SHORT REPORT

Malfunction of Peritoneal Catheters by Proliferation of Vascularized Fibrous Tissue

Malfunction of the peritoneal catheter compromises the success of this dialysis technique. The incidence of malfunction seems to be highest during the first 6 months. Common causes are constipation, occlusion by fibrin, dislocation, and omental wrapping (1,2), whereas encapsulation by vascularized fibrous tissue is reported only in single cases (3–7). In this report we analyzed retrospectively 10 videolaparoscopy cases of catheter encapsulation.

MATERIALS AND METHODS

All cases that were referred to the nephrology and dialysis units of Jesi and Ancona for videolaparoscopic revision were revisited regarding catheter encapsulation in the absence of other causes of malfunction. Ten cases in 8 patients had been registered from 1995 to 2013 (patient age 37 to 78 years, median 71 years). Histology was performed in 8 cases. The incident rate of encapsulation was estimated on the basis of the number of laparoscopic revisions for any cause performed during the abovementioned period.

RESULTS

Malfunction by encapsulation occurred soon after placement, from 18 to 65 days (median 37 days). All patients presented dialysate outflow failure, and 3 patients even had thrombus formations in the drainage. Videolaparoscopy was performed 5 to 75 days after malfunction (median 12 days). Two patients had a recurrence which was successfully treated by laparoscopy, 43 and 59 days respectively after the previous revision.

Macroscopically the tissue formation was of whitish-yellowish colour with small superficial vessels (Figure 1). In 2 cases, the catheter was attached to the anterior abdominal wall resulting in an encasement of the entire length. In the remaining 8 cases, encapsulation and vascularization originated from the visceral peritoneum covering prevalently the distal part of the catheter.

Revision was performed with a single port technique using a laparoscope with an instrument side-channel. The catheter was liberated and the encapsulating tissue partially removed in 6 patients, resulting in a permanent restoration of function in all but 1 patient. In the remaining 4 cases, as only diagnostic laparoscopy was performed, the malfunctioning catheter was

Figure 1 — Macroscopic aspects of the tissue formation around the peritoneal catheter.

removed and a new one placed during laparoscopy access. The incident rate of encapsulation was 12%, corresponding to 10 cases out of 85 revisions.

Light microscopy confirmed fibrous tissue intersected by vessels, mostly of small diameter. Infrequently, focal lymphocyte infiltrates were present, without signs of granulomatous foreign body reactions. Hemosiderin deposits in 2 specimens indicate bleeding episodes during fibrous sheet formation. Intraluminal thrombus formations consisted of vascularized fibrous tissue as well.

DISCUSSION

Encapsulation in the absence of other causes of malfunction seems to be a relatively infrequent event. Four cases of encapsulating sheath formation in peer reviewed journals (3–6) and 2 cases in a Web-based electronic journal have been published (7). The 4 peer-reviewed cases reported a similar time span

from placement to malfunction. Recurrence was observed in 2 patients after a similar period of time. The possibility that remaining fibrous tissue at the side of the preceding catheter might have favoured reappearance can not be excluded. The encapsulation seemed to develop from the parietal or visceral peritoneum, and to expand along the catheter, initially causing only outflow obstruction due to valve function. The macroscopic aspect was similar to published cases (3–5,7). Histological findings have been reported only in 2 cases: granulation tissue without inflammation (4) and avascular mesothelial cell lining sheet (6). The avascular mesothelial cell lining sheet, a sign of early intraperitoneal surface repair, seems to be subsequently transformed in mesenchymal tissue during the wound healing process, which lasts about 2 to 6 weeks.

A stimulus of fibrous tissue formation might be the placement of a catheter in patients with increased systemic inflammation. Some patients, especially those with diabetes mellitus, seem to present an altered production of fibroblast or vascular growth factors (8,9). Other cases might be related to complications or to the catheter itself, for example leakage, bleeding, intestinal lesion, bacterial contamination, Dacron fibers or chemical contaminants (10–12).

Encapsulation of the catheter by fibrous tissue neoformation should be considered as a possible cause of malfunction, especially early after catheter placement. Causes of encapsulation seem to be multifactorial. Prospective research might clarify patient- and catheter-related triggering factors.

DISCLOSURES

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