



Advancements in Diagnosis and Treatment of Rhabdomyosarcoma

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DESCRIPTION

Rhabdomyosarcoma is defined as the malignant tumor of striated muscle origin. Rhabdomyosarcoma of the head and neck is primarily a disease of the first decade of life, and it is the most common soft tissue sarcoma in childhood. This is usually diagnosed in individuals younger than 25 years. Out of this, 60-70% is younger than 10 years. The annual incidence of rhabdomyosarcoma in the United States is 4.5 cases per 1 million children younger than 14 years. People of Asian descent have a slightly low prevalence than that of blacks or whites.

These are the primitive mesenchymal tumors that recapitulate the process of myogenesis and comprise the most common pediatric soft tissue sarcoma [1]. It is one of the ten most common childhood malignancies. It is not only limited to skeletal muscle but arise from different anatomical sites. They show diverse clinical presentations relating to mass effect and obstruction. During the past decades, the survival rate of rhabdomyosarcomas has improved gradually. The advanced rhabdomyosarcoma may lead to death in smaller proportions of people. It is most common in arms, legs, head and neck, urinary and reproductive organs. Different types of rhabdomyosarcomas include embryonic rhabdomyosarcoma, botryoid rhabdomyosarcoma, Spindle rhabdomyosarcoma, Alveolar rhabdomyosarcoma and Pleomorphic and undifferentiated rhabdomyosarcoma [2].

Prediction of outcome of rhabdomyosarcoma has been complicated due to plethora of presentations and variable prognosis. The site of origin, the presence of metastasis, the age of the patients, genetic and histological properties of the tumor should be taken into consideration besides adequacy of excision. Rhabdomyosarcomas can be stratified into low, intermediate and high risk groups based on the combination of these features. The cytological states of myogenesis and the interaction of neoplastic rhabdomyoblasts with the connective tissue matrix adjacent to it are featured by a fascinating array of histological aspects of rhabdomyosarcomas.

Diagnosis of rhabdomyosarcoma

Usually the histologic patterns and cytologic features of rhabdomyosarcomas range from undifferentiated small round blue cell neoplasms to lesions with advanced cytohistologic features reminiscent of rhabdomyoma. Identification of embryonic myogenesis is the sine qua non rhabdomyosarcoma diagnosis [3]. This property is usually apparent from standard histological preparations, ultra structural examination, and/or immune histochemical assays of myogenic markers such as desmin, muscle specific actin, myosin, or myoglobin. Nuclear transcription factors that initiate myogenesis, such as MyoD (myf3) or myogenin (myf4), have become popular immune histochemical markers in recent years, as expression of these markers precede later correlates of myogenesis such as cytoplasmic striations, myosin-ribosome complexes, and markers of terminal differentiation such as myoglobin and muscle-specific actin [4]. However, these features do not distinguish rhabdomyosarcoma from other potentially myogenic neoplasms, such as wilms tumor, carcinosarcoma, sertoli-leydig cell tumors, or malignant peripheral nerve sheath tumor.

It can be diagnosed by using biopsy (only way to confirm cancer where small amount of tissue from the tumor is taken for examination), bone marrow biopsy (where small amount of bone, blood and bone marrow) and lumbar puncture (used to take fluid from the spine for testing).

Treatment of rhabdomyosarcoma

The treatment for rhabdomyosarcoma is treated by considering the factors such as the stage, the type of rhabdomyosarcoma, possible side effects and the persons overall health and preferences. There are some treatments that can cure rhabdomyosarcoma which is called remission that means the cancer can no longer be detected. But there are chances of recurrence where the rhabdomyosarcoma can come back. The recurrence can be back in the same place of the body or in

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different places. Rhabdomyosarcomas can be treated by four different methods which include:

Chemotherapy

In case of chemotherapy, the medications are injected into the blood stream where the drugs kill cancer cells or stop them from dividing and spreading. The children mostly will receive the chemotherapy in order to prevent the disease recurrence. New drugs and combinations for the treatment of rhabdomyosarcomas are being carried out [5].

Radiation therapy

There are three types of radiation therapy which include- three dimensional conformal radiation therapy, intensity modulated radiation therapy, brachytherapy which is also referred to as internal radiation therapy. The possible side effects include fatigue, vomiting, nausea, diarrhoea, increased rate of infections. Radiation is usually given 5 days a week for many weeks.

Surgery

It is also called excision where the surgeon will cut out part of tumor and some tissue around it. This happens in almost all cases of rhabdomyosarcoma.

It is also called as supportive care used to treat the symptoms as well as the side effects of the medications. Medications, Relaxation, Nutrition therapy are examples of palliative care.

Forest fire detection

A network of Sensor Nodes can be installed during a forest to detect when a fire has started. The nodes can be equipped with sensors to measure temperature, moisture and gases which are produced by fire in the trees or foliage. The early detection is crucial for a successful action of the firefighters; because of Wireless Sensor Networks, the fire army will be able to know when a fire is started and how it's spreading.

Military Operations

Wireless sensor networks are provided suitable sensors the system can detect identify and classify threats based on the count, number, type weather it's armored vehicles or men in

bottom, type and amount of weapons they carry can be detected before. This system provides reliable real time war picture and better situational awareness. This will further help to enhance the troop readiness and reduce the response time. Using the information collected tactical planning for deploying troops effectively can be done. In case of civil operations economic zones like oil fields, gold mines, can be shielded from intruders and attackers. Industrial complex and production facility can be protected with minimized man power and improved efficiency.

Area monitoring

In area monitoring, the sensor nodes are deployed over a phase in which a few phenomenon is to be monitored. When the sensors detect the event being monitored the event is reported to at least one of the base stations, which then takes appropriate action.

Transportation

Real-time traffic information is being collected by WSNs to later feed transportation models and alert drivers of congestion and traffic problems.

Health applications

Some of the health applications for sensor networks are supporting interfaces for the disabled, integrated patient monitoring, diagnostics, and drug administration in hospitals, tele-monitoring of mortal physiological data, and tracking doctors or patients inside a hospital.

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