TABLE VI.—Time Lost from Work by Schoolchildren

Weeks	Days	Plaster	Procaine	Hydro-cortisone	Bandage
	0	3	9	4	2
	1		2		1
	2		1	1	
	3	2			
	4				
	5	1			
	6			1	
	7			1	
1		1			2
3		5			
3		3			1
4		1			1
5		1			

not large. Of the patients treated by procaine infiltration, three adults showed no sign of union four months, six months, and seven months after injury. None had any disability. Seven patients treated with procaine showed union on check x-ray examination. Of the patients treated with hydrocortisone, two adults and one youth showed no union when radiographed four months, seven months, and eight months after injury. None had any disability. Fifteen of the patients treated with hydrocortisone showed union of their fractures. Four patients treated in plaster were radiographed at random and showed union.

Conclusion

It is concluded that local infiltration of the fracture site with procaine or hydrocortisone, together with mobilization, reduces the time away from work of the patients so treated, and has no long-term disadvantages. Procaine appears to be slightly more effective than hydrocortisone in encouraging an early return to work, though it is realized that the two groups are not strictly comparable as half of the patients in the hydrocortisone group were heavy workers as opposed to only a quarter of the procaine group. Both forms of treatment are better than treatment of this minor fracture by strapping alone, and much better than treatment in plaster.

Summary

An investigation into the best method of treatment of fractures of the styloid process of the fifth metatarsal has been made in 146 patients who attended the General Hospital, Birmingham, between September, 1958, and September, 1960.

The patients were divided into four groups according to whether they were treated by immobilization in plaster-of-Paris or immediate mobilization and associated infiltration of the fracture site with procaine or hydrocortisone, or mobilization with the help of a supportive bandage. The groups were further analysed in regard to occupation. In assessing the results of treatment, attention was paid to relief of pain, duration of time off work, and residual disability. A limited radiological survey showed non-union in three patients in each of the procaine and hydrocortisone series, but none had any disability.

Of the 65 patients treated with plaster-of-Paris, 66% were off work for over a week, the average being three to four weeks; 40% were off work for four weeks or more. Fourteen patients had residual stiffness.

Twenty-six patients were treated by injection of procaine into the site of the fracture. With the exception of two failures, no patient lost more than two days from work. There was no residual disability.

All 27 patients treated by injection of hydrocortisone into the fracture site were free from pain in one week.

No patient was off work for longer than a week. There was no residual disability.

Of the 28 patients treated by support in the form of a below-knee crêpe bandage, 42.8% were off work for one week or more, the average time off work for the whole series being 8 days. Three patients had residual aching pain.

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TRANSIENT UNILATERAL EXTERNAL RECTUS MUSCLE PALSY IN NEWBORN INFANTS

BY

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In newborn infants transient peripheral nerve palsies due to birth injury are well recognized. Hepner (1951) found facial nerve paralysis in 6.4% of 875 consecutive cephalic births. Brachial plexus lesions are also well known. Damage to the upper part (Erb's palsy) may give rise to unilateral paralysis of the diaphragm in addition to the characteristic deformity (France, 1954); while lesions of the lower part (Klumpke's palsy) may be complicated by Horner's syndrome. Injury to the radial nerve may produce wrist-drop (Lightwood, 1951).

In this paper are described the cases of three infants who had a unilateral transient loss of ocular abduction characteristic of external rectus muscle palsy.

Method of Testing Eye Movements

In Cases 1 and 2 I examined the eye movements at birth, using vestibular and otolith stimulation. Case 3 was found during a search of the records. This infant probably had the same lesion as the first two infants but, unlike them, he also had other congenital lesions, which proved fatal.

At birth and subsequently, eye movements were tested as follows. (1) The "doll's eye" phenomenon was obtained by passive rotation of the head either sideways or up and down. In a normal infant at birth the eyeballs move in the opposite direction (André-Thomas *et al.*, 1960; Paine, 1960). (2) The extraocular movements were also observed during rotation of the whole infant. The baby was held in a vertical position at arm's length by the examiner, who then rotated about his own axis several times in each direction. In the normal infant there is conjugate ocular deviation towards the direction of movement during rotation and in the opposite direction after stopping (Paine, 1960).

