Gynecologic Oncology 136 (2015) 466–471

Contents lists available at ScienceDirect

Gynecologic Oncology

journal homepage: www.elsevier.com/locate/ygyno

Management of symptomatic ascites and post-operative lymphocysts with an easy-to-use, patient-controlled, vascular catheter

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HIGHLIGHTS

- Use of the vascular catheters can aid to symptoms management in patients with malignant ascites and postoperative lymphocysts.
- Insertion of the vascular catheter and following drainage are safe, easy, can be performed in the outpatient department.
- There is a good patients' acceptance of the procedure and self-control of symptoms with a small, flexible drain.

ARTICLE INFO

Available online 28 November 2014

Keywords:
Ascites
Lymphocyst
Management
Catheter
Drainage
Symptom

ABSTRACT

Objective. Malignant ascites (MA) can be managed with paracentesis, diuretics, shunt-systems, chemotherapy, and targeted therapies. Some treatments are ineffective; others are associated with complications, involve inpatient procedures, or are not cost-effective. Postoperative lymphocysts (LCs) are managed with inpatient drainage and sclerotherapy or surgery. We tested the use of a vascular catheter in the management of symptomatic MA and LC.

Methods. Fifty-five patients with primary or recurrent cancers with ascites or LCs were managed for symptom relief. A central venous 14-Ga 16-cm catheter (Arrow®) was inserted into the abdominal cavity or LC, followed by drainage.

Results. The catheter was safely inserted with ultrasound guidance in 43 patients with MA (39 with ovarian cancer: 9 before primary cytoreduction, 30 with recurrence; 4 non-gynecological cancers), and 12 patients with LCs (10 retroperitoneal, 2 bilateral inguinal). All procedures were performed in the outpatient department under local anesthesia, without insertion-related complications. Within a mean of 30 days after catheter placement (range: 7–90 days), no grade 3 infection, peri-drain leakage, or self-removal was noted. In three patients with recurrent ovarian mucinous ascites and one patient with an inguinal LC, some drain obstruction was noted. In cases before primary cytoreduction for ovarian cancer, drainage enabled better nutritional and anesthiological outcomes. Patients with chronic ascites were able to self-monitor the amount of evacuated fluid. Twelve patients whose ascites were drained had chemotherapy at the time, and they reported better well-being, and we estimated better performance status. LC drainage followed by sclerotherapy enabled symptom control and LC radical treatment.

Conclusion. The use of the vascular catheter is safe, easy, and cost-effective in the management of symptomatic MA and LC.

Introduction

Malignant ascites (MA) is a frequent cause of morbidity and presents significant management problems. Cancer accounts for approximately 10% of all cases of ascites, which occurs in ovarian, endometrial, breast, colon, gastric, and pancreatic carcinoma [1]. Close to 60% of patients with MA present with symptoms, which include abdominal swelling (55%), abdominal pain (53%), nausea (37%), anorexia (36%), vomiting (25%), and fatigue (17%) [2].

Lymphocyst (LC) can be a complication after pelvic and para-aortic lymphadenectomy. LC symptoms (hydronephriosis and renal insufficiency, bowel obstruction, pain) are seen in 0.5-10% of patients. Infected LCs are particularly a challenge. Drainage and antibiotics are required. Any adjuvant treatment is delayed. Also, a large cystic lesion in a retroperitoneal space makes an adjuvant radiotherapy (if required in patients with endometrial or cervical cancer) challenging [3].

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http://dx.doi.org/10.1016/j.ygyno.2014.11.073
0090-8258/

Because most patients with MA have a poor prognosis, it seems reasonable to suggest that symptomatic management should be guided by a principle of minimal disturbance [4]. Treatment options include diuretics, repeated paracentesis, shunt systems, intraperitoneal chemotherapy, and biologic agents such as catumaxomab, bevacizumab, or aflibercept. Some of these are ineffective, while others are associated with complications, involve inpatient procedures, or are not cost-effective. LCs are managed with inpatient drainage and sclerotherapy or surgical procedures. We evaluated feasibility, safety, efficacy regarding symptom relief, and acceptance of prolonged, patient-controlled drainage of ascites and LC using a 14-Ga vascular catheter.

