the two cities. In Newcastle this was found to be 2.8 per 1,000 live births (Davison, 1946) and in Birmingham 3.0 per 1,000 live births (MacMahon, Record, and McKeown, 1951). The incidence of this disease has been measured on a number of occasions, and is relatively constant in different localities, and we may therefore conclude that the techniques of ascertainment in Newcastle and Birmingham are very similar in their degree of accuracy. Since pyloric stenosis and intussusception are alike in their hospital requirements it also seems safe to assume that the wide difference between the two cities in the incidence of the latter could not be due to a difference in the number of children treated in outside hospitals.

Conclusion

Clinical impressions and previous estimates of incidence suggested that acute intussusception was unusually common in the North of England. Because there have been so few factual studies the incidence of this disease has been estimated a second time in Newcastle and found to be persistently higher (over 4 per 1,000 live births) than in Birmingham (1.5 per 1,000 live births), the only other city for which it has been accurately assessed. The reasons for this difference are at present unknown, but the degree is sufficient to encourage the accurate measurement of incidence in other defined communities and to suggest the need for a more detailed analysis of local factors in the care of young children which might throw light on the aetiology of the disease.

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POLYAGGLUTINABILITY OF THE HUMAN RED BLOOD CELLS

BY

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The phenomenon in which the erythrocytes undergo transformation so as to become agglutinable by any serum, irrespective of the blood groups, can occur *in vitro* or *in vivo*, and presents a problem in correct grouping and matching.

The *in vitro* phenomenon is also known as the "Hübener-Thomsen-Friedenreich" phenomenon, and is seen usually in old blood samples with bacterial contamination. The very similar but more uncommon *in vivo* phenomenon has been termed "polyagglutination" to distinguish it from the *in vitro* phenomenon, termed "panagglutination," perhaps mainly on the ground of earlier observations that autoagglutination is not a feature of the former as it is of the latter. This has not been found to be true in all cases, and the consensus of opinion seems to be that the two phenomena are identical because of the outstanding

fact that in most cases of polyagglutination a bacterial infection can be shown to be present. It is very likely that the enzymes liberated by the infecting organisms activate the "T" agglutininogen *in vivo* just as the enzymes of the contaminating bacteria do *in vitro*.

The subject has been discussed by Reepmaker (1952) and a good review of the recorded cases given.

Case Report

A blood sample from a patient suffering from septic abortion with profound toxæmia was received with an urgent request for blood transfusion. No history of previous conception or blood transfusion was given. The patient appeared to be group AB, Rh+ on repeated groupings by different batches of grouping sera, but one sample each of group AB, A, B, and O blood from stock was matched and only the group O was found compatible. Haemolysis of the incompatible cells by the patient's serum was pronounced. Her serum was tested against cell samples, five each from groups A, B, and AB and 10 from group O, freshly obtained from known donors (Table I). Her cells were tested against sera from these donors and two samples of cord blood serum (Table II).

Serum samples, one each from groups A, B, and AB, were adsorbed by equal volumes of three-times-washed packed cells of the patient, first at room temperature for one hour and then for another hour at 4° C., to adsorb the "T" agglutinin. The reactions of the adsorbed and unadsorbed samples are summarized in Table III. The patient's serum agglutinated at 4° C., group O cells also. Autoagglutination, though not detected at room temperature (near about 36° C. at this place during the season), was quite strong at 4° C. and could not be abolished even after prolonged adsorption at low temperature with group O cells.

TABLE I

	Group A Cells	Group B Cells	Group AB Cells		Group O Cells	
			Rh +	Rh -	Rh +	Rh -
Patient's serum: At room temp. . .	***	***	***	***	—	—
At 4° C. . .	++*	++*	++*	++*	++	++

+ = Agglutination. — = No agglutination. * = Haemolysis.

TABLE II

	Serum, Group A	Serum, Group B	Serum, Group AB		Serum, Group O		Serum, Cord Blood
			Rh +	Rh -	Rh +	Rh -	
Patient's Cells: At room temp. At 4° C.	++ +++	++ +++	++ +++	++ +++	++ +++	++ +++	—

TABLE III

	Serum, Group A		Serum, Group B		Serum, Group AB	
	Ad- sorbed	Non-ad- sorbed	Ad- sorbed	Non-ad- sorbed	Ad- sorbed	Non-ad- sorbed
Patient's cells: At room temp. At 4° C. . .	— —	++ +++	— —	++ +++	— —	++ +++

Cultures were made from the patient's blood and the sample of pus collected from the cervical canal. Blood culture was positive within 24 hours. On bacteriological examination of the cervical swab and the patient's blood the same strain of *Escherichia coli* (typical type I) was isolated. Blood culture was negative a week later and the cervical sample was found unsuitable owing to frequent washings by antiseptic lotions.

