CHOLELITHIASIS IN HOME PARENTERAL NUTRITION (HPN) PATIENTS – COMPLICATIONS OF THE CLINICAL NUTRITION: DIAGNOSIS, TREATMENT, PREVENTION

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Long-term home parenteral nutrition (HPN) is an important factor for cholelithiasis. An individualized nutrition program, trophic enteral nutrition and ultrasound bile ducts monitoring is a necessity in those patients.

The aim of the study was to evaluate the usefulness of prophylactic cholecystectomy in patients with asymptomatic cholelithiasis requiring HPN.

Material and methods. 292 chronic HPN patients were analyzed in the period from 2005 to 2012. Patients were divided into four groups: A – without cholelithiasis, B – with asymptomatic cholelithiasis, C – urgent cholecystectomy because of cholecystitis caused by gallstones, D – cholecystectomy in patients without cholelithiasis performed during an operation to restore the continuity of the digestive tract. The patients were additionally divided depending on the extent of resection of the small intestine and colon.

Results. 36.9% of chronic HPN patients had cholelithiasis confirmed using ultrasonographic examination. Cholecystectomy due to acute cholecystitis symptoms was performed in 14.4% of the patients. The remaining 22.6% patients had asymptomatic cholelithiasis. Prophylactic cholecystectomy was performed in 5.5% patients with no signs of cholecystisis during the planned operation to restore the continuity of the digestive tract.

Conclusions. Cholelithiasis in chronic HPN patients is a frequent phenomenon. It seems useful to perform prophylactic cholecystectomy during primary subtotal resection of the small intestine, because the risk of cholelithiasis in this group of patients is very high.

Key words: HPN, cholelithiasis, cholecystectomy

Cholelithiasis can be found in 15% to 18% of the Western European society and 11% of the Polish society (1). The formation of gallstones in the gall-bladder is associated with the oversaturation of bile with cholesterol and/or disordered contractility of the gall-bladder. For many years the main risk factors for cholelithiasis included: age > 40 years, female sex and obesity. Cholelithiasis is promoted by diseases accompanied by hemolysis, familial intrahepatic cholestasis, hypothyroidism, hyperadrenocorticism, diabetes, hormonal disorders, hypertriglyceridemia, hyperlipoproteinemia, rapid weight loss and cystic fibrosis (1–4). Other significant factors are parenteral nutrition, malabsorption, central obesity and chronic dehydration (4, 5). Post 30 years of age the prevalence of cholelithiasis rises with age, which may be caused by reduced synthesis of bile acids with the concurrent increased cholesterol secretion. With age pancreatic polipeptide synthesis increases. The pancreatic polypeptide reduces gall-bladder contractility. In addition, the number and sensitivity of cholecystokinin receptors decreases, which also compromises the gall-bladder motor activity (6).

Important risk factors for cholelithiasis include medicines affecting cholesterol me-
tabolism and gall-bladder contractility, long-term parenteral nutrition in patients with malabsorption syndromes or using an intravenous nutritional mix incompatible with the current needs of the patient (5). Patients who are fed both parenterally and enterally develop cholelithiasis less frequently than patients who are fed exclusively parenterally, since the food supplied enterally stimulates the secretion of cholecystokinin, gastrine and Y neuropeptide, which increase the motor activity of the biliary tract, including gall-bladder contractions. This stops bile from staying in place for too long, which prevents the formation of deposits (7). If there is no effective stimulation of the gall-bladder motor activity, bile becomes condensed and forms deposits in the gall-bladder.

The aim of this paper is to analyse the prevalence of cholelithiasis in patients requiring chronic parenteral nutrition. The authors analysed the usefulness of prophylactic cholecystectomy in patients with asymptomatic cholelithiasis requiring home parenteral nutrition.

