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Original Research Article

Study to Evaluate the Association of Hypothyroidism and Cholelithiasis and Complications Associated with Laparoscopic Cholecystectomy

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Abstract

Aim: The aim of this study to evaluate the association of hypothyroidism and cholelithiasis and complications associated with laparoscopic cholecystectomy.

Methods: The present study was conducted in the Fort U Mediemergency Hospital, Patna, Bihar, India. It included analysis of 100 cases and 100 controls for one year.

Results: Ten of them (10%) found to have subclinical hypothyroidism and 90 (90%) found to be euthyroid. All patients with subclinical hypothyroidism were in the age group of 38–53 years. The patients with subclinical hypothyroidism had more prevalence of single gall stone than multiple stone. Most patients with subclinical hypothyroidism had positive family history (70%), and (30%) had negative family history.

Conclusion: Thus, studies conducted in the last two decades, have found a relative association between thyroid dysfunction and cholelithiasis, especially in terms of gender. There have also been speculations about higher incidence of subclinical hypothyroidism in cholelithiasis and also varying results with respect to thyroid dysfunction being more prevalent in patients with choledocholithiasis.

Keywords: Hypothyroidism, Gall stones, Thyroid dysfunction, Euthyroid, Hyperthyroidism

Introduction

The disorders associated with biliary tract stones dates way back to the 21st Egyptian dynasty and not just in the modern era. Around 2000 years ago, young Egyptian women had gallstones, during the period of The Roman Empire, as suggested by archaeological evidence. [1] The core process involved in this chronic hepatobiliary disease, Cholelithiasis, is impaired cholesterol, bilirubin and bile acid metabolism, resulting in the formation of gallstones in the hepatic duct, common bile duct or gallbladder. In the western population, majority of the Gallstones are

cholesterol stones. Around 6.12% of the adult Indian population is affected by Cholelithiasis. [2] The incidence has increased these days, partly because to the wide use of ultrasonography in the last two decades and also due to the changing socio-economic conditions and other epidemiological factors including diet. [3]

In a series of 668 female patients who had undergone cholecystectomy for gallstone disease, the proportion of treated hypothyroidism was 2.4% compared to 0.8% in the 782 controls. [4] Other studies [5] found a proportion of previously diagnosed hypothyroidism of 8% and 6% in patients having common bile duct and gallbladder stones, respectively, compared to a proportion of only 1% in the controls. The usage of thyroxine was even suspected to dissolve gallstones. However, a spontaneous passage of the stone to the duodenum could not be excluded in this case report. [6] In an animal model of rabbits in whom a fatty diet induced gallstone formation, administering thyroxine was associated with a low gallstone weight, but did not dissolve the gallstones. [7]

The disease frequently occurs in young to middle aged, otherwise healthy people with a prevalence of 11-36 % on autopsy report. The prevalence of hypothyroidism in India is 10.95%. [8] Despite a significant percentage of cases being asymptomatic, gallstone disease adds substantially to health care costs and manpower, and its complications are sometimes life threatening. According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases. [9] The prevalence differs not only between countries but also between ethnic groups. Age and gender also influence the prevalence of gallstone disease.

Diseases like cirrhosis, chronic haemolysis and Crohn's disease have been identified as risk factors for the formation of black pigment stones. Gallstone disease in children is rare and has been found to have an association with risk factors which are similar to those in adults, particularly obesity. [10]

The aim of this study to evaluate the association of hypothyroidism and cholelithiasis and complications associated with laparoscopic cholecystectomy.

Materials & Methods

The present study was conducted in the Fort U Mediemergency Hospital, Patna, Bihar, India. It included analysis of 100 cases and 100 controls for one year.

Inclusion criteria

- Patients between aged 20-65 years of age admitted to the department of general surgery

Exclusion criteria

- Pregnancy
- Known cases of haematological disorders
- Patient on drugs causing hypothyroidism: Amiodarone, Lithium, antidepressants,
- Phenytoin, Interferon, Imatinib
- Patient on drugs causing gallstones: Estrogen, Fenofibrate, Gemfibrozil.
- Patients who do not give consent to participate in the study

Case group included 100 patient's ultrasounds proven cholelithiasis undergoing laparoscopic cholecystectomy, clinically euthyroid / undiagnosed hypothyroidism Control group -100 Patients with no ultrasonographic evidence of cholelithiasis, clinically euthyroid/ undiagnosed hypothyroidism

Measurement of exposure

Hypothyroidism was defined as >10, subclinical hypothyroidism defined as TSH 5-10, euthyroidism TSH < 5.

Study duration: 12 months

All the patients were worked up and assessed according to following principles:

1) Detailed history taking including history of thyroid disorders.

2) Complete clinical examination.

3) Complete blood count.

4) Thyroid function test (T3, T4, TSH).

5) Abdominal ultrasound.

The study populations were men and women, aged 22–65 years, all thyroid function test measurement were performed in the teaching laboratory. Patients with serum level of TSH of 0.5–4.7 mIU/L with normal T3, T4 levels were considered euthyroid, serum level of TSH of 4.7–10 mIU/L with normal T3, T4 levels is considered as a subclinical hypothyroidism.

