

## CLINICAL EXPERIENCE WITH SHORT PERITONEAL CATHETERS

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### Summary

To avoid displacement of the peritoneal catheter, we modified two conventional catheters (Gore-Tex and Tenckhoff) shortening the intra-peritoneal segment (8cm) and inserting it 3cm above the pubis. In two groups of patients we compared 41 short catheters with 26 conventional catheters (total experience 312 and 278 months respectively); the skin exit infections were nine in both groups; the catheter dislodgements were respectively 0 and 14. Our data suggest that displacement of the peritoneal catheter will be resolved by the use of short catheters.

### Introduction

A functional peritoneal catheter is essential in the management of peritoneal dialysis. One common catheter-related complication is the inability to drain effluent from the peritoneum. When drainage problems occur they often result in displacement of the distal tip of the catheter which may be due to either excessive length of the intra-peritoneal segment or bowel constipation. In these instances, it is necessary to replace the catheter if a strong stimulation of bowel peristalsis is ineffective in repositioning the catheter.

During the most severe episodes of peritonitis [1], adynamic ileus, a common complication, often causes the displacement of the Tenckhoff catheter and, in most cases, leads to occlusion of the catheter with fibrin. The treatment for this condition is to replace the catheter surgically. This, however, may lead to both clinical (surgical stress, clinical aggravation, bleeding) and technical (malfunction, dislocation, obstruction of the new catheter) problems.

Another possible therapeutic approach is the early removal of the catheter. The patient is moved temporarily to haemodialysis using temporary vascular access. This approach results in clearing the peritonitis, but large intestinal adhesions may develop, which make it difficult and sometimes impossible to place a new device [2].

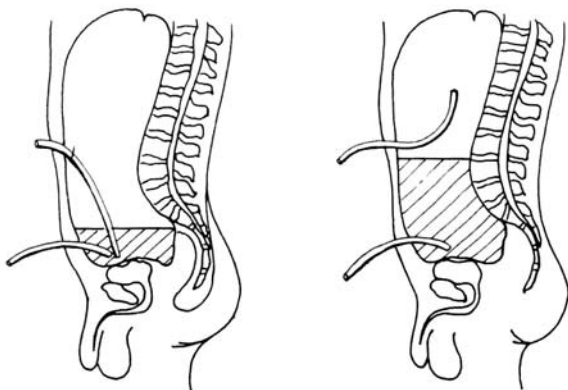


Figure 1. Possible positions of catheters and their influence on drainage

The complication of displacement may be prevented by employing a catheter with a short intra-peritoneal segment, and inserting it through a lower site on the abdominal wall. Thus, the intra-peritoneal segment, because of its shortness, does not affect drainage, whatever its position inside the peritoneal cavity. This report describes three years' experience with conventional and short catheters.

### Materials and methods

Since 1982 we have used two different peritoneal catheters (Gore-Tex® peritoneal catheter [3] and Tenckhoff [4] Miramed®) of two different sizes: conventional size and short size. The latter has been obtained by shortening the intra-peritoneal segment of the standard catheter to a length of approximately 8cm, without varying the number of the lateral holes.

A conventional catheter was placed into 24 patients, 17 males and 7 females, aged from 18–73 (mean  $57.6 \pm 14.3$ ); 13 of them were undergoing intermittent peritoneal dialysis (IPD) and 11 continuous ambulatory peritoneal dialysis (CAPD).

A short catheter was placed in 34 patients, 22 males and 12 females, aged from 18–74 (mean  $51.1 \pm 15.1$ ); 11 of them were undergoing IPD and 23 CAPD.

All the catheters were placed surgically, preferably on Hunter's line, the conventional ones 2–3cm under the navel and the short ones 3–4cm above the pubis.

### Results

All the results are reported in Table I. We have placed 26 conventional catheters in 24 patients (total experience 278 months). We observed nine episodes of skin exit infection, three of them linked with peritonitis and dislocation of the catheter. Six patients needed the replacement of the device, two others were

