Exfoliative Cytological Changes in Peritoneal Fluid from Patients on Peritoneal Dialysis

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Abstract

Background: Ambulatory peritoneal dialysis introduced by Popvich *et al* (13) in 1978 , consists of a four to five hours lavage of peritoneal cavity with 2000 ml of glucose solution .It remains a useful method for treating patients with end stage renal failure till renal transplantation becomes possible.

Objectives: The aim of the study is to evaluate the value of cytological changes of mesothelial cells in dialysate patients.

Methods: Within one year period, 32 cytological peritoneal fluid samples were collected from patients with end stage renal failure regardless of the underlying causes, admitted to the dialyzing unit in Kadimya Teaching Hospital. Smears were prepared and fixed in 95 % ethyl alcohol and then stained with H & E stain to be interpreted by the same pathologist.

Results: Thirty two samples of peritoneal fluid were obtained from patients in peritoneal dialysis with a mean age of 54.8 years and male to female ratio of about 1.9: 1.

Twenty two had short term dialysis were compared with 10 patients with long term dialysis.

Gross examination of the samples revealed clear yellow fluid. Macroscopical examination showed no evidence of inflammatory cells with increased exfoliation, cellularity and three dimensional mesothelial cellular clustering pattern with increased nuclear size. No statistical significances were found in the changes seen in cytological smears between both groups but remarkable nuclear changes were shown in both of them.

Conclusion: This study demonstrated that peritoneal dialysis of any duration can induce significant atypical changes in mesothelial cells. The pathologist needs to be aware of these changes and to include peritoneal dialysis in the list of other benign conditions that cause reactive mesothelial atypia.

Key words: Cytology, Peritoneal fluid, Dialysis.

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Introduction

Peritoneal dialysis is in common use to treat patients with end stage renal failure . Very little is known about cellular changes induced by short or long term dialysis. Routine examination of the lavage fluid which corresponds to an artificial ascites is not necessary. However cellular sediments of the fluid can be studied to identify and early diagnose any induced inflammatory process.

Carlon and Della were the first scientists who published their paper report on cytological findings of peritoneal fluids taken from patients on peritoneal dialysis [(1)]. In the present study we presented our finding by analyzing the macroscopical and the microscopical morphological changes of peritoneal dialyzing fluid compared between short and long term peritoneal dialysis.

Methods

A total of 32 cytological peritoneal fluid samples were obtained from patients admitted in dialyzing unit at Kadimya Teaching Hospital for dialysis regardless of the underlying causes for their end stage renal failure. The content of the bag was poured into conical disposable glass tubes, and then centrifuged for 15 minutes at 5000 rpm. The supernatant fluid was decanted and 2 to 3 sediment drops were smeared on 2 glass slides. The glass slides were labeled and dripped in Alcoholic Coplou Jar for at least 30 minutes. These were then stained by Haematoxyllin & Eosin stain. All cytological aspects of theses preparations were analyzed for this study.

Results

Within six month period, around 32 peritoneal fluid samples were obtained from patients on ambulatory peritoneal dialysis in dialyzing unit at Kadimya Teaching Hospital. Their age range was between 37- 68 years with a mean age of 54.8 years .Males were predominant with a sex ratio of about 1.9 male: 1 female.

Twenty two out 32 patients had short term dialysis (less than 6 months) compared with 10 cases who had long term dialysis (more than 6 months) **(Table-1)**.

Gross examination of all peritoneal fluid samples revealed clear yellow dialyzed fluids .It was neither purulent nor hemorrhagic. This was confirmed by microscopic examination which showed little or no evidence of inflammatory cells or RBC in the slides examined **(Table-2)**.

Microscopic cytologic changes in the dialyzed fluid were illustrated in **fig.1** and **fig.2**. and summarized as **Table-3** increased exfoliation and

cellularity of both groups (20% for short term and 19% for long term in high grade cellularity) as well as increased three dimensional mesothelial cellular clustering pattern (papillary/acinar pattern 18% for short term &26% for long term) and mesothelial nuclear diameter size (3-4 x larger than lymphocyte in short term and 4 x larger than lymphocyte in long term dialysis).

No significant statistical differences regarding the cytological smear changes between short and long term dialysate patient groups (P>0.05).

Finally the most remarkable features seen in both groups of dialysis were nuclear changes (enlarged and atypical nucleus) in the absence of significant inflammation.

(Table – 1)

Duration of Peritoneal Dialysis (in months) in 32 Patients.

