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Editorial

The management of skull base tumours: A challenge claiming for a multidisciplinary collaboration

The interest in a special issue on the management of skull base tumours resides in the recent developments of surgery and radiation therapy which are the main treatment modalities employed for these lesions. These recent progresses together with an improved knowledge of biology and natural history of skull base tumours have allowed more tailored treatments for patients affected by tumours of this body district.[1,2] As a matter of fact, a large variety of benign and malignant lesions may arise in the base of skull. A peculiar aspect of this anatomic site is the close proximity of the tumours to several structures deputed to highly relevant vital functions that limit the aggressiveness of surgery and radiotherapy that have to take into account the preservation of the patients' quality of life.

In the case of a tumour mass in the base of skull, often detected after the onset of symptoms related to the specifically involved anatomic subsite, the first clinical issue that should be addressed is a pathology diagnosis. The treatment and the prognosis may dramatically change in the case of a benign lesion without compression of critical structures or a malignant tumour invading and infiltrating nervous tissue in the brainstem or in the temporal lobes. A comprehensive review of the main tumour types arising in the skull base is reported by Marszalek et al.[3] who describe the main pathologic features of these tumours. The correct histological diagnosis is the first step for planning the subsequent imaging staging and discuss possible treatment approaches.

A crucial aspect that may determine whether a tumour is resectable or not is the extension and the proximity to the surrounding critical structures. Imaging techniques have improved greatly over time especially in the last decades thanks to the progresses of CT and MRI scans. The article by Thust and Yousry[4] illustrates well how these imaging modalities play a central role in defining the tumour spread for the planning of an optimal treatment approach. The authors underline how important a multidisciplinary team discussion is in improving the outcome of these challenging tumours.

Treatment strategy has changed over time not only based upon evolving knowledge of biology and natural history but also thanks to the progresses of treatment modalities, including surgery, radiotherapy and chemotherapy and other new drugs. The main aspects of these changes are summarized in the article by Mazzoni and Krengli.[5] They describe the evolution of the surgical approaches from traditional transfacial and transcranial ones to the endoscopic techniques, allowing for radical and less invasive surgery. The article also illustrates the progress of radiotherapy from quite simple techniques to recent and very sophisticated ones using not only photons but also charged particles like protons and carbon ions. As a matter of fact, these techniques allow for optimization of dose distribution with dose escalation while sparing surrounding healthy tissues.

The mainstay of the treatment of skull base tumours is still the surgical resection that in many cases does not require adjuvant treatments. The article by Rangel-Castilla et al.[6] describes various surgical approaches, which should be selected based upon the characteristics of the patient and the tumour as well as the experience of the neurosurgeon. The authors clearly demonstrate how modern microsurgical techniques, diagnostic imaging, intraoperative neuronavigation, and endoscopic technology have remarkably changed the concept of skull base surgery and have extended the boundaries of tumour resection with minimal morbidity.

In a number of cases, especially when the lesion is biologically aggressive and/or located in particular anatomic sites, surgery is not able to achieve a radical resection and postoperative radiotherapy has a specific indication in order to guarantee high rates of long-term local control and survival. In other cases, surgery is just unfeasible and radiotherapy can be requested to cure the tumour as a sole treatment modality. As far as technical aspects are concerned, various radiation types can be used nowadays. Conventional and innovative photon and proton techniques are described in the article of Fossati et al.[7] They enter into details of the most effective and innovative radiation modalities including intensity modulated radiotherapy (IMRT), stereotactic radiotherapy, brachytherapy and, in particular, protontherapy reporting available results in terms of local control, survival and side effects. The paper by Mizoe et al.[8] is very informative on the most recent data of carbon ion therapy that is one of the last evolutions of radiation therapy, being able to combine an optimal spatial

dose distribution with a high radiobiological effectiveness. These peculiar characteristics are of great advantage in the treatment of tumours resistant to conventional radiation that typically occur in the skull base. This innovative radiation modality, available only in a few centres worldwide, has been applied with very promising results in several skull base tumours such as adenoid cystic carcinoma, sarcomas and malignant melanoma.

Systemic therapy has a relevant role in the management of selected skull base tumours. The article of Colia et al.[9] highlights the use of chemotherapy and targeted therapy in the treatment of skull base sarcomas including chondrosarcoma, chordoma, giant cell tumour and solitary fibrous tumour/hemangiopericytoma. The rarity of these neoplasms and the need to test innovative approaches claims for new organizational models with reference centres and collaborative networks allowing to conduct clinical trials testing new drugs in large patient series. The "chordoma" model with the foundation of an international collaborative research group, which includes patients as well, is a very interesting experiment.

In the subsequent articles, peculiar aspects of some tumour types with a particular location are described in details in terms of diagnosis and treatment modalities. Results on the pituitary adenomas,[10] cavernous sinus meningioma,[11] temporal bone carcinoma,[12] endolymphatic sac tumour of the temporal bone[13] and acoustic neuroma treated by surgery[14] or radiotherapy[15] are reported by the authors who describe and discuss the literature data on the basis of their personal experience.

The last two articles are devoted to a special tumour type: chordoma. Krengli et al.[16] describe a peculiar aspect of a failure in operated chordoma that is related to tumour cell seeding the surgical pathway. It is an infrequent but not exceptional finding after complex surgical approaches and has peculiar implications for diagnosis and treatment that are extensively discussed based upon literature data.

Habrand et al.[17] describe a rare case of craniocervical junction chordoma presenting at paediatric age and report a comprehensive literature review on diagnosis and treatment of skull base chordoma in children.

This Special Issue shows how skull base tumours represent a real challenge. The heterogeneity of tumour types and their clinical presentations require very specialized professional competences for both diagnosis and treatment. Decision making requires multidisciplinary discussion to find out an optimal treatment combination. Surgery has clearly a major role in most of the tumours; however, radiotherapy can be employed as adjuvant treatment in several cases when resection cannot be radical. In other cases, radiotherapy, often using charged particles, can represent the main treatment modality when the patient is not suitable for surgery or when a better result in terms of function preservation is expected. Systemic therapy has a rising role related to the implementation of new drugs with biological target. All these considerations explain the need for a collaborative approach among various professionals and the need to diffuse the knowledge about these tumour types that should be managed in centres where all the competences are available in order to guarantee the potentially best outcome to the patients.

Conflict of interest

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