Methods

Consecutive patients with symptomatic MA and LC were examined between 1 April 2012 and 31 March 2014 in the outpatient gynecologic oncology department. All possible management options were presented, including indications, complications, feasibility, and surgical maneuvers performed during procedures. A central venous indwelling 14-Ga (2.2 mm), 16-cm catheter (Arrow®, Teleflex Incorporated, USA), a ready-to-use set (Fig. 1), was used in patients who provided informed consent in writing (inserted into the abdominal cavity in cases with MA or into the lumen of LC). Prospective follow-up was planned.

The procedure for MA and LC included the following steps: trolley preparation with a sterile needle holder, non-absorbable 4.0 surgical suture, pair of sterile gloves and Arrow® set; transabdominal ultrasound examination to estimate the safest space to insert the catheter (in all patients with retroperitoneal abdominal LC, Doppler ultrasound was used to visualize iliac vessels, and patients were asked to empty the urinary bladder); skin preparation with an antiseptic agent; local anesthesia with 1% lidocaine; insertion of an 18-Ga introducer needle at 60–70° relative to a skin surface, until fluid evacuation; insertion of a spring-wire guide; evacuation of the introducer needle; insertion and evacuation of a tissue dilatator; insertion of the indwelling catheter until it stops on the skin; evacuation of the spring-wire guide; and fixation of the drain to the skin with a single suture (Fig. 2). The drain was connected to the infusion set (filter removed). The procedure is presented in a supplementary video material to the article (supplementary material). While the patient was in bed, the drain was placed into the container (opened, or the one used to collect urine) on the floor. In most patients with LC, fluid was evacuated with the catheter connected to a sterile plastic vacuum flask. Patients were educated regarding how to use the drain (antiseptic preparation, evacuation of maximum 2000 ml per day), and were able to receive counsel at any time in hospital or by telephone. Chemotherapy with catheter in situ was allowed in patients with indications.

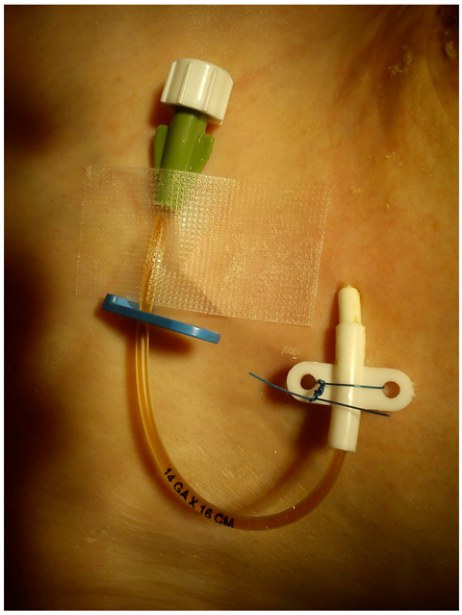

Fig. 2. Vascular catheter inserted into lymphocyst and sutured to the skin.

Patients were followed for subjective symptom relief and potential complications: infection, bowel or blood vessel injury, peri-drain leak, catheter obstruction or self-removal, peritoneocutaneous fistula, hypotonia, renal impairment, hyponatremia, or any other conditions considered an adverse event. If possible, Common Terminology Criteria for Adverse Events v.4.03 was used to grade complication conditions. Hypoproteinemia was not evaluated and considered as a drainage complication because it may be a sign of malnutrition, which is a condition that often coexists with a malignancy.

We compared anesthetic report charts (first hour of surgery) from 9 patients with ovarian cancer and MA drainage before primary surgery with 18 control patients with upfront surgery (ascites volume >3000 ml, and no catheter). Infusion fluid amount and patients' blood pressure changes were considered.

