DISCUSSION
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Voluntary female sterilization is the most widely used contraceptive method in the world. About 95 million women depend on it to control their fertility. The rapid spread of voluntary sterilization over the last decade has been made possible by the surgical methods of minilaparotomy which are quick, highly effective and safe. In our country laparoscopic sterilization has now been accepted as a method of choice for terminal sterilization as it produces minimum discomfort to the patient.

Some researches have suggested that a wide range of symptoms such as abnormal menstrual bleeding, pelvic pain, various gynecological problems and even benign breast disease may develop in many women after sterilization.

Some have called this "Post Ligation Syndrome" with causative theories, such as psychogenic instability, pelvic varicosities, development of pelvic adhesions and hydrosalpinx. Interruption of the terminal branch of uterine artery to the ovary, lack prostaglandin F₂ alpha as a luteolytic substance, inadequate diffusion of estrogen and progestrogen from the ovary to the uterus. So vascular disruption and hormonal disturbances evoking the study.

Though some patients remain asymptomatic after tubal sterilization but quite many of them do come back with
different types of complication from minor to really
troublesome complication of Menstrual disorder requiring
surgical intervention. No particular sterilization tech-
nique appears to affect menstrual functions.

To explain, how sterilization could theoretically
these problems, some clinicians hypothesize that damage to
the fallow pain tube disturbs blood supply to ovaries,
causing changes in hormone production or diffusion that in
turn causes this problems.

Therefore it is important to find out whether these
menstrual irregularities are merely coincidental or they
are because of some associated pathology or have some other
basis.

In the present study, menstrual pattern changes
after tubal sterilization was studied in 100 cases. In
patients who have menstrual irregularities endometrial
biopsy and vaginal cytology were done.

In our study the over all incidence of menstrual
irregularities was found to be 60% irrespective of the
method adopted for ligation.

When the two methods i.e. laproscopic and abdominal
tubal ligation were considered, the incidence of menstrual
disorder was 25% & 75% respectively.
Incidence of Menstrual Irregularities after Abdominal Ligotion in Different Series.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Author's Name</th>
<th>Year</th>
<th>Incidence of Menstrual Irregularities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mehta &amp; Mehta</td>
<td>1958</td>
<td>31%</td>
</tr>
<tr>
<td>2.</td>
<td>Bisney et al</td>
<td>1967</td>
<td>68.8%</td>
</tr>
<tr>
<td>3.</td>
<td>Dawn</td>
<td>1968</td>
<td>15.6%</td>
</tr>
<tr>
<td>4.</td>
<td>Kishore et al</td>
<td>1972</td>
<td>66.6%</td>
</tr>
<tr>
<td>5.</td>
<td>Purandare et al</td>
<td>1975</td>
<td>70%</td>
</tr>
<tr>
<td>6.</td>
<td>Shrish et al</td>
<td>1981</td>
<td>90%</td>
</tr>
<tr>
<td>7.</td>
<td>Fortney et al</td>
<td>1983</td>
<td>80%</td>
</tr>
<tr>
<td>8.</td>
<td>Miller et al</td>
<td>1989</td>
<td>67%</td>
</tr>
<tr>
<td>9.</td>
<td>Rojansky</td>
<td>1991</td>
<td>73%</td>
</tr>
<tr>
<td>10.</td>
<td>K. Shy et al</td>
<td>1992</td>
<td>57%</td>
</tr>
</tbody>
</table>

It appears that the incidence of menstrual irregularities is higher in most of the series except in the series of Dawn (1966), Pandit (1961) and Coyagi et al (1964) as compared to the incidence of 64.28% in our series.

Kishore et al (1972) & Miller (1989) had almost same incidence 66.6% & 67% as compared to the incidence of 64.28% in our series.

As far as laproscopic ligation is concerned, a
comparision of incidence of menstrual irregularities has been shown in table.

