

teristics which constitute the well-known "faulty development of the infantile type." They are often undersized and thin, with poorly developed mammae, a long thorax, and an acute subcostal angle. Another fairly common type is the maternal—women whose abdominal walls have never recovered from the stretching of pregnancy.

It is the conjunction of caecal stasis with inadequate support for the caecum which apparently determines the onset of symptoms. The sympathetic nerve supply to the bowel is carried to it in the walls of the blood vessels. The sympathetic, it will be remembered, inhibits bowel movements and closes the ileo-colic sphincter. The theory of Tyrrell Gray and Carslaw is that, when the loaded caecum descends into the pelvis, traction is made on the vascular pedicle, which is the most resistant constituent of the mesocolon. The sympathetic nerves are stimulated by the traction, and the bowel movements are inhibited; stasis increases, the drag and the stimulation are augmented, and so the process continues in a vicious circle. In some of my own cases I have seen the bundle of vessels which run to the ileo-caecal angle standing out like a rope, and obviously supporting the weight of the colon.

The operation of colopexy, as devised by Waugh, seeks to imitate nature, and to confer on the subject of right-sided ptosis the same degree of fixation of the colon as his more fortunate fellow humans have at birth. After the appendix has been removed, an incision is made into the peritoneum in the angle between the ascending colon and the flank. A pocket is made by stripping up the peritoneum from the flank; the colon is rolled into this, and made secure by sewing the peritoneal flap over it. The bowel is thus in contact over a broad area with retroperitoneal tissues, and the adhesions which in these forms are the important element in its fixation. There is no technical difficulty in the operation, provided that a sufficient incision is made. I always use a paramedian incision to avoid weakening the abdominal wall, though the wide retraction entailed is responsible in some cases for a fair amount of after-pain. I have performed the operation fifty-three times, and have had no untoward complications and no deaths.

The results in some cases have been dramatic. In one case the most careful preparation in the ward had failed to remove all solid faeces from the caecum. The day after the operation, for the first time that this patient could remember, her bowels moved naturally, and have continued to move without purgatives ever since. About thirty of my cases have been from my own panel, and the happy result has been that many who were formerly most troublesome cases now make infrequent appearances.

It must not be forgotten that dyschezia is as likely to be present after the operation as before. Caecal stasis also may occur, but it causes no pain. Some of my cases radiographed after the operation show only slight elevation of the colon compared with the previous condition, and moderate caecal stasis; yet they have been relieved of their symptoms. This observation harmonizes with the theory of Tyrrell Gray and Carslaw, for if it is the traction on the mesocolon which causes the pain and the stasis, then a very small lift and fixation is sufficient to relieve the trouble. If a man is hanging by the neck, a lift of an inch or so will save his life.

As the result of the study I have given to this subject I have formed the opinion which I have tried to justify in this short paper that the vast majority of pathological abdominal conditions occur in that quarter of the population who have congenitally ill-supported colons. A timely colopexy would relieve their early symptoms, and save them subsequent visits to the operating theatre for much more serious operations.

THE SOURCE OF INFECTION IN A MINOR OUTBREAK OF PUERPERAL FEVER

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The two cases of puerperal pyrexia to be described occurred at close intervals of time at a nursing home in a town. The home had been until then singularly free from sepsis. Both patients were infected with haemolytic streptococci and, in addition to the rise in temperature, presented one unusual feature in common—namely, multiple suppurative arthritis. It was thought possible that the two organisms might be identical, and that there was present a common source of infection responsible for both cases.

King¹ showed that there is a well-marked correlation between the presence of haemolytic streptococci in the upper respiratory tracts of medical attendants and the incidence of cases of puerperal fever. Subsequently, Smith,² by means of agglutinin-absorption experiments, showed that, out of eighteen cases of haemolytic streptococcal infection during the puerperium, the source of infection could be traced in eleven to the throat or nose of the doctor, student, or nurse in attendance.