Case 1

This was the second pregnancy of the mother, who was aged 29. Labour was induced by high rupture of the

membranes because of pre-eclamptic toxæmia, and vertex delivery followed at 36 weeks. The first stage lasted 5 hours and 40 minutes, but after a second stage of 1 hour and 40 minutes forceps were applied because of maternal distress. An infant boy weighing 8 lb. $\frac{1}{2}$ oz. (3,855 g.) was delivered after an easy extraction. The condition at birth was good and respiration was established immediately. When he was examined on the first day the only abnormality found was an internal squint and complete loss of abduction of the right eye (Fig. 1). Movements of his left eye were full. There was no diastasis of the cranial sutures and the tension of the anterior fontanelle was normal. The skull circumference on the first day was 13 $\frac{1}{4}$ in. (35 cm.), and subsequently this increased at the expected rate. Slight abduction of the right eye was detected for the first time on the tenth day and full abduction was present on the twenty-third day. Progress was uneventful except for two periods of vomiting lasting two to three days each at the second and fourth weeks. He smiled at six weeks and his subsequent development was normal.

Case 2

The mother was healthy and 22 years of age, and this was her second pregnancy. Vertex delivery occurred at 41 weeks. The first stage lasted 20 hours and 15 minutes, but because of delay in the second stage, which lasted 2 hours 20 minutes, forceps were applied. A girl weighing 8 lb. 12 oz. (3,970 g.) was delivered after a moderately easy extraction. She gasped after three minutes and regular respiration was established at five minutes. On examination on the first day the only abnormality in the nervous system was internal squint and complete loss of abduction of the right eye. The tension of the anterior fontanelle was normal and there was no diastasis of the sutures; the skull circumference was 12 $\frac{1}{2}$ in. (32 cm.). There were two small areas of fat necrosis on the left cheek where the forceps had been applied and also one on the right elbow. Slight abduction of the right eye was present on the eleventh day and full abduction at the sixth week. She smiled at the fifth week, and subsequent growth and development were normal.

Case 3

This was the second pregnancy of the mother, who was healthy and 44 years of age. Labour began spontaneously at probably 42 weeks. The first stage of the vertex delivery lasted 21 hours and 5 minutes. The membranes were ruptured artificially five minutes before full dilatation of the cervix. The liquor amnii was stained with meconium. A second stage of 15 minutes ended in delivery of a male infant weighing 4 lb. 5 oz. (1,960 g.). He cried at three

FIG. 1.—Case 1. Internal squint due to external rectus palsy of right eye.

FIG. 2.—Case 3. Internal squint due to external rectus palsy of right eye.

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minutes and regular respiration followed. The infant was mildly cyanosed; he had micrognathia and flexion deformities of his fingers. On the first day he was noticed to have an internal squint (Fig. 2) and a failure of abduction of the right eye. There were no cardiac murmurs. He was discharged home at three weeks, but was readmitted nine days later because of failure to thrive and persistent cyanosis. The chest x-ray and electrocardiogram were normal. Ocular movements were normal. He made poor progress and died suddenly at 2 months of age. Necropsy was not permitted, but clinically the cause of death was thought to have been cyanotic congenital heart disease with a pulmonary infection.

Discussion

Paralysis of the external rectus muscle was present at birth and disappeared in a few weeks in all three infants. Injury to the abducent nerve during delivery was therefore a possible cause. Haemorrhage into the brain stem is common in the newborn (Schwartz, 1961), and it is conceivable that it could produce an isolated paralysis of the sixth cranial nerve. However, this seems unlikely, since such haemorrhage would probably cause more widespread damage with involvement of the long tracts or of other cranial nerve nuclei. Thrombosis of the cavernous sinus is also unlikely since this is usually associated with oedema of the periorbital tissues, papilloedema, and often complete internal and external ophthalmoplegia. It is well known that raised intracranial pressure due to any cause can impair the conductivity of the sixth cranial nerve, leading to paralysis of the external rectus muscle (Collier, 1904; Cushing, 1910; Uthoff, 1911). Although the intracranial pressure during birth is not known it seems probable that it is substantially increased during the second stage of delivery. In vertex presentation the skull becomes moulded as the head is repeatedly rammed against the cervix by uterine contractions. It is possible, therefore, that in the infants described transient abducent nerve palsy was produced by raised intracranial pressure during birth. The finding of fat necrosis in Case 2 called to mind the similar finding in newborn infants with birth injury to the radial nerve described by Lightwood (1951).

Summary

The cases are described of three newborn infants who had transient external rectus muscle palsy. Possible mechanisms of injury to the abducent nerve during birth are discussed.

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