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Study of spectrum of neoplastic and non-neoplastic lesions in fallopian tube in a tertiary care hospital

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Abstract
Background: Fallopian tubes are affected by a wide spectrum of diseases varying from salpingitis to carcinoma. Most pathological processes involving the fallopian tube are inflammatory and are of clinical significance because they interfere with the function of the fallopian tube and result in infertility. Although fallopian tube is affected by a wide spectrum of diseases, a literature search reveals that there are only occasional studies, documenting histologic changes in the fallopian tube removed for all reasons. This prompts the present study. The aim is to study the gross and microscopic features of the excised fallopian tubes and to study the common and unusual lesions in them and to study the frequency of histological findings and relative frequencies of different findings.
Materials and methods: Four hundred and forty-five cases of fallopian tubes that were removed were studied retrospectively, and their histopathological findings documented.
Results: The majority of the fallopian tubes had inflammatory changes comprised of acute and chronic salpingitis, salpingitis isthmica nodosa, tuberculous salpingitis, xanthogranulomatous salpingitis, hematosalpinx, and hydrosalpinx. Sixteen cases comprised of ectopic pregnancy. One case of primary fallopian tube adenocarcinoma and two cases of metastatic adenocarcinoma.
Conclusion: The majority of the fallopian tubes remain unremarkable in a majority of the surgical pathology specimens, yet the fallopian tube must be subjected to a thorough histopathological examination to evaluate the various pathological lesions.

Keywords: Fallopian tube, salpingitis, tuberculous salpingitis, adenocarcinoma

Introduction
The fallopian tubes represent more than conduits from the ovary to the endometrial cavity [1]. The fallopian tube functions as an anatomic and physiologic link between the ovary and uterus in reproduction by ensuring efficient and orderly ovum transport and providing a proper environment in which fertilization can occur. The fallopian tube undergoes changes from puberty to menopause [2, 3]. It usually is examined as a salpingectomy or tubal ligation specimen or as part of a more complex specimen from a hysterectomy and/or oophorectomy operation. Fallopian tubes are affected by a wide spectrum of diseases varying from salpingitis to carcinoma [4]. Most pathological processes involving the fallopian tube are inflammatory and are of clinical significance because they interfere with the function of the fallopian tube and result in infertility [5].
The aim of this study is to describe the various histopathological findings of fallopian tubes surgically removed with or without medical termination of pregnancy.

Materials and methods
This study was a combination of retrospective and prospective study done in a tertiary care center from January 2010 to December 2012. Fallopian tubes required for the study were obtained from patients undergoing either salpingectomy, tubal ligation, or hysterectomy/oophorectomy. A minimum of 3 bits was taken from isthmus, ampulla, and infundibulum from each tube in keeping with the standard procedure. The tubes were cut, and contents of the lumen, thickness of the wall, and patency were noted. Specimens of suspected ectopic pregnancy were also examined for the presence of embryo, hemorrhage, and rupture. Adequate tissue blocks were made and stained with hematoxylin and eosin for light microscopy study.

Results

Four hundred and forty-five specimens consisting of various gynecological lesions were examined. Most of the patients were diagnosed with dysfunctional uterine bleeding. The distribution of cases, according to clinical diagnosis, as shown in Table I.

Table I: Distribution of cases according to clinical diagnosis

Clinical diagnosis	No.of cases	Incidence
DUB	81	30.6%
Fibroid	44	16.6%
Ectopic pregnancy	16	6%
TO mass	8	3%
Chronic cervicitis	26	9.8%
Prolapse	3	1.1%
Infertility	7	2.6%
Tubectomy	77	29.1%
Torsion	1	4%
Ca cervix	2	0.8%
Tuberculosis (abdominal)	5	0.76%
Ca endometrium	16	2.3%
Others	35	5.15%
Total	687	265 (100%)

The present study includes 445 fallopian tubes, which were obtained from 265 patients. These tubes were obtained by various surgical procedures; 161 (60.8%) patients underwent total abdominal hysterectomy with salpingo-oophorectomy, which was either unilateral or bilateral. The rest were obtained from tubal ligation and salpingectomy, as shown in Table II.

