Future Directions in the Treatment of Malignant Spinal Cord Tumours

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The relative rarity of malignant spinal cord tumours has hampered the study of these uncommon nervous system malignancies. Consequently, the exact understanding of the pathology and success of the optimal treatment is limited, and these tumours continue to inflict high morbidity and mortality both in children than in adults. In fact these rare entities reduce the quality and quantity of life and present an enormous pattern of patients. Moreover, due to the low incidence of these tumours, progress in treatment often proceeds slowly [1-5]. For this reasons spinal cord tumours are on the top of the list of rare cancers for which there is an urgent need for better treatment. The future of spinal neurooncology nowadays proceeds primarily on two ways: 1: develop of neuroimaging 2: research on molecular pathology.

Neuroimaging

The introduction of MRI in clinical practice has been one of the most important advances in the care spinal tumours. In fact, with the exception of MRI, most imaging modalities play a limited role in imaging the spinal cord. MRI provides some advantages such multplanar capabilities, superior contrast agent resolution and flexible protocols that play an important role in assess tumour localization, extent and infiltration, in directing biopsy, in planning appropriate therapy, and in evaluating therapeutic results. Recently the 3-Tesla scanner is considered the gold standard imaging modality for spinal cord disease, especially tumours; the major advantage of the 3-T MRI is improved quality of imaging, such as DWI, motor and sensor fiber tracking, SWI, perfusion weighted imaging PWI and MR spectroscopy. An important role is played by the fiber tracking: in fact it provides a detailed study of the sensory and/or motor fibers and their course within the spinal cord, helping the surgeon in choosing the safer surgical way to remove the lesion, preserving, as soon as possible, the course of fibers [5-7]. Actually, neuroimaging is entering an exciting new era in which we can ask and expect to answer important questions concerning spinal cord tumours. The shift to high-end imaging incorporating DWI, DTI, MRS, PWI, PET and intraoperative MRI (nowadays is possible only in a few number of centres), as a part of the mainstream clinical imaging protocol has provided neurologists, neuro- oncologists and neurosurgeons a spectrum of opportunity to assess the biologic behaviour of malignant spine neoplasms. These novel approaches may, in the future, be routinely used preoperatively, intraoperatively and in therapeutic monitoring. In fact the ultimate success of spine surgery will depend on the incorporation of anatomic and functional imaging with High-field MRI to diagnose patients sooner and more accurately, when patients’ symptoms is devious and clinical status is minimally affected.

Molecular Pathology

In my opinion this is the key point of the future therapy of spinal malignancies. A better understanding of the pattern of molecular alterations associated to the develop and progression of spinal cord tumours is basically, because it may assist in supporting a particular histopathological diagnosis when tissue is limited, predict the biological behaviour and evaluate the success of therapy. Another important point is the need to identify the various progenitor cells and the critical signalling pathways that regulate the proliferation and differentiation of these: this is fundamental for the understanding of the spinal cord formation. In my point of view, the opportunity to a multidisciplinary study group of specialists, such as neurobiologists, cancer biologists and stem cells biologists that cooperate in the characterization of normal and malignant stem cells is mandatory to delineate future therapeutic strategies. Moreover, For many years it was assumed that spinal cord regeneration was not possible. Paralysis, often resulting from damaged spinal cord, was likely to be permanent, and many peoples’ lives were forever changed by a spinal cord injury [8-12]. This is still the case today, but what has changed is the degree of optimism many people hold about someday being able to use medical techniques to fix spinal cord injuries and restart the damaged nerves that have lost function. So many studies are focusing on neural cell-based therapies, in the hope that the spinal cord could be used as a scaffold for restoring remyelinated axons. These studies are investigating how to reprogram endogenous adult stem cells, which exist within each person’s body, to become neural cells. Introducing these cells into the spinal cord may be the future direction. In this way in the next years we could treat optimally spinal cord tumours and we could restore the spinal cord function due to regeneration of the damaged axons.

In my opinion, our understanding of the biology and treatment of malignant spinal cord tumours will not be made without a radical change in the way that we study these tumours. The rarity and heterogeneity of these tumours drives that laboratory and clinical investigators must collaborate closely to improve the lives of all patients. Extension of a collaborative network to include neurobiologists, stem cell biologists and cancer biologists, in association with neurosurgeons, neurologists, radiologists and oncologists accelerate the pace of basic science research and the discovery of effective new treatments for malignant spinal cord tumours.

References


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