Cost-effectiveness was measured by comparing the cost of an ambulatory visit and a catheter insertion procedure with the cost of a hospital admission and a catheter placement, according to the national health

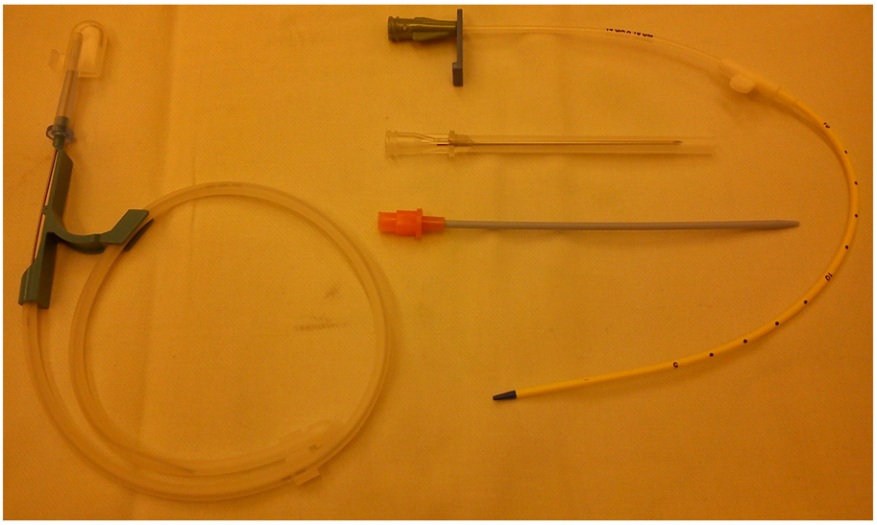

Fig. 1. Vascular catheter Arrow® set.

care provider in Poland (www.nfz.gov.pl). The cost of the catheter was not included in these calculations.

Results

Sixty-three patients with symptomatic MA or LC were considered to be candidates for vascular catheter insertion. Eight patients had contraindications: three patients with ascites volumes that were too low to allow safe catheter insertion, one patient lacked significant symptoms of ascites, three patients lacked symptoms of LC, and one patient refused placement of a catheter.

The catheter was safely inserted with ultrasound guidance in 43 patients with MA and in 12 with post-operative LC (Table 1). Four patients with bilateral LC required the concurrent insertion of two catheters. There were no insertion-related complications. The shortest duration of catheter placement was 7 days in a patient with symptomatic MA and before primary cytoreduction for ovarian cancer. The longest duration was 90 days in a patient with recurrent, symptomatic LC; repeated sclerotherapy was performed via the catheter. During drainage (mean 30 days), there were no grade 3 infections, peri-drain leakage or self-removal. One patient with MA and occult primary disease was admitted to hospital with fatigue and icterus 7 days after catheter insertion. Electrolyte imbalance, renal impairment, and hyperbilirubinemia were noted. Drainage was stopped. Due to the patient's poor condition and lack of improvement after pharmacological treatment, no cancer therapy was offered. It was not possible to determine whether the patient's symptoms were caused by the disease or by ascites evacuation via the catheter. Twelve patients with MA had catheter inserted and were receiving chemotherapy (carboplatin, cisplatin, 5-fluorouracil, paclitaxel topotecan) for recurrent disease (ovarian, breast, colon cancer). Following drainage, they subjectively reported better general quality of life, we estimated better performance status. One patient, who was during chemotherapy with topotecan for recurrent ovarian cancer, had infection grade 2, which involved peri-drain skin and subcutaneous tissue. Examination of the abdominal fluid and the inner part of the catheter revealed no microbes. The drain was removed, and efficient antibiotics were used according to the peri-drain smear. Her body mass index (BMI) was 39 kg/m^2. Catheter obstruction was noted in three patients with recurrent ovarian mucinous ascites, where the drain was patent for 3 to 14 days. Insertion of another catheter was needed; however, efficiency was limited in time owing to obstruction. The patency of a catheter was impaired in one patient with bilateral inguinal LC, and drains with wider lumen were needed. In one patient with retroperitoneal abdominal LC, drainage with a vascular catheter was insufficient (though it was patent) owing to the formation of septa in an LC lumen after previous repeated needle aspiration and sclerotherapy attempts. Surgery (laparoscopy with LC fenestration) was required in two patients — one with insufficient LC sclerotherapy with doxycycline, and another with septa in the LC lumen. All complications are listed in Table 2.

