IJPRP

Indian Journal of Pathology: Research and Practice

Volume 7 Number 5, May 2018
DOI: http://dx.doi.org/10.21088/ijprp.2278.148X.7518.2

Original Research Article

Histopathological Spectrum of Cystic Lesions of Ovary: Experience from a Tertiary Care Centre in Rural Uttar Pradesh

Sheetal G. Gole[1], Praneeta J. Singh[2]

[1]Professor & Head, Department of Pathology, Employee's State Insurance Corporation Medical College & Hospital, Faridabad, Haryana 121001, India. [2]Associate Professor, Department of Pathology, K.D. Medical College Hospital & Research Center, Mathura, Uttar Pradesh 281406, India.

Corresponding Author:

Praneeta J. Singh
Associate Professor,
Department of Pathology,
K.D. Medical College Hospital &
Research Center, Mathura,
Uttar Pradesh 281406, India.
Email:
pranita.singh123@gmail.com

(Received on 13.04.2018,
Accepted on 23.04.2018)

Abstract

Introduction: Ovarian cystic lesions are commonly encountered surgical specimens presenting as mass lesion. It is difficult to categorize them as non-neoplastic or neoplastic based only on clinical, radiological or surgical findings. Histopathology aids in diagnosing and categorizing lesions for proper treatment.

Materials and Methods: Fifty-one ovarian cystic mass specimens were received in the Department of Pathology at a tertiary care centre in rural Uttar Pradesh during the period of 1 year. Specimens comprised either hysterectomy specimen with unilateral or bilateral adnexa, or oophorectomy and/or cystectomy. Detail clinical history, physical examination and radiological findings along with provisional diagnosis were obtained. Specimens were fixed in 10% neutral buffered formalin. Detail gross examination performed, and sections were stained with Hematoxylin and Eosin.

Results: Fifty-one ovarian non-neoplastic and neoplastic (benign and malignant) cystic lesions were studied during the period under review. The youngest patient was 15 years old and the oldest 72 years old. The age group 31-40 years showed peak incidence of 17 (33.33%) cases. Considering laterality of ovarian cystic neoplastic lesions, 10 (90.90%) were unilateral and 1 (9.09%) was bilateral. Non-neoplastic ovarian cystic lesions were 40 (78.43%) and the neoplastic ovarian cystic lesions were 11 (21.56%).

Conclusion: It is difficult to categorize ovarian cystic lesions non-neoplastic or neoplastic based on clinical, radiological or surgical findings alone. Histopathological examination of these lesions is of prime importance to diagnose and categorize them for proper treatment. In benign functional cysts spontaneous resolution may occur, hence symptomatic treatment and observation helps to minimize surgery.

Keywords: Ovarian Cyst; Serous Cystadenoma; Mucinous Cystadenoma; Endometriosis; Mature Cystic Teratoma; Struma Ovarii; Papillary Thyroid Carcinoma.

Introduction

Ovary is an important organ concerned with progeny production. Ovaries are a common site for non-neoplastic and neoplastic lesions. Ovarian cystic lesions behave in diverse ways and generally escape detection until they attain a massive size or cause signs and symptoms. They show diverse morphological spectrum and can be categorized into functional or benign cysts, and benign, borderline malignant tumours. Ovarian cyst can be physiological or pathological. Physiological cysts are mainly follicular cysts and luteal cysts which are benign in nature. Pathological cysts are mainly ovarian tumours

which can be benign, borderline or malignant. Some non-neoplastic lesions of the ovary usually present as a pelvic mass and mimic an ovarian neoplasm can be categorized into follicular cysts/simple cysts, corpus luteal cysts, endometriotic cysts and hemorrhagic cysts. Their proper recognition and classification is important to allow appropriate therapy.

Ovary consists of totipotent sex cells and multipotent mesenchymal cells. So, when it becomes neoplastic, almost any type of tumour can thus result [1].

Most patients with ovarian cysts are asymptomatic, with the cysts being discovered incidentally during ultrasound or routine pelvic examination. Some cysts may be associated with a range of symptoms, sometimes severe, although malignant ovarian cysts commonly do not cause symptoms until they reach an advanced stage. Pain or discomfort may occur in the lower abdomen. Cyst rupture can lead to peritoneal signs, abdominal distension, and bleeding that is usually self-limited [2]. Polycystic Ovary Syndrome is one of the most common endocrinopathy affecting women. The estimated prevalence in women of reproductive age is 5-10% [3].

