Successful radiation treatment of chylous ascites following pancreaticoduodenectomy

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Abstract Chylous ascites is a rare complication following pancreaticoduodenectomy. We report on a case of chylous ascites following pancreaticoduodenectomy in a 76-year-old patient diagnosed with pancreatic cancer. There are various known conservative management strategies, including dietary measures or total parenteral nutrition. Unfortunately, conservative treatment—with total parenteral nutrition and fasting over a period of 4 weeks—was not successful in the present case. The daily output volume of chylous ascites was up to 2500 ml/day. Based on clinical experiences with successfully treated lymphocutaneous fistulas, low-dose radiotherapy was initiated. External beam radiotherapy comprising a total dose of 8.0 Gy to the para-aortic lymph node region was administered in daily single fractions of 1.0 Gy (five fractions/week). Throughout the course of external beam radiotherapy, the secretion of abdominal ascites rapidly decreased, resulting in complete resolution after 2 weeks. There was no clinical evidence of chylous ascites on follow-up. As a result of this experience, we believe that external beam radiotherapy should be considered as an alternative therapy in refractory cases of chylous ascites.

Keywords Radiotherapy · Pancreatic cancer · Lymphadenectomy · Chylous ascites · Pancreaticoduodenectomy

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**Background**

Chylous ascites is the extravasation and accumulation of chyle in the abdominal cavity. It can result from various disorders, including congenital abnormalities of the lymphatic system, infectious diseases, liver cirrhosis, or abdominal malignancies [2, 8]. Furthermore, chylous ascites can occur as an uncommon complication in abdominal surgery. It is related to unrecognized injury of major retroperitoneal lymphatic vessels or the cisterna chyli. Some reports describe cases of chylous ascites following aortic surgery [13] or extended retroperitoneal lymph node dissection for urologic or gynecologic malignancies [2, 14]. Due to the anatomic proximity of the cisterna chyli to the pancreatic head, laceration can occur during a pancreaticoduodenectomy with lymphadenectomy [15]. The incidence of chylous ascites is not clear. A recent study from the Netherlands by van der Gaag et al. [15] in 609 patients who had undergone pancreaticoduodenectomy described chylous ascites in 11% of patients. Female gender and focal chronic pancreatitis were independent risk factors for development of chylous ascites. We report the case of a patient with pancreatic cancer who presented with chylous ascites after pancreaticoduodenectomy, and discuss diagnostic and therapeutic options.

**Case presentation**

A 76-year-old male patient was diagnosed with pancreatic cancer located in the head of the pancreas. On diagnostic work-up, no distant metastases were detected. The patient underwent pylorus-preserving pancreaticoduodenectomy and local lymphadenectomy. A total of 21 lymph nodes were obtained. Histopathologic examination revealed a moderately differentiated adenocarcinoma of the processus unciniatus. Tumor size was approximately 2 cm and showed duodenal submucosal invasion. The pathologic tumor stage was pT3 pN1 (1/21) R1. Overall, the intraoperative course was uneventful.

After surgery, the patient was admitted to the intensive care unit. On admittance the patient presented with significant hypotension, bilateral pleural effusion, and diarrhea. Furthermore, the drainage tubes in the left lower abdomen started to drain chylous ascites, with an increasing drainage volume over time. Cytology of the chylous ascites was negative for malignancy and laboratory analysis excluded anastomotic leakage. Conservative therapy with total parenteral nutrition was initiated. Further supportive treatment included intravenous fluid therapy (up to 5 l/day), human albumin, and blood transfusions. Nevertheless, the lymphatic leakage continued.

On the 27th postoperative day, the patient was transferred to the Department of Radiation Oncology for further treatment. The total output at that point was up to 2500 ml/day. A lymphoscintigraphy with 159 MBq Tc-99m nanocolloid was performed to identify a potential site of lymphatic leakage. Radiotracer was injected into the interdigital space of both feet. Flow of tracer was documented. First accumulation was detected bilaterally at the groin, proceeding up to the aortic bifurcation with subsequent disruption of the flow at the paraaortic level. Unfortunately, a specific site of extravasation suitable for a surgical ligation could not be identified. Based on clinical experience in lymphocutaneous fistulas successfully treated with radiotherapy [10] and after careful consideration at a multi-institutional tumor board, it was decided to treat the paraaortic lymph node region with external beam radiotherapy. Despite microscopic evidence of residual disease (R1 resection), the prescribed radiotherapy dose was 10.0 Gy to the paraaortic lymph node region in daily single fractions of 1.0 Gy, using an anterior-posterior/posterior-anterior beam arrangement (see Fig. 1). Gemcitabine-based chemotherapy or radiotherapy with a sufficient adjuvant dose [3–5, 7, 12] was not feasible, due to the poor performance status of the patient. A planning CT scan was performed. It revealed diffuse anasarca of the abdominal wall soft tissues, bilateral pleural effusion, and ascites in the abdominal cavity. Throughout the course of external beam radiotherapy, chylous ascites was rapidly reduced and an oral diet (low-fat, medium-chain triglycerides) could be started. Total parenteral nutrition was decreased gradually. Due to the rapid output reduction, radiotherapy was terminated at 8.0 Gy. No side effects were observed. The drainage volume was successfully reduced to zero within 2 weeks and the drain was removed (see Fig. 2). The patient has remained asymptomatic, with no further clinical signs of ascites at follow-up after 7 months.

**Discussion**

Treatment of chylous ascites is challenging for clinicians. Overall, addressing the underlying cause of chylous ascites is of essential importance. Various management strategies exist. Conservative treatment options include dietary measures, involving a diet or total parenteral nutrition. Generally, dietary intervention is the treatment of choice. The successful radiation treatment of chylous ascites following pancreaticoduodenectomy

**Schlüsselwörter** Strahlentherapie · Pankreaskarzinom · Lymphadenektomie · Chyloperitoneum · Pankreatikoduodenektomie
Malik et al. [9] recommended total parenteral nutrition as first-choice treatment for chylous ascites—not only as an alternative treatment option in refractory cases. The same approach was used in the present case. Unfortunately, the patient’s condition did not improve.

Treatment with somatostatin analogs is another option available for the conservative treatment of chylous ascites. Several reports prove the effectiveness of somatostatin in treating chylous ascites [6, 14]. Somatostatin is known to decrease splenic blood flow and to inhibit a variety of gas-
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Prospective, randomized clinical trials regarding the treatment of chylous ascites are not likely. Due to its low incidence, the management of chylous ascites is mainly based on empirical evidence. A variety of successful strategies have been reported in small retrospective cohort series or single case reports, leading to controversial results [6, 9, 13, 14].

Conclusion

The present report contributes to the very small amount of existing evidence on the effectiveness of external beam radiotherapy in the successful treatment of chylous ascites. As a result of this experience, we believe that external beam radiotherapy should be considered as an alternative therapy in refractory cases of chylous ascites. Furthermore, regarding treatment costs of conservative management options, external beam radiotherapy is a cost-effective alternative compared to the relatively high costs of somatostatin treatment. However, further research is needed to establish the most effective treatment strategy.

Compliance with ethical guidelines

Conflict of interest S. Corradini, S. Liebig, O.M. Niemoeller, F. Zwcker, and W. Lamadé state that there are no conflicts of interest. Informed consent was obtained from all patients included in studies. Consent was obtained from all patients identifiable from images or other information within the manuscript. In the case of underage patients, consent was obtained from a parent or legal guardian.
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