No. of patients	*Short term dialysis <6 months*	*Percentage %*	*Long term dialysis >6 months*	*Percentage %*
32	22	68.7	10	31.3

(Table-2)

Peritoneal Fluid Color in 32 Patients on Peritoneal Dialysis

No. of Patients	*Clear Yellow*	*Cloudy*	*Bloody*
32	32	0	0

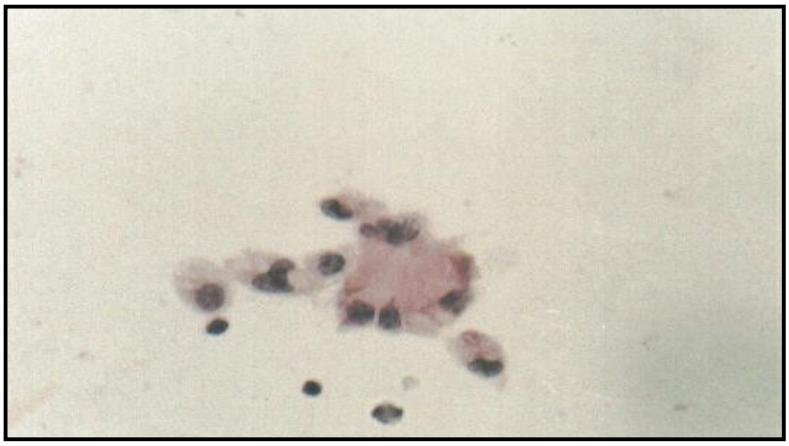
(Table-3)

Microscopical Changes in 32 Patients on Peritoneal Dialysis Regarding the Duration.

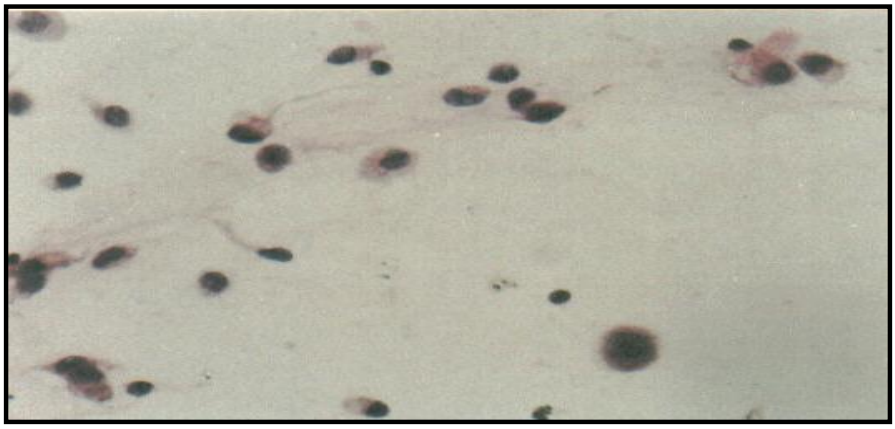
Microscopical changes	Short term dialysis	Long term dialysis
Dirty background including significant hemorrhage	0	0
Cellularity (no .of cells / Hpf)		
Low(10-19)	54%	60%
Moderate(20-39)	26%	21%
High(400&more)	20%	19%
Significant inflammation(lymphocyte or neutrophil)	0	0
Mesothelial pattern		
Singly	66%	55%
Sheets	16%	19%
Papillary/acinar	18%	26%
Mesothelial nuclear size	3-4 x larger than lymphocyte	4 x larger than lymphocyte
Mesothelial nuclear membrane		
Thin	74%	71%
Thick	26%	29%
No. of nucleoli		
Inconspicuous	22%	27%
1-2/nucleus	64%	67%
3 and more	4%	6%
Erythrophagocytosis	0%	0%
Mitotic figure	0%	0%

- ***Normal Mesothelial Cell Nuclei around 2x Larger than Lymphocyte with Thin Nuclear Membrane and Inconspicuous Nucleoli.***

(Figure -1)
Smear Showing Cellular Shedding of Reactive Benign Mesothelial Cells With Cytological Atypia. H & E (400 X)



(Figure -2)
Smear Showing Cellular Shedding of Reactive Benign Mesothelial Cells with Cytological Atypia Tending To Acinar Formation . H & E. (400x)



Discussion

Besides its therapeutic value [2, 3, 4], ambulatory peritoneal dialysis can be interpreted as an experimental model of ascites [4]. The clinical reason for performing a cytological examination of dialysate fluid is the known risk of infections [5, 6, 7]. In peritonitis, the inflammatory agents and irritants (bacteria and chemicals) can induce marked changes in the mesothelial cells. These changes are usually depicted as an increased exfoliation and cellularity , presence of two and three dimensional cell clusters , dirty background in the form of inflammatory cells and hemorrhage , degenerative nuclear mesothelial cellular changes in the form of hyperchromasia, increased nuclear size , thickened nuclear membrane and increased number of nucleoli .Sometimes these cytological changes may closely mimic those of malignancy [9,10,11].Similar changes have also been noted in uremia [8], hepatic cirrhosis[9] and pancreatits [12] as well as following chemotherapy and radiotherapeutic administration [9].

Patients undergoing ambulatory peritoneal dialysis frequently experience recurrent episodes of peritonitis which was excluded from our study [13]
The most remarkable and noticeable feature in our study in both dialysate groups was significant nuclear cytological atypia in the absence of significant inflammation resulted from repeated stimulus of dialysate solute and acidic pH
(Sodium, potassium and magnesium chloride, lactate and dextrose ions). These features will be augmented if both bouts of infection happened.

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