PAPERS AND ORIGINALS

Non-accidental injury in children: what we do in Derby

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Summary

A scheme for dealing with cases of non-accidental injury¹ in children in the Derby clinical area has been operating since 1971. A stable team of doctors, policemen, and social workers deal with each case. The parents are told at once that battering is suspected, and the police and social services department co-operate closely in establishing the facts, supporting the family, and protecting the child. A psychiatric assessment of the parents may help social workers decide on the long-term care of the child, and the forensic physician is invaluable if the case has to go to court. The team has made three recommendations about prevention and management of these cases: a specialist social service team should be set up to deal with these children and regain the skills and knowledge lost when children's departments were abolished in 1971; babies should be routinely weighed naked in infant welfare clinics; and juvenile courts should be able to order a psychiatric report on the parents in care proceedings.

Introduction

Cases of non-accidental injury¹ in children (the battered baby syndrome) are now part of the bread and butter of paediatrics, and their management is difficult. General outlines have been suggested by various bodies,²⁻⁶ but to some extent management will depend on local conditions. We describe here our practice in a medium-sized paediatric unit in the east Midlands.

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The area

Although there are pockets of bad housing, poverty, and deprivation, Derby is socially middle-of-the-road. It is a manufacturing town of 230 000 people who have a low unemployment rate and are reasonably law-abiding (see table). The population is stable and people identify with Derby aero engines (Rolls-Royce), Derby rolling stock (British Railways workshops), and Derby County Football Club. The area outside Derby includes the hill-farming area of the Peak District, the heavily populated former coalmining area of the Erewash valley, and the still-productive South Derbyshire coalfield.

Crimes of violence* in Derby, Birmingham, and England and Wales

Area	Average population of area	Rate per 1000 population		
		1970	1971	1972
Derby and Derbyshire Constabulary	898 000	0.894	1.176	1.342
Birmingham City Constabulary ..	1 035 000	1.00	1.184	1.156
England and Wales	48 943 000	0.838	0.963	1.069

*Includes offences 1-11 of class 1 offences (those against the person) in Home Office's classification.

Derbyshire Children's Hospital is the only specialist children's hospital serving this population of about 450 000-500 000, which includes about 30 000 children aged 5 and under. The casualty department deals with about 12 000 new cases a year. The hospital is also the regional neurological centre for Derby, Nottingham, and Leicester, so some children with subdural effusions are admitted from outside the area.

Incidence of non-accidental injury—The national incidence of non-accidental injury has been estimated at 4000 cases yearly⁷ (out of a total population of about 50 million). In Derby, therefore, we might expect about 40 cases a year in all ages. In a children's hospital most cases are in children aged under 3 years; in fact the highest incidence is in the first year of life. Older children⁸ tend not to reach paediatricians. Some cases of deprivation dwarfism are probably missed or not referred and the cases we have identified have not been included in the total. We have identified an average of 12.3 cases a year in children under 3 since 1970. In 1970-3 there were 49 cases of non-accidental injury seen at the hospital and four children died.

The Derby scheme

In March 1970 Dr V Leyshon (Medical Officer of Health, Derby County Borough) called a meeting in response to the letter from the

Chief Medical Officer, Ministry of Health, and the Chief Inspector of the Children's Department at the Home Office on non-accidental injury to children⁹ that had been sent in February of that year. In December Mr N Lonsdale (Children's Officer, Derbyshire County Council) called a similar meeting in the county. After 1970 the two groups combined to form the non-accidental injuries consultative committee, which met yearly until the setting up of an area review committee in 1974. The scheme was worked out during 1971 and circulated to hospitals, social services departments, the National Society for the Prevention of Cruelty to Children (NSPCC), and family doctors in October 1971. The scheme (see figure) looks complicated, but early mistakes soon convinced us that we could make progress only by following an agreed protocol. We claim no particular originality for it, and similar schemes operate in other parts of the country.^{10 11} Our scheme* in operation is best illustrated by a case report.

The Derby scheme.

CASE 1

A 7-week-old boy was brought to the casualty department by his mother at 4.30 pm because of a swollen right arm. He was clean and well nourished but had bruises on his back, a left conjunctival haemorrhage, and a torn upper labial frenum. His right forearm and both lower legs were swollen and tender. He was admitted to the ward as a probable battered baby. Skeletal survey showed two small linear fractures of the skull, flake fractures of the right tibia (lower end), left tibia, and fibula (both ends), with gross periosteal elevation, a healing fracture of the left femur, and a fresh fracture of the right radius. His bleeding time, clotting time, and platelet count were normal.

