

# Peritoneo-venous shunt implantation as a therapy for chylous ascites

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## Keywords

Chylous ascites, peritoneo-venous shunt, septic state, primary lymphatic disease

## Summary

We report a case of primary chylous ascites in a progressively poor condition with protein-losing enteropathy, pleural and pericardiac effusion. **Therapy:** Denver peritoneo-venous shunt was implanted. Three years later the patient became septic and the shunt was removed. **Clinical course:** Soon after implantation the patient's condition improved, and in two months he lost 51 kg. After three years fibrinous occlusion of the shunt and sepsis developed. The occlusion could be dissolved with streptokinase. Removing the shunt cured the patient's septic state. The chylous ascites did not recur. **Conclusion:** In emergency cases implantation of a peritoneo-venous shunt leads to a rapid relief of the state. Usually this is a palliative treatment, but in this case it gave a final result. Fibrin can deposit on or occlude the drain which can be solved without further complications. If the patient is septic the drain must be removed and the septic state ends.

## Schlüsselwörter

Aszites chylosus, peritoneovenöser Shunt, Shunt-Sepsis, primäre lymphatische Erkrankung

## Zusammenfassung

Fallbericht über einen Patienten in schlechtem Allgemeinzustand bei primärem Aszites chylosus mit eiweißverlierender Enteropathie sowie Pleura- und Perikarderguss. **Therapie:** Ein peritoneovenöser Shunt wurde implantiert. Drei Jahre später musste das Implantat wegen einer Shuntsepsis entfernt werden. **Verlauf:** Nach der Implantation des Shunts verbesserte sich der Zustand des Patienten rasch hatte der Patient bereits 51 kg abgenommen. Drei Jahre nach Implantation des Shunts kam es zu einem fibrinösen Verschluss desselben, woraus sich im weiteren Verlauf eine Shunt-Sepsis entwickelte. Der Shunt-Verschluss konnte mit Fibrinolytika aufgelöst werden. Die Sepsis wurde durch Entfernung des Implantats geheilt. Der Ascites chylosus ist nach dem Entfernen des Implantats nicht erneut aufgetreten. **Schlussfolgerung:** In Notfallsituationen bei einem Ascites chylosus kann die Implantation eines peritoneovenösen Shunts den Zustand des Patienten verbessern. Dies ist in den meisten Fällen als palliative Therapie anzusehen, jedoch erwies es sich in diesem Fall als dauerhafte Lösung. Fibrin kann sich im Shunt ablagern oder den Shunt verschließen, was aber mit Fibrinolytika ohne weitere Komplikationen aufgelöst werden kann. Beim Auftreten einer Shunt-Sepsis muss das Implantat entfernt werden und durch diesen Eingriff kann die Sepsis geheilt werden.

Chylous ascites means the presence of intestinal lymph in the abdominal cavity. The accumulation of milk-like, triglyceride-rich fluid indicates the leakage of some lymphatics in the abdominal cavity. This condition is promoted by an extrinsic or intrinsic obstruction of the central lymphatics. The leading etiology of chylous ascites are primary lymphatic disease, lymphatic malformation (primary chylous ascites) (► Fig. 1) (3, 5, 26) and those of secondary chylous ascites are as follows (2, 4, 7, 8, 11, 20–22, 25, 28):

- various malignant tumors (e. g. lymphoma, carcinoma),
- non-malignant obstructive diseases (e. g. cirrhosis, fibrosis, filariasis, tuberculosis),
- trauma, sometimes iatrogenic.

Although different pathological processes may be responsible, the following mechanisms have been revealed:

1. direct leakage of chyle through a lympho-peritoneal fistula,
2. exuding of chyle through the walls of retroperitoneal megalymphatics,
3. exuding or leakage of chyle from dilated lymphatics on the wall of the bowel or in the mesentery, caused by obstruction of the lymphatics. Protein-losing enteropathy usually accompanies this condition (3).

