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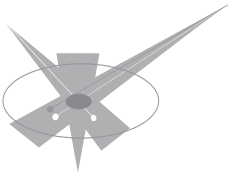

Original Paper

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Combined treatment for tumours of the base of the skull

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Summary

Aim

Tumours situated in the region of the base of the skull are at the limits of possibility for radical resection and in patients with malignant tumours it is necessary to use combined methods of treatment. The purpose of this paper is to evaluate the early results of combined treatment tumours of the base of the skull.

Materials/Methods

Between 1994 and 2004 68 patients with malignant tumours of the base of the skull and 10 with benign tumours were treated by an interdisciplinary group. Treatment included surgery, radiotherapy, and chemotherapy.

Results

After a period of post operative observation (median length 19 months), 32 patients with malignant tumours were without recurrence of disease, 8 lived with the tumour, 21 died as a result of disease progression and 4 died of other causes. Information was unavailable for 3 patients. Among 10 patients with benign tumours, 5 lived without symptoms of disease and 5 with the tumour.

Conclusions

Because of the limited possibilities regarding radical removal of malignant tumours in the region of the base of the skull, combined treatment using radiotherapy, surgery and, in some cases, chemotherapy is standard. Use of aggressive treatments gave local control in about half the patients though further observation is necessary in order to assess later oncological results.

Key words **base of the skull • tumours • surgery • radiotherapy**

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Background

Radical treatment of tumours at the base of the skull is challenging and methods such as surgery and radiotherapy have only recently become possible. [1,2]. Experience of skull base surgery is further limited by short patient observation periods and low numbers of treated patients.

Surgery to the base of the skull is carried out by a team of specialists from various disciplines, enabling the best combinations of techniques and experience to be used to safely complete these complicated and risky operations. In the case of malignant tumours, however, it is rare that surgical resection is the only treatment. This is a result of the complex anatomy of the base of the skull and the fact that many organs and functionally important structures are situated nearby. For this reason, in the majority of patients with malignancies of the base of the skull, a combination of surgery, radiotherapy and chemotherapy is applied in order to obtain the best oncological results.

Aim

The purpose of this paper is to present the early results of our combined treatment for cancers of the base of the skull in a group of patients treated by a multidisciplinary team.

Materials and Methods

Beween 1994 & 2002, 241 patients were operated for tumours of the base of the skull. All patients were operated by a team consisting of neurosurgeons, otolaryngologists, general surgeons and oncological surgeons. The patients were divided into groups. Group A consisted of 96 patients diagnosed with malignant tumours. Of these, 68 patients received combined treatment and underwent 80 surgical procedures for the purposes of removing the tumours. 29 patients received pre-operative radiotherapy (including 8 cases of radio-chemotherapy) and 7 received chemotherapy. Benign tumours were diagnosed in 133 people and of these 10 received combined treatment (group B). This group underwent 19 operations. 2 patients were treated with radiation pre-operatively and 8 post-operatively. Table 1 shows histological diagnoses.

For all patients, treatment was planned by a team consisting of surgeons of various specialities. Additionally, planning for patients with malignant tumours included radiotherapy and chemotherapy specialists. For benign tumours the opinion of oncologists was sought, prior to treatment planning, depending on the clinical situation. 51 operations were of a salvage character after failure of earlier treatment. 28 patients with a malignancy could not be treated using the combined therapy. In 13 cases this was because of the type of tumour, in 6 the general state of the patient was the reason for exclusion and 4 other patients refused further treatment.

Patient data was collected and stored in a database which was used to evaluate the results of treatment.

Results

In group A, radical resection en bloc accounted for 12% of operations, total macroscopic resection of the entire specimen with free resection margins was possible in 72% of cases and in the remainder of operations only partial removal of the tumour was possible. In group B, en bloc resection was not used and total macroscopic resection accounted for 11% of operations.

Table 1. Histological findings.

Diagnosis	Number of patients
Squamous cell carcinoma	24
Basal cell carcinoma	7
Adenocarcinoma	5
Adenoid cystic carcinoma	4
Other carcinoma	14
Sarcoma	14
Juvenile angiofibroma	7
Meningioma	2
Hypophyseal adenoma	1

Table 2. Resections and complications.

	Group A	Group B
Radical resection en bloc	10	0
Total macroscopic resection	58	2
Partial/Subtotal resection	12	17
Total number of operations	80	19
Number of complications	17	4
Deaths in postoperative period	1	0

Table 2 shows the extent of resections and post-operative complications.