Tumours of the ovary are a common neoplasm in women. Among cancers of the female genital tract ovary is the third most common site of primary malignancy in Indian females. About 80% are benign and occur in women of 20-45 years and malignant tumours are more common in 40-65 years. Ovarian cancer is the seventh leading cause of cancer death (age standardized mortality rate: 4/100,000) among women worldwide. In India it comprises up to 8.7% of cancers in various parts of the country [4,5]. Histopathological presentation of ovarian tumours is variable which lead to its detection in advanced stage where neither effective surgery nor chemotherapy can be done. Ovarian neoplasms are usually detected at a late stage and are large in size, because of their presentation with mild symptoms [6,7]. Incidence of invasive epithelial ovarian cancer peaks at 50-60 years of age. In postmenopausal women about 30% of ovarian neoplasms are malignant, whereas in the premenopausal patient only about 7% of ovarian epithelial tumours are frankly malignant [8]. Prognostically ovarian tumours in women under 40 years of age have greater chance of recovery than older patient [9].

Subdivision of ovarian tumours can be done based on tissue of origin into surface epithelial tumours, sex cord stromal tumours, germ cell tumours, metastatic tumours and tumours from ovarian soft tissue or non-neoplastic process. Distinguishing non-neoplastic lesion from a neoplastic lesion is a challenge clinically and is necessary since proper treatment depends upon the histological abnormality. An accurate and early diagnosis of malignant lesions would be an aid in optimal management of these cases. Ovarian cysts are one of the commonest gynaecological problems in our set up. Hence this study was conducted to determine the histopathological spectrum of cystic lesions in our hospital.

Materials and Methods

A total of 51 ovarian non-neoplastic and neoplastic (benign and malignant) cystic lesion specimens were received and processed in the Department of Pathology at a tertiary care centre in rural Uttar Pradesh during the period of 1 year. Specimens comprised either hysterectomy with unilateral or bilateral adnexa, or oophorectomy alone and/or cystectomy specimens. Detail clinical history regarding the age, clinical features, physical examination and radiological findings along with provisional diagnosis were obtained. Specimens were fixed in 10% neutral buffered formalin. Detail gross examination of specimens for size, external surface, consistency, papillary excrescences, and the contents of cysts was done and then after the routine histopathological processing the sections were stained with Hematoxylin and Eosin (H&E) stain.

Results

A total of 51 ovarian non-neoplastic and neoplastic (benign and malignant) cystic lesion specimens were received and processed during the period under review. The youngest patient was 15 years old while the oldest patient was 72 years old. The age group 31-40 years showed peak incidence of 17 (33.33%) cases. Considering the laterality of ovarian cystic neoplastic lesions in the present study, 10 (90.90%) were unilateral and 1 (9.09%) was bilateral. The various non-neoplastic ovarian cystic lesions were 40 (78.43%) and the neoplastic ovarian cystic lesions were 11 (21.56%). (Table 1) Amongst the 40 (78.43%) non-neoplastic lesions were follicular cysts 19 (47.5%), corpus luteal cyst 12 (30%), inclusion cysts 4 (10%), endometriotic cyst 1 (2.5%), edema of ovary 1 (2.5%), tuboovarian abscess 1 (2.5%), ectopic pregnancy 1 (2.5%), twisted cyst 1 (2.5%). (Table 2) Amongst the 11 (21.56%) neoplastic lesions (benign and malignant) were serous cystadenoma 4 (36.36), mucinous cystadenoma 2 (18.18%), serous cystadenofibroma 1 (9.09%), mature cystic teratoma 1 (9.09%), mature cystic teratoma with papillary thyroid carcinoma in struma ovarii 1 (9.09%), serous cystadenocarcinoma 1 (9.09%), mucinous cystadenocarcinoma 1 (9.09%) (Table 3).