Table II: Type of surgical procedures

Type of specimen	No. of cases	Percentage
Hysterectomy with salpingoophorectomy	161	60.8%
Tubal ligation	77	29.1%
Salpingo-oophorectomy	7	2.6%
Salpingectomy	20	7.5%
Total	265	100

Most of our patients belonged to 41-50 years. The youngest patient was 11 years, and the oldest patient was 80 years old. The age distribution of the patients is shown in Table III.

Table III: Age distribution of the patients in the study

Age	No. of patients	Percentage
11-20	1	0.4%
21-30	81	30.5%
31-40	50	18.9%
41-50	106	40%
51-60	24	9.1%
61-70	1	0.4%
71-80	2	0.7%
Total	265	100

The tubes were classified according to the histopathological features, as shown in Table IV. Most of the tubes 258 (58%) had no pathological changes and were unremarkable. The non-neoplastic lesion commonly seen were chronic salpingitis flowing hydrosalpinx, hematosalpinx, and acute salpingitis. Ectopic pregnancy was noted in 16 (3.5%) tubes.

Table IV: Distribution of various tubal lesions encountered in the present study

Microscopic features	No. of tubes	Percentage
Unremarkable	258	58
Acute salpingitis	8	1.8
Chronic salpingitis	61	13.7
Acute on chronic salpingitis	2	0.4
Hydrosalpinx	49	11.0
Haematosalpinx	13	2.9
Foreign body granulomatous salpingitis	11	2.4
Tuberculous salpingitis	2	0.4
Xanthogranulomatous salpingitis	4	0.8
Ectopic pregnancy	16	3.5
Salpingitis isthmica nodosa	5	1.1
Torsion	2	0.4
Endometriosis	4	0.8
Endosalpingiosis	2	0.4
Primary adenocarcinoma	2	0.4
Metastatic	3	0.6
Haemangioma	2	0.4
Lipoma	1	0.2
Total	445	100.00

Fig 1: Xanthogranulomatous salpingitis. Cut section of the left fallopian tube shows yellowish white material in the wall and the lumen

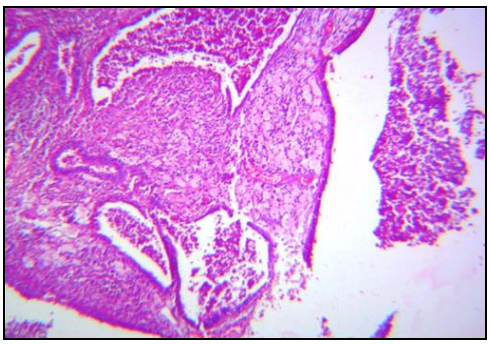

Fig 2: Xanthogranulomatous salpingitis shows numerous foamy macrophages admixed with chronic inflammatory cells (H&E x100).

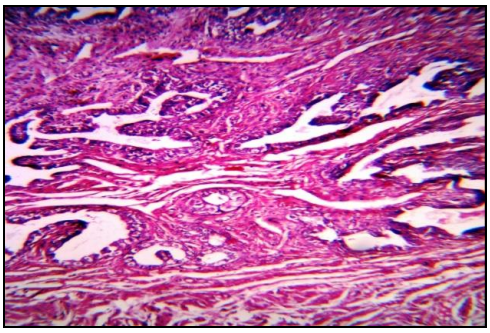

Fig 3: Primary adenocarcinoma of fallopian tube (H&E x100)

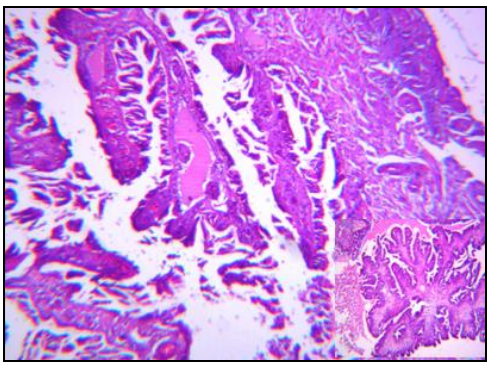

Fig 4: Metastatic papillary serous cystadenocarcinoma of ovary infiltrating into the fallopian tube. Inset shows papillary fronds and necrosis. (H&Ex100)

