Cancer Association of South Africa (CANSA)

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Fact Sheet
on
Spinal Cord Cancer

Introduction

The human vertebral column (backbone or spine) consists of 24 articulating vertebrae and 9 fused vertebrae in the sacrum and the coccyx. The vertebrae are separated from each other by intervertebral discs. It houses and protects the spinal cord in its spinal canal.

The human vertebral column is divided into different regions, which correspond to the curves of the spinal column. These regions are called the cervical spine (neck), thoracic spine (chest), lumbar spine (middle back), sacrum and coccyx (lower back). There are seven cervical vertebrae, twelve thoracic vertebrae and five lumbar vertebrae.

[Picture Credit: Picture of Spinal Cancer]

Spinal Cord Cancer

Spinal cord tumours are masses of abnormal cells that grow in the spinal cord, between its protective sheaths, or on the surface of the sheath that covers the spinal cord. Most non-cancerous tumours develop within the spinal cord rather than spreading from other parts of the body. These are called primary tumours, and they usually are non-cancerous (benign).

Primary spinal cord cancers rarely spread to other parts of the body.

Most cancerous spinal cord tumours are secondary, meaning they spread from a cancer at another site of the body.

Spinal cord tumours can affect people of all ages, but are seen most commonly in young and middle-aged adults.

Researched and Authored by Prof Michael C Herbst
[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic counselling; Diagnostic Radiographer; Dip Audiometry and Noise Measurement; Medical Ethicist]
Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

Rauschenback, L. 2020.
"Intramedullary spinal cord tumors (IMSCT) are rare entities for which there currently exist no standardized treatment paradigms. Consequently, patients usually receive treatment modalities that were established for intracerebral tumors; these approaches, however, typically result in functional impairment, recurrent tumor growth, and short overall survival. There is a distinct lack of promising research efforts in this field, which raises questions about whether spinal cord tumor microenvironment (TME) might promote the development, progression, and treatment resistance of IMSCT. In this review, we aim to examine spinal cord biology, compare spinal cord and brain microenvironments, and discuss mutual interactions between IMSCT and TME. Manipulating these pathways may provide new treatment approaches for future patient groups."

Incidence of Spinal Cord Cancer in South Africa
The National Cancer Registry (2017) does not provide any information regarding the incidence of Spinal Cord Cancer.

Monastero, R.N. & Meliker, J.R. 2020.
"Ionizing radiation at diagnostic and therapeutic doses is a known contributor to the development of brain and spinal cord (CNS) cancer. However, little is known about risk from exposure to radon, a natural radiation source which the general population is exposed to residentially and environmentally. This study investigated correlations between mean county radon levels and CNS cancer incidence in five highly populated and radon-enriched US states (Minnesota, mean radon level 4.6 pCi/L; Wisconsin, 5.7 pCi/L; Pennsylvania, 8.6 pCi/L; Iowa, 6.1 pCi/L; and New Jersey, 4.4 pCi/L). Mean radon levels per county were accessed through AirChek, which provides publicly available radon data measured in residences and workplaces. CNS cancer incidence data were accessed through the states' health department websites and span differing amounts of time due to the publicly accessible nature of the data, though all time spans were over 10 years. Negative binomial regressions were run to assess correlations between mean radon and CNS cancer incidence per county. Quantile maps were constructed and Moran's I was calculated to assess spatial autocorrelation in residuals; no spatial autocorrelation was evident. Iowa was the only state with a significant positive association between radon and CNS incidence; no associations were detected in other states, and a negative association was observed in the 5 states combined. This study does not provide evidence that radon is a risk factor for CNS cancer; however, the possibility of an association cannot be ruled out due to limitations of the study, principally its ecologic nature and lack of individual-level exposure data."

Symptoms of Spinal Cord Cancer
The most noticeable sign of spinal cancer is pain. Pain can come from the tumour's presence in the spinal column, pushing on sensitive nerve endings or causing spinal instability. When the spine is not lined up properly, other physically notable symptoms may result (e.g., changes in posture, Kyphosis or hunchback).

