

Original Research Article

Effect of surgical menopause on serum lipid profile-a prospective study

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ABSTRACT

Background: Menopause marks the onset of cessation of ovarian function which is associated with changes in cardiovascular risk factors especially an unfavourable change in lipid profile. This is more pronounced in perimenopausal females who have undergone total hysterectomy with bilateral salpingo oophorectomy. This study aimed at looking into the changes occurring in the lipid profile and other cardiovascular risk in patients who have undergone oophorectomy over a 3 months period.

Methods: The study was conducted as a case control one. We studied 70 consecutive perimenopausal patients admitted in a tertiary care teaching medical college hospital in Kerala, South India who were admitted for hysterectomy and bilateral oophorectomy over a 1 year period. The lipid profile and anthropometric measurement with blood pressure recording was done prior to surgery and the same patients were followed up after 3 months when the cardiovascular risk assessment and lipid profile estimation were repeated. Here, the cases acted as controls after the end of third month.

Results: It was found that after the end of 3 months of surgical menopause there was no significant change in body mass index, waist hip ratio or systolic BP. However, the DBP was higher in patients after surgery (78.68 ± 7.94 vs 83.31 ± 11.03 , $P < 0.001$). There was also statistically significant increase in total cholesterol (166.07 ± 28.22 vs 242.94 ± 45.65 [$P < 0.001$]), TG (129.33 ± 31.16 vs 177.06 ± 50.57 [$P < 0.001$]) and LDLc (107.83 ± 20.06 vs 166.73 ± 48.51 [$P > 0.001$]). The HDLc was found to be 27% after 3 months of surgical menopause (59.31 ± 8.22 vs 43.73 ± 35 [$P > 0.001$]).

Conclusions: Thus, it was concluded that there was a significant unfavourable effects on lipid profile and diastolic blood pressure 3 months after surgical menopause.

Keywords: Menopause, Surgical menopause, Lipid profile

INTRODUCTION

For most women menopause marks the beginning of uninterrupted oestrogen deficiency and indicates the onset of permanent cessation of ovarian function.

Menopause is diagnosed after 12 months of amenorrhea and the mean age at menopause is 51 years. It has been shown that several symptoms and diseases have a causal association with menopause.¹ The Prospective Pittsburgh

Study has found that menopause is associated with changes in several heart disease risk factors such as increasing LDL cholesterol and decreasing HDL cholesterol. Natural menopause has an unfavourable effect on lipid metabolism which may contribute to an increase in the risk of coronary artery disease.² Women with premature menopause (before the age of 40 years) or early menopause (between 40 and 45 years) experience an increased risk of overall mortality cardiovascular disease, psychiatric disease, osteoporosis and other sequelae.³

It had been shown that early menopause had modest effect on cardiovascular disease and the effect was more pronounced for women with an artificial menopause than women with a natural menopause.⁴ Women who underwent bilateral oophorectomy before 45 years of age experienced an increased mortality associated with cardiovascular disease.⁵

By contrast in older women with hysterectomy and bilateral oophorectomy did not have a higher CVD risk when compared to women with hysterectomy alone.⁶

Likewise, it was found that in a report based on cardiovascular risk factor data from SWAN (Study of Women's Health Across the Nation), women who had surgical menopause in their 40s and 50s were not at any greater risk for increase in CVD risk factors compared with women who had a natural menopause.⁷

It was because of these contradictory findings we proceeded with this study which aimed at examining the pattern of lipid profile in the premenopausal age group and the change in lipid profile after 3 months of surgical menopause in the same group of patients. The study also aimed at studying the change in blood pressure, body weight and waist hip ratio after surgical menopause.

METHODS

The study was designed as a case control study. 70 patients meeting the inclusion criteria admitted to a tertiary care teaching medical college hospital in Kerala, South India were taken. The same group of patients acted as controls also. 70 consecutive premenopausal patients admitted in the obstetrics and gynecology department of the same institution for total hysterectomy with bilateral oophorectomy were recruited over a one-year period.

The study was done after getting ethical clearance from the institution and also after obtaining written informed consent from each patient.

A detailed performa was filled up for each patient which included age, history of hypertension and coronary artery disease. A detailed physical examination was done including examination of cardiovascular system and anthropometric measurements. Blood pressure was recorded with a standard mercury manometer using WHO guidelines.

The height was measured barefoot and weight (in kilogram) in normal indoor clotting. Body mass index was calculated and if found to be above 25 kg/m² was taken to be abnormal. Values between 25-29 kg/m² was considered as overweight and more than 30 kg/m² as obese. Waist circumference was measured at the naval while the patient was breathing quietly, and the hip circumference was measured at the intertrochanteric level using a steel tape. A waist hip ratio of more than 0.85 was considered as truncal obesity.

