expected from the direct relaxing action on the arteriolar smooth muscle. Thus there was no evidence of a specific chemical *reversal* of the adrenaline effect.

Although sufficient studies have not been made of the action of vasculit in counteracting the effect of noradrenaline, the drug may be expected to have this property. There may therefore be a place for vasculit in the diagnosis of phaeochromocytoma. Patients with a considerable rise in the level of circulating adrenergic hormones would, on the evidence of the present study, be expected to respond to intra-arterial vasculit (in a total dose of 0.5 mg.) with a smaller increase in flow than the normally expected average increase of 50–60%, but because of individual variations in the response to the drug the significance of any such test would probably become apparent only when a series of patients are studied under conditions comparable with those of the present investigation. The hypertensive patient in this series behaved no differently from the others.

The effect of vasculit was seen to persist only so long as the drug was being infused, for the dilator effects passed off soon after the infusions were completed. However, it seems likely that in the concentration of 100 μg./min. the increase in flow is maximal, and higher doses do not have any greater effect. It would therefore be reasonable to administer vasculit intra-arterially in this concentration over longer periods of time to patients suffering from ischaemic disorders, fundamentally of one or other extremity—for example, from arterial embolization. The absence of any systemic effect in increasing heart rate or lowering blood pressure is a further advantage of using vasculit in this way.

Summary

The effects of infusing vasculit into the brachial artery have been measured with plethysmographs in a group of hospital patients under controlled conditions.

With amounts totalling between 0.1 and 2 mg. (average 0.6 mg.) vasculit caused an increase in blood flow in the infused hand which averaged 57%.

The dilator effect was at the periphery, and was sufficient to counteract the constrictor effect of simultaneously infused adrenaline (in the total dose of 0.5 μg.).

The effect of the vasculit did not appear to depend on the initial level of blood flow in the infused hand.

The effect of vasculit persisted for only the duration of the infusions, but, on the other hand, was not associated with any detectable systemic effects.

Some clinical and pharmacological implications of these findings are discussed.

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EMOTIONAL DISTURBANCES OF BURNED CHILDREN

BY

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For some years the staff of the Burns Unit at the Birmingham Accident Hospital were becoming increasingly aware of the social and emotional problems of their child patients. Many of these children came from "broken homes," and the almoners found that much more time was needed for patients with burns than other accident cases. This led to the question: Do emotionally disturbed children tend to get burned, or do severe burns tend to produce disturbed children?

This present study was based on 198 children aged under 15 years on admission, who sustained burns of 10% or more surface area and who were in-patients during 1952–5. These children were the survivors from the more severe burn cases, and represented about half of the total child admissions. The mothers of these children were asked to give an opinion about the emotional state of their child at the time of the investigation (1957–8). This was compared with the state of the child prior to the burn, so far as the mothers could recall it.

Similar investigations were made of the 608 siblings of the patients, about whom the mothers also gave an opinion. A further independent control group of 50 children was selected at random from the same districts in the city as the patients.

The purpose of the investigation was to try to find out (*a*) whether emotional disturbance really existed, and if it preceded or followed the accident; (*b*) if it did exist, the forms it took; and (*c*) whether disturbance was related to any particular factors involved in the accident or hospitalization. The sample of 198 patients was taken from a possible 208. The 10 cases excluded were untraceable, or living over 50 miles (80 km.) from the hospital.

A letter was sent asking each mother if she was willing to help. This was followed in nearly every case by a home visit. Three mothers were seen in the hospital. Answers were obtained to the same 10 questions, either by the mother providing them spontaneously or, if this did not happen, by putting the questions directly. Notes were made after each interview and the data tabulated later for analysis.

Existence of Emotional Disturbance

The mother's opinion was chosen as the main criterion of disturbance, as she knew the child intimately both before and after the accident, and could probably assess any changes that might have occurred. However, estimates by the investigator were also made, and are discussed later.

