OVARIAN NEOPLASMS—A STUDY OF 403 TUMOURS

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Introduction

The ovary is a frequent site for primary and metastatic tumours. Despite recent therapeutic advances, mortality from ovarian cancer has shown little decline in the last decade. The clinical stage of the neoplasm per sé is inadequate to evaluate the optimum mode of therapy, and to compare the various therapeutic results. Histological classification of ovarian tumours forms an integral part of this evaluation. Due to its complex structure, primary ovarian neoplasms are of diverse histological types. This diversity has led to the use of numerous nomenclatures and classifications of ovarian tumours in the past. Hence it is difficult, if not impossible, to interpret epidemiological data and assess therapeutic results.

In recent years, Serov *et al* (1973) and Scully (1977), have proposed a classification for tumours of the ovary based upon its histogenesis. Wider application of this classification will make the epidemiological data more meaningful. We present the data on 403 ovarian tumours, classified according to Serov *et al* (1973).

Material and Methods

A clinicopathological study of 403 ovarian tumours seen over a 10 year period from 1968 to 1978 in the department of Pathology, AIIMS, New Delhi, is presented. Four hundred tumour specimens were obtained after surgical resection, while 3 were obtained from autopsy material. Gross features of each specimen were noted. Specimens were then fixed in 10% formalin and prepared for histopathological examination. The number of blocks studied ranged from 2-8 per tumour. Haematoxylin and eosin staining was done in all cases. Special stains like PAS, mucicarmine and reticulin were used wherever necessary.

Observations

Of the 403 ovarian tumours studied, 270 (66.99%) were benign and the rest malignant. Female genital tract tumours constituted 16.94% of all tumours received in the department of Pathology from 1968 to 1978. Ovarian cancers formed 0.817% of all malignant tumours and 14.15% of all malignant female genital tract tumours over the same period.

The age distribution of ovarian tumours is shown in Table I. The largest number of tumours were seen between the ages of 21 to 40 years. The youngest patient was 2 years in age and the oldest 80 years (Table I). Peak incidence of benign tumours was 21-30 years while that of malignant tumours 30-50 years.

Bilateral ovarian tumours were observed in 48 cases. Histologic data of these cases are set out in Table II. In 25 both

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TABLE I
Age Distribution

Age in years	No. of tumours	Benign tumours	Malignant tumours
0-10	4	0	4
11-20	40	27	13
21-30	127	104	23
31-40	99	63	36
41-50	75	46	29
51-60	42	20	22
61-70	12	8	4
Over 70	4	2	2
Total	403	270	133

TABLE II
Bilateral Ovarian Tumours

Lesion	No. of cases
Serous cystadenoma	2
Mucinous cystadenoma	2
Serous cystadenocarcinoma	5
Mucinous cystadenocarcinoma	6
Endometrioid carcinoma	4
Benign teratoma	7
Metastatic tumours	10
Benign teratoma/endometrioid	1
Benign teratoma/serous cyst.	7
Benign teratoma/mucinous cyst	2
Serous cystoma/adenocarcinoma	1
Brenner/malignant Brenner	1
TOTAL	48

tumours were malignant, and in 30 both were benign.

Histogenetic origin of these tumours is presented in Table III. Tumours arising from the surface epithelium formed 65% of all ovarian tumours. Of 262 such tumours, 184 were benign. Benign surface epithelial tumours constituted 68.1% of all benign ovarian tumours. Its malignant counterparts formed 58.6% of all malignant ovarian tumours.

Of the benign surface epithelial tumours, serous cystadenoma was the commonest, followed in frequency by mucinous cystadenoma (Table IV). Out of the 12 cystadenofibroma studied, only 2 were

TABLE III
Histogenetic Group of Origin

	Total		Benign		Malignant	
	No.	Percentage	No.	Percentage	No.	Percentage
1. Surface epithelial tumours	262	65.0	184	68.1	78	58.6
2. Sex cord stromal tumours	29	7.2	16	5.9	13	9.8
3. Germ cell tumours	85	21.1	70	26.0	15	11.3
4. Metastatic	26	6.5	—	—	26	19.6
5. Miscellaneous	1	0.2	—	—	1	0.7
	403	100.0	270	100	133	100.0