Efforts to contact the patient for further investigations after her discharge from hospital have not been successful. Unfortunately, the culture materials, together with the organisms, were discarded after identification as a matter of routine before the scope of further investigations related to the problem could be realized.

Discussion

The reactions leave little doubt that the patient was group O, Rh+, presenting the phenomenon of polyagglutination, contamination being ruled out as the tests were made on fresh samples. Autoagglutination must have been partly due to the non-specific cold agglutinin, but mainly due to the "T" antigen-antibody reaction, as it persisted even after prolonged adsorption at low temperature with group O cells. It is not yet clear if any significance in relation to polyagglutinability can be attached to the presence of the specific haemolysins anti-A and anti-B, apparently in high titres.

Like most of the recorded cases, this case presented bacterial infection with features of septicaemia. In none of the reported cases, however, could the infecting organisms be isolated from blood culture (Reepmaker, 1952). That bacteraemia could have been present in those cases also at some stage of the infection could not be ruled out, for blood culture is likely to be negative much before the organisms are eliminated from the local sites, and blood of a patient presenting polyagglutination will continue to show the phenomenon for some time after the control of the infection, until substantial numbers of the changed erythrocytes have been replaced by new ones.

What part bacteraemia plays in the *in vivo* process can as yet be only a matter of conjecture. However, it indicates, at least, bacterial growth severe enough to produce conditions approaching that *in vitro* for the enzymes to affect the erythrocytes. Presence or absence of associated bacteraemia may perhaps be one of the explanations for polyagglutinability not appearing in bacterial infections with the regularity with which red cells undergo transformation *in vitro*. A direct proof has to be sought, and attempts must be made to test the ability of the organisms isolated from blood culture or local sites to produce the change *in vitro* as well. Meanwhile, there does not appear to be much objection to regarding bacteraemia in the present case as strong evidence in favour of the common aetiology of the *in vitro* and *in vivo* phenomena.

Summary

A case of polyagglutinability of erythrocytes in a patient with septic abortion and severe *E. coli* infection and positive blood culture is described.

Its similarity to the Hübener - Thomsen - Friedenreich phenomenon is discussed, and that bacteraemia in such cases could be strong evidence in favour of the common aetiology of the two phenomena is stressed.

I am indebted to Dr. B. P. Mishra, lecturer in bacteriology, Darbhanga Medical College, for the bacteriological report. It is hoped that with his collaboration more detailed investigations will be possible in future. Thanks are also due to Dr. Hari Prasad and Dr. M. Quadros, and Dr. S. M. Hashim, superintendent of the hospital, for permission to publish the case.

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Medical Memoranda

Aortography as an Aid to the Investigation of Haematuria

Generally, in the diagnosis of disease, radiology labours under the great disadvantage that a diagnosis can be made only when the disease has caused positive structural changes in an organ or in a system of organs. There is therefore a lapse of time between the onset of symptoms, which may sometimes be alarming, and the confirmation of the diagnosis by x-ray examination. The names of many diseases could be mentioned in which this time-lag occurs, the period showing a good deal of variation in time, largely depending on the severity of the disease; for example, bony metastases cause pain for some time before they become visible radiologically.

It is therefore necessary to use every available method of examination in the elucidation of symptoms in a difficult case. In the following case the patient was suffering from haematuria and the diagnosis was firmly established only by the use of percutaneous abdominal aortography.

VALUE OF AORTOGRAPHY

Most writers would argue that abdominal aortography is of considerable value in demonstrating the degree of obstruction in patients suffering from aortic and iliac atheroma, and also in showing the size and position of an aortic aneurysm.

Agreement concerning its value in the investigation of renal disease is not so unanimous. In the first place, conventional methods are often sufficient to establish the diagnosis, without resort to aortography. Secondly, if conventional methods show an abnormality the surgeon might well decide that he must operate on the kidney, in which case aortography (which is not without its risks) would seem to be unnecessary.

We have found renal aortography to be of value in a number of instances. (1) In proving the presence of a hypernephroma otherwise unsuspected. One of us (J. A. R.) was able to show a hypernephroma in the right half of a horseshoe kidney which was not shown by conventional methods. The case described below is a similar instance of its value. (2) It has been suggested that one type of unilateral disease with hypertension, suitable for treatment by nephrectomy, has the following features (Arthur Jacobs, 1958, personal communication): (a) non-function of one kidney on intravenous