Although a formal survey was not undertaken it was the impression of the health care team that was involved in the caring for these patients that they were all together very comfortable with the maintenance of the catheters and reported better symptoms control and increased intake of food and nutritional supplements.

A smaller volume of infusion fluids was used during the first hour of primary surgery for ovarian cancer among patients with preoperative ascites evacuation via catheter (n = 9) compared with no drainage (n = 18) (mean 700 vs. 2000 ml). No significant blood pressure changes were noted.

The catheter was safely inserted in all patients with symptomatic LC. The amount of fluid evacuated was between 200 and 1800 ml. No patients had infection or malignant cells in the evacuated fluid. The most efficient way to empty LC was to connect the catheter to a plastic vacuum flask; through gravity, the use of passive drainage was efficient in patients with large LC. There were no patients in whom drainage alone was sufficient to manage a symptomatic LC, and sclerotherapy was needed. We used povidone-iodine (efficient in all cases; the number of infusion sessions ranged from 1 to 5), and doxycycline (used in three patients and 5 LC, efficient in 2 LC but for a limited period of time with recurrence; number of infusion sessions ranged from 3 to 7). It was possible to perform radiotherapy planning when LCs were emptied via the catheter in situ.

According to the national health provider, an inpatient (up to 2 days) paracentesis procedure costs 493 USD (1530 PLN (Polish currency)), while an outpatient procedure costs 13–26 USD (40–80 PLN).

Discussion

Malignant ascites, both before a diagnosis and at a recurrence can significantly influence treatment results (e.g. malnutrition caused by not optimal food intake and secondary wound complications; alternations in chemotherapy agent distribution), and impair patient's quality of life. Large LCs following lymphadenectomy can cause pain, ureter obstruction, thromboembolism, etc., or just change a normal anatomy,

Table 1
Patients' characteristics.

Characteristic	MA, n = 43	LC, n = 12
Age, mean (range)	65 (41–82)	55 (39–71)
Malignancy:		
Ovarian	39	1
Cervical	0	4
Endometrial	0	5
Vulva (inguinal LC, bilateral)	NA	2
Colon	1	NA
Breast	2	0
Occult primary	1	NA
Primary or recurrent:		
Primary	10	LC as a complication
Recurrent	33	of LND
Chemotherapy with catheter inserted	12	0
PS		
0/1	20	11
2	22	1
3	1	0
Previous intervention		
Repeated paracentesis	15	3
Abdominal drain placement	0	1
LC localization		
Iliac vessels region	NA	7
Iliac and paraaortal region		2
Pelvis — in the midline		1
Inguinal (bilateral)		2

Abbreviations: LC, lymphocyst; LND, lymph node dissection; MA, malignant ascites; NA, not applicable; PS, performance status (ECOG/Zubrod).

Table 2
Complications concerning paracentesis and drainage with vascular catheter Arrow®.

Complication	MA, n = 43	LC, n = 12
Infection, local peridrain (G1, G2)	1	0
Infection, peritonitis/sepsis, (G3)	0	0
Renal impairment, G3	1	0
Hypotension, G3	1	0
Hyponatremia, G3	1[a]	0
Bowel perforation	0	0
Blood vessel injury	0	0
Peritoneocutaneous fistula	0	0
Peridrain leak	0	1
Self-removal	0	0
Drain obstruction	3	2[b]
Surgery required	0	2[c]

Abbreviations: MA, malignant ascites; LC, lymphocyst.
[a] Only evaluated if electocytes imbalance suspected.
[b] One patient with real catheter obstruction, one with catheter not patent due to septa formation in a LC lumen.
[c] One patient due to septa formation in the LC lumen, one with drainage and sclerotherapy not efficient.

thus complicating follow-up and impairing adjuvant treatment. Instead of using ineffective diuretics, repeated paracentesis, shunts (with demanding implantation procedure), or expensive biologic agents, we utilized fine vascular catheter, inserted under local anesthesia, for a prolonged time, showing safety, patients' acceptance and efficacy in controlling symptoms cased by MA or LCs.