TABLE IV
Histopathological Classification of Ovarian Tumours

	Total number	Percentage
	262	65.0
I. *SURFACE EPITHELIAL TUMOURS*		
A. Serous tumours		
(i) Cystadenoma, papillary cystadenoma	95	23.5
(ii) Adenofibroma, cystadenofibroma	10	2.5
(iii) Cystadenocarcinoma	21	5.2
B. *Mucinous tumours*		
(i) Cystadenomas	75	18.6
(ii) Cystadenofibromas	2	0.5
(iii) Borderline cystadenocarcinoma	7	1.7
(iv) Cystadenocarcinoma	26	6.5
C. Endometrioid carcinoma	15	3.7
D. Clear cell carcinoma	1	0.3
E. *Brenner*		
(i) Benign	2	0.5
(ii) Malignant	1	0.3
F. Mixed malignant epithelial tumours	1	0.3
G. Undifferentiated carcinoma	6	1.4
II. *SEX CORD STROMAL TUMOURS*	29	7.2
(i) Granulosa theca	24	5.9
(ii) Serotoli Leydig cell	4	1.0
(iii) Mixed stromal tumour	1	0.3
III. *GERM CELL TUMOURS*	85	21.1
(i) Dysgerminoma	6	1.5
(ii) Endodermal sinus tumour	5	1.2
(iii) Mixed germ cell tumour	1	0.3
(iv) Teratoma		
(a) Mature	70	17.3
(b) Immature	1	0.3
(c) Mature with malignant change	2	0.5
IV. *METASTATIC*	26	6.5
V. *LYMPHOMAS*	1	0.2

mucinous and the remainder serous. Mucinous cystadenocarcinomas were more frequent than serous cystadenocarcinomas, frequencies being 6.5% and 5.2% of the total ovarian tumours respectively. Bilateral tumours were found in 23.8% of serous and 23% of mucinous carcinomas (Table II). Seven mucinous tumours were of border-line malignancy.

Endometrioid carcinomas were diagnosed in 15 cases. Four were bilateral, and in another a mature teratoma coexisted in the opposite ovary (Table II). Mesonephroid carcinoma was the rarest of the surface epithelial tumours and only 1 case showed a pure, clear cell pattern (Table IV). However, a clear cell pattern along with endometrioid and serous carcinoma

was seen in one other case and this was labelled as a mixed epithelial carcinoma. Six malignant tumours had to be classified as primary undifferentiated tumours. No differentiating features were seen in any of these and special stains also were of no value.

Germ cell tumours formed the second largest group of ovarian tumours comprising 21.1% of the total. Of these 85 tumours, 70 were benign and 15 malignant (Table III). Mature teratoma was the commonest germ cell tumour. It was bilateral in 7 cases, while 10 cases had other tumours in the contralateral ovary (Table II). Malignant change in a mature teratoma was seen only in 2 cases. The malignant components identified in these were squamous cell carcinoma and adenocarcinoma respectively. There was 1 case of immature teratoma. It showed mainly glial and neuroepithelial differentiation. Six cases of dysgerminoma, and 5 of pure endodermal sinus tumours were also identified (Table IV). One case was labelled as a mixed germ cell tumour, as it had features of endodermal sinus tumour and dysgerminoma.

The third largest group of 29 cases was that of gonadal stromal tumours (Table III). Granulosa-theca cell tumours formed 82.7% and Sertoli-Leydig cell tumours 13.8% of the group. One case of mixed stromal tumour was also seen. It showed Leydig-Sertoli cells mixed with granulosa theca cell elements (Table III & IV). Metastatic adenocarcinoma formed 6.5% of all ovarian tumours (Table IV). Primary sites of these tumours were breast (7 cases), gastrointestinal tract (4 cases) and uterus (2 cases). 38.5% of the metastatic tumours were bilateral (Table II).

Discussion

The terminology of Serov *et al* (1973) and Scully (1977) was used in this study. Older nomenclatures like solid carcinoma (Patil *et al*, 1964, and Gault *et al*, 1954) or solid and cystic carcinomas (Agarwal *et al*, 1962) have been discarded.