Discussion

The age group of the patients in our study was between 36 - 45 years (77.98%). The majority (72.77%) of the tubes in from Bhagwan *et al.* (76.1%) and from Gon.S *et al.* (76.1%) were also obtained from patients who underwent hysterectomy. Inflammatory conditions of the tube formed the major group of pathological lesions in the present study constituting 157 (35.2%) tubes which included acute salpingitis, chronic salpingitis, hydrosalpinx, haematosalpinx, acute on chronic salpingitis, foreign body granuloma, tuberculous salpingitis and xanthogranulomatous salpingitis which is similar to the previous study by Bagwan *et al.* who reported inflammatory conditions in 18.05% of the tubes studied and Gon *et al.* in the year 2013, and the percentage is 16.46% [6, 7].

11(2.4%) tubes in this study showed foreign body granulomatous salpingitis. The foreign body that evoked the inflammatory response in the tubes appeared to be suture material, which is probably the result of tubectomy. Bagwan *et al.* found 8 (1.16%) tubes with suture granuloma, and Sisodia *et al.* found 3 (1.07%) in their study [6, 8].

Genital tuberculosis is diagnosed secondary to tuberculosis elsewhere, and fallopian tubes are the first pelvic organs to be involved. Tuberculosis was diagnosed in 0.4% of the tubes in our study and was associated with infertility. Agarwal *et al.* did a clinic-pathologic study of female genital tuberculosis and found the incidence declining from 1.8% in 1974 to 0.8% in 1989 and onwards. They noted the involvement of endometrium in 99.5%, fallopian tube in 94.7%, and cervix in 81.5% [8].

The rarity of the lesion described by Bagwan *et al.* 2002 in 4(1.60%) tubes and Gon *et al.*, 2013, in 5 tubes (0.19%). Sisodia *et al.* 2011 had studied five tubes (1.7%) with tuberculous lesions in the fallopian tube [6, 7, 8].

Genital tuberculosis was seen in two patients in our study who came with the complaint of amenorrhea and infertility. Two (40%) of the patients from the study conducted by Sisodia *et al.* presented with infertility highlighting the possible role of inflammatory tubal pathology is causing the tubal block and hence infertility [8].

Xanthogranulomatous inflammation is part of chronic inflammation that is destructive to the normal tissue of affected organs. Features of xanthogranulomatous inflammation were present in 4 (0.8%) of the tubes, of which both were bilateral and one synchronous cavernous haemangioma in the ovary. The age of the patients ranged from 35-47 years. Sisodia *et al.* reported 1 (0.3%) tube with xanthogranulomatous lesion out of 278 tubes, which is similar to the present study [8].

Ectopic pregnancy is a potentially life-threatening condition, and as many as the highest number of ectopic pregnancies occur within the fallopian tubes [9]. Hunt *et al.* found ectopic decidua in 3% of specimens of postpartum patients present in both subserosal and plical areas [2].

Ectopic pregnancy was diagnosed in only 16 (3.5%) tubes, which were from 16 patients. Most of these studies showed the right tube predominantly being involved. In the present study, the left side showed predominant involvement for ectopic pregnancies. The macroscopic examination of all the 25(100%) tubes in the present study revealed perforation. Bagwan *et al.* found ectopic pregnancy in 81(11%) tubes in their study. Studies conducted by Gon.s *et al.* found 350 (13.5%) ectopic pregnancies of the 2575 tubes [6, 7].

Most of the tubes, i.e., 14 (93.7%) contained blood clots in them, and only 2 (6.3%) tube had hemorrhagic fluid. Fetal parts were identified in one tubal lumen, and in one, the fetus was sent separately with the tube.