Disturbances in the children were classified according to severity. "Severe" cases were those where the mother was sufficiently concerned to seek outside help —for example, child guidance, G.P., etc. Cases were classified as "slight" if the mother considered the child only a little affected. Of the 198 cases investigated, 81% showed signs of emotional disturbance according

to their mothers. Of this 81%, 26% had severe disturbances, 41% had moderate disturbances, and 14% had slight disturbances.

Recording and Classification of Disturbances

Emotional disturbances in children can be classified in different ways. The table devised by Cameron (1955) for use in such follow-up studies as this requires fairly complicated diagnostic interpretation. It was therefore considered more suitable for this study to classify the disturbances as specific symptoms according to the table used at the Child Guidance Centre, Ealing, London (see Table I).

TABLE I

Symptoms	Occurrence in Children with:	
	One Symptom Recorded	Two Symptoms Recorded
Primary behaviour disorders:		
Fears and anxiety	48	45
Solitariness or unsociability	1	4
Depression or lethargy	9	11
Difficult to manage at home (in general)	9	14
Difficult to manage at school (in general)	1	3
Temper tantrums	1	8
Direct aggression	3	10
Sexual difficulties	0	1
Psychosomatic disorders:		
Enuresis	3	11
Encopresis	0	0
Sleep disorders	7	12
Habit spasms	1	1
Feeding difficulties	1	14
Hysterical symptoms	2	4
Speech disorders	0	3
Asthma or eczema	0	0
Delinquent behaviour:		
Lying or stealing	0	1
Truanting or absconding	0	0
Disorders with organic components:		
Epilepsy	1	2
Spasticity	1	0
	88	144

Some of the mothers described a variety of symptoms in their children. In order to simplify the analysis of these, not more than two were scored for any one child. The ones chosen were those about which the mother seemed most concerned.

Fears and anxieties were the most common complaints. They were described by the mothers in various ways. For example: "He's generally nervous," or "Everything worries him." Of the psychosomatic disorders, feeding difficulties, sleep disorders, and bed-wetting are the outstanding problems.

Relating Disturbance to Possible Causes

Most of the mothers thought the disturbances in their children arose as a result of the terrifying experience of the burn, followed by the pain and the separation from home incurred during hospitalization. In an attempt to isolate some of the possible causes of the disturbances, the following eight factors were examined: (1) sex of the child, (2) age at time of admission, (3) existence of clinical shock, (4) length of stay in hospital, (5) percentage of surface area burned, (6) percentage of whole skin loss, (7) frequency of visits from parents, and (8) emotional state of the mother. Analysis of factors 1–6 inclusive showed no statistically significant relation between any one of them and emotional disturbance in the patient.

Analysis of factor 7 (parental visiting) showed no significant relation with disturbance in the children *over* 5 years of age, but showed a strong negative relation for those *under* 5 years (see Table II). Unfortunately, this is based on a very small sample, as so few of those under 5 years were visited. (Parents came to see their children, but usually only when asleep, and this is not here counted as visiting.)

TABLE II.—*Relation Between Emotional Disturbance and Parental Visiting for Children Under 5 Years Old*

	Visited	Not Visited
Emotionally disturbed	9	78
Not " "	12	13

$\chi^2 = 18$. $P < 0.01$.

Factor 8 (emotional state of the mother) was based on the mother's opinion concerning her own emotional disorders described at the time of the interview. Out of the 194 mothers seen (four had died or had deserted the home) 115 described themselves in various ways as having "upset nerves." Analysis of these figures shows a tendency for the "upset" mothers to have emotionally disturbed children (see Table III).

TABLE III.—*Relation Between Disturbance in Patients and "Upset" Mothers*

	"Upset" Mothers	Not "Upset" Mothers
Emotionally disturbed	97	60
Not " "	18	19

$\chi^2 = 2.14$. $P = 0.15$. (If the 9 children considered by investigator to be disturbed are added to this table, $P = 0.05$.)