Of 403 ovarian tumours, 270 (66.9%) were benign. As in other studies, the peak incidence of benign tumours was found in the 21-30 age group (Ramachandran *et al*, 1972). Serous and mucinous cystadenomas were the commonest benign tumours, and constituted 62.9% of benign and 42.1% of all ovarian tumours. Mature teratomas were the next common benign tumours (17.3% of total). Incidence of mucinous cystadenomas (18.6%) and mature teratomas (17.3%) correlate well with those of Ramachandran *et al* (1972) (18.27% and 17.49% respectively) and Tyagi *et al* (1978 a and b) (19.23% and 18.46% respectively). However, serous cystadenomas formed 23.5% of the total in our series, as compared to 16.6% in the study of Ramachandran *et al* (1972) and 31.54% reported by Tyagi *et al* (1978b). Mehta and Purandare's (1964) results on the other hand differed from those in the present study (41.6% for serous cystadenomas and 12.0% for mucinous cystadenomas). Incidence of mature teratomas also correlate well with those of Peterson *et al* (1951).

Ovarian cancers formed 0.9% of all malignant tumours in the study. This was similar to that reported by Jussawala and Gangadharan (1973) from three centres at Calcutta, Hyderabad and Kanpur. However, the Bombay, Madras and Ahmedabad centres reported a much higher incidence (3.2%, 2.4% and 2.1% respectively). Madan *et al* (1978) from Aligarh found that ovarian cancers formed 4.6% of all malignant growths, and 26.21% of all female genital tract cancers. These figures are also significantly higher than those observed in the present report.

Of the ovarian tumour, 33% were malignant. This compares well with the data of Jagadeswari *et al* (1971), Ramachandran *et al* (1972), Mehta and Purandare (1964) and Tyagi *et al* (1978 a and b). Their figures were 35.85%, 31.12%, 28.1% and 28.46% respectively. However, Patil *et al* (1964) and Agarwal and Saxena (1962) observed significantly lower values (24.17% and 22.9% respectively).

There was a preponderance of mucinous carcinomas over serous carcinomas in the ratio of 1.57:1 (borderline and malignant grouped together). Ramachandran *et al* (1972) found serous carcinomas three times more frequently, while Patil *et al* (1964) observed an equal ratio. Tyagi *et al* (1978b) reported more mucinous carcinomas. *Aure et al* (1971) analysed 990 ovarian carcinomas and found that serous carcinomas were 36.1% and mucinous carcinomas 20.5%.

Earlier workers (Ramachandran *et al*, 1972, Agarwal and Saxena, 1962, Patil *et al*, 1964; Mehta and Purandare, 1963; and Gault *et al*, 1954) did not observe any case of endometrioid carcinoma. In the present study this constituted 15.8% of all primary ovarian carcinomas. However, Aure *et al*, (1971) reported a higher incidence (21.5%) and Tyagi *et al* (1978b) a lower one (5.4%).

Malignant transformation in a mature teratoma is a rare occurrence. It was seen in 2.8% of all mature teratomas in this series (2 out of 72 cases). Peterson *et al* (1955) analysed 1007 cases of teratomas and found the incidence of malignant transformation to be 1.19%. Tyagi *et al* (1978a) documented this change in 4% (1 out of 25 cases), and Ramachandran *et al* (1972) in 3.12%.

Only 6 cases of dysgerminomas were seen in this series (Table IV). This figure is considerably lower than that reported by Ramachandran *et al* (1972). Their incidence was 3.99% of all ovarian neoplasms, and 12.0% of all ovarian malignancies.

In the present study, sex cord stromal tumours and metastatic carcinomas formed 7.2% and 6.5% of all ovarian tumours. These figures are quite similar to the ones reported by Madan *et al* (1978) (5.38% for each). Our incidence of metastatic tumours was higher than that reported by earlier authors. Patil *et al* (1964) reported 4.1%, Mehta *et al* (1964) 0.7% and Ramachandran *et al* (1972) 1.0%. Rare neoplasis like primary lymphomas and endodermal sinus tumour were also seen.

Summary

Four hundred and three ovarian tumours seen from 1968 to 1978 in the department of Pathology, AIIMS, New Delhi have been classified using the criteria of Serov *et al* (1973). 66.99% of the tumours were benign, while 33.01% were malignant. Surface epithelial tumours were the commonest (65% of total tumours). Serous cystadenoma, mucinous cystadenoma and mature teratomas were the common benign tumours while serous and mucinous cystadenocarcinomas were the common malignant tumours. The incidence of various tumours has been compared with that reported in other series from India.

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