CERVICAL CANCER: A REVIEW

SHABANA SHERIN TT[1], DR NEETHU J*[1,] DR LAL PRASANTH*[2]

1-SEVENTH SEMESTER BPHARM

*1-PROFESSOR, DR MOOPEN'S COLLEGE OF PHARMACY

*2-PRINCIPAL, DR MOOPEN'S COLLEGE OF PHARMACY

ABSTRACT

A major worldwide health concern, persistent infection with high-risk human papillomavirus (HPV) strains is the primary cause of cervical cancer. Cervical intraepithelial neoplasia, the term for this cancer that usually starts in the cervix's epithelial cells, can be used to distinguish between its pre-invasive and invasive stages. Effective management and prevention depend on early detection via screening techniques including Pap smears and HPV tests. Improvements in HPV vaccination have drastically lowered incidence rates, although differences in access to care and screening protocol adherence still exist. The epidemiology, pathophysiology, screening, and preventive measures of cervical cancer are examined in this abstract, which highlights the significance of ongoing public health initiatives to lessen the disease's worldwide burden. Persistent infection with high-risk human papillomavirus (HPV) strains is the main cause of it. Precancerous lesions called cervical intraepithelial neoplasia (CIN) are a common step on the path from HPV infection to cervical cancer. Cervical cancer has become far less common and has a much lower death rate because of standard screening techniques like Pap smears and HPV tests that enable early identification. Vaccination against HPV has additionally aided in the prevention of infections. Inequalities in access to healthcare and variations in local resources persist in impacting results, even in the face of advancements in screening and vaccination.

INTRODUCTION

The cervix, the lowest portion of the uterus that attaches to the vagina, is where cervical cancer starts when cells start to grow out of control. A chronic infection with specific strains of the common sexually transmitted virus known as human papillomavirus (HPV) is the main cause of this uncontrollably growing tumor. The majority of HPV infections go away on their own, but occasionally the virus lingers and can cause cancer. Regular screening is essential since cervical cancer frequently exhibits no signs in its early stages. As the illness worsens, symptoms like these could appear: - Pelvic pain - Unexplained vaginal bleeding (such as bleeding during periods, after sex, or after menopause) - Discomfort during sexual activity Frequent screening exams such as HPV testing and Pap smears, which look for precancerous cells, Early detection of these alterations is possible with routine screening procedures such as HPV testing and Pap smears, which check for precancerous cells. Precancerous diseases can be identified and treated before they become cancer, which increases the likelihood of a favorable outcome and increases survival rates.

Cervical cancer is one of the leading causes of cancer death among females worldwide and its behavior is epidemiologically like a venereal disease of low infectiousness. Early age at first intercourse and multiple sexual partners have been shown to exert strong effects on risk. The introduction of screening also influences the wide differences in the incidence among different countries. Although the general picture remains one of decreasing incidence and mortality, there are signs of an increasing cervical cancer risk probably due to changes in sexual behavior. Smoking and human papillomavirus (HPV) 16/18 are currently important issues in the concept of multifactorial, stepwise carcinogenesis at the cervix uteri. Therefore, society-based preventive and control measures, screening activities, and HPV vaccination are recommended. Cervical cancer screening methods have evolved from cell morphology observation to molecular testing

BIOLOGY OF CERVICAL CANCER

The cervix is surrounded by mucus-secreting columnar epithelium and stratified squamous epithelium, with the squamocolumnar junction being most vulnerable to viral neoplastic transformation. Squamous cell carcinomas are the most common type, while adenocarcinomas are more common in endocervix tumors. HPV infection accounts for most cervical cancer incidences, with 95% of malignant lesions being caused by HPV. Progression from dysplasia to aggressive cancer can take years or decades.