Malignant ascites

A review paper stated that in patients with varied diseases, diuretics were successful in relieving ascites in 44% of cases overall. A general consensus for the use of diuretics in this setting and a reliable method to predict those who would respond were lacking [1]. Ascites did not mobilize after diuretics in patients with MAs; however, a response was observed in patients with ascites secondary to massive hepatic metastases who had a serum: ascitic albumin gradient of >11 g/l (1.1 g/dl), which suggests that this gradient may provide a useful guide to predict the response to diuretics [5,6]. In one series of 76 patients, all responders to diuretic therapy had hepatic metastases [7]. The limited available data, suggested the use of spironolactone, starting at a dose of 150 mg per day, and increasing the dose every few days until a response is achieved, or biochemical and/or clinical features prevent further increase [1]. Hypovolemia and renal failure are potential side effects of diuretics [8].

Paracentesis yields temporary relief in approximately 90% of patients. Catheters are typically removed within 24 h after drainage to prevent infection. Recurrence is a common issue and many patients require multiple paracenteses [8]. In a series of cases with ascites and ovarian, colon and breast cancer a mean of approximately six procedures per patient were needed [9]. Paracentesis for malignant ascites is usually performed as an inpatient procedure, with a median length of stay of 3–5 days and intermittent clamping of the drain due to a perceived risk of hypotension. Paracentesis performed in an outpatient department achieved complete ascites drainage without complications, or the need for inpatient admission in 94.7% of cases at a cost of £954 compared with £1473 for inpatient drainage [10]. In a systematic review that assessed the efficacy of abdominal paracentesis in the management of symptomatic MAs, a grade D treatment guidelines were developed: first, paracentesis is indicated for those patients who have symptoms of increasing intra-abdominal pressure; second, intravenous fluids do not seem to be routinely required when removing up to 5 l of fluid; third intravenous hydration should be considered if a patient is hypotensive, dehydrated or known to have severe renal impairment, and paracentesis remains indicated [11]. Significant reductions in the serum protein levels have been associated with therapeutic paracentesis. Hypoalbuminemia may be minimized when patients are supplemented with a high protein diet combined with the frequent, small volume removal of ascites [8].

In a paper by Appelqvist et al. [12] a total of 127 permanent drains were installed in 100 patients with malignant ascites. After each drainage of 1000–2000 ml, drains were clamped for 2 h. The catheter remained in the peritoneal cavity for varying periods of time (1–103 days). N,N′N′-triethylenethiophosphoramide (Thiotepa) was instilled via the catheter to abdominal cavity of 23 patients. In the whole group there were 4 deaths considered a consequence of drain placement, but detailed analysis of fatal cases is necessary to draw conclusions. Two patients died from pulmonary emboli within 24 h of paracentesis. Another two died from perforation of a large intestine and purulent peritonitis. The latter two patients received Thiotepa via catheter during the study (2 out of 23 receiving chemotherapy agent) and abdominal radiotherapy in the past [12]. It seems that mortality rate could be lowered if no chemotherapy agent was instilled into peritoneal cavity in patients with previous abdominal radiotherapy, and thromboembolism prevention was ordered (now relatively safe and accessible low molecule heparin (LMH)). In our group all patients with symptomatic LC, and those with ascites before primary surgery and during chemotherapy for recurrence did receive a LMH in prophylactic doses. The paracentesis itself was not considered an indication for thromboembolism prevention.