Types of Disturbance in Relation to Possible Causes.—It was thought possible that some factors (such as the age or sex of the child) might be related to the type of symptom shown. Symptoms were classified into four main groups: mainly anxiety; mainly aggressive; mainly depressive; mainly psychosomatic. Although some children had symptoms of more than one type, they were classified into the group that seemed to predominate. These groups were tested against the same eight factors described above. No significant relationship was found, but there was a marked tendency for the boys to show aggressive symptoms more than the girls.

Existence of Disturbance Prior to the Burn

The suggestion that many children who suffer burns are disturbed before the accident was checked, so far as was possible, by obtaining an opinion from each mother about the state of her child *before* the accident and whether she felt the accident had changed her child emotionally in any way.

Out of the 160 emotionally disturbed children, 27 apparently showed signs of slight disturbance before the accident occurred. This rate of disturbance *before* the accident (17%) is not significantly different from that found in a random control group. It is much lower than the rate of disturbance *after* the accident (81%), suggesting that most disturbances arise as a result of the accident and hospitalization. It was noted, however, that there is a tendency (though not statistically significant) for those who were showing slight disturbances before the accident to become severely disturbed afterwards.

Control Groups

In order to compare the children in the investigation with others who had not suffered severe burns, two control groups were chosen: (1) siblings of patients, and (2) children chosen at random.

Sibling Group.—The first comprised 608 siblings of the patients (11 patients had no siblings). The existence of disturbance in the siblings, according to their mothers, was 7%. On dividing the siblings into two groups, those of disturbed patients and those of not disturbed patients, the incidence of disturbance in the two groups showed no significant difference. It was interesting to note that, of the 43 siblings who were disturbed, 14 were reported by their mothers to be so, either because of an accident the siblings had had themselves or because they were involved in the patients' accidents. Each of these 14 were siblings of disturbed patients. A sibling control group provides a good comparison with the patients, since they have in common the same home, parents, and many shared experiences.

Random Control Group.—Fifty children whose names were supplied by the public health and education departments were selected in such a way that the distribution of their age, sex, and the districts in which they lived matched those of the patients. Their mothers were visited at home, in the same way as the patients' mothers. Each was asked for an opinion about the emotional state of the child selected and of its siblings. Disturbance was reported by the mothers in 14% of this group and in 12% of the group's 123 siblings.

The random control group (50) is smaller than the group of patients (198). It makes, however, a useful comparison and provides an independent estimate of the incidence of emotional disturbance, as here described, in similar but uninjured children. The incidence of disturbance in the sibling control group is lower than that in the random control group. This could be due to an under-estimation by the mothers of disturbance in the siblings. A burn accident occurring in a family must inevitably focus extra attention on the patient.

Home Backgrounds

A simple social assessment was made of each home, to see whether the home conditions bore any relation to disturbance in the children, and whether any factors in the patients' homes appeared outstandingly different from those in the homes of the random control group.

The assessment was based on the following eight negative factors: death; separation or serious illness of either parent; prolonged unemployment of father; poor housing; extreme poverty; overcrowding; and five or more children in the family. Homes with two or more of these "negative" factors were defined as "unfavourable."

Analysis showed no statistically significant relation between emotional disturbance and unfavourable homes either in the patients or in the random control group.

There are, however, two factors of some importance in the patients' homes that are not apparent in the random control group, in spite of the fact that they come from the same districts. Firstly, 37% of the patients have five or more siblings. (According to the Birmingham Central Statistical Office, a random sample of children in the city shows only 15% with five or more siblings.) The random control group has 24%. Secondly, a significantly higher proportion of the patients than of the control group come from materially very poor homes. The two factors may well be related.