Because chylous ascites is relatively infrequent and sometimes subclinical, its prevalence and etiology are difficult to define. Further lymphatic abnormalities are often present not only in primary lymphatic diseases, but in other cases as well, the most common being lymphoedema of the lower limb (3, 6–8, 11, 24).

Chylous ascites is not benign: Its mortality rate in adults is about 50 percent. This

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## Peritoneovenöse Shunt-Implantation als Behandlungsansatz für chylöse Aszites

**Phlebologie 2010; 39: 24–27**  
Received: August 18, 2009  
accepted: November 26, 2009

figure is somewhat higher among malignant cases and lower among iatrogenic ones (2, 3, 7, 8, 11, 24, 25).

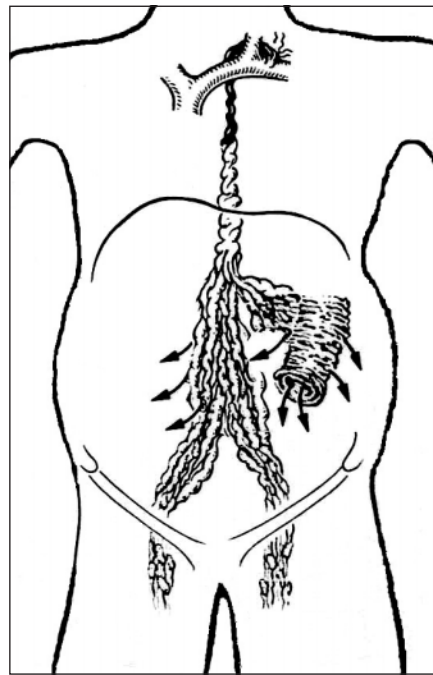
## A man with lymphoedema

A 33-year-old man had known lower limb lymphoedema since infancy. No similar diseases appear in his family history. He had a tonsillectomy at the age of ten. Three years later, a periappendicular abscess was operated on and protein-losing enteropathy was revealed. He was admitted to different hospitals for nephrosis syndrome, hypertension, uraemia and anaemia. He perceived that his body weight and abdominal girth had increased significantly, and that he tired easily. Paracentesis conducted during this period yielded the typical finding of accumulation of chyle, a milky, sterile, odorless fluid, in the abdominal cavity. His body weight temporarily decreased by 20 kg as a result of diuretic therapy, but his condition did not improve and a planned kidney biopsy could not be performed.

Half a year later the patient was admitted to our department. He had dyspnea in a reclining position and could take only a few steps without effort. His body weight was 115 kg, and his abdomen was full of fluid. There was elephantiasis in his lower limbs and a pitting oedema all over his body. X-ray examination found pleural effusion and pulmonary hypertension. Echocardiography revealed fluid in the pericardial sac. There was low voltage in the ECG.

## Treatment

After proper preparation, a Denver peritoneo-venous shunt was chosen for implantation because of past successes with this technique (6, 26, 27). This shunt has two valves for directing the flow of chyle one way from the abdominal cavity to the venous system. The venous limb of the shunt was introduced into the left internal jugular vein. It is generally recommended that the shunt be inserted in the right side (► Fig. 2), but because a central venous line had been introduced there earlier, the



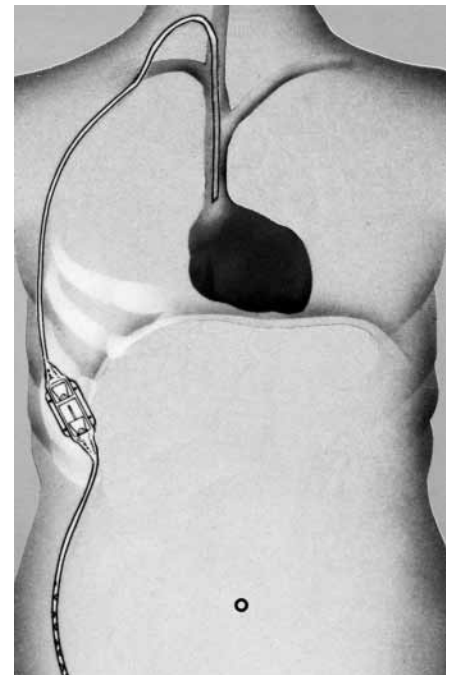
**Fig. 1** Chylous ascites is caused by the occlusion of the thoracic duct. In some cases there is only one leakage point and in others there are several.

danger of contamination of the catheter was exceedingly high in that area. Following the introduction of the peritoneal end of the catheter, eight liters of milky-white fluid were drained. The pump of the shunt was placed over the ribs for efficient manual use. There were no complications following surgery.

