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Short Communication

Bone cancer: osteosarcoma

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Abstract

Osteosarcoma is the most common type of cancer that starts in the bones. The cancer cells in these tumors look like early forms of bone cells that normally help make new bone tissue, but the bone tissue in an osteosarcoma is not as strong as that in normal bones. Osteosarcoma tends to occur in teenagers and young adults, but it can also occur in younger children and older adults.

Treatment usually involves chemotherapy, surgery and, sometimes, radiation therapy. Doctors select treatment options based on where the osteosarcoma starts, the size of the cancer, the type and grade of the osteosarcoma, and whether the cancer has spread beyond the bone. Osteosarcoma begins when a healthy bone cell develops changes in its DNA. A cell's DNA contains the instructions that tell a cell what to do. The changes tell the cell to start making new bone when it isn't needed.

INTRODUCTION

The most frequent type of cancer that develops in the bones is osteosarcoma (also known as osteogenic sarcoma). The cancer cells in these tumours resemble early kinds of bone cells that ordinarily aid in the formation of new bone tissue, but the bone tissue in an osteosarcoma is weaker than normal bone tissue.

The majority of tumours form in the bones surrounding the knee, either in the lower half of the thigh bone (distal femur) or the upper section of the shinbone (proximal tibia).

The second most common place is the upper arm bone near the shoulder (proximal humerus).

Osteosarcoma can grow in any bone, including the pelvic (hips), shoulder, and jaw bones. This is especially true with senior citizens.

OS is characterised by a high level of malignancy, invasiveness, rapid disease development, and a high fatality rate; it is regarded as a severe hazard to human health worldwide. OS is frequent in the metaphysis of long tubular bones, but uncommon in the spine, pelvis, and sacrum; also, the majority of OS patients have only one lesion.

Osteosarcoma (OS) is a malignant tumour that arises in the mesenchymal tissue (spindle-shaped stromal cells that can generate bone-like tissues) and accounts for 20% of all primary malignant bone tumours worldwide [1,2]. In fact, among adolescent patients, it is the most common kind of primary malignant bone tumour [3-5].

The metaphysis of long tubular bones (such as the proximal humerus, distal femur, and proximal tibia) is prevalent with OS, although it is uncommon in the spine, pelvis, and sacrum [6]. The vast majority of people with OS have only one lesion [7]. Localized pain and swelling, as well as joint dysfunction, are the most common symptoms during the start of the disease.

SUBTYPES OF OSTEOSARCOMA

Osteosarcomas are classed as high grade, intermediate grade, or low grade based on how the cancer cells appear under a microscope. The tumor's grade indicates how likely it is for the cancer to spread quickly and to other sections of the body.

Osteosarcoma is a bone cancer that starts in the cells that make up the bones. Osteosarcoma most commonly affects the long bones, particularly the legs and arms, but it can affect any bone. It can happen in soft tissue outside of the bone in extremely uncommon cases.

Chemotherapy, surgery, and in rare cases, radiation therapy is used to treat cancer. The location of the osteosarcoma, the size of the cancer, the kind and grade of the osteosarcoma, and whether the disease has progressed outside the bone all influence treatment options.

Over time, advancements in osteosarcoma treatment have considerably improved the prognosis (prognosis) for this malignancy. After completion of treatment, lifelong monitoring is recommended to watch for potential late effects of intense treatments

SYMPTOMS

Signs and symptoms of osteosarcoma may include, among others:

- Swelling near a bone
- Bone or joint pain
- Bone injury or bone break for no clear reason

CAUSES

The cause of osteosarcoma is unknown. Doctors believe that this cancer develops when something goes wrong in one of the cells responsible for the formation of new bone. When the DNA of a healthy bone cell alters, osteosarcoma develops. The DNA of a cell includes the instructions that tell it what to do. When the cell isn't needed, the alterations inform it to start creating new bone.

OSTEOSARCOMA TREATMENT

Treatment is determined by various factors, including the location of the tumour, its rate of growth, and if it has spread, age and overall health will also be taken into consideration. Treatment begins, before the disease has gone beyond the bones to other tissues or organs. Tumors are usually discovered early on because they produce discomfort, swelling, or a limp.