DIAGNOSIS AND PATHOLOGY

Cervical cancer diagnosis usually requires the following steps: The Pap Smear, also known as the Pap Test, is a regular screening procedure in which cervix cells are removed and analyzed under a microscope to look for anomalous alterations that might point to cancer or precancerous conditions. Testing for high-risk strains of the human papillomavirus (HPV) that are known to raise the risk of cervical cancer is known as HPV testing. Biopsy: A little sample of tissue from the cervix may be removed during a colposcopy and examined in this test. Imaging Tests: If cancer is found to be present, imaging tests like a PET, MRI, or CT scan may be performed to assess for metastases and ascertain the cancer's extent, or stage. Regular screening is essential for early detection, which leads to better treatment outcomes. It is crucial to seek individualized guidance and assessment from a healthcare expert if you are experiencing any symptoms or have concerns. Understanding the cellular and tissue features of the illness is essential to understanding the pathogenesis of cervical cancer. The salient points are as follows:

.Histology is based on the tissue of origin, cervical cancer is divided into two types: Approximately 70–90% of cases are of the Squamous Cell Carcinoma type, which develops from the squamous epithelial cells lining the cervix. The transformation zone, where the squamous and columnar cells converge, is frequently where it starts. - Adenocarcinoma: Less common but more difficult to identify with routine Pap smears, this kind comes from the glandular cells of the cervix. 2. Grading: The degree to which cancer cells resemble normal cells determines the following   grades:

 Well-Differentiated (Grade 1): Cancerous cells resemble healthy cells in several ways and often - Cancer cells develop more quickly and have some aberrant characteristics. - Moderately Differentiated (Grade 2): Cancer cells have abnormal features and grow more quickly. Inadequately Differentiated (Grade 3): Cancer cells have a markedly different appearance from healthy cells and a propensity for faster growth and dissemination. 3. Staging: The prognosis and available treatments are determined by classifying the cancer's extent into stages. The FIGO (International Federation of Gynecology and Obstetrics) staging system is widely employed, encompassing stages 0 (carcinoma in situ) through Stage IV (advanced cancer with dissemination to remote organs). 4. Molecular Pathology: Genes like TP53 and PIK3CA can have mutations or modifications, leading to genetic and molecular abnormalities associated with cervical cancer.

PREVENTION AND TREATMENT

Cervical cancer prevention involves several strategies, including HPV vaccination, regular screening with Pap Smears and HPV testing, safe sexual practices, avoiding smoking, maintaining a healthy lifestyle, and following up with healthcare providers. Vaccination is most effective when given before sexual activity, while regular screenings are recommended for women starting at age 21. Safe sexual practices, quitting smoking, maintaining a healthy diet, exercising regularly, and managing stress contribute to overall health and support the immune system's ability to fight infections, including HPV.

Cervical cancer treatment varies based on the stage of the cancer, the patient's health, and personal preferences. Common options include surgery like conization, hysterectomy, or trachelectomy. Radiation therapy, such as external beam radiation or brachytherapy, can target cancer cells in the pelvic region. Chemotherapy, targeted therapy, and immunotherapy are used to kill or slow cancer cell growth. Supportive care includes pain management, nutritional support, and psychological care to improve quality of life. Treatment plans are often multidisciplinary, involving gynecologic oncologists, radiation oncologists, and medical oncologists to ensure comprehensive care.

CURRENT RESEARCH AND FUTURE DIRECTIONS

The outlook for cervical cancer research and technology appears promising, focusing on overcoming current challenges and capitalizing on emerging opportunities. Treatment progress, including targeted and combination treatments, is anticipated to enhance treatment outcomes, particularly in affluent nations with well-established vaccination and screening programs. However, the global health impact of these advances hinges on addressing access disparities to advanced therapies and preventive measures, especially in resource-constrained settings. Future research endeavours will likely explore innovative approaches that utilize emerging technologies to bolster cervical cancer awareness, prevention, and treatment. Digital health interventions, AI, and personalized screening strategies are areas of focus for potential advancements in cervical cancer care. Moreover, there is a pressing need for increased research in developing countries and marginalized communities to ensure equitable access to the benefits of technological progress.

The development and implementation of these advancements pose challenges and opportunities. Although novel technologies hold promises for enhancing the accuracy of cervical cancer prevention, their effective deployment requires substantial time and resources. The shift from conventional screening methods to personalized approaches presents challenges and opportunities for risk assessment and integrating new biomarkers to enhance screening effectiveness. In conclusion, cervical cancer research and technology offer significant potential for progress in treatment, prevention, and screening strategies. Addressing access disparities, embracing emerging technologies, and conducting inclusive research are imperative to maximize the impact of these advancements on a global scale.

CONCLUSION

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