

# PSEUDOMONAS PYOCYANEA MENINGITIS FOLLOWING SPINAL ANAESTHESIA

BY

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At Medical Clinic B we had the opportunity of observing four cases of *Pseudomonas* meningitis following spinal anaesthesia, and in the literature we were able to consult\* accounts of a certain number of cases. Garrod (1946) asserts that this complication is not as rare as one would think. He rejects the opinion of Livingstone and his collaborators (1943), believing that aseptic meningitis is not due to local irritation but is produced by Gram-negative bacilli not easily detected by ordinary laboratory technique. Evans (1945) deals with the different sources of contamination (the hands of the surgeon, the instruments, the anaesthetic solution, etc.) and describes the method of prevention. Barrie in 1941 had in the course of three months 11 cases of meningitis among 96 patients who underwent hypobaric "percaine" spinal anaesthesia; one of these was fatal. The affection started about the eighth day after the spinal anaesthesia and usually disappeared within eighteen days. The cell count of the cerebrospinal fluid varied from 9 to 11,400 per c.mm., and the albumin fluctuated in the neighbourhood of 100 mg. per 100 ml. Bacteriological analysis showed in one case Gram-negative bacilli, not fermenting common sugars, and producing no indole, but which could not be identified. Smith and Smith (1941) made the bacteriological analysis in Barrie's cases and found the same bacilli in the water, which had passed through a Berkefeld filter and then been used to rinse the syringes. After the filter was discarded no further case was seen. Hewer and Garrod (1942a, 1942b) saw an increasing number of cases of meningitis when the ampoules containing the spinal anaesthetic were sold with gummed labels (formerly the

surgeon. He attributes the infection either to the "novocain" used for local anaesthesia or to the saline employed to rinse the syringe.

In wartime literature (Cairns, 1944) we meet with cases of deep skull wounds communicating with the arachnoidal cavity and producing *pyocyanea* meningitis. Botterell and Magner (1945) describe 9 cases. During the same period they had two cases of *pyocyanea* meningitis in patients whose wounds did not communicate with the arachnoidal cavity but to whom they had applied preventive intrathecal penicillin for slight meningism. They made a bacteriological test of all the phials of penicillin administered during twenty days, before and after use. Only the residue of two of them contained *Ps. pyocyanea*.

Meningitis caused by the *melanogenes* variety of *Ps. pyocyanea* was not reported in the literature consulted. This organism, which is very rare, was identified and described by Radais (1897), and Cassin (1902) found it in a purulent leg-wound. Cultures of the bacillus produce a black pigment, which, unlike pyocyanine, is insoluble in chloroform.

### Analysis of Personal Cases

We have been able to observe 4 cases of *pyocyanea* meningitis. Infection took place outside our service. Three of these patients were sent to Medical Clinic B for meningitis treatment; in the fourth patient we discovered an ectopic ovary (with periadnexitis) situated under the liver. She had been operated upon elsewhere, and we saw her again, in consultation, subsequent to the outbreak of meningitis, which took place a few days after the operation, performed under spinal anaesthesia.

Our cases came from two different surgical centres (A and B). These centres have the peculiarity that the nursing personnel belong to the same staff. Cases 1 and 2 came from Centre A, Cases 3 and 4 from Centre B. The accompanying Table sums up the essential points of the observation.

