of them was diagnostic of malignancy, the patients with a loss in weight of greater than 7 kg, a palpable abdominal mass, a serum iron of less than 7 $\mu\text{mol/l}$, a peak acid output of less than 8 mmol/h in the first hour, a serum B_{12} level of less than 400 ng/l, or a serum cholesterol of less than 5 mmol/l, were more likely than not to have neoplastic lesions. Though of little value in isolation, these criteria may be useful in raising or increasing the suspicion of malignancy in lesions that otherwise appear benign or doubtful. It is of interest that the erythrocyte sedimentation rate, commonly thought of as an indicator of serious disease, was not significantly different in patients with benign and malignant gastric ulcers.

The final component of this study involved a computerized multi-factorial analysis of the investigations described above to differentiate benign from malignant lesions. The computer analysis weights the different factors to allow for their discriminative power. The analysis was done without including endoscopy. Radiology was picked out as by far the most discriminatory test, and in no case was the evidence from other factors sufficient to alter the radioscopic diagnosis when the latter was a firm one. When the radiological conclusions were uncertain (in 27 cases, or 24% of the total), the analysis suggested the presence of an abdominal mass as the most discriminating factor. When this was used alone, correct diagnoses were made in 18 out of 20 non-malignant cases but only 4 out of 7 malignant cases (endoscopic diagnosis was wrong in 1 and doubtful in 2 of the benign cases, and wrong in 1 of the malignant cases, for which the computer diagnosis was also incorrect).

What guides are these observations to the management of patients in whom gastric pathology is suspected or shown to be present? Firstly, gastric radiology, which has stood the test of time, appears to be reasonably accurate and is likely to remain as the preliminary examination. The definite radiological diagnosis of gastric cancer is rarely incorrect and should be taken as an indication for operation without recourse to endoscopy.

Endoscopy should be reserved for barium-negative dyspepsia and for the definitive diagnosis of any gastric lesion not diagnosed as malignant by radiology. The endoscopic diagnosis of malignancy by an experienced observer is much more accurate than

gastric biopsy (93 and 70% respectively). Thus gastric ulcers which appear malignant should be treated as such and biopsy reserved for equivocal or benign lesions. Endoscopy and biopsy can only confirm and never refute the presence of gastric cancer and thus should be repeated on ulcers in which serious doubt remains. Negative biopsies, which we found in 30% of malignant lesions, should never be taken to indicate the benign nature of a lesion—only that no evidence of malignancy was seen.

Loss of weight greater than 7 kg, short duration of pain, the presence of an abdominal mass, serum iron concentrations of less than 7 $\mu\text{mol/l}$, cholesterol of less than 5 mmol/l, a serum vitamin B_{12} level less than 400 ng/l, and a peak acid output of less than 8 mmol/h in patients with gastric lesions should alert the clinician to the possibility of malignancy.

It is hoped that the proposed approach to the diagnosis of gastric ulcers, which is in accord with the views of others,⁴ will serve as a guide to the optimal use of limited endoscopic and histological resources.

We would like to thank Professor K. D. Bagshawe for plasma carcinoembryonic antigen measurement, Dr. J. Kohn for measurement of serum α_1 -fetoprotein, and the departments of clinical chemistry and haematology at Northwick Park Hospital. A.W.S. held a Vera Levi memorial fellowship and received support from the Medical Research Council.

Correspondence to A.J.L.

References

- Swynnerton, B. F., and Truelove, S. C., *British Medical Journal*, 1952, 1, 287.
- Sherlock, P., Ehrlich, A. N., and Winawer, S. J., *Gastroenterology*, 1972, 63, 672.
- Lancet*, 1974, 2, 386.
- Novis, B. H., et al., *South African Medical Journal*, 1974, 48, 857.
- Blendis, L. M., et al., *British Medical Journal*, 1967, 1, 656.
- Multicentre Study, *Lancet*, 1967, 2, 534.
- Chanarin, I., in *The Megaloblastic Anaemias*, p. 623. Oxford, Blackwell, 1969.
- Searle, F., et al., *Journal of Immunological Methods*, 1974, 4, 113.
- Kohn, J., and Weaver, P. L., *Lancet*, 1974, 2, 334.
- Cantrell, E. G., *Quarterly Journal of Medicine*, 1971, 158, 239.
- Hadfield, A. R. W., et al., paper presented at British Society for Digestive Endoscopy, September 1974.

