment till one year old. He was late in sitting up and walking, and at the time of examination at the age of 3 years 3 months, was subject to fits and continual screaming attacks.

Thus as a result of late treatment, contractures develop in four main groups: (1) sub-scapularis, leading to internal rotation deformity; (2) pectoralis major, leading to adduction deformity; (3) pronator teres, leading to pronator deformity at the elbow; (4) flexion deformity at the elbow.

Various operative methods have been devised to correct the contracture deformities (Meehan, 1940), but in this series of thirty-seven, apart from division of the pectoralis major tendon in two cases, it was felt by the surgeon-in-charge (R. Ollerenshaw, M.D., F.R.C.S.) that no benefit could be gained by surgical interference in the other cases.

#### Summary

1. End result of thirty-seven cases of Erb's palsy have been investigated.
2. The condition is slightly more common in males.

3. Injury at birth to the supraclavicular portion of the brachial plexus is the accepted cause of the condition, and therefore, skilled obstetric technique in delivery, particularly in the use of forceps, is the main factor in avoiding this paralysis.

4. Large babies are more likely to be injured. A large child in a primigravida needs very special care with the delivery of the head and arms.

5. Treatment must be carried out from birth. Cases treated within the first month do uniformly well and results are 100 per cent. successful.

6. If treatment is delayed, contractures causing impaired function of the shoulder and elbow will develop very quickly.

My thanks are due to Mr. R. Ollerenshaw, M.D., F.R.C.S., for helpful criticism and advice, and for allowing me full access to his cases.

#### REFERENCES

- Meehan, A. (1940). *Med. J. Austral.*, **2**, 464.  
 Sever, J. W. (1916). *Boston med. Surg. J.*, **174**, 327.  
 — (1920). *Canad. med. Ass. J.*, **10**, 141.  
 — (1925). *J. Amer. med. Ass.*, **85**, 1862.