from staphylococcal infections, 45% of which were frequent in children, but there was no significant difference in incidence between the sexes. The chance of recurrence of staphylococcal infection in an individual was double the incidence in the general population, while the risk of a recurrence in any members of the same family was four times the rate experienced by a family with no previous infection. Infection in one individual later spread to other members of the family in no fewer than half the cases. It was nearly always found that a single staphylococcal strain was the cause of all the lesions in a family.

Comparing the staphylococcal strains found in the lesion and in the anterior nares, these were found to be identical in the individual with the lesion in two-thirds of the instances, while in half the cases another member of the patient's family was carrying the lesion strain, whether or not the patient was a nasal carrier of this strain.

Evidence is presented for the belief that the axilla and the perineum must be regarded as carrier sites in addition to the nose, and that there may be an association between the position of the lesion and the site of carriage of the causative staphylococcus.

I am indebted to Dr. M. T. Parker, lately Director of the Public Health Laboratory in Manchester. Dr. Parker was responsible for all the bacteriological services required in this study, and he has given me encouragement, advice, and most valuable constructive criticism. I am grateful also to Dr. K. W. Cross, of the department of medical statistics, Queen Elizabeth Hospital, Birmingham, for his assistance with the statistical aspects of the study; to the staff of the department of medical illustration, Manchester Royal Infirmary, for the presentation of the tables and graphic material; and to the Research Committee of Council of the College of General Practitioners for advice and encouragement in planning the investigation.

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FRACTURES OF BASE OF
FIFTH METATARSAL

BY

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It was decided to compare the effectiveness of different forms of treatment of a relatively minor fracture, that of the styloid process of the base of the fifth metatarsal. This fracture is usually sustained during acute inversion of the foot, when peroneus brevis is stated to be pulled off the base of the fifth metatarsal, together with the styloid process to which it is attached (Jones, 1921). Attempts artificially to produce the fracture on cadavers were unsuccessful. While Watson-Jones (1955) states that "strapping is usually sufficient treatment though a walking-plaster may have to be worn for six weeks," no record can be found of a critical assessment of these two methods, or of the use of local infiltration of the fracture site with procaine or hydrocortisone.

Diagnosis is based upon the finding of tenderness at the lateral aspect of the base of the fifth metatarsal, both on local pressure and on inversion of the foot. X-ray examination confirms the presence of a fractured styloid process of the base of the fifth metatarsal, though congenital anomalies of ossification in this region have to be borne in mind (Holland, 1921). In this series the clinical signs were always supported by confirmatory x-ray films, and there was no doubt that the appearances were those of fracture and not of an os vesalianum or unfused epiphysis. In children there is often a juxta-epiphysal fracture of the tubercle rather than a true diaphysal fracture.

Methods

Between September, 1958, and September, 1960, 146 fractures of the styloid process of the fifth metatarsal were seen in patients attending the casualty department of the General Hospital, Birmingham.

Sixty-five patients were treated in plaster-of-Paris. The usual regime was that the plaster was applied as a "back slab and U" from the level of the tibial tubercle to the metatarsal heads, and after a week this was enclosed and a walking-block applied so that the weight-bearing could be resumed. The plaster was removed after a variable time and usually a supportive bandage ("cellanband") was applied for a week or more after the plaster had been removed.

Twenty-six patients were treated by infiltration of the fracture site with 2% procaine, and 27 were treated by infiltration of the fracture site with hydrocortisone. In the case of the procaine infiltrations, from 2 to 5 ml. was injected into the fracture haematoma and the effectiveness of this was demonstrated by confirming that forcible pain-free inversion of the foot could be performed after the injection. The patient was immediately encouraged to walk with no support. In the case of the hydrocortisone injections, a bleb of procaine was first injected into the skin in order to make the directing of the needle less painful to the patient. A fresh needle was then passed into the fracture site, which was opened by holding the foot in inversion, and from 25 to 75 mg. of hydrocortisone was injected, the patient then being encouraged to walk.

Twenty-eight patients were treated by activity from the start, a crêpe bandage being supplied as the only

means of support, and no infiltration being made into the fracture site.

Attention was directed to the duration of the pain, time off work, and occupation of the patient. The occupation was classified into four groups: (1) heavy, involving prolonged standing or walking at work; (2) light, involving sitting most of the time; (3) housewife; and (4) schoolchild. Housewives and schoolchildren were placed in groups of their own because they could not be readily fitted into groups 1 and 2, and factors other than their disability and the need to resume wage-earning tended to govern their return to work.