Pulled Elbow: A Study of 100 Patients

CYNTHIA M. ILLINGWORTH

British Medical Journal, 1975, 2, 672-674

Summary

Pulled elbow is a common condition but may not be recognized by practitioners unaware of its existence. Most of a series of 100 children with this condition were aged 1 or 2 years, and none were over 6 years. An important precipitating factor was the normal recalcitrance of the 1-3 age group. The three children who were over 5 years had all had earlier episodes which may have stretched the annular ligament. The wrist was the most common site of pain after the elbow. A single manipula-

tion was successful in 96 cases but multiple manipulations may be needed.

Introduction

A pulled elbow occurs in young children when the head of the radius is pulled partially through the annular ligament.¹⁻³ This may occur because the radial head may be small in relation to the annular ligament or because in certain positions of the arm—especially when the forearm is pronated—the shape of the head may make it liable to be pulled out of place. The fibres of the annular ligament may actually tear in some children.

Though pulled elbow is common and well recognized by orthopaedic surgeons¹⁻⁵ and has been well known for many years⁶⁻⁸ it is often unrecognized by general practitioners, even those dealing with many children. Green and Gay⁹ stated that cases of pulled elbow were often thought to be due to brachial plexus injury by doctors who did not know the condition.

The condition predominantly affects young children; there is an acute onset of considerable pain and parents are alarmed because the child suddenly loses the use of an arm. Thus, 100

The Children's Hospital, Sheffield S10 2TH

CYNTHIA M. ILLINGWORTH, M.R.C.P., Consultant in Paediatric Accident and Emergency

patients were investigated in detail to clarify the diagnostic features.

Patients and Methods

The age, clinical features, and response to treatment of 100 patients with pulled elbow were recorded. The condition was diagnosed clinically in all cases. Usually a previously well child with an appropriate history of trauma had lost the use of one arm; there was slightly limited supination of the forearm but no swelling of the elbow and no loss of elbow flexion, and radiographs showed no abnormality. Most patients were so young that the centre of ossification of the head of the radius had not appeared. A simple manipulation was performed without anaesthetic by holding the lower part of the humerus firmly, and with the thumb over the head of the radius flicking the forearm into full supination. If this was successful the child at once obtained full painless function of the elbow.

Results

The common factor in the illustrative case histories given below was traction on the forearm.

Case 1.—A 3-year-old was sitting playing in a heap of sand. His grandfather took hold of his hands to help him out. He cried, immediately complained of pain in an arm, and was unable to use the arm.

Case 2.—An 8-month-old baby was held by an arm to prevent her crawling behind a sofa. In the short time before she was put to bed nothing was noticed but she became troublesome during the night and her right arm was obviously painful.

Case 3.—A mother held her tired obstreperous toddler by the hand to prevent him from pulling things off a shelf in a supermarket while she paid for her purchases. When they arrived home his arm was painful and he could not use it.

Cases 4 and 5.—One child could not move his arm after swinging on his father's coat and another after swinging between both parents when walking along a road.

Case 6.—An 11-month-old baby was being held under the arms by his mother while they were getting on to a bus. The baby stretched forward and held the bus rail. There was a sudden jerk when the bus started and after that he did not use one arm.

Age, Sex, and Family.—The children's ages are shown in table I. Sixty-six patients were girls, and 66 patients had siblings (a total of 114 children). Two of the patients were twin sisters, each of whom had had at least three episodes. Otherwise only one sibling of the other children was known to have had pulled elbow. In the whole series there was no significant difference as to which arm was affected.

Recurrence Rate.—Thirty children had had other episodes of pulled elbow (table II) and 20 of these were girls. The recurrences in 20 children occurred only on the same side as the recorded episode.

Pain and Duration of Symptoms.—In 36 very young children it was impossible to localize the pain, but of the older children 15 complained of pain only in the wrist and six of pain predominantly in the shoulder (table III). The duration of symptoms before treatment was under six hours in 62 children, six to 11 hours in six, 12 to 23 hours in 12, 24 to 47 hours in 14, 48 hours in three, four days in one, and not recorded in two.