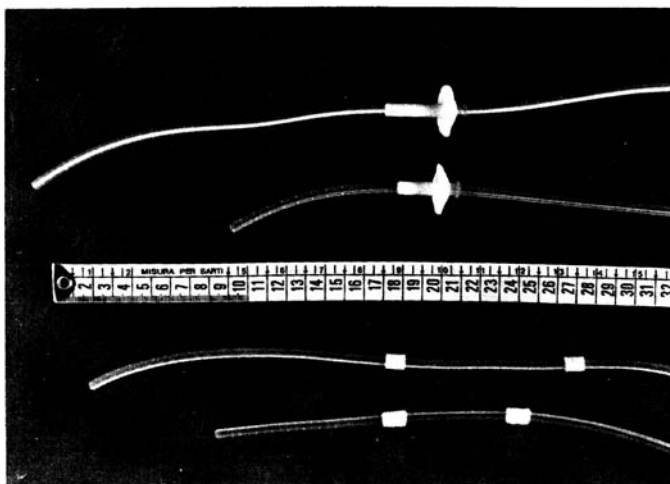


Figure 2. Catheters used in the study

TABLE I. Cumulative comparison between conventional and short catheters

	Conventional catheter			Short catheter
Patients	24			34
Died with functioning catheter	10			10
Converted to haemodialysis	3			2
Converted to another kind of catheter	7	4 Short-cath 3 Column-disc cath	1	1
Present patients	4			21
Catheters	26	4 Gore-Tex 22 Tenckhoff	24 17	41
Total experience (months)	278	64 Gore-Tex 214 Tenckhoff	199 113	312
Skin exit infections	9	3 Gore-Tex 6 Tenckhoff	7 2	9
Dislocations	14			0

transferred permanently to a haemodialysis programme because of the technical impossibility of placing a new catheter and a third patient died of cardiac problems before catheter replacement. The episodes of catheter displacement were 14; eight required the simple repositioning of the intra-peritoneal segment of the catheter, three its substitution and three others the change of the patients to a haemodialysis programme.

We have inserted 41 short catheters in 34 patients (total experience 312 months). We observed eight episodes of skin exit infection which required catheter replacement: in three of them, with peritonitis, it was necessary to discontinue peritoneal dialysis and to move temporarily to haemodialysis. Another skin exit infection occurred in a patient with severe cachexia from anorexia nervosa, who died afterwards. Two patients were transferred to haemodialysis because of loss of ultrafiltration.

During the study we never observed any displacement of the short catheter. Over this period all the short devices have functioned adequately (spontaneous drainage of 2L in 10–14 minutes).

One patient experienced adynamic ileus, following a severe episode of diverticulitis, complicated by transmural *Pseudomonas aeruginosa* peritonitis. However the device remained functional and permitted a continuous peritoneal lavage with an antibiotic added to the dialysis solutions. The third day the cultures were negative, but intestinal atony persisted. An exploratory laparotomy was performed, without removing the catheter. The next day it was possible to resume peritoneal dialysis, with small volumes, but the patient died of surgical complications. Throughout the whole episode, the catheter was functional.

## Discussion

The Tenckhoff catheter has made peritoneal dialysis available to a large population of renal patients. Attempts to modify it partially or entirely have not resulted in significant improvements [5,6]. Although it remains the most widely used prosthesis, one of the most frequent and dreadful complications of the Tenckhoff catheter is dislodgment. Sometimes dislodgment results in decreased efficiency and, in a few cases, in such a reduction of drainage that replacement of the device becomes necessary.

Dialysate outflow mainly occurs because of the positive pressure exerted by the elastic abdominal wall. Patients with round and flaccid abdomens and with hypotonic abdominal muscles, may sometimes present drainage problems.

A catheter inserted low in the abdomen, close to the lowest point of the peritoneal cavity, permits a nearly complete drainage because of gravity and reduces residual volumes. Moreover, insertion in a low anatomical site requires a short distal segment that, regardless of position, will not affect drainage. This advantage becomes even more useful during severe episodes of peritonitis, which are often complicated by adynamic ileus. Recent trends suggest peritonitis should be treated during CAPD by adding the antibiotic to the bag. The most severe episodes may require continuous lavage of the peritoneal cavity. It is

absolutely necessary, therefore, to have an adequate well-functioning access.

What we have observed was confirmed in one of our patients. Despite a severe adynamic ileus, the short catheter kept functioning and the wide laparotomy did not result in drainage problems. There is evidence that a catheter inserted at a low site does not interfere with an eventual laparotomy, if it becomes necessary.

The catheter, inserted low on the abdominal wall may be preferred as access to the peritoneum, especially when abdominal scars or large intestinal adhesions, resulting from previous operations, make the insertion of a Tenckhoff catheter difficult.

In our experience, the position of the catheter, near the pubis, did not cause a higher incidence of cutaneous infections. No patient complained about hindrances in sexual activity. Because of the low insertion, the catheter and the protective band may be hidden under clothing and bathing attire, allowing the patient to go to the seaside on holidays, without psychological problems resulting from the presence of an evident prosthesis.

## References

- 1 Rubin J, Rogers W, Taylor HM et al. *An Intern Med* 1980; 92: 7
- 2 Mion CM, Boen ST, Scribner BH. *Am J Med Sci* 1965; 250: 675
- 3 Bay WH, Vaccaro PS, Powell SL, Erlich LF. *Am J Kidney Dis* 1984; 4: 268
- 4 Tenckhoff H, Schechter H. *Trans ASAIO* 1968; 14: 181
- 5 Oreopoulos DG, Izatt S, Zellerman G et al. *Proc Clin Dial Trans Forum* 1976; 6: 96
- 6 Ash SR, Johnson H, Hartman J et al. *ASAIO J* 1980; 3: 109