Ovarian Cancer Detection: Cause, Symptoms and Techniques

Anjali Sharma
M.Tech Scholar, Department of ECE
SSCET, Badhani, Punjab, India
[1]engineeranjalisharma@gmail.com

Satnam Singh
AP, Department of ECE
SSCET, Badhani, Punjab, India

Sanjeev Kumar
AP, Department of ECE
KCET, Amritsar, Punjab, India

Abstract

Ovarian tumour is the most common and fifth most common cause of death in women. Since the 1960s, almost 80% of women with ovarian tumours are diagnosed when the disease has spread to the upper abdomen (stage III) or beyond (stage IV). Unfortunately, the 5-year survival rate for those women is approximately 15%, whereas the 5-year survival when detected at early stage (I) approaches 90%. Therefore, the diagnosis of early stage ovarian tumour would significantly decrease the morbidity and mortality rate from this disease. In spite of the increased awareness of ovarian cancer symptoms, the predictive value of symptoms remains very low. The aim of this paper is to review selectively recent progress in the pathology of ovarian tumors, with particular emphasis on those aspects that relate to the management of the patient.

Keywords— *ovarian cancer; CA125; CLFNN; DNA*

I.   Introduction

Ovarian cancer is accepted as a "silent killer" probably because it is believed that majority of patients is diagnosed in late stage, and that in early stage disease no symptoms are evident. However, over the last decade there has been a lot of research in the symptom-based detection of ovarian cancer [1–5]. In order to find the cure it is necessary to quickly diagnose the disease accurately and treat it based on the kind of symptoms appeared.

Ovarian tumour has several classifications, which may help to determine the best treatment. The diagnosis of complex genetic diseases like tumour has conventionally been done based on the non-molecular characteristics like kind of tumour tissue, pathological characteristics and clinical phase. Ovarian tumour precedents to almost 27% of all mortalities, making it the leading cause of death in America and also around the world. Timely and exact detection of tumour is life-threatening to the comfort of patients. Examinations of gene expression data precedents to cancer recognition and categorization, which will make ease appropriate treatment selection and drug development. Recognition of the signals that are symptoms for the disease phenotype and its progression requires the use of hardy techniques.

The advancements in technology and modern diagnostic systems made possible the thorough investigation of ovary but there are still unsolved problems. Ovarian tumour has an unknown natural evolution, starting often insidiously, without specific symptoms; the diagnosis is put during a routine exam [6-7]. Although it was tried to associate precursor lesions to the disease, the results were not conclusive, cellular changes can be incriminated also in other non-tumour pathologies. We motivate towards this topic due to the alarming increase in the number of cases in the last 20 years and becoming the main cause of death from malignancy in gynaecology.   Application of new technologies for detection of ovarian tumour could have an important effect on public health, but to achieve this goal, specific and sensitive molecular markers are essential[8–10].

II.   Main Causes

An overview of statistical data shows that the number of deaths of women born in the mid-century was growing compared with those born at the beginning of the century. This variation is probably due to the improvement in diagnosis methods but also highlights a change of lifestyle.

- Ovarian cancer may cause due to gene mutations in the genes BRC1 and BRC2.

- It may occur due to damage to DNA (deoxyribonucleic acid).
- Accumulation of fluid in the ovary may form cysts which may become cancer.
- Any tumor like epithelial germ cell or stromal may leads to cancer formation.
- Cancer may occur due to heredity problem.
- Talcum powder applied directly to genital area or sanitary napkins may be carcinogenic (cancer causing).
- Malnutrition (non-intake of healthy food) can cause cancer.
- Analgesics like aspirin and acetaminophen may cause cancer.
- Alcohol and smoking may cause cancer.
- Excessive bleeding during menstrual cycle or postmenopausal bleeding may results cancer.

It is predicted that above points are the cancer causing reasons but in actual there is no evidence to prove this.

III.   Sign & Symptoms

The main symptoms of ovarian cancer are:

- Bloating.
- Pelvic or abdominal pain.
- Trouble eating or feeling full quickly.
- Urinary symptoms such as urgency (always feeling like to go) or frequency Fatigue.
- Upset stomach
- Back pain
- Pain during sex
- Constipation
- Menstrual changes
- Abdominal swelling with weight loss.

Table I: Expected Frequency of Symptomsin Ovarian Cancer Patients (91 Responses).

FREQUENCY OF SYMPTOMS	NO (%)
Never	10(11%)
2-3 times a month	33(36.3%)
4-12 times a month	30(33%)
12-30 times a month	18(19.8%)
Total	91

IV. Related Works

Ovarian Tumour is the most vicious disease, the cure of which must be the prime target through scientific investigation. The early detection of tumour/cancer can be useful in curing the disease effectively. There are several methods found in literature for the recognition of tumour. Many researchers have contributed their views in the detection of ovarian tumour/cancer.

