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Case report

Osteosarcoma of the Mastoid Process Following Radiation Therapy of Mucoepidermoid Carcinoma of the Parotid Gland – A Case Report

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A B S T R A C T

Radiation therapy is frequently used method in treatment of the head and neck malignancies. Osteosarcoma is a rare complication of radiation therapy and usually occurs after a long latent period. We report the case of 75-year-old female with osteosarcoma of the mastoid process. Twelve years before presentation she received radiation therapy after total parotidectomy and radical neck dissection in treatment of mucoepidermoid carcinoma of the parotid gland. Diagnostic procedures included contrast – enhanced CT and MRI of the head and neck and HRCT of the temporal bone. The final diagnosis of the low grade osteosarcoma was confirmed by biopsy. Diagnostic criteria were fulfilled and the lesion was classified as a radiation induced osteosarcoma[1,2].

***Key words**: osteosarcoma, radiation induced, mastoid process*

Introduction

Radiation therapy is an important modality in treatment of various tumors. Depending on the applied dose, possible alterations of bone tissue within radiation field include disturbances of bone growth, osteonecrosis and radiation induced sarcoma[3].

Sarcomas are attributed to radiation therapy if they fulfill the criteria proposed by Cahan and colleagues in 1948 and modified by Arlen and colleagues in 1971[1,2]. The criteria are (1) a history of previous radiation for a benign process or a malignancy without osteoblastic activity, (2) the presence of osteosarcoma within the field of radiation, (3) a long latency period, and (4) the presence of histologically proven osteosarcoma.

We report the case of radiation induced low grade osteosarcoma of the mastoid process.

Case Report

We present the case of 75-year-old female patient presented with painful retroauricular swelling and right sided facial nerve palsy. During the hospitalization she developed facial nerve paralysis.

Her past medical records showed total right sided parotidectomy and radical neck dissection due to mucoepidermoid carcinoma of the parotid gland with right sided lymph node metastases, performed twelve years ago. Preoperative CT described malignant lesion of the right parotid with enlargement of ipsilateral lymph nodes. The mastoid process area was unremarkable. Postoperatively she underwent radiation therapy using Cobalt-60 with unilateral field on the parotid bed and ipsilateral cervical lymph nodes. The dose was 54 Gy administered in 27 two Gy fractions given during five weeks period.

In the course of her present hospitalization contrast enhanced CT and MRI of head and neck and high resolution CT of the right temporal bone were obtained. Post contrast CT and high resolution CT of the right temporal bone identified osteosclerosis of the mastoid proces and adjacent soft tissue (Figure 1). There was mastoid expansion, cortical violation and periostal reaction of »sun-

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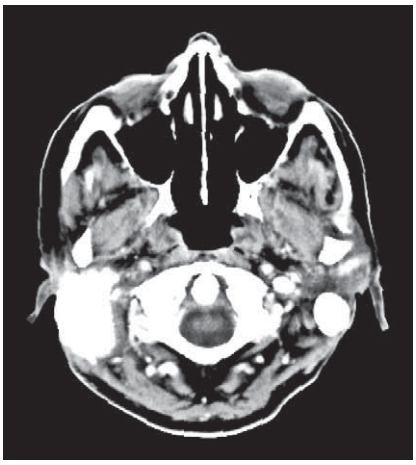

Fig. 1. Postcontrast axial CT scan demonstrates highly enhancing osteosarcoma infiltrating right mastoid process and adjacent soft tissue.

burst« appearance, with the cortical destruction posteriorly. The sclerosing process infiltrated the mastoid cells, with the loss of pneumatisation (Figure 2). There was no visualization of the distal part of the facial canal, suggesting its infiltration.

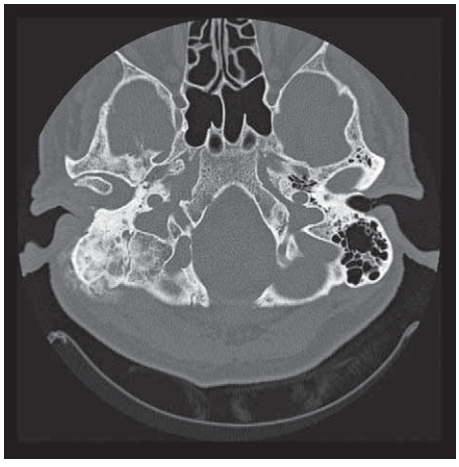

Fig. 2. Axial high resolution CT scan demonstrates expansion of the right mastoid process with cortical violation and periostal reaction.

Soft tissue applied to the mastoid is extensively sclerotic, with strong postcontrast enhancement (Figure 3).

The maximum diameter of the lesion was 4 cm. All these findings implied the diagnosis of osteosarcoma. MR at 0.5 T could not distinguish the nerve coursing the facial canal. Post contrast T1-weighted axial scan described mostly hypointensive lesion, due to sclerosis, and also an isointensive part of the lesion, suggesting the tumor matrix (Figure 4).