Discussion

Ovarian masses consist of functional and pathological lesions [6]. Given the location of these paired organs and the mildness of symptoms associated with lesions arising in them, these lesions usually attain a fairly large size before they are detected and removed. Neoplastic disorders can

arise from (1) mullerian epithelium, (2) germ cells or (3) sex cord stromal cells. Precise diagnosis of lesions of the ovary is a sine qua non-for optimal management of such lesions.

Majority of our patients were in the age group 31-40 years (17 patients, 33.33%). The second largest group of patients were in the age group 21-30 years (13 patients, 25.49%) and closely followed by the age group 41-50 years (12 patients, 23.52%) (Table 1).

This is in concordance with the studies of Ramachandran G et al. [10] (20-39 years -53.0%; 40-59 years -30%), Pilli GS et al. [11] (20-39 years -58.0%; 40-59 years-30%), and Prakash A et al. [12] (20-39 years - 53.4%; 40-59 years -30%). Kar T et al. [13] reported 46.25% of patients in the age group 40-59 years.

Considering the laterality of ovarian cystic neoplastic lesions in the present study, 10 (90.90%) were unilateral and 1 (9.09%) was bilateral. Our findings are in concordance with various other studies (Table 4).

Table 1: Age Incidence of various ovarian non-neoplastic and neoplastic (benign and malignant) cystic lesions

Age (Years)	Non-neoplastic lesions (%)	Neoplastic lesions (%) (Benign)	Neoplastic lesions (%) (Malignant)	Total Neoplastic Lesions (%)	Total Lesions (%)
10-20	2 (5)	-	-	-	2 (3.92)
21-30	12 (30)	-	1 (33.33)	1 (9.09)	13 (25.49)
31-40	15 (37.5)	1 (12.5)	1 (33.33)	2 (18.18)	17 (33.33)
41-50	7 (17.5)	5 (62.5)	-	5 (45.45)	12 (23.52)
51-60	3 (7.5)	-	1 (33.33)	1 (9.09)	4 (7.84)
61-70	1 (2.5)	1 (12.5)	-	1 (9.09)	2 (3.92)
71-80	-	1 (12.5)	-	1 (9.09)	1 (1.96)
Total	40 (78.43)	8 (72.72)	3 (27.27)	11 (21.56)	51

Table 2: Histomorphological spectrum and frequency of various non-neoplastic ovarian cystic lesions

Non-neoplastic lesions	Number of cases n (%)
Follicular cysts	19 (47.5)
Corpus luteal cyst	12 (30)
Inclusion cysts	4 (10)
Endometriotic cyst	1 (2.5)
Edema of ovary	1 (2.5)
Tuboovarian abscess	1 (2.5)
Ectopic pregnancy	1 (2.5)
Twisted cyst	1 (2.5)
Total	40

Table 3: Histomorphological spectrum and frequency of various neoplastic (Benign and Malignant) ovarian cystic lesions

Neoplastic lesions (Benign/Malignant)	Number of cases (%)
Serous cystadenoma	4 (36.36)
Mucinous cystadenoma	2 (18.18)
Serous cystadenofibroma	1 (9.09)
Mature cystic teratoma	1 (9.09)
Mature cystic teratoma with papillary thyroid carcinoma in struma ovarii	1 (9.09)
Serous cystadenocarcinoma	1 (9.09)
Mucinous cystadenocarcinoma	1 (9.09)
Total	**11**

Table 4: Laterality of ovarian neoplastic lesions in various studies in comparison with present study

Authors	Laterality	
	Unilateral	Bilateral
Prakash A *et al.*[12]	90.8%	9.2%
Kar T *et al.*[13]	73.13%	26.87%
Kanthikar SN *et al.*[22]	78.18%	21.82%
Couto F *et al.*[24]	91.25%	8.75%
Thakkar NN *et al.*[30]	88.40%	11.60%
Prabhakar BR *et al.*[37]	90.90%	9.10%
Misra RK *et al.*[38]	95.50%	4.50%
Present study	90.90%	9.09%