Incidental diagnosis of endometriosis was made in 4(0.8%) of the tubes. Endometriosis of the fallopian tubes is very rare and is reported to account for only 1.6% of endometriosis. Endometriosis is defined as the presence of ectopic endometrial tissue outside the lining of the uterine. Endometriosis frequently involves the tubes in the form of nodules located in the wall or serosa [10]. Microscopically, endometrial glands surrounded by stroma was found located within the wall of the tubes in this study.

Salpingitis isthmica nodosa (SIN) of the tube is a condition of the fallopian tube characterized by nodular thickening in the tunica muscularis of the isthmic portion of the tube enclosing cystically dilated glands leading to complete obliteration of the tubal lumen. The incidence of SIN in the normal population is reported as between 0.6% and 11% [11]. SIN is usually associated with ectopic tubal pregnancies with a wide range of incidence (2.8%–57%) [12, 13]. The presence of SIN is seen in 5 (0.8%) in our study and had a history of ectopic pregnancy; Bhagwan *et al.* found 5 (0.7%) tubes, and Gon *et al.* found 3 (0.1%) with salpingitis isthmica nodosa in their study [6,7].

Torsion was accounted for only in 2(0.4%) in our study. The youngest one was 11 years old, and the other 43 years old. In the study conducted by Bhagwan *et al.*, torsion was much less common when compared to the present study with an incidence of 0.1% [6].

The lipoma is a common benign tumor occurring throughout the body of which a fallopian tube is an unusual location. In the present study, 1 tube (0.2%) of 445 tubes from a 45-year-old patient presented with features of lipoma. Akbulut.M *et al.* reported a few cases of lipoma in the fallopian tube [14].

Two (0.4%) tubes of 445 tubes presented with features of cavernous haemangioma. The patient was a 52-year-old lady who showed bilateral presentation. In the literature, 6 cases have been reported to date in the 60s and 70s. The study conducted by Gowri *et al.* reported a case of fallopian tube haemangioma in a young girl who presented with an acute abdomen with haemoperitoneum [15].

Primary tubal neoplasms are rare and are usually only recognized at surgery or on pathological examination of the excised specimen [6]. Primary fallopian tube adenocarcinoma accounts for 1% of all female genital tract malignancies [16]. It was encountered in only 2 (0.4%) tubes. This malignancy was diagnosed in a 80 year old woman who presented with postmenopausal bleeding. The patient was operated total abdominal hysterectomy with bilateral salpingo-oophorectomy.

Longacre *et al.* [17] attributed a low incidence of primary malignancy in part due
to admittedly arbitrary definitional criteria as it is difficult to distinguish primary tubal carcinoma from primary ovarian or primary endometrial carcinoma in patients with high stage disease is important to section the fallopian tubes serially and submit all of the tissue for a microscopic examination so that the diagnosis of carcinoma is not missed [18]

Metastatic carcinoma of the fallopian tube accounts for 80-90% of all malignant tubal neoplasm; the ovary is the primary site in 60% of cases [19]. Only 3 (0.67%) tubes of the 445 tubes studied had tubal metastasis from the ovary. One case was with a bilateral lesion. This tube was obtained from a 45 and 50-year-old lady.

Bagwan *et al.*, in their study, had 2 (0.29%) tubes with metastasis, which correlates with the present study. Gon *et al.* had reported five tubes (0.19%) metastasis [6, 7] Tubal metastasis usually indicates poor prognosis regardless of the site of the primary tumor.

Conclusion

The fallopian tube is a common specimen in the histopathology laboratory. More than half of them had some pathology. So all the fallopian tubes removed as a part of tubectomy or tubal ligation or as a part of any other procedure should be subjected for histopathological examination, as it may focus many unrevealed lesions. Early diagnosis of these diseases helps the clinician initiate prompt and adequate treatment. With the laparoscopic technique of biopsy/surgery, the diseases can be recognized and treated early so that more extensive surgery can be avoided. This study has documented various pathologic changes in the tube and helps elucidate the histomorphology of fallopian disease.

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