CASE I

Mrs. X was admitted at 3.30 a.m. on June 18th, 1931. Vaginal examination was made by Sister A on admission, and again at 6 p.m. on the same day. At 7 p.m. a vaginal examination was performed by Dr. B; the perineum, etc., was prepared by Sister A and Nurse C, and a low forceps delivery was made by Dr. B. During delivery the perineum was lacerated. The following evening the patient had a rigor, temperature rising to 104° F. on June 19th. Daily rigors followed; suppurative arthritis developed in the right shoulder and wrist, and in the right knee. The patient ran an intermittent temperature, and died at the end of three weeks.

No face masks were worn by any of the attendants either before or after delivery.

Bacteriological Findings.—Throat, negative for haemolytic streptococci; urine, sterile; cervix, coliforms and haemolytic streptococci; perineum, negative for haemolytic streptococci; blood, shoulder, and knee, positive for haemolytic streptococci.

CASE II

Mrs. Y was admitted at 3 a.m. on June 21st, 1931, and spontaneous normal delivery took place at 4 a.m. No vaginal examinations were made before delivery. Sister A only was present at delivery, and she wore a mask. Nurse C relieved Sister A at 6 a.m., and subsequently did all the nursing for this patient until June 27th, when Sister A attended her only. Rigors commenced twenty-four hours after delivery, and occurred daily, with high temperature between. Within one week the patient had developed suppurative arthritis in the left sterno-clavicular joint and in the right wrist-joint. After two weeks her condition slowly improved, and the temperature settled after about eight weeks.

No masks were worn by Nurse C up to the time the patient had developed a temperature.

Bacteriological Examinations.—Haemolytic streptococci found in throat, vagina, and blood; urine, sterile.

HISTORY OF CONTACTS

Dr. B delivered Mrs. X only. During the week before and the week after delivery of Mrs. X Nurse C had delivered, had been present at the delivery of, or had nursed during the puerperium, five other women. After Mrs. X's delivery masks were worn. All five had uneventful puerperia. Sister A also dealt with three patients, and wore a mask while attending each. They also had uneventful puerperia.

Bacteriological Findings from Throats of Possible Carriers.—Sister A (present at both deliveries), positive for haemolytic streptococci; Dr. B (present in Case I), negative for haemolytic streptococci; Nurse C (assisted at both cases), positive for haemolytic streptococci; maid (in attendance on both Sister A and Nurse C), positive for haemolytic streptococci. (This maid was suffering from acute tonsillitis.)

Where available, two separate colonies of haemolytic streptococci were picked off the culture plates to initiate strains for investigation. The strains for convenience were labelled as follows:

Strain A	.....	Nurse C	.....	Throat
Strain B	.....	Nurse C	.....	Throat
Strain C	.....	Sister A	.....	Throat
Strain D	.....	Sister A	.....	Throat
Strain E	.....	Mrs. Y	.....	Throat
Strain F	.....	Mrs. Y	.....	Vagina
Strain G	.....	Mrs. Y	.....	Vagina
Strain H	.....	Mrs. Y	.....	Blood
Strain I	.....	Mrs. X	.....	Blood
Strain K	.....	Maid	.....	Throat
Strain L	.....	Maid	.....	Tonsil

TECHNIQUE

With a view to identifying the strains from possible carriers with those present in the blood of the patients agglutinin-absorption experiments were performed. The technique adopted was that used by Smith.² Agglutinating serums were prepared by immunizing rabbits with

Table of Agglutination of Strain H by Serum H following Absorption by Various Strains

Absorbing Strain	Serum Dilutions										Titre
	1/40	1/80	1/160	1/320	1/640	1/1280	1/2560	1/5120	1/10240	Control	
A	-	-	-	-	-	-	-	-	-	-	0
B	-	-	-	-	-	-	-	-	-	-	0
C	+	+	+	+	+	+	+	+	+	-	1,600
D	+	+	+	+	+	+	+	+	-	-	1,280
E	+	+	+	+	+	+	+	+	-	-	1,280
F	-	-	-	-	-	-	-	-	-	-	0
G	+	-	-	-	-	-	-	-	-	-	40
H	-	-	-	-	-	-	-	-	-	-	0
I	-	-	-	-	-	-	-	-	-	-	0
K	+	+	+	+	+	+	+	-	-	-	800
L	+	+	+	+	+	+	+	+	-	-	1,600