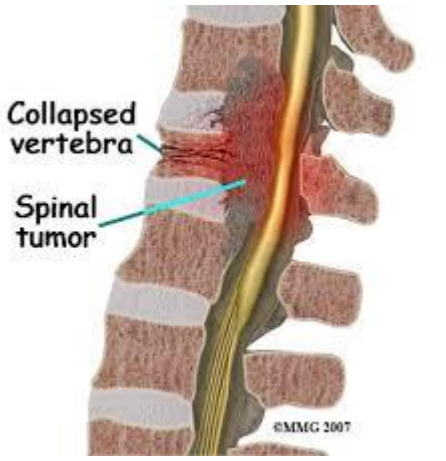
Some common signs of spinal tumours may include the following:

- Pain (back and/or neck pain, arm and/or leg pain)
- Muscle weakness or numbness in the arms or legs
- Difficulty walking

- General loss of sensation
- Difficulty with urination (incontinence)
- Change in bowel habits (retention)
- Paralysis to varying degrees
- Spinal deformities
- Pain or difficulty with standing
- Focal spine pain that is worse in the morning
- Pain that is severe when there is direct manipulation or compression of the affected area of the spine
- Back pain along with constitutional symptoms, such as loss of appetite, unplanned weight loss, nausea, vomiting, or fever, shills or shakes
- Decreased sensitivity to pain, heat and cold

Types of Spinal Cord Tumours

Spinal cord tumours are classified according to their location in the spine.



[Picture Credit: Spinal Cord Tumour]

Spinal cord tumours may be classified as intradural or extradural depending on where they occur relative to the protective membranes of the spinal cord. Intradermal tumours occur within the dura mater.

Spinal Cord Tumours in Children

In children, spinal cord tumours are often gliomas (including spinal ependymoma). It is also possible for children to get spinal cord neuroblastomas or Ewing's sarcomas. All of these are very rare.

Risk Factors for Spinal Cord Cancer

Risk factors for spinal cord cancer may include:

- Prior history of cancer - cancers that may be more likely to spread to the spine include breast, lung, prostate and multiple myeloma.
- Compromised immune system - some people whose immune systems are compromised develop spinal cord lymphomas.
- Hereditary disorders - Von Hippel-Lindau disease and Neurofibromatosis (NF2) are inherited conditions that are sometimes associated with tumours in the spinal cord.
- Exposures - exposure to radiation therapy or industrial chemicals may increase the likelihood of developing spinal cancer.

Diagnosis of Spinal Cord Cancer
Brain and spinal cord tumours are usually found because of signs and symptoms a person is having. If a tumour is suspected, tests will be needed to confirm the diagnosis. These tests may include:

Medical history - if signs or symptoms suggest one might have a brain or spinal cord tumour, the doctor will get a complete medical history, focusing on the symptoms and when they began. The doctor will also do a neurologic exam to check the brain and spinal cord function. It tests reflexes, muscle strength, vision, eye and mouth movement, coordination, balance, alertness, and other functions.

If the results of the examination are abnormal, the doctor may refer the patient to a neurologist (a doctor who specialises in medical treatment of nervous system diseases) or a neurosurgeon (a doctor who specialises in surgical treatment of nervous system diseases), who will do a more detailed neurologic examination or other tests.

Imaging Tests - the doctor may order one or more imaging tests.

Grading of Spinal Cord Cancer
The grade describes the rate at which tumours grow and the likeliness or ability to spread into nearby tissue. Most central nervous system tumours do not spread in the body. However, the medical team may need to do other tests to check if the cancer has spread (e.g. CT or MRI scans, or checking the cerebrospinal fluid).

Spinal Cord Tumour Treatment
Treatment of spinal cord tumours may include:

Surgery - while surgery is increasingly recommended for benign and malignant primary spinal cord tumours, the role of surgery in spinal metastasis, or cancer that has spread to the spine, is controversial.
Radiation Therapy - most patients with primary spinal cord tumours will most probably not require radiation therapy. Radiation, however, may be used to treat spinal cord compression due to metastatic cancer or cancer that has spread from other locations.
Radiosurgery - with an advanced device called the CyberKnife may be an option for some patients. The CyberKnife is a painless, non-invasive treatment that delivers high doses of precisely targeted radiation to destroy tumours or lesions.
Chemotherapy - chemotherapy, similar to that used for brain tumours, may be recommended in adults for spinal gliomas that progress after surgery and radiation.