TABLE I—Age when 100 Children with Pulled Elbow were First Seen

Age:	<1	1	2	3	4	5-6	Total
Boys	5	8	11	7	1	2	34
Girls	2	15	25	18	5	1	66
Total	7	23	36	25	6	3	100

TABLE II—Recurrence Rate at Different Ages

Age:	<1	1	2	3	4	5-6
No. of children	7	23	36	25	6	3
No. with >1 episode	0	7	11	6	2	3
No. of known recurrences (no. of children × no. of attacks)		6 × 2 1 × 4	7 × 2 4 × ≥3	3 × 2 3 × ≥3*	1 × 2 1 × 3	2 × 2 1 × ≥5

*Twins had at least three episodes each.

Effects of Treatment.—In 96 children symptoms were immediately and completely relieved after the first manipulation. One child had to have the arm manipulated again after 24 hours, with immediate loss of symptoms. One had three manipulations on successive days before the arm became normal, and the relief in two patients was doubtful at first but complete the next day. Radiological examination of the patients who needed more than one manipulation showed no abnormality. The child who needed one remanipulation had had symptoms for eight hours and the girl who needed two for one and a quarter hours. In the two children with doubtful relief symptoms had been present for 24 hours before treatment. A subsequent attack in one of these children needed six manipulations before the arm became pain free.

TABLE III—Site of Pain in 64 Children

Site:	Elbow	Elbow and Shoulder	Shoulder	Elbow and Forearm	Forearm	Wrist
Boys	13	2	2	1	2	3
Girls	21	2	0	1	5	12
Total (%)	34 (53)	4 (6)	2 (3)	2 (3)	7 (11)	15 (23)

Discussion

Some cases of pulled elbow recover spontaneously but it is impossible to say how many because at hospital we only see those which have not done so. When the history and clinical findings both pointed to a diagnosis of a pulled elbow the first simple manipulation produced immediate relief in 96 children. There were no radiological abnormalities in any case. At the start of the study we took radiographs with both elbows in the same position in those children who had had previous episodes, but this proved to be impracticable and unhelpful and was abandoned.

The children at greatest risk are those aged 1 or 2 years. During this time they are at their most awkward and recalcitrant, and this recalcitrance was apparent in many of the case histories; the child pulled away from the mother or dawdled and cried, especially when tired and being made to do something which he did not want to do. Some of the older names for the condition—"nurse-maid's elbow" and "temper-tantrum elbow"—bear this out.

The typical histories fall into groups. Many children are pulled up when sitting on the floor or slip down their parent's back when being given a "piggy back." Many are playing with older siblings who keep hold of one hand. Young children may pull their elbow by swinging between parents while walking. Often the child has fallen but continued to hold on to something; a toddler may fall off a small pedal car but continue to hold the handle bars which when the bicycle falls away from him gives sufficient pulling force to jerk the arm. This sort of accident may, of course, have enough twisting force to fracture the radius.

Smallness of the radial head in relation to the shaft of the radius is an important factor in the mechanism of pulled elbow. In this series 34 children were 3 years or over when first seen and of these only 11 had had any earlier attacks. Of six children seen first when they were 4 years old only three had had earlier attacks; one child had had only one when aged 1 year, another had had her earlier attack when she was 3 years, and the third girl had had "at least" five attacks since the age of 3. In this last patient the episodes seemed to occur with trivial stress—the "arm just cracked" when playing with her grandfather—and always involved the right arm, which suggested that there may have been some earlier tearing of fibres of the annular ligament. Several weeks after her last attack both arms were examined radiologically in the same position but no abnormality could be seen. Over the next 18 months she did not return with any more attacks.

Recurrent attacks in very young children may cause diagnostic difficulties. A 2-year-old was sent to the medical outpatient department with "recurrent paralysis of the left upper limb." The

paralysis had started with an attack six months earlier for which he had been admitted to hospital and which recovered spontaneously after two days with no diagnosis being made. Subsequently he had had several attacks. His mother was told to bring him as soon as the next attack began and the diagnosis of "pulled elbow" was immediately obvious. Other cases were those of young children with episodes of painful arm whose families were suspected of causing non-accidental injury.