Permanent implantable drains may prevent the need for repeated paracentesis and thus cause fewer electrolyte imbalance problems, while avoiding the potential risks of tumor dissemination and coagulopathy associated with peritoneovenous shunts. Thus, while permanent drains provide symptomatic relief in all cases for a mean duration of 52 days, they pose a significant risk of infection (38%) and symptomatic hypotension (5%). Therefore, it seems appropriate to consider this approach in patients who develop severe electrolyte imbalance following paracentesis and/or those who require repeated paracenteses in whom peritoneovenous shunting is contra-indicated [1]. A retrospective review of 38 patients who had 45 indwelling catheters inserted for the management of symptomatic MAs, the procedure was technically successful in all patients, with immediate symptomatic relief. However, two cases of fatal hypotension were encountered in the first 24 h after catheter insertion (acute catheter-related mortality rate of 4.4%). These were attributed to the rapid drainage of the peritoneal fluid, although gastrointestinal tract bleeding was contributory in the second patient. The rate of infection was 1.6 episodes per 100 catheter-days. Thirteen tubes were removed prematurely, six (16.2%) due to sepsis, five (13.5%) because of tube blockage and two (5.4%) because of loculated ascites. The median length of time for which catheters were functional was 37 days (95% CI 14.1–59.6), with an average daily drainage of 539.5 ml (range 18–4000 ml) [13].

Intraperitoneal chemotherapy (IPC) together with its potential complications should be mentioned when discussing the issue of permanent abdominal drain and the risk of infection. First IPC was delivered via catheter developed for chronic peritoneal dialysis [14]. Because a part of the catheter was placed outside the body, the rate of overall infection was 7.7–25%, and the rate of peritonitis was 3.8–25%. Fully implanted peritoneal access devices were developed, but the overall rates of infection and peritonitis remained high at 0–20.5%, and 0–8.3%, respectively, while obstruction was reported in 2.1–22% of patients [15].

In a systematic literature overview of patients with refractory MA who underwent indwelling intraperitoneal catheter placement ($n = 221$), a median 5.9% of patients (range: 2.5%–34%) had documented peritonitis [16]. In a chart review of 19 patients, where interventions included French pigtail, Tenckhoff catheters, and Port-A-Caths, infections were documented in two patients (11%), seven catheters (37%) became occluded, and two leaked (11%) [16]. Pigtail catheters have been associated with a complication rate of up to 30%, including infection, sepsis, and occlusion [13]. In our series of 55 patients with symptomatic MA or LC (twelve during chemotherapy), all were treated with a prolonged vascular catheter placement. The catheter was obstructed in 3 of 43 cases (7%) with MA. Only one (1.8%) suffered grade 1/2 infection (peridrain). The patient was during topotecan treatment for ovarian cancer recurrence and was obese (BMI = 39 kg/m^2). In our series of patients we did not record any grade 3 infectious complications. Very low catheter diameter, insertion under ultrasound control, an insertion end tip of a spring-wire guide "J" shaped and flexible, detailed and not time limited consultation with the patient (explaining how to take care of the catheter, possibility to consult by the phone or urgent visit), as well as iodpovidone (antiseptic) usage for sclerotherapy of symptomatic LCs, all can explain a low rate of infections (and bowel, vessels injuries) in our series. Possibly a number of treated patients may bias results. One might be anxious about risk of a neutropenia or a febrile neutropenia (FN) during chemotherapy and consider prolonged catheter in place as an additional risk factor for G3-5 infectious complications. We monitored patients with catheters for any abnormalities, but we also acknowledged that FN risk with all chemotherapy agents we used was below 10%, but topotecan with the risk of 10–20%. Moreover, in our department, systemic treatment was ordered to other patients with central venous catheters, dialysis catheters and pleural cavity drains, and infectious complications were not reported often. The IPC, discussed elsewhere in the text, is the next issue that supports

relative safety of a systemic therapy in patients with catheter in place. The Multinational Association of Supportive Care in Cancer (MASCC) risk-index score can be used to predict the complications of patients at presentation with FN [17]. We added the online calculator of this score, which may facilitate clinical decisions (http://gin-onc-calculators.com). Additional procalcitonin evaluation can be implemented as a routine use in clinical practice [18].