**Incidence of Menstrual Irregularities after Laproscopic Ligation in Different Series.**

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Technique of Laparoscopic Ligation</th>
<th>Incidence of Menstrual Irregularities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steptoe</td>
<td>1970</td>
<td>Electrocoagulation.</td>
<td>33%</td>
</tr>
<tr>
<td>Neil J.R</td>
<td>1975</td>
<td>&quot;</td>
<td>39%</td>
</tr>
<tr>
<td>Leiberman B.A</td>
<td>1977</td>
<td>Hulbercleman clip.</td>
<td>39%</td>
</tr>
<tr>
<td>Chamberlaina G.</td>
<td>1978</td>
<td>Electrocoagulation.</td>
<td>55.35%</td>
</tr>
<tr>
<td>Richard J. Stock</td>
<td>1978</td>
<td>Tubal Ring</td>
<td>27%</td>
</tr>
<tr>
<td>Shirish S. Sheth</td>
<td>1981</td>
<td>&quot;</td>
<td>15.6%</td>
</tr>
<tr>
<td>Donnez et al</td>
<td>1981</td>
<td>Electrocoagulation.</td>
<td>54%</td>
</tr>
<tr>
<td>Fortny et al</td>
<td>1983</td>
<td>Ring &amp; Spring loaded clip</td>
<td>47.3%</td>
</tr>
<tr>
<td>Kjer et al</td>
<td>1990</td>
<td>Laproscopic</td>
<td>37%</td>
</tr>
</tbody>
</table>

Laproscopy is a very wide term. It is clear from the above table that the incidence of menstrual disorder also depends upon the method of Laproscopic Ligation. The incidence is much higher when Electrocoagulation was the.
method adopted for sterilization. Such higher incidence of Menstrual Irregularities by Electrocoagulation can be attributed to damage of maximum tubal tissue than in other techniques.

Our incidence i.e. 25% in the laproscopic group is comparable to the figures of Richar J. Stock and Steptoe in 1978 & 1970 27% & 33% respectively.

The incidence was much lower 25% after laproscopy as compared to abdominal ligation 75%. It may be explained on the basis of better acceptability, greater mental satisfaction after operation & lesser disturbances of ovarian vascular supply by minimal tubal damage.

Age of the patient our study varied from 20 to 45 years, most of the patients were in the age group of 30 to 35 years. Lull Mitchell (1950), Prystowsky and Eastman (1955), Mehta & Mehta (1958) and Chakravarty (1966) also quoted the same age group to be most common.

The incidence of menstrual complaints by laproscopy was maximum 46.66% in 30 to 35 years.

Prystowsky and Eastman 195 , Chakravarty 1966 and Kishore et al 1972 have reported the menstrual complaints to be maximum between 20 to 30 years of age after abdominal ligation. Though in our series the incidence is highest within age group of 30 to 35 years. Though the Dysfunctional
uterine bleeding occurs at or about 40 years. It has been observed that in post sterilization cases it tends to occur at a younger age group. In our series also, the incidence of abnormal uterine bleeding was highest in the younger age group after abdominal sterilization the menstrual problems were more common by the abdominal method than laproscopy the incidence being only 25% in the latter.

Since laproscopic ligation are usually performed in camps and the cause are motivated by social workers with an impression that it is not an operation but merely application of rings on the fallopian tubes though laproscopic and they can be back home after 2 hours with resumption of normal house hold work. This results into better acceptance and more satisfaction and thereby less disturbance in the hypothalamopitutary ovarian axis leading to fewer menstrual problems.

Most of the cases who presented to us were having either 3 or 4 children, the percentage being 31% and 26% respectively followed by 12% in parity 5. Only 52% cases had two living children.

Neil et al (1975) reported the avarage age of children in their series to be 2.9 ± 0.12. In the study of Shirish S. Sheth et al (1981) and Kishore et al (1972), the maximum number of ligation were performed in third or fourth para.
Their finding correspond to our observation.

Psystowsky and Eastman (1956) and Mehta and Mehta (1958) reported maximum number of abdominal ligation done on 8th para and 5th para respectively.

The performance of ligation at a lower parity could be explained by greater awareness of the public towards benefits of short family.

In abdominal group, the occurrence of menstrual disorders was highest (35.52%) in women with 5 living children. The possible explanation for this high incidence could be the large number of cases sterilization during puerperium along with a high rate of infant mortality leading to psychological instability. This in turn leads to imbalance of hypothalamopituitary ovarian axis with its associated sequelae.