Table giving Analysis of Cases

Case	Symptoms of Onset	Blood Leucocyte Count	Cerebrospinal Fluid				Course and Treatment	Total Dose of Sulphonamides
			Day	Albumin mg./100 ml.	Cell Count per c.mm.	Bacteriological Test		
1	Outbreak 15 days after scurocaine spinal anaesthesia. Evident symptoms of meningitis	12,300	1st	180	1,120 polymorphs	<i>Ps. melanogenes</i>	Fatal issue in 76 days. Sulphonamide treatment per os (a few intrathecal injections). Nine returns of pyrexia with chills	419 g. of sulphonamides in 76 days
			3rd	110	2,230 "	"		
			60th	117	11,400 "	"		
2	Outbreak 4 days after scurocaine spinal anaesthesia	--	--	--	--	"	From 4th to 9th day penicillin intramuscularly and intrathecally. From 6th to 9th day, 6-8 g. sulphonamides daily. Died 9th day	Slight
3	Outbreak 4 days after scurocaine spinal anaesthesia. Evident symptoms of meningitis. Severe headaches	7,500	1st	125	8,000 polymorphs	"	Fatal issue in 114 days. Three remissions of pyrexia	1,172 g. of sulphathiazole in 114 days
			80th	130	3,500 "	"		
			100th	--	83 "	"		
4	Outbreak 4 days after scurocaine spinal anaesthesia. Apparent recovery. 12th day: relapse. Epileptiform crises. Violent headaches	9,500	1st	110	4,100 "	<i>Ps. pyocyanea</i>	Two returns of pyrexia; 59th day definitely apyrexial. Complete recovery on 92nd day	740 g. of sulphathiazole in 92 days
			30th	70	700 "	"		
			60th	50	140 "	Sterile		
			90th	53	9 "	"		

particulars of the product were etched on the glass itself). The ampoules were immersed in spirit for 60 minutes, but the sterile water in which they were then rinsed gave positive cultures. Worth (1945) mentions the occurrence of staphylococcal meningitis following osteomyelitis of a vertebra after diagnostic lumbar puncture.

Evans (1946) describes two fatal cases of *pyocyanea* meningitis which occurred at three days' interval after spinal anaesthesia had been administered by the same

### Case Reports

*Case 1.*—A woman 26 years of age was operated on for vesico-vaginal fistula, under "scurocaine" spinal anaesthesia. Symptoms of meningitis occurred suddenly 15 days after the operation. Irregular pyrexia was present, accompanied by chills, and she was somnolent, sometimes even semi-comatose. Lumbar puncture revealed *Ps. melanogenes* meningitis. Sulphonamide treatment was prescribed and a total dosage of 419 g. was given over 76 days; the only other treatment was symptomatic. The case presented striking remissions, and at times there was promise of complete recovery. The blood serum contained no antipyocyanic agglutinins. The patient

\* On account of the destruction of the library of the University in 1940 our literature was very limited.

died on the 76th day of her illness after a fresh rise of temperature.

*Case 2.*—This patient, a woman aged 24, was operated on for ectopic ovary with periadnexitis, under scurocaïne spinal anaesthesia. The fourth day after operation peritonism and meningism were seen. On the sixth day there were evident signs of meningitis, and *Ps. melanogenes* was found in the cerebrospinal fluid. Penicillin was given intramuscularly and intraspinally, and medium doses of a sulphonamide were administered from the sixth day. She died on the ninth day.

*Case 3.*—A man aged 41 was operated on for hernia and appendicitis, under scurocaïne spinal anaesthesia. Symptoms appeared suddenly on the fourth day. The patient complained chiefly of severe headaches. *Ps. melanogenes* was found in the C.S.F. The illness seemed to respond favourably to sulphathiazole treatment; three remissions occurred, but the temperature returns were of little importance. On the 100th day of the illness the cell count of the C.S.F. was 83 per c.mm. (it was 8,000 at the beginning). The patient, however, was anything but docile, and we were unable to keep him any longer at the clinic. He went home, and very soon had a renewal of pyrexia, with signs of meningitis, urinary retention, and a Cheynes-Stokes type of respiration. The patient died 15 days after returning home, having received 1,172 g. of sulphathiazole in 114 days.

*Case 4.*—A woman aged 35 was operated on for epigastric hernia under scurocaïne spinal anaesthesia. Illness occurred four days after the operation. The patient was treated with sulphathiazole and seemed very soon to improve, but on the 12th day symptoms of meningitis were observed, accompanied by general and local epileptiform crises. Lumbar puncture revealed the presence of true *Ps. pyocyanea*. The patient was successfully treated with sulphathiazole; the headaches weakened, the epileptiform crises diminished, and after two minor relapses the temperature was normal from the 59th day, after 436 g. of sulphathiazole had been given. Owing to a persistent slightly raised cell count in the C.S.F. we gave her 8 g. of sulphathiazole daily for 38 days. She took in all 740 g. in 92 days. We kept her under observation for 15 days, without treatment, before discharging her. Seven months after her departure she was perfectly well.