Table of Agglutination of Strain I by Serum I following Absorption by Various Strains

Absorbing Strain	Serum Dilutions										Titre
	1/40	1/80	1/160	1/320	1/640	1/1280	1/2560	1/5120	1/10240	Control	
A	-	-	-	-	-	-	-	-	-	-	0
B	-	-	-	-	-	-	-	-	-	-	0
C	+	+	+	+	+	+	+	+	+	-	1,600
D	+	+	+	+	+	+	+	+	-	-	1,280
E	+	+	+	+	+	+	-	-	-	-	640
F	-	-	-	-	-	-	-	-	-	-	0
G	-	-	-	-	-	-	-	-	-	-	0
H	-	-	-	-	-	-	-	-	-	-	0
I	-	-	-	-	-	-	-	-	-	-	0
K	+	+	+	+	+	+	+	+	-	-	1,280
L	+	+	+	+	+	+	+	+	+	-	1,600

killed emulsions of strains H and I. The titres of the serums prepared were 1 in 2,000 for the homologous strains. For the agglutinin-absorption tests 0.02 c.c.m. of serum was absorbed with the deposit obtained after growing each strain in 50 c.c.m. of 10 per cent. ox-serum broth for forty-eight hours at 37° C. These cultures were enumerated by counting against red blood cells, and contained approximately 500 million cocci per c.c.m.—that is, 0.02 c.c.m. of serum was absorbed by 25,000 million cocci. The deposits in each case were made up to 0.18 c.c.m. bulk, so that the final dilution of the serum in absorption tests was 1 in 10. All absorption tests were first incubated in water bath at 37° C. for four hours and then left overnight at room temperature. In order to obtain stable suspensions for agglutination with the homologous serum the strain was repeatedly subcultured in 50 c.c.m. of beef-heart broth (pH 7.4) for twenty-four hours. The culture was then centrifuged for a very short period, and, if the broth was sufficiently turbid, then one volume of emulsion was added to one volume of normal saline in a Dreyer's tube and incubated in water bath for two hours at 55° C. If no spontaneous agglutination occurred the emulsion was then tested against the homologous antiserum to determine its sensitivity. From seven to nine subcultures were necessary to obtain strains in a suitable condition for the tests. All agglutination tests were incubated in water bath at 55° C. for two hours before being read.

COMMENTARY

From the history it was possible that either Sister A or Nurse C could have been the carrier. The maid, who was suffering from tonsillitis and from whose throat haemolytic streptococci were recovered, came into daily contact with both Sister A and Nurse C, but not with the patients. It was possible that the maid may have infected either Sister A or Nurse C, one of whom subsequently could have carried the infection to the patient.

From the above tables of agglutination-absorption tests it appears that strains A, B, F, G, and I have absorbed all the agglutinins present in serum H. Similarly, strains A, B, F, G, and H have absorbed all the agglutinins present in serum I. Thus, strains A, B, F, G, H, and I are serologically identical. If the source of these strains is recollected it will be seen that the organisms recovered from the throat of Nurse C are identical with those present in the blood of both patients and in the vagina of one of them, Mrs. Y. The results, therefore, of these experiments show that Nurse C was the carrier responsible for the infection of both patients.

SUMMARY

1. Cases of puerperal pyrexia have been studied with a view to determining the source of infection.
2. Bacteriological examination of the secretions of the patients and the throats of possible carriers has been made, several strains of haemolytic streptococci being recovered.
3. Possible sources of infection have been discussed, and evidence of the source of infection by means of agglutinin-absorption tests has been deduced.
4. In both cases it has been shown that the infecting organism was carried in the throat of a midwife who attended both cases.

REFERENCES

1 King, W. W.: *British Medical Journal*, 1930, i, 533.
 2 Smith, J.: *Puerperal Fever. Causation and Source of Infection.* Reports of Scientific Advisory Committee. Department of Health for Scotland, 1931.