The most frequently observed complication concerned problems with wound healing and was seen after 8 operations. During the post-operative period one patient died. After surgery, 30 patients from group A received additional radiation doses of 60 Gy while 6 received chemotherapy. In group B, post-operative radiotherapy was used in 8 patients. Three patients suffered further complications from radiotherapy.

Data concerning oncological and functional status were available for 75 of the 78 patients selected for the study. The median observation time was 19 months. Table 3 shows the results of treatment.

Discussion

Possibilities for the safe and effective treatment of tumours of the base of the skull now exist, thanks to multidisciplinary teams of interested specialist surgeons in this area. The beginning of this type of work was surgery of neuromas of

Table 3. Results of treatment.

	Group A	Group B
Survived – symptom free	32	5
Survived – disease stationary	1	2
Survived – disease progressing	7	3
Died as a result of disease progression	21	0
Died of other causes	4	0
Total number of patients	65	10

the acoustic nerve performed by House and Hitselberger in the 1960s [3]. During the 1970s, teams and centres for surgery of the base of the skull were founded. These centres developed rules for cooperation and techniques for resection and reconstruction. Also in this period, scientific associations were formed, of surgeons, oncologists and other specialists involved in the treatment process, with the purpose of developing treatments for the area of the base of the skull [1]. At the same time, improvements in radiological technique made it possible to deliver radiation within very accurate areas and with very exact dosing with only limited damage to healthy structures. The equipment needed for gamma surgery became more common, and also linear accelerators were introduced, which allowed for stereotactic irradiation [2]. It became possible to deliver radiation very precisely and to irradiate safely tumours in every location.

Despite gigantic progress, treatment of cancers of the base of the skull remains very difficult; the introduction of organizational ideas and the mastering of new techniques requires a great deal of time and effort. For these reasons, the number of interdisciplinary teams with meaningful experience remains limited and the observation periods for treated patients remain relatively short. This has resulted in significantly greater information about the technical aspects of treatment than about late results [4,5].

The possibilities for carrying out radical resections in the region of the base of the skull are limited by the number of important structures found in this area. There are almost no limits to the surgical techniques which may be employed, though the risks may be difficult to accept. Therefore, optimal treatment should combine conservative and surgical methods in order to ensure the best results while limiting the risks. It is possible to live a long time with a slow-growing benign tumour and, in such cases, quality of life comes first. Surgical treatment should not involve the risk of serious reductions to patients' quality of life and treatment combined with radiotherapy can ensure adequate local control of the tumour for many years [6]. In the case of malignant tumours, non-radical surgery gives no greater advantages than conservative treatment. Therefore, possibility of radical resection should be evaluated and the patient should be asked if he accepts the risks. If he does not, use of radiotherapy and chemotherapy will be appropriate.

Radical resection en bloc at the base of the skull is difficult to achieve. The teams that operate only upon patients in whom radical resection is thought to be possible, can achieve it in around 80% of operations [7]. In our group, we advise surgery also when preoperative diagnosis suggests that total macroscopic removal of the tumour with clear resection margins will be possible insteated of radical 'en bloc' resection. With use of such qualifying critera, radical resection en bloc was possible in 12% of operations. However, even after resection en bloc, it is rare to obtain sufficiently wide margins of healthy tissue to avoid the use of complementary treatments. In the material we present, in only 2 patients the initial treatment was surgery and observation was recommended in these cases. Radiosurgical techniques can now be used as initial treatments for patients with malignant tumours of the base of the skull owing to improvements in availability and technological advances. The size of the tumour is a limitation. The post-treatment observation period is relatively short, as with surgical methods, but local control, survival and the number of complications are better than among patients treated surgically [2,8,9]. However, a comparison of these methods is practically impossible due to different qualification criteria. Chemotherapy is used routinely in certain cancers of the base of the skull (nasopharyngeal cancers, esthesioblastoma), but not as the only method and in the majority of patients should be used only within the areas of research protocols [10].

Treatment of malignant tumours of the base of the skull is therefore dependent on combined therapies, among which, surgery is one of the stages. Evaluation of the results of treatment and identification of prognostic factors is very difficult because the clinical material contains a variety of tumours in different locations. Small differences in the tumours localization result in major variations in the difficulty, risks and complications of surgery. Surgical and radiological techniques must, therefore, be individualized. The possibility of attaining 40–60% symptom free 5 year survival is the result of progress in conservative and surgical methods and their skilful application through the experiences of many specializations [1,5,7,11–13].

Conclusions

Treatment of tumours of the base of the skull is challenging for both the head and neck surgeon and radiotherapist. Due to very inconvenient localizations of these tumours combined treatment (surgery + radiotherapy+– chemotherapy) gives the best results.

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