# Prevention and treatment of peritonitis in CAPD: eosinophilic peritonitis

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**SUMMARY**

**Over a three-year period 82 patients were managed on CAPD for a mean period of eleven months. They developed 113 episodes of peritonitis in all. The causative organisms were: gram-positive cocci 44 %, gram-negative organims 18 %, Candida 0.4 %, «eosinophilic» 6 %, «sterile» 28 %, others 3.6 %. Peritonitis was treated by continuation of CAPD with usage of Cefuroxime (200 mg/l.) added to peritoneal fluid. This antibiotic was modified if bacteriological cultures indicated it.**

**The treatment was succesfull in 83 % of the episodes with a recurrence rate of 13 % in 1979 and 21 % in 1981. Catheter removal was necessary on 23 occasions because failure to cure peritonitis or severe exit site infection. Thirteen patients discontinued CAPD because peritonitis, four of them lost all peritoneal cavity secondary to severe pseudomonas infections. There were no deaths secondary to peritonitis. In eight patients eosinophilic peritonitis, was seen. This affection was bening and probably related to a reaction to the material component of the system.**

**Key words: CAPD, Peritonitis, Eosinophilic Peritonitis.**

**RESUMEN**

**En un programa de DPCA con 82 pacientes seguidos a lo largo de 11 meses (1-36) se trataron 113 episodios de peritonitis.**

**El protocolo seguido fue la continuación del procedimiento de DPCA con la adición inicial al líquido de diálisis de Cefuroxime (200 mg/l.), medicación que fue eventualmente modificada ulteriormente, dependiendo del informe bacteriológico. El catéter se retiró cuando hubo resistencia al tratamiento al 3.° ó 4.° día, infección del túnel subcutáneo, peritonitis por hongos o recurrencia repetida.**

**El 44 % de los episodios fueron causados por gérmenes gram-positivos, 18 % por gram-negativos, 28 % aparentemente estériles y 0,4 % por candidas. El resto se repartieron entre formas con celularidad eosinofílica (6 %) y variantes infrecuentes (3.6 %).**

**El tratamiento tuvo éxito en el 83 % de los casos, con un índice de recurrencia del 13 % en 1979 y 21 % en 1981.**

**La retirada del catéter fue necesaria en 23 ocasiones. En 4 de estos pacientes no fue posible la reinserción del mismo por adherencias peritoneales.**

**Trece pacientes debieron salir de DPCA, por causa de padecimiento de peritonitis.**

**No hubo muertes secundarias a esta complicación.**

**En 8 enfermos la celularidad predominante del líquido peritoneal fue eosinofílica (55-91 %), caracterizando a una inflamación benigna, estéril y probablemente relacionada con algún componente del material del sistema.**

**Palabras clave: DPCA, peritonitis, peritonitis eosinofílica.**

CAPD is gaining increasing acceptance as a primary form of dialysis treatment, with nearly 1,000 patients on it in the U. K. [1]. Although CAPD has some distinct advantages, its major drawback is peritonitis, which may significantly reduce its use [2,3]. This paper relates to the experience of managing peritonitis in the Newcastle-upon-Tyne Renal Unit, together with in vitro studies of the broad-spectrum antibiotic, Cefuroxime, which is used as a first line «blind» agent in management of these episodes.

TABLE I

**PERITONITIS IN NEWCASTLE-UPON-TYNE**

| Incidence of peritonitis | |
|---|---|
| Total episodes of peritonitis | 113 |
| Patients at risk | 82 |
| No. patients with no peritonitis | 24 |
| No. peritonitis/patients risk | 1.6 |
| No. peritonitis/peritonitis population | 2.3 |

| Peritonitis rate | 1979 | 1980 | 1981 |
|---|---|---|---|
| No. of episodes | 1/20 pat. week | 1/47 pat. week | 1/35 pat. week |
| No. Rx at home | — | 9 (26 %) | 33 (47 %) |
| No. Rx at hospital/home | 19 (62 %) | 23 (62 %) | 25 (35 %) |
| No. Rx at hospital | 12 (38 %) | 18 (51 %) | 13 (18 %) |
| No. Rx with cefuroxime | 17 (54 %) | 21 (60 %) | 41 (60 %) |
| No. of precipitating factors isolated | 4 (13 %) | 10 (28 %) | 12 (17 %) |
| Successfully treated episodes | 28 (90 %) | 26 (75 %) | 59 (85 %) |
| Recurrence | 4 (13 %) | 13 (37 %) | 15 (25 %) |
| Catheter removal | 3 (10 %) | 9 (25 %) | 11 (15 %) |

## PATIENTS AND METHODS

Over a three-year period 82 patients were managed on CAPD for a mean period of eleven months (range 1-36 months). For the initial nine months of the programme there was a CAPD Sister exclusively in charge and nursed on a general medical ward, with 'set changes' done in a side room. Thereafter the patients were managed in the Dialysis Unit adapted for CAPD.

The diagnosis of peritonitis was based on a cloudy peritoneal dialysis fluid (WBC > 100 per $mm^3$) with or without overt clinical signs and symptoms of peritonitis or a positive bacteriological culture. The PD fluid was cultured by passing the fluid through a 0.2 μ filter, which was then incubated aerobically and anaerobically.

The peritonitis was treated by continuation of CAPD with usage of Cefuroxime 200 mg/l. Initial lavage was undertaken (6 quick exchanges) if patient was toxic. Treatment was initiated in hospital and continued at home without necessitating hospitalisation. Gentamicin, Cloxacillin, Erythromycin, Fucidin, Miconazole, were other antibiotics used depending on bacteriological sensitivities. A cure was defined as resolution of signs and symptoms of peritonitis with PD count of WBC less than 100 per $mm^3$ and a negative effluent culture.