**MATERIAL AND METHODS**

The analysis covered 292 patients, including 158 women (54.1%) and 134 men (45.9%) fed parenterally at home between 2004 and 2012. HPN patients were divided into four groups depending on the presence or absence of signs of cholelithiasis as well as the extent of resection of the small intestine and colon:

- **group A** – no signs of cholelithiasis,
- **group B** – asymptomatic cholelithiasis was diagnosed,
- **group C** – urgent cholecystectomy due to symptoms of cholecystitis caused by gallstones was performed (this group included 27 patients awaiting an operation to restore the continuity of the digestive tract and 15 patients with a history of such operations),
- **group D** – planned cholecystectomy was performed in patients with no signs of cholelithiasis during operations to restore the continuity of the digestive tract related to e.g. intestinal fistulas or an end ostomy. The decision to remove the gall-bladder was made intraoperatively depending on the anatomical conditions in the abdominal cavity. The surgeries were performed using the classical method. No laparoscopic cholecystectomies were performed since the anatomical conditions following earlier laparotomies did not allow for laparoscopy.

**RESULTS**

Cholelithiasis was found in 37% patients requiring chronic HPN. Detailed results are presented in tab. 1.

Additional analysis was performed on the age of 108 chronic HPN patients from groups B and C, in whom signs of cholelithiasis were found during routine ultrasound examination (fig. 1).

**DISCUSSION**

The results obtained show that cholelithiasis is found over two times more frequently in HPN patients (36.9%) compared with other populations (1, 6).

Manji et al. demonstrated that patients suffering from short bowel syndrome are at a greater risk of developing gall-bladder disorders primarily because of long-term parenteral nutrition. What is considered to be the main cause of

<table>
<thead>
<tr>
<th>The reason for chronic HPN</th>
<th>HPN patients</th>
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<tbody>
<tr>
<td>A – 57.5%</td>
<td>B – 22.6%</td>
</tr>
<tr>
<td>n=168</td>
<td>n=66</td>
</tr>
<tr>
<td>C – 14.4%</td>
<td>D – 5.5%</td>
</tr>
<tr>
<td>n=42</td>
<td>n=16</td>
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</tbody>
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Subtotal resection of the small intestine and of < 50% of the colon: 42 20 19 10
Subtotal resection of the small intestine and of > 50% of the colon: 35 16 4 1
Subtotal resection of the small intestine without removing the colon: 25 13 11 5
Partial resection of the small intestine and of < 50% of the colon: 27 11 5 0
Partial resection of the small intestine and of > 50% of the colon: 21 3 1 0
Partial resection of the small intestine without removing the colon: 18 3 2 0

Table 1. HPN patients broken down into groups depending on the extent of the small intestine and colon resection and on the performance of urgent vs. planned cholecystectomy.
gallstone formation in these patients is cholestasis in the gall-bladder due to the lack of food supplied orally, which acts as a stimulus for the contraction of the gall-bladder muscle tissue and the excretion of bile. In the present study the highest incidence of cholelithiasis is found in chronic HPN patients who underwent subtotal resection of the small intestine. The analysis involved 9 years of observation of 11 patients with short bowel syndrome, among whom 5 patients underwent parenteral nutrition for more than six months and whose residual part of the intestine was > 60 cm in length. In the course of multiple years of observation all patients developed symptomatic cholelithiasis in the form of acute cholecystitis and secondary acute pancreatitis. The present authors also point to the taking of anticholinergic and analgesic medicines as the cause of cholelithiasis, beside the lack of food ingestion. It was demonstrated that the significantly elevated risk of cholelithiasis in patients with short bowel syndrome is indeed a major phenomenon and it seems justifiable to perform preventative cholecystectomy already in asymptomatic patients (8).