In patients with end-stage abdominal carcinomatosis complicated by MA, the Pleurx tunneled catheter provided effective palliation and alleviated the need for repeated percutaneous paracentesis (experience with ten patients) [19]. The safety and effectiveness were confirmed on 28 consecutive patients (32 drain insertions) with refractory MAs. Factors significantly associated with complications (only minor were reported) included current chemotherapy, low hemoglobin levels, low albumin levels, high white cell count and high c-reactive protein levels. The length of time the drains remained in situ, and therefore patent, ranged from 5 to 365 days (mean, 113 days). Out of the original 28 tunneled drains, 24 (86%) remained in situ and functioning until the patients' death [20]. A multi perforated large diameter catheter port system was reported in a case with metastatic malignant melanoma that presented with refractory ascites and bilateral pleural effusions. A multi perforated 15 F silicone catheter connected to a subcutaneous port was surgically implanted in the peritoneal and both pleural cavities under general anesthesia. It avoided morbidity and the patient's anxiety related to repeated puncture-aspiration. The large catheter diameter allowed an easy and fast drainage of large volumes, giving the patient a total liberty in daily life between two sessions of drainage [21]. In our series of patients with MA who had catheter inserted for palliation, there were no complications, but drain obstruction in three cases with dense, mucinous ascites.

A venous port proved to be an effective method to control the ascites refractory to medical management, and was easily placed under local anesthesia, with little risk or discomfort to the patient with severe MA [22].

A peritoneovenous shunt (PVS) is a tubal connective system with a one-way valve that opens at a specified pressure to allow flow from the peritoneum to the vena cava. Three types of shunts are common: Hyde, LeVeen, and Denver. Shunt is designed for symptomatic relief without repeated procedures and fluid, electrolyte, or protein loss [8]. Denver PVS for MA provided effective palliation in 75.3% of patients. Primary patency averaged 87 $\pm$ 57 days. Complications occurred in 38% of patients including occlusion (24%) and disseminated intravascular coagulation (9%) [23]. In addition, PVS can be associated with the risk of tumor dissemination from the peritoneal cavity to the pulmonary vasculature, and this phenomenon has been described in several case reports. While the theoretical risk of tumor dissemination exists, the clinical significance of this process is unclear [1].

The alfapump is a subcutaneously implanted battery-operated pump, designed specifically for the management of ascites. This pump automatically and continually moves ascites from the abdominal cavity to the urinary bladder, where they are excreted naturally from the body (http://www.alfapump.com/alfapump). A prospective, multicenter, nonrandomized study of patients with refractory ascites due to liver cirrhosis showed that the automated pump seems to be an efficacious tool. Its safety remains moderate, but its broad use in different conditions is to improve the surgical technique and medical surveillance [24].

The high protein content of ascites fluid suggests that vessel walls are compromised [25]. An emerging culprit for this phenomenon is vascular endothelial growth factor (VEGF), which enhances vascular permeability [26]. The activation of VEGFR-2 by VEGF-A has a major permeability-enhancing effect important in the formation of MA [27,28]. Aflibercept (VEGF-TRAP) is a high-affinity soluble decoy receptor that comprises portions of the extracellular domains of both VEGFR-1 and VEGFR-2 [25]. A phase 2 study that randomized ovarian cancer patients to either aflibercept or placebo for the treatment of recurrent MA showed that aflibercept effectively controlled ascites and significantly prolonged the time to first paracentesis [29,30]. Bevacizumab has also shown positive effects in the symptomatic treatment of MA, significantly prolonging the time until the next paracentesis [31]. Intraperitoneal bevacizumab may be a useful tool in the palliation of malignant ascites [32,33]. In a phase II/III clinical trial that randomized patients with malignant ascites to paracentesis plus catumaxomab or paracentesis alone, treatment with three functional antibody catumaxomab delayed the deterioration in the quality of life of patients with MA [34].