Emotional State of the Mothers

The mothers of 115 (60%) of the patients spoke of their "nerves" being "upset." Many made remarks such as "I've never been the same since" when referring to their children's accidents. 26 of the mothers described how they had had "nervous breakdowns" severe enough to require medical treatment. These all occurred after the children returned home. There is some relationship between emotional disturbance in the patients and "upset nerves" in their mothers. If the nine children who were considered disturbed by the investigator (but not recognized as such by their mothers) are counted as disturbed, this relationship becomes statistically significant. It is difficult to sort out which is cause and which effect. Most of the patients' mothers spoke of their nervous disorders as being caused by the accidents to their children. Probably the mothers and children interact, disturbance in the one tending to create it in the other.

In the random control group (50) only 26% of the mothers admitted to emotional upsets in themselves, and in this group it did not appear to be related to disturbance in the children. There is no evidence to suggest that a higher proportion of upset mothers come from unfavourable homes. It seems reasonable to conclude that the accident to their child was the precipitating cause of nervous trouble in most of the upset mothers, though some may have been already prone to such disorders.

Contrary to expectation, the children with less severe burns (10–20% surface area), particularly those over 5 years old, had a higher proportion of upset mothers than the children with more severe burns (over 20% surface area).

Most of the mothers expressed sincere gratitude to the hospital, but some were critical. Most of the criticism came from mothers of those under 5 years old. They found the hospital ruling at the time, that their children should be visited only in the evening when asleep, was a real source of strain and unhappiness. Most mothers have a natural desire to try to console their children when they are hurt. When this is not satisfied the sense of frustration can be very great.

Performance at School

With the parents' permission, questionaries were sent to the head teachers of all the school-age patients and the children in the random control group, so that the performance at school of the two groups could be compared.

The class teachers, who generally have the closest contact with the children, were asked to complete the questionary.

Of the 154 school-age patients, 151 had questionaries completed, and 38 of the 39 school-age children in the random control group.

TABLE IV

	Patients (151)	Random Control Group (38)
1 or more negative factors ..	68%	38%
2 „ „ „ „ ..	51%	18%

The teachers were asked to comment on attendance, attainments, attitudes to teachers and children, and behaviour during recreation time and in general. Each comment under seven headings was classified as

" positive " (for example, Attitude to Teachers: " He is friendly and co-operative ") or " negative " (for example, Behaviour in Recreation: " A continual nuisance to other children "). The incidence of emotional disturbance noted in the patients by the teachers (Table IV) is rather less than that noted by the mothers. This may be because some children can suffer severe disturbances at home and yet manage quite well in school. Also, some teachers are not specially good at recognizing emotional disturbance in children, possibly as a result of the large classes and consequent lack of time.

Eight of the children considered severely disturbed by their mothers had no negative comments from their teachers. Most of these children had psychosomatic disorders that might easily pass unnoticed at school.

Of the 38 children not considered disturbed by their mothers, 28 were of school age, and 11 of these had two or more negative comments from their teachers. This shows that some children have disturbances at school which are not apparent to their mothers at home.

The teachers' comments suggest that the patients have two outstanding problems in school in comparison with the random control group children. Firstly, the patients have difficulties in making good relations with the other children. Secondly, a far higher proportion of the patients are classified as " well below average " in work than of children in the random control group. This may be due to the time lost from school during hospitalization, or it may be that duller children tend to get burned.

Circumstances of the Accident

Nearly half the accidents to the 198 patients were due to clothes igniting from unguarded fires, fires with inadequate guards, and gas ovens used as a means of heating. Over a third of the cases were scalds from baths of hot water left about, or saucepans, teapots, etc., being knocked down. From the mothers' accounts of these accidents, it seems that two factors combine to cause most of them. One is the children's behaviour—climbing, fighting, playing in the kitchen, etc.—which is normal and to be expected. The other is lack of care on the part of parents. The first is inevitable, the second one hopes can still be improved upon.

It may be useful to try to arouse parental responsibility and a sense of conscience by publicizing the " horror " aspect of burns as a preventive measure. In contrast to this, however, everything should be done to *decrease* parental anxiety and guilt once a burn has occurred. The two situations are entirely different.