In present study, 40 (78.43%) lesions were non-neoplastic. Amongst the neoplastic lesion 11 (21.56%), 8 (72.72%) were benign and 3 (27.27%) were malignant. In study done by Prakash A et al. [12] 101 (44.1%) lesions were non-neoplastic, 124 (54.14%) benign and 4 (1.74%) malignant neoplasms. Study by Zaman S et al.[14] had 68.87% non-neoplastic lesions and 31.13% neoplastic lesions. Sawant A and Mahajan S [15] study showed 110 (76.92%) non-neoplastic lesions and 33 (23.07%) neoplastic lesions. Kreuzer GF et al.[16] reported 82 (40.39%) non-neoplastic lesions and 121 (59.60%) neoplastic lesions. Martinez-Onsurbe P et al. [17] reported 55 (41.66%) non-neoplastic lesions and 77 (58.33%) neoplastic lesions. Gurung P et al. [18] study there were 135 cases of cystic lesions of which 59 (43.7%) were non-neoplastic cysts and 56.29% of neoplastic lesions. Amongst the neoplastic lesions, 69 (51.1%) were benign tumors, 5 (3.7%) were malignant tumors and 2 (1.5%) were borderline tumors. Pudasaini S et al.[19] study showed 87.3% benign cyst and tumors and 12.7% malignant tumors.

In the present study follicular cysts 19 (47.5%) were the most common non-neoplastic lesion closely followed by the corpus luteal cysts 12 (30%). Present study had 4 (10%) inclusion cysts and 2.5% of endometriotic cysts. Endometriosis is common condition found in women of reproductive age. The most common location of endometriosis is the ovary and posterior cul-de- sac. Prakash A et al. [12] showed almost similar findings with 45.5% follicular cysts being the most common non-neoplastic lesion followed by 25% corpus luteum cysts. Sawant A and Mahajan [15] study reported 77(70%) follicular cysts and 14 (12.72%) corpus luteal cysts. Kreuzer GF et al.[16] and Martinez-Onsurbe P et al.[17] studies had almost similar results of 55% follicular cysts and 45% corpus luteal cysts. Gupta N et al.[20] reported 80.2% follicular and corpus luteal cyst and 2.9% endometriotic cysts. Gurung P et al. [18] study showed 59 cases of benign cysts (43.7%), of these 13 (9.6%) corpus luteum cyst, 23 (17%) of endometriotic cysts, and 6 (4.4%) of hemorrhagic cyst. Pudasaini S et al.[19] found 13.7% of haemorrhagic corpus luteal cysts and 5.9% of endometriotic cysts. Haemorrhagic corpus luteal cyst is an ovarian cyst formed by bleeding into a corpus luteum cyst. Maliheh A et al. [21] found 57.1% of functional cysts and 5.9% of endometriotic cysts in their study. Kanthikar SN et al. [22] study reported 73 cystic lesions, out of these follicular cysts 56 (76.71%), corpus luteum cysts 15 (20.54%), 2 inclusion cysts, and 2 (2.67%) endometriotic cysts. Al Fozen H and Tulandi T [23] in a study conducted for 6 years reported 340 lesions out of which 155 (45.59%) were ovarian endometriosis.

Ovarian tumour may occur at any age, including infancy and childhood. Incidence rate, however increase with age, with the greatest number of new cases being diagnosed beyond 4th and 5th decade. In our study, the youngest patient was 15 years and the oldest 72 years old. This was in concordance with Kanthikar SN et al.[22] and Couto F et al.[24] In Pudasaini S et al.[19] study, the range of age was 6 to 70 years. Leake JF et al.[25] study had patients with ovarian tumors ranged from 6 to 98 years. Study done by Bhattacharya et al. [7] the age ranged from 10 to 73 years. Pudasaini S et al. [19] study showed the peak incidence of ovarian tumors in the age group 21 to 30 years with maximum 53.8% cases of malignancy seen in patients over 40 years. Kayastha S [26] study showed the peak incidence of ovarian tumors in the age group 21 to 40 years with maximum 66.7% cases of malignancy seen in patients over 40 years. In our study, out of 11 neoplastic lesions maximum 5 (45.45%) cases were in the age group of 41-50 years.

In the present study out of 11 neoplastic lesions benign tumors were 8 (72.72%) and 3 (27.27%) malignant tumors. Pudasaini S et al. [19] study had incidence of 87.3% benign tumor and 12.7% malignant tumor. Similar finding was seen in study done by Jha R et al. [27] where 83.9% of ovarian tumors were benign and 16.1% of ovarian tumors were malignant. However, in a study done by Ahmad Z et al. [28] the incidence of benign tumors was 59.2% and malignancy was 40.8%.