Some reports indicate that it is necessary to perform preventative cholecystectomy during one of the planned repeated laparotomies before the patients develop massive abdominal adhesions making it difficult to perform urgent cholecystectomy in the future. The data presented in the study mentioned above which covered 16 preventative cholecystectomies confirm the statement that it is safer to remove the gall-bladder as a preventative measure in comparison to removing it when inflammation and adhesion disease have already developed. A study by Thompson covering 53 patients with short bowel syndrome chronically fed parenterally showed that symptomatic cholelithiasis was observed in 6 patients and 4 patients in this group required cholecystectomy. Three patients underwent preventative surgery to remove the gall-bladder. Based on the results of studies the author suggests that it is necessary to routinely remove the gall-bladder during one laparotomy in the short bowel syndrome patient group (9).

Another study on the role of preventative cholecystectomy and cholelithiasis risk factors in patients with short bowel syndrome chronically fed parenterally included 50 patients with the remaining small intestine of below 180 cm. The patients were observed for 15 years. Preventative cholecystectomy was performed in 10% of patients while 31% of patients developed cholelithiasis. It was concluded that the length of the removed intestine was of paramount importance. Patients with the residual intestine of less than 120 cm in length tended to have a higher incidence of cholelithiasis (10). A study by Seetharam et al., which included 210 patients with short bowel syndrome, demonstrated that cholelithiasis can be found in 30–40% of patients chronically fed parenterally. As a way of preventing the development of cholelithiasis it is recommended to perform supplementary enteral nutrition, to administer ursodeoxycholic acid and medicines which act prokinetically on the gall-bladder as well as performing preventative cholecystectomy in asymptomatic patients (11).

In our study we did not perform pharmacological prevention of cholelithiasis since our previous experience with the ursodeoxycholic acid shows that due to the lack of necessary length of the residual small intestine the medicine is not sufficiently absorbed and does not have any significant impact. Our own analysis presented in the paper demonstrates that the prevalence of cholelithiasis correlates with the extent of the small intestine resection. The larger the removed part of the small intestine the more probable it is that stones are going to form in the biliary tract due to chronic parenteral nutrition. It seems that the length of the residual colon does not play that significant a role in the origin of cholelithiasis.
The analysis of patients chronically fed parenterally cholelithiasis was most often diagnosed in patients between 30 and 60 years of age, which correlates with the population of people fed normally, that is, by mouth. The authors of another study analysed 153 patients fed parenterally who had undergone nutritional treatment for more than 2 months. It was determined that following 6 months of parenteral treatment cholelithiasis developed in 6.2% of patients and after the next 6 months the percentage of patients with stones formed increased to 21.2%. After 24 months of parenteral nutrition gall-bladder deposits were found in as many as 38.7% of subjects (12).

Authors of other studies also recommend preventative cholecystectomy in patients chronically fed parenterally due to digestive tract insufficiency (13, 14, 15). Bloch et al. present potentially interesting conclusions from their study. They suggest that undergoing total parenteral nutrition for more than 6 weeks caused the formation of the so-called "bile mud" in the gall-bladder in all patients. The longer the parenteral nutrition the more condensed bile was in those patients. Bile returned to its previous, less dense form once supplementary enteral nutrition was introduced (16).

The material presented in our paper points to the necessity of performing preventative cholecystectomy in patients who underwent subtotal resection of the small intestine and whose projected primary way of supplying essential nutrients is going to be parenteral nutrition. The risk of developing acute cholecystitis in this patient group is very high, therefore it seems necessary to remove the gall-bladder earlier before it becomes inflamed. This can be done for example during a planned operation of restoring the continuity of the digestive tract due to intestinal fistulas or during the surgical removal of end ostomy. Our experiences confirm the observations made in other European centres concerned with home parenteral nutrition.

CONCLUSIONS

The presence of cholelithiasis in patients who underwent subtotal resection of the small intestine and have been chronically fed parenterally is a frequent phenomenon. Patients with concurrent cholelithiasis requiring chronic parenteral nutrition run a high risk of developing acute cholecystitis. It seems purposeful to perform preventative cholecystectomy during the primary subtotal resection of the small intestine, since the risk of cholelithiasis development in this group is very high.

REFERENCES


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