Indications for peritoneal dialysis catheter removal were peritonitis episodes resistant to antibiotic treatment of 3-4 days duration, tract or tunnel infection, fungal peritonitis or repeated recurrence of peritonitis.

## RESULTS

There were 113 episodes in all, 83 % were successfully treated. However, there was a recurrence rate of 13 % in 1979, 21 % in 1981. Catheter removal was necessary on 23 occasions related to either failure to cure peritonitis (21 patients) or severe exit site infections. It was not possible to reintroduce the catheter in four patients because of peritoneal adhesions (Table I).

85 % of episodes were managed by Cefuroxime alone, which was administered for a mean period of seven days (5-14 days). Treatment duration was longer in gram-negative and streptococcal infections. The causative organisms were as reported before [4] (Table II). Half the episodes were related to skin organism, while 18 % were related to gram negative organisms. The 'sterile' peritonitis rate (28 % overall) declined in the last two years with improved bacteriological techniques.

TABLE II

**CAUSATIVE ORGANISMS IN CAPD PERITONITIS 3 YEAR STUDY IN NEWCASTLE-UPON-TYNE**

| | No. | % |
|---|---|---|
| Staph. epidermidis | 38 | 27 |
| Staph. aureus | 16 | 11 |
| Streptococci | 11 | 6 |
| Gram-negative organisms | 24 | 18 |
| Candida | 1 | 0.4 |
| Eosinophilic | 8 | 6.0 |
| «Sterile» | 38 | 27 |
| Others | 5 | 3.6 |

### Complications related to antibiotics

Ototoxicity related to Gentamicin was observed in two patients while a further two had this secondary to Erythromycin [5]. Diarrhoea associated with Clostridium difficile occurred in five patients treated with antibiotics.

### Outcome

Of the twenty-four patients who discontinued CAPD for reasons other than renal transplantation, thirteen

TABLE III

**EOSINOPHILIC PERITONITIS**

| | Case 1 | | Case 2 | | Case 3 | | Case 4 | |
|---|---|---|---|---|---|---|---|---|
| | PD Fluid | Blood | PD Fluid | Blood | PD Fluid | Blood | PD Fluid | Blood |
| WBC ($\times 10^3/\mu l.$) | 1.4-8.0 | 9.5 | 2.2-6.3 | 6.5 | 0.11-0.5 | 4.0 | 0.2 | 7.0 |
| N % | 12-25 | 65 | 0-1 | 60 | 2-18 | 45 | 8 | 62 |
| L % | 7-8 | 23 | 1-6 | 24 | 3-7 | 33 | 25 | 25 |
| M % | 5-9 | 3 | 6-8 | 7 | 3-31 | 7 | 2 | 6 |
| E % | 59-74 | 9 | 88-91 | 9 | 65-72 | 15 | 66 | 7 |
| RBC in PD Fluid | — | | — | | — | | — | |
| Duration of eosinophilic effluent | 4 weeks | | 2 weeks | | 3 days | | 3 days | |
| Onset of eosinophilia after starting CAPD | within 1 week | | within 1 week | | 3 months | | 1 day | |

were related to peritonitis, although there were no deaths secondary to this cause. Four patients lost all peritoneal cavity secondary to severe pseudomonas peritonitis. No long term loss of ultrafiltration was noted.

### Eosinophilis peritonitis [6]

This was seen in eight patients. It differs from bacteriological peritonitis in that the predominant cell type is the eosinophil as opposed to the neutrophil in the bacterial one (Table III). It comes on very early in the CAPD life, it is benign, asymptomatic, and probably related to a reaction to the material component of the system. No treatment is necessary and it can persist for up to six weeks.

### Prevention of peritonitis

This is very desirable and is dependent upon the following factors:

1. Good training programme and constant review.
2. Bacteriological filter/UV light.
3. Adequate nursing and medical staff and special area for CAPD.
4. Improvements in connectors, catheters.
5. Patient selection.

We consider it an absolute necessity to have a well trained and enthusiastic medical and nursing staff with a defined (preferably separate) area for use for CAPD exchanges and training. To conduct CAPD in a less than ideal environment increases peritonitis.

An improvement in the connectors and catheters is required and the in-line filter or the use of UV light to sterilise the connectors may both reduce this risk. The care of exit site still remains a problem and whether a 2 cuff or single cuff Tenchkoff catheter is used the problem is still present.

### Usage of antibiotics

The use of Cefuroxime as a first line antibiotic has been based on its wide-spectrum of activity. Intraperitoneal usage produced high levels in serum and PD fluid [7]. The use of antibiotics is far from standardised. some units use a cephalosporin with an aminoglycoside as a «blind» antibiotic and continue this for eight to ten days [8]. There is a risk of ototoxicity from the high levels of the Tobramicin achieved in the serum.

## CONCLUSION

CAPD has distinct advantages when compared to haemodialysis but its future will depend on achieving a significant reduction in the incidence of peritonitis. Improvements are needed in the catheters, connectors and fluids to minimise this complication.

Antibiotic usage, dose, route of administration and duration of treatment are still unclear and we need to develop a profile of a high risk patient so that he can be excluded from CAPD. This entails a better understanding of the pathophysiology of peritonitis, early detection and thus better treatment.

#### ACKNOWLEDGEMENT

The author wishes to acknowledge the use of data from the Renal Unit, Royal Victoria Infirmary, Newcastle-upon-Tyne and help of medical and nursing staff of that Unit, in particular Dr. A. Bint for the bacteriological studies and Dr. J. Ramos for preparation of the data.

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