Results

The assessment of the effectiveness of any form of orthopaedic treatment may rest upon three criteria: (1) relief of pain, (2) duration of time off work, and (3) residual disability. It was with these in mind that the survey was made.

Patients Treated with Plaster-of-Paris.—The most effective way of relieving pain in fractures of the fifth metatarsal base is complete rest of the foot. This was achieved by placing the affected lower leg in plaster-of-Paris for from one to six weeks (Table I); 66% of the patients treated in this way were off work for over a week, and one was off work for 12 weeks (see Table III). As was to be expected, heavy workers composed the majority of those people off work for longer than four weeks, while housewives predominated in those never off work (see Table V). Fourteen patients complained of stiffness or occasional weakness of the injured foot when questioned one to two years after the injury. It is believed that this high proportion of patients with disability following a plaster treatment was a result of immobilization, with consequent adhesions.

Procaine Series.—Pain was effectively relieved immediately by injection of 2% procaine, but in half the patients the pain returned in a few hours to disappear again within a week (Table II). There were two failures in this group of 26. One was a foreman mechanic who suffered a comminuted fracture of the styloid process of his fifth metatarsal as a result of a direct blow, and who had to be treated in plaster-of-Paris after two months of aching pain. During this time he was away from work. The other was a housewife who stated that the pain was worse after an injection and who was then treated with plaster-of-Paris for three weeks, and cellan-band for a further two weeks. Most of the patients were never off work, and the remainder lost no more than two days (Tables III to VI). There was no residual disability, except in the case of the foreman mechanic, who complained of aching. It is evident, in the light of experience with the foreman mechanic, that patients with comminuted fractures of the base of the fifth metatarsal ought not to be treated by local infiltration.

Hydrocortisone Series.—Hydrocortisone was injected with the idea of diminishing local inflammatory reaction to the injury. While only two patients were immediately

relieved of pain, all were free from pain within a week (Table II). No patient was off work for longer than a week (Tables III, IV, V, and VI), though the proportion of heavy workers was inadvertently larger in this group than in that treated with procaine. There were two patients in this series who could not be included in the assessment of time off work. One was a transport driver away from work for four weeks because of an associated sprained ankle. The other was a housewife who had a fracture of the lateral malleolus of the other leg, but whose pain was eased in the unplastered leg one day after injection of hydrocortisone. In this group there was no residual disability.

TABLE III.—Time Lost from Work by Heavy Workers

Weeks	Days	Plaster	Procaine	Hydro-cortisone	Bandage
	0	0	2	4	5
	1	0	2	1	1
	2	1	2	1	
	3			2	
	4			1	
	6			2	
1	7	1		2	1
2	14	1			1
3	21	1			3
4	28	4			
5	35	4			1
6	42	1			1
7	49	1			
8	56	5	1		
9	63	1			
10	70				
11	77	1			
12	84	1			

TABLE IV.—Time Lost from Work by Light Workers

Weeks	Days	Plaster	Procaine	Hydro-cortisone	Bandage
	0			1	
	1				
	2	1			1
	3				
	4				
	5				
	6				
1	7			1	
2	14	1			
3	21	4			1
4	28				
5	35	1			
6	42	2			
7	49				
8	56	1			

TABLE V.—Time Lost from Work by Housewives

Weeks	Days	Plaster	Procaine	Hydro-cortisone	Bandage
	0	12	6	3	6
1					
2					
3		1			
4					
5			1		
6		2			
7					
8					
9					
10		1			

Patients Treated with Bandage Only.—Of the 28 patients treated with support only, twelve were off work for one week or more (Tables III to VI), and three complained of aching at the fracture site when questioned six months after the injury. It was not found possible to estimate the duration of pain in this group, as half were interviewed at least one year after the injury had subsided, and most were vague in their estimate of actual time taken for the pain to go.

Assessment of Union

Check radiographs for progress of union were taken in some of the cases surveyed, though the numbers were

TABLE I.—Patients Treated with Plaster (65 Patients)

Weeks in plaster-of-Paris	1	2	3	4	5	6
No. of patients	5	12	23	23	1	1

TABLE II.—Duration of Pain After Injection

Days:	0	1	2	3	4	7
No. injected with procaine	11	5	5	1	0	2
„ „ „ hydrocortisone	2	9	6	6	2	1

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.

My thanks are due to Mr. A. B. Watson for suggesting this investigation, and for much helpful advice in the preparation of the paper. I am grateful to Mr. J. C. Fulford and Mr. M. H. M. Harrison for allowing me to treat their patients also, and to Dr. P. Jacobs for the large amount of radiography that was involved.

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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