Benign neoplastic lesions constituted 8 (72.72%) out of 11 neoplastic lesions in present study. (Figure 1 A, B, C, D) This is in concordance with Pachori G et al. [29] 72.3%, Couto F et al. [24] 80.76%; Pilli GS et al. [11] 76%; Thakkar NN and Shah SN [30] 84.5%. Prakash A et al.[12] study revealed 96.8% benign neoplastic lesions. Kanthikar SN et al.[22] study reported 70 neoplastic lesions, of these most common was benign followed by, borderline malignancy and malignant tumour. In the present study we had 1 (9.09%) case of serous cystadenofibroma (Figure 1 A, B).

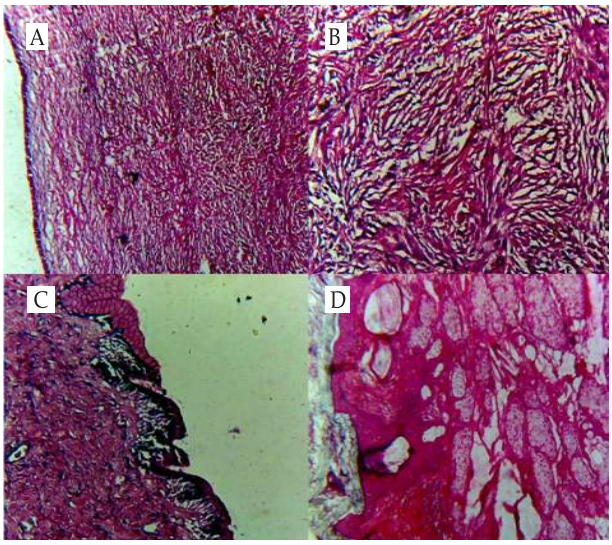

Fig. 1 A: Ovarian serous cystadenofibroma (H&E,10X), **B:** Ovarian serous cystadenofibroma (H&E,40X), **C:** Ovarian mucinous cystadenoma (H&E,10X) **D:** Ovarian dermoid cyst (H&E,10X)

Serous cystadenomas were the most common benign neoplasm encountered in our study 4 (36.36%) followed by mucinous cystadenomas 2 (18.18%). (Figure 1C) One (9.09%) case of mature cystic teratoma was also observed. (Figure 1D) Prakash A et al.[12] study reported serous cystadenomas as 64.5% and 24.2% mucinous cystadenomas. Pudasaini S et al. [19] study had 40.2% serous cyst adenoma as the commonest tumor followed by 9.8% mucinous cyst adenoma. The second most common tumor in their study was germ cell tumor (19.5%). Yogambal M et al.[31] reported 21.4% serous cystadenoma and 19.9% mature cystic teratoma. In the study done by Mondal SK et al.[5] the commonest benign tumor was serous cystadenoma (29.9%), followed by mature teratoma (15.9%) and mucinous cystadenoma (11.1%). In the study by Iqbal J et al.[32] serous cystadenoma (38.5%) was the most common benign tumor followed by mature cystic teratoma (30.8%). In the study done by Yasmin S et al.[33] the commonest benign tumor was also serous cystadenoma (24%) followed by mature cystic teratoma (18%). Gurung P et al.[18] study had 69 (51.1%) of benign tumors of these 29 (42%) were benign epithelial tumors and 40 (58%) were benign germ cell tumors (mature cystic teratoma). Their study included serous cystadenoma (32%), mucinous adenoma (9%) and serous adenofibroma (1%). In the study done by Maliheh A et al. [21] the most common benign tumor was serous cystadenoma (38%) followed by mature cystic teratoma (30%), mucinous cystadenoma (22%), adenofibroma (5%) and fibroma-thecoma (5%).

The present study revealed one case of mature cystic teratoma with papillary thyroid carcinoma in the struma ovarii in a 21-year-old female. (Figure 2A, B, C, D) Struma ovarii is a rare and highly specialized form of mature teratoma constituting 5% of all teratomas. A preoperative diagnosis of struma ovarii can be suspected in cases with hyperthyroidism, but this is seen in only 5-8% cases. In our case, as there was no suspicion of struma ovarii prior to surgery, the thyroid function tests done post operatively showed normal levels.