Tuan Zea Tan and others [11], demonstrates that the confluence of CLFNN-DNA micro-array, CLFNN-blood tests, and CLFNN-proteomic test improves the diagnosis accuracy with higher consistency. CLFNN exhibits good performance in ovarian cancer diagnosis in general. Thus, CLFNN is a promising tool for clinical decision support.

Hong Tang and others [12], discovered that some cancers affect the concentration of certain molecules in the blood, which allows early diagnosis by analysing the blood mass spectrum. They have continued this work and applied data mining to the diagnosis of ovarian cancer. They have identified the most informative points of the mass-spectrum curve, and then used decision trees, support vector machines, and neural networks to determine the differences between the curves of cancer patients and healthy people.

Zainuddin and others, [13] given an enhanced wavelet neural network for early analysis of cancer patients using clustering algorithms. Translation parameter is caused based on the a variety of clustering algorithms, that is, K-means (KM), Fuzzy C-means (FCM), symmetry-based K-means (SBKM), symmetry-based Fuzzy C-means (SBFCM) and modified point symmetry-based K-means (MPKM) clustering algorithms.

Y.Ireaneus Anna Rejani and others [14] projected a tumour discovery modus operandi as of mammogram. Their tactic spotlight on the result of two tribulations i.e. Detection of

tumours as suspicious regions with a very weak contrast to their background and extracting features, which categorize tumours.

Wang [15] demonstrates that DNA micro array can pursue the expressions of many genes simultaneously. Micro-array data habitually a surround a petite number of samples, it includes a hefty number of gene expression levels as a feature.

F. Chu and L. Wang [16] used support vector machine for cancer classification with the microarray gene expression data. The selection of genes has been completed by the use of four effective feature dimensionality reduction methods, for instance, principal components analysis (PCA), class-separability measure, Fisher ratio, and T-test.

Huilin Xiong and Xue-Wen Chen [17] says the new approach called kernel function, which improves the performance of the classifier in genetic data. The efficiency of a kernel approach has been probed in which it is depends upon on optimizing a data-dependent kernel model.

L. Shen and E.C. Tan [18] presented the penalized logistic regression for classification of cancer. The penalized logistic regression united with two-dimension reduction methods in order that the classification accuracy and computational speed were improved.

Feng Chu and Lipo Wang [19] proposed a novel radial basis function (RBF) neural network for cancer classification using expression of very few genes. This technique was applied to the three data sets were used such as the lymphoma data set, the small round blue cell tumours (SRBCT) data set, and the ovarian cancer data set.

Zhang, Huang [20] presented a method hail as the Extreme Learning Machine (ELM) algorithm for multicategory cancer classification in cancer diagnosis with micro array data. From the result of performance comparison the ELM algorithm achieves better classification accuracy comparable to that of the other algorithms as well as the its training time is less and network structure is also very small.

Rui Xu, Anagnostopoulos and others [21] demonstrated a classifier called Semi supervised Ellipsoid ARTMAP (SsEAM) for multi class cancer favouritism.

Lipo Wang, Feng Chu [22] proposed the approach for cancer classification using an expression of very genes. The result of all data set specifies that finding gene minimum gene

selections for cancer classification provides very good classification accuracy as well as T-score and CS is the best approach for important gene selection.

V. Tumour classification

As we know that the unit of our body is cell. Cell divides to form new cells, the phenomenon is known as mitotic division. In mitotic division process, cell multiplication takes place. If this mitotic division occurs in an uncontrolled and abnormal manner then tumour takes place which may or may not becomes cancer. Cancer is now a dreadful disease these days. Cancer may be defined as a malignant growth or enlargement of a tissue which results due to unlimited and uncontrolled mitotic division. Tumour may develop anywhere on or in the body. However, all tumours are not cancerous. There are two types of tumours; benign or non malignant and cancerous or malignant.

Benign tumour

- It grows slowly throughout.
- It remains confined to the site of its origin.
- It remains intact. It is non cancerous.

Malignant tumour

- It grows first slowly then rapidly.
- It extends into neighboring tissues.
- Its bits break off, move with blood or lymph to other parts to invade new tissues (metastasis) and form secondary tumors.
- It is cancerous.

VI. Response of Tumour

Table II: Responses To Detection Of Ovarian Cancer Questions (110 Resposes).

QUESTIONS	YES (%)	NO (%)
Ovarian cancer is detected by smear test	0	110 (100%)
Almost all women diagnosed with early stage disease are reporting symptoms	103(93.6%)	7(6.4%)

Early clinical diagnosis possible	65(59.1%)	45(40.91%)
Women with ovarian cancer are more likely than those with benign conditions to experience very frequent, sudden onset, and persistent symptoms	29(26.4%)	81(73.6%)

VII.   Conclusions

This paper gives the overview of ovarian tumor cause detection techniques. In spite of the above-mentioned shortfalls, the current questionnaire-based survey has given some very important messages with regard to clinician's perception on knowledge and awareness of ovarian cancer symptoms and risk factors.

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