The use of laparoscopic intraperitoneal hyperthermic chemotherapy in the treatment of MA benefited peritoneal carcinomatosis patients with debilitating ascites who were excluded from cytoreductive surgery [35]. Cisplatin, 5 fluorouracil, mitomycin C, etoposide, mitoxantrone, topotecan and bleomycin have been given via the intraperitoneal route. Overall, the ascites were controlled in 47% of patients. Many patients evaluated in these trials were receiving concurrent systemic chemotherapy for their disease, and delineating the intervention that controlled the ascites is difficult [1].

Lymphocyst

LC fine needle aspiration is rather considered a diagnostic procedure, because recurrence is observed in 50–100% cases even after complete empting [36,37]. Treatment with prolonged drain placement alone was efficient in 57–72% of cases, and this rate reached 77–90% when sclerotherapy was added [36,38–40]. Sclerothizing agents are considered to cause local inflammation and scarring, which obstruct lymph vessels and closes the lymphocyst lumen [41]. Few agents have been described as active in LC sclerotherapy: povidone-iodine, ethanol, doxycycline, bleomycin, and polidocanol [3]. Complications of sclerotherapy may occur in 12% of patients. These complications involve subcutaneous tissue inflammation, peritonitis, and elevated creatinine serum levels [42]. Surgical treatment involves laparoscopy and LC fenestration to the peritoneal cavity, and is considered very effective and safe [42]. The newest microsurgery method called lymphaticovenular anastomosis is a minimally invasive procedure that is considered effective in the treatment of pelvic lymphocysts [43].

A vascular catheter (Arrow®) has been successfully used for drainage and sclerotherapy in the case with large, symptomatic LC after lymphadenectomy and radical hysterectomy for cervical cancer [44].

The advantages of vascular catheter (Arrow®) use for the control of MA and LC symptoms include availability; a safe insertion procedure (an insertion end tip of a spring-wire guide is “J” shaped and flexible, which effectively prevents injury to the abdominal cavity organs); the possibility of performing the procedure in an outpatient department; a very low rate of significant complications; the patients' acceptance of an outpatient procedure; the self-control of symptoms; and a small, flexible, easy-to-hide drain. One catheter insertion under ultrasound control reduces the incidence of potential injuries and septa formation compared with repeated (often blind) paracentesis. Cases of planned systemic treatment for recurrent disease feature potentially improved chemotherapy agent distribution when the gross ascites fluid volume is evacuated via a catheter prior to chemotherapy infusion. In patients who require adjuvant radiotherapy but experience LCs after lymphadenectomy, catheter insertion and fluid evacuation enables planning, and sclerotherapy via a catheter is efficient for permanent LC treatment. The catheter can be easily opened and closed.

Disadvantages include potential complications, such as hypotension, infection, renal impairment, and hyponatremia, in cases of uncontrolled MA evacuation. Uncontrolled evacuation of ascites fluid can worsen hypoproteinemia, which already constitutes a significant sign of malnutrition among cancer patients. The palliative character of a prolonged catheter presence and fluid evacuation may impair the quality of life of some women. MA drainage via vascular catheter was not effective owing to catheter obstruction in patients with macroscopically dense fluid (mucinous).

Regarding the management of symptomatic malignant ascites and post-operative lymphocysts, the use of the vascular catheter is safe, easy, and cost-effective for both medical conditions, and also allows patients to self-monitor symptoms.

Encouraged by the results we are going to launch a multiinstitutional observational study to validate our results, with special emphasis on a prolonged catheter placement safety issues during chemotherapy and a quality of life measurements (with questionnaires) in patients for whom symptom management and palliation are main concerns.

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.ygyno.2014.11.073.

Conflict of interest

The authors have no conflicts of interest.

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