In our series out of 100 cases 45 were ligated in the puerperal period. 29 cases in interval, 20 cases were performed alongwith medical termination of pregnancy as shown in table 5.

In incidence of menstrual irregularities was highest (45%) in puerperal group and higher than 29% in interval group. In the study of Shirish S. Sheth et al (1981) all the cases were performed in the postpartum period and the
Incidence of menstrual disorder was 13.42%.

Neil J.R. et al (1975) had 39% incidence of menstrual irregularities in the interval group which is higher as compared to our finding.

Menstrual disorders observed in cases which were performed along with MTP by both the methods or along with Caesarian Section were minimum (6.66%) in our study this is possibly due to the better motivation of patients for sterilization when they are already pregnant and want to escape existing or future pregnancy.

Kishore et al (1972) also reported multiparity to be the sole indication for ligation. In the series of Sheth et al (1981) and Agarwal (1985) also the commonest indication was multiparity indication of ligation possible does not influence the incidence of menstrual irregularities.

In this study it was found that the social workers were the major motivating force for sterilization as a large number of women 44% were motivated by social worker. 25% were self-motivated and about 15% got ligation done due to announcement of extra incentive in camps. A small group constituting about 16% cases.

Menstrual complaints which were observed fell mainly in cases who were motivated either by social worker 44% cases. In this 46.67% cases are of laproscopy & 55.56% cases of abdominal ligation.
In our series menstrual disorder were minimum in patients who were either motivated by doctors or for incentive (15%). The reason being that this results into minimum alterations in the hypothalamopitutary ovarian axis leading to change in menstrual pattern. The psychological attitude towards the matured adopted for sterilization plays an important role in the development of menstrual irregularities.

In our study majority of the patients were satisfied with operation and least liable to develop menstrual problems which were to the time of 26.67% in laproscopic of 33.33% in abdominal method. Laparoscopic ligation is accepted more because it is quick safe and causes minimum discomfort to the patient. Those who regretted the operation because of minor post operative complication of death of the child after sterilization, showed a higher incidence of menstrual irregularities. The overall incidence is 50% in this group.

The regret of the patient is reflected in the long term by disturbance if Hypothalamopitutary Ovarian axis leading to hormonal disturbance.

Richard J. Stock (1978) also reported regret after operation and development of Gynaccological problems in 2.2% cases.

Baker at al (1981) showed that most of the women were
satisfied after operation and they had fewer menstrual complaints.

M. Agarwal (1985) showed the incidence of menstrual irregularities in satisfied group was 1.09% whereas in those who were regretting it was 36.42%. ICMR (1982) reported that dissatisfied group had more menstrual irregularities. When the menstrual pattern was studied it was found that menorrhagia was commonest complaint as it was presumed in 45% cases out of 60 cases of menstrual irregularities. Polymenorrhagia in 25% cases followed by Polymenorrhoea 11.67% & lastly 0.33% dysmenorrhoea. When two method of ligation is considered than higher incidence of menstrual irregularities were with abdominal method of ligation the possible explanation for this is that the conventional techniques causes more disturbances in the vascular supply of ovary leading to cystic degeneration of the ovaries due to increased follicular activity resulting into excessive estrogen production. The proliferative phase is speeded up leading to short cycle.

In 1976, Chamberlain G. and Foulkes J. reported that about one third patients had heavier periods while one fifth had shorter cycle.

Though not proved but it can be presumed that the sequelae of various abnormal menstrual pattern is as a result of L.H. secretion which is increased due to the feed
back mechanism of ovarian hormone. The ovulatory function of the ovary is lost and there is continuous production of estrogen from the theca cells of the follicle and the ovaries become cystic. This hyperestrinism results in menorrhagia. Later when the ovaries undergo atrophy Polymenorrhoea & Oligomenorrhoea may follow leading to premature menopause. It is clear that the commonest menstrual disturbance was menorrhagia followed by Polymenorrhoea. The incidence were higher with abdominal method. We can say that it is the amount of tubal tissue damaged during operation which is responsible for the menstrual pattern change.

It was also seen that most of the cases 55.55% developed menstrual disturbance within 1 to 3 years of sterilization.