On the day of admission the paediatrician saw the baby, consulted the general practitioner, who agreed with the course of action proposed, and interviewed the mother and father in the presence of the ward staff nurse. They could not explain the fractures. They were told that this had to be regarded as a case of non-accidental injury and that inquiries by the police and the social services department would inevitably follow. The paediatrician rang the medical social worker at her home, contacted the social services duty officer, and informed the forensic physician. At 6.45 pm he telephoned the detective superintendent. When the parents were visited by a detective and a woman detective both admitted striking the baby.

A case conference attended by the paediatrician, the detective superintendent, the detectives, the casualty officer, the medical social worker, the health visitor, the area officer of the social services department, and a social care officer was held seven days after the boy was admitted. The forensic physician was unable to attend. The parents were young (mother 18, father 21), and the boy was their first child. They had moved from a privately

*A booklet, "Guide Notes and Procedures," describing a modified version of this scheme is available from the Director of Social Services, County Offices, Matlock, Derbyshire.

rented flat to a council house a few days after the baby was born. They had had to pay rent on both dwellings (about £10 a week) for two weeks, and had spent much of their savings during the move. The mother was lonely after they moved.

Both parents were asked to attend for a psychiatric interview. They were reported as emotionally warm and reasonably mature people who would probably make a good home for the child. The baby was allowed home after eight days, and the social worker visited regularly. One or two further slight bruises were seen at follow-up, but he thrived, smiling at 8 weeks, sitting at 5 months, and walking at 10 months. He was fully breast-fed on admission and his mother continued breast-feeding until he was 7 months old. He was discharged from follow-up at 16 months, the mother requesting that references to injuries inflicted by his parents be removed as she did not want him to find out about this later on. The diagnosis on the general practitioner's records was therefore revised to "multiple fractures."

This was an unusual case because the baby was breast-fed throughout (another abused baby who was breast-fed has recently been reported¹²) and no place of safety or care order was sought, but all the other features of the Derby scheme were used. Although the police found that the parents had committed a criminal offence, they did not prosecute in view of the particular circumstances of this case. The police in fact played a positive part because these young parents accepted the detective as a supportive figure.

The paediatrician's first interview with the parents

We believe it is important to take the parents into our confidence from the start. As soon as battering is suspected, usually on the day of admission, the parents are interviewed in front of a witness (ward sister or medical social worker). Firstly, we reassure them that the child will recover rapidly (if this is the case). Then they are told that the injuries are not consistent with the explanation given, but that we are not making allegations against any particular person; we are dealing with a condition which carries a 10% mortality rate and our first duty is to the child; we must ensure that the child is discharged to a safe home when the time comes, but we are independent of the police, and want to help the child, and the best way of doing this is to help the parents. Nevertheless, they will have to face questioning by the police and the social services department, which will be unpleasant. The social services department will probably also ask for a 28-day place of safety order.

We have found that in most cases parents accept this straight-dealing approach remarkably well. Everyone knows where they stand and we can encourage visiting and greet the parents at the bedside without hypocrisy.

Forensic physician

The average doctor performs poorly in the witness box and most clinicians are reluctant to appear as witnesses against people (usually parents) with whom they have a continuing relationship. Much skill is needed in recording and interpreting injuries; bruises fade quickly and records need to be made within hours. For these reasons the inclusion of an experienced police surgeon in our team has been one of its sources of strength. In his role as the forensic physician he is a medical colleague acting in court on behalf of the hospital and not for the police. He works in an honorary capacity and his only payment is the usual witness fee if he appears in court.

Police

Although official circulars on the battered child have urged co-operation with the police, practice varies widely. Some police forces find that only a handful of cases are reported, and many paediatricians and social workers are still dubious about their role. We have no doubt that through our co-operation with the police our management of cases has improved, without loss of humanity. The detective superintendent attends all case conferences.

There are three main reasons for including the police. Firstly, a crime may have been committed. Secondly, because of their training the police are often more successful in finding evidence in the home and interviewing people to establish the truth than doctors and social workers. A doctor "finds it most difficult to proceed when he is met with protestations of innocence from the aggressive parent, especially when the battered child was brought to him voluntarily."¹¹ Thirdly, evidence must be obtained speedily, preserved, and presented in accordance with the law. It is unfair to everyone that the police should

be called in when the trail is cold. Many parents have felt relieved after they have been able to face what really happened and stop deceiving everyone, and the social worker has the advantage of being able to work with clients (usually the parents) who have already admitted their guilt to the police.

The chief constable has considerable discretion over whether to prosecute or not. The following case shows how a frequently battered child was rescued through the intervention of the police.