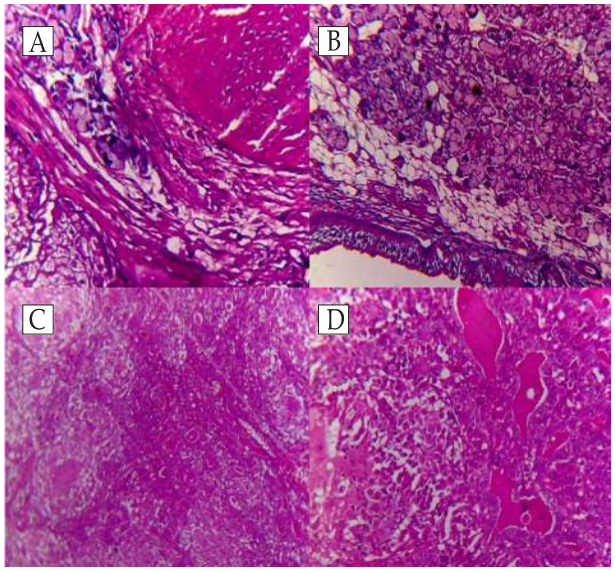

Fig. 2: Mature cystic teratoma with papillary thyroid carcinoma in struma ovarii **A:** Mature cartilage and glands (H&E,10X), **B:** Transitional epithelium and endocrine glands (H&E,10X) **C:** Papillary thyroid carcinoma in Struma ovarii (H&E,10X) **D:** Struma ovarii (H&E,40X)

Thyroid scan was normal, and patient was advised to undergo prophylactic thyroidectomy with hormone replacement therapy and close follow-up. Struma ovarii is diagnosed when thyroid tissue is the predominantly (over >50%) or entirely of thyroid tissue. About 5-10% of struma ovarii are malignant with papillary carcinoma and follicular carcinoma being the most common. The percentage of papillary thyroid carcinoma within malignant struma ovarii is 70%, 44% of the tumors being classical type and 26% follicular variant of papillary thyroid carcinoma [34,35,36].

Pudasaini S et al. [19] observed serous cyst adenocarcinoma as the commonest malignancy (4%) and was seen in patient older than 40 years. In Gurung P et al. [18] study there were 5 (4.5%) cases of malignant tumor, all 5 cases were epithelial tumours. Malignant tumor observed in the study was serous cystadenocarcinoma. In our study we had 1 (9.09%) case of serous cystadeno-carcinoma seen in 40-year-old female (Figure 3A, B).

One case (9.09%) of mucinous cystadenocarcinoma was seen in 60-year-old female. (Figure 3 C, D) We had only 3 cases of malignant lesions in our study. Given the small number of cases, no conclusions could be drawn from studying their frequency or distribution. We have not been able to elicit any reason for the low incidence of malignant neoplasms in our study.

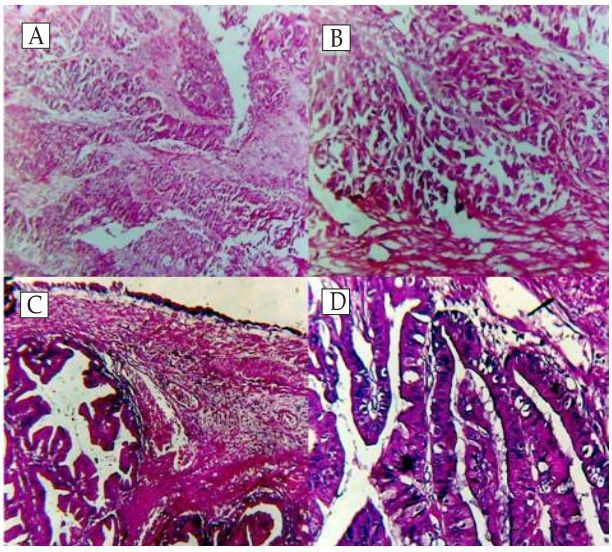

Fig. 3 A: Serous cystadenocarcinoma (H&E,10X), **B:** Serous cystadenocarcinoma (H&E,40X) **C:** Mucinous cystadenocarcinoma (H&E, 40X), **D:** Mucinous cystadenocarcinoma (H&E,100X)