Aoyama, Y., Kondoh, C., Anno, M., Takahashi, T., Yoshino, K., Kizawa, R., Ozaki, Y., Tanabe, Y., Miura, Y. & Takano, T. 2020.
"Malignant spinal cord compression (MSCC) is defined as a compression of the spinal cord or cauda equina with neuropathy caused by tumor spreading to the vertebral body. The common symptoms of MSCC are back pain, neck pain, muscle weakness, sensory reduction, bladder and rectal disturbance. The risk of MSCC is relatively high in patients with lung cancer, breast cancer, and prostate cancer. MSCC is one of the oncologic emergencies that requires prompt diagnosis and

treatment to preserve and improve neurological function. Evaluation by magnetic resonance imaging (MRI) and computed tomography (CT) are useful for the diagnosis. The prognosis of these patients is often poor at the time of diagnosis of MSCC, thus it is important for deciding the treatment strategy to consider the prognosis and background of the patient in addition to the objective findings including the degree of MSCC and spinal instability. Treatment options consist of medical, surgical, and radiation therapy. We need a multidisciplinary approach because the pathology of MSCC involves multiple departments, such as medical oncology, orthopedics, and radiology. Supportive care including rehabilitation and preventing skeletal related events are also important. The cancer board, in which each physician and multidisciplinary health care professionals regularly have a discussion and review the cases, is required."

Pataraia, A. & Crevenna, R. 2019.
"The incidence of cancer-associated non-traumatic spinal cord dysfunction is rising due to population aging and better cancer treatment. The overall benefit of rehabilitation in specialized facilities for traumatic spinal cord dysfunction has been confirmed many times. Because of their fragility and multiple comorbidities cancer patients still face challenges to complete rehabilitation in the spinal rehabilitation facilities. In this narrative review we describe specific aspects, challenges in rehabilitation and opportunities to improve care. A literature search was performed in the PubMed database from 1 January 1978 to 30 November 2018. The focus was to find publications that discuss challenges and opportunities for rehabilitation of patients with non-traumatic spinal cord dysfunction due to a tumor. Most publications described the benefits of rehabilitation in specialized facilities. There were only few publications about survival and functional outcomes after rehabilitation for this patient population. Overall benefits including fewer complications associated with spinal cord dysfunction, less pain and depression, and better quality of life were shown. Within the past decades increasing number of publications revealed a growing interest for this group of patients. Despite major progress in cancer treatment, patients still have a limited vital prognosis and access to specialized rehabilitation units because of the concerns about the medical complexity. Patients with spinal cord tumors can benefit in areas of functionality, mood, quality of life, and survival from inpatient rehabilitation programs, in spite of the increased medical comorbidities."

Benign or Non-Cancerous Spinal Tumours
Spinal tumours that are usually benign - a benign tumour is not cancerous and will not spread to other parts of the body. Benign spinal tumours include:

- Neurofibromas
- Schwannomas
- Meningiomas
- Ependymomas
- Astrocytomas
- Hemangioblastomas
- Osteosarcomas
- Osteoid osteomas.

About Clinical Trials

Clinical trials are research studies that involve people. They are conducted under controlled conditions. Only about 10% of all drugs started in human clinical trials become an approved drug.

Clinical trials include:

- Trials to test effectiveness of new treatments
- Trials to test new ways of using current treatments
- Tests new interventions that may lower the risk of developing certain types of cancers
- Tests to find new ways of screening for cancer

The **South African National Clinical Trials Register** provides the public with updated information on clinical trials on human participants being conducted in South Africa. The Register provides information on the purpose of the clinical trial; who can participate, where the trial is located, and contact details.

For additional information, please visit: www.sanctr.gov.za/

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