SURGERY

The purpose of surgery is to eliminate all cancer cells. Even a few remaining cells can develop into a new tumour.

In, limb-sparing surgery, doctor removes the tumour and some surrounding tissue from an arm or leg. A medical device, or prosthesis, will fill in the gap left in the bone, either partially or completely. A bone transplant, which uses a piece of bone from another region of your body or from a donor, may also be necessary. Tumor surgery is performed to remove the tumour in its entirety in order to achieve total resection of the disease. In this scenario, there are two options for surgery: limb salvage or amputation [8, 9].

Surgical treatment for OS has progressed from preserving lives to optimising the functioning of the damaged limbs [10]. The surgical method to restore bone and joint function following substantial resection of malignant bone tumours of the limbs is known as limb salvage surgery [11]. The most important aspect of the process is choosing the right boundary [12].

Amputation

If the tumour is huge and has gotten into nerves or blood arteries, then all or part of the limb or arm may have to be amputated or removed. The pateint might want to get fitted for a prosthetic or artificial limb. Amputation is a common therapeutic option for those with early-stage OS. Amputation is considered a necessary and effective treatment option for malignant bone tumours after unsuccessful adjuvant therapy. Amputation is deemed as a necessary and effective treatment alternative for malignant bone tumors that can cause extensive cell destruction [9].

ROTATIONPLASTY

The doctors may be able to restore a portion of lower leg and foot to thigh bone if leg must be removed above the knee. The ankle acts as a new knee joint with the help of a prosthesis.

Surgery to remove osteosarcoma from your pelvis, jawbone, spine, or skull may be more difficult. It's possible that you'll need radiation therapy as well. Your doctor may need to remove tumours in your lungs or other regions of your body if the cancer has spread to those areas.

CHEMOTHERAPY

The importance of neoadjuvant chemotherapy is that it allows for early systemic treatment to eliminate potential micrometastases; it allows for preoperative chemotherapy to be evaluated based on tumour necrosis rate to guide postoperative chemotherapy; it reduces tumour edoema bands; increases limb salvage rates; and lowers recurrence rates [13]. This concept was widely accepted and then widely used in clinical practise, eventually forming a comprehensive limb salvage treatment that complemented neoadjuvant chemotherapy, establishing limb salvage surgery as the standard of care for OS and significantly improving the 5-year survival rate [14]. The concept of neoadjuvant chemotherapy has been a watershed moment in the history of OS treatment, and this concept has become a watershed moment in the history of OS treatment.

RADIOTHERAPY

Local radiation has been reported to have some effect in patients who cannot be surgically resected or in whom tumours remain on the resection margin, as well as in patients with OS whose tumours do not react well to chemotherapy [15, 16]. Early results suggested that combining external irradiation with systemic therapy could be a successful strategy for achieving local control and symptom relief. After using induction chemotherapy effectively for non-metastatic OS of the limbs, Machak et al. [17] believes that radiotherapy is a reliable method to control local diseases and protect limb functions.

IMMUNOTHERAPY

Immunotherapy is used to control a person's immune system in order to kill tumour cells, regulate and balance the immune system, and differentiate and prevent tumour growth, among other things [18]. Because of its unique and beneficial outcomes for cancer patients, this therapy technique has gained popularity in the adjuvant treatment of malignancies. Cytokines regulate the activation, proliferation, and functional activity of immune cells and are the most basic ingredients in immunotherapy [19]. Non-specific immunotherapy, specific immunotherapy, adoptive immunotherapy, and immuno-guided therapy are all options for treating OS [20].

Given that genetic mutation is the most common cause of OS, genetic research is critical in developing prevention and treatment techniques. Gene therapy is a biomedical technique in which normal genes or genes with therapeutic effects are introduced into human target cells via vectors in order to rectify gene abnormalities or exert therapeutic effects sufficient to produce therapeutic outcomes. OS gene therapy is mainly focused on tumor suppressor genes, suicide genes, combined gene therapy, antisense genes, immune genes, and anti-angiogenic genes.

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