On clinical study it was found that 51.51% cases showed a diffuse enlargement of uterus. They had menorrhagia, Polymenorrhagia, Polymenorrhoea. In our series 27.27% cases had Palpable Tender Adenexa presented to us with Polymenorrhoea, Menorrhagia and Dysmenorrhoea 12.12% cases had tuboovarian mass presented as menorrhagia & polymenorrhoea & dysmenorrhoea. This type of pelvic pathology was probably due to the residual infection and cystic degeneration of ovaries as a result of disturbance of blood supply.

R. Agarwal (1985) in her study has also shown diffuse enlargement of uterus in most of the cases.
Rojansky (1991) reported Dysmenorrheoa due to Chronic venous congestion occurring over a good length of time.

Marvin (1993) reported pelire pan & Dysmenorrheoa in post ligation cases.

In the present series out of 60 cases in which histomorphology of endometrium was studied. Non secretory 46.67% was the commonest finding.

Hyperplastic endometrium was present in 13.33%. This type of endometrial pattern is suggestive of excessive estrogens. Stimulative and lack of stimulation by progesterone Hormonal disturbance is either due to interruption of avarian blood supply or due to subconscious psychological factor operating through the autonomic nervous system via the hypopituitary avarian axis leading to various menstrual disturbances.

About 25% cases revealed secretory endometrium & 5% shown biphasic endometrium. In the series of Mallick and Atkin (1952) 75% were bleeding from secretory and biphasic endometrium. They concluded that tubal destruction due to sterilization leads to decreased tubal production of prosta-glandin F2 alpha leading to failure of normal luterlysis with prolonged production of progesterone leading to irregular shedding of endometrium resulting into menorrhagia & polymenorrheoa.
In study of Kishore et al (1972) the commonest finding was non secretory endometrium present in 32 cases out of 34 cases.

Nagar & Rastogi (1982) reported Non secretory endometrium to be the commonest (56%) finding.

R. Agarwal (1985) reported 34% secretory endometrium of next being 31.03% proliferative type.

In this series of study vaginal smear had taken of maturation index had studied. More cases shows maturation index 0/20/80 i.e. 41.64% which shows the preponderance of estrogen stimulation and lack of stimulation by progesterone. This hormonal disturbances could be either due to interception of ovarian blood supply or psychological factor operating through the autonomic nervous system. Via the hypothalamo-pituitary ovarian axis leading to various menstrual disorders.

Maturation Index 0/80/20 was in 25% cases. It shows that there is prolonged production of progesterone. The cause may be that tubal distruption due to sterilization leads to deaseased tubal production of prostaglandin F2 alpha leading to failure of normal lutealysis with prolonged production of progesterone leading to irregular shedding of endometrium resulting into menorrhagia of polymenorrhoea.
Maturation index 3/6/30 shows that both estrogen and progesterone is producing. As there are few parabasal cells also present it shows that there is exfoliation. Thus we can say that in our study, the menstrual pattern which was observed was of dysfunctional uterine bleeding type and operation perse can be held responsible for this.

In our study, patient who came with the complaint of menstrual disorder treated conservatively for 3 - 4 cycles. Patient who did not respond to medical therapy surgical treatment had given.

Medical Management :-
- First of all Non steroidal autimflamatory drugs were used.
- In some cases Fenamates (Mefonamiu acid) had given.
- Nsaaproxen & Ibafrofen had also used.

Hormonal Treatment :-
Estrogens in form of - Estrogen only
Or Comfrihend preprat.
- Progesterone
- Testosterone.
- Danazil.
- Gn. Rl. analogue.
In our study all cases of menstrual irregularity were treated first with medicines, but 58.33% were responded to medical treatment rest 41.67% were not responding to medical therapy. While taking medicine they were not complaining any problem, but after discontinuation of medicine the symptoms reappeared. Cases in whom symptoms reappeared Surgical treatment is given.

Hystereotomy was done in most of the cases.

- Rojansky et al 1991 reported that 60% of cases who had tubal sterilization needed hystereotomy.

- Kjer et al (1990) reported 50% cases had hystereotomy after tubal sterilization.

- Miller et al (1980) also reported 50% cases had hystereotomy after tubal sterilization.

So in our study also it is reported that 41.67% cases needed hystereotomy.