Blood was drawn after 12 hrs of fasting 3 days prior to surgery. These women were followed up after 3 months and a detailed physical examination including anthropometric measurements were repeated. A fasting blood sample was taken for estimation of serum lipid profile. ECG was taken only for patients who gave a history of angina.

RESULTS

General characteristics

The 70 patients who were studied belonged to ages from 41 to 55 with a mean age of 46.23 years (Table 1).

Table 1: Distribution of age.

Age	Frequency	%
40-45	33	47.1
46-50	25	35.7
51-55	12	17.1
Total	70	100.0

For majority (74.28%) the indication for hysterectomy was fibroid uterus and in the rest (25.72%) for dysfunctional uterine bleeding (Table 2).

Table 2: Indication for hysterectomy.

Diagnosis	Frequency	%
Dysfunctional uterine bleeding	45	64.3
Fibroid uterus	25	35.7
Total	70	100.0

The mean body weight of patient before surgery was 55.82±8.72 and there was no statistically significant weight gain 3 months after surgery (mean 56.14±8.71 with P >0.5) (Table 3).

Table 3: Weight.

	N	Weight		Paired differences		Paired t test	
		Mean	SD	Mean	SD	T	P
Before treatment	70	55.99	8.76	-0.17	2.17	-0.662	0.510
After treatment	70	56.16	8.63				

There was also no statistical change in body mass index, waist hip ratio or systolic blood pressure in the post-surgical period (Table 4, Table 5, and Figure 1).

However, the diastolic blood pressure was higher in patients after surgery (78.68 ± 7.94 Vs 83.31 ± 11.03 mmHg) which was found to be statistically significant ($P < 0.01$) (Table 6).

Table 4: Waist Hip ratio.

	N	WHR		Paired differences		Paired t test	
		Mean	SD	Mean	SD	T	P
Before treatment	70	0.92	0.04	0.01	0.09	0.831	0.409
After treatment	70	0.91	0.08				

Table 5: Systolic blood pressure.

	N	SBP		Paired differences		Paired t test	
		Mean	SD	Mean	SD	T	P
Before treatment	70	148.41	140.59	17.33	139.72	1.038	.303
After treatment	70	131.09	16.14				

Table 6: Diastolic blood pressure.

	N	DBP		Paired differences		Paired t test	
		Mean	SD	Mean	SD	T	P
Before treatment	70	78.26	6.59	-2.97	9.94	-2.502	0.015
After treatment	70	81.23	11.13				

Analysis of lipid profile

Of the 70 total cases studied the mean levels of total cholesterol was 166.07 ± 28.22 in patients before surgery compared to 242.94 ± 45.65 after surgery; which was highly significant ($P < 0.001$) (Table 7). The mean HDL cholesterol was 59.31 ± 8.22 before oophorectomy when compared to 43.73 ± 9.35 after surgery (Table 8). Thus, there was a 27% reduction HDL within 3 months which was statistically significant ($P < 0.0001$). None of the patients studied had an HDL-c value < 35 mg/dl before surgery. After surgery 25.7% of patients HDL-c values

dropped below 35 mg/dl. The percentage change in TG level after surgical menopause was found to be statistically significant (2682% with $P < 0.001$). The mean values before and after surgery had been 129.23 ± 31.16 and 177.06 ± 50.57 respectively (Table 9). 97% of patients had a TG value < 200 mg/dl and the rest had values between 200-400 mg/dl before oophorectomy. After surgery this changed to 60% and 40% respectively. The mean LDLc before and after surgical menopause had been 107.83 ± 20.06 and 166.73 ± 48.51 respectively. The percentage change was significant (36.83% with $P < 0.001$) (Table 10).

Table 7: Total Cholesterol.

	N	TC		Paired differences		Paired t test	
		Mean	SD	Mean	SD	T	P
Before treatment	70	166.07	28.22	-76.87	36.44	-17.649	< 0.001
After treatment	70	242.94	45.65				

The percentage of patients LDLc values < 100 mg/l was 40% before surgical menopause which dropped to 2.86% after surgery. None of the patients had LDLc values above 161 mg/dl before surgery which had risen to 41%

3 months post-surgery. The TC/HDL ratio also had changed from a mean of 2.81 ± 0.53 to 5.75 ± 1.63 after surgical menopause which is again highly significant ($P < 0.001$).

Table 8: HDL.