Conclusion

It is difficult to categorize ovarian cystic lesions non-neoplastic or neoplastic based on clinical, radiological or surgical findings alone. Even though the tumour can be diagnosed clinically, origin and nature of tumour cannot be clinically determined. Hence histopathological examination of the ovarian cystic lesions is of prime importance to diagnose and categorize them for proper treatment. Clinical and radiological evaluation along with histopathological examination is important in management of the ovarian tumours. In cases of benign functional cysts spontaneous resolution may take place, symptomatic treatment and observation may help minimize surgery in these patients.

However, the observations and results of this study proved to be valuable base line information regarding frequency and pattern of ovarian tumours in our rural setting.

References

1. Sikdar K, Kumar P, Roychowdhary NN. A study of ovarian malignancy: A review of 149 cases. J Obstet Gynaecol India 1981;30:478–80.
2. Bottomley C, Bourne T. Diagnosis and management of ovarian cyst accidents. Best Pract Res Ckin Obstet Gyaecol 2009;23(5):711–24.
3. Ramanand SJ, Ghongane BB, Ramanand JB, Patwardhan MH, Ghanghas RR, Jain SS. Clinical characteristics of polycystic ovary syndrome in Indian women. Indian J Endocrinol Metab 2013;7(1):138–45.
4. Basu P, De P, Mandal S, Ray K, Biswas J. Study of 'patterns of care' of ovarian cancer patients in a specialized cancer institute in Kolkatta, eastern India. Indian J Cancer 2009; 46(1):28–33.
5. Mondal SK, Banyopadhyay R, Nag DR, Roychowdhury S, Mondal PK, Sinha SK. Histologic pattern, bilaterality and clinical evaluation of 957 ovarian neoplasms: A 10-year study in a tertiary hospital of eastern India. J Can Res Ther 2011;7:433–7.
6. Modi D, Rathod GB, Delwadia KN, Goswami HM. Histopathological pattern of neoplastic ovarian lesions. IAIM 2016;3(1):51-7.
7. Bhattarcharya MM, Shinde SD, Purandare VN. A clinicopathological analysis of 270 ovarian tumors. J Postgrad Med 1980;26:103-7.
8. Berek JS, Natarajan S. Ovarian and fallopian tube cancer. In: Berek JS, editor. Berek and Novak's Gynecology. 14th ed. New Delhi: Wolters Kluwer Health (India) private Limited; 2007.pp.1457–47.
9. Scully RE. Ovarian tumours: A review. Am J Pathol 1977; 87(3):686–719.
10. Ramachandran G, Harilal KR, Chinnamma K, Thangavelu H. Ovarian neoplasms -A study of 903 cases. J Obstet Gynecol India 1972;22:309-15.
11. Pilli GS, Sunitha KP, Dhaded AV, Yenni VV. Ovarian tumors - a study of 282 cases. J Indian Med Associ 2002;100(7): 420-4.
12. Prakash A, Chinthakindi S, Duraiswami R, Indira V. Histopathological study of ovarian lesions in a tertiary care center in Hyderabad, India: a retrospective five-year study. Int J Adv Med 2017;4:745-9.
13. Kar T, Kar A, Mohapatra PC. Intra-operative cytology of ovarian tumors. J Obstet Gynecol India 2005;55(4):345-9.
14. Zaman S, Majid S, Hussain M, Chugtai O, Mahboob J, Chugtai S. A retrospective study of Ovarian tumors and tumor-like lesions. J Ayub Med Coll Abbottabad 2010; 22(1):104-8.
15. Sawant A, Mahajan S. Histopathological Study of Ovarian Lesions at a Tertiary Health Care Institute. MVP Journal of Medical Sciences 2017;4(1):26–9.
16. Kreuzer GF, Parodowski T, Wurche KD, Flenker H. Neoplastic or Nonneoplastic ovarian cyst The Role of Cytology. Acta Cytol 1995;39:882–6.
17. Martinez-Onsurbe P, Villaespesa AP, Anquela JMS. Aspiration cytology of 147 adnexal cysts with histologic correlation. Acta Cytol 2001;45:941–7.
18. Gurung P, Hirachand S, Pradhanang S. Histopathological study of ovarian cystic lesions. Journal of Institute of Medicine 2013;35(3):44-7.
19. Pudasaini S, Lakhey M, Hirachand S, Akhter J, Thapa B. A study of ovarian cyst in a tertiary hospital of Kathmandu valley. Nepal Med Coll J 2011;13(1):39-41.
20. Gupta N, Bisht D, Agarwal AK, Sharma VK. Retrospective and prospective study of ovarian tumours and tumour-like lesions. Indian J Pathol Microbiol 2007;50(3):525–7.
21. Maliheh A, Yasmin S. Surgical histopathology of benign ovarian cysts: a multicentric study. Iranian J Pathology 2010;5(3):132-6.
22. Kanthikar SN, Dravid NV, Deore PN, Nikumbh DB, Suryawanshi KH. Clinico-Histopathological Analysis of Neoplastic and Non-Neoplastic Lesions of the Ovary: A 3-Year Prospective Study in Dhule, North Maharashtra, India. Journal of Clinical and Diagnostic Research 2014;8(8): FC04-FC074.
23. Al-Fozan H, Tulandi T. Left lateral predisposition of endometriosis and endometrioma. Obstet Gynecol 2003;101:164-6.
24. Couto F, Nadkarni NS, Rebello MJ. Ovarian tumors in Goa. A clinicopathological study. J Obstet Gynecol of India 1993;43(3):408-12.
25. Leake JF, Currie JL, Rosenshein NB, Woodruff JD. Long term follow up of serous ovarian tumors of low malignant potential. Gynecol Oncol 1992;47:150-8.
26. Kayastha S. Study of ovarian tumors in Nepal Medical College Teaching Hospital. Nepal Med Coll J 2009; 11:200-2.