Most parents suffer strong feelings of guilt when their child is burned. These feelings need to be understood by the hospital staff, as sometimes they make parents seem " on the defensive." Excessive guilt increases the mothers' anxiety, and as this has some bearing on the disturbances in the children special care should be taken over the reception of parents. It is particularly important to avoid phraseology that could be interpreted as accusations of neglect.

Discussion

The investigation has supplied answers to some of the questions originally raised. Emotional disturbance attributed by the mothers to the accident and hospitalization exists in 81% of the patients. The incidence of disturbance is not significantly different in the children whose burns occurred four to five years previously from those who were burned two to three years previously.

This high level of disturbance (81%) compared with that in the control groups (7% and 14%) is the most striking fact to come out of the investigation.

Although there is nothing surprising about the symptoms, which are fairly varied, a fact of greater interest is their persistence for so long after the accident.

It is important that lack of parental visiting to those under 5 years old was found to be significantly related to disturbance, as it confirms the findings of Spitz (1945), Bowlby (1951), Robertson (1958), etc., that for the child under 5 years old separation from its mother is often a cause of emotional disturbance.

The Burns Unit staff used to believe that daily visiting of those under 5 years old was not justified because of the risk of increasing infection. However, in the light of recent researches showing the risks to mental health of prolonged separation from the mother, daily visiting has been encouraged since March, 1957. This not only helps the child to maintain its relationship with the mother, but helps lessen the mother's sense of guilt and helplessness. This is particularly so if she can be made to feel that her visiting plays a positive part in her child's treatment.

It seems reasonable to conclude that causes of disturbance in burned children are not analysable as specific factors. Probably a large number of causes, differing for individual children, combine in varying ways to create the disturbances. This makes it difficult to suggest specific ways of modifying these disturbances. In spite of this, it does not mean that emotional disturbance must almost inevitably occur as an aftermath in children who have a severe burn and who undergo prolonged hospitalization. Pickerill (1942, 1948), Spence (1947), MacKeith (1953), Vaughan (1957), and many others have suggested ways in which children's reactions to hospital may be improved. A greater understanding of children's needs on the part of some doctors and nurses would lead to a recognition of the children as individuals with differing abilities to stand stress and pain. If the children's feelings are understood positive attitudes would replace the punitive ones still sometimes shown. There is a widespread need for more qualified nurses who will work with children because they choose to do so. The mothers of burned children suffer a great deal of guilt and anxiety. They need some additional support, both to understand their own feelings and to help them regain confidence in handling the children on their return home.

Greater appreciation is still needed of the part parents can play in helping their children's recovery. Some hospitals still do not encourage daily visiting. It is hoped that in the future it will be a matter of course that children's wards are built separately from adult wards and that cubicles will be so designed that mothers of small children can stay in the hospital and take part in their child's care.

Summary

Of 198 child patients who had severe burns two to five years previously, 81% showed signs of emotional disturbance according to their mothers. This incidence of disturbance was in marked contrast to that noted in the patients' 608 siblings (7%) and in a random control group of 50 (14%). Of many factors examined, only

the lack of parental visiting to children under 5 years old was found to be significantly related to disturbance. It is concluded that in most cases the disturbances resulted from various combinations of factors. If the incidence of disturbance is to be lessened, more attention should be paid to the emotional needs of the children and the part parents can play in treatment.

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SACRO-ILIITIS IN REITER'S DISEASE

BY

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Involvement of the sacro-iliac joints in Reiter's disease has received little attention in the past. Gounelle and Marche (1941) observed that these joints may be involved, and Marche (1950) devoted a paper to the subject, in which he considered that these joints were commonly affected and estimated that the true figure was probably between 60 and 80% of chronic recurring cases. All his patients were of the post-dysenteric form of Reiter's disease. Harkness (1950) found sacro-iliac involvement in only 5.4% of his series of 126 patients. Romanus (1953) noted that some cases of Reiter's disease were complicated by sacro-iliitis and that when radiological changes were present in these joints they were indistinguishable from those found in ankylosing spondylitis. Ford (1953), when reviewing 20 patients with chronic relapsing forms of Reiter's disease, found that 4 had developed ankylosing spondylitis, and he concluded that this was one of the sequelae of Reiter's disease. Marche (1950) had reached a similar conclusion concerning the post-dysenteric form of the illness.