## Follow-up

Two months after the operation his body weight was only 64 kg – he had lost 51 kg and was able to resume his job as a television repairman (► Fig. 3).

Three years later he returned urgently because of septic fever and weakness following antibiotic therapy for suspected pneumonia. The chest X-ray did not show any signs of lung disease. Physical examination revealed that the pump chamber of the drain was hard, which generally indicates an occlusion of the shunt (6). Contrast X-ray confirmed this hypothesis. Nevertheless, the ascites did not recur. After antibiotic therapy (vancomycin hydrochloride, naltimycin sulphate) the febrile



**Fig. 2** Usual position of the implanted peritoneo-venous shunt in the body. In our case the shunt was implanted in the left hand side.

state disappeared. A cardiac ECHO failed to detect signs of endocarditis, but a long thrombus was revealed in the right atrium, attached to the central part of the shunt. This thrombus was resolved with 1.5 million units of streptokinase.

The shunt was removed two days later, and coagula were observed in its lumen and valve chamber. The culture of coagula and peritoneal fluid did not reveal any pathogens.

The patient recovered well after surgery. Neither the fever nor the ascites recurred, and he was discharged. He resumed his work and after ten years he is still in fairly good condition.

## Discussion

Although theory dictates that most lymph fistulas heal spontaneously, healing may not occur for several months or longer (24). It is known that the thoracic duct transports up to 4 litres of chyle per day in a healthy adult. Some 95 percent of transmitted lymph is derived from the gastrointestinal tract and the liver; the remainder



**Fig. 3** The patient  
**a)** before surgery: enlarged abdomen and oedema all over the body  
**b)** after surgery (implanted shunt on the left-hand side): He lost 51 kg in two months.

originates in skeletal tissue (17). Primary chylous ascites and chylothorax are the clinical manifestations of proximal lymphatic stasis, in contrast to lymphedema of the limbs, which is the clinical result of distal lymphatic stasis (18). One result of chyle loss is metabolic: 60 to 70 percent of absorbed dietary fat passes through the lymphatic system and so triglycerides, cholesterol, and fat-soluble vitamins (A, D, E, K) will be lost in these cases. Central lymphatics are also conducting vessels for the return of extravasated proteins to the circulation. The other consequence of chyle loss is immunological: Lymphocytes form the bulk of the chyle's cellular content. In the early years of organ transplantation, this fact attracted clinicians to the procedure of thoracic duct drainage in order to effect immunosuppression. Loss of lymphocytes resulting from chyle loss can lead to death from inanition and recurrent infections (3, 12, 17). For all these reasons, therapy of chylous ascites is a difficult problem and controversial in every case.

In cases without primary or secondary lymphatic circulation problems, recovery with a slow decrease of chylous ascites can be effected by opening the collateral lymphatic pathways and lymphovenous shunts so that sealing of the lymphoperitoneal fistula can take place (12).

Chylous flow can be successfully manipulated with starvation and dietary measures, since abdominal lymph flow increases after meals to more than 200 times that of starvation levels (2, 7, 20, 21). Conservative treatment with starvation and parenteral nutrition is therefore successful in some cases, such as after abdominal and retroperitoneal surgery (13, 21). Combining this treatment with manual lymph drainage therapy can help the recovery (12). Chylous ascites resulting from obstructive causes is not amenable to treatment by the above methods. If the condition is the result of another known disease (secondary chylous ascites) such as neoplasm, infection, trauma or an iatrogenic lesion, the first step is to begin with therapy of the etiologic factor (3, 20, 25). Patients sometimes fail to respond to diuretics, which were only temporarily effective in our case, and so these are not suitable as a cure for the disease (2, 20).

