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Surgical Treatments for Bone Tumors

Musculoskeletal oncology is a challenging field of medicine in which only a small group of doctors in Singapore are trained. It concerns the management of tumor and tumor-like conditions of the bones, joints and soft-tissues of the extremities and spine. These are broadly classified into the following:

- Benign Tumors- tumors that grow and expand and cause local problems and diagnostic difficulties. These are not usually fatal. Many of these occur in children as "cysts", "fibrous tumors" or "cartilaginous tumors".
- Malignant Tumors- these are the cancers of the bones and soft tissues. Malignant tumors can be primary (ie. originally derived from the bones and soft tissues and also known as sarcomas) or secondary (ie. spread from a distant site). Being malignant, these tumors can be fatal.

Some musculoskeletal oncology conditions may not be life-threatening but, they often hamper daily activities and hence need to be dealt with urgently.

Bone Cancer

The primary cancers of the bone and soft-tissues (cancer that begins in the bone and soft tissues) are rare. Also known as bone sarcomas, osteosarcomas and chondrosarcomas are the two most common variants. These affect individuals of all ages but in particular those in their twenties and sixties. Bone cancers can occur by themselves or be a part of a syndrome where entire families may be at risk. Treatment is generally surgical with chemotherapy for certain types (eg. osteosarcomas and Ewing's sarcoma). These tumors will involve large segments of bones and joints and require creative solutions to solve them (eg. specialised knee replacement prostheses -10 to 20 times the size of normal knee replacements which are known as megaprotheses).

The NUH
Musculoskeletal
Oncology service is
one of the most
comprehensive of its
kind in Singapore and
NUH is the only
government-
restructured hospital
to treat both
paediatric and adult
patients.

Metastatic Cancer To Bone



X-ray showing a bladder cancer patient with artificial replacement for his affected joints.

The commonest involvement of the skeletal system is by the spread of primary cancer from elsewhere in the body. The bones commonly affected are the spine or the pelvis. When cancers in other parts of the body spread to the bone and soft tissues, these structures become compromised. As a result patients develop fractures that do not heal and they become invalid. This in turn reduces their life expectancy.

Our specialists have been trained to reconstruct these afflicted bones and joints so that patients with such conditions are able to lead their remaining lives out with dignity.

Treatments For Bone Cancer

The treatments available for bone cancer would depend on the age of the patient, type of cancer, amount of spread of the cancer and general life expectancy of the cancer.

The challenges in managing these conditions revolve around removal of these tumors in a way that they do not recur, and then reconstructing the structure to replace the missing anatomical structure and restore their functionality. The general approaches to reconstruction can be both biological and prosthetic where the bone removed will be replaced with bone from another part of the body, or with an artificial replacement. The procedures available range from major resection and reconstruction with allograft or implants to minimally invasive procedures of Cryoablative Therapy & Kyphoplasty etc.

At NUH we have a unique blend of both approaches and only the most appropriate is offered to our patients. We also have our own in-house bone bank (the only one of its kind in Singapore) and has been helped set up centres regionally.

Multidisciplinary Management

In certain challenging situations, it becomes necessary to enlist the help of a number of specialists. It is not uncommon for an orthopaedic oncologist to work with a colorectal, plastic and spine surgeon to remove tumors which are particularly aggressive.

Novel Approaches To Bone Cancer Management

Cryoablative Therapy

After a bone tumor is removed, liquid nitrogen is used to freeze the tumor cavity to subzero temperatures, killing tumor cells and decreasing the chance of tumor recurrence. The frozen bone is stabilised by filling the tumor cavity with bone graft, cement, or rods and screws to prevent fracture.



Cryoablative Therapy - pouring liquid Nitrogen into tumor cavities.

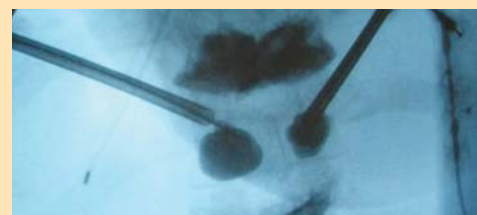
Now with newer devices like the recently procured cryoprobe, it allows the delivery of hypercooled ice balls (-40°C) into tumor cavities in a controlled manner which can be monitored with thermometers. These are more precise than pouring liquid nitrogen into cavities and are able to deliver tumors into deep recesses with minimal incisions. Alternatively, this technique can be combined with CT scan guidance to allow tumors to be frozen deep within a body cavity giving control rates similar to open surgery or curative radiotherapy. It has become an important adjunct to the treatment of bone and soft tissue tumors. NUH is currently the National Center for this novel approach to treating bone and soft tissue cancers under a coveted grant given out by the Ministry of Health.

Kyphoplasty

This method jacks up a vertebra that has been eroded by tumor using minimal incisions. Although primarily developed for treatment of osteoporotic compression fractures, these can be utilised in patients with spinal metastases which often require many levels of treatment. The technique involves the introduction of cement into tiny portals created in the spine. More than 95% of patients who have undergone this procedure have improved as far as pain is concerned. Patients also benefit from a faster recovery and cost-savings since hospitalisation is not required following the surgery as the procedure is done as a day surgery procedure.



Kyphoplasty - jacking up a vertebra that has been eroded by tumor using minimal incisions.



This technique involves the introduction of cement into tiny portals created in the spine.

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The Department of Orthopaedic Surgery provides comprehensive and specialised orthopaedic medical services which includes:

- Adult Reconstruction Surgery
- Paediatric Orthopaedics
- Spinal Surgery
- Sports Medicine
- Orthopaedic Trauma