Radiological abnormalities were present in the sacro-iliac joints of some of Ford's patients, though not all were *x*-rayed. Stanworth and Sharp (1956) quoted a series of 20 patients with Reiter's disease, of whom almost half had radiographic evidence of sacro-iliitis. Murray, Oates, and Young (1958) and Reynolds and Csonka (1958) in a radiographic study of two series of patients with Reiter's disease found that 39% and 32% respectively had *x*-ray evidence of sacro-iliac disease. Mason, Murray, Oates, and Young (1959), in a comparative radiographic study of ankylosing spondylitis, rheumatoid arthritis, and Reiter's disease, also stressed the frequent occurrence of sacro-iliitis in the latter condition.

As the sacro-iliac joints are primary synovial joints (Macdonald and Hunt, 1952) there is no reason to expect that they should be exempt from attack in an illness such as Reiter's disease, where arthritis is usually the most prominent feature of the condition. Indeed, it may be that there are reasons, based upon local anatomical relationships, for supposing that these joints may be especially exposed to risk of involvement. Prostatitis is present in a high percentage of cases of Reiter's disease in the acute stage and in virtually all in the chronic relapsing stages (Weinberger, Dienes, and Bauer, 1952; Romanus, 1953; Oates, 1958). The lymphatic drainage of the prostate is to the glands lying in the hollow of the sacrum and in front of the bodies of the lumbar vertebrae (Hamilton, 1956). No direct connexion between these prostatic lymph channels and those of the sacro-iliac joints has been demonstrated, but little work of this nature has been undertaken. That such a connexion exists seems likely in view of the common finding of metastases around the region of the sacro-iliac joints in patients suffering from carcinoma of the prostate.

A further factor that is probably of even greater importance is the venous system described by Batson (1942), which passes from the prostate and seminal vesicles to lie in the lower part of its course, directly over the sacro-iliac joints, with which it almost certainly has connexions. Further support for this theory is given by the work of Romanus (1953), who found a very high incidence of chronic prostatovesiculitis in patients with ankylosing spondylitis, and he considered this genital infection to be the commonest cause of spondylitis.

The diagnosis of sacro-iliac disease is difficult to make, as the joint is not easily accessible to physical examination and the movements permitted at the articular surfaces are very slight. The nerve supply of the joints is derived principally from the first and second sacral nerves, from the superior gluteal nerve (L 4 and 5 and S 1), and there is possibly a contribution direct from the lumbo-sacral trunk. This innervation explains why the pain of sacro-iliac disease is so widely referred.

The symptoms of sacro-iliitis consist chiefly of backache or stiffness, both of which are exceedingly common complaints with a multitude of causes. The pain experienced is a dull ache which is commonly localized in the upper medial quadrant of the buttock and posterior aspect of the upper thigh on the affected side. An associated feeling of stiffness across the buttocks and thighs is also often noted. Physical signs are usually minimal and need to be carefully sought. In subacute cases they are often absent. Local tenderness just below and medial to the posterior superior iliac space is sometimes found in the acute stage, and one or more of the many tests for sacro-iliac disease may be positive. A common feature of Reiter's disease is the occurrence of localized areas of pain and inflammation variously described as "fasciitis," "tendonitis," or "myositis," and these areas are often found in the paraspinal and gluteal muscles. In consequence the presence of sacro-iliac tenderness must be carefully evaluated before interpreting it as evidence of involvement of these joints.

Present Study

Seventy-eight patients (76 men and 2 women) who had suffered an attack or attacks of Reiter's disease were studied. The diagnosis of Reiter's disease was made by the association of arthritis involving one or more joints