27. Jha R, Karki S. Histological pattern of ovarian tumours and their age distribution. Nepal Med Coll J 2008;10:81-5.
28. Ahmad Z, Kayani N, Hasan SH, Muzaffar S, Gill MS. Histological pattern of ovarian neoplasm. Pak Med Assoc 2000;50: 416-9.
29. Pachori G, Meena US, Sunaria RK, Pachori P, Jethani N, Bayla T. Histopathological study of ovarian tumors in Ajmer region. Int J Med Sci Public Health 2016;5:1400-3.
30. Thakkar NN, Shah SN. Histopathological study of ovarian lesions. Int J Sci Research 2015;4(10):1745-9.
31. Yogambal M, Arunalatha P, Chandramouleeswari K, Palaniappan V. Ovarian tumors - Incidence and distribution in a tertiary referral center in South India. IOSR J Dent Med Sci 2014;13(2):1400-3.
32. Iqbal J, Aurangzaib, Naseem A, Shahid A. Pattern of Ovarian Pathologies. Journal of Rawalpindi Medical College 2013; 17(1):113-5.
33. Yasmin S, Yasmin A, Asif M. Clinicohistological Pattern of Ovarian Tumors in Peshawar Region. J Ayub Med Coll Abbottabad 2008;20(4):11-3.
34. Devaney K, Snyder R, H.J. Norris, Tavassoli FA. Proliferative and histologically malignant struma ovarii: a clinico-pathological study of 54 cases. International Journal of Gynecological Pathology. 1993 Oct;12(4):333-43.
35. Salman WD, Singh M, Twaij Z. A case of Papillary Thyroid Carcinoma in Struma Ovarii and Review of the Literature. Pathology Research International 2010;2010:352476.
36. Jean S, Tanyi JL, Montone K, Mcgrath C, Martinez Lage-Alvarez M, Chu CS. Papillary thyroid cancer arising in struma ovarii. Journal of Obstetrics and Gynaecology 2012; 32(3):222-6.
37. Prabhakar BR, Kalyani M. Ovarian tumors prevalence in Punjab. Indian J Pathol Mirobiol 1989;32(4):276-81.
38. Misra RK, Sharma SP, Gupta U, Gaur R, Misra SD. Pattern of ovarian neoplasms in eastern UP. J Obstet Gynecol 1990;41(2):242-6.