CASE 2

A 10-day-old boy was brought to the paediatric outpatient department with a fracture of left humerus. It was thought possibly to be an unrecognised birth injury and healed rapidly. Eight days later he was admitted with facial bruising; the police were not informed (this was before the scheme was in operation), but casework was begun by the children's department. There were further admissions with bruising at six weeks and three months; casework continued. At five months he was readmitted with bruises, emaciation, and a fractured left humerus again. His mother refused to agree to fostering. At 11 months he was again admitted emaciated, bruised, and with a fractured skull and left fibula. The police were informed.

A detective interviewed the parents. The father admitted a long series of attacks on the boy and was eventually found guilty of grievous bodily harm and cruelty and sent to prison for two years. The boy was adopted after a period of fostering and at 2½ was happy and well.

Legal procedures

Initially a 28-day place of safety order was taken out in some cases. Now we do it in all cases, even in the middle of the night, because parents have arrived at 9 am to take the child home after agreeing the night before to leave him in hospital. After the case conference the social services department generally seeks a care order, which gives it power to send the child to a children's home, a foster home, or back to his parents under careful supervision. Many of the parents who commit these crimes are unstable and their attitudes may change unpredictably after the child is discharged from hospital: co-operative and anxious to please at one moment, a few days later they may bar the door to the social worker and break off relations. Without a court order the caseworker is then powerless.

Social workers sometimes think that a court hearing upsets clients and damages the casework relationship, but we suggest that social workers should take clients into their confidence at the outset and explain to them that care proceedings, which may be taken, should be seen as a framework within which the child and often the family can be supported and not as a punishment.

Social services departments often interpret the Children and Young Person's Act 1969 as providing for care orders only as a last resort: the child must need care "which he is unlikely to receive unless the court makes an order" (section 1 (2) (f)). We think that this interpretation is too narrow and that the intention of the Act is clearly stated in section 1 (2) (a): "His proper development is being avoidably prevented or neglected, or he is being ill-treated." We feel the Act is not used enough.

Criminal prosecutions for assault occasioning actual bodily harm, grievous bodily harm, and cruelty have been brought in only a few cases. Whether such prosecutions are appropriate in any of these cases is a philosophical point. Callousness, neglect, or harsh discipline shown to children may reflect social stress or a parent's immature personality, and in most of our cases no prosecutions have been sought. But calculated cruelty such as repeatedly burning a child with a lighted cigarette seems an action which should not go unpunished.

Psychiatrists

One of our acute problems is to know whether the battering parents are likely to respond to casework and can sooner or later provide a safe and loving home for the child or whether they have such a damaged personality that the therapeutic efforts are unlikely to succeed. Until his death in 1976 Dr K O Milner, physician superintendent of Aston Hall Hospital, provided valuable help to the team by making psychiatric assessments. Dr Milner's special interest was the disturbed or delinquent adolescent, and his experience was invaluable. Many parents have agreed to a consultation but others have refused, and we think that the law should be modified to allow juvenile courts to order a psychiatric report on the parents or guardian in care proceedings. At present this is possible only in a criminal prosecution of the adult.

NSPCC

The Society has stimulated study into non-accidental injury, its prevention, and treatment, but there is no NSPCC unit for battered children in Derby, so that all cases go to the social services department. Nevertheless, in the few cases which NSPCC inspectors bring to our notice we work through the Society.

Social Services Department

Non-accidental injuries in children are primarily a social problem, and unless there are severe head injury and subdural effusion the physical injuries heal rapidly. So the social services department of the local authority is the key to recognition and treatment. Area officers and social workers have co-operated closely with the hospital, and the successful outcome in our cases has been largely due to their devotion and skill. As soon as a case of non-accidental injury is recognised the duty officer is contacted, often in the middle of the night. A social worker is allocated to the family straight away and a comprehensive social report is available to the case conference within a few days. Nevertheless, we think that the disappearance of the Children's Department into a social services department was a retrograde step, and, like others,¹³ we believe that a specialised team should be set up within the social services department to concentrate experience and improve management. At present those responsible for policy and planning in the department attend half-yearly meetings but never see a case "on the ground."

Hospital social worker

There are two qualified part-time medical social workers specialising in children in the hospital. They now have much experience in these cases and are involved from the outset. They are on hand to comfort and counsel the parents in the hospital when the child is first admitted and throughout his hospital stay. They also act as catalysts, coordinators, and staff officers, arranging the case conference and contacting the many people concerned.

Health visitor

The health visitor, who has a nurse's training and considerable social work skills, now has a grass-roots involvement with families with young children. She is the most important early warning system in family breakdown. She spots the bruised face, and senses the mother who is feeling the strain from a crying baby and whose husband retreats to the pub. In many cases her prompt action has led to therapeutic intervention. There is one change in welfare clinic practice which could help her: it should become routine for babies to be weighed naked. Signs of neglect and bruising would be noticed more easily, and it would no longer be invidious to undress the "at-risk" baby. It should also become normal practice for her to see the baby undressed whenever she visits the home, even if it means waking him up.