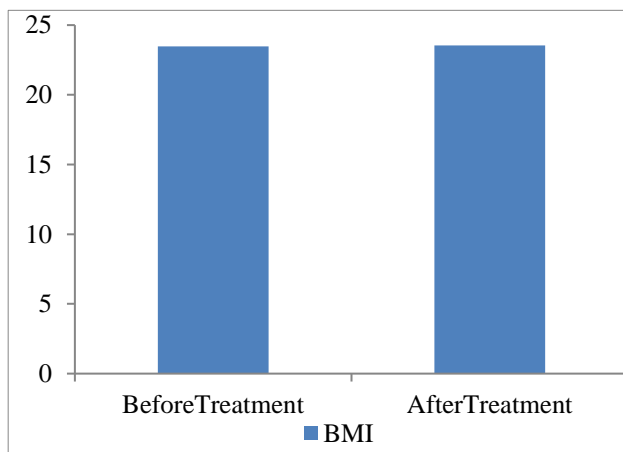
	N	HDL		Paired differences		Paired t test	
		Mean	SD	Mean	SD	T	P
Before treatment	70	59.31	8.22	15.59	10.19	12.797	<0.001
After treatment	70	43.73	9.35				

Table 9: TG.

	N	TG		Paired differences		Paired t test	
		Mean	SD	Mean	SD	T	P
Before treatment	70	129.33	31.16	47.73	37.17	-10.743	<0.001
After treatment	70	177.06	50.57				

Table 10: LDL.

	N	LDL		Paired differences		Paired t test	
		Mean	SD	Mean	SD	T	P
Before treatment	70	107.83	20.06	-58.90	43.38	-11.360	<0.001
After treatment	70	166.73	48.51				

**Figure 1: BMI.**

DISCUSSION

In India cardiac mortality is one of the leading causes of death in both men and women. Kerala is a state in South India which has one of the best health indicators.⁸ According to the PROLIFE study it was shown that the coronary heart disease death rates in women is only about half that in men.⁹ This difference is attributed at least partly to the favourable effects of oestrogens on serum lipid concentrations.¹⁰ Menopause has a great effect on the circulating levels of lipids and lipoproteins. There has been significant increase in total cholesterol, LDL-c and triglycerides with no significant change in HDL-c during the post menopausal period.¹¹ Perhaps the most dramatic evidence suggesting that loss of endogenous oestrogen increases cardiac risk. The sharp increase in LDLc that

begins in the perimenopausal period continues to at least 60years with these higher levels sustained thereafter. These unfavorable changes in lipid profile had led to the increased risk of CHD in post menopausal females. The effect of early bilateral oophorectomy is easier to study in the sense that a discrete event marks the onset of oestrogen deficiency. In contrast to natural menopause bilateral oophorectomy increases coronary artery disease risk and this risk appears to be prevented by oestrogen replacement therapy.¹²

In our present study which included 70 patients who underwent hysterectomy with bilateral oophorectomy were followed up for a period of 3months. It was found that there was a significant and early adverse effect on the lipid profile within 3months of procedure. There was a significant elevation of TC, LDLc and TG; the percentage change had been 44.48%, 36.83% and 26.82% respectively. At the same time there was a dramatic fall in HDLc by 27%. After the surgical menopause it was seen that 25.7% of patients HDL values fell below 35mg/dl which is an independent risk factor for development of coronary artery disease. This is particularly important in the setting where the patients were instructed to have a usual diet after surgery and there had been no significant increase in body weight, body mass index and waist hip ratio.

Another interesting outcome which was noticed was that even though the systolic BP did not show may significant change the diastolic blood pressure rose significantly after surgery. This is one of the prospective studies which had demonstrated such as increase in diastolic blood pressure after oophorectomy. The study had demonstrated

that there has been a change in coronary risk profile in women undergoing bilateral oophorectomy within as early as 3 months with an unfavourable diastolic BP. Probably oestrogen supplementation can obviate many of these adverse events of oestrogen deficiency. There is at present a lot of controversy on the role of oestrogen supplementation as a mode of primary prevention for coronary artery disease. The Women's Health Initiative had concluded that the overall health risks especially the risk for invasive breast cancer exceeded benefits from the use of combined oestrogen plus progesterone among post menopausal women. So, a practical approach will be an early screening for lipid profile and aggressive alteration of lipid patterns and control of hypertension with lifestyle modification and drugs for the prevention of coronary artery disease in this group of patients.

CONCLUSION

The study had shown that there was a significant unfavourable effect on lipid profile and diastolic blood pressure 3 months after surgical menopause. With these results a practical approach will be an early screening for lipid pattern and aggressive reduction in lipid profile along with control of hypertension in females undergoing total hysterectomy with bilateral oophorectomy.

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