Histological examination of the biopsy specimen confirmed the diagnosis of low grade osteosarcoma.

Patient refused further treatment in our hospital.

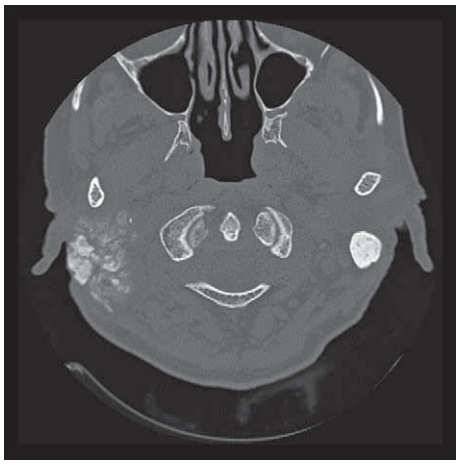

Fig. 3. Axial high resolution CT scan (several scans lower than in Fig. 2.) demonstrates extensively sclerotic soft tissue surrounding the sclerotic right mastoid tip.

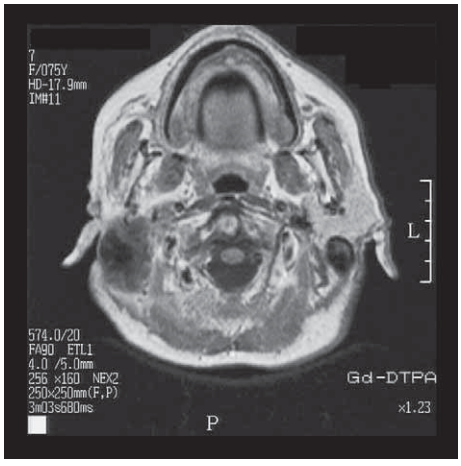

Fig. 4. Axial post-contrast T1-weighted image demonstrates, due to sclerosis, mostly hypointensive lesion of the right mastoid process.

Discussion

Radiation induced sarcomas can arise in either soft tissue or bone. The risk of osteosarcoma occurring after radiation therapy is rated around 0.01–0.03% of all irradiated patients[4]. It is considered that treatment with doses above 30 Gy can induce occurrence of secondary tumors, most frequently osteosarcomas and fibrosarcomas[3]. Bony changes usually precede the development of radiation- induced tumor[2]. These changes usually occur in the areas of intermediate radiation damage that receive radiation sufficient to induce mutation, but not enough to destroy the regenerating capacity of the bone[5].

Most frequent radiation induced osteosarcoma is parosteal osteosarcoma, the uncommon surface tumor of the bone that arises in the periosteum or in the parosteal connective tissue. It is a low grade form of conventional osteosarcoma, comprising less than four percents of all

osteosarcomas[6]. Latency period from radiation to presentation of sarcoma is reported to be between 3.4-55 years (median 13–14 years)[7,8].

In a recent study on radiation induced osteosarcomas of the calvarium and skull base reported median survival time was 29 months, and the 5-year survival rate was 29.6%[9].

Mastoid process is a very rare location of radiation induced osteosarcoma and we were able to find only one article describing such finding[10].

Although the conventional radiography is the first imaging method to indicate bone destruction with periostal reaction and suggest the specific diagnosis of the osteosarcoma, CT and MR are more useful in defining the extent of the neoplasm and its relationship to surrounding neurovascular structures. MR imaging appears to be superior to CT scanning in defining the intraosseous and extraosseous extent of the tumor[11].

Our patient received radiation therapy on account of parotid gland carcinoma and she developed a low grade osteosarcoma, after twelve year latency, within the field of radiation. The diagnosis was confirmed by biopsy thereby fulfilling the required criteria for radiation induced sarcoma.

Conclusion

Radiation induced osteosarcoma is a rare entity which must be taken into differential diagnosis in patients with history of radiation therapy of the affected area. CT and MRI are methods of choice in diagnosis and follow–up.

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OSTEOSARKOM MASTOIDNOG NASTAVKA NAKON TERAPIJE ZRAČENJEM MUKOEPIDERMOIDNOG KARCINOMA PAROTIDNE ŽLIJEZDE – PRIKAZ SLUČAJA

SAŽETAK

Terapija zračenjem često se primjenjuje u liječenju malignih tumora glave i vrata. Rijetka komplikacija je postiradijacijski osteosarkom, a prezentira se nakon dugog perioda latencije. Opisujemo slučaj 75-godišnje pacijentice s osteosarkomom mastoidnog nastavka temporalne kosti, 12 godina nakon terapije zračenjem, po istostranoj totalnoj parotidektomiji i radikalnoj disekciji vrata poradi mukoepidermoidnog karcinoma parotidne žlijezde. Učine se CT i MR glave i vrata, te HRCT temporalne kosti. Patohistološki nalaz intraoperativno uzetog bioptičkog materijala bio je low grade osteosarcoma. Ispunjeni su dijagnostički kriteriji potrebni za dijagnozu postiradijacijskog osteosarkoma[1,2].