Data collection: At time of admission, the following information were gained from the patients and recorded in a special questionnaire form prepared for patients who were admitted for elective cholecystectomy: Age, gender, family history of thyroid disorder, abdominal ultrasound and thyroid function test.

Results

Table 1: Age group of the patients

Variables	No.			Percentage
Age groups				
20-35 years	20			20
36-50 years	70			70
51-65 years	10			10
No.	Minimum	Maximum	Mean	Std. Deviation
100	24	65	44.70	7.649

The data collected from 100 patients, the majority of them were in 36–50 years age group, the mean age of patients was 44 years. (Table 1)

Table 2: Gender distribution of the patients

Variables	No.	Percentage
Gender		
Male	20	20
Female	80	80
Total	100	100

Of the patients tested, 80 (80%) of them were females and 20 (20%) were males.

Table 3: Abdominal US finding of the patients

Variables	No.	Percentage
Single stone	30	30
Multiple stone	70	70
Total	100	100

Abdominal ultrasound findings in 30 patients (30%) were showed single gall bladder stone and 70 patients (70%) had multiple stone. (Table 3)

Table 4: Thyroid functional tests distribution of the patients

Variables	No.	Percentage
Euthyroidism	90	90

Hypothyroidism	10	10
Total	100	100

Ten of them (10%) found to have subclinical hypothyroidism and 90 (90%) found to be euthyroid.

Table 5: Hypothyroidism patients' characteristics

Gender	Male Female	4 6	40% 60%
US finding	Single stone Multiple stone	7 3	70% 30%
Family history	Positive Neative	7 3	70% 30%
Age	Mean 44.70	Std. Deviation 4.833	

All patients with subclinical hypothyroidism were in the age group of 38–53 years. The patients with subclinical hypothyroidism had more prevalence of single gall stone than multiple stone. Most patients with subclinical hypothyroidism had positive family history (70%), and (30%) had negative family history.

Discussion

This study tests the association of hypothyroidism with cholelithiasis by analysis of cases and controls. In the case group Female gender was a significant risk factor for gall stones. Thyroid dysfunction affects cholesterol metabolism, bile content and bile acid synthesis at multiple levels. In thyroid disease, both composition and transport of lipoproteins tends to get affected. In hypothyroidism, there is increase in the levels of cholesterol, thereby causing increased concentrations of LDL. Conversely, in hyperthyroidism, there is reduction in the levels of total cholesterol and LDL. [11] Hypothyroidism causes hypercholesterolemia resulting in supersaturation of bile with cholesterol, thereby causing reduced motility, contractility and filling of gall bladder, which in turn leads to prolonged stagnation bile. This results in the retention of cholesterol crystals and adequate time for them to nucleate and grow into mature gall stones. [12]

Subclinical hypothyroidism is a predominant disorder among adult population; however, it is often overlooked. A recent study by Ahmed MM et al. [13] concluded that there was a incidence of hypothyroidism in 16% of patients with choledocholithiasis in contrast to 8% in cholelithiasis group with subclinical hypothyroidism. Furthermore, a study by Laukarrien et al. [14] found a prevalence of subclinical hypothyroidism 10.2% which is slightly high as compared to present study that showing the prevalence of subclinical hypothyroidism among cholelithiasis patients found (7.8%) this may be due to the fact that their study done in endemic areas of iodine deficiency. The present study shows an increase prevalence of subclinical hypothyroidism with increasing age of patients and this was maximum at age above 40 years (7/10), younger than this age the prevalence shown to be less (3/10) of patients.

Age is a main risk factor for gallstones, the age of 40 years appears to denote the cut-off between relatively low and high rates of cholecystectomies. Between the ages of 40 and 69 years, the incidence is 4 times higher than in younger subjects. Laukkarinen et al. study show that thyroid

function abnormalities even mild and preclinical should be screened in patients with gallstones' especially in women above 60 years. This matched with our result study about age group and its distribution because with increasing age there is decrease in water contents of body which may reach 45% of body weight, this is due to decrease in lean (muscle) mass of the body which may lead to more concentrated body fluids and excretions and more deposition of solid contents of the excretions which may lead to nucleation and formation of gall stone. [14]

On the other hand a study conducted by Volzke H et al. 15 thyroid function and gallstones shows that women were affected nearly twice as often as men, while gallstones were only slightly more often detected by ultrasound in women than in men. Volzke H et al. [15] earlier diagnosis and treatment of hypothyroidism in women compared to men. [16]This assumption is supported by the fact that the association between high serum TSH levels and cholelithiasis was mainly found in females with sonographically detected gallstones as proved in our study and still more predominant in female gender.

Conclusion

Thus, studies conducted in the last two decades, have found a relative association between thyroid dysfunction and cholelithiasis, especially in terms of gender. There have also been speculations about higher incidence of subclinical hypothyroidism in cholelithiasis and also varying results with respect to thyroid dysfunction being more prevalent in patients with choledocholithiasis. Most of these studies have analyzed a relatively small sample size and are predominantly of the retrospective type. However, further research is required in the future to conclude if thyroid abnormality has a role in the development of gallstones or not.

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