Altogether 30 children had symptoms for 12 hours or more before being treated. There was no indication that parents of children who had had previous episodes were quicker in coming for medical help than those whose children had not had an earlier attack. A girl of 5½ years who had had at least five earlier episodes was not brought for 12 hours and a 4-year-old with two previous attacks arrived after 48 hours. The striking exceptions were the twin sisters who between them had had pulled elbows at least six times and who both came half an hour after the onset. Apart from these twin sisters there was no evidence that siblings of patients were at increased risk of pulled elbow.

Even when symptoms had been present for up to four days the child obtained immediate and complete relief with the first manipulation. The exceptional child who needed six manipulations had had symptoms for only two hours before being seen. After the sixth manipulation the mother, when the child was seen a few minutes later, said, "I knew it was all right this time—she forgot about it straight away."

Just as pain in the knee may be referred from a hip and vice versa, pain from an elbow may be referred to the wrist or shoulder; 15 children had pain only in the wrist, and a further six had pain predominantly in the shoulder. If this is not realized by doctors it may cause difficulty in diagnosis.

The survey could not have been carried out without the helpful co-operation of Dr. Helen Wesley, Dr. Patricia Brennan, and the senior house officers of the paediatric accident and emergency department. I thank Mr. John Sharrard for his most valuable advice.

References

- ¹ Blount, W. P., *Fractures in Children*, pp. 13, 15, 75. Baltimore, Williams and Wilkins, 1969.
- ² Sharrard, W. J. W., *Paediatric Orthopaedics and Fractures*, p. 976. Oxford, Blackwell Scientific Publications, 1971.
- ³ Pollen, A. G., *Fractures and Dislocations in Children*, p. 56. Edinburgh, Churchill Livingstone, 1973.
- ⁴ Boyette, D. P., *et al.*, *Journal of Pediatrics*, 1948, 32, 278.
- ⁵ Corrigan, A. B., *Medical Journal of Australia*, 1965, 2, 187.
- ⁶ Hutchinson, J., *Annals of Surgery*, 1885, 2, 91.
- ⁷ Van Arsdale, W. W., *Annals of Surgery*, 1889, 9, 401.
- ⁸ Magill, H. K., and Aitken, A. P., *Surgery, Gynecology and Obstetrics*, 1954, 98, 753.
- ⁹ Green, J. T., and Gay, F. H., *Journal of Bone and Joint Surgery*, 1954, 36A, 655.

General Practice Observed

High Blood Pressure: Detection and Treatment by General Practitioners

CHARLES HODES, PAULINE A. ROGERS, MICHAEL G. EVERITT

British Medical Journal, 1975, 2, 674-677

Summary

A questionnaire was sent to a 10% random sample of general practitioners in England and Wales on their attitudes to the detection and treatment of hypertension; 62% responded and no further inquiry was made. Their views on detection and criteria for treatment and investigations performed were considered in relation to their background. More of the older general practitioners always measured blood pressure and 36% of all practitioners believed that hypertensive patients usually present with symptoms. Altogether 91% thought that strokes could be prevented by treating hypertension, and only 18% reported difficulty in keeping patients on treatment. Older practitioners preferred to measure the

diastolic pressure using phase five, while the younger preferred phase four. Nearly all doctors were satisfied with their current sphygmomanometers.

Introduction

The evidence favours the early treatment of moderate and severe hypertension,¹⁻⁴ even in symptomless cases. The attitudes of general practitioners to the detection of high blood pressure and their criteria for treatment are therefore important. A questionnaire was sent to a 10% random sample of general practitioners in England and Wales to gauge their attitudes. The results may be valuable in the development of community control of hypertension.

Method

A 10% random sample of doctors in England and Wales providing general medical services was prepared with the approval of the General Medical Services Committee and the Statistics and Research Division of the Department of Health and Social Security. The updated Register as at October 1972, completed in May 1973, was used. A random sample of every 10th doctor was obtained; there were no appreciable differences between the sample and the total population of principal general practitioners in age, sex, area, list size, and year of registration. A total of 2067 doctors were available

Chronic Disease Control Study Unit, Department of Community Health, London School of Hygiene and Tropical Medicine, London WC1B 3EL

CHARLES HODES, M.B., F.R.C.G.P., Director and General Practitioner, Borehamwood, Herts.

PAULINE ROGERS, M.Sc., Statistician

MICHAEL EVERITT, B.Sc., Systems Programmer