Rapid accumulation of the ascites necessitates paracentesis when the patient becomes acutely dyspneic. If there is no serious reason for chylous ascites (e. g. iatrogenic origin), it can disappear after one or two aspirations (7). In most patients regular paracentesis is required, which leads to deteriorating nutritional status and carries the risk of infection as well (2, 24).

Due to chyle loss, they become hypalbuminaemic, hypoproteinaemic, anaemic and lymphocytopenic (8). To prevent fatal outcomes in such cases, surgical therapy (19) is the method of choice, with the aim of closing the fistula (14, 15, 18). In some patients, resection of a bowel segment is necessary to remove the multiple leaking lymphatics of the bowel. In generalized lymphangiectatic and diffuse leaking cases, surgery of the anatomical abnormalities is not promising (3). A simpler surgical solution is to bypass the compromised lymphatic routes and to return the abdominal chyle to the body via peritoneo-venous shunt (1, 2, 13, 24).

In our case, the patient had elephantiasis in the lower limbs and chylous ascites, suggesting that the obstruction of lymphatic vessels was on the level of thoracic duct or retroperitoneal lymphatics (3, 9, 24). The chylous ascites and the protein losing enteropathy probably had a common origin: the diffusion of bowel lymphatics. Given the patient's serious condition, shunt implantation seemed to be the shortest and easiest surgery. Past successes with this technique, both within and outside our department, supported this opinion (13, 26–28). One further benefit of shunt implantation is that it is unnecessary to perform an exact anatomical diagnosis to identify the site of leakage. These diagnostic procedures are time-consuming, expensive, sometimes painful, and not always successful (2, 11, 13). In some cases, as with our patient, shunt implantation is urgently needed because of the weakened condition of the patient. The technique is simple, and the operation results in an immediate reduction of intra-abdominal pressure, improved respiration and easing of discomfort (2, 8). The recovery period is not too long, and the positive result is long-lasting (26, 27). Using the shunt, the chyle finds a new outflow path, which may explain the long-term reduction of pressure in the lymphatic system and peritoneal cavity. As a result, the leakage point of the abdominal lymphatic system is allowed to seal.

Foreign bodies such as the peritoneo-venous shunt can cause complications and not only the long-term result but also the life expectancy of the patient depends on their solution. The occlusion of the ca-

theter can be dissolved with fibrinolytic therapy either with a direct puncture into the drain if fibrin is in the device or with systemic administration if fibrin is attached to it. If the shunt is contaminated as in this and in our former cases, the septic state exclusively by the removal of the tube could be successfully treated.

## Conclusion

This is a demonstrative case of shunt implantation regarding the indication, the early therapeutic success, typical complications and their therapy. This patient draws our attention to further important facts:

Implantation of a peritoneo-venous shunt is a simple and effective method in the treatment of chylous ascites.

In emergency cases it is able to save the patient's life without delay because this therapy does not require a detailed diagnosis. This means that the algorithm recommended by Aalami et al. (1) can be bypassed with an emergency limb. The shunt works well as a palliative therapy for years in every case and in our one it proved to give a final result with the healing of the leakage point. We know that the successful functioning of the drain is usually temporary because of two possible complications: one is occlusion of the tube or the chamber by some fibrin deposit but this can be solved, the other is the colonisation of the silicon tube. The patient is in danger if the shunt is infected and can die if the shunt is not removed in time. This can happen with the Denver and the LeVeen shunt (16) as

well. Pabst et al. (21) are reluctant to recommend shunt implantation because of this complication. From our positive experience, we can recommend this therapy as a first method of choice in emergency cases. In the literature the shunt is recommended as a method of choice only for anatomically diffuse extravasation of chyle cases (10) and it can be furthermore recommended in emergency cases as well.

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