Specialist assignment

Paediatricians, casualty surgeons, and orthopaedic surgeons have all become better at identifying and managing cases of non-accidental injury as their experience has increased, and what success we have had in Derby has been due largely to the specialists who have come together to form our team: the same police surgeon (who acts as forensic physician), the same detective superintendent, and the same psychiatrist are involved in every case. Only in this way can we build up a core of knowledge and profit from our mistakes. We would also like to have a single senior officer from the social services department to work with us in the same way.

Conclusion

At present, we can intervene only in crises. The aim must be to break the cycle of deprivation—battered children growing up to be battering parents. For this we need to identify children at risk and develop a similar scheme using the skills of different disciplines for their long-term management. Frommer and O'Shea have made a promising start in predicting possibly

inadequate mothers (and hence children at risk) during pregnancy.¹⁴ They showed that women who had been separated from their own parents when they were aged under 11 were more likely than others to have problems with their babies or marriages, and were thus more in need of support.

We acknowledge the help of many people not mentioned in the article who have worked hard with us over many of these cases: family doctors, radiologists, registrars, house physicians, casualty officers, casualty sisters, ward sisters, and others.

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Measurement of cardiac muscle relaxation in hypothyroidism

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Summary

The isovolumetric relaxation time of the left ventricle (IRT) in 20 hypothyroid patients ($133 \pm (\text{SE of mean}) 4 \text{ ms}$) was significantly longer than that in 23 normal subjects ($95 \pm 3 \text{ ms}$). During a trial of thyroxine replacement the IRT in 12 hypothyroid patients fell from $143 \pm 4 \text{ ms}$ to $107 \pm 4 \text{ ms}$. The IRT seems to be a useful index of end-organ function in hypothyroidism.

Introduction

Combined apex cardiography and phonocardiography can reliably measure the isovolumetric relaxation of the left ventricle (IRT).¹⁻³ Since relaxation of skeletal muscle is delayed in hypothyroidism,⁴ relaxation of cardiac muscle might also be delayed. We therefore measured the IRT in hypothyroid patients before and after treatment with thyroxine.

Patients and methods

Apex cardiography was carried out using a hollow bell attached to a piezoelectric transducer.⁵ A phonocardiogram (aortic area) and electrocardiogram (standard lead II) were recorded simultaneously with a multichannel recorder. Ankle reflex time was recorded with a photomograph. IRT was measured from the major deflection of the aortic component of the second heart sound to the 0-point of the apex cardiogram, which coincides with mitral valve opening (fig 1).^{1 3 5 6}

As part of a preliminary assessment of their thyroid status patients were given a clinical hypothyroid diagnostic score.⁷ Protein-bound iodine levels (PBI; normal 315-630 nmol/l 4-8 $\mu\text{g}/100 \text{ ml}$), Thyopac-3 index (radiochemical centre, Amersham; normal 90-110%), serum

FIG 1—Normal apex cardiogram showing how isovolumetric relaxation of left ventricle was measured. ACG = Apex cardiogram. PCG = Phonocardiogram. ECG = Electrocardiogram.

cholesterol concentrations (normal 3.89-7.77 mmol/l 150-300 mg/100 ml), 48-hour ¹³¹I uptake (normal range > 15% of dose), and Achilles tendon reflex half-relaxation time (normal range 250-380 msec)⁴ were also measured, and the thyrotrophin stimulation test (10 units of thyrotrophin for 3 days) was performed.

Hypothyroidism was diagnosed when two or more indices were abnormal, at least one of the abnormal indices being the thyroid score, PBI concentration, or radioiodine uptake.

Twenty patients diagnosed as hypothyroid according to these criteria were studied (table I). Fifteen of the hypothyroid patients consented to undergo a therapeutic trial of thyroxine. The trial consisted of monthly increments of thyroxine 50 $\mu\text{g}/\text{day}$, to a total daily dose of 300 μg or until the patient became clinically and biochemically euthyroid. Before each monthly increment every patient was assessed clinically, and 12-lead electrocardiography, ankle jerk tests, apex cardiography, phonocardiography, and standard lead II electrocardiography were performed as described above.

Twenty-three normal subjects were also studied. All were clinically euthyroid with a normal PBI value and Thyopac-3 index and were either ambulant hospital patients with conditions not referable to the thyroid gland or hospital staff (table II). The normal subjects were matched for age, but not sex, with the patients.

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