### Comments

Patients 1 and 2 had been operated on at Surgical Centre A by two different surgeons. The two cases were caused by *Ps. pyocyanea* of the *melanogenes* variety. At the same period and at the same clinic two other cases of meningitis occurred 15 days after spinal anaesthesia; these were cured by intensive sulphonamide therapy, but the pathogenic agents were not determined. Patients 3 and 4 were operated on by one and the same surgeon at Surgical Centre B. This surgeon has used the same technique for spinal anaesthesia for the last seven years, and so far no complication has occurred. But all of a sudden 7 cases of meningitis arose. After the appearance of the first case the surgeon intensified the aseptic measures, but, despite this, 6 new cases were seen at the same time. Three of these patients died (one of them is Case 3). Cultures of the C.S.F. of all the cases were made at the surgeon's request.

The pathologist, Prof. Bruynoghe (1944), found only two positive cultures (Cases 3 and 4): in one, true *Ps. pyocyanea* was developing; in the other, *pyocyanea* of the *melanogenes* variety. The causes of the infection in our four cases are obscure.

The third surgeon (of Centre B), who had 7 cases of meningitis, sent to Prof. Bruynoghe a box of scurocaïne ampoules; five of them were submitted to careful bacteriological examination, but did not reveal the slightest trace of any pathogenic agent. The brushes, however, used by the surgeon to clean his hands were never sterilized. Prof. R. Bruynoghe is inclined to attribute the cause of the infection to that reason: since then the brushes have always

been sterilized, and no further cases of meningitis have been reported from the two clinics. It is interesting to repeat that the nursing personnel of the two surgical clinics belong to the same school.

The three cases treated by us have received very heavy dosages of a sulphonamide—419 g. in 76 days, 1,172 g. in 114 days, and 740 g. in 92 days—without any reaction. The three cases caused by *melanogenes* proved fatal in spite of the fact that two of them (1 and 3) received intensive sulphonamide treatment. Patient No. 4, whose meningitis was caused by true *Ps. pyocyanea*, recovered completely after 92 days' sulphathiazole treatment.

### Summary and Conclusions

Reports are given of 4 cases of *Ps. pyocyanea* meningitis, three of which were of the *melanogenes* variety. Three of them received intensive sulphonamide treatment (by mouth). The fourth had a rapidly fatal issue, and was wrongly given penicillin and only medium doses of a sulphonamide.

One of the cases, caused by true *Ps. pyocyanea*, was cured after intensive sulphathiazole treatment (740 g. in 92 days).

*Pyocyanea* meningitis—in particular that due to the *melanogenes* variety—is very rare, and possibly is nearly always of traumatic origin.

The four cases recorded show that spinal anaesthesia may be the cause of the infection. When using that method the aseptic technique therefore can never be too thorough.

These forms of meningitis, in particular those of the *melanogenes* variety, are very resistant to treatment; early and intensive sulphonamide therapy, persevered with because of the frequency of relapses, seems to give the only hope for a real cure.

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*Thorpe's Dictionary of Applied Chemistry* is a work which has gained a well-established position in technical literature. Volume VII of the fourth edition is now before us (Longmans, Green and Co. price 80s.). Its contents run from Iodine to Metallography. The work is primarily intended for consultation by technologists, and the technical aspect of the subject matter is everywhere prominent; but the members of the Editorial Board have wisely recognized that pure science is entering the realm of technology in ever-increasing measure. They have accordingly made a selection of contributors of special articles from among the most prominent men who are acknowledged specialists in the scientific approach to the respective subjects and these contributors have incorporated the newest information. As examples of the exhaustive treatment it may be mentioned that under Iodine considerable space is given to iodine therapy, and that a full account of Vitamin K is given under its own heading. Other articles worthy of special mention are those concerned with iron and steel, leather, magneto-chemistry, mass spectra, and metallography. The references include a most extensive variety of matters extending from such subjects as those named above down to the chemical constituents of the lotus plant and of the homely leek. The eminent position of *Thorpe's Dictionary* in chemical literature is fully maintained in the new edition.

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