The role of radiotherapy in the treatment of primary tumours of the frontal sinuses

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Primary carcinomas of the frontal sinuses are rare. They may remain undetected for a long time because of their hidden position and the absence of characteristic clinical symptoms and X-ray findings. Diagnosis is mostly confirmed only by histological examination. If the tumour has invaded the ethmoid cells, it may spread to the cerebral cavity through the lamina cribrosa (Smith et al., 1954). In cases in which the orbit and the posterior ethmoid cells are involved, the prognosis is very grave. Metastases of these tumours are rarely found, but if any, these occur in the cervical lymph nodes or the lung (Browson and Ogura, 1971; Rainer and Burne, 1956).

Radical surgical removal of malignant tumours of the paranasal sinuses is not recommended by some authors in view of the frequent complications and poor prognosis (Badib et al., 1969). According to others, however, in the case of frontal sinus tumours the best method is radical resection combined with radiotherapy. If the posterior wall is also involved, the dura, or occasionally the eye, might be sacrificed. If the tumour has spread to the intersinus septum, part of the contralateral sinus is also resected. The ethmoidal labyrinth is invariably removed (Browson and Ogura, 1971).

Radiotherapy of carcinomas of the frontal sinuses may be applied alone or combined with surgery.

If combined with surgery, it may be given pre, post, or intraoperatively.

According to Boone et al. (1968) postoperative irradiation is better tolerated by these patients than preoperative radiotherapy. Sinha and Prasad (1970) reported on the favourable effect of 4000 r postoperative irradiation.

Preoperative irradiation may be more effective because the local oxygenation of the tissues is still intact before surgical intervention, and, consequently, radiosensitivity is higher. In such cases the otolaryngologist who will perform the operation must see the patient before the commencement of irradiation, because the extent of the tumour must be established beforehand.

Radium may be placed intra-operatively into the frontal sinus cavity supplemented with postoperative external X-ray irradiation (Kapur and Fairman, 1958).

As radiation sources orthovoltage X-ray, 60Co gamma radiation, betatron electron therapy or radium tubes or ovoids can be applied.

The method believed to be the most effective is high energy electrons given to an anterior field because this is how the frontal lobes can best be spared. The dose delivered is 5000–6000 rad in 5–6 weeks. If the orbit is also involved, an L-shaped field is applied containing the affected orbit; at the same time, the contralateral orbit is protected.

Badib et al. (1969) recommended the use of an anterior open field and two
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lateral wedge filtered portals for the irradiation of tumours of the frontal sinuses.

In the following, three cases of frontal sinus carcinomas will be described, all males.

Case 1. A 42-year-old male was treated for a swelling at the root of his nose which he had first observed a few months before. Roentgenograms were taken and they showed destruction of the anterior wall of the frontal sinus and of the nasal bones (Fig. 1).

The anterior wall of the frontal sinus is absent and bone destruction is evident in the upper two-thirds of the nasal bone. Note the shadow in the lower two-thirds of the frontal sinus.

The X-ray finding and the soft consistency of the swelling suggested gumma, which was also corroborated by the positive complement reaction. An oto-laryngologist had not seen the patient and no biopsy had been taken. The patient was under dermatological treatment for six months, but failed to show improvement. Biopsy was then performed because tumour tissue was found in the nasal cavity. Histology showed anaplastic carcinoma.

The tumour reacted favourably to X-ray irradiation (4000 r in 25 days) through an anterior portal.

The patient remained free of symptoms for 8 years. Roentgenograms showed the affected bone structures to have been partly restored (Fig. 2).

Case 2. The roentgenogram of this 73-year-old man had shown opacity in the right frontal sinus for years, which failed to respond to conservative therapy.

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On surgical exploration firm foreign tissue with small nodules was found in the frontal sinus close to the infundibulum and on the anterior wall of the right frontal sinus. Histology showed it to be planocellular keratoid carcinoma.

FIG. 2.

Following deep X-ray irradiation, the frontal sinus cavity is pneumatic and the contours of the nasal bone have re-appeared.

The anterior wall of the frontal sinus was already infiltrated. The surgical intervention, therefore, only served for confirmation of the diagnosis. Deep X-ray irradiation failed to arrest tumour growth and the anterior ethmoid cells soon became invaded. Six months after the operation the patient died.

Case 3. A 33-year-old man was admitted for a swelling in the right inner canthus, sanguineous nasal discharge, and severe headache. Roentgenogram showed a shadow in the right frontal sinus but no bone destruction (Fig. 3). At surgery a tumour with a nodular surface was found in the infundibulum. Histological examination showed it to be anaplastic carcinoma. Postoperative radiotherapy with 2000 r X-ray and 1600 rad telecobalt irradiation was applied through an anterior portal.

On follow-up the roentgenogram showed a pneumatic frontal sinus cavity. The patient has been symptom-free for four months. He is currently under observation.

Discussion

As shown by Case 1, radiotherapy may in itself be effective if the tumour is radiosensitive. In contrast to the cases described in the literature, where super-
FIG. 3.

Note the bean-shaped shadow in the frontal sinus slightly to the right of the midline.
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Voltage irradiation was almost exclusively applied, the 8-year survival was in this case attained with orthovoltage radiation.

Nevertheless, the first choice, as generally accepted, is radical surgery. Radiotherapy is mostly combined with surgical treatment applying supervoltage radiation either before or after operation. The palliative use of radiotherapy is illustrated by Case 2, when the tumour was beyond resectability.

The therapy of choice currently advocated is drainage of the frontal sinus followed by appropriate doses of radiotherapy and resection (Browson and Ogura, 1971).

Summary

Three cases of primary frontal sinus carcinoma are described, all three in males. Radiotherapy for these tumours can be applied either combined with surgical treatment pre, or postoperatively using supervoltage radiation, or by itself. If applied alone, it may either be a palliative measure in inoperable cases, or a curative measure in radiosensitive tumours.

REFERENCES


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