Abstract:
Primitive neuroectodermal tumors (PNETs) are a type of small round cell tumors developing from migrating embryonal cells of the neural crest. Peripheral primitive neuroectodermal tumors (pPNETs) are less common with varying incidence of occurrence in head and neck region. Very few reported cases of pPNET of maxilla are available in the English literature. We report a case of 28-year-old male diagnosed as pPNET of maxilla after detailed radiologic, histopathologic, including immuno-histochemical examination and molecular diagnosis using reverse transcription-polymerase chain reaction showing EWS-FLI1 translocation.

Keyword: pPNET, maxilla, head and neck

Introduction:
Primitive neuroectodermal tumor (PNET) comprises of small round cells and develops mainly in the central nervous system (CNS) and soft tissue. These tumors generally manifest in infancy or early childhood (1–3). PNET arising outside the CNS are called peripheral primitive neuroectodermal tumor (pPNET). They develop from migrating embryonal cells of the neural crest (2). Although pPNET is exceedingly rare, its presence in the chest wall, abdomen, extremities, posterior mediastinum, myocardium, kidney, vagina, bladder, parotid, and even in the orbit has been reported (1–4). Very few cases of pPNET of maxilla have been reported till now (2). Diagnosis can be established by immunohistochemistry (IHC) that demonstrates various degrees of neural differentiation (5,6). Molecular techniques using reverse transcription polymerase chain reaction shows EWS-FLI1 translocation. However, treatment of pPNET in adults is not clearly defined in the literature. Surgery
is performed in all cases, either for definitive diagnosis or for therapy (4,6,7). We report a case of pPNET that is unusual because of its location and the patient’s age.

Case report:
A 28-year-old gentleman presented to our institute with a painless, progressively enlarging mass on the left upper alveolus for two months. He had undergone excision biopsy of the lesion elsewhere, which was reported as malignancy. Examination showed a firm non-tender proliferative growth (4.5cm × 4.0cm) on the left hard palate extending into the alveolar process and upper gingivobuccal sulcus (Figure 1a). The neck was clinically uninvolved, and chest and abdominal computed tomography (CT) scans were also normal. CT scan of paranasal sinuses revealed heterogeneous mass in left maxillary sinus with extension to posterior nasal cavity and left infratemporal fossa (Figure 1b and c). Histopathologically the tumour comprised of uniform population of round cells with scant cytoplasm and hyperchromatic nuclei (Figure 1d). The nuclei were round to oval and there were numerous mitotic figures. Immunohistochemically the tumour cells were positive for CD99 (Figure 1e), neuron-specific enolase (NSE), vimentin, and chromogranin (Figure 1f). They did not stain for leukocyte common antigen (LCA), keratin, actin, myogenin, desmin, or synaptophysin. EWS-FLI1 fusion transcript was detected by RT-PCR. Based on these findings, the lesion was diagnosed as pPNET of the maxilla. A bone scintigram showed an increased abnormal activity in the left side of maxilla corresponding to the tumor. Bone marrow aspiration and a bone marrow biopsy were within normal limits. The patient was planned for a multimodality treatment. He initially received four cycles of vincristine, adriamycin, cyclophosphamide alternating with ifosfamide and etoposide (VAC/IE) based chemotherapy. He underwent left subtotal maxillectomy with infratemporal fossa clearance after the fourth cycle of chemotherapy. The postoperative histopathology revealed 2 cm × 2 cm × 1.5 cm viable tumors with 30% tumor necrosis. The margins were free of tumor. He subsequently received 54 Gray (Gy) of radiotherapy and further went on to complete sixteen cycles of VAC/IE chemotherapy. He has completed 6 months of follow up and is in remission.

Discussion:
PNET is predominately neural, nonepithelial neoplasm which is included in the differential diagnosis of small round cell tumors. PNET are classified into two types, based on their location in the body: pPNET and central nervous system PNET (cPNET). PNET, Ewing’s sarcoma, and Askin’s tumour in the thoracopulmonary region are now considered to be part of the PNET-Ewing’s sarcoma family (2), because cytogenetic studies have shown similar abnormalities in Ewing’s sarcoma and PNET cells: mainly the t(11;22),(q24;q12) translocation (5,8). The EWS-FLI1 fusion transcript can be detected in 80–90% of the PNET-Ewing’s sarcoma family by RT-PCR. Peripheral primitive neuroectodermal tumors of the maxilla are extremely rare disease entities (9). In the head and neck region, differential diagnosis of small round cell tumours includes malignant lymphoma, leukaeemia, neuroblastoma, leiomyosarcoma, rhabdomyosarcoma, undifferentiated carcinoma, and pPNET-Ewing’s sarcoma (6,10,11). The diagnosis of pPNET in the present case was based on immunohistochemistry. CD99 was present, neural differentiation was suggested by the presence of NSE, chromogranin, and vimentin, and EWS-FLI1 fusion transcript was detected by
RT-PCR. A multidisciplinary approach is necessary to manage patients affected by PNET. There is however no consensus about the best therapeutic strategy. Because of the rare occurrence of pPNET, optimal therapy is challenging, particularly if they occur in the head and neck. In many studies of such patients, aggressive local treatment in terms of surgery followed by adjuvant radiotherapy to a dose of 45 to 70 Gy and multiagent chemotherapy has been described (1,3,7,9,11,12). Close cooperation between surgeons and their oncologist and radiotherapist colleagues is obligatory when treating pPNET. A close follow-up with regular radiographic examination for at least 5 years is mandatory.

Conclusion:
Maxilla as a site of origin of pPNET is rare. Hence, the differential diagnosis of pPNET is very important. A combination of chemotherapy, organ preserving surgery and adjuvant radiation therapy has been the recommended treatment of choice.

References:


